The Australian Rangeland Society

RANGE MANAGEMENT NEWSLETTER
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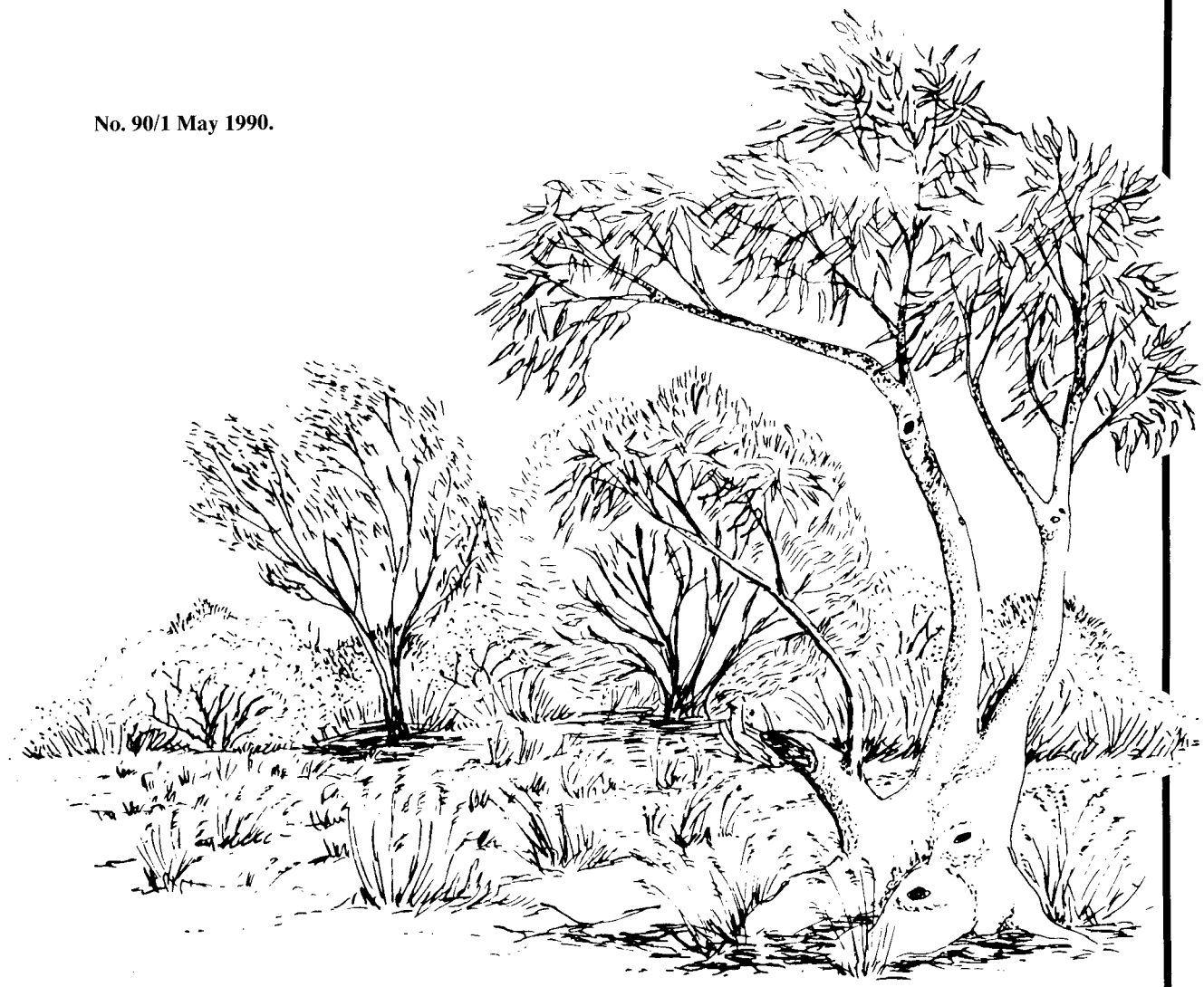
Range management Newsletter

No. 90/1 May 1990.



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EDITORIAL

Welcome to another year with the RMN. 1990 will see some significant changes to your publications. Having settled for a policy of three issues per year your RMN issues will be bigger and better. There will be more technical items in line with the changes initiated last year.

This issue sees two of these articles, both through the efforts of Gary Bastin. The first is a follow up to the Umberumba story RMN (No.88/3) and describes some of the changes Bob Purvis sees as necessary after a violent storm in late 1989. Gary in conjunction with Reg Andison has put together some research findings in Kidman Springs Country - 10 years on.

Your council has been particularly active over the summer months and their jottings contain a number of interesting points.

Tony O'Brien has added some useful points to the Drought Criteria discussion.

The 1990 conference in Carnavon is looming on the horizon. Notes from Edwina Faithfull cover the programme and a copy of the registration form is also enclosed.

Closing date for applications for the conference Scholarship have been brought forward to June 30th 1990 to provide opportunity for applications for travel to the International Rangelands congress. Please note the changes.

Perhaps the most significant contribution to Australian Rangeland issues in recent years has been the release of CSIRO's "National Rangeland Policy". All members should read it! In future issues it would seem productive to examine parts of the Policy so please send in your thoughts and feelings.

Please note, the following changes to contact numbers.

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Dennis Barber Phone: (08) 260 8134 Fax: (08) 349 7003

Wishing you all a productive and enjoyable year.

G. Gardiner
EDITOR

FROM YOUR COUNCIL

AGM May 31st 1990

The Executive Council will hold their Annual General Meeting on Thursday 31st May. Any member wishing to attend or contribute to the AGM should contact the Hon. Secretary (08 260 8134) for further information.

OVERSEAS CONFERENCE SCHOLARSHIP 1990

Owing to the interest shown by members in 1989 wishing to attend the International Rangelands Congress in France during April 1991, the ARS council has decided to call for further applications during 1990. Applications for the Overseas Conference Scholarship are normally due by November 30th each year. The closing date has been brought forward to June 30th so the successful member or members will have time to take care of financial arrangements in time for IRC.

The Overseas Conference Scholarship is open annually to any ARS members who are participating or contributing to a meeting or conference outside Australia which deals with the science and art of rangeland resources.

Applications should be lodged with the Honarary Secretary no later than June 30th 1990, stating clearly the reason for travel and the benefits to be gained along with an estimation of the travel costs incurred.

TRAVELLING FELLOWSHIP 1989

The 1989 Travelling Fellowship has been awarded to Andrew Drysdale who is a pastoralist from Charleville, Queensland. He has applied for funding to attend the 6th Australian Rangeland Conference at Carnavon in September 1990.

FROM THE PRESIDENT

Greetings!

SOUTH AUSTRALIAN RANGELAND STRATEGY

I penned this just having returned from a two day Residential Workshop held to prepare a strategy document about South Australia's needs for research, education, training and extention relating to the arid zone. This arose out of the Middleback Weekend Retreat held last September (which I referred to in the previous newsletter). It was a very significant event - the first time the major players in the arid zone rangeland game in South Australia had got together with the agreed purpose to work towards such a strategy. Those involved included academics, researchers, State Government departments, the pastoral industry and conservationists. A first draft document has been prepared which is not only meaningful and useful, but which meets the broad agreement of all parties. This will be finalised in the next two months or so.

This document will serve as the basis for co-operative South Australian bids for funding from State and Federal Governments, and from appropriate funding organisations. This is the kind of approach which is needed if we are to secure adequate resources to undertake the tasks which will lead to better management of the arid zone. Bob Lange takes the credit for providing the infrastructure which has enabled this initiative to develop.

A NATIONAL RANGELAND POLICY

You will have heard about C.S.I.R.O.'s recently released policy for the future of Australia's rangelands, prepared by the C.S.I.R.O.'s national rangleland's program. This caused some controversy because of what it had to say about pastoral management - but like most such controversies, a close reading of the document will show that the document is a well balanced one,incorporating the distilled wisdom of many year's research and pastoral experience, which views the rangelands resources as a whole, and addresses the concerns of both pastoralism and conservation.

I urge all members to read it.

It is refreshing to see the C.S.I.R.O. viewing a research area like range management, in its wider perspective, and recognising the importance of non-science concerns such as business, economics, administration and legislation. It is ironic that the C.S.I.R.O., long criticised for not taking these wider considerations into account, is now criticised for doing it!

I congratulate Barney Foran, Mark Friedel, Neil MacLeod, Mark Stafford Smith and Allan Wilson for their fine document.

RANGE MANAGEMENT THEORY

I'd like to draw your attention to an important paper which appeared last year, by Mark Westoby, Brian Walker, and Imanuel Noy-Meir (1989) "Opportunistic Management for Rangelands not at Equilibrium" Journal of Range Management 42(4): 266 - 274.

