



The Australian Rangeland Society

RANGE MANAGEMENT NEWSLETTER

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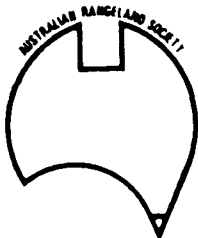
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FROM THE EDITOR

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

Welcome to the first *RMN* for 1994. Just a quick introduction as you will see more of me later on. This Newsletter leads off with a central Australian flavour as Margaret Friedel reports on her investigations into the reasons for success or failure of mechanical rehabilitation using pitting and opposed disc ploughing. The next article is rather more worldly in perspective as Mark Stafford Smith and Barney Foran demonstrate parallels between the science of rangeland management and the international business world. They conclude by offering their thoughts on the future of rangelands in a business-oriented world. Their ideas should at least generate some discussion amongst the Society membership and I urge you to respond, via a letter to the Editor, on their article or any other topic in this Newsletter.

This issue has reports on recent conferences and workshops, news from Council, and an update on organisation for the Katherine conference.

Please put pen to paper and send me your contribution for the next, or any following, Newsletter. I don't want to be accused of producing a parochial Alice Springs, or worse still - CSIRO, publication! *RMN* 94/2 should be out shortly after the Katherine conference making mid June the deadline for material for that issue.

Pleasant reading - and see you at the Katherine conference.

PITTING AND OPPOSED DISCING IN CENTRAL AUSTRALIA: Are They Worth Trying?

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Where It All Began

The first pits to be constructed in the Alice Springs district were ploughed in 1968 on a scald west of the town's airport, according to Bob Keetch (1979). Following the 1960s drought, when blowing dust became a hazard at the airport, major mechanical works were initiated for the Airport Dust Control Project. After preliminary trials, reclamation began in earnest in 1972, and it was highly successful. Significantly, there were five years of unusually high rainfall soon after the project began.

Noting the widespread establishment of buffel grass and other species in the treated areas, pastoralists took an increasing interest in mechanical works for improving pasture growth and stabilising soil on unproductive or damaged areas. During the 1980s a number of landholders availed themselves of the expertise and equipment of the NT's Conservation Commission (CCNT) or developed their own. As a result, native pastures on a variety of soil types and with differing annual rainfalls were treated, and the age of treatments is now anything from zero to twenty-plus years.

Types of Treatment

The most common types of treatment have been pitting and opposed discing, often in combination. Pitting produces three rows of offset pits on each pass of the machinery and two passes are usually made side-by-side. Two offset rows of "staggered furrows" are commonly alternated with pitting. These are generated by two passes of an opposed disc plough, which creates a discontinuous row of paired furrows either side of a longitudinal mound at each pass. Ponding banks have not been widely used until recently, despite their success elsewhere. Almost without exception, exotic species, especially varieties of buffel grass, have been sown during treatment.

Our Aims

After twenty years, it was time to find out if commonly-used mechanical treatments were doing as intended. Our first aim was to survey representative treated areas across the district. It was soon apparent that pitting and opposed discing didn't always work. Consequently, our second aim was to develop simple "ecological" indicators for predicting where rehabilitation had the best chance of success.

We assumed that most pastoralists wanted to improve pasture production when they treated their land and that they wanted an economic return for their outlays. This is not always true but these expectations are common and reasonable, and so we have used them to determine success.

Study Location

We measured vegetation and soil features at 33 different locations in the Alice Springs district, from the southern calcareous grasslands to the northern open woodlands. In general, mechanical treatments had been applied to what are or were loamy soils at least 10 cm deep, on slopes of 2% or less. Because pitting and opposed discing occurred together on a number of the sites and we measured them separately, we made a total of nearly 50 assessments. Average annual rainfall ranged from 200 mm in the south to 370 mm in the north.

Did Pasture Production Improve?

Maximum forage improvement on the very best site was an extra 360 kg/ha, on the assumption that all the annuals and perennials were edible except for the least palatable perennials (a generous assumption). The preceding year - to November 1992 - had been only slightly below average: 282 mm instead of 320 mm.

For most sites, the improvement was either much less or non-existent. For about 80% of the sites the improvement was only 180 kg/ha or less, and for 60% of the sites it was 90 kg/ha or less.

Economic Outlays and Returns

At the best site, we estimated that costs were \$2,260/sq km if seed had to be purchased, and \$1,660/sq km where pastoralists provided their own seed.

How do costs compare with likely returns?

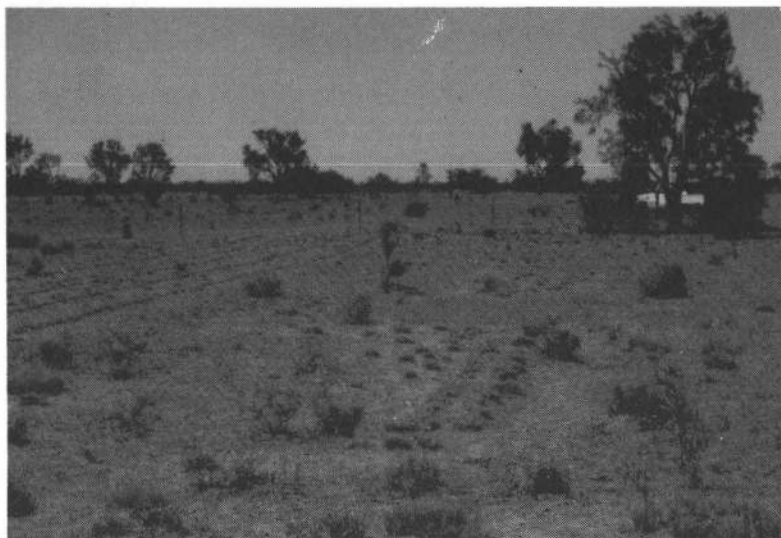
- * Let's assume daily intake is 2% of liveweight, and that common liveweight for cattle is 400 kg.
- * Thus daily intake is 8 kg and annual intake is 2,920 kg.
- * If the pastures are utilised at 30%, one beast requires 9,733 kg of available pasture per year.

- * If the 360 kg/ha (or 36,000 kg/sq km) extra from the mechanical treatment is available *every* year (which is unlikely), the pasture can carry an extra 3.7 beasts/sq km.
- * A beast sold in Alice Springs (based on prices over the last year or so, less selling and freight costs) is worth around 90 c/kg liveweight.
- * If good quality steers gain 130 kg/year, the extra beasts give $3.7 \times 130 = 481$ kg extra weight gain per sq km.
- * At 90 c/kg, gain = \$433/sq km/year. About half of this gain might be expected with lesser quality or average stock.

Thus annual return for the best site, at peak production and during an average season, is:

- * With bought seed: 19% for good quality steers, 10% for average stock.
- * With own seed: 26% for good quality steers, 13% for average stock.

Note, however, that the percentage rate of return over the life of an investment in mechanical rehabilitation can be markedly lower than these levels if the pits and the pasture established on them have a short life.



Examples of successful (top) and unsuccessful (bottom) mechanical rehabilitation using pitting and opposed discing.



The Bottom Line

Pitting and opposed discing are good value on high potential sites with good quality beasts.

On typical sites, with average stock, economic losses are almost guaranteed. *Why?* Because typically, treatments are applied to the very worst-looking areas, where water and nutrient relations are poorest.

On the whole, that means the value of pitting and opposed discing lies in pasture improvement rather than rehabilitation. For poorer quality sites, ponding is a better bet because it traps water and nutrients on a much bigger scale, and endures much longer.

How can we determine where pitting and opposed discing are likely to work?

"Ecological" Indicators

We tested many potential indicators:

- soil quality e.g. texture, colour, pH, stability, evidence of erosion
- rainfall e.g. average annual, average summer, amount prior to treatment
- landscape features e.g. upper/mid/lower slope, runoff/runoff

Since buffel grass was the only species that was widely successful, the results largely apply to buffel, although some native species responded too.

The best response to mechanical treatment was obtained where:

- Surface soils were sandy clay loam or sandier, or sandy lag deposits were still present after some erosion. Clay content above 25% gave poor results.

Reason: *Water infiltration is easier in sandy soils. The roots of newly germinated seedlings can penetrate more readily too.*

- Soil crust was relatively weak and could be broken with gentle thumb pressure.

Reason: *A strong crust can indicate clay, or a stripped and nutrient-poor subsoil, or a "cryptogamic" crust of tiny lichens, algae and fungi which repel water. All can disadvantage water infiltration and germination.*

- Average annual rainfall was more than 300 mm or else the area was nutrient-rich and received extra runoff.

Reason: *Perennials need reliable soil moisture every year to persist, though they may establish in a wet year in drier country.*

- Soil surface had well developed "microtopography" i.e. was uneven on a scale of centimetres.

Reason: *Small hollows trap resources e.g. water, organic material and seeds, which otherwise would wash or blow away.*

- Surface soil was stable and did not collapse quickly on wetting.

Reason: *Unstable soils make a slurry when wet and block up the soil pores created by ants, termites and old root channels. Water can't penetrate easily and will evaporate or run off. Seedling establishment is difficult when the surface is mobile. Structures created by mechanical treatment may slump quickly too.*

On the basis of our survey of pitting and opposed discing, we recommend that Centralian pastoralists planning to use these techniques:

- Time the work to maximise chances of rain within three months. That means early summer for the treatment, based on long term rainfall records.
- Control grazing. Six months or longer of no grazing after plants germinate is desirable. Slower, or no, response must be accepted if grazing is not controlled. This in turn means little or no economic return.
- Only treat reasonably high potential sites. Pitting and opposed discing should not be used on stripped and scalded country - ponding should be more successful.

Postscript

It's interesting to note how much of the buffel grass has died in the Airport Dust Control Project area recently. A big contributor to success twenty years ago was the 1974-8 rains. It may be that the plants are dying now because they have run out of nutrients and because they are not adapted to the runs of dry years which the area experiences. Surviving plants tend to be in local hollows where water and nutrients would be marginally better.

The CCNT is currently running native species trials, seeking species which are adapted to local conditions. Even if waterponding can compensate for unreliable rainfall to some extent, plants are needed which can cope with limited nutrient supply and more clayey soils. And there is another reason for using local species. If exotic species are good colonisers, they make good weeds, too. Buffel grass has invaded rich areas like floodplains and river frontages and now presents conservation problems which were never anticipated when it was first introduced.

Acknowledgements

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LESSONS FOR RANGE MANAGEMENT FROM THE BUSINESS WORLD

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(Ed. The following article is a condensed version of a paper presented at the 17th International Grasslands Congress in Palmerston North, New Zealand, last February. In this shortened article, Mark and Barney identify similarities between the management of rangelands and directions being taken by innovative business. They then discuss how some of the business world's lessons might be incorporated into rangeland management.)

Introduction

As ecologists, we tend to concentrate on the biological aspects of Rangeland Management and often overlook the ways in which ecology and animal husbandry interact with other management components. Because the rangelands operate with large management units and are subject to variable climates and markets, we need to understand and manage the system as a whole. A key component is the management of biological and economic risk in relation to productivity and landscape change.

Production from the rangelands is, of course, a business venture and we tried to explore similarities in the management of risk between rangeland management and the wider business world, in the context of continuing external pressures from cost-price constraints and growing environmental awareness. We approached the task by initially identifying the key ecological factors in the rangelands and recent management themes that arise from these. The following ecological themes are, no doubt, familiar to most readers of *RMN* and for brevity they are simply listed here (further detail can be found in Stafford Smith and Foran, 1993):

- Integrating the whole management system
- Managing variability through time
- Knowing where production comes from
- Understanding long-term vegetation change
- Recognising resilience and avoiding resource damage
- Coping with rehabilitation
- Assessing and monitoring
- Involving other land uses

We then surveyed various recent business books and all issues of *The Economist*, *McKinsey Quarterly* and *Harvard Business Review* published during 1989-92 for similar forward-looking themes relevant to the commercial world. We tried to avoid identifying the *status quo* or 'conventional wisdom'. Although this process may have partly reflected our own biases, we identified eight more themes which we considered were relevant to the business world and to the rangelands. These are now described in a little more detail.

