



The Australian Rangeland Society

RANGE MANAGEMENT NEWSLETTER

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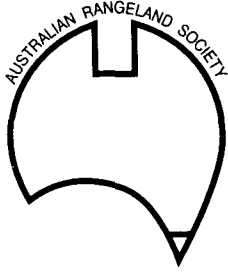
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FROM THE EDITOR

Gary Bastin, CSIRO, PO Box 2111, Alice Springs NT 0871

Welcome to the first newsletter for 1997. Over the summer months, much of inland and northern Australia has had a good soaking as the monsoon has finally penetrated inland. Here in central Australia, there has been good grass growth - the best that I can remember since 1989, and possibly even 1983. Although livestock commodity prices are still depressed, graziers across much of central and northern Australia can at least look forward to reasonable forage supplies for the remainder of the year.

The first article in this newsletter highlights the value of long-term photopoints as a way of better understanding country and how it responds to rainfall and grazing. With obvious enthusiasm, David Freudenberger describes how he was able to trace the history, and pinpoint the approximate dates, of significant vegetation changes at a series of monitoring sites on Gilruth Plains near Cunnamulla in south-west Queensland. David illustrates how the recording of such long-term change can provide important information for land managers. The tangible nature of photos also breathes life into the rather sterile graphs and tables that are used to report information in the scientific literature. David's central theme is that although vegetation changes through time, some country is resilient and may withstand short periods of overgrazing while other landscapes are easily damaged and may never recover. This varying resilience stresses the importance of recognising each area's grazing capability and thereafter managing it accordingly.

Almost all Society members would be aware of the South West (Queensland) Strategy (see *RMN* 95/3 for a full description). Those at the Port Augusta conference last year had the opportunity to view several posters describing various areas of work being conducted within the Strategy. In this newsletter, Peter Johnston describes a further component - that of reassessing lease carrying capacities to better manage the different land systems of the region. The appeal to me of this work is that it is being done by respected members of the grazing community and is backed by the results of scientific research, rather than being something that is decided by government and then imposed on graziers.

In the third major article in this issue, Rosemary Buxton looks at the financial implications of **not** controlling woody weeds when their density is low and control is possible. Although the figures will vary in each situation, I am sure that Rosemary has a message that can be applied to the control of almost all pest plant and animal species; i.e. hit them before they become a problem and take a long-term view to managing the country.

Please take the time to have a good look through this newsletter as there is bound to be at least one or two articles of interest. Feel free to respond with any comments you may have. As I keep reminding you, please keep your contributions coming. My deadline for the next *Range Management Newsletter* is the end of June.

NOTICE OF ANNUAL GENERAL MEETING

Ron Hacker, ARS President, NSW Agriculture, PMB 19, Trangie NSW 2823

The 1997 Annual General Meeting of the Australian Rangeland Society will be held at the Barrier Motel, Marshall St, Cobar at 7.30 PM on **Friday 23 May, 1997**.

The agenda will include:

- minutes of the 1996 AGM;
- reports from Council, Treasurer, Subscription Secretary, and the Publications Committee;
- election of officers and appointment of the Publications Committee;
- motions on notice, and
- general business.

Any financial member wishing to place a motion on notice before the AGM should ensure that the signed motion is lodged with the Hon Secretary, PO Box 1840, Dubbo NSW 2830 by **16 May, 1997**.

CALL FOR COUNCIL NOMINATIONS

Queensland and South Australia

Ron Hacker, President Australian Rangeland Society, PO Box 865, Dubbo NSW 2830

Council moves from New South Wales to Queensland with the AGM to be held on Friday 23 May. The following Council will be based in South Australia. Nominations are required for positions on the Queensland Council.

The positions of:

President
Vice President
Honorary Secretary
Honorary Treasurer and
Subscription Secretary

are to be filled from the Queensland membership. A position of Vice President is to be filled from the South Australian membership. Nominations signed by two financial members of the Society and countersigned by the person nominated must reach the Secretary by 10 April, 1997.

LANDSCAPE RESILIENCE AND RESISTANCE

An Example from South-Western Queensland

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I'm a keen proponent of photo-points because they bring alive the reams of numbers and ideas generated from research and experience. For example, I first learned of the former CSIRO 'Gilruth Plains' research site near Cunnamulla, Qld, through technical papers by Williams and Roe (1975), Orr (1991) and Roe and Allen (1993). These authors provide graphs, tables and statistics regarding the dynamics of the Mitchell grassland at this site. They report large and often rapid changes in grass biomass, composition and recruitment over various periods between 1941 and 1983. These data came 'alive' for me a couple of years ago when 150 large black and white photos found their way to my office, compliments of Dick Roe. In this short article, I've included some examples from one photo-point (no. '03') that illustrate many of the tables in Williams and Roe (1975).

Background

A 12 ha plot ('south oestrus', Fig. 1) was continuously grazed by 16 ewes from 1938 to 1944. This was a stocking rate three times greater than recommended and the resulting overgrazing is evident (photo 1). From 1944 onwards, the plot was destocked and fenced to exclude kangaroos and rabbits. O.B. Williams maintained measurements and photo-points until 1974. Since then, the site has been used in the study by Orr (1991), and mostly kept free of livestock, though kangaroos now have access. Roger Oxley had the foresight to replace the hardwood photo-point posts with steel in 1974. It was a thrill to find them again in 1995. At that time, Robert Palmer and I repainted the posts and attached permanent aluminium identification tags.

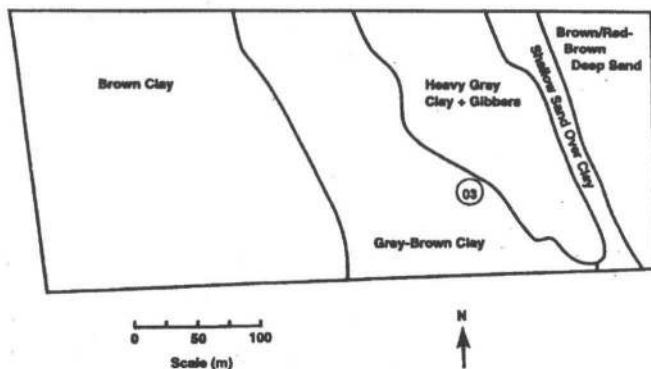


Figure 1. Soil map of 'South Oestrus' paddock at 'Gilruth Plains', a former CSIRO study site east of Cunnamulla, Qld. Location of the photo-point is marked.

Numbers Envisaged

The Gilruth Plains photo-points reveal a fascinating ecological history that tables of numbers can only hint at. The plot was very much a moonscape when the sheep were finally pulled out in 1944 (photo 1). But the residual butts of Mitchell grass (*Astrelba* spp.) were clearly alive and they had rapidly filled out and increased in number by 1948. This growth occurred in response to early summer rains in 1947 and follow-up rains during early 1948 (Fig. 2). The detailed and laborious measurements made by O.B. Williams and Dick Roe showed that many of the Mitchell grass tussocks present in 1944 survived for up to 23 years. This can be seen by comparing the position of grass butts in photo 1 with those in photo 3 - many are clearly the same plants 15 years later. However by 1970 (photo 4), most of the old tussocks seen in 1959 had gone. This is confirmed by Williams and Roe (1975) who reported that none of 70 individuals known in 1944 survived until 1970; the last three died sometime between 1968 and 1970. This slow death was due to old age and was accelerated by dry summers.

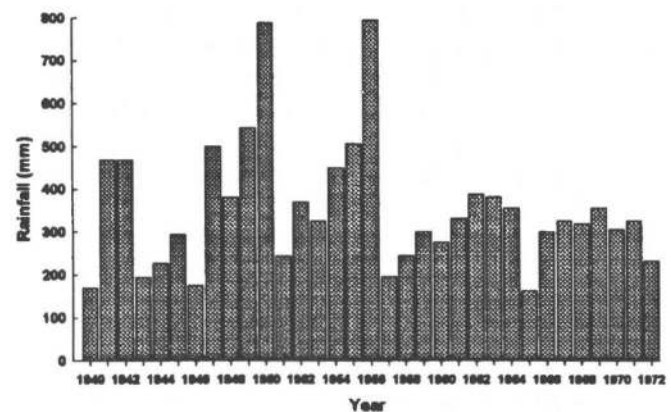


Figure 2. Annual rainfall at the 'Gilruth Plains' site. The long-term mean rainfall from 115 years of records at nearby Cunnamulla is 372 mm.

Williams and Roe (1975) also reported the only large recruitment of neverfail (*Eragrostis setifolia*) in 1947. Neverfail was clearly absent in 1944 (photo 1) but makes an appearance in the right hand lower corner of photo 2. However, this cohort (group) of neverfail plants rapidly died out over the subsequent five years. The data are available in Williams and Roe (1975), but these photos bring them to life.

Resistant to Shrubs

"There is no reason to suppose that the invasion of woody species will not continue given the continued absence of grazing." These are the final notes recorded in 1974 by whomever compiled the photo-points that eventually made their way to my office. This concern was due to the unpalatable shrubs that appeared during the wet mid-1950s. An example of these shrubs can be seen at the base of the dead poplar-box (*Eucalyptus populnea*) in photo 3. These individuals continued to grow through until 1995. However, there has been no significant recruitment of shrubs since the mid 1950s. Shrubs have appeared at a couple of other photo-points, but these sites are confined to the heavy grey soils near the gidgee (*Acacia*

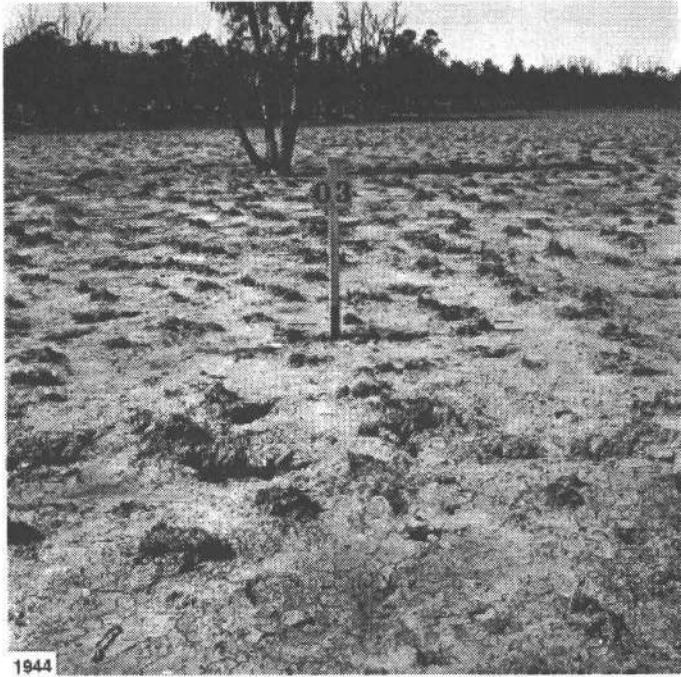


Photo 1. One of ten photo-points at 'Gilruth Plains' in 1944 after six years of severe overgrazing and drought. Grazing had ceased at the time of this photo.



