



The Australian Rangeland Society

RANGE MANAGEMENT NEWSLETTER

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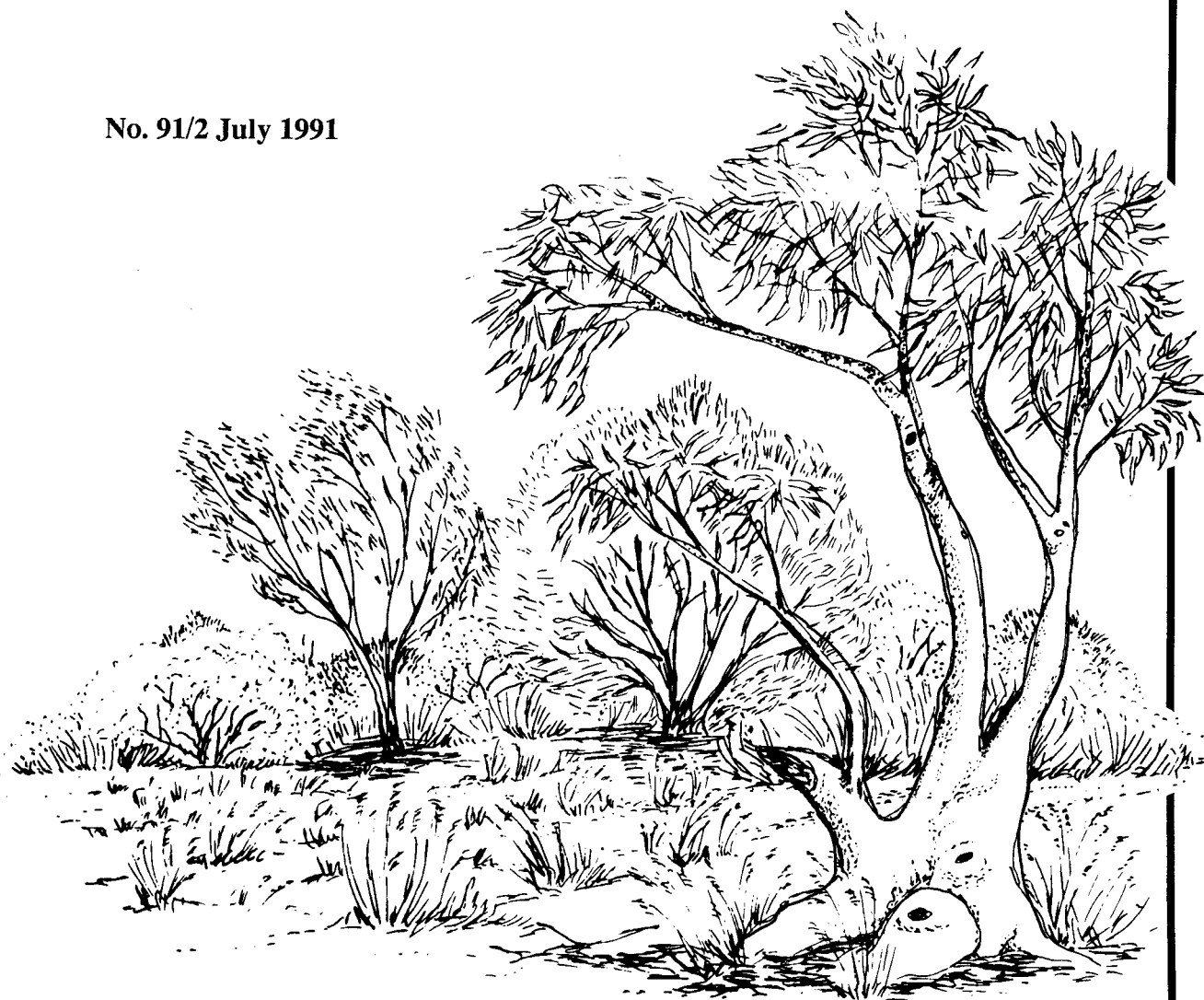


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EDITORIAL

Gary Bastin, Editor

Welcome to RMN 91/2. This issue is well endowed with contributions, so just a short introduction from me. Having received a very informative article from Peter Clark on kangaroo control, I decided to focus this issue on the control of vermin and pest animals. With a little gentle persuasion, Brian Cooke has written an overview on the current state of research into rabbit control, while Leigh Hunt has provided an account of extensive rabbit control on Arkaba Station in the Flinders Ranges. This ambitious program is complemented by the story of a similar commitment to rabbit control on Mt. Riddock station in the Northern Territory.

One of the unifying features of work undertaken by Peter Clark (Leander), Dean Rasheed (Arkaba) and Dick Cadzow (Mt. Riddock) has been the level of dedication and thoroughness in controlling pest animals. All have recognized at a very early stage that improving the land through reduced stocking rates of domestic animals is futile whilst pest animals continue to have free reign. These programs show that control of pest animals is achievable through persistence and that the country is both the immediate and long-term beneficiary. Although apparently expensive to implement (particularly warren ripping), these programs are proving economic over the longer term through improved livestock production and reduced running costs. One of the most heartening aspects to me is that surrounding managers are now taking notice and starting to recognize that pest animals can be controlled. Complete control can only be achieved through community action - or as Brian Cooke says, the success of rabbit control must be viewed in a broader context than just the number of warrens ripped.

Effective communication is a very important process in Improving the land and this is a point that Stephen Morton picks up on in a scientist's response to two articles in the last Newsletter. Steve has provided a positive contribution to furthering essential communication and, as Editor, I would welcome any similar contributions.

Council has transferred from South Australia to the NT and this issue has reports associated with the AGM plus other Council business. There is also a brief profile of the new Council members. Please check the inside cover for contact details of the new Council.

The deadline for RMN 91/3 is the end of October so please put pen to paper.

RANGELAND MANAGEMENT AND RANGELAND SCIENCE

Stephen Morton, CSIRO, PO Box 2111, Alice Springs NT 0871

I was greatly stimulated by two articles in the Range Management Newsletter of March 1991. In one, Bob Waudby put forward his thoughts on the management of Central Mount Wedge Station in the NT, and in the other Daniel Hickson discussed the role of information technology in Landcare. Both contributions were from pastoralists, and I believe it inestimably important that managers continue to state their views. The reason why it is so critically important is nicely outlined by Daniel: although scientists and managers both speak English, they rarely use the same language. As a consequence, people from one group frequently seem to misjudge the others' motives. In so many senses, effective communication is the answer to the problems of the rangelands. In this spirit, I've decided to put my own recent thoughts on paper so that one scientist's point of view is also available.

One aspect of the two articles particularly impressed me, and that was the commitment to the land and its management evident in both. It seems to me that rangeland management rests ultimately upon the degree to which the manager is concerned about the land. Landcare will not succeed if scientists or bureaucrats advise managers to care for their land; it will only happen if managers truly care about caring for that country. This is one area where science can do nothing: the manager is solely responsible. In this regard, the two articles provide grounds for considerable optimism.

Scientists do have a role in other areas, however. One primary role they have is to look beyond the specific pastoral lease and to help identify broad-scale, regional problems and potential solutions to them. In their enthusiasm for their work, and in the sometimes obscure details of their ideas or their technological solutions to the problem that they perceive to be developing, they may get too distant from the manager. It is at this point that people from the two groups can diverge, despite their common goals. Two such issues arise from Bob's contribution.

The first concerns the widespread scientific view that many areas of the rangelands are degraded and that both productive and conservation values will eventually suffer, if they have not already done so. Bob disapprovingly quotes George Chippendale, who noted in 1965 that "It is possible that our arid lands will not be as productive in the future as they have been in the past". Chippendale may have got the time-scale wrong in his prediction, which is why so many central Australian pastoralists have criticised him, but I would say that very many rangeland scientists would agree with his overall opinion. The main reason for this divergence of opinion is that these trends are occurring over long periods of time in our highly variable, rain-driven environment, and they are rarely crystal clear. Thus, the development of effective monitoring techniques and careful interpretation of long-term records by both scientists and managers is a most important task.

The second issue I want to mention concerns Bob's suggestion that the pastoral industry cannot be blamed for the disappearance

of the native medium-sized mammals that have become extinct in central Australia, as they have throughout much of our rangelands. He is correct in one important way: the presence of domestic stock was **not** the sole reason. Other critical factors included the arrival of the rabbit, the fox and the cat, and perhaps alterations in fire regimes. Nevertheless, there is little doubt that the sudden arrival of mobs of grazing animals was a shock to the system in which these animals had lived. The bilby is a good example - it now survives only where there is no pastoral activity, but it originally occurred throughout two-thirds of Australia.

I know that pastoralists may feel themselves under personal threat when statements such as I have just made appear in the media, but this reaction misreads the intent of the scientist. I'm not interested in **blaming** anybody for what happened in the past, for that is entirely fruitless. What I want to do is try to **understand** the lessons of the past so that they are learned, rather than forgotten. If we as a society have made mistakes in the past, as I believe we have done in rangeland management (and my family was on land in the semi-arid country, too!), then I think we must face up to them and not try to bury our heads in the sand. Only if we do that will we leave something better for our children rather than country that is in worse condition.