Lessons from the Business World

Theme 1: Visions and Strategies

Firms with a clear, long-term vision outperformed others fifty-fold on Wall Street from 1920-70. The vision should be backed by positive, measurable but challenging goals, the classic example of which was NASA's "before this decade is out, land a man on the moon and bring him safely back to earth". With the goal should go a culture of quality and pride.

Well-defined enterprise goals and guiding philosophies are often lacking in the rangelands, at both the policy and the station level. Policy-makers are not clearly enunciating different land-use goals for land in different regions, and the industry tends to push the product rather than the culture. The growing influence of eco-tourism illustrates how rangeland industries which are less bound to the ideologies of intense production can capitalise on the "outback" mythology.

Theme 2: Less is More

The 'hidden champions' of the business world go for quality rather than quantity, and design rather than repair, aiming at simplicity with fewer parts, fewer defects and less waste, continuous product development, with improvements passed on rapidly to customers, and spend six times more on training and education than the average. They had close relationships with customers, looking at their needs almost before they themselves recognise them.

Pastoralists have tended to focus on quantity of product rather than its quality, especially as regards meat production. This has been mainly due to the relatively low productivity of rangelands but examples exist which show that it is possible to target market specifications. Pastoralists suffer severely from the 'tyranny of served markets', thinking themselves unable to provide something innovative, and this is often encouraged by industry bodies dominated by influences from higher production areas. Close relationships with customers are not common although recent advances in communications may be changing this.

Theme 3: Short and Long-term

Economic theory used to be short-term (e.g. three months!), based only on amounts of capital and labour without worrying about where they came from. Now there is a new emphasis on knowledge as a factor; but human capital (e.g. years of education) and ideas (e.g. number of patents) only come out of long term investment in education and some sort of R&D. Policies that offer short term cost advantages, but that seriously undermine innovation and dynamism, are profoundly wrong.

Most of the tactical tools and advice in the rangelands have been directed at the short term. Although some successes have had long-term value, such as breed developments and disease controls, these have often led to unforeseen long-

term problems. For example, disease- and drought-resistant cattle combined with supplementation allowed producers to keep cattle alive in north eastern Queensland during the dry years of the 1980s, but caused considerable ecological damage. The rangelands are relatively poor in the 'knowledge-based' factors of production, although training is improving.

Theme 4: Cycles of Opportunity

Even in the worst times, well-run businesses manage to prosper somehow, with good plans, and often investment 'against the cycle' to be ready when things get better. Surviving the bottom of the cycle involves cutting back on variable costs but maintaining long-term core investments. Diversification seems to have a poor track record as a way of coping with cycles; unrelated diversification makes no long-term contribution to innovation.

The rangelands are strongly 'cyclical' although climate-driven patterns (e.g. drought) may not mesh with business cycles (e.g. low prices). Until recently, the rangelands have generally lacked a philosophy of proper risk analysis. Although small businesses in unstable industries aim at debt servicing ratios of about 13% (compared with 25% in stable industries), financial advice in the rangelands seems to encourage much higher levels (e.g. 30%). Because the grazing enterprise is the end of the chain of processors and marketers, profit squeezes and high debt pressures in agriculture stop at the farm, and impact directly on to the environmental resource. Strong culling and selection is one example of using a drought to the long-term benefit of a pastoral enterprise.

Theme 5: Competitive Advantage and Innovation

Competitive advantage means doing the things that you can do better than everyone else, and making sure it stays that way through continual innovation and improvement - industry leaders stay that way by creating new products 2.5 times faster than the industry average. Businesses gain advantages because of differences, not similarities: winners ask - "What must we do differently?". Benchmarking (comparing your way of doing business with competitors) is essential. Disadvantages can also promote competitive advantage by forcing innovation (e.g. small Italian steel mills became adept at using scrap steel). It is hard for firms steeped in old paradigms to perceive the significance of something new - innovators are often firms that are simply looking in the right place, unconcerned by conventional wisdom. Innovators are often outsiders in a social sense, and not part of an industry elite. The less the innovator demonstrably profits, the less incentive there is to innovate.

Many of these points apply to rangeland businesses, although the incremental gains to be made through innovation are often submerged by year-to-year variability in climate and markets. This highlights the need for good monitoring and feedback mechanisms - procedures currently lacking effectiveness in the rangelands. Most industry and state

supported R&D tends to be inward looking, rather than seeking international competitive advantages.

Theme 6: Error Tolerance

Many companies recognise that errors will inevitably occur, and try to define management structures that use them constructively and ensure that staff learn from them, rather than pretending errors do not exist. They spread the risk by subdividing tasks and developing error-recovery techniques. This leads to anticipating problems rather than handling them as things fail. The best firms have error rates 500-1000 times less than the industry average.

Serious errors in the rangelands tend to cause near-permanent loss of production, so it is all the more important to catch mistakes early. Managers must deal with large, diverse areas and swamping year-to-year variability with limited monitoring techniques. Our culture does not encourage the constructive recognition of mistakes, yet we need better 'adaptive management'.

Theme 7: Environmental Accounting and Ecological Subsidies

More and more, industries are having to account for their use of the environment as well as direct economics. Coping with exacting environmental standards can provide market rewards - examples are companies that have embraced the need for ozone-friendly refrigerants and for non-chemical pesticides. Such investments have been rewarded with longer patents, and quicker acceptance of new products; the company also gains a competitive advantage over others who have been fighting against the trends as regulations become tougher.

The same changes mean that rangeland degradation must be included in production equations. Degradation, if present, should be better reflected in land values which still tend to be driven by non-market factors such as the need for inheritance land. Rangeland industries benefit from unaccounted ecological subsidies (e.g. disease control, roads, communications, low rentals, subsidised research), which depress long-term competitive advantage. Some of these may be justified but they should be more transparent and better integrated with land management objectives. Poor environmental standards will impact on trade in the future as trading partners refuse to take products which are not demonstrably sustainable. Even apparently positive changes, such as introducing 'better' grass species, are closing off future options - for example, buffel grass in central Australia is a boon to the grazing industry but may be a major threat to conservation.

Theme 8: Gaps in Economic Theory

There are similar short-comings in both ecological and economic theory. Short-term production modelling in rangelands is well established (although not so well accepted

among managers), whilst long-term models of vegetation change are poor. Classical succession theory is discredited without an adequate successor. Production models deal inadequately with spatial and temporal variability.

Even more than in business, robust models are needed in the rangelands because the cycles of climatic impact run over decades and it is very hard for managers to learn how to handle unusual events from their own experiences only. With all of this, a better understanding is still needed of human behaviour and semi-rational decision-making; much past research and extension has been poorly targeted.

Integrating Business and Biology in the Rangelands

The business world and rangeland managers face environments with similarities:

- Both systems are complex, and must deal with variation through time.
- Increasing international trade is imposing external factors on companies which are beyond their control. Companies must manage for these uncontrolled factors, just as rangeland managers must manage for an uncontrollable climate.
- Issues of cost-price squeezes, the environment, market fads and the maintenance of innovation are common to both business and agriculture. There is no long-term, best-bet management option as the 'playing field' is never stationary.
- Both areas of management must cope with errors, although the consequences of errors may be more critical and irreversible to the resource base of the rangelands.

From our involvement in rangeland science and our analysis of the business literature, we offer the following views on the future of rangelands in a business-oriented world.

Visions and goals need to be better articulated in the rangelands, at both policy and industry levels. Policy must clarify the balance that society expects between production and conservation in the different regions, and it must also give rangeland products a different identity to other agricultural production. Industry visions need to recognise the international trends towards lower biological and economic returns, tougher environmental standards and greater interest in alternative land uses - particularly conservation and recreation. For what it is worth, our idea of a possible vision of a niche for the rangelands would be *free-range, low residue, sustainable products from lands which do not compete for more intensive agriculture*. However, stakeholders must make up their own minds about this.

Production must be sustainable. This requires matching stocking rates to forage availability or *stocking conservatively* so as to manage for the driest of years. The latter approach

seems to us to meet the small business lessons best - to minimise errors, to assist in maintaining market flexibility, to reduce the effects of external factors (e.g. interest rates and trade conditions) and to maintain relatively constant production and income.

Even with sustainable production in place, environmental changes will occur in the rangelands. There will be the need to repair past damage, and there will be future deliberate or accidental manipulations. Management of these changes requires *continuing innovation*; this in turn demands an *increased investment in human capital and knowledge* in the rangelands. One of the most pressing needs is the development of short-term tactics to manage vegetation towards predictable, and useful, long-term change. This need applies in both the production and rehabilitation spheres of rangeland management.

Effective monitoring schemes are required at the industry and regional scale to demonstrate that environmental standards are being met. Such schemes must be able to filter management influences from seasonal variability. Where problems are identified at the regional level, industry and policy-makers must be united to take appropriate remedial actions. At a more local scale, effective monitoring is required to provide feedback to innovators and good managers to encourage their on-going practices.

Last but not least, substantial *social change* is still needed to meet the goals of a truly sustainable industry. Some areas will be profitable at the lower stocking levels necessary for sustainability. Other regions have become non-viable, either because the land is too marginal, or because past errors have broken leases into areas which are too small. Still other areas may be sustainable for pastoralism but society may demand that the land is available for alternative uses such as conservation or recreation. In these places there will be major social changes, which need extensive public consultation and discussion, and may need support from the public purse.

The adoption of high environmental standards seems to be the best chance of allowing the pastoral industry to be sustainable ecologically, economically and politically, in times which will be hard on all three accounts. To do this, the vision must be expressed, the industry must continue to innovate, successes must be monitored, and links with other land uses must be exploited credibly.

More details can be obtained from the authors, or found in: Stafford Smith, D.M. and Foran, B.D. (1993). Problems and opportunities for commercial animal production in the arid and semi-arid rangelands. In: *Grasslands for our World* (Proceedings of XVII International Grasslands Congress), SIR Publishing, Wellington NZ.

THE OLIVE PINK FLORA RESERVE An Arid Zone Botanic Garden

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The Olive Pink Flora Reserve, situated on the east bank of the Todd River within a kilometre of the Alice Springs business centre, is a 16 ha reserve. The facility serves the primary purposes of education, conservation and recreation - in that order. As a botanic garden, the reserve provides a facility to display the rich and diverse flora of central Australia. It is currently the only functioning arid zone botanic garden in Australia although another garden is being developed at Port Augusta.

The reserve was established in 1955 by Miss Olive Pink, an anthropologist who worked amongst the Aboriginal people of central Australia and a somewhat eccentric character. In 1955, Miss Pink became a permanent resident of Alice Springs and applied for the present-day reserve area to be set aside as a flora reserve. The following year, the Australian Arid Region Flora Reserve was gazetted with Miss Pink being granted an occupational lease and becoming the honorary curator. It was her intention that the reserve would contain representative specimens of the desert flora. Following her death in 1975, the reserve was renamed the Olive Pink Flora Reserve. It was opened to the public in 1985 and today it is administered by a voluntary board of trustees under the NT Crown Lands Act, with funding through a modest annual NT Government grant (\$38,000 in 1992). The reserve is managed by a curator and part-time horticulturalist who undertake ongoing maintenance and development work and provide a seven-day per week information service to visitors.

Throughout Australia, there is a network of botanic gardens whose role includes the propagation and conservation of Australia's native flora, and particularly those species which are rare or endangered. Due mainly to population distribution, these gardens have a coastal bias. During the 1970s and early 1980s, the absence of a botanic garden within the 250 mm rainfall region was identified as a major omission in the national network of botanic gardens. Plants endemic to the arid zone are unlikely to grow well in a coastal location. In addition, many species have a very restricted natural distribution and their future survival can be better assured if they are cultivated at a number of suitable sites.

The long term aim of the reserve is to represent the diversity of plant species which occur in a range of local habitats. This includes those species which nationally are listed as being 'rare' or 'endangered' (Briggs and Leigh, 1988), are recognised as being locally vulnerable to extinction, have potential for horticultural use or can be grown in local gardens. The limited workforce at Olive Pink Flora Reserve means that trees and shrubs are planted in preference to ephemeral species: propagation of the rarer grasses, forbs and sedges would require a much greater horticultural commitment.