The significance of this paper is that it brings together recent developments in ecological theory, many of them developed here in Australia, and applies them to range management and rangeland administration.

They point out that the traditional Clementsian view of range management - that vegetation composition moves up and down the successional gradient according to the resultant forces of grazing pressure and weather - is not the way the ecological world actually works. Ecological systems do not behave in a linear manner, and particularly in Australia, rangeland ecology is driven by episodic events. The appropriate model, therefore, is a 'state-and-transition' model which views rangeland vegetation as being in one of several states, with transitions occurring abruptly between these states. These transitions are brought about by the coincidence of episodic events such as drought, over grazing, fire, flooding and so forth.

The implication of this is that there are critical times in the life of a rangeland where management can intervene to change the system for better or worse. Because the ecological system does not behave in a steady, continuous manner, neither can management be applied on a steady, continuous basis.

Furthermore, whilst research programs can be planned in advance, many experiments can only be performed when the conditions are right, and to do otherwise is to doom the research to failure. Likewise, administrators need to recognise that management and research cannot be applied on a steady-state basis.

Many of you think that theory has little to do with day to day management. This is not true - theoretical considerations shape management in a very fundamental way, and inappropriate theoretical underpinnings lead to inappropriate management strategies. I hope that this new view of the world which Mark, Brian and Imanuel have so elegantly crystallised, does come to replace the inappropriate Clementsian view.

Martin Andrew

PRESIDENT

Submission To The Review Of Agriculture And Related Education By The Australian Rangeland Society

THE SUMMARY

The Australian Rangeland Society believes that rangeland management needs better recognition as a desirable field of study within Australian Higher Education, and that there should be one or more designated centres for teaching and research in rangeland management in Australian universities, perhaps with the creation of chairs in rangeland management. The Society urges the review to take this into its consideration.

THE NEEDS

Australia's rangelands, principally arid and semi-arid regions unsuitable for cropping, are coming under increasing pressure. It is now recognised that the traditional enterprise of extensive livestock grazing be managed within a 'landcare' ethic. There is increasing tourism interest in the region, pushes for more mining, and lobbying to create more national parks. With return to Aboriginal land management, traditional Aboriginal use is becoming significant in some areas. Future needs may include specialist applications not common at present, such as solar energy harvesting. Rangelands are an inherently multiple use resource, even though they are currently considered by many as being synonymous with pastoralism.

There are increasing needs for education, training, research and extension in rangeland management. Pastoralists need to become more skilled in a spectrum of areas, including resource use planning and management, rangeland monitoring, land rehabilitation, farm planning and budgeting, evaluation of alternative enterprises, marketing, communication skills, and so forth. A similar range of skills is increasingly needed for those who work in the service sectors. New legislation, such as the South Australian Pastoral Land Management Act, and the Soil Conservation and Land Care Act, both recently proclaimed, have created a need for more trained personnel. Other initiatives such as the National Soil Conservation Program have also created their own demands for skilled staff. Tourists are demanding more specialised and sophisticated services in tune with the environment and a greater educational content.

The public at large is having a greater influence on Government policy; it is important therefore that the public is well informed and has a balanced view of rangeland management issues.

In the research arena, there is a continuing need for fundamental research, and the development of that research into usable technology to solve the problems which press upon rangeland managers, problems such as rabbits and other pests, more efficient ways of handling stock, revegetation techniques, and the like. There is also a need to extract, synthesize and package information that is already known about rangeland management but which is not being adopted by the industry.

Another exciting area is the development of computer based decision support systems, including expert systems, to assist land managers to carry out their tasks more effectively; 'Rangepack' and 'SHRUBKILL', both developed by the C.S.I.R.O., are examples.

Rangelands thus provide a real and topical context for examining issues surrounding multiple resource use and research. We recommend to the Review Panel the recent "Policy for the Future of Australia's Rangelands", developed by the C.S.I.R.O.'s National Rangeland Program, as a clear statement of the many issues involved.

In addition to Australian needs, there is also an opportunity to provide education and research training for students from overseas, *particularly* from developing countries. Australia provides an alternative to the U.S.A. in this regard, an alternative that is too little exploited at present. Australia is well placed to attract overseas students to study rangeland management. This will be inhibited unless a focus is developed to attract this interest. The establishment of a Chair and funding support for one or more universities in Rangeland Management would provide this focus.

PRESENT OFFERINGS

Australia does not have any University entity for range management, unlike the U.S.A. where the tradition of Departments of Range Science/ Management is long established. Range issues are taught by committed individuals from other departments (eg: Agriculture, Botany, Geography, and Wool and Animal Science).

University of Adelaide Botany Department has the long tradition of studies in rangeland management, perhaps due to Adelaide's proximity to the arid zone. This involvement dates back to at least the 1920s with Professor Osborn who established the Koonamore Vegetation Reserve (now called the T.G.B. Osborn Reserve). The present rangeland exponent, Dr R.T. Lange, has for many years taught a third year subject 'Rangeland Ecology'. Dr Lange established, with the aid of the State Government and pastoralists, the Middleback Field Centre near Whyalla, to provide a base for teaching and research in the chenopod shrublands.

The other major facility is at Fowlers Gap, a research station north of Broken Hill belonging to the University of N.S.W. Its Department of Wool and Animal Science has also a long tradition of working

in the arid zone with a stronger emphasis on animal production than at the Botany Department at the University of Adelaide, and its Geography Department also runs range-relevant courses. The University of N.S.W. offers both a coursework M App Sc and a Grad Dip in Arid Lands Management, the latter including streams in Range Management and Management of Pastoral Enterprises, and the undergraduate degree in Wool and Pastoral Science includes range-relevant options. Subjects offered include 'Range Management' (including one week's field work at Fowler's Gap), 'Geomorphology of Arid Lands', 'Arid Zone Surface Water Hydrology', and 'Ecological Studies in Arid Lands Management'. The U.N.S.W. also offers courses in Remote Sensing and Land and Geographic Information Systems.

Other Institutions which offer relevant subjects include:

The University of Queensland which offers the subject "Range Management" as part of its B Ag Sc, along with other subjects which touch on range issues to do with agronomy, pasture science, and animal production. Its Botany Department includes 'range and national park management' within its brief.

The University of New England touches on range issues in some subjects taught in its Departments of Botany, Agronomy and Soil Science, and Natural Resources Management.

In South Australia, in addition to the University of Adelaide's Botany Department, the school of Biological Sciences at Flinders University teaches some range-related subject 'Ecology and Management of the Arid Zone', also Roseworthy College and the University of Adelaide offer courses in remote sensing and geographic information systems.

The National Key Centre for Teaching and Research in Dry Land Agriculture and Land Use Systems, based at Roseworthy Agricultural College, is Australia's only Key Centre dealing with broad scale agricultural and animal production. It includes rangelands in its brief. Dr Lange is now a Visiting Fellow with it.

The present round of mergers in higher education has bought Roseworthy and the University of Adelaide together (from 1/1/91), and Queensland Agricultural College has now merged with the University of Queensland. Both these mergers offer the chance to strengthen range programs in the merged Institutions.

OPPORTUNITIES

It may not be possible (given the trend to large departments for administrative efficiency) or desirable (given the strength of the discipline based departments which already exist in universities, and the location of the universities away from rangelands) to create Departments of Range Management/ Science. However, it would be possible to provide a focus, direction and formal presence for range management in one or more universities by creating a multi-disciplinary Centre for range management, and/or by designating a Chair or other senior position in range management.

These arrangements would actively link the component discipline experts within the field of range management. This has been done at Lincoln University in New Zealand, where the only Professor of Range Management in Australasia is part of the multi disciplinary Centre for Resource Management. Indeed, this has been the de facto role of Dr Lange within the University of Adelaide and now Roseworthy.

Doing this would have achieved several objectives:

(1) It would recognise range management as an important field of study.

(2) It would provide a focus for rangeland studies (both teaching and research), not just within the Institution, but also for revelvant Institutions outside, such as State Government Departments, C.S.I.R.O., and grazier organisations. These represent those facing the day to day problems, whom the Higher Education Institution can assist with both award and short, non-award courses, consultancies, training and research and development.

(3) By creating such a focus, it would facilitate the conduct of teaching and research in range management.

(4) It would make it easier to attract students from overseas, especially from Africa, who desire a range management qualification and expect to study in a range management 'entity'. By having no such named entity, Australia tends to miss out on providing such training in favour of named Range Management/Science departments in the U.S.A..This is regrettable since developments in rangeland theory in Australia are in the forefront of the world (e.g. Westoby et al. 1989), and Australia, with its less developed infrastructure, may offer a better context for education and training of people from less developed countries than the U.S.A.