Photo 2. Rapid recovery of Mitchell grasses and neverfail by 1948.



Photo 3. Conditions were dry in 1959, but the old tussocks in the foreground were present in 1944. Note the few shrubs that have established in front of the dead tree.

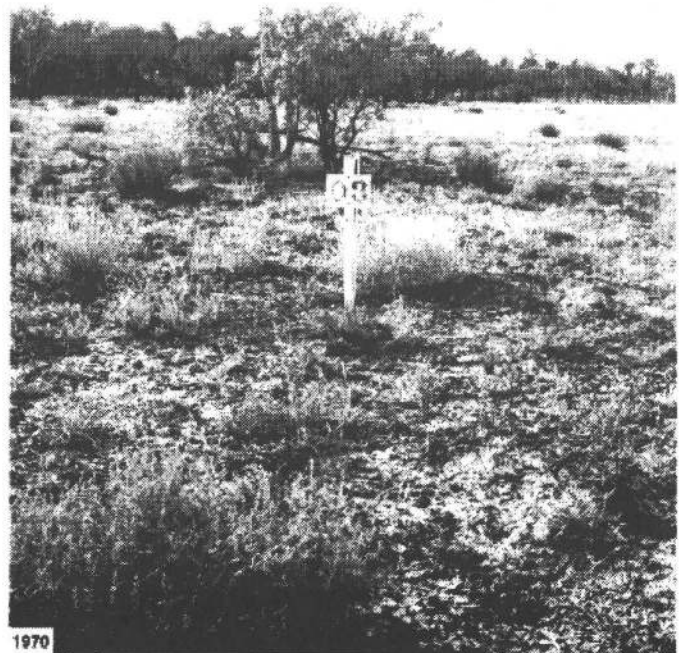


Photo 4. Mitchell grasses had undergone a major decline by 1970, even in the absence of grazing. Prickly roly-poly (*Salsola kali*) established in the gaps.



Photo 6. 50 years on! Kangaroos, and occasionally stock, now graze this plot but the grasses are well established. The shrubs are old and no new ones are in sight. Maybe someone will read this article 50 years hence and take another look.

cambagei) grove seen in the background of photos 1-6. In the brown clay (Fig. 1), shrubs appeared only along a now-defunct bore drain.

These clay soils appear to be resistant to shrub invasion. I predict that many shrubs will die of old age unless another very wet period like the mid 1950s enables successful recruitment of shrub seedlings.

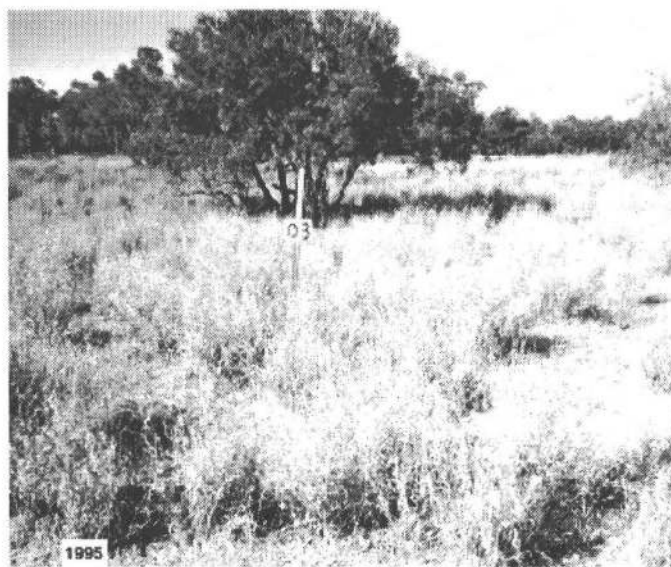
Resilient in Places

The 'Gilruth Plains' studies were initiated as a response to community concerns regarding the massive loss of Mitchell grasses that occurred during the 1930s. However, the cracking clay soils at this site proved to support a remarkably resilient grassland. It rapidly recovered from a rigorous flogging during WWII and also bounced back from various dry summers during the 1960s, '70s and '80s. The spinifex (*Triodia* spp.) also took a beating on the sandhill at the far eastern end of the plot (Fig. 1). It too recovered rapidly and has expanded during the past 50 years. The spinifex has also remained generally free of shrubs and trees (*Callitris* spp.). This cannot be said for the understorey of the gidgee grove which was stripped of its topsoil. Few perennial grasses established in this area, and even fewer survived for more than a couple of years. Some landscapes are resilient, some are not.

To be Continued

The ecological story of the mix of plant communities at Gilruth Plains is far from over. I hope to return to the site at

Photo 5. Suitable summer and autumn rains fell in 1974 to stimulate a major recovery of grasses. This site is now photographed in a slightly different direction - placing the dead tree in the upper left corner.



least every five years to continue photographing the 12 points. The fences are slowly falling apart. No doubt stock will be present at times, but that shouldn't matter. Previous studies have shown that there were no significant differences in plant dynamics inside and outside the enclosure. My own measurements in 1995 also showed very few differences on either side of the fences, i.e. there were no fence-line contrasts.

Maintaining these few photo-points is probably adequate to retain 'Gilruth Plains' as a valuable study site. We have gained a predictive understanding on how this landscape changes based on the detailed studies of Williams, Orr and others. Maintaining photo-points will allow us to detect large changes we don't expect. I look forward to being surprised.

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SOUTH-WEST QUEENSLAND CARRYING CAPACITIES

Preliminary Observations

Peter Johnston, QDPI Animal Research Institute, Locked Mail Bag 4, Moorooka QLD 4105

Introduction

A project examining livestock carrying capacities of individual south-west Queensland properties has been operating since July 1995. It is part of the Natural Resource Management component of the South West Strategy (see RMN 95/3 for a general description of this Strategy). Due to the sensitive nature of carrying capacity issues, participation by graziers in the project is voluntary.

The aim of the work is to objectively assess the long-term livestock carrying capacity of individual properties. Assessments involve the preparation of detailed maps of the paddocks and land systems on a property. After a survey of current land condition, average annual long-term forage production (kg/ha) from the different land systems is estimated. These estimates are the product of an average annual rainfall-use efficiency (kg/ha/mm) for each land system and the average annual rainfall (mm) for the property. The rainfall-use efficiency values were estimated from primary productivity measurements and pasture growth modelling using the GRASP model. The number of livestock that can be run in order to consume a safe portion of this forage is then calculated. Safe utilisation levels were derived from grazing trials in the Charleville area, consensus of local knowledge and grazing practices on 'benchmark' properties (Johnston et al. 1996).

As each property has its own mix of land systems, the assessed livestock carrying capacity is unique to that property. With improved information for individual properties, the application of potentially misleading district average carrying capacities to individual properties can be avoided. An objective assessment of the land systems and long-term carrying capacity of individual properties also forms a sound basis for property management planning.

The Queensland Department of Primary Industries and Department of Natural Resources work closely together on this project. Valuable 'roadtesting' of the methodology on 20 benchmark properties was conducted by two graziers, Robert Crichton and Donald Cooney, under the guidance of Peter Tannock from the Department of Natural Resources.

With close agreement between the calculated carrying capacity and owner estimates of carrying capacity on these 20 properties, a cautious broader application of the model has occurred.

It has been essential to work at the paddock scale. This is the scale most relevant to graziers as it is here that stocking decisions are made and implemented. While working at the paddock scale is more time-consuming than at the whole property scale, it is the level necessary to have an impact on land management decisions.

Properties Assessed

As of December 1996, 85 properties had participated in the program (Fig. 1). This is 17% of the properties in the Bulloo, Murweh, Paroo, Quilpie and Tambo shires and together, they cover 52,827 sq km (24% of the area of the above shires). Participating graziers have found the exercise valuable in enhancing their knowledge of their properties and complementing their stocking decisions. An additional 25 properties are waiting to participate in assessments.

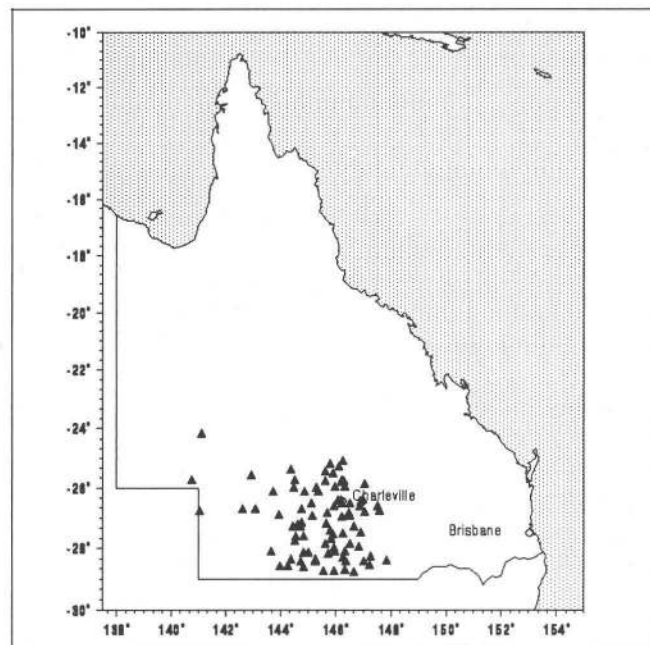


Figure 1. Properties in south-west Queensland whose carrying capacities had been assessed by December 1996.

Future Evaluation

The number of properties participating is only one measure of progress. Whether grazing practices have changed as a result of the project's activities also needs to be assessed. This is to be formally gauged in a project review to be conducted in mid 1997. The review will target four groups across south-west Queensland:

- participating graziers,
- randomly selected non-participating graziers,
- government agencies and financial institutions working in south-west Queensland, and
- formal grazing industry representatives.

Changing Perceptions and Practices

Most of the participating graziers have an in-depth knowledge of the land systems found in the paddocks on their properties. This project has complemented this knowledge by mapping and measuring the areas of land systems at the paddock scale. An improved understanding of the relative proportions of different land systems and the long-term forage production

expected from them has led some graziers to re-evaluate the numbers of livestock run in specific paddocks.

Carrying Capacity Comparisons

On 55 properties to date, the owners have provided their own estimates of long-term carrying capacities, either derived from their records or experience. To compare the calculated and owner-derived carrying capacities, the sample of 55 properties was divided into two groups based on the relative area of open downs country on each property. The first group consisted of 45 properties with less than one-third downs country. The majority of the country on these properties consisted of mulga, frontage, and gidgea land zones. The balance (10 properties) had greater than one-third of their area as downs country.

On 64% of properties with less than one-third downs country the owner-derived carrying capacity was within 10% of the calculated carrying capacity. On 80% of the properties with greater than one-third downs country the owner-derived assessment was within 10% of the calculated value.