Having identified candidate species for inclusion in the reserve, considerable knowledge and skill are required to successfully propagate them. This includes a knowledge of when to collect propagules (seeds or cuttings) from the host plants, how to successfully establish this material in a nursery and then how to transplant it into (hopefully) favourable locations in the reserve. Simply collecting material can be difficult as the species of interest are often in remote and infrequently visited areas.

From a horticultural perspective, the knowledge gleaned in propagating species is gradually expanding. In turn, the supply of material available for further plantings is expanding as successes are achieved. Local nurseries increasingly are making this material available to residents with an interest in native species, increasing the frequency of planting which, in turn, is enhancing the conservation status of some of the rarer species.

AUSTRALIAN ARID LANDS BOTANIC GARDEN Port Augusta (South Australia)

This reserve, set on approximately 3 sq km of remnant natural vegetation on the northern outskirts of Port Augusta, is intended as a venue for the conservation, study and display of arid zone flora. Within the reserve, a 40 ha area is planned for the feature display of Australian arid zone plants. All existing trees will be maintained and the garden will be landscaped to blend in with the surrounding environment. It is bounded on one side by Spencer Gulf, with its impressive high red cliffs, and has excellent views of the Flinders Ranges.

The reserve was protected during the mid 1980s with a vermin-proof fence. More recently, a raised boardwalk and viewing platform containing display material and resource information were installed. The platform provides a vantage point from which to view the garden site and surrounding landscape.

The garden's soils range from deep sand to claypan and grow a diverse vegetation. Mangroves (*Avicennia marina* var. *resinifera*) on the Spencer Gulf shore are a unique feature of the garden. Other significant tree species include western myall (*Acacia papyrocarpa*), sugarwood (*Myoporum platycarpum*) and the quandong (*Santalum acuminatum*). Chenopods (e.g. bladder saltbush - *Atriplex vesicaria*, pearl bluebush - *Maireana sedifolia* and blackbush - *Maireana pyramidata*) occur extensively across the site.

The garden concept is actively supported by a "Friends of the Australian Arid Lands Botanic Garden" group which formed in 1984. This group has been instrumental in developing the garden concept, raising funds, coordination and actual site works.

(Information extracted from signage located at the viewing platform and from an article by John Zwar in *S.G.A.P. Journal* (1986) Vol. 10 No. 1 pp 9-11.)

Plantings

One quarter of the reserve's area is planted with approximately 1,500 shrubs and trees representing 350 species. Eighteen of these species are formally recognised as being rare or endangered (Briggs and Leigh, 1988), and several other species may be vulnerable to local extinction. Information about some of the more significant rare species planted at the reserve is given in Table 1.

The reserve contains a variety of habitats ranging from hills through to a saline depression and the sandy levee bank of the

MISS OLIVE PINK 1884 - 1975

Miss Pink was born in Hobart and studied art at the Hobart Technical College before travelling to Sydney as a young woman. There she studied anthropology and became secretary to the Anthropological Society of NSW. Her interest in the Australian Aborigines led to two trips, in 1926 and 1927, to Ooldea on the Transcontinental Railway in South Australia. Many of Miss Pink's drawings of desert flora date from this time.

In 1930, Miss Pink moved to the Northern Territory and, in the following years, lived with Aborigines in the remote Tanami Desert. Severe drought conditions in 1946 forced her from her primitive home to the almost equally remote Granites goldfield. From there, increasing government officialdom in the early 1950s eventually confined her to Alice Springs.

Miss Pink was known for her dedication to the Aboriginal cause, her strong individuality and her battles with bureaucracy. At one time, upon being denied access to the Aboriginal section of the Alice Springs gaol, she committed a small offence by outwitting the guards and "breaking" into the gaol. She refused to pay the resultant fine and demanded to be gaoled but the prison superintendent, wishing to spare himself further trouble, paid the fine on her behalf.

Miss Pink's skirmishes with those in authority continued as her Australian Arid Regions Flora Reserve developed. She named individual trees in a small planting after prominent citizens of the day and the care each received was directly proportional to her opinion of the namesake's performance in authority. Several politicians apparently received bunches of attractive, but poisonous, flowers at times when Miss Pink was dissatisfied with them.

Although an eccentric and often difficult character, Miss Pink is remembered for her work with the Aboriginal people of central Australia and for establishing the forerunner to the Olive Pink Flora Reserve. This reserve continues to develop as a tribute to her inspiration and efforts to create an arid zone botanic garden.

(Compiled from information in the Olive Pink Flora Reserve Visitor Centre)

Todd River. In fact, eight land units have been mapped across the relatively small area (Lehman, 1991) indicating the natural diversity of the reserve. Hills comprise the majority of the 75% of the reserve's area which has been left in its natural state.

The saline depression unit has particular educational value because its plantings provide a good demonstration of which species will grow on saline texture-contrast soils. Soil salinity is a problem for many Alice Springs residents located in the lower parts of the town and the reserve is frequently cited on radio gardening shows and in the printed media as an example of how these difficult areas can be vegetated.

In other parts of the reserve, local features have been enhanced or modified to create a further three demonstration environments. These include:

- A dune field formed with approximately 300 tonnes of imported aeolian sand. This area is planted with 'desert' type species including desert oak (*Allocasuarina decaisneana*), mallee eucalypts and spinifex.
- A ponded alluvial fan planted with river red gums (*Eucalyptus camaldulensis*) and also growing native perennial grasses (*Eulalia fulva*, *Bothriochloa ewartiana* and *Themeda triandra*).
- A rocky waterhole environment based around a permanent concrete-lined pond. Introduced plants include the rare Palm Valley palm (*Livistona mariae*) and cycad (*Macrozamia macdonnellii*) and water plants such as nardoo (*Marsilea* spp.). This area is a particular haven for frogs, birds, rock wallabies and various reptiles.

Educational Role

The trustees place a high value on the reserve's educational role and have defined goals that the reserve should fulfil for different sections of the community (Table 2). Approximately 10,000 people visit the reserve each year and this number is growing. Visitors include interstate and international tourists, organised school groups and members of the local community.



The Olive Pink Flora Reserve fulfils many roles. Here, local residents are learning about the area's geology and flora from the vantage point of Annie Meyer Hill.

Table 1. Propagation information for rare species planted at the Olive Pink Flora Reserve

Species	Common* Name	Risk** Code	Number Planted	Number of Losses	Propagation Method	Origin* of material
<i>Acacia dolichophylla</i> ⁺⁺		2R	2		seed	wild
<i>Acacia latzii</i>		3V	22	7	seed	wild
<i>Acacia peuce</i>	waddy wood	3VCi	15	4	seed	wild
<i>Acacia undoolyana</i> ⁺⁺		2VCi	4		seed	wild
<i>Eucalyptus lucens</i>	shiny-leaved mallee	3RC-	2	1	seed	wild
<i>Eucalyptus sparsa</i>		3R	3	1	seed	wild
<i>Hakea grammatophylla</i>		3RC-	2	1	seed	wild
<i>Hibbertia glaberrima</i>	desert buttercup	3RCa	2		cutting	wild
<i>Hibbertia</i> spp1. (Mt Giles)		2R	3		cutting	wild
<i>Leucopogon sonderensis</i>		3R	1		cutting	wild
<i>Livistona mariae</i>	Palm Valley palm	2VCa	11		seed	
<i>Macrozamia macdonnellii</i>	MacDonnell Ranges cycad	3VCa	10	1	seed	wild
<i>Ricinocarpus gloria-medii</i>	glory-of-the-centre	2VCat	8	1	seed	wild
<i>Samolus eremaeus</i>	water pimpernel	3R	1		whole plant	wild
<i>Sarojusticia kempeana</i>		3RC-	3	2	cutting	culti- vated
<i>Wrixonia schultzii</i>		2VC-	2		cutting	wild

* common names extracted from Strong (1987)
 ** risk code explanation (from Briggs and Leigh, 1988)

2 geographic range less than 100 km

3 geographic range 100+ km

V vulnerable

R rare (not threatened)

C population reserved

a population adequately reserved

i population inadequately reserved

- adequacy of reservation unknown

t total population reserved

+ origin of propagation material - either wild (in its natural state) or cultivated

++ species considered to have horticultural value

Information about the reserve’s purpose, the central Australian environment and its flora is provided on display boards in a Visitor Centre. As well, a network of walking tracks guide the visitor through the reserve where strategically placed signs provide further information about each landscape and various species of flora represented within the reserve. The identity of all plantings and many of the naturally occurring trees and shrubs is clearly shown with engraved aluminium stakes. In this way, the interested visitor is able to learn a substantial amount about the central Australian environment and its flora. This knowledge can be increased by talking to the staff and/or purchasing literature available at the Visitor Centre.

Other Uses of the Reserve

The reserve provides a convenient venue for a wide range of recreational and other activities. These include cultural activities, meetings and exhibitions in keeping with the broad theme of the reserve, through to picnics and weddings. The Visitor Centre provides an office for Greening Australia

while local members of the Australian Rangeland Society have held two forums focussing on land use issues in this facility in recent years. The Arid Lands Environment Centre and the Society for Growing Australian Plants are also frequent users of the reserve. Many people visit to bird watch, view the town and encircling ranges by climbing Annie Meyer Hill, or simply to enjoy the solitude of the area.

The Reserve’s trustees host two special heritage events each year; one with a historical theme where Miss Pink’s birthday is celebrated, the other recognising Wattle Day. During this mid-March birthday function, invited speakers reflect on Miss Pink’s life while members of the audience usually reminisce spontaneously about their memories of this colourful character. Guests are then served Miss Pink’s customary refreshments of Madeira cake, sherry and Bickfords limejuice cordial. Wattle Day is recognised with a mixture of educational and fundraising activities on the first Sunday in September. The floral theme of the day is supported with talks, guided walks and static displays while native plants are generally available for sale.

Table 2. Educational goals for various target groups visiting the Olive Pink Flora Reserve.		
Target Group	Aims	Action
local community	encourage the use of indigenous native plants in local gardens, street plantings & commercial landscaping	organise open days, demonstrations & guided walks to show the use of native plants for specific purposes (e.g.shade, screening, colour, bird habitat)
local community & visitors	enable people to identify plants seen in the bush	develop habitat plantings within the reserve & produce a map of them
	provide enjoyable experiences so that people will value the reserve encourage use of the reserve for picnics, cultural activities, exhibitions & weddings	develop selected areas for low-impact family picnicking; develop a suitable outdoor area for weddings & photography
tourists	promote increased tourist use of particular sites e.g. the Annie Meyer Hill walk, the waterhole	further develop interpretive signage & produce information sheets
local schools	encourage better use of the reserve by local schools	develop a self-guided walk & teachers’ notes on ethnobotany & adaptations in the arid zone; conduct field days & after-school workshops for teachers
scientific bodies, other botanic gardens & specialist groups	grow specimens of as many rare & endangered plants of central Australia as possible	monitor & record the growth of these plants with a computer database & photography
conservation groups	promote the conservation of rare & endangered plants & their habitats	produce information sheets on plants grown in the reserve, their natural habitats & distribution

A Growing Horticultural Database

The large planting of native species requires an elaborate database to track the fate of each individual. The staff are as interested in why plants fail to establish as in their successes. Each plant is identified with a serial number when planted and its position is marked on a gridded map. Regular stocktakes record attributes such as height, canopy width, condition and immediate maintenance requirements. This information is entered into a computer database and complements extensive information about propagation and transplanting methods (e.g. source of material, fertilizer history, hole preparation etc).

The database is extremely useful in providing an accurate and emerging record of the propagation and establishment success of each species. This allows horticultural procedures to be streamlined and favourable habitats within the reserve to be more clearly defined. The knowledge base is expanding to the fortunate position where, for some rare and endangered species, propagation is now most efficiently performed under controlled environmental conditions by local nurseries. There is a growing demand for this material amongst the local community and the Olive Pink Flora Reserve also buys required species, when available, to expand its plantings. Increased plantings throughout the township and in surrounding communities is seen as an effective means of increasing the opportunities for conservation of some of the rarer species.