Nevertheless, rangeland management is unlikely to be a high demand field in terms of the number students who wish to specialise in range management alone. However, students from many disciplines have demonstrated their interests in courses in range management by the strong demand for courses such as 'Rangeland Ecology' in the Botany Department of the University of Adelaide, and in an arid zone unit taught at the University's Graduate Centre for Environmental Studies; this underscores the point above that rangeland management is a useful context for learning about resource management generally.

Furthermore, study in rangeland management/ science is more expensive than working in other land management fields because of the need to undertake field work and field teaching in arid situations usually at a considerable distance from city

bases. Intra-university funding allocations need to recognise this.

One final point about research organisation. The 'state-and-transition' model of rangeland ecology articulated by Westoby et al. (1989), recognises that our rangelands do not behave in a steady, continuous manner.

Rather, they are perturbed by the coincidence of episodic events (drought, flood, fire, over-grazing) and tend to move rangeland condition rapidly from one state to another (which may or may not be more desirable for the land management being practiced). This view is in contrast with the conventional view of range management in the U.S.A., which views the condition of rangeland as moving up and down a continuum, according to the resultant forces of weather and grazing. The Westoby et al. (1989) model is a better representation of present ecological theory. What the model implies for research, though, is that, whilst experiments can be planned in advance, there is often no point implementing them until conditions are right; to do otherwise may lead to unhelpful or misleading results. This then implies that research should not be planned on a continuous basis, but rather on a contigency basis with bursts of activity (and funding) at the appropriate times. The Review may care to ponder how this might be arranged.

The Society will be pleased to pursue any matters which the Review might care to raise with it.

Yours sincerely

DR M H ANDREW

PRESIDENT

References: Westoby M, Walker B and Noy-Meir I, (1989) :"Opportunistic management for rangelands not at equilibrium" J. Range Management 42 (4):266 - 274.

NEW MEMBERS

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Dennis R Barber
(Hon Secretary)

ROSEWORHTY JOTTINGS

Roseworthy Agricultural College will graduate its first aboriginal graduates on the 6th April, 1990.

One of these, Bruce 'Tracker' Tilmouth, from Central Australia, has made heavy use of the C.S.I.R.O.'s 'Rangepack' decision support system in his final year project for the degree in Natural Resources Management. Tracker, now Assistant Director of the Central Land Council, completed a Land Assessment and Enterprise Management proposal for the Mimili Community in the Pitjantjatjara Lands. Another Aboriginal graduate, Peter Peckham, has returned to Canberra, taking up a professional post in the Bureau of Rural Resources with the Department of Primary Industry, promoting and assessing Aboriginal community enterprises based on vertebrate and pest plant control strategies.

Roseworthy also plans to begin its new Masters of Applied Science by research degree this year, with the first intake of students in July. This is Roseworthy's first higher degree, and its first research degree. It is planned that the emphasis will be very much on the 'applied' philosophy, with students undertaking mission-oriented research within a farming or industry systems framework, in which the analysis of the industry will be an important part to demonstrate that the proposed research project is indeed a real need, and that solving the problem is an efficient way to improving the lot of the industry.

Prospective students should contact the Academic Secretary (Mr John Hague), or the Associate Director (Dr Martin Andrew) at Roseworthy Agricultural College, Roseworthy 5371

Telephone 085-248057 Fax 085-248007.

TEMPERATE RANGELANDS

AN EX OUTSIDERS VIEW - BILL SEMPLE

Having recently moved to the 'inside' country of N.S.W., I can reaffirm Wal Whalley's assertion that rangelands do exist here - at least in the Tablelands. Furthermore, graziers have similar problems to those of the drier areas in managing their rangelands:

A lack of decent perennial grasses, particularly cool season species, is evident. Jacobs and Pickard's (1981) "Plants of NSW" lists some 140 perennial grass species for the Central Tablelands of NSW, but decent forage species are difficult to find in quantity in many paddocks.

Although much of the better country has been "sub and supered" (but rarely 'perennial grassed' as well), native pastures are widely believed to be capable of carrying additional stock when seasons turn dry.

The decline in useful perennial grasses on the tablelands appears to be a complex story with many questions and, as far as I'm aware, few answers.

Woody Weeds are very common in some parts - usually the poorer country - of the tablelands and slopes. The main species is **sifton bush** (Cassinia arcuata), also called biddy bush or chinese scrub, a native shrub which exceeds 2m on better sites.

I don't claim to have discovered this problem - it was declared noxious in Victoria as far back as 1923 - but I don't recall any mention of it in the rangeland literature. It is a problem for much the same reasons as woody weeds are elsewhere: though its density is usually higher, I've measured up to 50 plants (including suppressed seedlings) m^{-2} and a canopy cover of 60%.

It has been claimed that by suppressing herbage growth, water erosion is enhanced under shrubs. I've heard this story before. My recent reading of U.S.A. research suggests the contrary to be the case.

Malcolm Campbell of NSW Agriculture and Fisheries estimates that the area of infested lands in NSW has increased from 93000 ha in 1975 to 483000 ha in 1988 with much of this increase occurring after the 1982 drought.

Methods of control include herbicides, slashing, rolling (when plants become brittle with age), removal by hand and burning.

Soil erosion, sheeting and gullying, is widespread. Naturally acid sub soils are a severe limitation to production in some areas, particularly if topsoil has been lost.

As with semi arid and arid areas, there is a lack of plant material for rangeland rehabilitation. The Consul cultivar of Eragrostis curvula has potential in the temperate rangelands but unfortunately, the species as a whole is a declared noxious weed over much of the area.

There appears to be increasing interest in the role and value of native perennial grasses in the Tablelands. Much of this can probably be attributed to the northern Tablelands work which we heard about, and saw, at the Biennial Conference in Armidale in 1986.

DROUGHT CRITERIA

TONY O'BRIEN

Land management is psychologically influenced by short term (± five years) concepts or apparent carrying capacity but more strongly influenced by longer term memories of accepted carrying capacity, especially those relating to a cycle of good years. Where weather cycles become less favourable, or land degradation occurs, or woody weeds invade: the management reaction in reassessing carrying capacity is slow. The problems associated with reassessment or carrying capacity due to these factors, whilst interactive with drought, should be separated from an assessment of drought.

Regional feed availablility and quality are factors directly related to land systems characteristics and whether appropriate adjustments have been made in stocking rate in relation to the dynamic equilibrium. They relate to management adjustments. As such they are misplaced as subjective assessors for drought declaration.

Feed droughts and water droughts are normal factors of agriculture that management must allow for, with capital investment and structural adjustment as necessary. Subsidies in drought only defer development of effective land management and structural adjustment. They stimulate a Handout mentality.

Drought assessment can be an aid in decision making on the property, especially if an empir-

ical assessment is based on local agroecological climatic units, (not administrative units). To be useful the assessment should contain an early warning element and both the number of months of rainfall deficit and a grading of accumulated intensity of deficit.

Drought assessment requires a moving average of "average" rainfall and a moving cumulative total of current rainfall, in comparison to cumulative totals in the "average" rainfall over the same period.

With natural cycles of rainfall (and temperature) and the greenhouse effects, an appropriate period for "average" rainfall in subhumid eastern Australia is a ten year moving average.The appropriate period to use may be adjusted for different agroclimatic areas. In more arid areas a longer term average may or may not be more appropriate.This period reflects climatically induced (non episodic!) changes in effective carrying capacity: changes in the dynamic equilibrium of plant composition and production.

Whether modal, median, mid decile or mean rainfall is appropriate to use for "average" rainfall may vary between agroecological climatic areas. (Modal:- most frequently occurring rainfall range in a distribution assessment of yearly rainfalls) While modal rainfall is difficult to define in a ten year moving average, I favour the use of a derived "modal" rainfall as being more realistically related to appropriate land management, (High rainfall requires as much emphasis for management intervention as does drought, a factor all too often overlooked in discussions of land management.)

The appropriate period to use for cumulative current rainfall will vary between agroclimatic areas. For sub humid eastern Australia this period is two months, adjusted on a pentad (10 day) basis. This represents an appropriate lead time for cumulative effects on current feed supplies.

In higher rainfall areas the influence of flood rains is quickly dissipated. As rainfall decreases the influence of above modal rainfall has a longer effect. Hence the cumulative current rainfall period will need to lengthen with increasing aridity. The effects of floods on drought criteria cannot be accommodated in this model. eg: the channel country.

When there is a one month deficit of accumulated current rainfall against accumulated modal rainfall, an early warning of drought should be issued. The months of deficit should be updated on a regular basis, until the accumulated current rainfall returns to the modal range. The intensity of the deficit can be expressed in either absolute or percentage terms, for both the cumulative current period and the total period of deficit.

What constitutes a drought is still a subjective decision but by this method it can be given an objective base for definition and grading of intensity. Extension recommendations can be based on appropriate stages in the development of the drought, as defined by period and intensity, for each agroecological unit.

