
The Australian Rangeland Society

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# Range Management Newsletter

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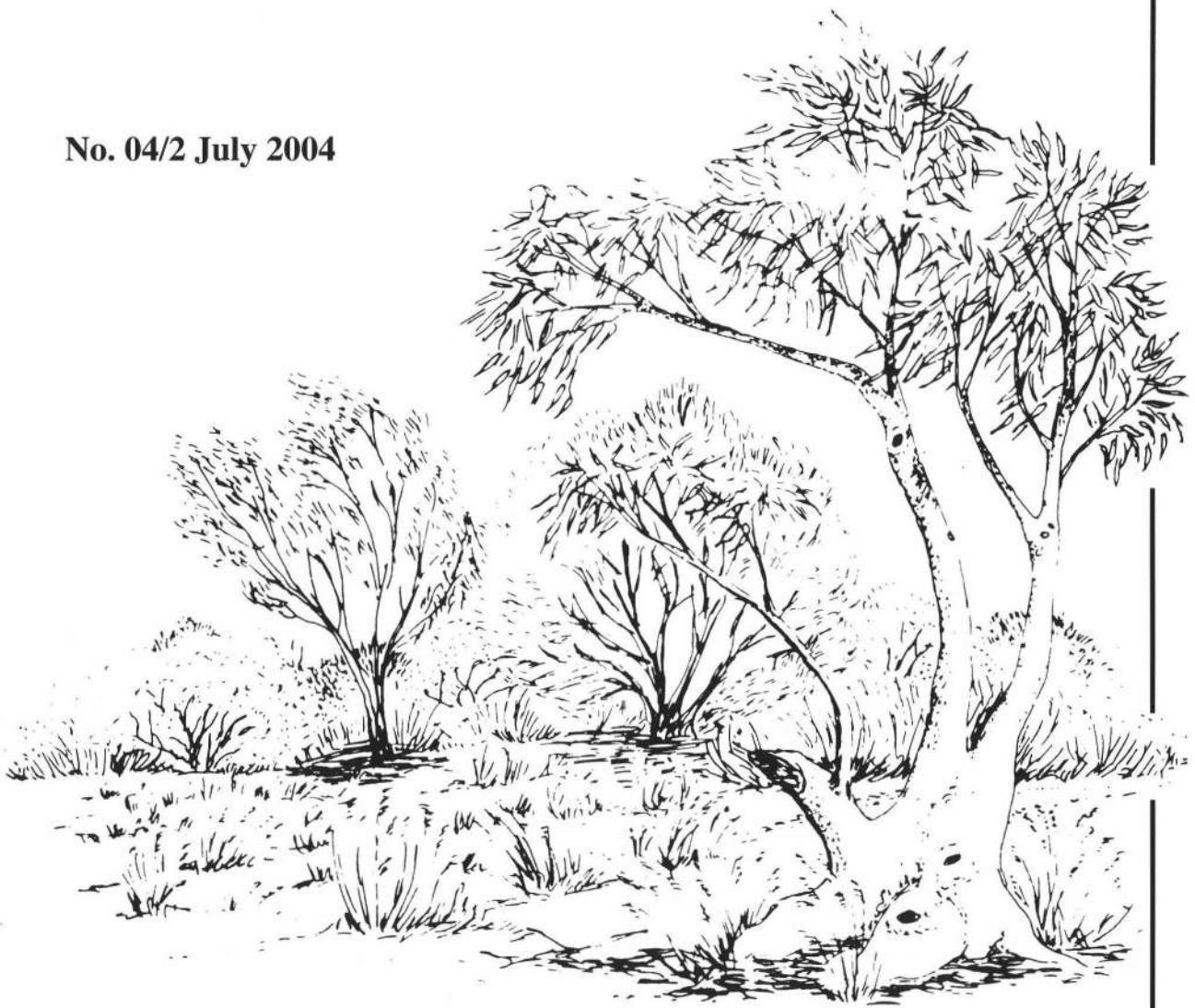

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# FROM THE EDITOR

Noelene Duckett, 7 Belcarra Place, The Woodlands, Texas, USA, 77382. Email: nduckett@ozemail.com.au

Thank you for taking the time to open the July issue of the Range Management Newsletter. I hope you will find a number of interesting articles related to the Australian rangelands.

This issue opens with a notice about the Annual General Meeting. It is to be held on 3 September, 2004 at the Department of Agriculture in South Perth. Please note that the 2004 Annual Reports to Members from the President and the Publications Committee are included at the back of this newsletter. The Finance and Audit Officer's report was not available at this time as the accounts are still in the process of being audited. This report will be included in the November issue of the newsletter.

I am pleased to include two major articles in this RMN issue. The first article, compiled by John Morley, details a number of key broad-scale environmental projects and products related to rangeland Australia and funded by the Natural Heritage Trust. The article includes information about projects related to biodiversity monitoring, total grazing management and biodiversity, fire management, virtual fencing, traditional indigenous knowledge, benefits of biodiversity, the Australian Collaborative Rangelands Information System (ACRIS) and the Lake Eyre Basin. It is very interesting to see how some of the $3 billion the Australian Government has committed to the Natural Heritage Trust has been utilised in the rangelands.

The second article, submitted by David Phelps, investigates Mitchell grass response to rainfall following severe drought in western Queensland. David's paper examines the patchy responses seen during the 2002/03 and 2003/04 summers and compares current observations with previous records. This paper clearly illustrates the complex responses of Mitchell grass and highlights the need for further targeted research.

This issue of the Range Management Newsletter also includes three reports from the recently held 13th Biennial Conference. By all accounts, the conference was a great success with the post-conference reports describing many interesting presentations and discussions. As Mark Alchin from the Department of Agriculture in Meekatharra, Western Australia wrote - "the 13th ARS Biennial Conference was successful at providing a balanced approach to addressing many of the varied objectives, threats and opportunities within all activities associated with rangelands."

Finally, this issue includes a number of short articles and notices. These include the communications report from Council, details of a new field guide for rangeland plants, new members (those joining prior to 31st May 2004) and the usual information snippets section.

Please note that the deadline for the November issue of the newsletter will be late September.

*The Australian Rangeland Society*

## NOTICE of ANNUAL GENERAL MEETING

The 2004 Annual General Meeting of the Australian Rangeland Society will be held on

**Wednesday 22 September 2004**
**at 5 pm WST**
**Department of Agriculture**
**South Perth, Western Australia**

The agenda will include:

- Minutes of the 2003 Annual General Meeting
- Reports from the Council President, Finance and Audit Officer, Subscription Manager and the Publications Committee
- Motions on notice
- General business

**Motion on notice**

For a range of reasons, the Australian Rangeland Society intends to change its auditor from Michael Boyce and Co, Dubbo to Lee Green, Adelaide.

The following motions will be put to the meeting:

A) That Michael Boyce and Co be removed as auditor of the company.

B) That Lee Green be appointed as auditor of the company

Any financial member wishing to place further **motions on notice** before the Annual General Meeting must ensure that the signed motion is lodged with the Secretary by posting, faxing or emailing to:

Sandra Van Vreeswyk
Department of Agriculture
Locked Bag 4
BENTLEY DELIVERY CENTRE WA 6983
Phone: 08 93683917
Fax: 0893683939
Email: svanvreeswyk@agric.wa.gov.au

**by 3 September 2004**

The AGM will be followed by light refreshments. Please let Sandra Van Vreeswyk know if you will be attending.

# THE RANGELANDS ENVIRONMENT: DEPARTMENT OF THE ENVIRONMENT AND HERITAGE PROJECTS AND PARTNERSHIPS

*Compiled by John Morley, Biodiversity Trends Section, Natural Resource Management Policy Branch, Department of Environment and Heritage, GPO Box 787, Canberra ACT 2601. Email: John.Morley@deh.gov.au.*

## Australia's iconic rangelands

Australia's rangelands have long been viewed as nationally significant in terms of their biodiversity, environmental and social values. The Australian Government Department of Environment and Heritage (DEH) has developed a range of projects and products through the Natural Heritage Trust which examine the key broad-scale environmental issues in rangeland Australia. These projects and products will improve national policy, support regional planning and investment decision-making and will help land managers monitor and manage biodiversity in rangeland Australia.

The following projects are some of the activities funded by the Australian Government's $3 billion Natural Heritage Trust.

## Biodiversity Monitoring in the Rangelands: Volume 1.

Published in August 2003, *Biodiversity Monitoring in the Rangelands: A way forward Volume 1,* followed up on an expert technical workshop held in Alice Springs in November 2002. This was prepared in conjunction with CSIRO's Centre for Arid Zone Research and the Tropical Savannas CRC.

The expert technical workshop had a number of objectives, including production of:

- a brief review of recent (often unpublished) research relevant to biodiversity monitoring in Australian rangelands to establish current understanding, gaps in knowledge and ways to move forward;
- a review of techniques and tools that do and don't work so that we can assess the capacity to value-add using existing approaches and build on lessons learned from the past;
- a manual for operation of well-tested, existing approaches as a set of technical guidelines to support planning of biodiversity monitoring systems;
- an outline of a framework for monitoring change using expert knowledge to support adaptive management and indicate environmental performance; and
- a toolbox that has the capacity for, or can fully support, measurable and meaningful benchmarking by demonstrating the degree of effectiveness of natural resource management (NRM) programs and whether funds are targeted effectively under the NRM 'matters for targets' initiative for DEH.

Outcomes of the workshop included:

- the bringing together of experts from all rangeland states and the Northern Territory;
- consideration and review of recent, and most importantly, unpublished, research relevant to biodiversity monitoring in the rangelands;
- development of a common 'state-of-the-art' view and an understanding of the complexity of biodiversity monitoring in the rangelands;
- development of a shared view on the most appropriate set of attributes and techniques for use by different clients to monitor changes in biodiversity;
- highlighting of the limitations of particular sets of attributes and techniques;
- identification of interim guiding principles for rangeland biodiversity monitoring; and
- identification of knowledge gaps and research needs.

Products of the workshop included:

- proceedings of the workshop as described in the report, available as hardcopy from DEH (phone John Morley (02) 6274 2249) or on the web: www.deh.gov.au/land/publications/rangelands-monitoring/index.html
- a CD ROM of commissioned papers on recent and new research pertaining to rangeland biodiversity monitoring
- publication of key papers in a thematic issue of *Austral Ecology,* the journal of the Australian Ecological Society (Feb 2004, vol 29, issue 1).

## Biodiversity Monitoring in the Rangelands: Volume 2.

Tropical Savannas CRC in partnership with the Desert Knowledge CRC have recently been funded to extend the work of Volume 1 through a series of case studies. Regional group case studies will take place in Queensland, Western Australia and western New South Wales. An enterprise-level case study will be undertaken in the Northern Territory. The case studies will look at working with the regional groups and pastoral enterprises to develop a monitoring regime based on their needs. The individual case studies will be written up as Volume 2 of the report in an effort to assist other groups and enterprises interested in developing their own biodiversity monitoring activities.