The calculated and owner-derived estimates of carrying capacity were compared statistically with a simultaneous F test of unit slope and zero intercept (Dent and Blackie 1979). This showed that the owners' estimates of carrying capacity were significantly higher than the calculated capacities on properties with less than one-third downs country ($F_{2,43} = 26.9, P < 0.01$; see Fig. 2). The owner-derived carrying capacities on properties with more than one-third downs country were not significantly different to the calculated capacities ($F_{2,8} = 0.02, P = 0.98$; Fig. 3).

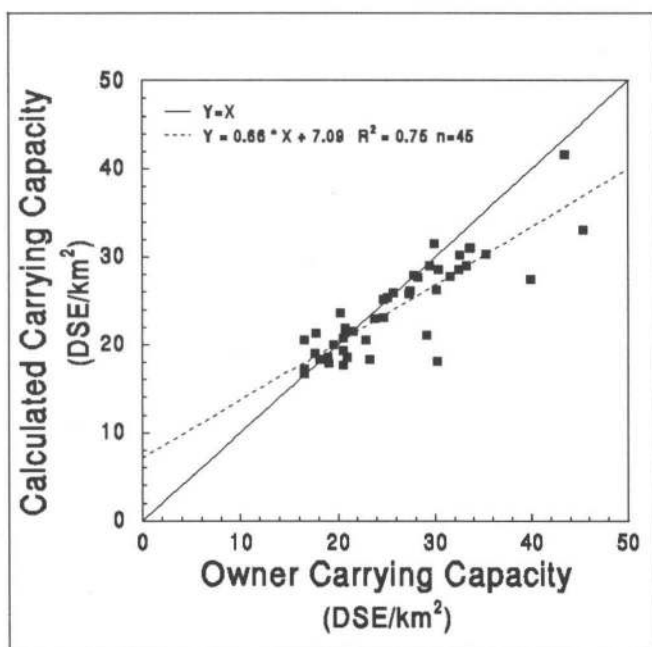


Figure 2. Relationship between the calculated carrying capacity and the owner's estimate of the long-term carrying capacity for properties with less than one-third downs country.

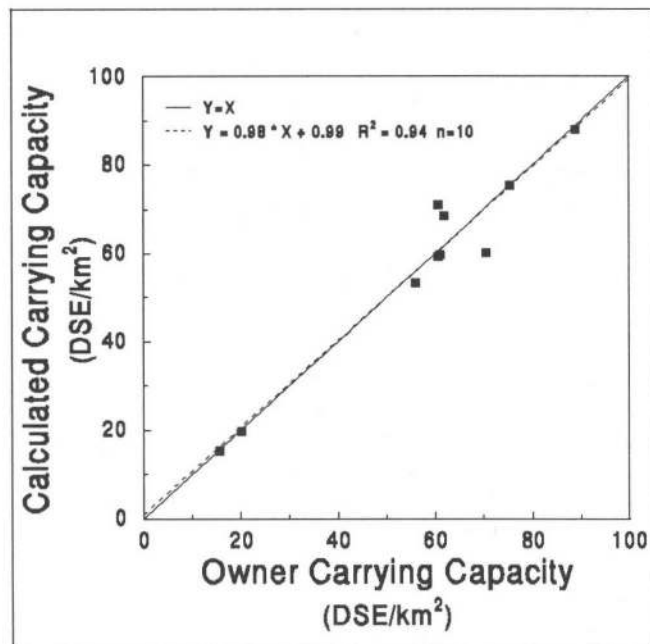


Figure 3. Relationship between the calculated carrying capacity and the owner's estimate of the long-term carrying capacity for properties with greater than one-third downs country.

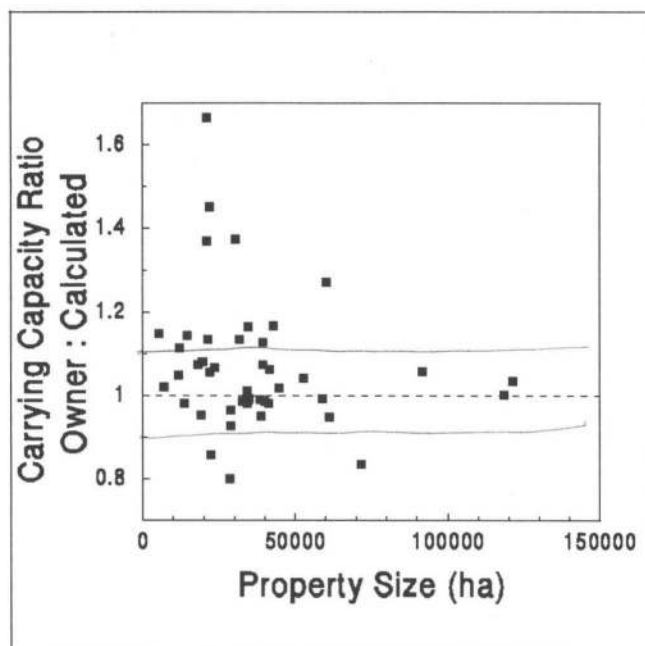


Figure 4. Comparison of the ratio of owner-derived to calculated carrying capacities and property size on the 45 properties with less than one-third downs country.

If the calculated carrying capacity can be considered 'safe' (based on 'safe' levels of utilisation of average forage growth), the ratio of the owner-derived to calculated capacity could be used as an index of grazing pressure. Ratios less than one should indicate conservative grazing and ratios of greater than one, heavier grazing. For the 45 properties with less than one-third downs country, this ratio was not related to property size (Fig. 4) or livestock numbers (Fig. 5). This indicates that livestock grazing pressure may not be related to property size or flock/herd size on these 45 properties.

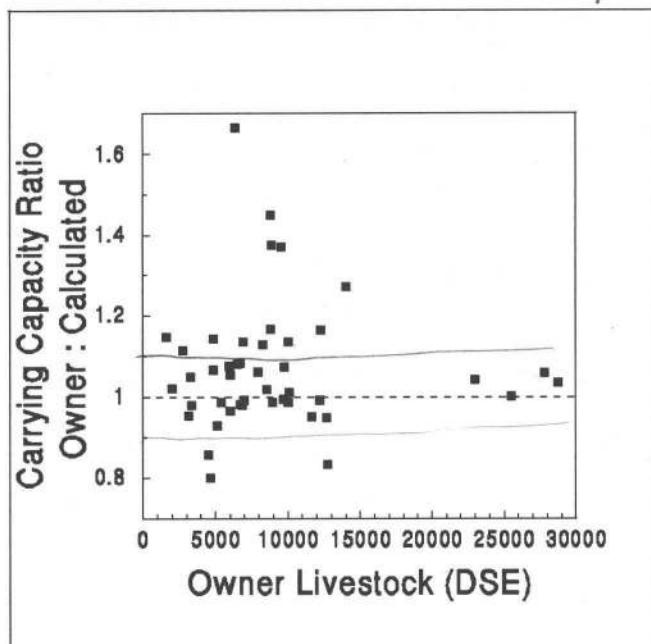


Figure 5. Comparison of the ratio of owner-derived to calculated carrying capacities and flock/herd size on the 45 properties with less than one-third downs country.

Conclusions

Due to the voluntary nature of the project, the 55 properties examined to date do not represent a true random sample of properties from south-west Queensland. However, there does appear to be an over-expectation of the long-term grazing capability of properties with less than one-third downs country. This agrees with anecdotal evidence from both graziers and agency staff within the region.

The deviation from a 'safe' carrying capacity did not appear to be related to the scale of the grazing enterprise (property size or flock/herd size). This disagrees with anecdotal evidence from the region which suggested that smaller properties were placing greater grazing pressure on the land resource.

These preliminary results indicate an objective examination of resource capability may assist in establishing 'safe' livestock carrying capacities for individual properties in south-west Queensland. To be relevant to individuals it must occur at the

paddock level and recognise the unique mix of land systems in each paddock.

Such an examination also needs to include administrators and financiers, and not be restricted to smaller properties.

This work will continue until June 1998, at which time further analyses will be conducted.

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Acknowledgments

It has been a pleasure to work with Steven Garrad, Julie Frousheger and other staff of the Charleville Pastoral Laboratory, staff of the Queensland Department of Natural Resources and the graziers of south-west Queensland on this activity. Funding has been provided by QDPI and the National Landcare Program.

THE NEW CHARLEVILLE PASTORAL LABORATORY

OIC, Charleville Pastoral Laboratory, PO Box 282, Charleville QLD 4470

February 17, 1997 saw the demolition of the Charleville Pastoral Laboratory buildings. A new complex is being built on the site and should be completed by October 1997. When completed, it will house staff from both the Queensland Department of Primary Industries and the Department of Natural Resources.

Over the last 30-odd years many Australian and international rangeland researchers, practitioners and administrators have visited the Charleville Pastoral Laboratory. They have seen and discussed the latest in rangeland research, development and extension, and have enjoyed the hospitality of staff and many local people in the Charleville district. Some have even been awarded Diplomas or Degrees in Arid Zone Recreational Studies from the Mulga Institute of Technology (a child of the Charleville Pastoral Laboratory). The motto of the Institute has been 'Good Ol Mulga Always Saves Ya'.

The Charleville Pastoral Laboratory continues to function with staff working from temporary accommodation while the new building is under construction. When the new laboratory is opened, the two Departments will be capable of providing improved and better coordinated services to the grazing industries of western Queensland.

WOODY WEED CONTROL

Can You Afford Not To?

Rosemary Buxton, CSIRO National Rangelands Program,
PO Box 2111, Alice Springs NT 0871

Economic analyses of woody weed control often focus on the cost of various control measures (e.g. chemical, burning, blade ploughing etc) without giving as much attention to the financial benefits which accrue from the reduction or elimination of woody weeds. This article looks at the question "What are the financial benefits of woody weed control and thus how much can I afford to spend on woody weed control?"

A station owner in western NSW wanted to determine the financial benefits of woody weed control. The current woody weed cover on the station is 0.11% (i.e. 0.11% canopy cover or 1.6 weeds per ha). This was calculated by:

- Estimating the average canopy cover of shrubs - at 7.07 sq m per shrub.
- Using one paddock, as representative of the whole station, to estimate the total number of shrubs on the station. The total number of shrubs was calculated to be 25,900.
- Multiplying the number of shrubs by their canopy area. This gave a total area of 18.3 ha - which is 0.11% of the station area (i.e. 16,188 ha).

This woody weed cover is not having a noticeably detrimental effect on production today but, over time and given favourable seasons, cover could increase to the extent where it does affect production. The pastoralist has two options:

- Control the current population of woody weeds, i.e. "do something"; or,
- Ignore the weeds and hope they don't increase, i.e. "do nothing".

These two options, and their implications, are illustrated in Figure 1. As highlighted in the diagram, it is important to

consider the financial benefits of getting rid of the weeds **AND** the losses you may suffer if woody weeds are allowed to increase. If the "do something" approach is taken, gains can be made in productivity and potential losses from woody weed encroachment prevented. If the "do nothing" approach is taken, any potential gains in productivity from the control of weeds are foregone and losses caused by weed encroachment will be suffered. **Therefore the two approaches cannot be considered in isolation.**

In doing this study, numerous assumptions had to be made; some key ones are:

- an extra 620 grams of grass (on average) grows in the area where each woody weed is removed,
- there is one growing season per year to produce this 620 grams, and
- a sheep eats and tramples a total of 1.1 kg pasture per day or 400 kg per year.