All this brings me to the real reason for writing, and that is to alert readers to the possibility that important decisions may well be taken out of our hands, be we managers or rangeland scientists. It seems to me that the situation at present is rather delicately poised, because a strong and potentially powerful body of opinion against pastoralism is building up in the big southern cities. A recent article entitled "Pastoralism: an industry of erosion and subsidies" in the Australian Conservation Foundation's *Conservation News* (by Chris Harris, June 1990) elicited no comment in the Range Management Newsletter. Such articles are not trivial; John Kerin felt that a reply was necessary (*Conservation News*, September 1990). My point is that if the pastoral industry attempts to pretend that this sort of thing is merely an annoying sideshow, then it would be seriously misjudging the situation. My secondary point is that it is foolish to blame the media, for the media are like politicians - they only say things that they believe the audience is interested in hearing. Don't just retreat into throwing blame onto the conservationists for kicking up a stink, either, for their reactions are at least partially founded in legitimate concerns.

What is to be done? First, we must recognise that community attention on rangeland management is going to intensify. Second, we must all recognise that there have been serious deficiencies in rangeland management, and that some of these deficiencies continue today. Third, we must all admit the reality of land degradation and start trying to do something about it, for example, through Landcare groups. Fourth, and most importantly, we must all work together. At those times when there is tension between scientists and managers, remember that the two groups are striving for very similar goals: the production of wealth, but in a sustainable manner and in such a way that other important values of the rangelands are not compromised.

KANGAROO CONTROL ON "LEANDER" STATION

Peter Clark, Leander Station, via Longreach QLD

"Leander" is a sheep breeding property of 30000 acres (12140 ha) situated 25 km north-west of Longreach in central western Queensland. During the 1982-83 drought, substantial numbers of sheep were sold or agisted. When seasonal conditions improved and numbers built up again, we decided to run the sheep at a lower stocking rate.

We observed that kangaroo numbers were increasing and it was obvious that the potential advantages of increased per head wool cut and increased lambing percentage would not be achieved, despite having had professional kangaroo shooters on the property for 20 years.

During the 1987 season, conditions were rapidly declining and a management decision was taken to implement a kangaroo cull under a Section 25 permit obtained from the National Parks Service.

Country

There are three main types of country, each of similar area, on the station:

- River Channels - with coolibah (*Eucalyptus microtheca*), wattle (*Acacia* spp.), gidgee (*Acacia cambagei*) and lignum (*Muehlenbeckia cunninghamii*) growing on heavy brown-black alluvial soils. This country grows a variety of seasonal grasses and herbage. It is watered by semi-permanent waterholes.

- Downs Country - with open areas of boree (*Acacia cana*), gidgee, vinetree (*Ventilago viminalis*) and some pebbly to stony country with thick stands of gidgee scrub. Heavy black soils through to quite light brown pebbly soils grow Mitchell grass (*Astrebla* spp.), feathertop (*Aristida latifolia*), Flinders grass (*Iseilema* spp.) and herbage.

- Desert Country - quite dense timber comprising dead finish (*Archidendroposis basaltica*), mulga (*Acacia aneura*), currant bush (*Carissa ovata*), wild orange (*Capparis mitchellii*), whitewood (*Atalaya hemiglauc*), vinetree and western bloodwood (*Eucalyptus terminalis*). The sandy red soils carry spinifex (*Triodia* spp.), wire grass (*Aristida* spp.) and herbage species.

"Leander" is well watered with 13 dams. The "average" stock carrying capacity is 7000 sheep of all ages to 5.5 years old. Lambing is timed to start in mid April.

Background to the Kangaroo Cull Decision.

Conditions post November 1987 deteriorated into drought rapidly. Stock numbers were progressively cut to 2500 sheep and the decision was made to hand-feed a nucleus of 1500 young classed ewes. The remaining sheep were run at 1 sheep to 12 acres (4.9 ha).

"Leander" was included in a 1986 CSIRO survey of kangaroos in the Longreach area. Many hours were spent on horses in an attempt to estimate kangaroo numbers in each paddock. The estimate for "Leander" was 2000 which, at the time, was thought to be exaggerated.

In the early summer of 1987, kangaroos were a social problem. While taking the children 10 km to the school bus, 100-plus kangaroos could be consistently counted each way, and it was a liability not to use a vehicle with a bull bar.

Travelling the 1 km distance by motor bike each night to turn the house pump off was dangerous and a vehicle had to be used.

A Section 25 permit was obtained for the following reasons:

1. To lower the total grazing pressure, thereby attempting to decrease an emerging land degradation problem.
2. To lessen the possibility of having to supplement the small number of sheep with blocks etc. which were being mainly eaten by kangaroos.
3. Many of the kangaroos were not of a professional marketable quality and were not easily accessible in the desert country.

Logistics and Equipment

An old short-wheel-base Toyota Landcruiser, with no top, was fitted with two spotlights. The main rifle used was a .222 with back up from .243 and .250 Savages. The rifles were fitted with X 6 scopes or 3 - 9 power variable. Reloading gear was purchased for these weapons.

Shooting was carried out three or four nights a week for periods of one to five hours. For the first three months, most of the shooting occurred in the centre of the property on desert country because of kangaroo abundance there. After this time, there was a gradual, but noticeable, decrease in kangaroo activity.

Observations on Kangaroos

Kangaroos displayed various reactions to being disturbed. Some just sat while others disappeared immediately, with all the variations in between.

In one paddock, kangaroos seemed to keep returning. Being ignorant of the exact numbers on the property, this was a disheartening result. It was eventually realised that this paddock was a desired feeding ground and the returning kangaroos were those which had disappeared beyond the light. Eventually, 720 kangaroos were destroyed in this 600 acre paddock.

There was an estimated 80% of females destroyed, of which 90% had young in the pouch even though the country was droughted.

When conditions were very dry, the red kangaroos and wallaroos disappeared. The greys remained territorial throughout and, although carrying young, were dying of starvation. Each animal shot was examined and all joeys were humanely destroyed.

The cull count was to -

December 1988: 5467

December 1989: 6711

December 1990: 7402

Floods interrupted the program during the autumns of 1989 and 1990.

There were no notable incursions from neighbouring properties, apart from a small increase observed in July 1990.

With the expertise gained from kangaroo behaviour, the adjusted figure for the kangaroo population NOW remaining on "Leander" is 1500 - 2000 AFTER the cull.

Due to our increased nocturnal activity, 92 feral cats, 23 foxes and 27 feral pigs have also been destroyed. There has been a consequent dramatic increase in the number and variety of wild birds, especially the "ground living" birds.

Effects on Sheep Production

The 1989 floods caused massive district-wide death of kangaroos and sheep due to exposure and low nutritional status. Graziers estimated that "at least half" the kangaroo population was destroyed. Given our knowledge of numbers it would appear that, at the most, 12% succumbed. Conversely, "Leander" lost two sheep bogged, and no kangaroo carcasses were seen after the storms - proof of stronger body condition for both species.

A potential increase in blowfly activity was a worry and a criticism from neighbours. This did not eventuate, and a study of the *Lucilia cuprina* life cycle shows that when non-sheep carcasses are "struck", there is a break in the fly life cycle as the larvae do not mature.

Neighbouring properties, with a heavier stocking rate, had more fly problems and had to jet more often than "Leander".

Flock body weight

The sheep significantly gained in body weight. As stated earlier, the district was in a severe drought in the late 1980's. In October 1988, we decided to join ewes as normal, whereas the majority of sheep properties waited until April 1989 to join after rain.

In February 1989 before any rainfall, 10 month old wethers were weighing 33.5 kg and ewes were 32 kg.

Lamb marking

The year from August 1987 started to dry off except for sparse falls of rain. The overall lamb marking for 1988 was 71%. Some paddocks averaged 86% but the river frontage paddocks were attacked by feral pigs despite baiting.

Despite below average rainfall, the ewes were in good condition at October 1988. The lamb marking figure for July 1989 was 94% with the lambs being in good strong condition.

Wool cut

Shearing is programmed for late September. The average wool cut per head for the entire flock remained the same for 1987 and 1988 despite a halving of the stocking rate. However, in 1989, the average per head wool cut rose by 0.91 kg despite the majority of the sheep being young and only having the benefit of good rain for 4.5 months of the wool growing cycle.

Other benefits of kangaroo control

Pasture growth - an objective comparison of the ground cover has been made by neighbours visiting the property, both from the air and on the ground. Comment has often been passed about the difference between their own properties and "Leander".

Fences - no specific records have been kept but there has been a substantial reduction in the requirement for fence maintenance. Perhaps the best example is the 600 acre (243 ha) paddock at the shearing shed. Fences always had to be repaired before putting sheep into this paddock but after removing 700 kangaroos in 12 months, we are now fairly confident that the paddock is continually stock proof.

Water - at some watering points, kangaroos disappeared completely. Consumption of water has dropped. On one equipped dam, the overflow previously only worked in a high wind. Since mid 1988, this tank has not stopped overflowing despite an increase in sheep numbers on this particular water.

The Future

With kangaroo numbers now at an acceptable level, the cull will be scaled down to a "holding" operation. Given the type of country, it is impossible to remove every kangaroo, nor is that required or desirable.