For further information on Biodiversity Monitoring in the Rangelands Volume 2 case studies, contact:

Leigh Hunt, Desert Knowledge CRC, Ph (08) 8950 7162;

John Morley, Australian Government DEH, Ph (02) 62742249

## Total Grazing Management and Biodiversity in the Rangelands

Land degradation is widely recognised as a major issue in the rangelands. There have been serious declines in native species, desertification, soil erosion and significant weed and feral animal problems. Land-use practices have a complex and sometimes poorly-understood relationship with the sustainability of rangeland ecosystems. These practices occur within the context of complex, and highly variable, natural and cultural systems. DEH identified a need to integrate available knowledge in a way that combines ecological understanding and economic and social considerations in order to identify the management changes required to achieve ecological sustainability.

A major issue for sustainable land management is the risk to the sustainability of natural resources through past and current grazing by the combined impact of domestic stock, feral animals, and native herbivores. Impacts include changes to perennial species composition, increase in woody species, decline in productivity and loss of biodiversity.

To adequately manage grazing pressure to reduce the threat to biodiversity, grazing management practices should be based on a comprehensive scientific understanding of ecosystems. To best inform regionally-based natural resource management, ecologically appropriate management practices need to be considered for different ecosystems in different ecological, economic and geographical contexts.

The team of contributors for this project has developed a new concept of Grazing Land Management Zones (GLMZ) for rangeland Australia (Figure 1). Analysis of factors such as climate, vegetation, land types and their modification, distance to water and grazing pressure led to the development of these zones.

The draft report revealed that action was needed at regional and property levels to address issues of total grazing pressure and achieve positive and sustainable biodiversity outcomes.

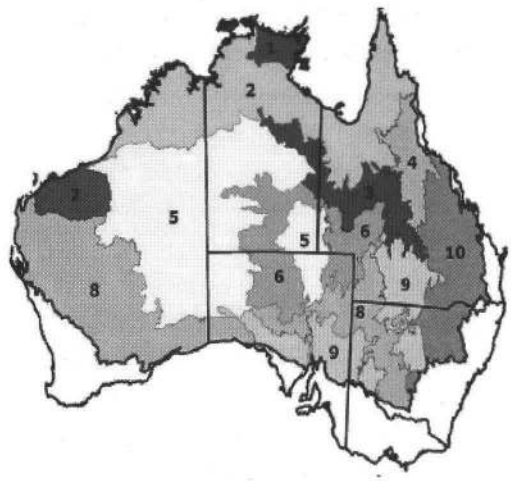


*Figure 1. Grazing Grazing Land Management Zones for rangeland Australia. Zones are identified as follows:*

1. *Arnhemland and Tiwi Islands*
2. *Tropical savannas*
3. *Mitchell grass downs*
4. *Einsleigh and Desert Uplands, north Queensland*
5. *Arid deserts*
6. *Central Australia cattle grazing*
7. *Pilbara*
8. *Southern Australia sheep and cattle grazing*
9. *Extensive sheep grazing*
10. *Highly modified rangelands*

### *Priority needs at the regional level*

- Further biodiversity inventory is required for most regions, particularly for the identification of management "hotspots".
- Support for local communities in a range of land management actions (eg. ranger programs on Aboriginal lands).
- Regional coordination of control campaigns for large, relatively mobile feral species.
- Integration of regional strategies for the management of total grazing pressure (TGP) with activities at the property level
- dentification of, and adequate protection for, biologically important and/or sensitive ecosystems from domestic and feral stock – for example, through control of waterpoint distribution; strategic fencing; feral animal control; incorporation into reserves
- Design and implementation of effective biodiversity monitoring programs

### *Needs at the property level*

- Ongoing management of grazing pressure by all grazing animals, including domestic stock, feral species and native grazing mammals.

- Integration of biodiversity conservation into property-level planning, integrated with regional priorities
- Adoption of recommended best-management practice (grazing systems).
- Improved tools for controlling grazing pressure (eg. waterpoint manipulation; installation of trap yards for feral species)
- Protection of sensitive areas, as identified through regional conservation planning.
- Appropriate incentives for on-property biodiversity management.
- Provision of information and training for land managers in 'biodiversity-sensitive' management.

Recommendations for further research and on-ground project funding are discussed on a zone-by-zone basis. Initial response by researchers and state agency staff to this GLMZ concept has been so positive that DEH intends to publish the GLMZ descriptions later this year, in conjunction with findings from the fire project discussed below.

The outcomes of this project should help land managers and decision makers assess the adequacy and effectiveness of proposed sustainable land management interventions that promote total grazing management practices and improve the ability to plan for and manage total grazing pressure in an integrated way to protect biodiversity.

For further information on this project, contact:

Anne Brady, Australian Government Department of Environment and Heritage, Ph (02) 6274 2527

## Fire Management in the Rangelands

Despite low levels of disturbance, the abundance and richness of rangeland biodiversity has declined. Evidence exists that inappropriate fire regimes are partly responsible. Fire is an integral part of the ecosystems of Australia's rangelands (Figure 2) and fire management is one of few management tools available to rangeland managers.

In the past, government agencies at all levels have funded numerous fire-related projects and initiatives. This project brought together current understanding on best practice to guide future directions for investment under the Natural Heritage Trust.

The aims of the fire project were to provide information to improve our investment decisions and promote adoption of best practice.

The outcomes of this project include a description, for each major rangeland major vegetation type, of the biophysical landscape, fire ecology and management, impacts of current fire regimes, fire knowledge gaps, key references and information sources.

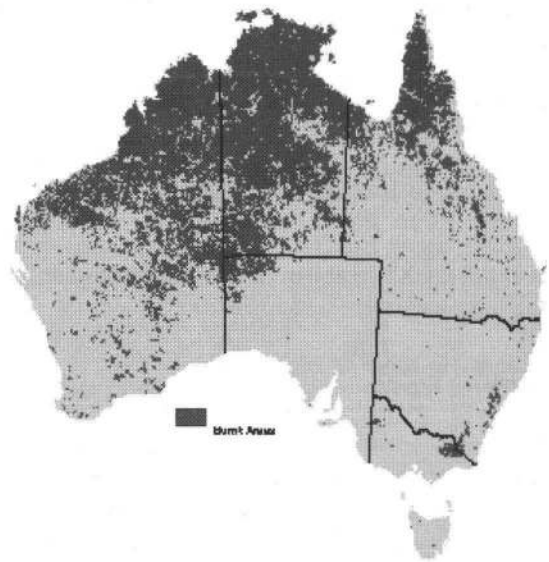

*Figure 2. Australian fire history for 1997-2003 derived from NOAA AVHRR satellite images by the Department of Land Information, Western Australia. Information, at a local scale, on fire history and current fire regimes is important in planning fire management activities.*

The project identifies the following key principles that provide a basis for the management of fire and biodiversity in rangeland landscapes:

1) The ecological effects of fire are determined by fire regimes.
2) Species of plants and animals have limits of tolerance to fire regimes, which can be exceeded under particular circumstances.
3) Knowledge of the limits of tolerance to fire regimes ('thresholds'), characteristic of particular plant communities can be used to predict the ecological effects of particular management strategies. The ecological outcomes of decisions made on this basis should be subsequently verified through appropriate monitoring.
4) The floristic composition and physical structure of plant communities determine the quality of habitat for many animal species. Effects of fire regime on plant communities therefore affect animals.
5) Management guidelines developed for plant communities may be applicable to animals because of the importance of vegetation as habitat.
6) Fire regimes are partly invisible because they are shaped by recurrent (past) events. A spatial fire history record is needed to describe the set of fire regimes that prevail in a landscape at any particular time.
7) The effects of fire regimes in general, and adverse fire regimes in particular, need to be understood at broad spatial scales. In particular, management needs to address

potential losses of species that may result from adverse fire regimes at a landscape scale.

8) The loss of a species from a landscape may occur when fire regimes that are detrimental to that species predominate across the bulk of its habitat in that landscape. In this sense, adverse fire regimes may act as a dynamic fragmentation process.

9) In general, even where optimal fire regimes for individual species are not known, a fire regime that provides variety and variability, preferably at a fine scale, (ie a mosaic) is likely to provide for the greatest variety of species, by allowing individuals to choose areas that meet their various requirements

For further information on this project, contact:

Jenny Tomkins, Australian Government Department of Environment and Heritage, Ph (02) 6274 2720

## Virtual Fencing

DEH in collaboration with Land and Water Australia, has supported work by WA Agriculture on the development of virtual fencing technology to manage domestic stock movement. While the concept of wireless fencing has been around for many years, the work of Dr Robert Rouda and others to combine these concepts with the newer and now more readily affordable electronic technologies has progressed to the patent stage and many steps closer to production and use by land managers in Australia's rangelands.

For more information on the virtual fencing technology project, go to:

www.gms.wa.gov.au

## Traditional Indigenous Knowledge

A workshop on traditional Indigenous knowledge was held at Desert Park, Alice Springs on 28 – 29 May 2003, hosted by DEH. The workshop explored a number of themes related to indigenous knowledge and regional delivery of natural resource management in the rangelands.

The purpose of the workshop was to recommend how indigenous knowledge works with regional delivery of natural resource management in the rangelands.

The outcomes of the workshop were:

- clarification on how regional delivery of natural resource management planning will occur;
- identification of issues in supporting indigenous knowledge;
- design of a framework for working with indigenous knowledge in regional planning;
- development of processes and protocols for implementation at the ground level; and
- specified ways forward at the community, regional group and agency levels.

The outcomes of the workshop are expressed in four documents (currently in print):

- Indigenous Knowledge Forum: Workshop Outcomes
- For Indigenous communities, ideas on how to get indigenous knowledge into the heart of land management practices in the community.
- For regional planning groups, a simple outline for when they are working with indigenous knowledge that indicates:
  - expectations;
  - draft framework;
  - protocols; and
  - processes
- For Australian Government agencies, recommendations on how they can build internal capacity in order to work more effectively with indigenous knowledge.

The following initiatives were recommended to address the issues involved in supporting indigenous knowledge in regional natural resource management planning:

- An Indigenous Natural Resource Management Plan, developed at the regional level and supported through:
  - a framework of principles;
  - agreed protocols for engagement.
- An Indigenous Knowledge Support Plan, developed within communities to define issues, priorities, linkages to existing structures and specific indigenous knowledge projects.

For more information on these publications, contact:

Anne Brady, Australian Government Department of the Environment and Heritage, Ph (02) 6274 2527

## Biodiversity Benefits

One of the objectives of programs such as the Natural Heritage Trust is to improve biodiversity by supporting activities that enhance native vegetation such as tree planting, weed removal and fencing of native bush to control grazing. However, we don't have any robust method for determining if these on-ground activities are useful ways to protect and improve biodiversity.

DEH and the CSIRO, in collaboration with the States and Territories, have developed the Biodiversity Benefits Framework as one way of assessing benefits.