Sixth Australian Rangeland Conference

Registration

Title (Prof/Dr/Mr/Mrs/Miss/Ms)

Surname.....

Given Name.....

For your badge Preferred Name.....

Affiliation.....

Address.....

.....Postcode.....

Telephone (Business) ( ).....

For our information, please indicate your likely travel mode and interest in tours.

Mode of Travel: ☐ Commercial flight
☐ Bus
☐ Private vehicle
☐ Local resident

Mid Conference: ☐ Local rangeland tour and BBQ
☐ Alternative mid conference local environs tour

Overland Tours: ☐ I plan to travel overland to the Conference in my own vehicle and require information on pastoral accommodation.

Pre or Post Conference: ☐ Coastal tours 1 day
☐ Gascoyne hinterland tour 2-3 days
☐ Monkey Mia tour 1 day

(099) 41 1164).

Absolute deadline for registrations is May 31, 1990

Please make cheques payable to Australian Rangeland Society Conference. Registrations will not be accepted unless accompanied by full payment of the due fees. Acknowledgement will be made in writing. Precis may be submitted without registration, however acceptance of your paper/poster does not guarantee accommodation bookings. Paper and poster precis, and completed registration forms with payment should be sent to:

Australian Rangeland Society Conference
c/- Post Office Box 522
CARNARVON WA 6701

AUSTRALIAN RANGELAND SOCIETY CONFERENCE

EDWINA FAITHFULL

As you will have heard the next Australian Rangeland Society Conference is to be held at the Fascine Lodge in Carnavon from 4th-6th September, 1990.

A registration form and details of the programme are given below. Register now to avoid disappointment - our accommodation is limited.

The Conference runs for 3 days. The first and third days will be occupied by paper presentations with opportunity for question and discussion. The second day will consist of a morning poster presentation and an afternoon field tour ending with a BBQ at Brickhouse Station. There will be an official dinner on the last evening.

The Conference promises an excellent opportunity to hear new (and old) ideas, innovations, opinions and results. We encourage you to make an effort to attend the Conference, your input is vital to the Society.

Well worth attending!

The Australian Rangeland Society 6th Australian Rangeland Conference

Carnarvon,Western Australian
3rd to 6th September, 1990

REGISTRATION FORM

CALL FOR PAPERS

The organizing committee of the Sixth Biennial Conference of the Australian Rangeland Society invites you to attend our Conference in Carnarvon, Western Australia.

The conference provides a forum for the interchange of ideas and information among Society members and those of interests allied with rangelands. This is in keeping with the aims of the Society which also aims to promote the wise use of rangelands and to encourage and develop awareness of the need to conserve the inherent resources.
You will be aware that 1990 marks the beginning of the Decade of Soil Conservation in Australia. It is our aim to use this conference as the launch for Soil Conservation in the Rangelands of Australia.

Fees

	Normal cost	Student cost
☐ **Full registration** (includes proceedings, morning and afternoon teas, lunches, mid conference tour and BBQ and Conference dinner)	$150	$120

Occasional Registration

☐ ☐ Tuesday — Conference sessions I-IV	$50
☐ Wednesday — Poster Sessions, lunch, Mid Conference Tours and BBQ	$40
☐ ☐ Thursday — Conference Session V-VII	$50
☐ ☐ Conference Dinner — (Thursday night) .....tickets @ $40 each	$40
A late fee applies on registrations received after March 31, 1990	$40
TOTAL	___

ACCOMMODATION (please tick)

I will arrange my own

Please arrange for accommodation at the Fascine Lodge for the nights of:

☐ ☐ Monday, September 3
☐ ☐ ☐ Tuesday, September 4
☐ ☐ ☐ Wednesday, September 5
☐ ☐ Thursday,September 6

☐ Triple share
or
☐ twin share Partner/s.....
or
☐ ☐ single (limited)

Organizers to arrange room share

We therefore expect that the conference will attract a wide range of land users of the arid zone including pastoralists, conservationists, traditional land users, as well as research and extension workers.

VENUE

Carnarvon is a coastal town of 8000 people situated 1000 km north of Perth and 100 km north of Monkey Mia the home of the Shark Bay dolphin. The town is located on the mouth of the Gascoyne River, which has a catchment area of 67,000 km^{-2}. As well as being the major service centre for the surrounding pastoral areas, Carnarvon also supports substantial fishing and horticulture industries.

Carnarvon has an arid climate (mean annual rainfall of 237 mm). September weather is fine and dry with warm days (mean maximum 23.8 C) and mild mights (mean minimum 13.8 C).

Spectacular displays of wild flowers occur in some years following good winter rains.

THE CONFERENCE

The conference will open with registration and an evening function on Monday, September 3. Plenary sessions will be held on Tuesday and Thursday at which keynote speakers will address a range of topics. For each session contributed papers and posters will be presented.

Chairmen will co-ordinate each session and summarize the papers and discussion.

A poster session will be arranged to give structured presentations.

A mid Conference Tour is arranged on Wednesday 5th to conclude with a bush barbecue. An alternative tour is also available (see programme).

Pre and post conference tours of 1 or 2 days duration will be organized by the Carnarvon Tourist Bureau to coastal and hinterland destinations. For overland visitors travelling in their own vehicle we can provide details of available shearers quarters accommodation and en route information on the pastoral areas.

The conference will end with a dinner and appropriate entertainment.

CONFERENCE PROGRAMME

Monday, September 3

6.30p.m.	Opening function. Welcome by the ARS President and the Organizing Committee.

Tuesday, September 4

9.15-9.30a.m.	Official opening.
9.30-11.00 a.m.	**Tradional Livestock Production I** Dr Alan Wilson will explore the potential for improved sheep and cattle production within increasing conservation restraints. Contributed papers are sought on sheep and cattle production research in ranglelands. Three will be selected for presentation.
11.30-1.00 p.m.	**Traditional Livestock Production II** Dr Mark Stafford-Smith will consider the influence of stock water supplies on the grazing distribution and productivity of livestock. Contributed papers are sought to support this topic and on innovations in stock management including infrastructure innovations. Two will be selected for presentation.
1.00-2.00p.m.	Lunch
2.00-3.30p.m.	**Developing Livestock Industries** Dr George Wilson will examine the potential of alternative animals in rangelands and will discuss the biological ecological and social constraints of using these animals. Contributed papers are sought on research involving alternative animals in range-

lands, practical experiences and on the philosophy of farming 'wildlife'. Three will be selected for presentation.

4.00-5.30p.m. **Other Land Users**

Dr John Holmes will consider conflicts between existing and potential land users and attend to how the conflicts maybe accommodated and how potential benefits can be realised.

Contributed papers on this topic are sought from or on behalf of all rangeland users including Aboriginal groups, tourists, mining companies, conservation groups and custodians of National Parks and other Reserves.

Wednesday, September 5

8.30-11.00 a.m. Structured concurrent poster presentations.

11.30-5.30 p.m. Mid conference tour including demonstration of rangeland regeneration equipment, the Boolathana sheep grazing study, visit Boolathana Station.

2.00-4.00 p.m. Alternative tour of Carnarvon Irrigation Area, Space tracking museum, prawning factory, Gascoyne Horticultural Research Station.

5.30 p.m. Barbecue at Brickhouse Station Woolshed.

Thursday, September 6

8.30-10.20 a.m. **Conservative Rangeland Management I**

Dr Bill Burrows will present an assessment of developments to date of rangeland management in Australia. The basic theory underlying rangeland management practise will be explored.

Contributed papers are sought from land users and research workers. Papers should examine the application of range management principles and their effect on enterprise profitability and rangeland productivity.

Papers covering practical on farm experiences are encouraged. Three will be selected for presentation.

11.00-12.10 a.m. **Conservative Rangeland Management II**

Dr Geoff Pickup will consider the impact of soil erosion on Australian rangelands.

Contributed papers are sought on the assessment and impact of soil erosion in rangelands. Two will be selected for presentation.

12.10-12.50 p.m. **Rangeland Rehabilitation I**

Dr Noel Fitzpatrick will address rangeland degradation from an Australia wide perspective and will explore community attitudes, community based systems to tackle the problem and down stream benefits of rangeland rehabilitation.

12.50-2.20 p.m. Lunch.

2.20-4.10 p.m. **Rangeland Rehabilitation II**

Professor Bob Linder will consider a basis for the division between public and private contributions for rangeland rehabilitation programmes.

Contributed papers are sought on rangeland rehabilitation research, community land care programmes and property based rehabilitation projects. Four will be selected for presentation.

4.20 p.m. Final session.

5.00-6.30 p.m. Australian Rangeland Society Special General Meeting.

7.00 p.m. Conference Dinner and Entertainment.