With the current interest in land care and sustained production, an exhortation to reduce domestic stock numbers should be carefully examined. "Leander" reduced the domestic grazing pressure in 1984. A rapid increase in kangaroo numbers followed which negated any benefit of reduced sheep numbers.

For efficient land care and utilisation, a judicious compromise must be attained by lowering the TOTAL grazing pressure to achieve the maximum efficient production per head from domestic stock under the conditions prevailing at the time.

RECENT ADVANCES IN RABBIT CONTROL IN ARID AREAS

Brian Cooke, Animal and Plant Control Commission, GPO Box 1671, Adelaide SA 5001

The 9th Australian Vertebrate Pest Control Conference was recently held in Adelaide (14-19th April 1991). Not surprisingly, about a quarter of the papers given had some bearing on the rabbit as a pest, and many considered aspects of rabbit control in arid areas. Contributions included several papers from New Zealand where rabbits are a persistent problem in drier parts of the South Island. Indeed, there are many parallels between rabbit control projects in both countries.

In this review, I have summarized major points from many of the papers given. However the views expressed are mine alone and not necessarily the opinions of researchers who presented the papers.

Within the conference, papers were organized under several general 'themes'. These included topics such as land management, fertility control in pest species and pest control in relation to the control of exotic outbreaks. The land management theme was opened by Dr Morgan Williams, Ministry of Agriculture and Fisheries, New Zealand.

Rabbit control and land management

New Zealand's dry, sheep-growing areas have a serious rabbit problem. It occurs largely because of the high cost of control relative to the productivity of the land, and in the past rabbit control has relied on massive '1080' poisoning campaigns. These have not resolved the problem and, to some extent, rabbit control has become an end in itself with other equally serious problems of land degradation being overlooked. This has led Morgan Williams to ask whether the goal of rabbit control and the goals of land management are as closely linked as they should be.

This is an important question to ask in the Australian context too. We measure the success of rabbit control in terms of the number of warrens ripped but we should be more interested in the final result. Is the land in better condition? Can a landholder manage his land more effectively? Has regeneration of native shrubs and pastures been successful? In short, we need to remember the goal of our rabbit control work. Getting rid of rabbits in just one step in the process of improving proper care and use of the land.

The complexity of the problem of regeneration of arid pastoral lands was brought into sharp focus in a paper given by Bob Henzell, South Australian Animal and Plant Control Commission, on the effects of rabbits on regeneration of mulga (*Acacia aneura*). Quite clearly, rabbits can destroy all seedlings which germinate but rabbit control alone does not guarantee effective regeneration. Land managers must also manage other livestock at critical times after rains which stimulate new germination of mulga.

Similarly, a paper presented by Ms Sandy Tartowski from Flinders University showed how the composition of arid zone pastures can change according to the grazing preferences of rabbits, wombats and kangaroos. The mix of herbivores also needs to be considered in achieving land management goals.

In New Zealand, land has been classified according to its susceptibility or "prone" to rabbit problems. This no doubt strikes a chord with anyone who has looked at rabbit problems in Australia. Rabbits are far more abundant in some land types than in others. Bill Tatnell, New South Wales Soil Conservation Service, provided new data on rabbit prone areas in the western areas of that state. This of course extends CSIRO's early study in the region but Bill also considers that rabbit problems and other land management problems, like woody weeds, are closely linked. Rabbit control may be part of the solution to woody weed control!

New Ideas in Rabbit Control

There have been a number of new developments in methods for controlling rabbits. Possibly the most novel, and certainly the most ambitious is that of using genetically engineered myxoma viruses in ways not previously considered. Dr Mark Bradley, CSIRO Division of Wildlife and Ecology, provided a broad overview of this subject.

It has been argued that the control of pest animals by reducing their fertility may have advantages over methods which simply rely on killing large numbers. Apart from issues of cruelty or animal welfare, it is clear that if fewer rabbits were born, damage could be lessened and other controls like poisoning could be used less frequently. However, although drugs which cause sterility are available, it is the administration of these drugs to sufficient numbers of rabbits which is the problem. We couldn't dose enough rabbits to make the process effective!

As a consequence, the idea of using the myxoma virus as a "delivery system" for an agent causing sterility in rabbits represents a real breakthrough. Myxomatosis affects most wild rabbits at some time in their lives so, in concept, it should be possible to cause sterility in all which recovered from the disease.

The sterility-causing agent itself will be a segment of genetic material inserted into the chromosome of the myxoma virus. This segment would reproduce part of a protein from either the rabbits' egg membrane or sperm, but production of large quantities of incomplete protein by the virus should trick infested rabbits into producing antibodies to some of their own reproductive proteins. Consequently, these rabbits would be infertile because the antibodies so produced would destroy the ova or sperm.

There are of course many other technical problems to overcome, and it is slow work, yet CSIRO's Dr Ron Jackson has shown that new genetic material can be spliced into the chromosome of a myxoma virus. In addition, proteins in the rabbits' egg membrane and sperm have been identified as 'targets'.

Work also continues on more familiar aspects of myxomatosis research. Ian Parer, CSIRO Division of Wildlife and Ecology,

presented an interesting review of work on the rabbits' resistance to myxomatosis. Understanding resistance is complex, as some resistance at least seems to be non-genetic, yet nevertheless inherited through the sire! Moreover, resistance is probably in some sort of dynamic equilibrium with the virus. When one rabbit population which had been challenged with field-strain viruses was challenged with more virulent virus, the level of genetic resistance rose. However, the level of resistance fell if attenuated strains of virus were used over several years.

A second paper on myxomatosis, presented by Brian Coman, provided evidence of significant increases in genetic resistance among rabbits in parts of Victoria over the last decade or so.

To me, the Conference papers provided a new insight into myxomatosis. It is obvious that we are not dealing with a single rabbit population in Australia. Rather, we have numerous sub-populations, each with its own level of resistance to myxomatosis depending on how effective vectors have been and how frequently or intensively myxomatosis has occurred. This explains why the European rabbit fleas, released in the late 1960's, were very successful in enhancing myxomatosis in some parts of Australia but not in others. This view of rabbit populations as local sub-populations is also a useful one to consider in relation to proposals to introduce further species of rabbit fleas. If rabbits in arid Australia have relatively low resistance to myxomatosis because of the lack of mosquitoes and subsequent low effectiveness of the disease, then the chances that new rabbit fleas could be beneficial are greatly enhanced.

Work on the introduction of new species of rabbit fleas from Spain is well advanced. Faerlie Bartholomaeus gave details of the introduction of the flea, *Xenopsylla cunicularis*, into quarantine in Adelaide during 1990. These fleas are being tested out on native Australian mammals to make sure that they will remain specific to rabbits. Application for the release of these fleas from quarantine will be made later this year.

Meanwhile, other forms of biological control are also under investigation. Drs Robbins-Brown and Tokhi from the University of Melbourne are investigating a strain of the bacterium, *Escherichia coli*, which causes heavy mortality in laboratory rabbits.

Dr H. Westbury, Australian Animal Health Laboratories Geelong, is beginning investigations of the newly discovered Rabbit Haemorrhagic Disease (RHD) to assess its pathogenicity to wild Australian rabbits. A wide range of native animals will also be tested to ensure that this disease is specific to the rabbit. Field studies of RHD among wild rabbits are also progressing in south-eastern Spain where a project is being run in conjunction with Dr Luis Leon Vizcaino from the University of Murcia.

Present research in Spain shows that RHD still causes heavy mortality in wild rabbit populations and the virus apparently has not become attenuated after 3 years in the field. However, outbreaks are erratic and unpredictable in low density rabbit populations.

Economics of Control

Michael Michelmores, Animal and Plant Control Commission, presented a paper on the economics of rabbit control in semi-arid sheep growing areas of South Australia. He showed that the costs of rabbit control, mainly by ripping warrens, were difficult to recover without some increases in sheep numbers. Better wool cut or better lambing percentages alone are unlikely to give sufficient return to pay for the investment in rabbit control.

In the discussions which followed this and other papers, it became clear that economics have a profound influence on not only rabbit control, but also on many other land management issues. Somehow, we need to determine how much of the increased pasture growth can be grazed to pay for rabbit control work while still leaving enough vegetation for regeneration to continue and act as a fodder carry-over in dry years.

Work carried out by Greg Mutze on Manunda Station shows quite clearly that warren ripping, if carried out thoroughly, can be effective for a decade or more. This means that it is a sound proposition from an economic point of view. More importantly, impressive regeneration of shrublands can be achieved if rabbits are eliminated and stock grazing is light.

Summary

To conclude, it is fair to say that a great deal of work is going on which eventually will lead to improvements in the level of rabbit control in arid areas. Results are encouraging, yet we have a long way to go. As we have seen this year in many parts of inland Australia, rabbits are far from controlled, and the damage to pastures and shrubs has been enormous. The momentum of present work will need to be maintained well into the future if we are to resolve the problem.

ODE FROM THE OUTBACK

Keith Greenfield, Billa Kalina Station, via Port Augusta SA 5700

(Ed. Richard Downward, a Senior Adviser with the SA Animal and Plant Control Commission, passed this contribution on to me. Keith Greenfield recited his poem on the ABC's 'Australia All Over' program earlier this year and it has also been given some circulation in South Australian newspapers since then. Further dissemination of any information on the devastation caused by rabbits in all forms of media should not go amiss.)