The framework is designed to:

- Provide a way of designing a monitoring program to assess the biodiversity benefits of past and current vegetation enhancement projects.
- Provide a way of designing new vegetation enhancement projects that have clear objectives, clear expected outcomes and tightly integrated monitoring and assessment procedures.

The framework is not a recipe or an alternative to existing planning, monitoring and evaluation procedures. Rather, it is one way of working through the many complex issues involved in assessing the biodiversity benefits of past projects and designing new ones. The framework may prove useful for catchment authorities, landcare groups and individual land managers to think about the concept of biodiversity, identify threatening processes, select appropriate enhancement activities, predict expected benefits and design ways to monitor the expected benefits of enhancement activities.

The framework was recently applied to a series of seven case studies, which demonstrated how it could be used to assess biodiversity benefits of on-ground works. The case studies also demonstrated the importance of collecting spatial data about a project in order to be able to accurately assess the impact of the project over a long-term timescale. To aid groups in determining what data should be collected a draft set of suggested minimum data specifications has been developed.

For more information on the framework and the seven case studies, find it on the web at:
http:// draft.deh.gov.au/land/vegetation/benefits/index.html

## Australian Collaborative Rangelands Information System (ACRIS)

DEH is also a partner in the development of the Australian Collaborative Rangelands Information System (ACRIS) along with Queensland, New South Wales, the Northern Territory, Western Australia and the Australian Government Department of Agriculture, Fisheries and Forestry.

ACRIS is a coordinating mechanism that brings together rangeland information from State and Northern Territory agencies and other sources.

ACRIS was conceived as part of the Rangeland Monitoring theme of the first phase of the National Land and Water Resources Audit and its detailed report *Rangelands – Tracking Change* (NLWRA 2001,http://audit.ca.gov.au/ANRA/atlas_home.cfm

A Management Committee comprising representatives of Australian and State/NT Governments oversees a small Management Unit through the Desert Knowledge CRC in Alice Springs.

The ACRIS is still in a developmental phase. The Management Committee has set itself and the Management Unit the initial task of reporting on management-oriented issues using existing data for a specified region in each State / NT. This will test our ability to report (addressing a set of nationally-relevant questions) using readily available monitoring data. From there, the task will be expanded to more comprehensive reporting on the condition of natural resources across the entire rangeland area of each jurisdiction using existing data. These expanded reporting criteria include:

- surface and groundwater,
- vegetation change on pastoral land,
- seasonal climate outlooks and satellite-derived change in seasonal characteristics (as contextual information),
- change in land-use and tenure, and
- extent of tree clearing.

ACRIS will be developed progressively to provide more comprehensive reporting of change in Australia's rangelands. For example, a recent national workshop addressed methods for monitoring change in biodiversity (Smyth *et al.* 2003) and relevant outcomes now need to be incorporated into agency monitoring systems. Other work will examine how best to monitor change in the social and economic wellbeing of regions. The ultimate challenge for ACRIS is to develop the full suite of products described in *Rangelands – Tracking Change* that will allow comprehensive and timely reporting on the condition of natural resources in the rangelands, including:

- biodiversity monitoring and analysis,
- trends in socio-economic status,
- landscape assessment at larger scale,
- extent, timing and frequency of fire,
- resource condition,
- locations and status of exotic plants and animals, and
- periodic assessment of total grazing pressure.

For further information on this project, contact:

Gary Bastin, Centre for Arid Zone Research, CSIRO Sustainable Ecosystems, Ph (08) 8950 7137

## Lake Eyre Basin

The Lake Eyre Basin covers about 1.2 million square kilometres, almost one-sixth of Australia, and is the world's largest internally draining system. Lake Eyre itself is the fifth largest terminal lake in the world. The Basin includes large parts of South Australia, the Northern Territory, Queensland and some of western New South Wales. About 57,000 people live and work in the Basin. The Basin supports a range of nationally important natural, social and economic values.

The Lake Eyre Basin is considered one of the world's last unregulated wild river systems. The vegetation of the Basin reflects the patterns of arid and semi-arid regions that rely on variable water flows. As a consequence the Basin is an area of high conservation significance that supports wetlands such as the Ramsar listed Coongie lakes, grasslands (Astrebla Downs National Park) and deserts (such as the Simpson Desert National Park). The Basin is also home to many rare and endangered species of plants and animals such as the greater bilby, the kowari and waddi waddi trees (*Acacia peuce*). Mound springs, wetland areas of natural water seepage from the Great Artesian Basin also support a number of rare and highly restricted endemic species.

In recognition of the importance of the Basin and its values, the Australian Government is working with the Queensland, Northern Territory and South Australian Governments and the Basin community to implement the Lake Eyre Basin Intergovernmental Agreement. The Agreement provides for the sustainable management of the water and related natural resources associated with cross-border river systems in the Lake Eyre Basin designated area.

The Lake Eyre Basin Ministerial Forum web site will be launched shortly.

For more information on the Basin go to:

www.deh.gov.au/water/sbasins/lake-eyre/index.html
or contact Scott Parker, Ph (02) 6274 2784

## References


NLWRA (2001). *Rangelands – Tracking Changes. Australian Collaborative Rangeland Information System.* National Land and Water Resources Audit, Commonwealth of Australia. 175 p.
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Smyth, A., James, C. and Whiteman, G. (2003). *Biodiversity Monitoring in the Rangelands: A way forward.* Report to Environment Australia, vol. 1, Centre for Arid Zone Research, CSIRO Sustainable Ecosystems, Alice Springs. 50 p.
www.deh.gov.au/land/publications/rangelands-monitoring index.html


# IS DROUGHT THE ONLY CAUSE OF THE DEATH OF QUEENSLAND'S MITCHELL GRASS?


*David Phelps, DPI&F, PO Box 519, Longreach Qld 4730.*
*Email: David.Phelps@dpi.qld.gov.au*



This article presents a brief overview of the impacts of drought on Queensland's Mitchell grass pastures, especially on contributing to the death of individual Mitchell grass tussocks in the central west. It describes the lack of Mitchell grass response following good summer rain over 2002/03 and 2003/04 and the research and information sessions conducted between March and June 2004 to determine if drought is the sole reason for wide-scale death of Mitchell grass tussocks. The need for further research to more fully understand the processes involved in the onset and breaking of drought dormancy of Mitchell grass tussocks is highlighted.


## The situation in 2004

An estimated 60-75% of Queensland's Mitchell grasslands have demonstrated a patchy response to rainfall over the 2002/03 and 2003/04 summers (October to March) following severe drought. The response has varied from:

- good within some districts, properties or paddocks – with more than half of the Mitchell grass tussocks responding; through to
- poor – with less than 10% of existing Mitchell grass tussocks responding.

Where there has been a poor response from Mitchell grass tussocks, pastures have been dominated by annual grasses, such as Flinders grass (*Iseilema* spp), or by broad-leaved herbages, such as wandering Jew (*Commelina ensifolia*), tar vine (*Boerhavia* spp) or tick weed (*Cleome viscosa*). The shift from perennial grass to a dominance of annual grasses and herbages represents a transition from good to moderate pasture condition; to poor pasture condition (Phelps and Bosch 2002). Other states where Mitchell grass naturally occurs have not reported similar incidences of poor response to rainfall events.

Those areas with patchy responses are facing an estimated 20-25% reduction in carrying capacity, with a similar direct impact in on-farm gross margins. The potential economic losses will be greater if per head sheep wool cuts or cattle average daily gains are reduced.

## The Mitchell grasslands

Queensland's Mitchell grasslands represent 19% of the state's native pasture area – some 33 M ha – and support in excess of 10% of the cattle herd and more than 40% of the Merino sheep flock in Queensland (Orr 1975, Figure 1). Between 2500-3000 people depend on employment generated by the grazing industry based on Mitchell grass country.

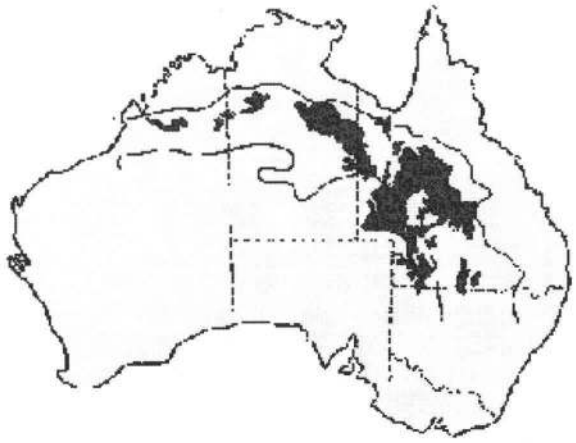

*Figure 1. The Mitchell grasslands (dark shading) cover 33 M ha in Queensland and a further 22 M ha in WA, the NT, SA and SA. Source: Orr 1975.*

Rainfall variability within western Queensland is high, even by Australian standards. Longreach, in the central west, has a coefficient of variability of 46%, with the lowest rain on record 107 mm in 2002 and the highest 1077 mm in 1894 (Clewett *et al.* 2003). Variability is accompanied by increasing winter rainfall influence to the south, and with mean annual rainfall declining to the west (Fensham *et al.* 2000). Variability tends to increase with increasing aridity; for example Boulia, at the western edge of the Mitchell grasslands, experiences a coefficient of variation of 61% (Clewett *et al.* 2003). The Mitchell grasslands are most common on clay soils within the 250-550mm mean annual rainfall isohyets.

Sheep and cattle have grazed the Mitchell grasslands since the 1860s, with intensification occurring in the 1920s as the artesian water supply became more readily available (e.g. Forrest 1988). Most Queensland Mitchell grass properties are leasehold tenure, with recent sales (2004) reaching $320-370/ha in the central west. Grazing has shifted from predominantly sheep to cattle in the last decade. The impacts of cattle grazing Mitchell grass are generally poorly understood.

## The Mitchell grass tussock

It is thought that individual Mitchell grass tussocks can live as long as 20-30 years, but can be as short as six years. To date, the maximum recorded lifespan for an individual tussock is 23 years (Williams and Roe 1975). Mixed-age tussocks at Toorak Research Station have been recorded continuously for 20 years (Orr and Phelps 2004), and are expected to break the 23-year age barrier. Tussocks are generally evenly distributed throughout the pasture at spacings of 25 – 80 cm, and range in size from 5 cm to 60 cm diameter at the base.

Mitchell grass tussocks have a dual root system, with 90% of the root biomass concentrated in the top 20 cm of soil, and the deeper roots growing to 1.2 m depth or greater (Everist 1964, Figure 2). The shallow roots tend to promote growth from existing tillers on smaller falls of rain (approximately 50 mm), whilst the deeper roots respond to deeper moisture penetration from heavier falls (approximately 200 mm) and initiate growth of new tillers from the crown and rhizomes (Phelps and Gregg 1991).