ACOMMODATION AND TOURS

Delegates will be accommodated at the Fascine Lodge in Carnarvon. The Lodge is pleasantly and centrally located and has a swimming pool and bar. Rooms will be available for triple share at $28.30 per person per night, for twin share at $32.50 per person per night or single at $55 per night.

Accommodation at the Lodge is limited to 150 and will be reserved on a first come basis. Those not applying early may need to find alternative accommodation. Persons should specify if they require shared accommodation and should either give the name of their partner or indicate if they wish the organizers to arrange shared rooms.

Delegates must settle their own accommodation, meal and bar accounts with the Lodge before departure.

Post conference tours should be booked directly with the Carnarvon Tourist Bureau. See registration form for tour destinations.

ARRIVAL AND TRANSPORT

Delegates should plan to arrive on Monday, September 3rd. Ansett Airlines have generously supported the Conference and the organizing committee urge interstate visitors to use their services. Ansett WA Airlines is the sole carrier to Carnarvon and there are daily flights to and from Perth.

Greyhound, Deluxe and Bus Australia run regular coach services to Carnarvon from northern and southern centres. Travel time by road from Perth is about 12 hours. Delegates arriving at Carnarvon on Monday flight from Perth will be met and escorted to the Fascine Lodge.

CONTACTS

Accommodation and bookings	Mrs Olga Truran	099 41 8103
	Fax	099 41 8334
Conference	Mr Alec Holm	099 41 8103
Organizers	Ms Edwina Faithfull 099 41 8103	
	Mr Tim Eckersley	099 41 8103
Papers and posters	Mr John Morrissey	09 368 3333
	Fax	09 368 3355

OBITUARY

VALE, OWEN BENSON WILLIAMS

It is with sadness that we record the passing of Owen Williams, as Honarary Research Fellow with the Division of Wildlife and Ecology, on 4 January 1990.

Owen was one of the pioneers of the demographic analysis of plant populations in pastures, publishing one of the first lifetable studies of pasture grasses. His early work was with the Division of Plant Industry at Deniliquin, where he was initially appointed to C.S.I.R.O. in February 1946 following his graduation from the University of Melbourne in Agricultural Science. Much of this work was to become classic, whether it be his studies on Mitchell grass or Wallaby grass, pastoral history in Deniliquin, ecology of the Riverina plain, plant-soil relationships in irrigated and semi-arid conditions or pasture species in semi-arid rangelands (e.g. Oldman Saltbush).

In 1961 Owen transferred to the the Division of Animal Physiology at Prospect, continuing his work as an ecologist but concentrating on plant and animal production studies. He then transferred to the Rangelands Research Unit (RRU) in Canberra in 1972. The RRU became part of the Division of Land Resource Management in 1973 and Owen formally joined this new Division. During this period his research covered resource assessment and inventory and demography of grassland communities. This research was continued by Owen following the restructure of CSIRO in 1978 when he transferred to the Division of Water and Land Resources. Then another restructure in 1986 saw Owen (and the group with whom he was working) transfer to the Division of Wildlife and Ecology, from which he retired as an SPRS in July 1988, after 42 years service to CSIRO. Although he had retired Owen continued to work as Honarary Research Fellow at both the Division and the ANU's Centre for Resources and Environmental Studies.

Owen was an ecologist before the name was fashionable (indeed, before many knew what one was) and, throughout his working life developed expertise (and maintained his interest) in three *main areas:*

semi-arid and arid ecosystems - vegetation stability, animal performance and conservation:

pastoral industries as ecological systems; and

research application.

In addition to his substantial achievements within CSIRO Owen took an active part in organisations affiliated with his research and its applicability to industry. In 1987 and 1988 he was Vice President of the Australian Society for Animal Protection, becoming President of that Society in 1989 and recently being elected President for 1990.

Owen had an enormous fund of knowledge of the long-term dynamics of Australia's semi-arid pastures which he shared freely with others. His colleagues within CSIRO, from the many Divisions in which he worked, will miss him. To his wife, Rita and her family, we all extend our deepest condolences at this time.

Steve Atkins
Divisional Secretary, Wildlife and Ecology
Taken from: **CO RESEARCH #330 (Feb-Mar 1990) pp11**

UMBERUMBRA REVISITED

GARY BASTIN
Dept Primary Industry & Fisheries
Alice Springs

INTRODUCTION

In RMN No 88/3 (August 1988), Bob Purvis gave a detailed account of the events leading to the degradation of a valuable piece of floodplain on the eastern side of Atartinga. Atartinga is 200 kms north of Alice Springs. Bob then went on to describe his efforts to reclaim this floodplain by diverting water out of the erosion gullies onto intact remnants of the old floodplain and by creating a new floodplain at the end of the system.

In November 1989, the eastern side of Atartinga had the most intense storm that Bob has seen in his 50 years in the area. One raingauge near the catchment area into the floodplain had 100 mm which Bob estimated fell in 2 hours. Considering the lengths of fencing flattened by floodwaters in the area, it is remarkable that the banks constructed to reclaim the floodplain could have withstood the force of this flood.

I tried to persuade Bob that RMN readers would be interested in following the story of Umberumbra, and particularly so after this intense flood. In his modest way, Bob tends to discount his successes and considers that his reclamation efforts on this floodplain are only of local interest. However, I think the story is worth telling.

It most certainly is! Thank you Gary & Bob for your efforts on what is becoming one of the best documented case studies in Australian Rangeland regeneration.

EDITOR

UMBERUMBRA

Umberumbra is the aboriginal name for two waterholes in the floodout of the Crooked Holes Creek. Intense stocking destroyed this floodplain by reducing pasture cover on the catchment and floodplain and increasing the flow of water through the floodplain. Gullies up to 2 m deep eroding through the floodplain meant that water was no longer able to spread over the floodplain and most of the area died as it became progressively starved of water.

Bob initiated restoration of the area by fencing, light stocking and regular spelling of paddocks. This greatly improved pasture cover on the catchment but gullies continued to erode and the former floodplain made very little recovery. Reclamation using earthworks commenced 7 years ago and culminated in the building of 3 large banks totalling 5 kms in length and 8 smaller banks adding up to a further km over the 1987/88 summer. These banks divert water out of the gullies and allow it to spread in a shallow, slow flowing, sheet over intact parts of the old floodplain.

Low sandhills 40 to 50 cms high lie along the floodplain. According to Geoff Pickup (the CSIRO erosion guru), these sand bars were deposited in monumental floods. Having watched one build in recent years, Bob thinks that they also form in smaller floods as sediment and leaf litter are deposited against obstacles such as thickets of river red gum saplings. These more-or-less parallel ridges are about 200 m wide along the length of the floodplain. The banks divert water onto flat sections of the floodplain between these ridges.

Flood damage

The November 1989 flood breached the banks in 8 places washing away about 200 m total length of bank. The biggest hole was 50 m long. Bob has since repaired all but the biggest hole with his Cat 930 loader. He is still wrestling with the problem of whether to fill this hole as it is obvious to him that he is working against nature.

The previously described sand hills lie in a NNE direction. Much of the length of these ridges was eroded as water flowed over the top of them last November. Too much water is being diverted into too small a section of the old floodplain in very big floods.

Bob now thinks that in small floods, the water safety flows in a NNE direction between the sand hills. However, it appears that the actual fall is to the NE and in huge floods, the water must break across the sand hills (fig. 1). However, the surveying costs required to determine the relative fall in each direction would be prohibitive.

The Future

The November 1989 flood was probably the biggest in 50 years. The 64 dollar question is **"when is the next one due"?**

amount of scrub clearing for the necessary surveying and more dozer hours to build the required banks.