I'm a fluffy little bunny, some people think I'm cute,
But the plain and simple fact is, that I'm a country killing brute.
For I ringbark all the branches, then I chew up every leaf,
And to the native creatures, I'm a terror and a thief.

It's not just farm and station, where we like to make our home,
For on National Parks and Crown Land, we're 'most always free to roam.
When my friends and I have finished though, the country should look grand,
There'll be nothing left to look at, but gibbers, rocks and sand.

Though I worry about myxo, I'm sure I won't die soon,
For my mummy and my daddy tell me they were both immune.
I've heard a nasty rumour of a fellow with a flea,
and an even worse concoction - a bug called VHD.

And just the thought of 'SIRO is enough to make you ill,
For the trick they are trying is like a lifetime on the pill.
But to bring them here to kill us, it would cost a lot of dough,
And the people in the cities, they don't really want to know.

For there's no votes in the Simpson and on the Cooper very few,
So we're left in peace and quiet, to just chew and chew and chew!
Through this decade of Landcare - I'm pretty safe you see,
For the Parliamentary people are all bunnies - just like me!

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RIPPING THE RABBITS RESTORES THE RANGES

Leigh Hunt, Department of Agriculture, PO Box 357, Port Augusta SA 5700

Dean Rasheed, Arkaba Station, via Hawker SA 5434

Arkaba Station in South Australia has shown a quite spectacular improvement in range condition in recent years. Arkaba is a 247 sq km sheep property located in the rugged hills of the southern Flinders Ranges. It has a semi-arid climate with an average annual rainfall of 325 mm.

When purchased by the Rasheed family in 1985, it was in a degraded and run-down state, but they felt confident they could restore its condition and increase its productivity by careful management of grazing and good stock husbandry.

The property was overgrazed with many paddocks having little ground cover, or a pasture dominated by unpalatable onion weed (*Asphodelus fistulosus*) and ephemeral grasses and forbs. Active erosion gullies were common and fences, waters, yards and buildings were in a bad state of repair. An improvement program was commenced immediately the purchase of the property was settled. This program included upgrading of capital improvements, establishing new waters, reducing grazing pressure and a small amount of contour furrowing.

Rabbit Control A Priority

Much of the overgrazing was attributable to the high rabbit population on the property. Warren density on 50% of the property was high (approximately one warren per hectare) and was very high (greater than one warren per hectare) on 20% of the property. The remainder of the property had a low level rabbit infestation.

Control of rabbits was considered to be the first priority in the improvement program, but it was clearly not going to be easy. Operating and moving machinery in the steep, hilly terrain which was dissected by deep erosion gullies would be difficult. Also many warrens seemed inaccessible to machinery being located well up the slopes of steep hills or around the base of mallee trees.

Consequently, advice was sought from the Animal and Plant Control Commission and it was agreed that experimental work would be carried out aimed mainly at tackling the tough problem of rabbits in steep hills. Poisoning, ripping and a combination of both were the methods assessed. The results demonstrated that ripping warrens with crawler tractors was the most cost-effective method because these tractors proved capable of reaching many warrens previously considered inaccessible. Also, although poisoning prior to ripping further reduced rabbit numbers, the overall cost was increased substantially. The tractor used in this work was Arkaba's relatively small Caterpillar RD4 with one 80 cm long ripping tine. Warrens were generally cross-ripped, but where the steep slopes made cross-ripping impossible or dangerous, warrens were ripped downhill only.

Large Tractor Or Small?

A large crawler tractor (Caterpillar D6-D pulling 5 tines) was also used for some ripping to compare it with the RD4. Despite its better than expected performance, the RD4 still lacked sufficient power to reach some warrens near the top of very steep hills. With only one tine, the dozer required many passes over the warren and it often slid sideways down the slope leaving excessively large gaps between the rip lines. These problems were avoided with the much more powerful and heavier D6-D with its 5 tines spread across its width.

Naturally the D6-D has a much higher running cost (\$75/hour) than the RD4 (approximately \$35/hour). However, because the D6-D takes less time to destroy a warren (about 5 minutes compared to 15 for the RD4), the actual cost per warren for both machines is roughly the same. Up to 100 warrens a day can be destroyed with the D6-D.

One advantage of the small tractor is that it disturbs the top soil less than the D6-D so ripped warrens are less prone to erosion. Minor erosion has occurred on some warrens ripped with the D6-D when summer thunderstorms have occurred before the warrens have become grassed over.

A Five Year Plan

The first step of the control program on Arkaba was an aerial inspection of the property. This facilitated the location of problem areas and the development of a systematic plan of attack. The result was a 5 year budgeted program which began in 1985.

The basis of the plan has been to utilize contractors with large machinery (e.g. D6-D) to tackle the most difficult areas in the steep hills and mallee country. (In some cases mallee trees were pushed over to destroy the warren, but these have since regrown from the stumps).

The easier areas and follow-up work are done with the smaller tractor, operated by the owner. Follow-up fumigation with phostoxin tablets is done within a fortnight of the initial ripping and after 12 months any warrens that have re-opened are re-ripped. This second ripping is very quick since there are generally only one or two burrows in any re-opened warrens.

This follow-up work is vital to the success of the control program. It is a major cost and must be included in the program budget.

Warrens which are inaccessible to even the large tractor (e.g. on very steep creek banks or under rocky ledges) are destroyed with explosives. This has proven expensive and often needs several follow-up attempts.

Missed Warrens A Problem

The rate of warren re-opening varies depending on seasonal conditions, soil moisture content, the amount of rock in the soil and the presence/absence of mallee trees.

In dry years, and in areas where there are no mallee trees, only about 0-2% of warrens need follow-up work in the fortnight after the first ripping. In mallee areas, about 15% of warrens need re-ripping after 12 months, while in open but steep hilly areas about 10% of warrens have re-opened after 5 years.

Much of this re-opening is caused by a few warrens being completely missed in the initial ripping, or failure to rip burrows beyond the edge of the main warren area.

Costs

Because ripping and moving around in the steep country of Arkaba is very slow, costs on Arkaba are much higher than would be expected in easier country. Currently rabbits have been controlled on 75% of the property. This includes all the areas of high warren density and the more difficult terrain. The overall cost so far has been \$120,000, made up of capital costs (RD4 cost \$26,000), labour (including owner's labour), fuel and the hire of contractors with large tractors. The average cost per warren is almost \$10. The estimated total cost of the program (now expected to take 7 years) is \$150,000.

In an effort to accelerate the program, an interesting deal was made with one contractor. Rather than being paid a set rate per hour, the contractor was entitled to agist 1500 sheep on the property and to trap and sell the feral goats roaming the property. In return, he supplied and operated a large tractor for rabbit ripping, dam construction and water soak development for almost 2 years.

The fortunate coincidence of high wool and sheep prices and excellent seasons in the middle years of the program have also helped considerably. This has meant that all rabbit control costs have been covered by wool and sheep returns. However, because the long term benefits of the project were obvious, it would not have been jeopardized by depressed markets, although progress would have been slowed. The budget allowed for the possibility of poor returns during the project and the need to borrow to keep it going. The budget also allowed for maintaining low stock levels for 2 years following rabbit control, to allow some improvement in pasture cover.

Of course, there will be ongoing maintenance costs once the initial program is finished. This will involve checking a defined area once a year and re-ripping any re-opened warrens. It is likely that these costs will decline with time.

An Excellent Investment

When Arkaba was bought, its carrying capacity was listed by the agents at 6,000 sheep. However, the previous lessees and other neighbours considered 4,500 to be the long term maximum carrying capacity. In 1985, the first year of the control program, it was stocked with a maximum of 3,500 sheep. In May 1991, Arkaba ran 7,500 sheep with up to 8,000 being possible. Even after a 9 month period without effective rainfall, there is still plenty of feed remaining, while on neighbouring properties where no rabbit control has been done, sheep numbers have had to be reduced. (Note: Arkaba does not have a maximum carrying capacity set by government regulations.)

Wool cuts have been excellent (average 7.7 kg/head) and lambing percentages have increased from 55% in 1985 to 97% in 1990 (although other management changes and good seasons have also contributed to this). Currently there are insufficient data for a full analysis of the benefits of the project.

Management flexibility has also increased with the improvement in pasture conditions. High lambing percentages have allowed heavy culling of the flock which has helped bring a rapid improvement in wool quality, particularly a reduction in fibre diameter. Also, it is now possible to sell surplus sheep when prices are high, because there is no longer an urgent need to reduce stock numbers over the dry summer period.

Better Quality Pastures

No detailed pasture data have been collected but photos of some sites suggest there is not only more pasture, but also an increase in the more palatable and perennial pasture grasses (e.g. *Danthonia* and *Stipa* spp.) and a decrease in unpalatable onion weed. Total ground cover has increased markedly and erosion gullies have become grassed over, reducing the rate of erosion. Establishment of good stands of *Acacias* has occurred

on some steep slopes, and even bullock bush suckers have grown in some areas and have not been grazed back by the sheep!

Rabbit Control Now Popular

Prior to the work at Arkaba only a few pastoralists had rabbit control programs on their properties. Now almost all pastoralists in the area have recognised the benefits of rabbit control and have programs under way.