From this we calculated that, if the current population of woody weeds was eliminated, there would be sufficient pasture to run an additional 35 ewes and followers each year. Considering the current low woody weed cover, we assumed that costs (e.g. mustering) would not change.

For the "do nothing" approach we considered two scenarios of woody weed increases over a 20 year period - an increase to 2% cover or to 5% cover. For both levels of woody weed cover we reduced the average number of sheep run according to the calculations above in order to maintain productivity (i.e. wool cuts, lambing percentages and mortality rates). We also looked at the financial consequences of maintaining sheep numbers despite the gradual increase in woody weed cover: this would reduce productivity, to a greater extent with a 5% woody weed cover than the 2% cover. In all cases, costs were increased to take account of the more difficult mustering conditions. It is interesting to note that, where we reduced productivity, it was impossible to maintain sheep numbers without altering management; the culling rate of ewe hoggets

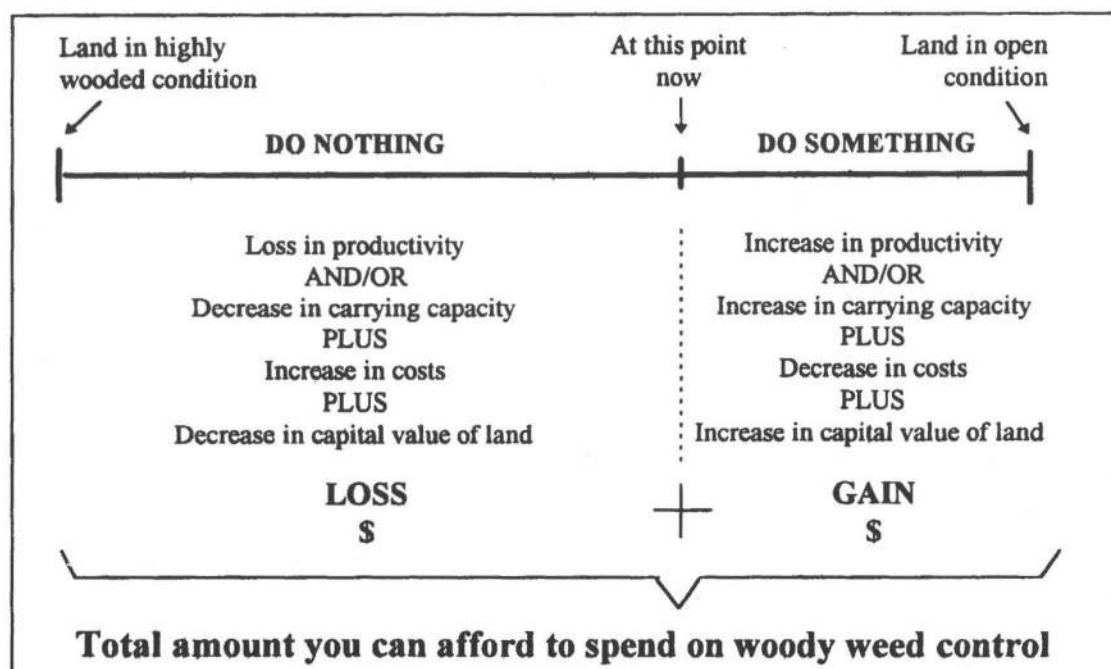


Figure 1. Options for woody weed control on a pastoral property, and implications of either controlling or not controlling woody weeds.

was reduced, and ewes had to be retained in the flock for an additional year.

These options of “do something” and “do nothing” were then modelled over a 20 year period of realistic seasonal variability and the cash flows compared (Table 1). The amount that you can afford to spend on woody weed control (the last row in Table 1) is the difference in the cash flow between each scenario in the “do nothing” approach, and the “do something” approach. The figures are quite astounding: **“Can you afford not to control woody weeds?”**

As we are only considering cash flow, potential changes in land values have not been included. Also not included are taxation and discounting of the future cash flow to present day values: these are likely to reduce the overall financial benefit shown above.

To put these figures in perspective, if cover was to increase to 2% in 20 years and you reduced sheep numbers as a result, the improvement in cash flow of an average of \$7,020 per year would justify the use of a suitable chemical (e.g. Velpar®) on

approximately 20,600 shrubs per year. This assumes a chemical cost of \$0.24/shrub and a labour cost of \$100/1000 shrubs treated (other costs may also need to be considered). That would account for 80% of the woody weed population currently on the station.

Whether the assumptions made here are right or wrong, this study highlights how important it is to consider both sides of the equation. If we only consider the “do something” approach we would conclude that the benefit in controlling woody weeds is minimal (cash flow increases by an average of \$829 per year), when the real ‘downside risk’ lies in the result of doing nothing. **If nothing is done about controlling the current woody weed population, given any of the scenarios used here, cash flow could decrease by between \$6,192 and \$16,044 per year.**

Details of assumptions and calculations are available from the author: PO Box 2111, Alice Springs NT 0871. Phone (08) 89 500160 or fax (08) 89 529587.

Table 1. Cash flows resulting from, and annual amounts that could be spent on, various woody weed control scenarios.

	Current state	Woody weeds controlled	Woody weeds increase to 2% cover		Woody weeds increase to 5% cover	
			Reduce sheep numbers	Maintain sheep numbers	Reduce sheep numbers	Maintain sheep numbers
Average annual cash surplus	\$33,328	\$34,157	\$27,136	\$24,414	\$19,139	\$17,284
Annual amount to spend on woody weed control over 20 years			\$7,020	\$9,743	\$15,018	\$16,873



Australian Rangeland Society RESPONSE TO THE DRAFT NATIONAL STRATEGY FOR RANGELAND MANAGEMENT

December 1996

Introduction

The Australian Rangeland Society (the Society) has developed this response from a number of sources. These include the results of a foresighting exercise dealing with rangeland futures undertaken by over 300 delegates to the Society's 9th Biennial Conference in September 1996, the discussion of outcomes from that conference presented to the Fenner Conference on Sustainable Habitation in the Rangelands in October 1996, the formal deliberations of the Society's Council and Policy Working Group, and informal discussions with members of the Society and a variety of other rangeland stakeholders.

The response is presented in three parts. The first deals with the major issues which the Society wishes to raise with the Working Group including an overview of the Draft, matters relating to priorities and responsibilities for implementation, and the content of the Action Plan. The second deals with the extent to which the Society's response to the Rangeland Issues Paper has been satisfied by the Draft Strategy, and the third contains detailed and specific comment on individual sections of the Draft.

The Society recognises the extensive consultation which has preceded the development of this draft Strategy and the inherently difficult nature of the Working Group's task in view of the many and sometimes conflicting interests in rangeland use and management. We wish to compliment the Working Group on the extent to which it has produced a comprehensive set of strategies and objectives which seek to accommodate these diverse interests, and provide a constructive framework for the future management of Australia's rangelands. Our comments below should be seen against this generally favourable reaction.

PART 1.

General comments on the draft

Overview

- The Strategy should clearly recognise the goal of ecologically sustainable development (or management) of rangelands at the outset, in the Forward or the Introduction. This will entail a commitment to the maintenance of biodiversity, ecological integrity and natural capital. It is essential that this strategy result in progress towards improved standards of management across all classes of land tenure and land uses and that, as a minimum, further degradation of resources be halted.

- A more appropriate title may be "National Strategy for Rangeland Development". This would be consistent with current usage in relation to economic reconstruction of rangeland industries and conveys a more comprehensive and proactive approach. The Society commends this suggestion to the Working Group for consideration.
- The central plank of the Strategy is the 25 year vision. While a long term vision is appropriate the current statement is somewhat limited as a succinct and motivating expression of the preferred future for the rangelands. We suggest, as an alternative,

"Rangelands which are valued by the Australian community and maintain a unique diversity of ecological processes, habitats, cultures and social and economic activity"

The Society strongly endorses many aspects of the draft Strategy. These include:

- The emphasis on partnerships and strengthening of linkages between stakeholders so that issues may be dealt with at regional or local levels, while recognising the responsibility of governments to deal with matters which cannot be handled at this level (page 5). The importance of people and their values in resolving the issues of the rangelands has been strongly reflected in discussions at the conferences referred to above.
- The emphasis on coordinated planning within regions which are defined by both socio-economic and biogeographic criteria. Recent conference discussions have highlighted the importance of regional diversity and the need to ensure that implementation of this strategy has a strong regional focus.
- The need to accommodate national and international strategy obligations (Objective 8.2) in this planning while recognising the primary responsibility of States and Territories for land management (Action 8.3.2), and the role of individual land managers.
- The emphasis on an improved legislative, administrative and financial framework for the operation of rangeland industries, particularly the pastoral industry, and the need for sensitive rural development based on restructuring and diversification of these industries where necessary.
- The recognition of the rights, knowledge and interests of indigenous people, and the commitment to conservation of social and cultural heritage (to the extent that these issues are dealt with in the draft).
- The establishment of effective national monitoring programs.
- The participative, adaptive management approach to rangelands R&D involving rangeland managers (both European and Aboriginal) in the planning of research programs and ongoing interpretation of the results.

However, there are also many areas in which the Society believes the Draft requires revision or strengthening:

(a) The Society urges that the Strategy give explicit recognition to the imperatives derived from the foresighting exercise undertaken as part of the Australian Rangeland Society's 9th Biennial Conference. In this exercise conference participants, working in small groups, considered four alternative scenarios for the rangelands in 2010, analysed the threats and opportunities posed by each and identified the actions necessitated by these analyses. The probability of each scenario was also assessed both nationally and regionally. The scenarios envisaged futures in which rangeland use and management were alternatively (i) 'market focussed' or driven by economic rationalism (ii) aligned to principles of 'best practice' (iii) determined by a conservation or 'extra green' ethic or (iv) associated with a 'partial retreat' from those areas no longer able to support viable enterprises or communities. A complete description of the scenarios is provided in Appendix 1.

An overview of the analyses (Blesing *et al.* 1996; D Blesing pers. comm.) revealed a number of strategies which were common to all scenarios. These strategies in combination should therefore allow rangeland communities and rangeland-based industries to maintain the flexibility to pursue economically and ecologically sustainable land use in the face of an uncertain future.

In broad terms these strategies include:

- Continued use of cutting edge technology in the mining industry
- Adoption of new technology to ensure the ecological sustainability of tourism, reduce energy use, improve remote area living conditions, and minimise the impact of rangeland development and habitation.
- Development of innovative mechanisms to achieve sustainable, multipurpose landuse (*)
- Regional retention of the economic benefits of rangeland use to further ecological, economic and social goals.
- Targeted use of information technologies to overcome distance barriers and provide rangeland managers with improved information for decision making.
- Development of alternative products which are unique to the Australian rangelands (*)

Although some of these strategies (marked *) are reflected in the current Draft most are not. All can, and should, be incorporated within the nine goals areas currently identified.