Mitchell grass has the ability to become drought dormant (Doley and Trivett 1974), with the leaves dying but stem bases and rhizomes staying alive. Drought dormancy is under hormonal control (Whalley and Davidson 1969). Mitchell grass also has the ability to extract more moisture from dry soil than other grasses (Phelps and Gregg 1991), and to commence photosynthesis within hours of wetting up when drought dormant, although not necessarily displaying new growth for a week to 10 days (Doley and Trivett 1974). Recovery is slower if leaves and stems have already become grey or blackened during drought, as opposed to retaining green at the base of the stems during dry periods (e.g. Doley and Trivett 1974).

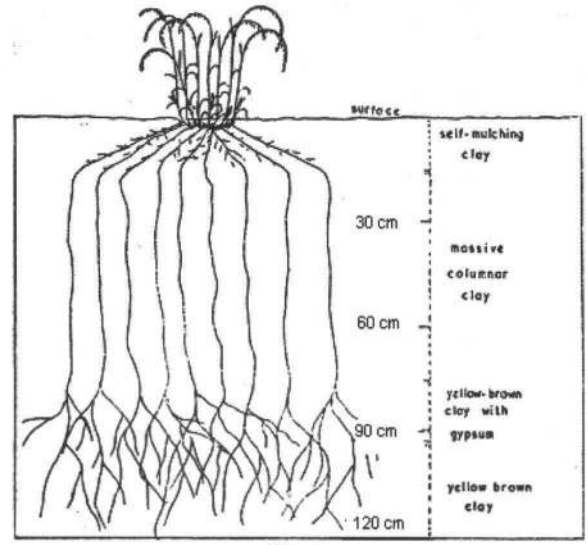


Fig. 2

*Figure 2. Mitchell grass root structure. Source: Everist 1964*

## Are tussocks in Queensland dead or dormant?

One of the key questions being asked by the graziers is: "Are Mitchell grass tussocks mostly dead, or are they still drought dormant but non-responsive?"

A small-scale pot study was conducted between March and May 2004 at Longreach DPI&F to determine whether tussocks were dormant or dead. A total of 216 tussocks were transplanted from a paddock in the Ilfracombe district to medium sized (13l) pots in the DPI&F shade house. The tussocks were transplanted from within a 100 ha area where 80-90% of tussocks had failed to respond. These tussocks were located adjacent to a paddock that had shown a good response. This suggests that the plants in the area were not dead at the start of 2004, since tussocks in the adjacent paddock produced good bulk and seed following January/ February rains. All tussocks used in the pot trial passed our practical field tests of:

- Being well anchored in the soil
- Rhizomes visually intact and firm
- Roots not obviously dead (not brittle).

Treatments were slowly wet up every week, fortnight or three weeks from overhead buckets with the equivalent of 100, 60 or 20 mm of rain. Soil moisture was monitored within each pot using a Theta probe and through weekly weighing.

Of the 216 presumed dormant tussocks transplanted from the field into pots, not a single one responded to watering levels as high as 100 mm weekly rainfall equivalent. This strongly suggests that the tussocks collected, and similar tussocks in the pasture, are dead rather than dormant. The result is not unequivocal, as deep roots (Figure 2) were not transplanted with the tussocks. Moisture penetration to the deep roots stimulates growth from tiller buds and rhizomes at the crown (Jozwick *et al.* 1970, Phelps and Gregg 1991), and thus may need to be stimulated by moisture for drought dormancy to be broken. However, Doley and Trivett (1974) found drought dormant plants transplanted into pots to rapidly respond to wetting up, whilst Whalley and Davidson (1969) postulated that the breaking of drought dormancy following 200 mm rain in January 1968 was hormonally mediated.

There is some field-based evidence to contradict the apparent wide-scale death of tussocks. High levels of tussock mortality have not been recorded at Toorak (Orr and Phelps 2004), but the drought has not been as severe in the Julia Creek district. Some graziers have noted a response in individual tussocks following rain in May. It is quite possibly that this response is from tussocks that had produced short tillers following the February rains, and that the response is only now apparent following May rain. Certainly there were tussocks rejected from the pot trial in March due to short (and very well hidden) tillers. The response noted in May is still poor, however, and does not represent wide-scale recovery.

## Has wide-scale death of Mitchell grass occurred before?

The wide-scale death of Mitchell grass tussocks during drought has been recorded, or strongly alluded to, in historical records and scientific literature from the last 140 years. The earliest reported drought for central western Queensland was in 1864 (Forrest 1988), although there is no indication whether it was pasture or water that was limiting. Reports from the oft-quoted worst drought in history (1898 to 1904) tended to concentrate on the impacts on livestock. There are indications that both pasture and water were limiting during the 1902 drought, with stock 'basically kept alive on the scrub cut for them' but that the 'lack of drinking water was by far the biggest drawback (Moffat 1987). Whilst the 1902 drought lasted for 71 months, the most protracted dry period (135 months) recorded for Longreach was from 1925 to 1939 (Table 1).

The 1930s received considerable scientific attention, with the Queensland Government botanist, Selwyn Everist, reporting concerns over the loss of Mitchell grass pastures in a number of articles (e.g. Everist 1935, 1939).

Generally, the response was recorded as patchy and indications are that pastures were similar to the central west in 2004.

In the Winton district in 1934, response to early rains was not very good, and it was thought that 'after eleven year's drought the Mitchell grasses would not come back at all' (Everist 1935). However, experiments conducted on the (then) Australian Estates Company property, Eldersleigh, in the Winton district over the 1935/36 summer revealed a dominance of Mitchell grass biomass in yield harvests following good January rains in 1936 (Griffiths Davies *et al.* 1938). This suggests that the Mitchell grass in the Winton district recovered quite rapidly.

Table 1. Periods of severe drought for Longreach between 1893 and May 2004. Source: Australian Rainman (Clewett *et al.* 2003).

| Drought | Period | Duration (months) | Total rainfall (mm) | % of time in severe drought[1] |
|---|---|---|---|---|
| 1 | Mar 1898 to Jan 1904 | 71 | 1,395 | 46 |
| 2 | Mar 1913 to Jun 1916 | 40 | 840 | 35 |
| 3 | Mar 1918 to Apr 1920 | 26 | 607 | 0 |
| 4 | Feb 1925 to Aug 1931 | 79 | 1,705 | 23 |
| 5 | Jan 1934 to Feb 1936 | 26 | 585 | 33 |
| 6 | Apr 1937 to Sep 1939 | 30 | 532 | 14 |
| 7 | Jul 1944 to Jul 1947 | 37 | 793 | 14 |
| 8 | May 1965 to Jan 1968 | 33 | 648 | 10 |
| 9 | Mar 1968 to Dec 1970 | 34 | 748 | 64 |
| 10 | Feb 1987 to Feb 1989 | 25 | 614 | 0 |
| 11 | Mar 1991 to Nov 1993 | 33 | 590 | 40 |
| 12 | Jan 2001 to Dec 2003 | 36 | 706 | 31 |

[1]Severe drought refers to the driest 5% of years for each 24-month period.

In the Boulia district, the response 'was rather patchy. In those areas which received rains in November and December, the Mitchell grass responded well, but in those areas which missed the early rains and received only the February rains, the response was poor' (Everist 1935).

For the Longreach district, reports were conflicting. For the Longreach-Jundah district, it was written that 'Mitchell grasses...responded remarkably well, having regard to the seasonal conditions. Old tussocks believed to be dead showed a wonderful recovery.' However, the district Inspector of Stock reported that 'the Mitchell grass responded very poorly even in places where conditions were favourable. And where it was reasonable to expect good results. Only a percentage of the old roots responded to the good rains' (Everist 1935).

However, it is difficult to find detailed records of the pasture condition for each of the 12 drought events; highlighting the necessity of capturing detailed observations and conducting field experimentation during the current event. Local knowledge from central western Queensland reports the 1960s, and for some areas the 1980s, as severely affecting Mitchell grass tussocks. For the southern Mitchell grasslands, Roe and Davies (1985) reported a decline in Mitchell grass density between 1943 and 1974, due largely to drought and a lack of seedling recruitment. Pasture monitoring was conducted during the early 1990s, but no wide-scale death of tussocks was reported (Phelps and Bosch 2002)

It appears that the current drought is dissimilar to other events; with generally high ground cover levels, including high levels of standing Mitchell grass stubble (in the 1930s and 1960s the Mitchell grasslands were often reported as 'barren wasteland' or 'moonscapes'). It differs to the most recent drought of the 1990s, in that existing tussocks then responded quickly to rainfall. In the current drought, however, tussocks have failed to respond to both January 2003, and February 2004 rains. Prior to this, we (Rangeland Scientists) had firmly believed that grazing conservatively to retain standing stubble and ground cover was the key to successful pasture management.

Everist (1935) reported that 'where the Mitchell grasses were not overstocked they seemed to be as good as they ever were.' In response to observations such as this, as well as long promoted conservative stocking strategies, we had invented colloquial catch cries like 'sell them or smell them' to promote early de-stocking and a conservative approach to managing Mitchell grass. Current training packages are promoting retaining stubble within a safe grazing management strategy (e.g. Chilcott *et al.* 2004). I believe these recommendations will still apply in the majority of years. However, some of these firmly held beliefs might need to be re-thought for specific events within the Mitchell grasslands to incorporate, for example, shorter stubble height in conjunction with spelling.

## Is drought the only cause of tussock death?

There is evidence from the current drought that drought is the most significant influence on Mitchell grass tussock death. The most often stated cause of current levels of tussock death by graziers is both the duration of the dry period and the timing of rainfall received over the last three to five summers.

For some areas the initial gap between significant rainfall events was up to fourteen months (November 2001 to February 2003), with 100 to 400 mm rain received as summer storm events in February 2003. Much of the Mitchell grass country then failed to receive further rain until January/February 2004, when 150 to 400 mm fell as summer storms. Some areas did receive rain late in 2003 (i.e. early summer rains), and some have also received May 2004 storms of 25 to100 mm.

It would be easy to conclude that it has simply been too dry for too long, even for Mitchell grass tussocks, especially when trees (e.g. mulga in the Jundah district, gidyea in the Aramac district) and other grasses (e.g. spinifex in the desert uplands region, buffel grass in the Tambo/Blackall districts) have also died during the current drought.

However, areas that show fence line or fire line effects contradict this simple explanation. For instance, the area from which the pot trial tussocks were exhumed demonstrated a strong fence-line effect. Adjacent to the sampling area is one of the best Mitchell grass tussock responses in the Ilfracombe Aramac district. Both examples are on the same soil type, have received the same rainfall, but have distinctly different grazing histories. The adjacent area is a laneway, which is grazed heavily (80-100% utilisation) by Merino sheep for 2-3 weeks every July in conjunction with shearing. The laneway is then ungrazed, except for 2-3 days each February, when only light levels of utilisation occur. At the time of exhuming the pot trial tussocks, at least 90% of the Mitchell grass tussocks in the laneway had gone to seed, there was excellent ground cover (at least 70%) and high levels of standing biomass (in excess of 1500 kg/ha dry matter).

The sample area was typical of the poor response within the district. Ground cover was high (at least 60%), but dominated by forbs and annual grasses and total standing biomass was approximately 500 kg/ha. The sample area had been grazed very sparingly for a considerable length of time (probably decades), due to the shape of the paddock.