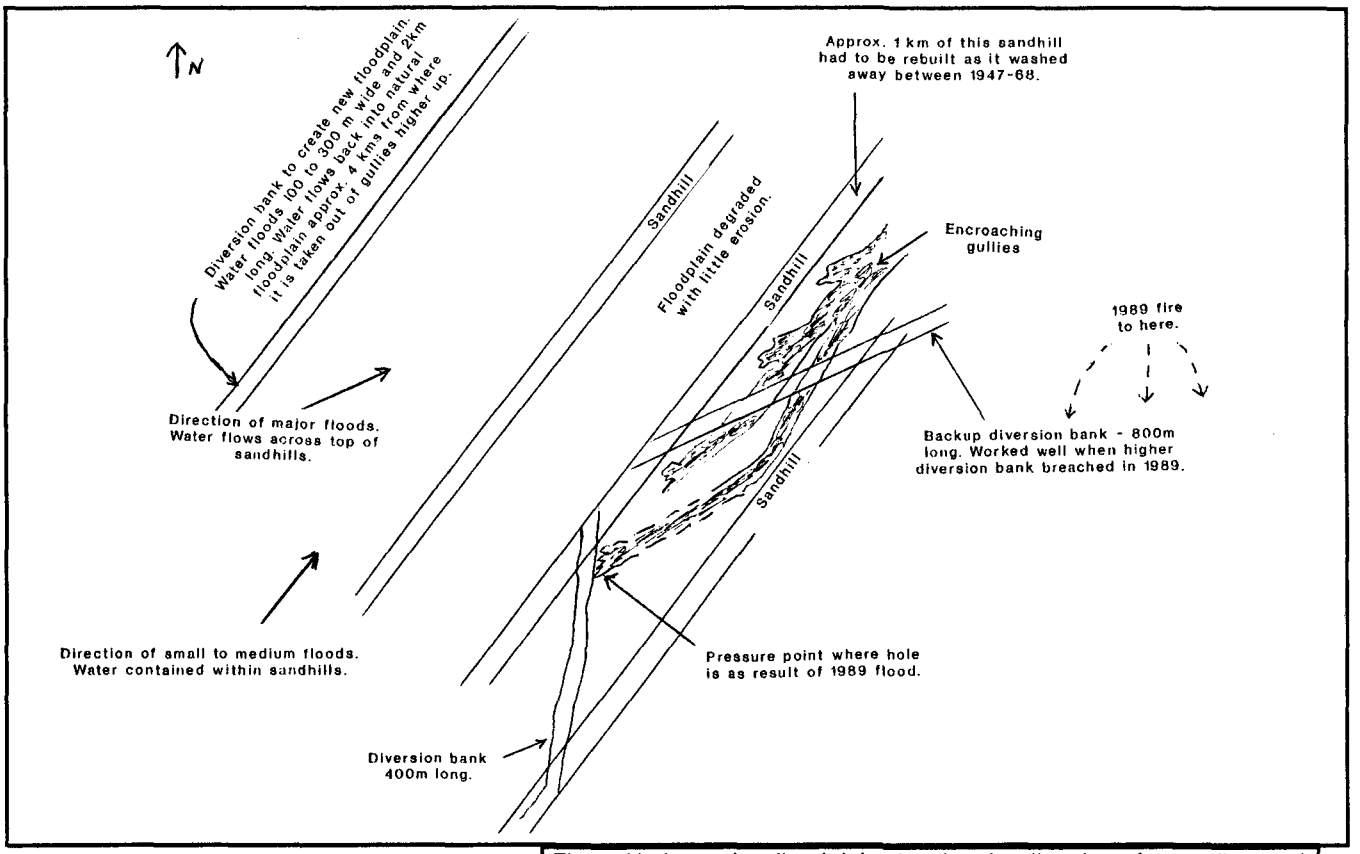


Fig. 1. Umberumbra floodplain showing the direction of water flow and how this affects diversion banks erected to reclaim the floodplain.

The hills feeding the floodplain require at least 100 ponding banks to arrest erosion and slow the flow of water into the floodplain. This will be about 2 years work and Bob hopes to get there with the dozer later this year.

I have put two monitoring sites behind the diversion banks and a strong upward trend in the pasture is apparent already following a total of three floods since 1988. Pasture cover is greatly improved and palatable perennial grasses are increasing.

If the next peak flood is not due for 20 years, and if it is no bigger than the 1989 flood, then the extra ponding banks in the catchment and the greatly increased pasture cover in the floodplain would make it seem safe to plug the remaining large hole. The other option would be use more of the old floodplain. This would require the reduction of water flow across the floodplain by considerably altering existing banks and building additional ones - a costly option in that it would need a considerable

Vegetation Changes

Woody weed encroachment has occurred over much of the old floodplain. Bob has had one successful fire on the area first reclaimed with earthworks 7 years ago. He hopes to get another burn behind some of the new banks this year following the November flood and 75 mm in January.

Before reclamation works commenced, there were three grass species present on the floodplain plus a few ephemerals after rain. During one smoko break while working the loader, Bob was able to count 22 species while sitting on a log.

The summation of this improvement is that 4 year old bullocks trucked out of this paddock (plus its periodically spelled neighbour) have increased in dressed weight by nearly 100 kg since reclamation works commenced on the floodplain 7 years ago. Some of this improvement is better breeding but the majority would seem to be better nutrition.

KIDMAN SPRINGS COUNTRY - 10 Years on

Gary Bastin* and Reg Andison+

INTRODUCTION

In the 1985 (Volume 7) issue of the Australian Rangeland Journal, Barney Foran, Brian Hill and Gary Bastin reported on the results of range management studies at Kidman Springs. This departmental research station is located 220 kms south west of Katherine (NT) in the Victoria River District (VRD). The reported studies involved the exclosure of small areas of red calcareous soil (in poor and good condition) and an area of cracking clay (black) soil.

Data collection stopped in 1979 but casual observations of the area continued through the 1980's. Pasture composition yield information, and shrub densities were again collected in June 1989 when some spectacular changes were observed.

Some of these changes were documented in "Managing North Western Australia's pastoral lands" (RMN No 86/4 - November 1986). The changes have implications for pastoral management in the VRD in terms of woody weed increase and the switch from annual-type pastures on the softer country to a pasture dominated by black spear grass (*Heteropogon contortus*).

Experimental Area

In July 1973, grazing exclosures 500 m square were erected on three sites:-

- calcareous red soil in Good Condition carrying mainly biennial limestone grass (*Enneapogon spp.*)

-calcareous red soil in Poor Condition; eroded and growing a sparse pasture of native couch (*Brachyachne convergens*), fairy grass (*Sporobolus australiasicus)* and wire grass (*Aristida spp.*)

-cracking clay soil dominated by ribbon grass (*Chrysopogon fallax*) and Flinders grass (*Iseilema spp.*). Blue grasses (*Dichanthium spp.*) Mitchell grass (*Astrebla spp.*) and feathertop wire grass (*Aristida latifolia*) were minor species.

All sites were essentially "open" in 1973; the calcareous red soils carrying an open woodland of silver leaf gum (*Eucalyptus pruinosa),* bloodwood (*E. terminalis)* and conkerberry, bauhinia (*Lysiphyllum cunninghamii)* and rosewood (*Terminalia volucris*) on the margins.

Permanent transects were randomly located inside and outside each exclosure. The two paddocks containing the exclosures were grazed by experimental herds on a continuous basis since 1973.

Pasture species composition and yield data obtained by harvesting randomly placed 1 m quadrats at the end of each wet season (June) gave the most useful information on the herbage layer. The density of woody species was measured in fixed areas of 0.14 ha at each permanent transect.

1973 to 1979

The results for this period can be briefly summarized as:-

Calcareous Red Soil

(i) 5 years after exclosure, pasture yield on the Poor Condition ungrazed area had reached that on the Good Condition ungrazed site.

(ii) Desirable limestone oat grass had increased from 20% of the pasture on the Poor Condition ungrazed area in 1974 to 50 % in 1979 where it equalled that on the Good Condition ungrazed site.

(iii) Grazing the Poor Condition areas kept them in poor condition over this period.

(iv) Other grasses such as blue grasses (*Dichanthium spp.*), Flinders grass (I*seilema fragile)*, feathertop wire grass (*Aristida latifolia*) and black spear grass (*Heteropogon contortus*) were becoming established on both Good and Poor Condition exclosed areas.

(v) Rubberbush (*Calotropis procera)* had completely dominated the tree and shrub layer. It had reached a density of 1000 stems ha-1 on grazing transects.

Cracking Clay Soil

Seasonal differences in pasture yield and composition were observed but there was no effect due to cattle grazing. The woody layer was stable within the measured transects.

*NT Dept. Primary Industry and Fisheries, Alice Springs (Rangeland Agronomist)

+NT Dept. Primary Industry and Fisheries, Katherine (Animal Production).

Our suggestions for pasture management at that time were:-

-areas suffering pasture degradation in the VRD had the capacity to recover due to the "reliability" of a wet season in most years. The amount and timing of wet season rainfall were critical factors in determining the rate of pasture recovery.

-protection of preferred grazing country (eg areas of calcareous red soil) by destocking was essential to enable pasture recovery. This destocking had to be complete (including feral animals) and probably required much additional strategically located fencing.

-the invasion of rubberbush had mixed implications. Anecdotal evidence suggested that its density varied widely over a 5 to 6 year cycle. Mustering difficulty was increased and it had the potential to greatly restrict pasture growth (although we were unable to establish a link between shrub density and pasture yield on exclosed areas up to 1979). On the positive side, rubberbush has crude protein levels of 15% and offers a valuable topfeed supplement in the late dry season. It is not susceptible to fire and we were unable to offer any effective control methods.

1979 to 1989

Casual observations made of the calcareous red soil areas between 1980 and 1986 suggested that black spear grass was spreading and that the rubberbush population inside the exclosures had been maintained. Rubberbush started to die out in 1988 following the poorest wet season recorded at Kidman Springs. This led to the transects being measured again in June 1989.