(b) More generally we consider that the draft is deficient in the following areas:

- Security of tenure, in particular the question of native title in relation to pastoral leases, is a major issue for rangeland pastoralists. It was identified as the third most important issue by the regional workshops (Appendix 5 of the Draft) yet does not appear explicitly in the issues listed on p 23. It is clear that the question of whether native title is extinguished by pastoral leases needs to be resolved expeditiously since security of tenure is fundamental to the

development of viable industries and communities in the rangelands. Some sections of the pastoral industry appear to be frustrated by the lack of a decision on this issue and this frustration could threaten the conciliation process. Indeed, the Native Title question could threaten the partnership principle which underlies the entire strategy and in consequence it deserves considerably more attention than is provided by the current Draft.

- In view of the importance of the tenure issue generally for landholders terms such as "flexible tenure arrangements" (action 3.1.1) need to be clearly defined.
- There is insufficient recognition of the interaction between drought and total grazing pressure as a critical factor influencing ecological change over the pastoral lands. Consequently insufficient attention is given to management of the components of total grazing pressure and to management of climate variability. Actions 2.2.1 and 3.4.2 (relating to commercial exploitation of exotic plants and feral animals) should be reworded to ensure that any commercial exploitation does not prevent the effective control of feral or pest species as components of total grazing pressure. (Note that pest management was rated as the number one issue by workshop participants - Appendix 5 of the Draft - yet is not explicitly mentioned in the listing of issues raised by these workshops on p 23. In contrast, the provision of better information for rangeland management and monitoring is specifically listed but was rated only equal ninth by workshop participants).
- The strategy should deal explicitly with the development of a financial environment which encourages self reliance and promotes the capacity of rangeland businesses to cope with climate variability.
- Inland rivers in eastern Australia in particular have been severely damaged by European carp. Objective 3.7 (sustainable use of rangeland water resources) should contain specific actions aimed at eliminating this species to allow recovery of native fish species and regeneration of riverine vegetation. These actions should preclude the development of commercial activities as a control measure.
- The claims made for biodiversity conservation under Goal 4 (Conservation of the Natural Environment) may be unachievable due to limited resources or technology (eg Action 4.4.1 - Establish or enhance programs for the rehabilitation of threatened species and ecosystems). This section should recognise the imperative to preserve current levels of biodiversity, and prevent any further degradation, as a prerequisite for future rehabilitation. This section should also include, as a broad strategy, the development of clearly understood and widely accepted objectives for biodiversity conservation. Unless such objectives are recognised by all parties there can be no effective regional planning process to achieve them.
- Objective 4.2 should provide for a "comprehensive, adequate and representative conservation" reserve system rather than the alternative "representative nature" reserve system. The former is preferable as a statement of principle

and in practice will not necessarily be more difficult to define than the simpler formulation.

- Goal 5 (Recognition of the knowledge, rights and interests of indigenous people) is a disappointing part of the draft Strategy. Aboriginal people have a strong cultural association with rangelands and the Strategy must give high priority to establishing policies for their sustainable habitation of these lands. This concept should be reflected in the goal - mere recognition of the knowledge, rights and interests of indigenous people is inadequate. As a result, the draft focuses too narrowly on land management issues with insufficient recognition of the need for policies which will achieve the broader objective of sustainable habitation. There is no assessment of the success of current pastoral land acquisition and Aboriginal settlement programs in achieving sustainable habitation. Nor is there any attempt to address the opportunities for Aboriginals to further develop their cultural ties with rangelands, for example through art, song and dance. Given the potential for substantially increased Aboriginal ownership or control of rangelands over the 25 year planning horizon of this strategy (eg through further purchases of pastoral leases, land claims over vacant crown land and joint management arrangements for parks and reserves) the final document should include an analysis of recent and likely future trends in land use and tenure and consider in more detail the implications of this changing pattern for sustainable habitation and utilisation of the rangelands.
- The objectives and actions listed under Goal 6 (Conservation of the Cultural and Social Heritage) propose little in the way of definitive initiatives which will achieve the long term goal. In particular this section fails to recognise the increasing value which the vast and relatively unspoiled spaces of the Australian rangelands will acquire in an increasingly crowded and polluted world. The Strategy must recognise this potential and incorporate actions to promote and capture the economic benefits of this vast wilderness.
- Goal 7 (Research and Monitoring) does not deal adequately with the issue of research information transfer (Objective 7.2) The current wording reflects a very restrictive and traditional approach. Interactive communication, best practice discussion groups, adult learning approaches etc all provide more effective learning opportunities than the mere availability of reports and this alternative needs to be strongly emphasised. The need to provide such learning opportunities for all relevant stakeholder groups should also be recognised. For pastoralists, in particular, there is a need to combine scientific knowledge and local experience in a form which assists practical decision making on individual properties, involving trade-offs between economic requirements, ecological requirements and seasonal risk.
- The economic value of rangeland pastoralism (\$1 billion) is presented in the context of GDP (p.10, par 1) or total agricultural production (p 12, par 5) and is depicted as small. On the other hand the contribution of alternative

industries (about \$200 million pa) is described as "substantial" (p 10, par 1; p 15, par 4). The contribution of the pastoral industry to economic activity and employment should be fairly acknowledged. It could also be noted that alternative industries may be subject to significant sustainability questions if their economic value were to expand to five times its present value.

- Significant areas of rangeland are excluded by the ABARE definition, particularly parts of the tropical, sub-tropical and semi-arid woodlands of eastern Australia and the Riverine Plain. The Society recognises the difficulty of establishing an unambiguous boundary for the rangelands, and the advantages of using boundaries based on statistical divisions. However, some recognition of the resulting anomalies and of the wider application of the Strategy should be made.

Priorities for Action

It is essential that the National Strategy for Rangeland Management result in positive and immediate action for the benefit of rangelands and rangeland communities. We have no doubt that stakeholders will soon become disillusioned if implementation of identified priority actions is not progressed with a sense of urgency at all levels of community and government.

A risk is that the implementation phase may devalue to the level of a lowest common denominator because the key players (i.e. pastoral, conservation and Aboriginal interests) are often in adversarial roles. If this is not to happen it will be essential that the regional planning processes involve the early negotiation of agreed objectives by all parties, together with a commitment by government and agencies to implement agreements negotiated between the stakeholders. All parties must be able to participate in regional planning arrangements confident that the process will at least be able to satisfy their needs (if not all of their wants) better than any alternative course of action. It is also essential that the issue of Native Title in relation to pastoral leases be resolved as rapidly as possible.

An immediate priority will be the identification (not necessarily the delineation) of regions which can act as foci for implementation. In some instances this may be a difficult process requiring consideration of ecological, socio-economic, and administrative factors. Socio-economic factors will include boundaries determined by Aboriginal cultural associations and administrative factors will need to consider both local and State administrations. Compromise will have to be negotiated within local communities. The regionalisation process should be a specific project within the overall implementation program and provided with an appropriate budget to enable the required consultations to occur. It should also be recognised, however, that many regional structures already exist in the rangelands (eg Land Conservation Districts, local authorities, Rural Lands Protection Boards, Aboriginal Land Councils) and that the development of a new regionalisation should only be necessary

where serious incongruities occur with respect to existing boundaries.

The Society does not consider it appropriate to be highly prescriptive in identifying priority actions. However, given that the regional basis for implementation can be determined, we consider that prioritised actions broadly comprise:

1. Actions aimed at improving the economic viability of pastoral businesses and the ecological sustainability of the pastoral industry. This industry is by far the largest land user and significant sections of it are currently in a poor economic condition. Achievement of the goals of the National Strategy is not possible without the development of more resilient enterprises on much of the land currently used for pastoralism. Emphasis should be placed initially on those actions which can be implemented in the short-medium term by judicial, legislative or administrative processes, or which can add value to community based development programs already in train (e.g. SW Strategy and WEST2000). Priority actions will thus relate to, in order:

- resolution of the issue of Native Title in relation to pastoral leases.
- reform of financial, administrative and institutional arrangements (eg Objective 2.3).
- implementation of sensitive regional development programs where these are driven by the community, and support for existing programs (Objective 2.4).
- development or facilitation of diversification opportunities.
- management of total grazing pressure and climate variability.
- improvement of resource productivity.

2. Actions which identify clearly understood and widely accepted objectives for biodiversity conservation, and which secure biodiversity conservation on and off reserves.

3. Actions which conserve cultural heritage

The Society considers that priorities 2 and 3 are no less important than 1. However, attention to priority 1 will also contribute significantly to both 2 and 3 in both direct and indirect ways. In practice some actions relating to all three will have to run together but actions relevant to 2 and 3 should concentrate on those issues which will not be materially assisted by improving the economic condition of pastoral landholders.

Responsibilities for Implementation

The responsibility for implementation will vary from region to region depending on local structures. Those involved will include individual landholders, Landcare groups, TCM and ICM Committees, Land Conservation Districts, Murray Darling Basin Commission, Aboriginal Land Councils and communities, local government and State agencies. This list is not exhaustive. In keeping with the overall thrust of the

strategy, participative and cooperative approaches will be required at all levels.

The Society believes that structures already in place, or able to be established rapidly should they be required by the regionalisation process, will be capable of effective carriage of the Strategy at regional or local levels. A specific State agency would be required to assume responsibility for the Strategy at the State level.

Of more concern is the structure available to give effect to those actions which will require national initiatives or cross-border coordination. While responsibility at the national level will ultimately rest with the Ministerial Councils (ANZECC and ARMCANZ) a specific, representative organisation is required to have exclusive responsibility for carriage of the Strategy at this level. The minimum requirement is a Standing Committee under the Ministerial Councils, provided with a permanent secretariat to ensure that national initiatives are actively and vigorously pursued. This body would also have responsibility for monitoring the overall effectiveness of the strategy, (recognising that any such evaluation must incorporate the opinions of those most directly affected). The preferred alternative, however, is the establishment of a National Rangelands Commission which would be empowered to receive and disburse Commonwealth funds made available for implementation of the Strategy, monitor the implementation process at State and regional levels, and assume responsibility for national and inter-state initiatives. The operation of this Commission must complement the regional and State-based components of the implementation process by ensuring that national components are actioned and that Commonwealth funds are directed to high priority programs. The overall structure might include a Ministerial Council, similar to the Murray-Darling Basin Ministerial Council, and a Community Advisory Committee which is broadly representative of rangeland stakeholders.

Whatever structure is adopted for implementation, it is essential that responsibilities at all levels be clearly identified. The final document should indicate the level (Regional, State or National) at which primary responsibility for particular actions will lie.

Content of the Action Plan

As for priority actions, the Society does not consider it appropriate to be highly prescriptive in suggesting the content of the Action Plan. However, in broad terms, we consider that the plan should include the following elements:

- a timetable and mechanism for establishing the administrative arrangements necessary to oversee the implementation of the Strategy and monitor outcomes.
- a proposal for Commonwealth-State cost sharing arrangements.
- a budget to support the first three years of the plan sufficient to achieve positive outcomes with respect to the priority actions identified above.
- development of performance indicators.