Many graziers have contacted Longreach DPI&F staff to provide their own examples of response, or lack thereof, over the last 18 months. The general indications coming from these reports were that either a lack of standing Mitchell grass stubble (i.e. high levels of utilisation) was needed at the time of January/February rains, or that rains were needed prior to Christmas/New Year to produce a moderate to good response. Poor responses were always reported where there was a combination of standing Mitchell grass stubble (representing 50% utilisation or lighter, Orr 1978) and rains not received until January or later.

It hasn't just been too dry for too long – so what is it? To help capture graziers own answers to this question, to capture the relationship between rainfall, standing stubble and Mitchell grass response and to disseminate the latest information from the pot trial, a series of information exchange days have been held throughout Queensland's Mitchell grasslands.

## Capturing graziers knowledge through information exchange days

A series of information exchange sessions were held at Augathella, Blackall, Jundah, Ilfracombe, Hughenden, Julia Creek and Morella, allowing graziers to relate their observations and map their pasture response in relation to rainfall received across their properties for the last two seasons. These days were held based on the premise that graziers are making good observations of how the pasture has (or hasn't) responded, and that it is critical to capture these observations and record them for future reference. It is equally important that the theories developed are discussed and captured for posterity to help in decision making and understanding for future drought events. Over 120 people attended the information series, and mapped over one million ha of pasture response for their own properties. This information is still being collated.

Simple soil moisture probes and soil seed bank sampling kits have also been distributed to participants. The moisture probes will assist graziers to understand the depth rainfall events wet the soil down to, and to start to relate pasture response to soil moisture levels. The soil seed bank samples to be collected by graziers will be returned to the DPI&F for processing to determine the average levels of Mitchell grass seed in the soil within their most severely affected paddocks. This will then act as a guide to the potential for seedling recruitment over the coming summer, and help to guide pasture management strategies.

## In conclusion

The only consistent trend seems to have already been reported by Everist in 1935: '... areas which received rains in November and December ... responded well'.

However, it has become quite apparent that there is no consistent trend in the smaller areas that responded well within an otherwise sea of dead Mitchell grass. The extended dry period, with the possibility of the entire deep-rooting profile drying out may be the key to death, but what is the key to the grazed or burnt areas surviving? Perhaps growth-inhibiting hormones or plant pathogens have been removed with the removal of stubble in these areas, or perhaps nutrient cycling has been enhanced through high-intensity grazing or burning and has promoted a response in these areas.

It is clear is that despite 80 years of research, we still don't fully understand the processes initiating and breaking Mitchell grass tussock drought dormancy, nor do we know how long Mitchell grass can survive without soil moisture. The most intriguing insights appear to be held within the areas demonstrating aberrant good responses. It is these locations in particular that further research needs to focus on over the next two to five years.


## Acknowledgements

Many Longreach DPI&F staff have contributed to this paper by collecting and collating information from personal observation and through involvement with producers over a wide area of western Queensland. These staff include Jenny Milson, Lew Markey, Tony Rayner, Désirée Jackson, Leilani Weier, Dominic Marshall and Garry Pidgeon. Thanks to David Orr and Mick Quirk for providing feedback on this article. Thanks also to the many producers who have given their time and energy to share their experience and information.


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# ANYONE INTERESTED IN SOME LONG-TERM SOIL MOISTURE AND TEMPERATURE DATA FROM SOUTH-WEST QUEENSLAND?

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For many years from the late 1930s, CSIRO had a field station in a Mitchell grass community at Gilruth Plains in south-west Queensland. Much of the research work done there was written up but some long term measurements of soil moisture, soil temperature and the N and S concentrations in rainwater, collected by Dick Roe, were never published.

This data has now been placed on record and is available to anyone interested. The soil moisture was collected for two years (1941-1943) on two clay soils, with regular measurements at 1", 6", 12", 24", 36" and 48" (122 cm) and occasional measurements at deeper layers. Data on the moisture characteristics of the two soils are given. Weekly maximum and minimum soil temperatures were measured at three depths (6", 12" and 24") for the greater part of 5 years (1943-1948) and N and S concentrations in rainwater were measured for two years.

The data could be of specific interest to anyone interested in moisture, temperature and nutrient regimes in semi-arid clay soils but could be of general use in validation of moisture and temperature models. The monthly rainfall data for periods when moisture and temperature was measured are included with the soil and temperature data. More detailed data for Gilruth Plains is available from the Bureau of Meteorology.

A brief text describing what and how measurements were taken is available as a Word document and the temperature and moisture data are in an Excel file.

The files are available from:

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# REPORT FROM COUNCIL

*Lachlan Pegler, Communications Officer ARS, 34A Bridge Street, Toowoomba QLD 4350.*
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The excitement was building in the Society as the Alice Springs Conference approached. The opportunity for members, and Council to meet face-to-face and seriously discuss issues such as the future directions of the Society seem too few and far between. However, I guess that is one of the legacies of a nationwide organisation that has many members outside the urban areas.

- There has been ongoing discussion between the Publications Committee and Council regarding the proposed electronic publication of the Journal. Leigh Hunt has done a sterling job of investigating the options available, however the outcomes are still under discussion. CSIRO Publications appears to offer the best solution – at a significant cost to the Society – but this may well be the only viable route for the Society in the long run. The proposal at this stage would see both hard and electronic copies of the journal produced. I hope that further discussions at the Conference and a 'reading' of member's views will clarify the eventual decision process for Council.

- Tim Ferraro has been extremely busy for the Society ensuring that various ATP and ASIC requirements have been addressed. He has also been ensuring the funds of the society have been working harder by optimising the investment of these dollars. Tim has been beavering away at getting the accounts, and has presented a set of books for 2003. These show a profitable result, but rely heavily on ongoing conference income.

- The development of a new logo for the society has stalled. The graphic artist engaged to provide a range of alternative interpretations of the Society's image produced three alternatives. The Council were not sufficiently impressed by any of these to recommend a change in logo. We will keep thinking about it, and are open to ideas.

- The WA sector of the Society (David Wilcox and Sandra Van Vreeswyk assisted by Ian Watson) are attempting to secure an Officer for the position on Council of Member Services. They have also managed to track down a web master for the Society web site; the services provided by Jason Batory from the Department of Agriculture in Perth are greatly appreciated by Council.

- Past President - Merri Tothill - has been investigating the archiving of past correspondence, minutes and publications of the Society. She has found that the current arrangements of stewardship by Andrew Nicolson of Middleback Station SA are working well, and that the archives are in good condition - although may need a bit of a cull.

- Ian Watson - Subscription Secretary - has reported an increase in membership numbers, from 301 to 356, which may demonstrate the importance of a membership drive at Conferences.

I hope that as many as possible of you were able to attend the Conference in Alice Springs – I am jealous that I was unable to attend, but hope that many of you had the opportunity to chat with Council members about what **you,** the members, want from the Society.


# POST CONFERENCE REPORTS

Three reports from the recent Biennial Conference are included below – by all accounts the conference was a great success. Although some information is repeated in the summaries, each report is presented in its entirety so as to emphasize the highlights of the conference.

## ARS Conference – the best ever!

*Merri Tothill, Communications and Media Studies Program, School of Journalism, University of South Australia, Adelaide, South Australia.*
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If you weren't one of the 350 people at the conference, here are a few snippets to give a feel for what you have missed.

Betty Pierce and Pat Dodds, representing the traditional owners – Lhere Artepe *(Luwra Tupa),* warmly welcomed Conference delegates.

Mr Ted Egan AM (Photo 1), Administrator of the Northern Territory, officially opened the conference and paid tribute to the traditional people. In his opening speech he focussed on the theme of "living in the Outback" and the vital role of women in supporting the family and educating children.

The opening keynote address by Paul Wand, Chairperson of the Board, Desert Knowledge CRC, stressed the importance of establishing and maintaining a desert knowledge base. "It's about managing our natural resources and we need people to do it," he said. "We also need to move away from the image of the desert as the 'dead heart' to a more true picture of a place of overwhelming 'aliveness'." "Linkages are extremely important and we need to work together to create enough critical mass" he said

ARS through its holistic approach has provided the vehicle to cover the issues in an integrated way.

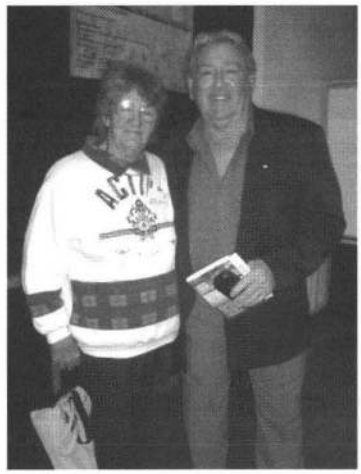

*Photo 1. Ted Egan AM and Faye McPherson from Byrock, NSW.*

Mark Howden of CSIRO, spoke on managing the risks of climate change. "Temperature and carbon dioxide levels have been falling and rising over the last half million years or so, according to data obtained from ice core samples," he said. "Climate has always been variable but the difference today is that we are no longer working within the bounds of variability."

In the next 50 – 100 years we can expect some temperature increases, changes in rainfall, sea level rise, increased wave activity and changes in ocean currents, as a result of human activity. To put this in perspective, Mark used the example of Melbourne having the climate and weather, currently experienced by Moree.

The effect of this includes more heat stress and the need to drink more water, more often. This applies to domestic stock, native animals and humans!

Mark stressed the need to start adapting management to cope with this change and he proposed a number of strategies to assist pastoralists and farmers. These include stocking based on seasonal climate forecasts, greater utilisation of spelling, selection of animal lines based on resistance to high temperatures and modifying timing of mating and weaning.

Carmel Wagstaff picked up the focus on people in her presentation on employment opportunities in the rangelands.

Carmel believes that we must portray working in the rangelands as rewarding and professional so we can attract the best and brightest and also keep them.

We must actively work to change the current perception and positively promote the rangelands and its industries. Taking a professional approach to recruitment, selection and induction and recognising the importance and value of a safe workplace are integral. Offering professional development and implementing better staff management practices are vital to avoid the potential chronic shortage of skilled staff.

To complement this theme, the ARS devoted a conference session to showcase the new generation of rangelanders with a number of excellent student presentations.

David Ross, Director, Central Land Council, gave the audience an insight into the achievements and challenges for indigenous people in the rangelands. David coined the term - *'Rangelands needs its people'* which was picked up by many speakers throughout the conference.

In her presentation on multiple use and multiple users, Kate Andrews from Land and Water Australia, expanded this to include – *'People also need each other'*, acknowledging that we are interdependent. We need focus on shared values and work on the common ground while acknowledging the differences. Its not easy but necessary if we are to move forward. In the words of Murray McGregor, of the Desert CRC, 'it's the chains that link all in the rangelands.'

These few bits and pieces from the conference have not done justice to all the hard work and effort. The posters sessions, field trips and social events were also a great success (see Photo 2). Overall the feedback received was overwhelmingly positive. The ARS thanks the Conference Committee and Organiser, Sarah Nicolson for their fantastic effort.