Calcareous Red Soil

Black Spear Grass Increase

Black spear grass (*Heteropogon contortus)* now dominates the pasture on the grazed Poor Condition area (Fig. 1) and comprises between 25 and 30% of pasture weight within the exclosures. Cattle had grazed native couch and limestone grass by June last year but were avoiding the black spear grass.

Pasture yield had declined inside the exclosures from the measured peak of 1979 (Fig. 2). The exclosed and grazed areas of the Poor Condition treatment had approximately equal pasture yields in 1989. Black spear grass contributed to the increasing yields within the exclosures but this is not clearly understood but could be expected to be linked to lower wet season rainfall and competition from trees and shrubs. Strangely however, there was no effect of extremely high rubberbush densities on pasture yield in the late 1970's.

Landscape photos which depict the same field of view for one particular transect show how black spear grass has encroached from the south east (Fig . 3). The prevailing dry season winds appear to spread the seed onto the bare ground in front of the dense stand of mature

Fig. 1. Changes in pasture species composition from 1974 to 1989 on the grazed Poor Condition calcareous red soil area.

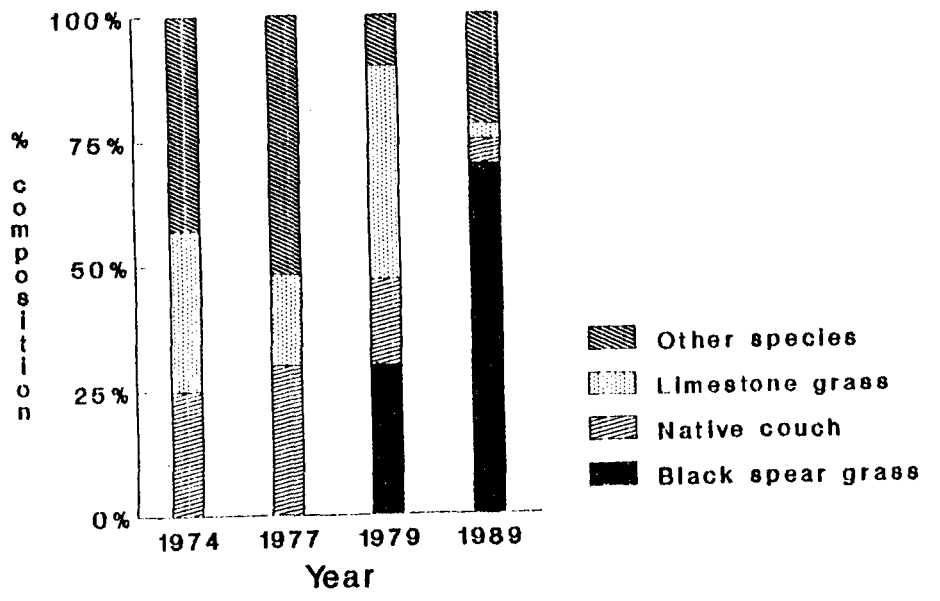
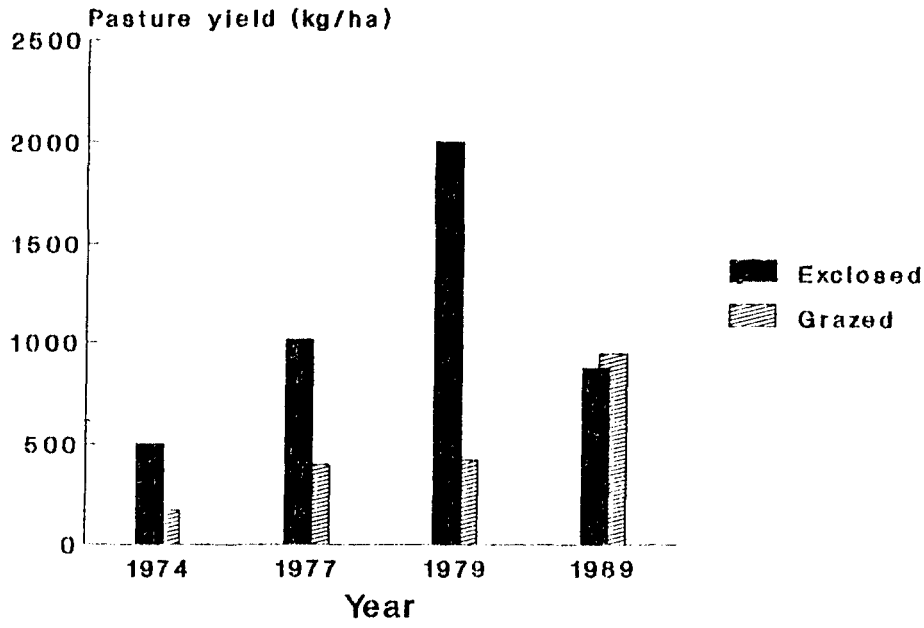


Fig. 2. Pasture yields on the grazed and ungrazed Poor Condition calcareous red soil areas.



plants. Seedlings which then successfully establish during the following wet are able to form large tussocks and allow this aggressive colonizing perennial to progressively "march" across a bare-soil landscape.

Decline in Rubber Bush

The density of rubber bush on exclosed transects has declined from almost 1000 stems ha^{-1} in 1989 (Fig. 4). The 1987-88 wet season was particularly poor and probably precipitated the demise of this ageing population.

The low trees, *Hakea macrocarpa* and *Ehretia saligna* (peachwood) increased on the no-grazing areas. *Hakea macrocarpa* occur as scattered trees on the grazed country while peachwood, a highly palatable topfeed, was not seen.

Cracking Clay Soil

Ribbon grass (*Chrysopogon fallax)* continued to dominate the pasture . It provided 70% of the estimated 1150 kg ha^{-1} present on exclosed transects and 75% of the 985 kg ha^{-1} which occurred on grazed country. Flinders grass (*Iseilema fragile*) is the only other major species at 15% of the pasture.

Juvenile rosewood *(Terminalia volucris)* increased from an average density of 5 ha^{-1} on both exclosed and grazed transects in 1978 to 100 ha^{-1} in 1989.

Management Implications

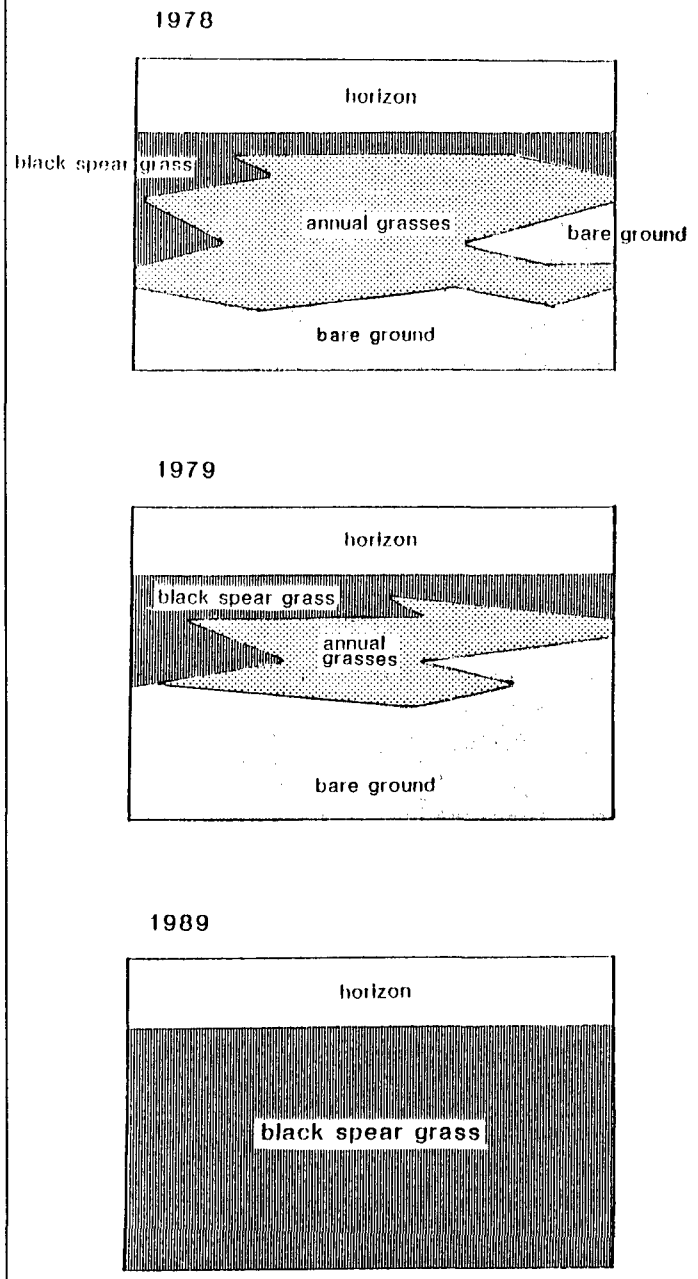
In the jargon of rangeland ecologists, the vegetation of the calcareous red soil has gone through at least two **thresholds** since 1973. Initially, the destocked Poor Condition area recovered through the re-establishment of limestone grass. Exclosed areas then rapidly switched to a shrubland dominated by rubbergrass - the first threshold. Since 1979, grazed country in Poor Condition has changed from an annual-grass pasture to one dominated by black spear grass (the second threshold) while this robust perennial has become well established in other areas. The area remains in a shrubby state with conkerberry, hakea and other shrubs replacing the senescing rubber bush population.