- a timetable and mechanism for allocation of responsibilities for particular actions among Commonwealth, State, and regional bodies.
- a timetable and mechanism for defining the appropriate regionalisation for implementation.
- a timetable for those actions which require only administrative or legislative change.
- a timetable for establishment of a National Rangeland Monitoring Program, with responsibility for implementation allocated to the national body charged with carriage of the Strategy.
- a procedure for publicising the strategy.
- a procedure for establishing regional consultative organisations in those areas where current structures are not adequate, and a proposal for funding of their activity.
- a procedure for ensuring that all bodies which provide funding for rangeland activities (eg Rural Industry R&D Corporations, MDBC, NLP etc) are aware of the Strategy and incorporate its objectives into their programs.
- a timetable for compilation of basic resource inventory data (at a scale of at least 1:250 000) in those areas where it is still not available.

PART 2

Comparison of the Draft Strategy with the Response by the Society to the Rangeland Issues Paper

Most of the issues raised by the Society in our response to the Rangelands Issues Paper have been addressed in the objectives and actions proposed albeit some have been addressed only superficially. However, some concerns have not been explicitly addressed and we wish to recommend these again to the Working Group for consideration, especially since in many cases they relate to the common strategies developed from the Port Augusta conference. These concerns include:

- potential to integrate solar technology with diesel generated power.
- management arrangements for Vacant Crown Land.
- use of modern communications technology to improve skills of pastoral industry workers and managers.
- role of pastoralists in off-reserve conservation in return for financial remuneration
- maintenance of communities and ecosystems rather than individual species as the basis for biodiversity conservation.
- development of innovative means of financing structural adjustment (eg grants in lieu of interest subsidies).
- linkage between rangeland and non-rangeland people (although we acknowledge that this is implied in the partnership principle).
- the principles applicable to rangeland inventory and monitoring programs and the development of information systems, including provision for effective cross-cultural information transfer.
- the constraints imposed on rangeland R&D by short term funding horizons.
- division of responsibilities for rangeland use among various agencies (although the need for complementary policies is noted).
- flow of costs and benefits resulting from various uses to comply with international agreements.

- ownership of the Institutional issues and how they have been chosen.
- differences in tenure arrangements between States.
- analysis of the nature of Aboriginal land use in the context of biophysical, economic and social sustainability of rangeland use.
- role of the Landcare movement.

Reference

Blesing, D., Andrew, M., Foran, B., Abel, N. and Bourne, J. (1996). Looking out or looking in: Two ways ahead for Australia's Rangelands. Paper presented to Fenner Conference "Sustainable Habitation in the Rangelands", Australian Academy of Science, Canberra, 29-30 October.

Ed. Part 3 of the Society's response to the draft National Strategy made editorial comment about many sections of the text. Due to the specific nature of these comments, they are not reproduced here.

Copies of the Rangeland Society's full response to the Draft NSRM can be obtained from the President (PMB 19, Trangie NSW 2823; Fax: 068-887 201).

HOW RANGELANDS WORK, FALL APART AND REHABILITATE

David Freudenberger, CSIRO Wildlife and Ecology, PO Box 84, Lyneham ACT 2601

A new book by a group of us rangeland scientists in CSIRO is designed to help managers develop sustainable land use practices by providing an understanding of how rangelands work or function.

The first part of the book describes landscape processes. We use a simple framework called the 'trigger-transfer-reserve-pulse' mechanism to illustrate how landscapes function. This section covers the processes by which landscapes conserve scarce water and nutrients.

The second section of the book deals with what happens when things go wrong - when a landscape loses its ability to efficiently capture and store water and nutrients and the land becomes leaky.

In the third section, ways of better managing rangelands based on this understanding of landscape function are considered. The concluding section looks at alternative uses for the rangelands in the future.

Landscape Ecology, Function and Management: Principles from Australia's Rangelands. This book has been edited by J. Ludwig, D. Tongway, D. Freudenberger, J. Nobel and K. Hodgkinson and is available from CSIRO Publishing, PO Box 1139, Collingwood VIC 3066, ph 1800 645 051. The book's recommended retail price is \$59.95.

LANDSCAPE RESILIENCE

The Role of Key Events and Grazing History

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For the past 10 years, a group of us in the CSIRO National Rangeland Program have conducted an integrated study within a 200 ha mulga study site at 'Lake Mere', a grazing lease 150 km west of Bourke. The treatments consisted of twelve fenced plots of various sizes, each stocked with six sheep and half of them also stocked with six kangaroos. The objectives of the research were to:

- Determine the effects of over-grazing on sheep production, survival of perennial grasses, soil surface condition and water run-off.
- Measure the impact of kangaroos on sheep production and feed supply.
- Develop a better understanding of how rangelands work or function.

We have met these objectives and much of our new understanding has been captured in the book *Landscape Ecology, Function and Management: Principles from Australia's Rangelands* (see the short accompanying article on page 14).

We have decided that the time has come to reduce our input into this study site by simplifying the treatments. Half of the plots have recently (March 1997) been permanently closed to grazing, the others permanently opened to the prevailing grazing in the area by goats, kangaroos and sheep. Our objectives are now to:

- Examine how a landscape recovers from a history of over-grazing.
- Determine the processes and events that lead to increases in landscape function.
- Further develop and test indicators of landscape function that contribute to resilience.

The studies at Lake Mere will be replicated by including a series of ten grazing exclosures established by Ken Hodgkinson, Ron Hacker (NSW Agriculture) and Peter Johnston (QDPI) in western NSW and south-western Queensland.

We intend to maintain the study sites for ten years with measurements taken at least once a year. If we are successful in obtaining assistance from Earthwatch volunteers, then twice-yearly measurements will be possible. CSIRO research in semi-arid rangelands is being reduced, but we are committed to maintaining a presence and interest over the long term.

REPORT ON A 1996 ARS TRAVEL GRANT

Tac Campbell, PO Box 501, UQG, Lawes QLD 4343

I would like to express my gratitude to the Australian Rangeland Society for providing me with a travel grant to participate in the conference at Port Augusta last September. This conference, with the theme of focusing on the future, greatly improved my awareness of the wide range of present and emerging issues in rangeland science and management.

Travelling by vehicle to Port Augusta through a variety of country was an education in itself and an experience I would not have missed.

I had wanted to attend the 1996 conference in order to gain a greater understanding of the people, government bodies and organisations that have a stake in the rangelands; in particular, those that might be potential employers. I started my degree at the University of Queensland at Gatton, intending to major in land resource management in order to work as a soil and water conservationist. Having had more experience with the livestock industries and being inspired by the likes of Len Bahnisch, it was natural that my studies tended to concentrate on pastures rather than crops. So it was that in 1996, my final year, I was looking forward to finally fleeing the coast and all its people and starting a career working in the rangelands.

Andrew Campbell's address at the conference struck a particular note with me. I understood him to be saying that we should be utilising the uniqueness of this country and that appreciating its ecology is the basis of sustainability and profitability for the rangelands. I believe that good land use is where the land is used for its maximum sustainable production - of not one, but many possible outputs. Management that works with natural processes and conserves the richness of the Australian ecology is not only the way to have sustainable farming systems, but a way of giving our traditional commodities a marketing edge. As this approach also provides other income opportunities, e.g. eco-tourism, it is surely the sensible way to manage the rangelands.

The group-session workshops were a marvellous concept to get discussion between people of different interests. Some of the older participants in my group found the exercise quite thought provoking and relevant. The small groups provided a non-threatening environment in which even I could participate and I feel privileged to have had the opportunity to participate in this direction-finding activity.

Apart from affording me the opportunity to listen to, and talk with, many very knowledgeable people, some of who's work I have studied, one of the greatest benefits I gained from going to the conference was to experience country that I had not seen before - such as the chenopod shrublands.

The Eyre Peninsula with bluebush, blackbush and myalls set against a backdrop of rugged, rocky hills looked like a scene

from Africa. With a total absence of eucalypts, it was totally alien to this boy bred in the big-scrub region of northern NSW. I think everyone on that trip had a most enjoyable and educational day. Most of the tagged plant species which passed up and down the bus all day or, for that matter, the reptiles shown to us at Middleback Station were new to me.

We travelled to Port Augusta via the Strezlecki Track and the channel country was ablaze with the flowers of native legumes. After the lushness of south-west Queensland and the Cooper in a good season, the stony plains of northern South Australia seemed very barren. This contrasted greatly with the country in the Flinders Ranges, which was reminiscent of New England.

All in all, I had a great time and found the experience extremely worthwhile. I have some great memories of camping by the Cooper and of the people I met at the conference. What I don't remember fondly is the return journey, and the rain bombarding my swag - but, such is life.

FIRE IN THE MANAGEMENT OF NORTHERN AUSTRALIAN PASTORAL LANDS

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A Workshop on fire for the management of northern Australian pastoral lands was held in Townsville in early 1996. The meeting brought together researchers, extension specialists, pastoralists and other land managers to examine the current state of knowledge, current practices and future needs in relation to fire in the management of the wide variety of ecosystems that are used for pastoralism.

Prof. Winston Trollope of the University of Fort Hare in South Africa presented overviews of the ecology of fire, fire behaviour, and fire management in savanna and woodland environments. Rodd Dyer (NT DPIF) and Andrew Craig (Agriculture Western Australia) reviewed fire-related research that has been done in northern Australia and Dr. Jim Noble examined the potential for using fire for the management of pastoral lands. A series of presentations by pastoralists from Queensland, the Northern Territory and Western Australia gave a variety of perspectives on how fire could and should be used.

It was apparent from the Workshop that fire is an extremely important factor in many of the northern Australian ecosystems that are used for pastoralism but also that there is great geographical variation in attitudes to fire and the use that is made of it. There is even great variation within individual regions and land types. Fire research in northern Australia has focused on a small number of geographical locations and stronger emphasis has been placed on fire in relation to conservation issues than its role in pastoral management.

However, depending on the region, fire has and is being used to manage woody plants, to control woody regrowth in cleared country, to reduce the risk of wildfire, to manipulate pasture composition, to improve forage quality, to improve livestock access to higher-quality forage, to manipulate grazing pressure and its distribution, and to prepare for the sowing of "improved" pasture species.

Several constraints to the use of fire were identified including a lack of knowledge of the effects of fire, unsuitability of conditions, particularly the inadequacy of fuel loads, real or perceived deleterious side effects of fire, an inadequacy of the skills necessary for implementing a burning program or managing individual fires, regulatory restrictions, and the effects of public perceptions of fire.

There is a need for education in relation to the constructive use of fire management in northern Australia, including its use on pastoral lands. The Workshop saw that this applies to pastoralists who require information on the costs and benefits of using fire and skills to develop effective fire programs. It also applies to the general public so that they are made aware of the positive aspects of the judicious use of fire.