*Photo 2. Early arrivals at the Conference Dinner at Ooraminna Bush Camp*

There is a sense that ARS is getting much closer to reaching its objective of providing a forum for the open discussion of rangeland issues. We are slowly coming to grips with the integration and balancing of environmental, social and economic outcomes. However, there is still more work to be done.

This evolution will continue as we attract new members from a wide range of fields. The next conference will be in Renmark, South Australia in September 2006. We plan to demonstrate that we are continuing on the journey. Let's hope that you can join us there.

## 2004 ARS Conference Points the Way Ahead for Rangeland Practices

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A record of over 300 participants at the 2004 ARS Conference held in Alice Springs this week heard many inspiring papers helping to change an historical notion of a 'dead heart' to a 'living red heart'. Welcomed by the Lhere artepe, "Loora tuppa", traditional owners of the host region, we heard about the way people used to live 'in tune' with the land and how local problems such as infrequent but costly flooding of Alice Springs might easily have been avoided by a better utilization of traditional knowledge.

Given present entrenchments of land uses now though, the focus turned to 'Adaptive Management' of natural resources to accommodate contemporary production and non-productive uses. One billion people now inhabit the one third of the worlds land surface which is classified as arid rangelands. Australia, with 11% of the worlds deserts and a reputation for innovation, is well placed to capitalize on its technologies and practices through institutions such as the new Desert Knowledge Cooperative Research Centre and from learning from such diverse gatherings as the ARS conference.

As a multi generational inhabitant of the region myself with an emergent particular interest in camels, their control and benefits, I was heartened to find so many ways that camels were able to provide answers to so many of the open questions presented by the conference papers. Many of the problems on the rangelands have arisen due to grazing by a small variety of specialized, hard hoofed herbivores with high water dependencies, grazing close to available watering points.

Greg McKeon, in his paper on the eight major episodes of 'degradation' pointed in particular to the emergence of woody weed 'problems'; the groups of plants most favoured by camels, yet rejected by the more traditional livestock. Mark Howden's paper on managing the risks of climate change showed a map of how 'heat stress' by an expected temperature rise of just 2.7° by 2070 would affect most areas of cattle production; still however within comfortable limits for camels. And so it went. Within almost every paper presented at the conference I was able to see the benefits of including camels into rangeland practices. We heard how some of Western Australia's pastoralists were turning to goats in a region that is particularly suited to camels, and coincidentally working with the same traditional markets as those for camel meat. Infamous for their desertification roles in arid regions, those goats might be timely replaced by the softer footed, higher reaching and less water dependent camels allowing those pastoralists to benefit from both their new marketing and historical in-situ rangelands experience.

Many good tools for managing and monitoring changes were provided by an excellent selection of speakers with great leading-edge backgrounds in their fields. These were heard and well received by a wide and fairly comprehensive cross-section of the rangeland communities. A new inclusion in proceedings, 'Indigenous Land Management', was particularly well received and our members enjoyed the opportunity to both listen and to be heard. Several speakers provided useful frameworks for joining, utilizing and managing elements of these 'net chains', and a general emphasis by all was placed with 'people' as an essential part of the rangelands.

I have returned to my work and living environment with a plethora of new 'tools' and ideas to help in the next two years until an update at the 2006 ARS conference at Renmark. Meanwhile I am hoping to be able to keep up with and participate in the changes forecast by the presenters at the 2004 Alice Springs ARS conference, and look forward to working with you all.

## ARS 13th Biennial Conference Wrap-up

*Mark Alchin, Department of Agriculture, Western Australia, PO Box 108, Meekatharra WA 6642.*
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Successful management of Australia's rangelands relies heavily on the capacity of rural and remote communities to remain socially strong and to achieve economic self-sufficiency. Delegates of the 13th Biennial ARS Conference came to fully understand this point which became the recurring theme for many of the presentations at the conference which was set quite fittingly in the 'dead' centre of Australia's rangelands in the magnificent surroundings of Alice Springs.

Delegates were extended with a warm welcome from representatives of the *Lhere Artepe* Aboriginal Corporation in order to formally recognize the traditional indigenous owners of the Australian rangelands and to demonstrate that the ARS has broadened its traditional focus beyond simply just issues regarding pastoral production.

Many of the speakers continued to emphasize that there were ongoing negative trends within many outback communities in which they continued to spiral further into social 'blackholes' which are characterized by declining services, shrinking populations, lose of social cohesion, reduced opportunities and greater financial hardship. In an effort to arrest this trend the Desert Knowledge Cooperative Research Centre (DK-CRC) was developed and officially launched at the conference. DK-CRC recognizes that people and their personal knowledge and experiences are the lifeblood of the Australian outback and they are the unique feature which has allowed the sometimes seemingly harsh desert environment to be a source of both social and economic fulfillment. It emphasizes that we need to think about our natural resources in the broader context of dynamic global markets and to capitalize on the inherent marketing characteristics of rangelands regardless of the land-use.

The focus of the DK-CRC appeared to be strongly supported by the representative speakers from industry who identified that the economic profitability of their enterprises was closely aligned with the extent to which they were effective at managing their greatest asset – people. 5th generation wool grower David Lord expressed that his family, along with the majority of the pastoral industry, were not managing properties for easy or convenient living; they have made a choice and the

properties are their long-term homes. David along with other representatives from other enterprises and pastoral companies considered that the greatest threat to the rangelands is the loss of people. This message seemed to reoccur even outside the formal proceedings of the conference within discussions between delegates during the various intermissions and social functions. Many considered that one of the major downfalls after decades of rangeland research has been that it has failed to effectively address the social aspects that virtually act as the linchpin for the initiation of proactive change in the rangelands.

Impacts as a result of mismanagement of pastoral lands were identified and the lessons that have been learnt from the historical degradation episodes were discussed. The conference linked many of these degradation issues with the failure of both industry and government departments to fully appreciate climate variability and the value of accurate forecasting. Industry tends to be highly skeptical of any information that departments release due to its perceived vagaries and therefore this area will undoubtedly continue to be a major focus for continuing R&D. Issues surrounding adaptive government policy which considers climate variability and the related financial consequences were addressed and appeared to provide many potential benefits to both industry whilst ensuring the long term sustainability of the natural resources if they were accepted by various State and Territory governments.

The need for greater scientific objectivity in grazing animal management was expressed in some of the presentations and in particular during the informal discussions at many of the social functions. Industry recognized that aside from their ecological obligations as land managers the benefits of improving the efficiency of their current management will potentially increase their gross margins as well. Unlike many other primary industries where science has removed a large degree of guesswork from many of the management decisions, it appears that rangelands as a discipline has failed to effectively resolve even some of the basics such as stocking rate. The growing application of remote sensing and GIS was demonstrated and identified as a tool that could assist delegates in elucidating some of the 'simple' questions. Delegates were challenged to 'get back to basics' and to address the issues that are of major concern to industry before attempting to resolve the somewhat more elusive academic objectives.

Terry McCosker was successful at capturing the full attention of the conference when he claimed that as scientists, administrators and land managers we should not be aspiring to ecological sustainability. He stated that we should not be aiming to sustain our already degraded resources in a state which is far from their original biological states. Rather we should be directing our resources towards ecological and economic renewal in order to fully achieve our objectives of rural and remote communities which are socially harmonious and profitable.

The various issues arising from the expansion of multiple land uses in the Australian rangelands (particularly tourism) were discussed and strategies in order to resolve potential conflicts were presented. The need for rangeland monitoring systems which effectively measure and relate meaningful information to government departments, land managers and conservation administrators was discussed by various speakers and was a major focus for many of the poster presentations.

The conference program provided many opportunities for delegates to catch up with many old colleagues and to share a beer with many new ones. The formal dinner was hosted at Ooraminna Bush Camp which was nestled in the rugged ridges of Alice Springs and acted as a magnificent venue providing many with an opportunity to experience a small taste of the rustic mystique of the Australian outback. It was a great night although the pads around the burning woodfire 44 drums were well worn and according to many inaugural ARS members it certainly was a quite a conservative night compared to many more "wild functions" of the past.

Undoubtedly, there are many challenges that lie ahead for the effective management of the Australian rangelands and there is sometimes a lot of negativity surrounding their future, particularly in regard to the longevity of the pastoral industry and its role in the rangelands. I consider that the 13th ARS Biennial Conference was successful at providing a balanced approach to addressing many of the varied objectives, threats and opportunities within all activities associated with rangelands. As a young man relatively new to the industry I am highly optimistic about its future. The Meekatharra District in Western Australia is now entering into a fourth year of ineffective winter rainfall seasons and most stations are virtually destocked yet many of the pastoralists continue to remain optimistic which is a testament of the resilient spirit of outback communities. If this is any indicator of the current status of the broader pastoral industry I consider that we are in for a bright future as long as we remain committed to constant improvement and readily adopt change as an attitude.

# FIELD GUIDE TO THE PLANTS OF OUTBACK SOUTH AUSTRALIA

*Frank Kutsche and Brendan Lay, Pastoral Program, SA Department of Water, Land & Biodiversity Conservation, GPO Box 2834, Adelaide SA 5001.*
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Have you ever had a plant in your hand when you were working in the Outback, or on holidays but had no handy reference book? How many times have you thought those reference books are just too big to carry around, costly to buy or too easily damaged? Have you ever wanted a field guide that was specific to the Outback region of South Australia?

The Pastoral Program has recently produced a field guide of native and introduced plants that occur within the rangelands region of South Australia (see Front Cover in Figure 1 below). The guide is of a convenient size, durability, and affordability to satisfy a large range of end-users. A partnership between the Soil Boards of the rangelands of South Australia, the Pastoral Program – Department of Water, Land and Biodiversity Conservation (DWLBC), and the Plant Biodiversity Centre - Department of Environment and Heritage (DEH), with major funding from the Natural Heritage Trust, has enabled this full-colour quality field guide to come to fruition. As part of collaboration between State government departments the Design Publishing Unit (DEH) carried out the artwork and layout work.