The encroachment of juvenile rosewood is transforming the formerly open grassy cracking clay soil area into a shrubland. Rosewood encroachment has been observed by the authors on other areas of the VRD.

Controlled use of fire must be re-introduced into much of the semi-arid tropical country of the southern VRD to arrest the shrub increase occurring on grassland and open woodland areas.

With data points 10 years apart, we cannot pretend to understand the subtle interactions of seasonal rainfall and grazing which have produced the measured vegetation changes. This highlights the need for an ongoing moni-

Fig. 3. Yearly maps of landscape photos for one transect area on the grazed Poor Condition area showing how black spear grass has encrouched across the camera field of view.



toring program in the VRD which can interpret the changes in vegetation and provide appropriate advice to pastoralists on grazing management.

The change in pasture composition from an annual pasture to one dominated by black spear grass would seem to be an inevitable process on areas of degraded calcareous red soil in the VRD. The more palatable limestone grass appears to be slowing its rate of encroachment on areas formerly regarded as being in good condition. Black spear grass has reached 30% of the pasture biomass on the grazed Good Condition transects while limestone grass has declined from 90% of the pasture in 1974 to 35% in 1989.

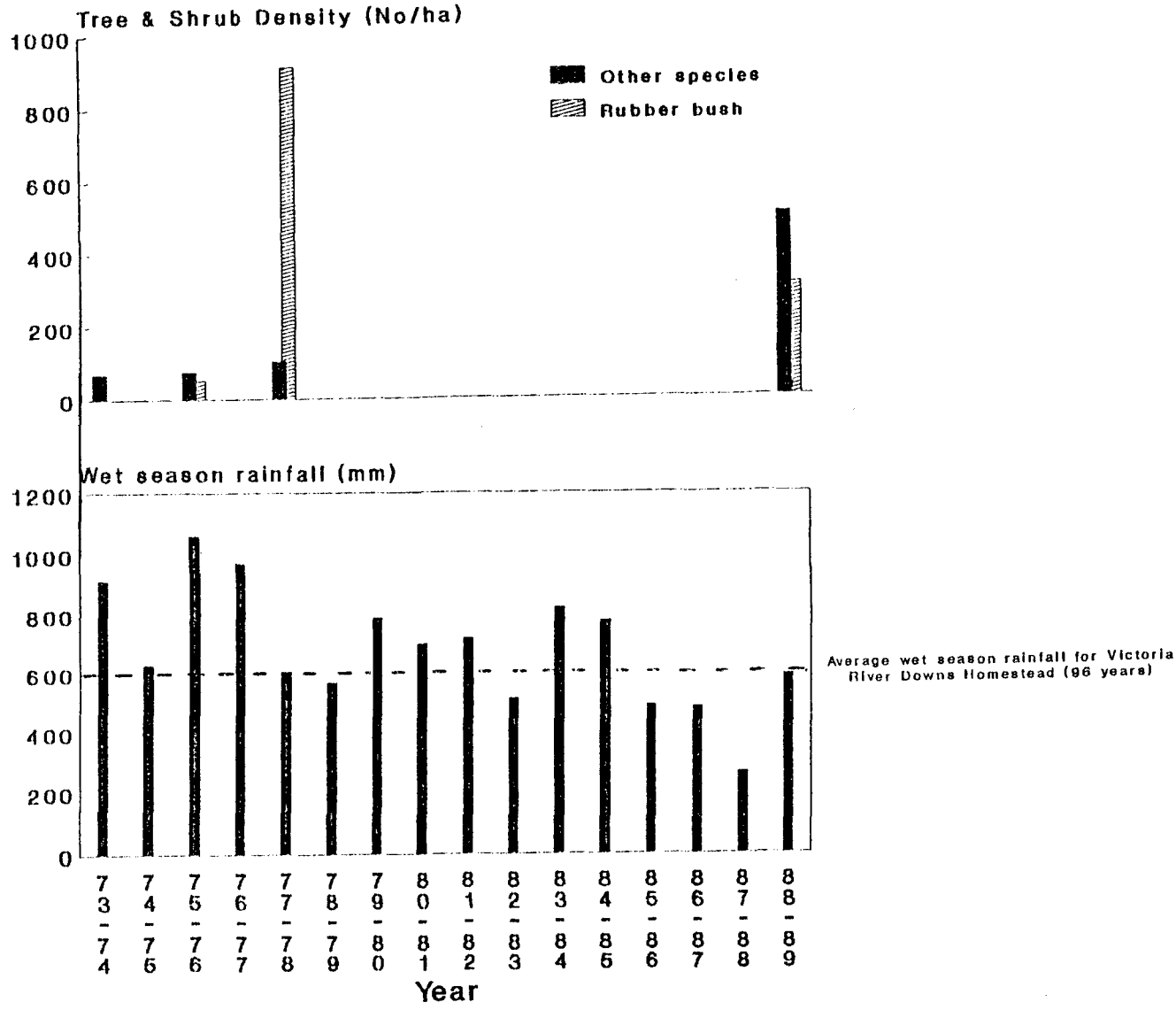
Queensland experience indicates that black spear grass is a very invasive species under certain conditions. It is a prolific seeder and has the ability to colonize bare ground. Establishment is favoured by it being a much less palatable plant than the accompanying annual and ephemeral species. This lower grazing pressure, combined with a lack of burning, allows the spear grass clumps to thicken and increase their hold on the country. Being a perennial, black spear grass is better able to compete for moisture - particularly, it would seem, against establishing shrubs.

Spear grass pasture provides more dry matter of a lower quality than that available from the original annual-grass pasture. Supplementation has to become a major component of cattle management to utilize this bulk. A nonprotein nitrogen supplement will stimulate an animal's intake and utilization of the lower quality dry matter and increase the ability to extract much needed energy from the standing dry feed. Nitrogen can also be applied to the system via a legume. Verano and seca stylos and Wynn cassia will grow in this area. On higher rainfall country closer to Katherine, spear grass - stylo pastures have given superior liveweight gains of 130 kg per head per year.

Fire must become an integral part of pasture management to remove old dry matter and to shift grazing pressure around the paddock thereby spelling heavily grazed areas.

Although black spear grass is an aggressive colonizer of bare ground and has the potential to provide a greater bulk of less palatable forage than that formerly available, the spear grass pasture system should not be regarded as an unlimited resource. Higher stocking

Fig. 4. The density of shrubs and trees (per ha) on the ungrazed calcareous red soil areas (both condition classes).



rates may reduce spear grass dominance through declining vigour and result in a gradual return to bare ground. Spear grass in Queensland grazed at 1 beast to 5 to 8 ha has been replaced by the stoloniferous *Bothriochloa pertusa* which is regarded as an even more stable system requiring less supplementation for effective cattle production (P. Anning, pers. comm.). The VRD however may not be so fortunate in having a successfully colonized sequel to black spear grass.

Reference

Foran,B.D., Bastin, G. and Hill, B. (1985). The pasture dynamics and management of two rangeland communities in the Victoria River District of the Northern Territory. *Aust. Rangel. J.* **7**. 107-115.

Australian Rangeland Society

C/- P O Box 262

EASTWOOD S A 5063

Subscription reminder notice - 1990

Annual subscriptions were due on January 1, 1990. This year we have introduced an incentive to encourage members to pay their subscription early - a discount for early payment. Subscriptions paid ***before March 31, 1990*** were subject to an 11% discount.

The annual subscription rates for 1990 are shown below:

Membership type	Full before 31/3/90	Full after 31/3/90	Partial before 31/3/90	Partial after 31/3/90
Individual	A$32	A$36	A$16	A$18
Company	A$55	A$55	A$16	A$16

There is no discount for companies or institutions making early payments because their subscription rates ***have not*** been increased.

Full membership includes:

- Two (2) Journals
- Three (3) Newsletters

....per year.

Partial membership entitles members to:

- Three (3) Newsletters

.....only.

Please cut off the slip below and return it with your payment to the above address before March 31, 1990.

Name_____

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Amount enclosed A$_____ Signature_____