Improved knowledge and documentation of fire histories would contribute to a better understanding of the effects of fire and enhance the capacity to implement effective burning programs. The same applies to a better understanding of the relationships between climate/weather and fire. In some areas there may be a need to review and revise regulations that have an impact on burning practices and programs and to undertake economic analysis of the use of fire in both the long- and short-terms. For many ecosystems or land types, there is a need for better information on the effects of fire intensity, fire frequency and the timing of fire on a wide range of ecosystem components. While there is some information on most of these interactions for some land types or geographical locations, there is a need to clarify the degree to which this knowledge can be more broadly applied.

The Proceedings of the Workshop are soon to be published as an Occasional Publication of the Tropical Grasslands Society. For further information contact Tony Grice at:
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ABSTRACTS and APPLICATION
ABSTRACTS
THE RANGELAND JOURNAL
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Special Issue: Grazing Management

**Grazing Management: Technology for
Sustaining Rangeland Ecosystems?**

R.K. Heitschmidt and J.W. Walker

This paper examines the ecological, economic, and social aspects of grazing management technology as it relates to sustaining rangeland ecosystems. We adopt FAO's definition of sustainable agriculture, that is, "The management and conservation of the resource base and the orientation of technological and institutional changes in such a manner as to insure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development is environmentally non-degrading, technically appropriate, economically viable and socially acceptable."

We explore the ecological aspects of grazing management as they relate to the need to balance solar energy capture and harvest efficiency so as to maximise productivity on a sustained basis. The long-term success or failure of all grazing strategies hinges around management's ability to control the frequency and severity of defoliation of individual plants over time and space. This is a particularly formidable challenge in rangeland environments because of high levels of environmental uncertainty.

We then focus attention on the social aspects of grazing management. Grazing management is a social process by virtue of its human component and that the major social dilemma encountered in grazed agro-ecosystems centres around the impacts that ever-increasing human desires have on rangeland resources. We examine the role of ecological economics and the impact of varying human value systems on management of rangeland resources. The fundamental problem encountered in the management of natural resources such as rangeland ecosystems is absence of perfect ecological knowledge.

We conclude that the major social dilemma of grazing management stems largely from two phenomena: 1) supply side management tactics designed to meet ever increasing human demands; and 2) potential failure to accurately factor long-term ecological costs into present day value systems. As such, we conclude that current grazing management technology necessarily requires moderate rates of stocking be employed to insure rangeland agriculture (i.e. grazing) is ecologically sound, economically viable, and socially acceptable.

**Evaluating Stocking Rate Impacts in
Rangelands: Animals Don't Practice
What We Preach**

A.J. Ash and D.M. Stafford Smith

Stocking rate is the most important management variable affecting productivity and stability in rangelands. In this paper we examine the relevance of stocking rate research to the complex and highly variable ecosystems that make up most rangeland enterprises. We review a number of stocking rate experiments that have been conducted in both rangelands and more intensively grazed, improved pastures and demonstrate a fundamental difference in the nature of the stocking rate - animal production relationship between the two environments.

Animal production in rangelands is less sensitive to increases in utilisation rate than in improved pastures, at least in the short to medium time frame of most experiments. These differences can largely be explained by factors relating to the much greater spatial and temporal variability of rangelands such as: inter-annual and seasonal fluctuations in vegetation composition and quality; long-term vegetation changes; and spatial and temporal patterns of diet selection in complex vegetation. Together, these factors limit the application of linear stocking rate models to complex rangeland environments for prediction of animal production responses.

We suggest that dynamic simulation models, which incorporate the spatial and temporal variability of rangelands, may be the best way of developing simple but useful management principles for setting stocking rates that are more appropriate than simplified regression relationships.

**Objective 'Safe' Grazing Capacities for South-
West Queensland, Australia: Development of a
Model for Individual Properties**

P.W. Johnston, G.M. McKeon and K.A. Day

The number of livestock that can safely graze a paddock or property is the main factor affecting the relative success of any grazing management strategy and is the main management option available to graziers in south-west Queensland. In an environment characterised by climatic and landscape variability, determining appropriate livestock numbers requires skill and experience. These decisions can be complemented with sound and objective information regarding the grazing capacity of the resource.

In this paper, links between grazier practice and ecological principles were developed to derive an objective method for estimating 'safe' grazing capacities of individual properties. The method developed is repeatable and can be applied to any property in south-west Queensland. This alleviates the problems of inaccurate estimates of a grazing capacity for a property when district average capacities are used.

If land managers and land administrators used this approach to assess grazing capacity, improved land management practices

may follow as a result of better informed decision making. Coupled with financial and economic analyses, improved estimates of appropriate property size could be examined.

Objective 'Safe' Grazing Capacities for South-West Queensland, Australia: Model Application and Evaluation

P.W. Johnston, P.R. Tannock and I.F. Beale

Two experienced graziers from south-west Queensland applied and evaluated a model for calculating 'safe' long-term grazing capacities on individual properties. The model was quantitative and based on ecological principles. It entailed estimates of average annual forage grown (kg/ha) on the different land systems on each property and the calculation of the number of livestock (Dry Sheep Equivalents) required to 'safely' utilise this forage. For the 20 properties assessed, the average pre-1989 Department of Lands rated carrying capacity (31.0 DSE/sq km) was 37% heavier than the owner assessed capacities (22.7 DSE/sq km), which in turn was 8% heavier than the calculated 'safe' grazing capacity (21.0 DSE/sq km).

This paper focuses on the evaluation of an objective method for estimating grazing capacities of individual grazing properties. If various agencies, financiers and land managers adopt such an approach, grazing capacity estimates may become more dynamic and may better reflect land capability. For land administrators and financiers, the end result may be greater confidence in the information base. This may lead to more informed decisions regarding sustainable land management and administration. For land managers, there may be greater respect for the information used by land administrators and financiers in decision making affecting properties and livelihoods. Land managers may also improve their information base at the paddock and property scale relevant to their own decision making.

Spatial Distribution of Sheep, Feral Goats and Kangaroos in Woody Rangeland Paddocks

Jill Landsberg and Jacqui Stol

The densities and distributions of sheep, kangaroos and feral goats were assessed from extensive dung surveys following dry, moderate and green seasons in three large paddocks in the wooded rangelands of north-western New South Wales. Densities of sheep (21 animals/sq km) were around the long-term district average. Densities of goats (24 animals/sq km) were often higher than sheep. Densities of kangaroos (11 animals/sq km) were usually much lower than either sheep or goats. Animal density was usually related to vegetative cover (ground cover for sheep and kangaroos, shrub and tree cover for goats), but there were also differences among paddocks. Distribution of kangaroos showed the most differentiation according to vegetation type, with densities being consistently high on a small area of alluvial grassland and very low in the paddock with no alluvial plains and the lowest levels of ground

cover. The distributions of sheep and goats were correlated in the dry season and both species showed similar ranges in preferences for different vegetation types. Of the large herbivores present in these woody rangelands, kangaroos were the most selective in terms of the vegetation types they grazed, and goats were the least selective. Because their grazing activities are focussed on alluvial grasslands, kangaroos have potential to degrade this locally uncommon vegetation type. However, the densities of kangaroos in other, more widespread, vegetation types were uniformly low. Goats were frequently the most abundant large herbivores present and were also the least selective. Therefore goats probably have the greatest potential for causing widespread grazing impacts across much of these woody rangelands.

Managing Drought in Australia's Rangelands: Four Weddings and a Funeral

Rosemary Buxton and Mark Stafford Smith

We report some of the findings of a project called 'DroughtPlan', which has involved close collaboration with pastoralists throughout the Australian rangelands. There were three general areas related to property management where producers felt better information and training could help them cope with climatic variability. These were strategic management of long-term stocking levels, tactical management of stock numbers between years, and business management skills.

A comprehensive series of representative studies linking herd biology with economic outcomes was undertaken on these topics with pastoralists in different regions of the rangelands. Some of the studies considered most important by pastoralists are reported here. These demonstrate that: (i) a reduction in current stocking levels can often improve cash flow; (ii) small adjustments in livestock selling tactics during drought can have large financial ramifications; (iii) it is financially advantageous to build stock numbers up quickly after a drought, even though this may conflict with longer-term environmental values; (iv) while diversification can provide financial rewards, these could be matched by small improvements in the biological rates of the livestock; and, (v) fine-tuning of the existing pastoral enterprise can provide a less risky means of increasing cash flow and reducing its variability than does diversification. Four of the examples indicate that better use of information can help both profitability and sustainability; the fifth suggests that the interests of short-term profitability are in conflict with long-term land conservation goals, as assessed by many pastoralists.

These studies highlight the value of linking producer knowledge with a systematic analysis framework, as well as the vital importance of incorporating the effects of climatic variability, when assessing the value of different management options.

Perennial Grass Response to Seasonal Rests in Naturalised Pastures of Central New South Wales

P.M. Dowling, D.R. Kemp, D.L. Michalk, T.A. Klein and G.D. Millar

The influence of grazing management, herbicide and fertiliser on botanical change in two perennial grass based pastures was assessed over six years at two sites in central New South Wales. Ten treatments at both sites compared continuous grazing, three seasonal rests from grazing (autumn, winter, summer), and herbicide application for seedling grass control, each at two levels of fertiliser addition (nil, recommended). These treatments were designed to screen options for management rather than devise complete systems.

In a degraded perennial pasture dominated by annual grasses, the proportion of perennial grasses and forbs increased with summer rests, especially at the recommended fertiliser level. Legumes increased with herbicide application, and annual grasses remained high in the continuously grazed control and other treatments. There were no significant effects on composition from autumn or winter rests. On the summer rest treatment at the recommended fertiliser level, perennial grasses (mostly cocksfoot) increased from 11% to 30% compared with the control where perennial grass declined below 5%. The increase was due to both recruitment and increase in size of existing plants, as a consequence of resting the perennial grasses when actively growing, flowering and setting seed, in favourable seasons. In contrast, on the better quality perennial pasture dominated by phalaris, there were limited management effects and perennial grasses increased on all treatments over time. The absence of a response at this site was attributed to a lenient stocking rate, dominant perennial grasses and limited rainfall during periods when active growth might be expected. Summer rests in this case also led to a small increase in forbs. The data suggest that perennial grasses can be encouraged with a conservative stocking policy that maintains the available feed-on-offer above 1 t DM/ha through seasons of active growth.

The Need for a New Approach to Grazing Management - is Cell Grazing the Answer?

J.M. Earl and C.E. Jones

With any grazing method, the grazing pressure applied to an individual plant is a site, stock density and time dependent variable and the diet selection hierarchy of grazing animals is to the disadvantage of the most palatable and actively growing pasture components. The greater the differences in palatability and abundance among the components of a sward, and the lower the stock density, the greater the variation in the grazing pressure exerted. These effects are heightened when animals are set-stocked under adverse environmental conditions.

This paper reports the comparative effects of cell grazing and continuous grazing on pasture composition on three properties on the Northern Tablelands of New South Wales. The basal diameters, relative frequency and contribution to dry weight of the most desirable/palatable species at each site were found to remain constant or to increase under cell grazing, while declining significantly under continuous stocking. The converse was true for the least palatable components of the pasture, which declined significantly under cell grazing but changed little under continuous grazing. Percentage ground cover was significantly higher after two years of cell grazing than under continuous grazing. These changes in pasture composition may have long-term benefits with respect to erosion control, nutrient cycling, hydrological function and the stability of animal production at the cell grazed sites.