Conclusion

Miss Pink's vision to create an arid zone botanic garden that would preserve and display central Australia's unique flora is now well established at the Olive Pink Flora Reserve. The trustees have clearly defined the reserve's purpose as providing an educational, conservation and recreational role to the local community and visitors. Natural features of the reserve combine with its heritage to offer much in the way of educational and recreational value for the visitor and local community. The reserve's significance as a conservation area grows as each additional rare or endangered floral species successfully establishes. In essence, the Olive Pink Flora Reserve encapsulates part of the Australian Rangeland Society's aims by developing an awareness of the need to conserve our flora and by providing information about aspects of our rangelands to the wider community.

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APPLICATION ABSTRACTS THE RANGELAND JOURNAL Vol 15 No 2 1993

Righting Scientific Writing: Focus On Your Main Message!

R.F. Brown, A.J. Pressiand and D.J. Rogers

This paper is about how to prepare research papers that are easier to write and easier to read. It draws on what we have learnt from running workshops for scientists about how to publish more readable papers. The key thing is to distil the most important point that needs to be made in a paper and then structure the paper around that point so that readers cannot miss it.

Mind-mapping and a clear understanding of what individual readers need to know are important tools to help distil a main message. Conversely, the traditional structure in which a paper builds to a knockout punch at the end and the traditional impersonal styles of written expression are the two most serious obstacles to the effective use of the main message strategy.

Mastering the main message strategy is the key to writing papers that are easier to understand, and also easier to write.

Land Degradation Assessment In Central Australia Using A Grazing Gradient Method

G.N. Bastin, G. Pickup, V.H. Chewings and G. Pearce

Information on how country is affected by grazing is essential for the continued productivity of rangelands. Pastoral land managers must know what effect grazing is having on the vegetation and soil within each paddock while land administrators and advisory personnel should be aware of the condition of grazed lands at the regional level. In the past, the collection of enough data to accurately determine land condition has been difficult because of inadequacies in the methods used.

In this paper, we describe a viable alternative to the problems associated with ground-based monitoring. This is based on a particular definition of land degradation as "a reduction in the capacity of landscapes to produce vegetation cover from rainfall". The entire grazed area within paddocks is examined using data obtained from remote sensing satellites to determine how vegetation cover changes with increasing distance from water and to judge how cover responds in the vicinity of water following significant rainfall. The normal pattern of increasing cover with distance from water is called a "grazing gradient". Where the gradient persists after the largest rainfalls, then some form of long term or permanent damage has occurred.

We report on the effects of grazing across 38,000 sq km in central Australia. Land systems containing a high proportion

of palatable forage have been most adversely affected by grazing in that they have the most intense and persistent gradients of increasing vegetation cover with distance from water, even after major rainfall events. These land systems are frequently the most intensively stocked due to their original productivity. In some cases, parts of these land systems have also had a relatively long history of grazing. Some land systems of lower pastoral value show no gradient after rainfall but a pattern of decreasing cover with distance from water after a period of grazing. This is associated with an increase in cover of unpalatable shrubs.

We present a cost comparison between the new approach to monitoring using remotely-sensed data and an established ground-based monitoring program. The grazing gradient approach has high capital costs associated with computing hardware but this is offset by a lower labour requirement and lower ongoing costs once the method is operational. The remote sensing-based method is also capable of providing comprehensive, objective and repeatable analysis of grazed country after future significant rainfalls.

Grazing Gradients In Central Australian Rangelands: Ground Verification Of Remote Sensing-based Approaches

G.N. Bastin, A.D. Sparrow and G. Pearce

Grazing in large arid zone paddocks is centred around watering points resulting in a gradient of vegetation change with distance from water. We call this pattern a grazing gradient. These gradients are detectable in satellite data as a change in plant cover and we demonstrate in an accompanying paper how they may be used to assess land degradation.

This study describes how vegetation cover changes with distance from water at two sites in central Australia. Measures of the pasture and woody species cover are obtained using a wheel point device. Woody species cover is also measured with a Bitterlich gauge. These data are plotted against distance from water and confirm that litter and herbage, components affected by grazing pressure, increase with distance from water. The data are then correlated with contemporary satellite measures of vegetation cover. Localised effects such as past erosion and the patchy distribution of woody species interrupt the progressive increase in vegetation cover along parts of some transects and this was detected by both the field and remote sensing methods.

The results show that grazing gradients exist on the ground and that they can be detected with remotely-sensed data. This should mean that the grazing gradient method, when used with satellite data, is a suitable technique for assessing the extent of land degradation.

Runoff And Sediment Yield From A Semi-arid Woodland In Eastern Australia.

11. Variation in some soil hydrological properties along a gradient in soil surface condition

D.J. Eldridge and T.B. Koen

The semi-arid woodlands dominated by red earth soils are an important rangeland type in eastern Australia. A century of over-utilisation of the pasture has resulted in woody weed invasion, a reduction in the productive potential of the soil surface and erosion.

We examined the relationships between pasture cover and runoff and erosion at three sites in central-western New South Wales. Soil surfaces at the sites ranged from stable, productive and uneroded, supporting moderately dense perennial grasses (site 1), to moderately degraded unstable and eroded surfaces with few perennials (site 3). As soil surface condition declined i.e. surface became more degraded, runoff and erosion increased markedly, and vegetation cover had a greater influence on runoff and erosion. On the degraded surfaces, vegetation cover was a good predictor of runoff and erosion, but under improved surface condition, soil physical properties were more influential.

This work demonstrates that in degraded situations, management practices which aim to maximise plant cover will lead to reduced runoff and erosion. On surfaces in good condition however, decreasing vegetation cover may not necessarily result in increased runoff and erosion, at least in the short term. In the long-term however, management practices leading to a decline in surface condition will ultimately influence surface hydrology and erosion. Accelerating erosion will eventually lead to loss of fertile soil and nutrients from the landscape, and a breakdown in landscape patterning which is vital to the redistribution of water and nutrients.

Judging Range Trend: A Preliminary Study Of Human Interpretation Of Rangeland Monitoring Data Drawn From Sites In The Western Australian Shrublands

Donald Burnside and Edwina Faithfull

Although objective monitoring of range trend is underway in most States in Australia, there has been inadequate attention paid to the interpretation and application of this information to management. The first step in the application of information is its interpretation. The study investigates interpretation through the judgements made by five subjects, four pastoralists and one adviser, about range trend using information provided by WARMS (Western Australian Range Monitoring System). A number of recommendations are given below arising from the results.

Extension people responsible for range monitoring should be aware of the wide range in skills amongst both pastoralists

and extension personnel in using and interpreting data presented to them. Further objective data should be extracted from the monitoring site photos, and attempts to improve the presentation of the numeric data should be continued with the aim of simplifying its use in interpretation and reference.

There is a need to work with pastoralists in the understanding of the monitoring data. To this end it is recommended that local advisers and small groups of pastoralists work together to refine judgements and develop a convergence of understanding about how to identify range trend with the available monitoring information.

We found the approach of posing a series of questions about the data very helpful. We recommend this style be developed and adopted by extension personnel in clarifying which aspects of the monitoring information are preferred and relied upon by individuals. Using such an approach prompts logical scrutiny of the monitored attributes and of other specific items at the monitoring site.

There is a need to continue the quest for an objective soil surface condition indicator easily perceived by pastoralists. Our observations were that pastoralists were eager to use soil surface condition as an indicator of change and struggled to interpret this from the site photos.

The process has also highlighted the need to clarify the relationship between the changes at the monitoring site, changes in the whole paddock, the effect of intervening seasons and past stock management. Some pastoralists confused management practice and range trend, and this warrants further investigation.

Fire Studies In Mallee (*Eucalyptus* spp.) Communities Of Western New South Wales: Grass Fuel Dynamics And Associated Weather Patterns

J.C. Noble AND R.G. Vines

This paper records data on the spatial distributions of different fuels, plant architecture and post-fire seedling recruitment and survivorship of porcupine grass (*Triodia scariosa*), obtained during field studies on contrasting mallee sites in western New South Wales. In addition, rainfall data extending over c. 100 years were used in a water balance study at one mallee site (Pooncarie); while similar rainfall data were analysed for three mallee sites (Pooncarie, Ivanhoe and Mount Hope) using a filter technique to examine quasiperiodicities of rainfall and potential correlations with known wildfire seasons in the past.

Precipitation records from the Meteorological Districts of western New South Wales, and from various towns in the area, were analysed as well. All data sets exhibited strong coherence and the resulting filter curves resembled each other closely, with peaks reflecting "above-average rainfall" and troughs "below-average rainfall or drought" - the latter often being associated with El Nino/Southern Oscillation (ENSO) events.

In most semi-arid and arid areas, there is a need for early warning systems that predict when fire disturbance (or conversely, land degradation following severe drought) may be imminent. The ability to recognise regional weather phenomena (e.g. the Northwest Cloud Band), as well as ENSO related drought events like those experienced in 1982/83 and recently in 1991/92, should enhance the planning capacity of managers since severe droughts are likely to end with major rainfall sequences following the break. Such rains then lead to an abundance of fuel for both potential management burns and wildfires. Indeed, given the current situation in early 1993 following drought-breaking rains, there is every possibility of wildfires occurring in western New South Wales in 1993/94.

A Glasshouse Study Of Competition Between *Astrebla lappacea* (Curly Mitchell Grass) And Two Associated Species

D.M. Orr and C.J. Evenson

For Mitchell grass (*Astrebla* spp.) to persist, recruitment (appearance of new plants) must occur in order to replace old tussocks which die. High densities of the annual Flinders grass (*Iseilema* spp.) are reported to prevent the recruitment of Mitchell grass in north western Queensland.

A glasshouse study was undertaken to test the competitive ability of seedling plants of curly Mitchell grass (*A. lappacea*) with those of Flinders grass and the summer annual forb Bladder Ketmia (*Hibiscus trionum*). At densities up to 280 plants m⁻², Mitchell grass seedlings were as competitive as Bladder Ketmia, but more competitive than Flinders grass. In the field, however, higher densities of Flinders grass than tested in this study are likely to occur and these may restrict recruitment of Mitchell grass. Densities of summer forbs are unlikely to restrict Mitchell grass recruitment.

Studies On The Mitchell Grass Association In South-western Queensland.

3. Pasture and wool production under different rates of stocking and continuous or rotational grazing.

R Roe and the late G H Allen

The effects on the Warrego Mitchell grass (*Astrebla* spp.) rangeland of grazing by sheep at three rates of continuous or rotational grazing was studied, in two stages, over a period of 13 years. The first half of the period was drought affected, and for the remainder above average rainfall was received.

During the drought period, size development of the sheep was reduced with the heavier stocking rate, particularly under rotational grazing.

Rainfall had a major influence on results. It also limited management options. The seasonal rainfall is very variable and unpredictable. Under these conditions there is little scope for complex grazing management techniques or for

management planning dependent on prospective seasonal conditions.

The results suggested that the optimal grazing management for this rangeland is continuous grazing at the rate of one sheep per two ha, with obligatory supplementary feeding during drought. This latter should be budgeted for in long-term management planning. Considering only returns from wool, this recommended stocking regime gave a 50% higher monetary return (over the full period of the studies) than the lighter stocking rate (one sheep per three ha). Also the stability of the grassland (i.e. maintenance of the Mitchell grass component) was not impaired. At the heavier stocking rate (one sheep per one ha) the Mitchell grass declined. There was no sustained advantage from rotational grazing.

The Mitchell grasses are long-lived plants, tolerant of grazing and resistant to drought. In the Warrego region, they occur on flat terrain and clay soils so that the risk of erosion is slight. Under other conditions and with less resilient grasses the suggested management system may not be expedient.

Some Effects Of Fire On The Survival Of Sifton Bush (*Cassinia arcuata* R.Br.)

W.S. Semple and T.B. Koen

Sifton bush (*Cassinia arcuata*) is a woody weed of the slopes and tablelands of NSW and Victoria. Though a variety of control techniques is available for arable lands, burning, if effective, would be a cheap alternative on non-arable lands. In this trial, simulated burns of varying intensities and durations were applied to different populations of shrubs in spring 1989, autumn 1990 and spring 1990.