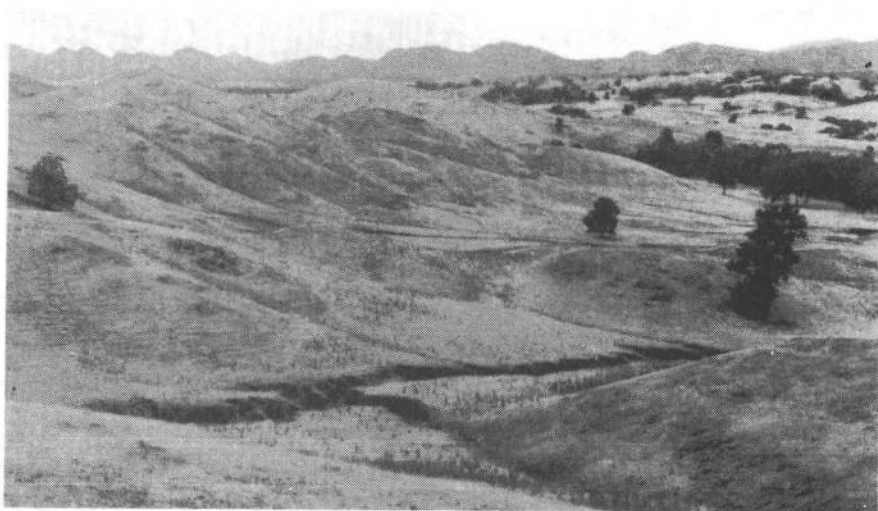
Perhaps the best indication of how good an investment rabbit control is in this area is to compare the cost of the two options available to increase sheep numbers. Arkaba has been able to increase its carrying capacity by approximately 3,000 sheep by controlling the rabbits, at a cost of \$150,000. By comparison, recent land sales in the area suggest that to buy a piece of land capable of carrying only 1,500 sheep, the cost would be about \$300,000!



A typical area on Arkaba which had a high rabbit infestation prior to control:

Photo 1 - before control, February 1985.

Photo 2 - six years after control, May 1991. Notice the steep hills and erosion gullies and the improvement in ground cover.



IMPROVING THE LAND - MOUNT RIDDOCK

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

The rabbit is currently public enemy No. 1 on Mt. Riddock, 200 kms north east of Alice Springs. When Dick Cadzow and his family bought the station four years ago, they quickly realized that, in addition to purchasing some good country, they were acquiring a range of management problems related to feral animals, woody weed encroachment, soil erosion and loss of palatable pasture species. Feral horses, which infested the Harts Ranges on the southern side of the station, are now gone. Rabbit eradication is taking a little longer and proving more costly but Dick is convinced that thoroughness and persistence in warren ripping are paying off.

Rabbits north of Alice Springs have a restricted distribution, occurring on dispersed patches of mainly limestone and granite soils. They also infest alluvial plains adjacent to the larger creeks. This patchy distribution should theoretically assist in their eradication because their chances of re-invading treated 'islands' of country are diminished. However, the task of eliminating rabbits from these northern islands is no less demanding than anywhere else in Australia.

Dick had grown up in the South Australian mallee and knew the ravages of the rabbit. He then moved to Phillip Creek station, immediately north of Tennant Creek. Having bought Mt. Riddock, it quickly became apparent that plans to regenerate the calcareous and granite country through better grazing management and mechanical reclamation could not succeed until the rabbit was controlled. Most importantly, Dick was convinced that the rabbit could be controlled over extensive areas of rangeland with thorough and persistent techniques.

Table Hill Paddock

This 130 sq km paddock in the north of the station takes its name from a tableland in the western part of the paddock. The tableland was originally the floor of part of a freshwater lake system which flooded the older Tertiary lateritic land surface approximately 7 to 8 million years ago. The tableland consists of layers of sandstone and calcareous mudstone, the surface of which was impregnated with silica as the lake dried out. This has formed the present-day chalcedonic (limestone-like) rock. This hardened surface has resisted weathering while the surrounding softer material has been eroded away leaving the remnant tableland sitting up to 50 m above the surrounding plain. Rabbits have formed warrens around the sides of this tableland and also burrowed under the 'cap rock' at the top of the tableland. This may well be a drought survival area for rabbits as it is presumably cooler and may be an area of greater moisture availability. Rabbits also occur extensively over the adjacent, gently undulating calcareous plains where they have caused severe pasture degeneration.

The Table Hill paddock has some of the sweetest and potentially most productive country on Mt. Riddock. In 1987, Dick Cadzow regarded the paddock as being virtually useless because of its very limited pasture growth. Recent dry years

were partly responsible. However, damage caused by rabbits on the limestone country and pasture deterioration on the clay soils through past stocking were also contributing factors that Dick considered could be reversed.

The paddock was totally destocked in 1988 and remains destocked today. Rabbit eradication by warren ripping and follow-up fumigation of re-opened burrows commenced in the 1988/89 summer and the ripping operation finished in March 1991. The station dozer (Cat D6C) has now clocked up 1500 hours ripping warrens with two thirds of that time spent in this paddock alone and approximately 100 sq km of the paddock having been treated.

Warren Ripping

The dozer has a three tyne ripper which is fitted with long boots which penetrate up to one metre into the ground. Wherever possible, the ripper is operated at full depth. Warrens on the flatter country are cross ripped with the rip lines extending well past the perimeter of burrow entrances to ensure that the warren is totally destroyed. Trees often have to be cleared to allow thorough ripping and the dozer has proven to be both an ideal machine and of an ideal size for the job. Only routine maintenance has been required during the 1000 hours in this paddock.

For thorough rabbit eradication, the difficult warrens below the limestone tableland also had to be treated. This has made for some interesting moments on the dozer. Warrens on the steeper slip faces have been ripped downhill - with many frantic grabs for the lunch box before it slid under the dozer. The cap rock surface might have seemed a likely place for explosives but the problem has been tackled by driving the dozer up to the rock lip, lifting the capping with the blade and then allowing the rock to collapse down onto the burrows - again not a place for the faint hearted!

Up until the last summer, Dick was the main operator, spending time on the dozer whenever he could. Two extra men were employed in late 1990 to work on rabbit eradication and associated land reclamation. The dozer operator put in four months' continuous work over the summer to complete this paddock, and since March, he has been ripping warrens continuously in granite and creek frontage country on the western side of the station.

Land Reclamation

During the early stages of rabbit eradication, Dick seeded ripped warrens by hand broadcasting buffel (*Cenchrus ciliaris*) seed off the dozer. This brought some complaints from his mechanic as the seed infiltrated the machine, thereby increasing the maintenance requirement. Ripped warrens are now seeded with a tractor-drawn three point linkage opposed disc plough.

Allied with rabbit removal on the calcareous country, a large amount of effort has gone into reclaiming the heavier clay loam soils. This country is level to very gently falling and has scattered gidgee (*Acacia georginae*) and other shrubs. Palatable perennial grasses could conceivably have been quite abundant

on these heavier soils, but in the late 1980's were confined to watercourses and depressions. Much of the country was barren or grew sparse herbage after rain.

The first reclamation work in early 1989 involved forming many kilometres of contoured parallel furrows placed about four metres apart with the grader. Buffel and purple pigeon (*Setaria* spp.) grass seed were then broadcast with a tractor-mounted three point linkage fertilizer spreader. Much of the seed landed on the hostile undisturbed surface between the furrows and so initial establishment was poor. Continuing low rainfall was a major contributing factor but seed harvesting by ants and a less than ideal seedbed within the furrow were other probable reasons for the poor establishment. Many of the furrows became partially filled with wind-blown drift as 1989 continued dry.

The station purchased a Bonel opposed disc plough during 1989 and fitted it with a seed box. Dick had also spent a few days through the year harvesting his own buffel seed meaning that seed purchases were restricted to purple pigeon grass. Staggered furrows were ploughed between the previously formed grader furrows, with a considerable area of new country being treated as well. All recently ripped rabbit warrens were also seeded with the plough.

Ant harvesting of seed was virtually eliminated by treating it with an appropriate insecticide (Cuprex). As required, batches of seed sufficient for the next two days sowing were tipped into

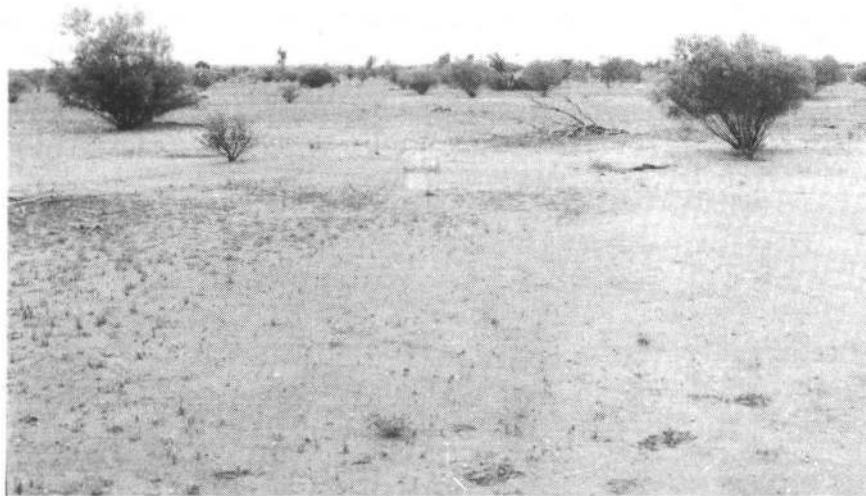
the concrete mixer and sprayed with insecticide whilst being tumbled. Treated seed was then re-bagged and taken out to the paddock for sowing.