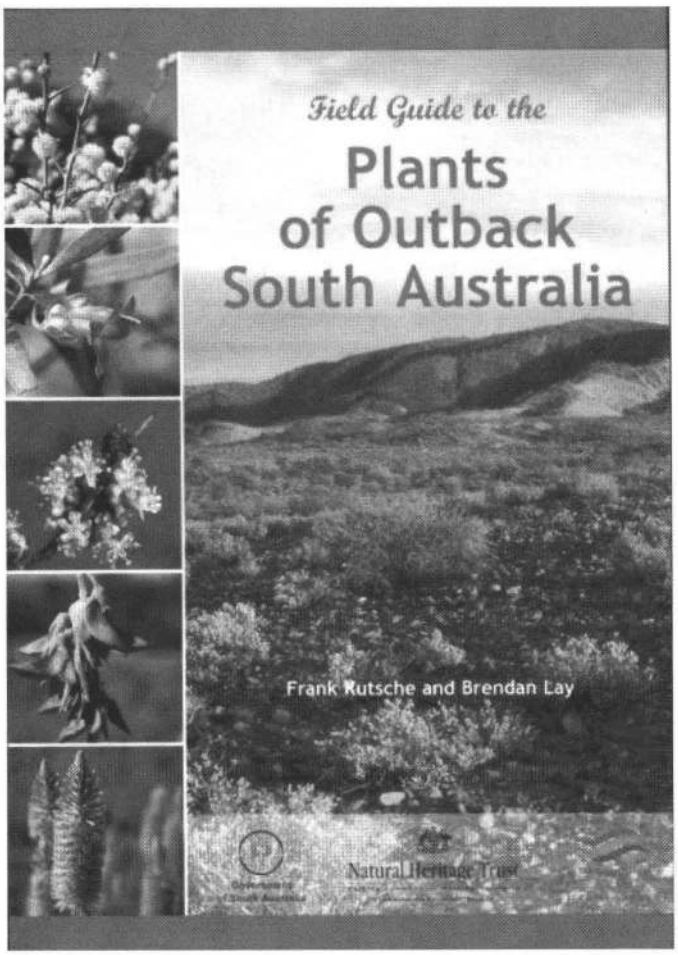


*Figure 1. Front cover of the new field guide.*

## Why was the book written?

There has been an increasing interest in the South Australian rangeland region as a tourist destination, brought about by such initiatives as The Year of the Outback, and increased accessibility with Public Access Routes instigated by the Pastoral Board of SA. Many of the visitors to this area take a large interest in what they are seeing, whether it is the geology, the fauna or the flora. In addition to tourists, other major interest groups for this book are pastoralists, scientific communities and the education community. Information contained within can aid in making management decisions. The book is also a valuable asset for interstate people due to the wealth of information contained within.

## Format of the book

To cater for all interest groups the language used in the guide is simple and follows a similar format to the well-respected but large-sized "*Plants of Western New South Wales*" (Cunningham et al, 1992). This book has until now formed the main basis for plant identification for people in the region but contains many plants that do not occur in SA. Other books use scientific language necessitating constant use of a glossary and generally cater for specific audiences. The field guide addresses the issues of convenient size (glove-box sized), simple language, cost and plants that occur in this State.

A total of 356 species are fully described and illustrated with high quality photos including close-ups of distinguishing features and the plant in their natural environments. The featured plants are a combination of the most common plants obtained from the Pastoral Program's extensive database as well as less-common species that would hold special interest. Many pastoralists requested the inclusion of weed species so these are highlighted. Rare and endangered species are featured with their current status provided by the Department of Environment and Heritage (DEH). The field guide contains the most up-to-date location map information and scientific names provided by the Plant Biodiversity Centre of the South Australia DEH.

In addition to the simple language used throughout the guide a glossary provides further assistance with plant identification. This particular glossary is unique in that it includes close-up photos of plant's distinguishing features rather than diagrams, to aid in recognition and familiarisation of features in plant identification in a "real" sense. This unique feature would make a valuable addition to other field guides.

The field guide is made from durable materials for work in the field such as a flexible plastic cover and "varnished" ink on the internal pages. A wealth of information is contained despite the relatively small size. This includes the plant's lifeforms, such as trees, shrubs, forbs, grasses and miscellaneous, including lilies, mistletoes and sedges. Quick reference guides contain plant's size, flowering times and how common a plant is, based on a three-tier system of common, locally common and uncommon. Leafs are described with common shapes for easy recognition, for example spearhead-shaped.

Scientific names form the main titles due to the regional variance in common names. Variations, subspecies and form taxon are given where applicable. The most widespread common name and lesser regional common names are also included. Textual information includes descriptions of plant shapes, bark, and sizes and descriptions of leaves, stems, flowers and fruits. Soils and land types the plants occur in (including quick reference icons) feature also. A "comments" section includes information on pastoral use and general interest sourced from pastoralists and similar books such as Cunningham et al (1992). Aboriginal usage comments have been largely sourced from the comprehensive Bushfires and Bushtucker by Peter Latz (1996) and several smaller regional sources. Location map regions for each plant are based on those shown in the Flora of South Australia series by J. P. Jessop and H. R. Toelken (1986) for continuity within the scientific community.

This book is a unique compendium of information to guide the management and conservation of the most widespread and important plants in the rangelands of South Australia. It builds on the vast amount of information collected during the pastoral lease assessment program of the Pastoral Program in the SA DWLBC, and from scientific study. It has been written by scientific staff of Program with 53 years combined knowledge in the rangelands region and incorporates the lifetime experience of many of our pastoral land managers in the region. The amount of information and photographs results in this book being a "must-have" for residents and serious visitors to the region.

### Sales and Feedback

For more information on retail and wholesale sales, and to provide feedback contact the Pastoral Program in the South Australian Department of Water, Land and Biodiversity Conservation on freecall 1800 678 447.

### References

Jessop, J.P. and Toelken, H.R. (ed) (1986) Flora of South Australia, 4th Edition, The Flora and Fauna of South Australia Handbooks Committee, South Australian Government Printing Division, Adelaide.

Cunningham, G.M, Mulham, W.E, Milthorpe, P.L and Leigh, J.H (1992) Plants of Western New South Wales, Inkata Press, Melbourne, Sydney.

Latz, P. (1996) Bushfires and Bushtucker, IAD Press, Alice Springs.

# INFORMATION SNIPPETS

## New Healthy Rangelands book launched

The book *Healthy Rangelands: Principles for Sustainable Systems, Focus on Australia's Burdekin Rangelands* was launched at the recent ARS Biennial Conference.

According to a review by Gordon Duff, this book brings together an extensive array of information on land use, management and biophysical systems in this Queensland catchment. Of the many areas that make up the tropical savannas landscapes, the Burdekin Catchment stands out as an important component of the pastoral estate in the north Australian rangelands, and one that plays a significant role in the regional economy.

The book's purpose is to take an integrated approach to sustainable management based on knowledge of the various landscape components and their complex interactions. Issues facing natural resources managers in the catchment are both localised, such as the long-term sustainability of the resource base for grazing and other land uses, and external, such as the relationship between the catchment and the Great Barrier Reef lagoon.

The book can be ordered through the Queensland DPI&F Book Stores (Phone Orders: 1 800 816 541 or Internet: www.dpi.qld.gov.au/shop) or from the Tropical Savannas CRC website (savanna.cdu.edu.au/publications/).
It is priced at $49.95 ($45.41 +$4.54 GST).

## Rangeland Australia offers short courses and postgraduate programs

Rangelands Australia, a national body for the exchange of rangeland knowledge and learning based at The University of Queensland's Gatton Campus, is currently offering industry responsive short courses and postgraduate programs.

The first three short courses are entitled:

- Being heard as a stakeholder in the rangelands;
- Introduction to rangeland monitoring for management; and
- Being in the rangelands for the long run: Balancing economic, environmental and social outcomes.

Each course is planned to be delivered flexibly to meet the particular needs of learners in the rangelands. These courses are specially designed for:

- Landholders and managers;
- Facilitators e.g. Landcare, Bushcare and catchment groups;
- Government advisers;
- Consultants e.g. Agribusiness;
- Environmental officers e.g. Local government, mining; and
- Training and service providers e.g. Banks.

Rangelands Australia is also offering coursework postgraduate programs in Rangeland Management which are designed to position people to meet the future social, economic and environmental challenges of industry and rangeland communities. Three levels of postgraduate programs for professional development are available:

- Graduate Certificate in Rangeland Management
- Graduate Diploma in Rangeland Management
- Master of Rangeland Management

Further details are available from the Rangelands Australia website (www.rangelands-australia.com.au) or by phoning 07 5460 1660.

## Guide to managing Landcare projects available

The Guide "Setting up for success: a guide for designing, managing and evaluating projects" has been developed to assist community Landcare groups in Australia to design, manage and importantly, to evaluate projects that are realistic, achievable and successful.

The guide asks questions to prompt thoughts on what to do and helps to decide on the critical steps needed to tackle problems encountered during the process. It helps determine what can be realistically achieved and how to measure progress and success.

A copy can be downloaded from the AFFA website at: www.affa.gov.au/content/publications.cfm?Category=Natural%20Resource%20Management&ObjectID=EF7AE060-A911-467B-B54AB4FCBCF86D43

## New Savannah Way tourist route established

Queensland, the Northern Territory and Western Australia have launched a new driving tourism route across Australia's Top End.

The Savannah Way - a 3700km route spanning northern Australia - links Cairns in Tropical North Queensland to Broome in Western Australia via Katherine in the Northern Territory. The route passes through some of Australia's most spectacular scenery, including: five World Heritage areas, 15 national parks, the world's longest lava tubes, historic goldmining towns, Outback cattle stations, Australia's oldest pub and a wealth of indigenous culture.

The Savannah Way project has included erecting directional road signage and interpretive panels, and publishing a dedicated route brochure, map and trip planning website.

For more information visit The Savannah Way website at: www.savannahway.com.au

## Historical photographs available on the QDPI&F website

The Queensland Department of Primary Industries and Fisheries website contains an interesting collection of photographs relating to the history of the Department and to agricultural development in the state. The photographs, some dating back to the 1880's, can be viewed by visiting www.dpi.qld.gov.au/department/15115.html.

## Australian Government Portal sites

The Australian Government has set up a series of Portal sites which provide gateways to various Australian resources on the internet.

The Environmental Portal (www.environment.gov.au) provides access to online services and information provided by Australian, State and Local Governments. The information is organised by seven broad environmental themes - Atmosphere, Biodiversity, Coasts and Oceans, Environment Protection, Heritage, Inland Waters, and Land. Information can also be accessed by Service, Resource and Location. The site provides easy access to information such as State of the Environment reporting, Natural Heritage Trust, Government Departments and environmental education.

The Agriculture Portal (www.agriculture.gov.au) is described as an ever expanding catalogue of Australian, State and Territory Government information and services for the agricultural, fisheries, processed food and forestry industries. Links are grouped into three major themes – Resource Management, Products and Industries and Agribusiness.

Other portals also exist for Australian Government (www.australia.gov.au), Culture and Recreation (www.culture andrecreation.gov.au), Science and Industry (www.scienceand industry.gov.au) and Business (www.business.gov.au).

## 2004 Australia New Zealand Climate Forum

The 16th Australia New Zealand Climate Forum will be held in Lorne, Victoria from 8 - 10 November 2004. 'Climate and Water' is the theme for this biannual forum which brings together researchers of climate sciences and users of strategic climate information.

ANZCF2004 sessions will include:

- Understanding and Predicting Climate Variability and Climate Change;
- Impacts of Climate Change and Variability on water resources and water management;
- Observations and lessons from southern Australia; and
- Applications of climate information for water management.