Burning only the base of the shrub was sufficient to kill most shrubs: the longer the burn and the smaller the shrub, the better the kill. This result was attributed to sifton bush's thin bark and its lack of below-ground shoot regenerative tissue. Data from this trial and observations following fires in sifton bush stands indicate that although sifton bush is readily killed by fire, seed germination and establishment is enhanced. Hence, if burning is used as a method of control, consideration must be given to controlling subsequent seedlings.

Distribution And Relative Abundance Of Feral Goats In The Rangelands Of Eastern Australia.

Colin Southwell, Karen Weaver, Nick Sheppard and Peter Morris

An aerial survey of 966,000 km² of the arid/semi-arid rangelands of Queensland and New South Wales in the winter of 1992 indicated a minimum feral goat population of almost 1 million animals (density 0.97 +/- 0.12 km⁻²). Observed density (+/- standard error) was higher in New South Wales (1.51 +/- 0.23 km⁻²) than in Queensland (0.47 +/- 0.09 km⁻²).

Abundance, Distribution, And Rate Of Increase Of Feral Goats In Western Australia.

C.J. Southwell and G.S. Pickles

Determining the effectiveness or success of feral goat control programs is enhanced by the availability of information on broad-scale distribution, abundance and rate of increase. The broad distribution of feral goats in Western Australia has been determined qualitatively from a questionnaire survey of state Agriculture Department officers, but estimates of abundance lack a rigorous quantitative basis and are widely disparate, and there is no information on rate of increase.

This paper reports the results of aerial surveys over 1.2 million km² of Western Australia in 1987 and 1990. Data on abundance, distribution and rate of increase of feral goats were obtained opportunistically from these surveys, whose primary purpose was to determine the distribution and abundance of kangaroos. Population estimates for goats were derived from raw count data without correction for visibility bias, and so are minimum estimates. Provided visibility bias was constant between years, comparison of uncorrected estimates provides an unbiased estimate of rate of increase.

Estimates of minimum feral goat populations (+/- standard error) in 1987 and 1990 were 363,000 +/- 44,000 and 596,500 +/- 41,200 respectively. The observed rate of increase over the 3-year period was 18% per annum. In the period between the surveys, an average of 187,000 goats were known to be harvested each year. The surveys indicate that the contribution of goats to overall grazing biomass is increasing, despite a substantial harvest off-take, and that coordinated control measures are needed if their impact on rangelands is to be contained.

The Climatology And Meteorology Of High Fire Danger In The Northern Territory

N. J. Tapper, G. Garden, J. Gill and J. Fernon

This paper provides a broad climatological background to the problem of high fire danger in northern Australia, concentrating in particular on the Northern Territory. The paper also addresses particular meteorological situations in northern Australia which give rise to elevated fire danger. Information contained in the paper will be of general interest and utility to land managers and those agencies responsible for the monitoring and control of wildfire in the northern part of the continent.

Two synoptic-scale weather patterns that produce high fire danger are discussed in particular; the passage of prefrontal troughs which seasonally produce high fire danger in the region of the tropic, and winter subtropical ridging which produces strong winds and high fire danger over the north of the continent during the dry season.

Contrasts are drawn between the characteristics of high fire danger over northern Australia and those obtaining elsewhere on the continent. The forest and grassland fire danger in southern Australia is greatest during the austral summer and is characterised by long periods of low fire danger interspersed with occasional extreme fire danger events. By contrast, much of tropical and subtropical Australia shows a distinctly different seasonality, magnitude and frequency of fire danger. The problem is essentially one of the austral winter-spring (dry season) period and is characterised by extended periods of moderate to high fire danger.

BOOK RELEASE

Survey Of The Grazing Lands Of Northern Australia

A comprehensive review of the resources and health of northern Australian grazing lands has been prepared by Dr. John Tothill and Mr. C. Gillies at the request of the Meat Research Corporation.

With the current interest in the sustainable use of grazing lands, there has been an important deficiency in that there has been no overall statement about the condition of our native pastures. This has now been rectified by the publication of a report entitled *The pasture lands of northern Australia - their condition, productivity, and sustainability*.

The report initially summarises the pastoral resources of northern Australia and examines their condition in terms of sustainability and degradation. Areas where degradation is of greatest concern are highlighted. Strategies for achieving sustainability are discussed and some priorities for action are suggested. Detailed figures about the extent of the different pasture communities and their potential for grazing are given in appendices and a map of the pasture communities in northern Australia.

This book of just over 100 pages will be the benchmark reference for all those interested in the sustainable use of northern Australian grazing lands. Copies, including the map, are available at a cost of \$25 (plus \$6.20 for postage within Queensland and \$7.80 interstate) from:

Tropical Grassland Society of Australia
c/- Cunningham Laboratory
306 Carmody Rd.
St. Lucia QLD 4067

PUBLIC ACCESS

Greg Campbell, S. Kidman & Co., PO Box 346, North Adelaide SA 5006

The South Australian Farmers Federation organised a public meeting at Marree in northern South Australia last October to focus on issues relating to public access and tourism in the outback. A good selection of pastoralists attended and heard addresses from representatives of the SA Department of Environment and Natural Resources (DENR), Department of Road Transport, State Treasury and the Tourist Commission. Leith Yelland from DENR outlined the SA Government's role in the declaration of public access routes as required under the Pastoral Land Management and Conservation Act. He has also written to all principal map makers requesting that they not show roads on their publications unless they are gazetted roads or declared public access routes. Under the Act, the SA Government is committed to maintaining public access routes in a trafficable state, with lessees having the right to temporarily close routes for valid reasons such as stock management, erosion control or reclamation, or road maintenance. Producers also have the right to refuse requests for access along non-declared routes such as lease service tracks or seismic lines.

A particular issue was the area of public liability and how this relates to signs and directions to features along non-declared routes. In considering duty of care or negligence in public liability suits, courts tend to look at what is "reasonable practice" on a pastoral lease. The law however regards invitees and trespassers similarly. Where people are "invited" to features by way of verbal or written directions (e.g. a sign), then the person or body providing that advice would jointly share any public liability. Where signs direct traffic along roads not declared public access routes, the pastoralist appears to have three options:

- Remove the sign but accept full responsibility for any traffic still using the route (or accessing a feature such as ruins). (Interestingly, ruins are regarded as an improvement!)
- Leave the sign and share the liability with the body promoting the feature.
- Add to the sign an explanation of any known risk - e.g. "dangerous dune crests", "hot bore water", "unstable ruins" etc. Such action mitigates, but does not entirely remove, the liability.

Agreed outcomes of the meeting were that:

- Most government signs will be left in place but SA Tourism will provide additional signage where a risk is perceived.
- DENR will provide a standard "No Public Access" sign for use throughout the pastoral country.
- Text explaining the nature of pastoral leases and public access in SA will be drafted. Once agreed upon by all parties, these signs will be placed at key entry points to the outback and at major information bays.
- The Marree Progress Association will build a bay to provide a range of information, including some on public access, at the junction of the Birdsville and Oodnadatta Tracks.
- DENR and the Department of Road Transport will arrange for signs at station boundaries giving the name of the property being entered. This will be a gradual program commencing with public access routes as they are declared.

LETTER TO THE EDITOR

Response to D. Lillecrapp's Article The District Plan

*Marcus Beresford, Conservation Council of South Australia,
120 Wakefield St, Adelaide SA 5000*

The transcript of D. Lillecrapp's opening address at the Cadney homestead field day in your November (RMN 93/3) issue repeated some misunderstandings which are of concern to the Conservation Council of SA.

Firstly, Mr Lillecrapp's "feeling we are still viewed as destroying the integrity of the land".

I believe that many pastoral leases are well managed, and from the information available, sustainably so.

I also believe that many lessees play a valuable role in management of arid lands that could otherwise become degraded through feral animals and other causes associated with neglect. The poor level of staffing of parks and reserves in the arid regions suggests that government lacks either the resources or the commitment to adequate management in the absence of pastoral lessees.

However, even Mr Lillecrapp would probably admit that there may be instances in the pastoral industry of unintentional overstocking and related land degradation. Indeed I understand the recent rigorous pastoral lease assessments in the Kingoonya region of SA suggest that some leases (on less "robust" areas) may have stocking levels that are too high, and that this may be related to degradation. In those instances, I would prefer to lay any blame at the door of the State Government, which has the information and power to set conditions to leases which prevent such degradation.

Secondly, Mr Lillecrapp refers to conservation moves "proposing to the Federal Government that the whole Lake Eyre drainage basin be placed under World Heritage".

The Conservation Council of SA and the Australian Conservation Foundation have never proposed that. Their combined proposal as early as 1985 suggested only a "heartland" area in SA - none in Qld, NT or NSW where the majority of the basin lies.

The proposal has long since been refined to an "archipelago" of sites in the SA portion of the basin. In determining those sites, Council supports the State Government suggestion that there be a "study area" of the SA portion of the basin north of the dog fence, but in no way expects the whole of that area to be nominated for World Heritage. Indeed Council has specifically suggested investigation of only the Innamincka Regional Reserve, Cooper Creek floodplain, the area of Lake Eyre covered by the National Estate and Lake Eyre National Park, and Mound Springs.

Thirdly, Mr Lillecrapp puts the view that "the whole would be administered under the World Heritage and Property Act, Federal legislation which would override all State legislation".

The fact is that the Federal responsibility is simply to ensure that any World Heritage areas are properly managed, and the Commonwealth can rely (and has elsewhere) on State agencies and legislation to fulfil the role.

Whatever the truth in relation to all these concerns, a small group of Conservation Council of SA representatives, at a meeting with about 100 pastoralists at Muloorina Station on 16 July 1993, proposed the following resolutions:

- "1. This meeting calls upon Federal, State and Territory Governments to examine the possibility of a voluntary system of coordinating land management in the catchments of the Lake Eyre Drainage Division.
2. This meeting calls upon the SA and Commonwealth Governments to ensure adequate resourcing of key community groups in the SA portion of Lake Eyre Basin to enable them to participate effectively in any 'Joint Lake Eyre Basin Task Force' or equivalent organization looking at a strategy for the basin.
3. This meeting calls upon State and Federal Governments to make a firm commitment to a management plan and adequate resourcing for management prior to any listing of areas for World Heritage.
4. This meeting calls for governments to ensure compensation commensurate with the loss sustained to any pastoralist adversely affected by any World Heritage listing."

Unfortunately the gathering was not inclined to vote on any of the proposals, or even give an informal indication of how they felt - a lost opportunity of establishing possible common ground, and disappointing when Council and other parties had travelled hundreds of kilometres to attend.

To conclude, are all pastoralists accepting that numerous other people (environmentalists, tourists, miners to name a few) have a legitimate interest in the areas they lease for grazing, and that those interests may have unwished-for effects? As an urban dweller, I have to recognise that other people have an interest in what I do (e.g. how much noise I make, whether I burn off rubbish, keep dogs, whether my swimming pool is fenced (if I had one) etc). The days when anyone can truly be "king of the castle" (including a grass one) are long gone.

NEW VICE PRESIDENT

As a result of the election last November, Ron Hacker is the Vice President from the next host State (NSW). Ron is Program Leader (Rangelands) with the Department of Agriculture in Dubbo. Congratulations to Ron on winning this position and, as Editor, I wish him well as Council continues to grapple with affairs of state and as NSW prepares to host the next federal council in 1995.

LETTER TO THE EDITOR

Experience With Cell Grazing

Tony O'Brien, Sharnae Research Centre, 5 Harding Crescent, Cleveland QLD 4163

I wish to comment on the serial contribution by Norman Kroon of "Kariegasfontein" (South Africa) in *RMN* 93/2 and 93/3. I don't doubt Norman Kroon gained the benefits described and that in the cheap labour conditions of South Africa, the benefits were economic. But the system described is labour intensive both in the capital invested in fencing and in the operation of frequent livestock shifting. (The use of one-way gates and water control can help in reducing labour requirements in livestock shifting.)

For many plant communities I agree with the logic of frequent moves (simulated shepherding), if "Incidentally, by concentrating animals, you change their eating habits and they become less selective and more competitive" and a higher proportion of non-preferred species are eaten **without** undue detriment to animal performance. Such management allows better opportunity for seed set (and seedling establishment), which is the core management tool in maintaining or improving range.