Again, reclamation efforts seemed to be dogged by low rainfall. However, the limited rainfall and subsequent germination of buffel and purple pigeon grasses did indicate that the opposed disc plough was a suitable machine for reclaiming this country.

Persistence pays off and the Table Hill paddock has been transformed by 275 mm of rain during January and February this year. A good strike of both introduced grasses has occurred on that country pitted over the last summer while scattered plants have established on previously worked areas. Most importantly, plants have grown to a full height in the absence of grazing and seeded prolifically. Some of the biggest plants occur on extinct rabbit warrens where infiltration has been aided by ripping and where plant roots have presumably been able to follow moisture and nutrients down into the deeply fissured soil.

Are the Costs and Effort Warranted?

Dick Cadzow firmly believes that rabbits have to be controlled, and that they can be controlled in the rangelands. He says that we can't be serious about conservation and land care until



An example of sweet country on Mt. Riddock that has responded dramatically to the removal of rabbits by warren ripping and the establishment of buffel grass by opposed disc ploughing.

Photo 1: June 1988 before control.

Photo 2: April 1991 after treatment and good summer rains.



Australia is rid of feral animals. This requires that government, land holders and the community in general work together toward this common goal. When feral animals are gone, then real progress can be made towards conservation - be it protecting the soil resource or our remaining native animals.

Dick estimates that without rabbits, Mt. Riddock could run another 1000 head of cattle and all cattle would be in better condition. Pasture response on grazing country amongst the Harts Ranges following the removal of brumbies showed what feral animal control could achieve. The war is now on against the rabbit.

The decision to destock the Table Hill paddock and commence rabbit control was easy because the paddock was virtually worthless. With the rabbit largely eliminated and the country continuing to recover under destocking, Dick estimates the paddock's eventual carrying capacity at 700-800 cattle.

The paddock will be closely inspected later this year for re-opened warrens. Small outbreaks will be fumigated with tablets or larvicide. It may be necessary to bring the dozer back for larger re-infestations and any missed warrens. Cattle will be re-introduced next year depending on the season and the paddock will eventually be subdivided to achieve closer control over grazing management.

One of the big challenges in the fight against feral animals is convincing other land holders that vermin should, and can, be controlled. Mt. Riddock hosted a field day for the Centralian Land Management Association in mid May with the Table Hill paddock being the focus. The success of rabbit control and land reclamation work in this paddock generated considerable interest and discussion amongst the fifty or so pastoralists and government people present.

Sincere Thanks

I am deeply appreciative of Dick's agreement and cooperation in allowing me to tell of his reclamation and rabbit control efforts in this Newsletter. I have documented the condition of the Table Hill paddock (and others) during my earlier monitoring days with the NT Department of Primary Industry and Fisheries and at times despaired that these areas would ever attain their former productivity. It is very heartening when people, such as the Cadzow family, embark on ambitious and single-minded ventures to remove vermin and restore country. Dick is confident that the costs will eventually be returned through more, and better, cattle. Australia, as a nation, must also benefit from these bold actions to rid the country of feral animals.

PETER A WRIGHT - AN APPRECIATION

Wal Whalley, Botany Department, University of New England, Armidale NSW 2351

Members of the Society will be saddened to read of the tragic and sudden death of Dr Peter A Wright on the 16th October, 1990. Peter was one of the grazier members who gave valuable help and encouragement in the early days of the Rangeland Society. He also had an association with the University of New England over a period of more than 50 years. The UNE Vice-Chancellor and the Principal of the Armidale Campus in a joint statement following his death, described him as "a man of vision with unbounded energy and a willingness to contribute to the needs of others".

This willingness led him to contribute in a very practical way to rangeland science on the Northern Tablelands when he generously gave financial support to one of my postgraduate students during the 1970s. In those days, funding bodies looked askance at any pasture research on the Tablelands which involved study of native species and their responses to grazing and other manipulations. Peter recognised the importance of our native pasture plants even in this part of the world and generously gave of his own resources to assist in their study.

I was able to persuade Peter to write one of the first book reviews published in the Australian Rangeland Journal in 1978. This review makes interesting reading today, not perhaps because of what he said about the book in question (Harold Heady's "Rangeland Management") but because of the perspective from which he wrote. His concern for the land and for the sustainable management of all agricultural lands, from croplands to arid zone rangelands, comes through clearly. His concern for proper land management for future generations is very evident and stems from his and his family's long association with the grazing industries of the Northern Tablelands.

Peter presented one of the few papers written by graziers at the 3rd Biennial Conference of the Rangeland Society at Alice Springs in 1981. Again his concerns were with the long term use of the land. He recognised that land usage on the Northern Tablelands affects the quantity and quality of water in the western flowing rivers which impacts all the way down to South Australia. His concerns are reflected in the later creation of the Murray Darling Basin Commission, in the concept of Total Catchment Management and in the formation of the present day Catchment Management Committees in NSW with far reaching responsibilities and powers.

The University of New England recognised his long, invaluable and unstinting service to it and to the local community by conferring on him the honorary degree of Doctor of Rural Science in 1983. This degree is the highest academic honour the University can confer. Peter richly deserved this recognition and all of us who knew him miss his friendliness, his cheerfulness and above all, his wisdom.

HELPING LAND-HOLDERS SHARE THE CAKE

Dennis Barber, Dept. of Lands, GPO Box 2370, Adelaide SA 5001

For the past few years, the Society has offered annual awards to members wishing to obtain financial assistance to attend a meeting or conference, or to undertake study which is related to rangeland science. These awards include the **TRAVELLING FELLOWSHIP** and the **OVERSEAS CONFERENCE SCHOLARSHIP** which are worth approximately \$1,000 and \$2,000 respectively, depending on the merit of individual applications and availability of funds.

It is of great concern that past awards have been allocated almost exclusively to members who are involved in either research or administration within government agencies and universities. Whilst the cost of running the ARS is highly subsidised by many of these institutions, it is time to share the cake amongst some of our land-holder members. I rather suspect that many of these members do not apply because of a basic lack of confidence and experience in competing for such awards. However, in 1990, the Travelling Scholarship was won by Andrew Drysdale, a pastoralist from Charleville, who was assisted in attending the 6th Australian Rangeland Conference in Carnarvon. I feel sure that there are many other land-holders who could benefit by applying.

Applications, which are called for in the third issue of RMN each year, should fall within the guide-lines of:

- promoting the advancement of the science and art of using Australia's rangeland resources for all purposes commensurate with their continued productivity and stability;
- encouraging and developing an awareness of the need to conserve the inherent resources of Australia's rangeland areas;
- encouraging and rewarding the study of rangeland science and improving rangeland management; and
- providing a means for the interchange of ideas and information amongst Society members and with those of allied disciplines concerned with rangelands.

Applicants should provide details of their proposed study or the function they wish to attend, along with a breakdown of the costs involved. There should also be a statement of the likely benefits to be gained personally and for the Society generally. It is suggested that those members applying for an Overseas Conference Scholarship provide information on their personal and professional commitment to the Society's objectives. Applications should be no longer than 500 words. Further details are available from the Honorary Secretary.

So come on members - how about a bit more enthusiasm?

REPORT OF THE COUNCIL TO THE ANNUAL GENERAL MEETING OF THE AUSTRALIAN RANGELAND SOCIETY 30 May 1991

Martin Andrew, Federal President, Roseworthy Campus, The University of Adelaide, Roseworthy SA 5371

The Council has met seven times since the last Annual General Meeting. Dr Charlie Carter resigned as Vice-President from the region to host the next Council, and Council was pleased to be able to replace him with Dr Bill Low of Alice Springs, who has nominated for the position of President.

A General Meeting of the Society was held at Carnarvon, WA, in September, in association with the 6th Biennial Australian Rangeland Conference. This provided a good opportunity to discuss a range of matters with members at large.

Mrs Jenny Colquhoun continued to provide valuable administrative assistance, until her recent departure from Australia forced her to resign. The time of Council members became increasingly scarce during the year, a trend which seems inexorable. We strongly recommend that the new Council obtain similar assistance. Council began investigating another way of coping with this administrative load - contracting the Australian Institute of Agricultural Science (perhaps by formal affiliation). This has potential benefits, including a permanent business address for the Society, and efficient administration of membership subscriptions, and we urge the new Council to continue investigating this or similar options.

Council has recently approached the Federal Dept. of Arts, Sport, Environment, Tourism and Territories to enquire whether the ARS would qualify for the financial support which is apparently available to assist the running of worthy environmental organisations.

Membership

Melissa Gibbs has continued her efficient administration as Subscription Secretary. She has presented a separate report to this AGM.

Council decided to raise the fees this year by only a very modest amount (ca. \$2) to cover some direct costs, given the downturn in the rural economy.

Finances

A separate Treasurer's report is presented. Suffice it to say that Council has continued to grapple with the complex issue of sorting out the Society's accounts, and we are pleased that the next Council will inherit a complete set of financial statements.