Event-Driven or Continuous; Which is the Better Model for Managers?

I.W. Watson, D.G. Burnside and A.McR. Holm

Over the past ten years or so, discussion of vegetation change in rangeland science has emphasised event-driven or episodic processes, occurring on timescales measured in decades or longer. Management recommendations arising from this literature have stressed that management must also be event-driven. This paper cautions against the uncritical acceptance of such a world view into management philosophies. We conclude that for management purposes, appropriate models of change in rangeland systems should include a balance between the effects of infrequent, unpredictable events and the effects of more continuous processes, measured in timescales of years or less. This may involve explicit recognition of multiple timescales in a hierarchical model system.

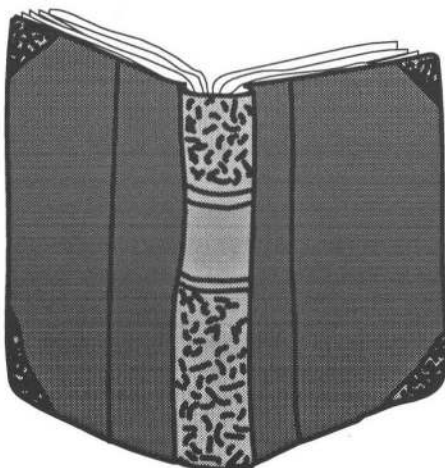
We arrive at these conclusions from a number of perspectives. Firstly, a substantial proportion of total demographic change in shrub populations occurs between events. Secondly, managers are best able to devise appropriate management strategies by a process of adaptive management. This can only be successful if the adaptive cycles have a short return time. Thirdly, it is important that managers think of change as being continuous. Mental models held by managers must acknowledge the value of continuous change. This provides the best opportunity for acquiring knowledge through experience and helps prevent management inertia when faced with an event outside previous experience. Finally, management can take best advantage of a given event by 'conditioning' the resource. This can be thought of as managing within states, say by building up a seedbank, and provides the opportunity to alter the probability of a given event occurring.

A Decision Support Approach to Sustainable Grazing Management for Spatially Heterogeneous Rangeland Paddocks

J.A. Bellamy, D. Lowes, A.J. Ash, J.G. McIvor and N.D. MacLeod

Public concern for the way land resources are used has led to the introduction of legislation in several Australian States requiring the demonstration of sustainable use of the pastoral resource. However, no practical system of appraisal of sustainability in grazing management systems exists. The common situation facing decision-makers at policy and enterprise levels is one of inadequate, unobtainable or inappropriate data, or systematic indeterminacy. This necessitates erring on the side of caution, through an adaptive integrated approach to decision-making. Such an approach requires: (i) an understanding of the key processes that govern the interactions between livestock, plants, and heterogeneous landscape systems; (ii) the identification of indicators of potential problems in these systems at spatial and temporal scales relevant to human use and management; and (iii) the availability of effective tools to evaluate management options in terms of their risks to the sustainability of the grazing land resource, and the profitability of production. This paper describes a decision support approach to improving our understanding of the complexities of grazing management systems. The paper first proposes an integrated framework for a decision support system (DSS) for evaluating the sustainability of grazing management in terms of the risk of changes to the vegetation and soil resource, and the profitability of production. It then examines an application of a DSS approach, called Landassess DSS, to the tropical woodlands in northern Australia, and discusses the broader implications for sustainable management of extensive native pasture livestock production systems.

(Ed. This is the last issue of the Range Management Newsletter to carry abstracts and application abstracts from The Rangeland Journal. The Publications Committee has decided that as application abstracts are now not required for papers submitted to the journal, there is limited value in reproducing abstracts from the journal in this newsletter.)



SOME THOUGHTS FROM THE PRESIDENT

Ron Hacker, ARS President, NSW Agriculture, PMB 19, Trangie NSW 2823

This is the last time that I will be able to share some thoughts with you as President. Council will move to Queensland after the AGM on 23 May. Looking back over the last couple of years I think the Society can be reasonably satisfied with its progress. Our membership continues to grow, albeit slowly, the biennial conference continues to be one of the major land management conferences in the country, our publications are of high quality and well regarded, and our administration is in good shape to hand over to the Queensland Council. We have also improved our public profile (e.g. by our press statement on RCD release) and contributed a substantial response to the Draft National Strategy for Rangeland Management. Council has also initiated moves to strengthen our international linkages by appointment of an International Advisory Board for the Journal and negotiation with the Society for Range Management on a joint bibliographic data base and opportunities for reciprocal membership rights. These initiatives will probably have to be concluded by the Queensland council.

While these things augur well for our future, other aspects of our present situation indicate that there is no room for complacency if that future is to be bright. First, we are a small organisation - too small to support a permanent staff and therefore dependent on mainly voluntary administration. No doubt some of the other Societies with whom we share some common interests are in a similar condition, and similarly vulnerable in a time when the workloads of the members we depend on to run the Society seem generally to be increasing. We need to consider whether strategic alliances with other Societies would allow for more efficient administration (e.g. a shared, permanent secretariat for subscription collections) and allow Council more time to deal with policy matters. Second, both this Council and its predecessor have experienced great difficulty in promoting the Society, and rangelands generally, in highly visible ways. For example, we have been unsuccessful in offers to provide interpretive material about rangelands for inclusion in airline in-flight magazines, and even for an outback visitors centre. While it would be wrong to read too much into these decisions alone, they reinforce a general impression that the need to remain relevant is one of the major challenges that our Society must continually recognise and confront. We must continually strive to broaden the base of our Society, to encourage membership by all groups with an interest in the use and management of rangelands, and to provide a forum for discussion and exchange among individuals of divergent interests. This is not to diminish the importance of our publications as major repositories for technical rangeland knowledge. Maintenance of that function is a critical service provided by the Society. It is to recognise, however, that moves towards multiple land use and changing community expectations are permanent features of our environment (whatever the outcome of the Wik debate) and that the Society needs to reflect these changes. The capacity to do so is one of our greatest assets.

MEDIA AND PRESENTATION SKILLS COURSES

Jenni Metcalfe, Econnect, PO Box 464, Paddington
QLD 4064

Toss Gascoigne and I run short courses that are especially designed for scientists and those involved in science. These courses may be of interest to members of the Australian Rangeland Society.

Media Skills Course

This practical two-day workshop teaches scientists to:

- control their message to the media with confidence,
- practice their interview techniques with five working journalists, and
- get their message out accurately.

Course dates for the remainder of 1997 are:

Canberra - April 22-23
Sydney - June 19-20
Brisbane - July 17-18
Melbourne - August 14-15

Presentation Skills Course

In this practical two-day workshop, we teach scientists to:

- give presentations with confidence,
- structure talks in a logical way,
- deliver interesting and animated presentations,
- handle the unexpected question, and
- use visual aids to add impact.

The aims of the Presentation Skills Course is to help participants to communicate their message effectively to a range of audiences. Course dates for the remainder of 1997 are:

Canberra - April 17-18
Sydney - June 16-17
Brisbane - July 14-15
Melbourne - August 11-12

Courses can be run in other locations, and special workshops can also be conducted - intensive workshops for smaller groups, one day workshops, or combined Media and Presentation Skills workshops. Please feel free to discuss your needs with the presenters.

For further information contact me at Econnect - environmental and science communication, PO Box 464, Paddington QLD 4064. Phone (07) 3367 2646, Fax (07) 3217 6376 or Mobile 014 91 6372.

"TEN TOP" ISSUES FOR 1997 New Year's Resolutions for Government?

Joe Baker, FASTS President

On January 1, FASTS released its "Ten Top Policies" for 1997. This list comprises the ten most pressing issues facing science and technology in Australia, and represents the views of 40,000 working scientists and technologists through their representative peak body.

1. *A national vision for Australia to 2020 and beyond*
FASTS urges the Government to determine a national vision for Australia's sustainable development, and to establish what science and technology is needed to support that future.
2. *The differential HECS fees and science*
FASTS recommends that the Government monitors science enrolments in universities and the impact of differential HECS fees, and takes immediate remedial action should there be any significant decline in numbers.
3. *Science and mathematics teaching*
The Government must address the decline in the quality and quantity of teachers in science and mathematics, and the lack of rigour and substance in Australia's science and mathematics curricula and teaching practices. All students are taught by appropriately qualified teachers. HECS charges for teaching education should be in the lowest bracket.
4. *Encouragement of private R&D*
Funding for private R&D should be increased to internationally competitive levels. Peer-reviewed competitive grants should be used as a mechanism to distribute funds and ensure the quality of research, and the Government should address the shortage of long-term venture capital by encouraging superannuation funds to invest in R&D.
5. *Restructuring the universities*
Australia has too many universities to be able to offer high-quality science courses in all disciplines at all institutions. FASTS advocates a restructuring process that guarantees access to high-quality science education and research, and which may involve amalgamation or shared teaching.
6. *Provision of career paths for scientists*
Too many young scientists face uncertain careers on short term funding. More talented people, especially women, need to be attracted into scientific careers through better remuneration and more secure career paths, with real opportunities to obtain competitive research funding.
7. *Infrastructure in research organisations*
The Government is urged to accelerate its program of replacing worn-out equipment, libraries, computer facilities and buildings in research organisations.
8. *Basic science*
A higher proportion of Government funding for science should be directed to basic science, to underpin future developments in applied science.
9. *The Australian ocean territory*
Australia needs to boost its scientific exploration of the AOT in order to exploit marine and seabed resources in a sustainable manner. Government should ensure adequate funding is directed to the research agencies in this area.
10. *Protection of intellectual property*
The protection of Australian intellectual property is as vital as its discovery and development. Patent costs should be an allowable R&D expenditure.

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AUSTRALIAN RANGELAND SOCIETY MEMBERSHIP APPLICATION FORM

Please complete and return to the Subscription Secretary, Rob Richards, PO Box 235, Condobolin 2877 NSW.

I, [name]

of [address]

.....

..... Postcode

apply for membership of the Australian Rangeland Society and agree to be bound by the regulations of the Society as stated in the Articles of Association and Memorandum.

I enclose \$..... for full/part* membership for an individual/institution* for the calendar year 1997.

* delete as appropriate

Signature..... Date.....

Membership Rates:

	Australia	Surface Mail	Overseas Air Mail
Individual or Family -			
Full (Journal + Newsletter)	\$55.00	\$65.00	\$75.00
Part (Newsletter only)	\$25.00	\$30.00	\$35.00
Institution or Company -			
Full (Journal + Newsletter)	\$85.00	\$95.00	\$105.00
Part (Newsletter only)	\$40.00	\$45.00	\$50.00

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Membership is for the calendar year 1 January to 31 December. All rates are quoted in AUSTRALIAN currency and must be paid in AUSTRALIAN currency.

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