But the timing of the total cycle should have some relationship to the expected rate of plant growth (protein dilution), the replenishment of root reserves and the probability of "regular" seasonal production. The better the growing conditions the shorter the cycle, with short cycles requiring other arrangements for seed set. The rate of deterioration of standing dry feed from dew (bacterial rotting) and the likelihood of unseasonal or aseasonal rains must also influence the logic in timing of the total cycle.

My main concern is with the statement "But the differences are really irrelevant as we are talking about grazing principles that are applicable anywhere". Here, the principles of grazing management are confounded with the use of the wagon wheel paddock layout. I have seen the effects of a wagon wheel layout in Zimbabwe. There was rapid deterioration of the plant community for quite a distance out from the hub producing an unacceptably large sacrifice area. No native species were able to colonise this degraded hub and inside paddock wedges. In a medium or high rainfall situation, this area probably would have been rapidly colonised by native weed grasses (*Sporobolus* spp. in Zimbabwe). It can be expected that different plant communities will react differently to a wagon wheel layout.

The wagon wheel layout ignores the different grazing management and grazing intensity requirements of different plant communities. Different plant communities should be fenced and managed separately, not just on a broad land systems basis but where possible on a land units basis. Rotation within and between these units can avoid the problems of the wagon wheel layout while catering for the compromise management requirements associated with different plant habits and seed setting of the different desirable species.

On some larger properties with mixed land systems, it is possible that a seasonal pattern of use of different land systems is the most desirable management, for land care and production economics. "Transhumance" movement of stock can be achieved with minimal herding by control of water and salt (or other licks) and with minimal separation fencing. We should not be enticed into thinking there is only one desirable management system or one set of principles.

(Tony O'Brien is a consultant in livestock development, forage resource development and land care, operating nationally and internationally.)

PASTORAL SOIL BOARD CONFERENCE IN SOUTH AUSTRALIA

Merri Tohill, Department of Primary Industries, PO Box 357, Port Augusta SA 5700

A very successful end of year "get together" was held in Port Augusta on December 10th. With over 50 participants, the majority of them landholders/managers from across the pastoral region, the conference provided an excellent opportunity to share individual and group expertise on land management issues in this region.

Feedback received from a number of landholders was very positive. It was particularly rewarding for the members of the newest Pastoral Soil Board District, Eastern Districts, to witness the confident and very professional approach of their contemporaries from other districts.

By far the most highly rated session was the "landholder presentations" and this clearly demonstrated the depth of knowledge and practical skills that we have amongst our pastoral community. Valuable information was gathered for those of us involved in the landcare field as to what issues are of concern. Topics for potential projects, field days or workshops were also identified. These include:

- * monitoring
- * plant identification and their value/use
- * rehabilitation of degraded areas
- * feral animal control
- * visits to other areas to observe landcare activities and successful management practices
- * general planning which includes both district and property planning
- * weed control.

Similar get togethers are planned on either an annual or biennial basis so hopefully, we can look forward to further successes.

REPORT ON THE ARS TRAVELLING FELLOWSHIP, 1992

Judy Smith, Depts. of Ecosystem Management/Zoology, University of New England, Armidale NSW

In 1992 I was granted a \$600 Travelling Fellowship by the Australian Rangeland Society. The award was to assist with travel expenses associated with a study of birds in arid NSW which I am completing for a PhD degree. I am a part-time external student at the University of New England and live in the Blue Mountains.

I began my PhD at Macquarie University in 1990, intending to undertake a community vegetation study in western NSW and watch birds whenever the opportunity arose. However, a trip to western NSW in mid 1990 with my then supervisor, John Pickard, convinced me that I would rather concentrate on birds and look at the vegetation as the opportunity arose. Thus, my vegetation study evolved into an investigation of the ecology of an arid zone bird community and I transferred from Macquarie University to UNE.

My study aims to determine what patterns exist in a bird community in an arid environment which is both variable and unpredictable, to relate patterns in the bird community to habitat patterns and to determine what strategies birds use to cope with this environment.

With these aims in mind I selected a study area adjacent to Peery Lake on Peery Station, via Wilcannia. The site covers about 500 ha and has a variety of habitats within close proximity. Peery is a Western Division grazing lease. I feel that the long-term conservation of birds in western NSW must be within the context of grazing (at least in the foreseeable future) so I was keen to work in an area leased for grazing rather than in a reserve situation.

In October 1990 I laid out over 10 km of transects to sample the habitat variability at the site. I censused these transects recording the abundance of all bird species. I have repeated censuses each winter and spring since. In 1993 I included additional autumn and summer censuses. At each census, I have collected data on habitat variables and on the foraging, nesting and aggressive behaviour of the birds. My interest in vegetation lingers and I have been particularly interested in those plant species preferred for foraging, nesting and shelter by the various birds. As the study site was hit by severe drought during 1991 and 1992, I was impressed by the importance of free water to birds. I have colour-banded several hundred birds and these have been helpful in elucidating patterns in drinking behaviour.

As a part-time student, my field work has spanned nearly four years. I have been fortunate to be able to follow birds through a severe drought and into good times. Though many resident species were decimated by the drought and have been slow to recover, nomadic species such as zebra finches, budgerigars, crimson chats, white-browed woodswallows, and white-fronted, pied and black honeyeaters have been quick to take

advantage of improved conditions. The nesting effort of species such as crimson chats, zebra finches and budgerigars following the drought was spectacular. Other species however, such as the chestnut-rumped thornbill, attempted to nest right through the drought but only survived in very low numbers. As an added bonus to the study, I have seen the adjacent Peery Lake fill twice and watched the passing parade of waterbirds and the spectacular shows of ephemeral plants. I have now recorded 153 bird species in the study area.

Field work was completed in January this year. I now face the task of completing analyses and writing up the study for a PhD thesis and publication. Despite the dust, bogs, heat, freezing pre-dawn winds and flies, I have thoroughly enjoyed and been fascinated by both the birds and vegetation of the study area. I do however feel concern for the long-term future of birds in western NSW, given their dependence on a number of tree and shrub species for food, shelter and nest sites and the low levels of regeneration of many of these plants.

I am grateful to the leaseholder, Greg Barlow, for allowing me to camp and work on Peery and for providing a fund of local knowledge. I would like to thank the Rangeland Society for their support which has helped me to cover travel costs incurred and thus make the study possible.

PROCEEDINGS OF FERAL GOAT WORKSHOP

David Freudenberger, CSIRO Division of Wildlife and Ecology, PO Box 84, Lyneham ACT 2602

The *Proceedings of the National Workshop on Feral Goat Management: Planning for Action* (October 1992, Editor: D. Freudenberger) has now been published by the Bureau of Resource Sciences. Complimentary copies can be requested from the Bureau, PO Box E11, Queen Victoria Terrace, Parkes ACT 2600 (Ph: 06 2724284, Fax: 06 2724747).

The Australian Rangeland Society assisted financially towards this successful workshop which brought together 35 representatives from most of the groups and agencies involved with feral goats. The proceedings includes 11 invited discussion papers ranging from the ecology of feral goats to commercial and animal welfare aspects of goat harvesting. It also includes the description and outcomes from four practical and realistic case studies. The proceedings is a helpful document for those groups involved in creating and implementing feral goat management strategies.

BOOK REVIEW

Rangeland Soil Condition Assessment Manual Author: David Tongway

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

There has long been a need for an objective method of assessing soil condition as part of rangeland assessment. To date, most state-based monitoring agencies have had to rely on little better than kicking the dirt and recording subjective and descriptive information about soils. However, the release of David Tongway's manual has now given soil surface assessment a new-found scientific rigour and repeatability which should lead to increased confidence in recording the effects of grazing management on this very important resource.

David produced the manual as a result of collaborative work with the WA Department of Agriculture and their rangeland monitoring system (WARMS). Although the many illustrations and colour plates relate mainly to the chenopod shrublands and mulga country of that state, the assessment methodology should be applicable to most rangeland soils and landscapes throughout Australia.

The manual initially introduces the user to the soil as a habitat for vegetation, and particularly, those pasture plants important to the grazing industry. David then goes on to emphasise the importance of landscape location: vegetation at any point is influenced by fertility, water-holding capacity and inherent stability. In most landscapes, fertile patches occur as small "islands" surrounded by poorer country. These patches are a relatively small part of the whole landscape but produce much of the forage for grazing animals. These patches are able to maintain their integrity when country is in good condition but they decline and fragment as country degrades. It is imperative to know where you are in the landscape before assessing it because, as David says, "mixing zone types in observing features will cause fatal confusion in the assessment".

There are three principal steps to assessing soil condition with David's methods:

- describing the geographic setting of the site,
- describing the "fertile-patch/inter-patch" association and any associated erosion, and finally,
- assessing the soil surface condition.

The manual, via line drawings, colour plates, dot points and tables, provides clear instructions on how to locate oneself in the landscape and to recognise patches and any erosion. Soil surface assessment is a quadrat-based procedure and hence is repeatable at different locations. Again, the manual provides clear guidelines on how to score the 11 different attributes used - such as protective vegetation cover, cryptogam and litter cover, soil texture, the "slake test" and erosion features. David has laboured to identify ecologically meaningful attributes for describing the soil surface and to define

unambiguous scoring criteria, thereby minimising differences between assessors. I would anticipate that as familiarity with the assessment procedure increases, the user could decrease their need to constantly refer to the manual by transcribing the various categories directly to the score sheet or to a more portable "cheat-sheet". This should reduce the time required to assess a site without sacrificing accuracy.

The manual is well suited to use in the field. It is clearly partitioned into sections covering philosophy and methodology with more than half of the 69 pages being given over to examples of landscapes and soil surfaces. These examples are provided via a multitude of quality colour plates and supporting line drawings. The book is printed on heavy paper and bound into a sturdy A4 format making it sufficiently durable for intensive use in the field.

I congratulate David on his production of this soil assessment manual and for providing the information to fill a long-standing gap in monitoring Australia's rangelands. The manual should be an essential tool for all people involved in rangeland assessment and a valuable reference for others with an interest in rangeland environments. Copies can be obtained for \$25 plus \$3.50 postage from:

Mr Norm Hindley
CSIRO Division of Wildlife & Ecology
PO Box 84
Lyneham ACT 2602

FORTHCOMING WORKSHOP

Ecological Research and Management in the Queensland Mulga Lands

5-7 July 1994

This workshop, to be held at Gatton College, is being organised by staff of the Department of Management Studies, University of Queensland. Presentations have been offered by staff at the Queensland Departments of Lands, Primary Industries, and Environment and Heritage, as well as university researchers and community groups. For others wishing to contribute, abstracts should be submitted to the organisers by 31 March and papers supplied in camera-ready form at the conference. Printed abstracts will be available in booklet form at the workshop, and the printed proceedings soon after.

Further details can be obtained from Manda Page or Terry Beutel, Mulga Lands Workshop, Department of Management Studies, University of Queensland Gatton College, Lawes QLD 4343.

BOOK RELEASE

Mulga Merinos and Managers

This handbook of recommended pastoral management practices has been written by members of the North Eastern Goldfields and Kalgoorlie (WA) Land Conservation Districts. It contains a compilation of recommendations on pastoral management by practical and progressive pastoralists who are interested in seeing the continuation of a sustainable and viable pastoral industry. The handbook was prepared in response to a perceived need for setting acceptable standards of management for the pastoral industry. The underlying theme is the pastoralist's concern for the welfare of their livestock and the rangeland of which they are custodians.

Copies of the booklet are available at \$15.00 each (which includes postage) from either the North Eastern Goldfields LCD, c/- Yerilla Station, Kookynie, WA 6431; or the Kalgoorlie LCD, c/- Department of Agriculture, 377 Hannan St., Kalgoorlie, WA 6430. Money raised from sale of the handbooks will be used for further landcare projects.

Note from the Editor (Gary Bastin)

It is not often that I am sufficiently motivated to offer voluntary comment about a book as a result of dodgers sent to me for inclusion in the *RMN* - nor perhaps should I. However, I read this particular booklet with great interest as my background in rangeland monitoring has taught me that pastoralists collectively have a wealth of knowledge on good land management, livestock husbandry and other aspects of running a successful business. However, there has long been a need for the pastoral community, at the regional level, to have the courage and enthusiasm to distil their knowledge into a booklet such as this and make it available to the wider community.