Council has reviewed the investment accounts which support scholarships, and topped these up from the general account.

Biennial Conference

The Society held the most successful Biennial Conference yet, at Carnarvon, last September. Reports have appeared in the Newsletter. Council congratulated the Organising Committee for their outstanding work.

Prior to that Conference, Council resolved a policy for the disbursement of Biennial Conference surpluses, being that the first \$1000, and 10% of the remainder, is retained by the Branch responsible for organising the Conference; the rest reverts to Council. This provides a fair division between Council and the Branch.

Council allocated the next Conference to Cobar, and is pleased with the progress the Organising Committee is making. This 7th Biennial Conference will be 5-7 October 1992. The Organising Committee comprises: Tony Grice (Chair), Russel Harland (Secretary), John Murphy (Treasurer), with Frank McLeod, Jim Noble, Daryl Green, and Ken Hodgkinson.

International Rangeland Congress

A substantial delegation of about 40 Australians attended the 4th IRC in Montpellier in April. Reports will appear in the Newsletter.

Australia's bid to hold the 1999 Congress was unsuccessful - the Continuing Committee awarded this to the USA. The Continuing Committee then decided to remove the 1995 Congress from Kenya because of its inability to demonstrate that an IRC of a satisfactory standard could be organised in time, thus bringing the USA Congress forward to 1995, and leaving the 1999 slot vacant. The new Council will need to apply again for the 1999 Congress if it sees fit.

Council congratulates Drs Tony Pressland and Margaret Friedel on their election by the 4IRC to the Continuing Committee (along with Dr Wal Whalley who continues). Council also thanks Mr Ray Perry, an outgoing member and its Chairman, for his good work. In future, Councils need to consult within Australia about who should be nominated to the Continuing Committee from the Australasian region, to avoid last minute confusion at the Congress. Note, however, that the members are elected by the Congress, and are not nominees of the various national societies.

Considerable interest was shown during a meeting of rangeland societies from around the world in establishing a network of communication between societies with similar interests. The Society for Range Management, headquartered in Denver, Colorado, has agreed to act as the mailbox and clearing house. Initially, a list of Societies, addresses and office-bearers will be prepared and distributed.

Publications

The Publications Committee has been very active and has achieved a great deal, thanks largely to the leadership of Dr Margaret Friedel, its Chair, who has a report before this meeting (Ed. which will appear in the next RMN due to space

limitations). Council thanks Margaret for her fine work. This AGM will consider amendments to the Articles of Association which will enable the operation of the publications to reflect today's realities. Other procedural changes have already been approved by Council.

This year saw a change in the Editorships of both the Journal and the Newsletter. Council expresses its sincere appreciation to both retiring Editors (Drs Ron Hacker and George Gardiner). Ron has guided the development of the Journal for a major proportion of its life; George continued to edit the Newsletter under difficult circumstances when he was no longer professionally involved in rangelands. Council welcomes the new Editors (Dr Allan Wilson - Journal, Gary Bastin - Newsletter) who have both tackled their portfolios with enthusiasm and hard work. We have already seen Gary's influence on the Newsletter; Allan's first Journal issue will appear shortly. Council is grateful for their contributions.

The Committee has proposed an exciting new format for the Journal, which Council wishes to discuss at this AGM as a final opportunity to consult with members.

Council regrets that it has been unable to deal comprehensively with two major matters which have been before it for some time. The first is the level of Honoraria paid to the Editors and Production Manager; the second is introducing a 3rd issue of the Journal each year. Both have substantial budget implications, and it has not been until recently that Council has been in a position to fully assess its budget. Since a significant proportion of Council's budget is spent on publications, and Council has not been prepared to raise subscription levels, Council has put these issues back to the Publications Committee to consider ways to re-organise its budget to achieve the outcomes it wants. Council has suggested that the introduction of a page charge for the Journal would be an appropriate move. The new Council will have to continue to grapple with these issues.

Recently, the Editor of "Tropical Grasslands" (the Journal of the Tropical Grasslands Society, based in Brisbane) informally suggested that we consider the merits of merging the two Journals to reduce overheads and increase the quality of both. Council sees some merit in the idea, and has referred it to the Publications Committee. I discussed this idea informally amongst some members at the 4IRC, who agreed that it was well worth exploring.

Awards

As foreshadowed last year, Council held back offering Overseas Conference Fellowships last year so as to increase the number it could offer this year for the 4IRC. Council (with Dennis Barber abstaining) was pleased to support the attendance to the 4IRC by Alec Holm, Dennis Barber, Noel Preece, Jim Noble, and to support Richard Silcock's attendance at the rangelands conference in Pretoria. We look forward to their reports appearing in the Newsletter.

Council awarded a Travelling Fellowship to Michelle Leishman, a research student at Macquarie University, to

support her field work travel to Lake Mere. Council was again disappointed at the few applications received, and the Secretary undertook to write an article for the Newsletter on how to prepare an application in the hope of attracting more interest in the future.

Council resolved a new policy not to make an award in any year if in its opinion there are no applications which directly further the objectives of the Society.

New Zealand Section

Discussions during the 4IRC made Council realize that there would never be enough New Zealanders to form their own rangeland society, but that there was merit in forming a NZ Branch of the ARS. No one seems to have thought of this before; no one could think of a reason why we shouldn't do it. This will require a change to the Articles, and perhaps a change of name to Australasian Rangeland Society. I hope that "our agent in NZ", Barney Foran, will prepare a short article on the merits of this for the Newsletter, but tentatively there will be a meeting of Society members and interested New Zealanders in NZ during the next International Grassland Congress in February 1993 to discuss this idea.

Other matters

Council dealt with a number of other matters, a record of which appears in the Council's minutes. Two of particular note are the appointment of Dr Allan Wilson (with Dr Mark Stafford Smith as alternate) as the Society's nominee to the Federal Government's Scientific Advisory Committee on Kangaroos; and the suggestion to the Bureau of Rural Resources that the Arid Zone Newsletter be incorporated in the Rural Research In Progress (or similar) computer database, following discussion of this matter at the general meeting in Carnarvon.

Thankyous

Council thanks the organisations in which we are employed for assistance with some secretarial support, provision of meeting rooms and other assistance in kind without which the work of the Society would be made very much more difficult.

I personally would like to thank my fellow members of Council and the Society's other office-bearers for their good work and valuable support.

We wish the new Council in Alice Springs every success.

APOLOGY

The last sentence of Daniel Hickson's article "The Role of Information Technology in Landcare" was omitted in RMN 91/1 (page 11). This concluding sentence should have read "Such an achievement would make us a world leader in sustainable agriculture, which in turn would provide us with numerous opportunities throughout the globe." I apologise to Daniel and RMN readers for this oversight. Ed.

DID YOU KNOW? - RABBITS BITE

(Ed. Some information extracted from a pamphlet published by the SA Department of Agriculture and Fisheries.)

The bite into agriculture:-

- eight rabbits eat as much as one sheep
- a \$68 million increase in the Australian wool cheque in 1952-53 resulted from controlling rabbits with myxomatosis - a form of biological control which, unfortunately, is not as effective now.
- on 1600 hectares in the mid-north of S.A., the destruction of 700 rabbit warrens increased the number of sheep carried by 400.
- there was a 60% increase in wool produced on a South-Eastern (S.A.) property after rabbits were removed.
- within seven years, rabbits and poor management slashed the wool production of a 3500 ha property from 250 bales to 70 - the wool production increased to 208 bales in one year when rabbits were controlled.

The bite into native flora and fauna:-

In a mallee national park, over a two year period there was:

- a 42% mortality of a re-planting of 350 native pines and stunting of the remainder and where rabbits had been excluded there was:
- a 126% increase in ground cover
- an increase from 11 to 27 in the number of native plant species.

On an off-shore island after rabbits had been removed by poisoning there was:

- the almost complete reduction of a large area of sand drift
- an increase in vegetation
- a subsequent increase in the numbers of nesting mutton birds.

Throughout much of Australia, rabbits have caused the near extinction of native animals such as the bilby (or pinkie) by competing for food and usurping their burrows.

Stock grazing can be controlled - rabbit grazing is uncontrolled and causes damage.

Stop the bite - use effective methods of control.