Full details of the forum are available from (www.bom.gov.au/events/anzcf2004/index.html)

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# Australian Rangeland Society

ABN 43 008 784 414

## 2004 ANNUAL REPORTS TO MEMBERS

## PRESIDENT'S REPORT

*D G Wilcox AM, President ARS, 54 Broome St, Cottesloe WA 6011. Email: dgwilcox@cygnus.uwa.edu.au*

It is pleasure that I present the report of the Directors of the Australian Rangeland Society for the twelve months ending 31 May 2004.

The principal business of the Society is to:

(i) Publish The Rangeland Journal

(ii) Publish the Range Management Newsletter

(iii) Hold biennial conferences of the Society for members and non-members on subjects relating to the use of rangelands in Australia

(iv) Provide travel grants for selected members assisting them to attend national and international conferences

(v) Be a forum of informed persons on rangelands matters in Australia

The business of the Society is discussed under these headings below.

### 1. Directors of the Society and members of the Council

The directors of the Society for the period till May 2004 are:

| | |
|---|---|
| David George Wilcox | President |
| Alexandra (Sandra) Van Vreeswyk | Secretary |
| Timothy Ferraro | Finance Officer |

(Assumed their positions on 30 August 2003)

### 2. Other members of the Council

| | |
|---|---|
| Merri Tothill | Immediate Past President |
| Neil McLeod | Membership Officer |
| Robyn Cowley | Membership Services Officer – (resigned) |
| Lachlan Peglar | Communications |
| David Lord | Vice President |

### 3. Chairmen and Secretaries of associated activity committees, not Council members

| | |
|---|---|
| Publications | Leigh Hunt (Chair) |
| Journal Editor | R D B Whalley |
| Newsletter Editor | Noelene Duckett |
| Subscription Secretary | Ian Watson |
| Printing Manager | Malcolm Howes |

### 4. Retirements

The following members of Council retired on 30 August 2003

| | |
|---|---|
| Sarah Nicolson | Secretary |
| John Maconochie | Finance Officer |

### 5. Business report

(a) *Publications*

Two issues of *The Rangeland Journal* were published in the current year, one being that containing papers from the 12th Conference of the Society and entitled "Drivers of Change in the Rangelands". The Journal continues to be well received though it does not yet have a corps of authors located outside Australia. It continues to be included in the Contents listing services to our great satisfaction. This achievement is due in great measure to the unremitting hard work of the Editor Dr Whalley, the Chairman of the Publications Committee, Dr Hunt and the Production Manager, Malcolm Howes as well as to the authors and their referees.

The means of publishing the Journal in other print form is being canvassed by the Publications Committee. Council is dealing with a proposal from the Publications Committee that the Journal, as distinct from the Newsletter, should be published electronically. The advantages centre around increasing the attractiveness of the Journal for authors who would be thereby guaranteed a much expanded readership given the trend of libraries to lead towards those Journals published in this way. In addition, publication electronically should increase the number of subscriptions to it through time. As there is clearly a need for us to identify the Society as one that can present a diversity of views on rangelands and their use electronic publication has significant advantages for the Society. If Council decides to move to electronic publication members would continue to receive their issues of the Journal in "hard copy" form.

There are of course factors that are not conducive to this change in the medium of publication and these include the increased cost. Council will be considering how this might be managed in the interests of members. No decision will be reached until later in 2004.

The *Range Management Newsletter* was produced three times during the year. Its content continues to be of interest particularly in respect of those articles on rangeland science which may not immediately secure a place in the Journal. The Council is keen that the Newsletter will be used as a medium for the publication and circulation of that vast, corporate body of knowledge about Australian rangelands that is currently held in so many offices throughout the nation. It is almost a responsibility to see that it shared. The less onerous refereeing strategies employed by the editor should encourage the use of the Newsletter in this way.

(b) *Conferences*

The 13th Biennial conference of the Society will be held in Alice Springs in July 2004. The program differs quite markedly from earlier meetings in that it focuses upon individual responsibilities for achieving proper land use in a wide understanding of the term. There are also parts of the program dealing with shared rights to land use and with the maintenance of the inherent biodiversity of these lands. The program highlights the change which has occurred in our understanding of the rights to use land and the emergence of true stewardship as a responsibility of occupancy over the 25 years of the existence of the Society.

The 12th, Biennial Conference was held in Kalgoorlie in 2002 and resulted in a new profit of approximately of $22 000 to the Society. Council will have to look to receiving comparable sums from each conference in the future if it is to maintain the services to members.

(c) *Membership*

Membership of the Society has undergone a decline since 1989 falling to about 300 until 2002. In the last year we have received 59 new applications for membership. This is indeed encouraging. As I look for the reasons for this increase I feel that the recent conferences of the Society have encouraged more to join as we could be seen as a logical focus for those interested in a holistic view of rangeland use. The Web Site might also be encouraging others to join as it now reliably shows the depth and breadth of the interests of the members.

Initiatives such as Electronic Publishing as discussed elsewhere may also increase membership numbers.

The Society has the capacity to be more that a body producing publications of world standard and of holding well attended conferences. It is the common meeting ground for many from varied disciplines who collectively have the ability to make public statements on matters concerned with rangelands. Two recent issues of the Journal of the Society concerned firstly with Change in the Rangelands, and secondly with the Impact of Clearing native vegetation should have had a greater impact. One might question why, as they are clearly the product of high levels of professionalism, great intellectual rigour and of many years of experience in the rangelands. Council will be researching opportunities for popularising the content of the Journal making it available to more than members and our subscribers.

(d) *Financial*

Council has adopted the principal recommendations made by Don Blesing in his report on the financial management of the Society and on those concerned with defining the correct procedures in a range of administrative matters. We are indebted to Don for this work and to the previous Council for recommending this review and overhaul.

Council did not proceed with the recommendation to employ a bookkeeper since after the consolidation of the various bank accounts and the establishment of a number of procedures this expense was not considered necessary.

The financial affairs of the Society are on a strong footing and its expenses are covered by income backed up by the strength of the current account.

(e) *The ARS Web Site*

I should make mention of the Web Site as it is a public window onto the Society. It has been available to those who wish to see it for about 18 months and is continually undergoing revision and development. Council is now in a position to engage a Web Master to look after our needs in this respect.

The Web Site receives up to 12 000 hits per month, most of these originate in Australia and in North America. There are no hits registered from Europe, Asia or Africa. Many of the visitors to the site are repeat visitors.

These data are very encouraging. I hope that we may be able to develop an interactive area within the site where various matters might be discussed using email links so that the Society is not involved in the maintenance of this part of the Site.

(f) *Membership Services*

Robyn Cowley, who resigned from Council on her move from Katherine NT to Queensland, contributed very significantly to awareness of the membership services that the Society provides. These have included travel grants to conferences on application and assistance to members and students as well as practising land managers to attend our conferences. Council will be determining the quantum of funds that might be made available for this purpose so that they can be placed on a firm footing. Council will be replacing Robyn with a member of the Society as provided for in the Articles of Association.

## Meetings of the Council and of the Membership

Council met on four occasions in the period 1 July 2003 to 30 June 2004. Three of these meetings were conducted by teleconference and one, that of August 2003, was held "in person" in Adelaide.

Annual General Meetings of the Society were held in Adelaide in August 2003 and in Perth in May 2004. Attendance at these meetings is never very large because of the nature of the membership. However, the biennial meetings of the membership held at conferences allow the free exchange of views in an unrestricted way that is pleasing.

## Appreciation

I would like to express my appreciation to the members of Council and to the Chairs and members of the several Committees which contribute to the successful running of the Society. They have all contributed willingly and at length to the well being of the members and to the objectives of our Society.

# FINANCE AND AUDIT OFFICER'S REPORT

Due to extenuating circumstances, the audited accounts were not available at the time of going to press. Therefore this report will be included in the November issue of the newsletter.

# PUBLICATIONS COMMITTEE REPORT

*Leigh Hunt, Chair, Publications Committee*
*C/- CSIRO Sustainable Ecosystems, Tropical Ecosystems Research Centre, PMB 44, Winnellie NT 0822.*
*Email: leigh.hunt@csiro.au.*

The main activities for the Publications Committee during the last year have been the publication of two issues of *The Rangeland Journal* and three issues of the *Range Management Newsletter* and the development of a proposal for electronic publishing of the Journal by a commercial publishing house.

The publication of both the Journal and Newsletter has continued with few problems thanks to the efforts of the two editors (Wal Whalley and Noelene Duckett) and our production manager Malcolm Howes. The December issue of the Journal was a special issue on 'Drivers of Change in Australia's Rangelands'. Production for the next issue of the Journal, due out in June, is well advanced.

Both publications remain strong. The flow of papers to the Journal continues to be good, and Noelene continues to source a good number and wide variety of articles for the newsletter. Interest in the Journal is increasing on the international scene. During the year we received several requests from abstracting services for permission to include our bibliographic data in their products. This is a promising sign for the Journal and provides additional international coverage for our flagship publication. The expected future electronic publication of the Journal will maximise the benefit of inclusion in abstracting services as it will allow interested readers to download copies of Journal papers via the Internet for a fee.

During the year we developed a proposed agreement with CSIRO Publishing for hard copy and electronic publishing of the Journal. The agreement is currently being considered by Council. If approved, CSIRO Publishing will be responsible for all production aspects for the Journal once papers are accepted by our editor. They will also publish the Journal on the web and include it in bundled scientific journals they sell to libraries. This bundling will substantially increase the number of institutional libraries that receive the journal. While we believe the proposed agreement is an exciting development for the Journal, and is very favourable in terms of the cost and benefits to the Society, it will represent a significant financial imposition on the Society, at least in the short term, until the expected increase in income eventuates. However, we view this cost as an investment in the future of the Journal. Ken Hodgkinson has played a major role in negotiations with CSIRO Publishing in the development of this proposal and I wish to thank him for his efforts, and his interest in the Journal.

The Committee will take advantage of the upcoming conference in Alice Springs, and the expected gathering of most members of the Publications Committee and Associate Editors, to convene a meeting. This will be the first meeting of the Committee since the last conference in Kalgoorlie a couple of years ago.

As in previous years many people have contributed to the success of the Society's publications, so in closing I would like to acknowledge them all. Wal Whalley (Journal Editor), Noelene Duckett (Newsletter Editor), Malcolm Howes (Production Manager) and members of the Publications Committee have all worked hard to ensure you receive interesting and high quality publications covering a variety of rangeland topics.

## MEMBERSHIP APPLICATION FORM

The Australian Rangeland Society

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Please complete and return to the Subscription Manager, Ian Watson, PO Box 483, NORTHAM WA 6401
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❑ Enclosed is a cheque for $AU..... for full/part* membership for an individual/student/institution* for the calendar year 2004.

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| Full (Journal + Newsletter)/Student | $80.00/$60.00 | $100.00/$80.00 |
| Part (Newsletter only)/Student | $45.00/$30.00 | $55.00/$35.00 |
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- All rates are quoted in AUSTRALIAN currency and must be paid in AUSTRALIAN currency.
- Membership is for the calendar year 1st January to 31st December. Subscriptions paid after 1st October will be deemed as payment for the following year.

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