The handbook is comprehensive and very well presented. It commences with a section on attitudes to pastoral management and then progresses through the areas of rangeland management, managing in a variable climate, sheep husbandry, shearing shed management, the office and property development. The final section deals with other land users (e.g. miners, government agencies) and the group offer sound advice, based on experience, on how to negotiate with these groups and resolve conflict before it may arise.

Although directed specifically at the pastoral wool industry, I am sure the booklet also offers much in the way of management principles to beef producers in the more northern parts of Australia. Much of the information is also relevant to staff in government agencies involved with the pastoral industries.

The booklet is very down to earth in presenting the collective wisdom and recommendations of producers in the two LCDs. The material is well written and is not overly prescriptive. Quips through the booklet lighten the subject at times yet

directly emphasize the importance of the subject; e.g. the research officer who, in relation to ram husbandry, stated that "infertility is not a very heritable trait" and the local pastoralist who, commenting about 1992, said that "this is the worst good season we've ever had".

I congratulate members of the combined LCDs for having the vision to produce this manual, for their persistence in reaching consensus on a wide range of subject areas and for their confidence in being willing to publicly state their position on a variety of rangeland management issues. The obvious planning and communication necessary to produce this booklet could well provide a model for other land care groups to follow in establishing consensus and conveying their management philosophies to the wider community.

NEW MEMBERS

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TRI-STATE LANDCARE GROUP

Vicki Linton, Department of Primary Industries, PO Box 357, Port Augusta SA 5700.

On the 8th December, about 30 people met at the Tibooburra racecourse to discuss forming a tri-state landcare group. The meeting was chaired by Margaret Betts from NSW and included speakers from the Department of Primary Industries (SA), Queensland DPI, NSW Soil Conservation Service and NSW Rangecare groups.

Common themes presented by all speakers were:

- deciding what was important to your region,
- the importance of monitoring your resources, and
- using this information in decision making for your region.

These themes appeared to be "common ground" for the formation of a tri-state landcare group.

The meeting also gave an opportunity to find out what other state landcare groups are up to and how they operate.

- Danielle Dignam, the Landcare coordinator from Broken Hill, described the beginning of landcare in western NSW. There, rangecare groups formed and immediately launched into action by obtaining grants for woody weed control and warren ripping. In more recent times, the emphasis of the groups has shifted towards planning.
- Chris Evenson, from DPI Charleville, gave examples of landcare groups getting funding for a variety of issues including native grass seed harvesting and woody weeds.
- Vicki Linton, DPI SA, spoke briefly about soil boards in SA, how they formed and operated, their requirements under the Act and what projects individual boards were up to. Activities include rabbit control, revegetation, goat control, plant identification, grazing exclosures and monitoring, and a land condition booklet.
- David Lord from Thackaringa Station (NSW) spoke about the activities of the Pine Creek Rangecare group, including their rabbit control and woody weeds work. The group estimates that the district has about 190,000 warrens and so far, 25,000 of these have been ripped

David said he supported landcare because it allowed a flow of information between groups and individuals, and it provided support in numbers. Landcare helped close the gap between city and country people and provided an opportunity to get the right message across and to dispel myths. It is an important part of taking control of issues that affect you. This part of David's talk provided good incentive for the formation of a tri-state landcare group.

A vote of interested parties present carried a motion to establish a tri-state landcare group, with the group to be established under the Queensland landcare system. Elections were held with the following people voted into positions:

President	Luke O'Connor, Mt. Poole NSW Ph: (080) 913545
Vice President	Shane Morrissey, Nappamerrie QLD
Secretary	Sandy Spence, Omicron QLD Ph: (080) 913971
Treasurer	Lyn Thomson, Mt Stuart NSW Ph: (080) 913452

Boundaries for the group were discussed, including Nappamerrie, Durham Downs, Bulloo Downs, Salisbury Downs, Innamincka and Quinyambie and to the edge of existing rangecare groups in NSW. After much discussion, the group developed the following mission statement:

"Working together caring for our land, so it will continue to produce and provide a healthy environment".

A range of draft objectives dealing with a viable, sustainable pastoral industry were also proposed.

R&D FOR SUSTAINABLE USE AND MANAGEMENT OF AUSTRALIA'S RANGELANDS: Report on a National Workshop in Brisbane

Stephen Morton, CSIRO Division of Wildlife & Ecology, PO Box 2111, Alice Springs NT 0871

Phil Price, Land and Water Resources R&D Corporation, GPO Box 2182, Canberra ACT 2601

The Land and Water Resources R&D Corporation (LWRRDC) has recently identified as a key topic for investigation the maintenance of condition, productive capacity and environmental values of Australia's rangelands. LWRRDC's early investigations of this objective revealed no broadly-agreed national plan for the future use and management of the rangelands that could be used as a base for identifying R&D priorities. As a consequence, in mid-1993 LWRRDC commissioned CSIRO's Division of Wildlife & Ecology to organise a National Workshop at which R&D priorities could be explored. The objective of the Workshop was to identify and rank actions necessary to help achieve sustainable use and management of Australia's rangelands, with an emphasis on R&D.

An organising committee comprised of Bill Burrows (Queensland Department of Primary Industries), Allan Wilson (Wool R&D Corporation), Phil Price and Steve Morton considered the issues to be discussed, and secured the services of Don Burnside (Western Australian Department of Agriculture) as a facilitator. Before the Workshop, LWRRDC commissioned two background papers considering the legislative framework of rangeland use and the economic viability and ecological sustainability of pastoral use around the country. The Corporation also wrote to many research organisations seeking information about current R&D

programs and priorities of those agencies for future work (many thanks to all those who responded so generously!). Finally, several people prepared short position papers on crucial issues for discussion at the Workshop.

The Workshop was held in Brisbane on the 11th and 12th of October, 1993. It was attended by 40 participants from a wide range of backgrounds and from all rangeland States and Territories. Among those present were eight pastoralists, some academics, rangeland scientists, agency representatives, representatives of Aboriginal interests, of conservation groups, and of tourism. Discussions were frank and fruitful.

A full report on the Workshop, including the background papers and position papers, has been published by LWRDRC (see next column). Here, we provide a brief summary.

In broad terms, R&D priorities fell into eight categories, listed as follows in descending order of their overall ranking by participants:

- sustainable pastoral production
- conservation of biodiversity
- monitoring of the land resource
- regional land-use planning
- diversification of land use and the economic base
- communication between rangeland managers, researchers and the general community
- pest management
- legislative arrangements for rangeland management.

The Report contains much detail of the route by which participants reached these conclusions.

Four issues intersect with these priority areas. Socio-economic aspects of rangeland management consistently emerged as an area of vital importance, an issue closely related to the need for communication and of significance to other priorities. Secondly, the importance of conserving biodiversity and its relationship to all aspects of management in the future was widely acknowledged. Thirdly, it was evident that although a national framework will provide benefits for effective and consistent management of the rangelands, priorities need to be weighed according to the requirements of individual regions; thus, there is an urgent need for regional analysis and planning. Finally, the rangelands will continue to experience substantial economic, social and cultural change, and all involved in this region need to be receptive to unexpected challenges and opportunities.

Copies of "**R&D for Sustainable Use and Management of Australia's Rangelands: Proceedings of a National Workshop and Associated Papers**", edited by S.R. Morton and P.C. Price, Land and Water Resources Research and Development Corporation, Occasional Paper Series No. 06/93:210 pp, are available at a cost of \$36 from The Department of Primary Industries and Energy Shopfront, Phone (06) 272 5771 or 008 020 157 (Free call).

The published proceedings of the workshop include all background papers.

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- * R&D for sustainable use and management of Australia's rangelands - S.R. Morton and P.C. Price

Part 2 *Workshop Papers*

- * Use and management of rangelands: a grazier's view - Simon Campbell
- * Aboriginal aspirations for land management - Tracker Tilmouth
- * Alternatives for Australian rangeland management - Lyn Allen & Richard Ledger
- * Alternative land uses in the rangelands - Stephen Morton & Mark Stafford Smith
- * Some notes on conservation of rangeland resources - Ross Blick
- * The changing context of rangelands R&D: a socio-economic perspective - John Holmes
- * Current rangelands R&D: is it addressing key gaps in our knowledge base? - Ken Hodgkinson

Part 3 *Background Papers*

- * A review of land management legislation relevant to Australian rangelands - R Ledger
- * Economic and ecological sustainability of current land use in Australia's rangelands - D.G. Wilcox & G.M. Cunningham
- * Current knowledge of rangeland management - A.D. Wilson
- * Integration of production and conservation in Australia's rangelands - Stephen Morton & Mark Stafford Smith
- * A survey of current research activities and future priorities pertaining to sustainable land use in Australian rangelands - J.C. Noble

NOTICE OF ANNUAL GENERAL MEETING

Sandra Van Vreeswyk, Honorary Secretary, PO Box 718, Victoria Park WA 6100

The Annual General Meeting of the Society will be held on Monday 30 May at 3.30 PM. The meeting will be held at the Department of Agriculture of Western Australia, Ngala Annex Conference Room, Baron-Hay Court, South Perth.

The business will include:

1. Reports from Council
2. 1993 Financial Report

The Council remains in office in Western Australia for the next year and elections are not required.

All members are invited to attend the AGM. Further details are available by contacting the Secretary at the above address or by telephoning (09) 368 3917.

ARID ZONE NEWSLETTER

REBORN?

Regular Rangeland News Reports by Institutions in RMN

*Jim Noble, CSIRO Division Wildlife & Ecology, PO Box 84,
Lyneham ACT 2602*

The *Arid Zone Newsletter*, which had its genesis in 1956, was produced annually for 30 years (apart from 1960-61) until it ceased production after the 1986-87 issue. The primary purpose of the Newsletter was to improve contact between individual range scientists and institutions concerned with arid zone problems and management. In the 1970s particularly, it became quite a large publication and there was considerable international interest generated by overseas scientists interested in the work being done in this country. In the following decade it seemed to lose some of its impetus and its regular production became increasingly time-consuming and expensive.

Since then we seem to have slipped into a hiatus wherein most of us have only a very general idea, if at all, of what is being done by various individuals and institutions in terms of rangeland research and management around the country. As a scientist, I found the newsletter very useful in keeping up to date with research publications, particularly those that don't appear in the scientific journals. I have been wondering whether in fact it may be possible to undertake this information exchange per medium of the *Range Management Newsletter* but in a different format to that used originally in the *Arid Zone Newsletter*.

In an attempt to generate some discussion on this topic, I am advocating that individual agencies (government, academic and business) with an involvement in range science and management be asked to contribute a very succinct statement on their current activities to be published in *RMN*. This could be combined with a list of relevant publications from the past couple of years. I don't envisage that this would appear in a single issue of *RMN*, but that instead, contributions could be published on a state-by-state basis. It may even take a couple of years to get around all the country but that should not be too much of a problem.

Any further comments on the utility (or futility) of such an exercise would be welcomed.

A Note from the Editor

I support Jim's call for a centralised database of rangeland research and management activities and agree that it is an issue that the Society should consider. The *RMN* (or a supplement to one issue) may well be the most appropriate medium for publishing such information but the material would, of necessity, have to be brief. Information included should be expanded beyond the arid zone to include all rangeland areas.

If there is general support for the idea, I would be willing to act as a coordinator or clearing house but would need assistance. I would suggest that it is an activity that each Branch could manage on behalf of their State. Assembled material could then be forwarded for inclusion in *RMN*. Alternative arrangements would have to be made where state branches do not yet exist. Finally, I would suggest that such a database should eventually become fully electronic whereby *RMN* provides just a list of topics, names and addresses and people interested in particular subjects then access something like email to obtain further information.

RANGELANDS ON THE NATIONAL AGENDA

*Ken Hodgkinson, CSIRO Division Wildlife & Ecology, PO
Box 84, Lyneham ACT 2602*

In early February, I attended a part of the *Outlook 94* conference organised by the Australian Bureau of Agricultural and Resource Economics. Of particular relevance was a part-day session on rangelands hosted by the Land and Water Resources Research and Development Corporation. This session was arranged as a platform for the release of the *Rangelands Issues Paper* as part of a National Rangelands Strategy being developed this year. There were four speakers on the day:

- Warren Hoey, Regional Director of QDPI at Longreach, spoke about the south west strategy which focusses on the mulga lands of Queensland and NSW. This strategy is based on regional development and property build-up and incorporates both financial resource and social components. Although this region is currently depressed and has been the subject of several enquiries, there is optimism that pastoralism in the region will survive.

Mark Stafford Smith from CSIRO's National Rangelands Program in Alice Springs spoke about the development of sustainable production systems and what this means for natural resource management. His view was that future sustainable land use will require that regional differences through the rangelands are better defined and that society develops and articulates regionally targeted land use objectives.

John Holmes, Professor of Geography at the University of Queensland, identified that resource values in rangelands are changing. He considered that pastoralists will increasingly need to better capture a higher income share from the resources they manage by innovative alternative land uses. John expressed the view that leases should allow resource use, not multiple land use, as at present. He urged the re-evaluation of rangeland resources for restructuring of both land tenure and human settlement.

- Graeme Robertson, Deputy Director General of WA Department of Agriculture and Chairman of the National Rangeland Management Working Group, gave the view that Australia's rangelands are in a critical period. This is because of a high level of uncertainty about economic and ecological sustainability of traditional uses. He considered that a vital element for achieving sustainable land management is to develop a desired vision for future use. The development of a strategy, although difficult, will provide new directions for shaping land use. He outlined reasons for the current development of a national rangeland management strategy and tabled the *Rangelands Issues Paper* describing the scope of this strategy. In this document, our Society is identified as a source of information and opinion and I believe it is essential for our Society to join others in having our views incorporated into the national strategy.

The meeting was well attended by about 100 people and it was clear from the topics and ensuing discussion that rangelands are high on the national agenda. However, I also attended some other sessions and concluded that other agricultural regions (e.g. irrigation and cropping areas) are under as much, if not more, economic and sustainability pressure. Although restructuring will need to continue in the rangelands, there are sound reasons why sustainable grazing systems are achievable. My concluding impressions were that there should be optimism for continued pastoral use in much of the rangelands.

NATIONAL RANGELAND STRATEGY

Rangelands Issues Paper

Alec Holm, President, Australian Rangeland Society, PO Box 718, Victoria Park WA 6100

All members of the Society should by now have been circulated with the *Rangelands Issues Paper* to prepare for the National Rangelands Strategy. The Society is taking an active role in the development of this Strategy. You may recall that following the Visions Workshop, I called for volunteers to assist Council develop policy for the Society. The Policy Working Party is now operational. We have decided initially to focus on input into the National Rangeland Strategy and to use this response as the framework for the Society's policy.

For your information, members of the Policy Working Party are:

- Alec Holm (convener - Western Australia)
- David Beurle (Western Australia)
- Margaret Friedel (Northern Territory)
- Greg Campbell (South Australia)
- Ron Hacker (NSW)
- Bill Tatnell (NSW)
- Tony Grice (Queensland)
- Piet Filet (Queensland)

Our approach for the NRS is to allocate the main issues to the members of the Policy Working Party for development of the initial response. We propose to produce a brief response to the *Issues* paper with some limited consultation and assistance from members and branches of the Society. This is due by 8 April. We will then continue to develop and refine this with the objective of presenting a more detailed response to members for your input at the Katherine conference. I therefore suggest that members liaise with the following members of the Policy Working Party to assist where possible in the preparation of this submission.

- Section 3.1 Rangeland users - Greg Campbell
- Section 3.2 Ecological sustainability, economic and social - Bill Tatnell and Ron Hacker
- Section 3.2 Ecological sustainability, environmental - Piet Filet and Tony Grice
- Section 3.3 Information systems and monitoring - Margaret Friedel
- Section 3.4 Institutional issues - Alec Holm and David Beurle

I will keep members informed over the coming months of progress with this submission which is seen as one of the more important activities for the Society during the life of the current Council.

LONG-TERM RESEARCH SITES IN THE RANGELANDS

Jim Noble, CSIRO Division Wildlife & Ecology, PO Box 84, Lyneham ACT 2602

Ten years ago I wrote a contribution under the title "To Exclose Or Not To Exclose" to the February 1984 issue of the *Range Management Newsletter* (No. 84/1). The article dwelt primarily on the perceived need to establish long-term study sites based on a minimum of two treatments, i.e. plus and minus grazing, whereby institutions, rather than individuals, had responsibility for their upkeep and data collection. My opening paragraph was as follows:

"One of the major problems we face as arid zone ecologists is the fact that our average life span, certainly working span, is almost irrelevant when compared with the life span of many perennial plant species. Consequently, when attempting to describe even the simplest aspects of the population ecology of some of our more important species, we are forced to make fairly crude assumptions about "average" life spans, "optimum" frequency for regenerating events to maintain resilient plant populations etc."

During the last Australian Rangeland Conference held at Cobar in October 1992, I raised the issue of long-term research sites again during a session devoted to Society issues and it was suggested that a further article be written for this newsletter. The fact that this contribution will appear shortly

before the next ARS conference in Katherine may also be timely and promote further discussion at this venue. The basic premise underlying my proposition is that little has changed in this context over the past ten years and little is likely to happen in the foreseeable future unless the Australian Rangeland Society as a professional, apolitical organisation, undertakes a more active role.

It is important to note that I am not simply advocating the establishment of more extensive monitoring sites although there is an element of monitoring over a long period of time. Rangeland monitoring is one area where there has been a significant change over the past decade as demonstrated in the deliberations of the range monitoring workshop detailed in the proceedings of the 5th Australian Soil Conservation Conference (Hamilton et al. 1992). Instead I am advocating the establishment of **research** sites where a minimum of two management treatments are imposed, hence my original emphasis on the construction of grazing exclosures.

With this in mind, I wish to recommend that the Australian Rangeland Society establish a working party to consider the merits or otherwise of developing either a position paper for further discussion and/or developing a draft protocol which states the need for such action. This document would detail those steps that need to be taken in order to develop a national, coordinated approach to setting up appropriate sites in designated rangeland types or "Representative Rangelands" similar to Representative Catchments.

There has recently been some discussion elsewhere about the need to establish registers of long-term ecological study sites in a variety of ecosystems throughout Australia. The problem is that such a *post hoc* approach does not adequately address the problem of compatibility of data. If an appropriate protocol could be developed then at least these data problems could be minimised. If the need to establish properly designed long-term research sites is accepted by the majority of members, then it may be something worth pursuing by the Executive.

I might conclude by quoting again from my homily written ten years ago:

"Obviously there is a considerable commitment in any such undertaking and many organisations may be loathe to spend scarce finances and manpower on an activity which promises little return in the foreseeable future. If however, we are not prepared to initiate such extended perspectives we, and more specifically future generations of range ecologists, will still be wondering well past 2000, how to better manage our arid vegetation resources".

HOW HIGH IS THE KATHERINE RIVER? 12 Metres and Rising

Tom Stockwell, Chairman, Katherine Conference Organising Committee, PO Box 1346, Katherine NT 0851

Organisation of the 8th Biennial Conference has achieved a major milestone - a good Wet. Katherine received regular rain from early November through December, a dry spell in January and another strong monsoonal influence during February and March. The Victoria River is over the bridge; some of the Gulf rivers are miles wide; and north and west Queensland, as well as some parts of central Australia, have had good rains. This means that in June, there will be good pasture cover and well-conditioned cattle, water on the floodplains, water over the falls in Kakadu and plenty of good scenery for the field trips. The Barkly Tablelands will look spectacular from the window seat of a jet from the east as will central Australia from the south and the Kimberley from the west.

The conference program has been finalised and includes an excellent range of speakers (see below). One such speaker is Prof. Larry White from Texas A&M University whose interest is in extension aimed at ensuring sustainable land use - whether that be grazing, tourism, conservation or a combination of land uses. Larry's attendance is being sponsored by NAP 2 (the Meat Research Corporation's North Australia Program Two).

The conference program has also allowed time for workshop, poster and discussion sessions, as well as other informal gatherings. Planned recreational activities include visits to the Katherine Gorge and Katherine River Low Level reserve.

Accommodation

Accommodation is starting to fill so you are advised to make bookings sooner rather than later.

Registration - Don't be an April Fool

Discounts of \$30 apply to registration payments made before April 1. A Registration Form is included with this *RMN* if required.

Conference fees are:

	Before 1-4-94	After 1-4-94
Full Conference	\$190	\$220
Students	\$140	\$170
Single Day	\$ 75	\$ 75

A conference newsletter will be circulated shortly.

Conference Program

This part of the organisation has been under the control of a Program Committee in Alice Springs. They have developed a program which includes:

Tuesday (21 June)

8.30 Official Opening

Session 1 - *Scene setting: Rangelands into the 90s*

- 9.00 Keynote address - Wim Burggraaf
- 9.30 Conservation and tourism - making them pay
- 9.45 National strategy for rangeland management

10.00 Morning tea

Session 2 - *Production/Industry Issues - Impact on the Man on the Land*

- 10.30 The export cattle trade; longer term implications for the North Queensland cattle industry - Bill Holmes, Qld DPI
- 11.00 Survivors in the wool industry - Bob Wynne, NSW CALM
- 11.15 Mabo, implications for land management - Neville Jones, NT Office of Aboriginal Development
- 11.30 Drought policy as it relates to the man on the land - Guy Fitzhardinge, NSW pastoralist
- 11.45 Taxation policy and its impact on rangeland management

12.00 Lunch

- 1.30 **Brief Presentations with Posters.** Five minute papers
Concurrent presentation of Brief Paper/Posters grouped by theme

3.00 Afternoon tea

- 3.30 **Workshops to develop/discuss contemporary rangeland issues** - under the control of Tom Stockwell & Don Burnside

5.15 **Society Business**

7'ish **Conference Dinner**

Wednesday (22 June)

- 8.30 **Open forum.** An opportunity for new ideas and new speakers. Seven speakers to talk for 12 minutes including 2 minutes of question time.

Speakers: Carolyn Ireland - Myall ecology
Sheldon Navie - Stocking rate vs soil seed bank
Andrew Craig - Fire regeneration
Peter Jessop - Indicators for range assessment
Chris Edgoose - Landscape evolution in the Barklys
Dave Robson - Woody weed rehabilitation
Grant Hatch - Costing stocking decisions in an uncertain environment

10.00 Morning tea

10.30 **Brief Presentations with Posters**

12.15 **Field Trip**

Thursday (June 23)

Session 3 *Extension, Education and Integration*

- 8.30 Keynote address - Larry White
- 9.00 Participatory problem solving - Richard Clark, Qld DPI
- 9.15 Arid zone resource planning in the corporate world
Greg Campbell, Kidman Pastoral Company
- 9.30 A practical approach to self assessment as part of a national resource monitoring strategy - John Fargher
- 9.45 A Rangelands perspective in school education - Rob Richards, NSW

10.00 Morning tea

Session 4 *Conservation Issues*

- 10.30 Keynote address - Dick Braithwaite
- 11.00 Biodiversity in relation to pastoralism - Marg Friedel
- 11.15 Fauna biodiversity in Mitchell grass - Alaric Fisher
- 11.30 Endangered species research particularly in relation to mining and pastoralism in extensive areas - Sonja Tideman
- 11.45 Native species in rehabilitation - Peter Simpson

12.00 Lunch

Session 5 *Ecological Research*

- 1.30 Rangeland ecology in northern Australia - John McIvor and Andrew Ash
- 2.00 Erosion processes at a regional level - Grant McTainsh
- 2.15 Modelling dynamics of rangelands - Greg McKeon
- 2.30 Role of biological soil crusts in soil and ecological processes - David Eldridge
- 2.45 Where is research being directed - Don Burnside & Hugh Pringle

3.00 Afternoon tea

3.45 **Workshop Plenary Session** - Jim Noble

4.45 **Concluding Session** - Bill Burrows

(Note: speakers names indicated where we have definite confirmation.)

For further information, please contact Neil MacDonald on 089 738746.