THE AUSTRALIAN RANGELAND SOCIETY BALANCE SHEET

at 31 December 1990

1989		1990
\$		\$
	GENERAL FUNDS	
	CURRENT ASSETS	
10437	Cash at Bank	9385
459	- General Account	48
90	- Publication Account	558
1730	- Newsletter Account	600
<u>12716</u>	Interest Received	<u>10591</u>
	CURRENT LIABILITIES	
-	Creditors	<u>900</u>
-		<u>900</u>
12716	NET ASSETS - GENERAL FUNDS	9691
	TRAVELLING FELLOWSHIP FUNDS	
	CURRENT ASSETS	
25000	Cash on Deposit	25000
5000	- Sirocredit	5000
<u>30000</u>	- State Bank of SA	<u>30000</u>
	OVERSEAS CONFERENCE FUNDS	
	CURRENT ASSETS	
45200	Cash on Deposit	51792
5000	- National Mutual	5000
<u>50200</u>	- State Bank of SA	<u>56792</u>
	SPECIAL PROJECTS FUND	
	CURRENT ASSETS	
10000	Cash on Deposit	10000
	- State Bank of SA	
	NET ASSETS EMPLOYED	
	CURRENT ASSETS	
102916		106483
	Represented by:	
	MEMBERS FUNDS	
87169	Balance 1 January 1990	102916
15747	Surplus for year	3567
<u>102916</u>		<u>106483</u>

DETAILED INCOME AND EXPENDITURE STATEMENT

For the year ended Decembr 31, 1990

	INCOME	
20340	Subscriptions	22814
495	Reprint Sales	1058
12151	Interest	13793
30	Other Income	10
<u>33016</u>		<u>37675</u>
	LESS EXPENSES	
-	Audit Fee	500
172	Bank Charges	143
648	Conference Expenses	-
1098	Freight and Postage	-
2500	Honoraria	2500
600	- Business Manager	-
6220	- Others	-
3259	Production of Journal	10421
610	Production of Newsletter	7660
-	Production of Brochures	200
-	Publications Committee	2613
-	Subscriptions	302
296	Sundry Express	404
647	Travel	150
760	Scholarships and Grants	8031
459	SA Secretary and Accountant	1184
<u>17269</u>		<u>34108</u>
15747	SURPLUS FOR YEAR	3567

SUBSCRIPTION SECRETARY'S REPORT

30 May 1991

Melissa Gibbs, University of Adelaide, Adelaide. SA 5000

The Society currently has 506 individual members, 85 library subscribers and 27 company members. While the majority of the individuals are ordinary members, the Society also has 6 honorary life members and 7 ex-officio officers. Membership has declined marginally in the past year with 80 members resigning or lapsing and 60 new members joining.

The policy of offering a discounted membership fee for payment before 31 March has continued to encourage members to pay promptly, although 182 members were unfinancial as at 26 May 1991. Several of the recent resignations by our pastoralist members have cited financial pressures as the reason for their resignations, but almost all have expressed their interest in the Society and the hope that when times improve they can take up their membership again.

Due to substantial increases in postage of registered items, subscription rates were marginally increased in 1991. A breakdown of members by state is given below (the figures for last year are included for comparison).

State	1990	1991
ACT	18	21
NSW	172	152
NT	37	55
QLD	108	109
SA	102	107
TAS	1	1
VIC	18	15
WA	128	114
Overseas	46	44
Total	630	618

SUMMARY OF THE 15TH AGM HELD IN ADELAIDE

30 May 1991

Dennis Barber, Honorary Secretary, Dept. of Lands, GPO Box 2370, Adelaide SA 5001

The President opened the meeting at 5:30 PM and welcomed Council members as well as SA Branch members. The President presented the Council Report and that of the Publications Committee. This report particularly urged the resolution of issues relating to the proposed redesign of the Journal and the publication of an additional special-themes issue in some years. There was some discussion on colours and titling for the front cover with members present preferring an option incorporating brighter colours. It was agreed that omitting "Australian" from the Journal title would enhance the Journal's international reputation. Ownership of the publication should be identified on the front cover with the statement (in small print) "Official Publication of the Australian Rangeland Society". Council considers that subscription rates cannot be justifiably increased to cover the cost of occasional special-themes issues of the Journal. It has asked the Publications Committee to investigate page charges on a "user pays" basis. The Publications Committee was re-appointed after the President commented on their sterling job during the past year.

Financial statements and the Auditor's Report were presented by the Treasurer. He cautioned that while the Society has benefited financially from past Conferences, there was little fat remaining in the main operating account. Whilst there has been some rationalising of bank accounts during the year (on advice from our Accountant), the Treasurer stressed that funds must be maintained for the Society's scholarships and not be treated as a surplus. The Auditor's Report was tabled for acceptance along with some suggestions relating to book keeping procedures which will be passed on to the incoming Council.

The Subscription Secretary's report was presented and accepted. Melissa commented that Council should be sensitive to those people terminating membership through financial constraints rather than lack of interest. She has agreed to write and thank these people for their past support.

A number of amendments to the 'Articles and Memorandum of Association' were presented by the President and unanimously accepted. Of significance were recognition that the Society has more than one Editor and Publication; formalising the status of the Range Management Newsletter; and renaming the Business Manager to the Production Manager in line with his/her tasks. Issues relating to honoraria paid to the Production Manager and Council members have been passed back to the Publications Committee for comment.

Despite an enthusiastic offer from the ACT to provide the ARS Council in 1993, Council members considered that WA would be the more appropriate location.

Finally, the incoming Council was appointed. Office bearers are Dr Bill Low (President), David Liddle (Vice President), Greg Campbell (Secretary), Bruce Strong (Treasurer) and Ashley Sparrow (Subscriptions Secretary). The President thanked all those present for attending and closed the Meeting at 7:00 PM after which the SA Branch AGM and dinner were held. John Bradsen from the Law School (University of Adelaide) was the guest speaker with the topic "Voluntary Land Care - the role of legislation".

CONGRATULATIONS - RAY PERRY

Margaret Friedel, CSIRO, PO Box 2111, Alice Springs NT 0871

Congratulations to Ray Perry, who has been made an officer in the General Division (AO) of the Order of Australia in the 1991 list of Queen's Birthday Honours. He has been recognised for his service to science and to the environment, particularly through land resources management.

Ray was a pioneer of land resource surveys in the 1950s and he was instrumental in establishing the discipline of rangeland science in Australia during the 1960s. In 1973, he was appointed Chief of the CSIRO Division of Land Resources Management and, in that role, developed a strong orientation in his research group towards management of natural rangeland resources.

Ray was one of the founders of the Australian Rangeland Society, serving as president of the Council and of the Publications Committee over the years. He chaired the Organising Committee of the International Rangeland Congress in Adelaide in 1984 and has recently retired as Chairman of the Continuing Committee of the International Rangeland Congress.

He has had a long and productive association with rangelands and rangelands research and is currently active as an international consultant. Our warm congratulations and best wishes to Ray.

MEET THE NEW COUNCIL

Bill Low, President

I obtained my BSc (Hons) and PhD from the Univ. of British Columbia specializing in wildlife management. This included several years of research on big game in British Columbia and a 3 year foreign aid stint to South Texas doing research on reproductive ecology of collared peccaries on the King Ranch and Welder Wildlife Refuge.

I am the beneficiary of 20+ years living in, and associating with, the rangelands of Australia. My contact with Rangeland Australia initially involved 10 years of research with CSIRO on pastoral land ecosystems. This has been followed by a similar period of contract work researching rabbit control, and more recently, pastoral and conservation resource appraisals. During the last 11 years I have been director of, and one of two or three workers in, a consultancy which takes on diverse, interesting and unusual tasks in the environmental - ecological appraisal and rehabilitation fields. Environmental planning and rehabilitation of mining leases are currently one interesting application of some of my experience.

Past experience with the ARS includes a stint between 1982 and 1985 as Vice President, President and Past President of the Federal Council.

My aims during the next two years on the ARS executive are to promote appropriate and well-managed use of the resources of Rangeland Australia. Multiple land use is appropriate to many areas and where this is the case, the fostering of integrated management from amongst the pastoral, mining, conservation, Aboriginal, tourism and recreational users is an urgent evolutionary path that we must pursue.

David Liddle - Vice President

I moved to the arid rangelands 11 years ago with a shift from forestry in South Australia to rangeland management with CSIRO in Alice Springs. That employment involved me in projects concerned with woody weeds, rabbits, cattle, fire and rangeland monitoring techniques in central Australia.

After a diversion to Armidale NSW to complete a Degree of Natural Resources, I have continued a slow movement northwards into the tropics. While in Tennant Creek with the NT Dept. of Primary Industry and Fisheries, I commenced a rangeland monitoring program on the Barkly Tableland. Other work in that area included investigations into the effects of spelling country along with establishing buffel grass and ponding banks. I am currently residing in Darwin working in the Top End with the NT Conservation Commission and continuing with Mitchell grassland work on the Barkly Tableland.

Greg Campbell - Secretary

Previous secretarial experience has involved stints with sporting and social clubs. My 'friends' in the Society thought I should move upmarket.

LAND TENURE IN THE NT

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

The Northern Territory Government is currently reviewing pastoral land tenure with a view to converting most remaining term leases to perpetual tenure. This process would see a move away from existing prescriptive "developmental" covenants, including a minimum stocking figure, to a "land care" based form of administration.

Alice Springs members of the Rangeland Society convened a public meeting on 29 May at which Mr John Pinney, Assistant Secretary of the NT Department of Lands and Housing, explained the underlying philosophy and planned workings of the proposed legislation. This was the second in a series of forums dealing with land use in central Australia (see RMN 91/1) and was attended by about 40 people including pastoralists, scientists, conservationists and members of the general public.

The proposed legislation acknowledges principles of the recently released CSIRO document "The future of Australia's rangelands" but has reservations about the mechanisms by which they are implemented. These principles are:

- use of rangelands must be appropriate to the resource
- use of the rangelands must be sustainable and must allow for future alternative uses
- administrative mechanisms must be established for dealing with resource use conflicts.

If the planned legislation is enacted, all leases will have covenants framed around a land care ethic. These covenants will be implemented and administered through a Territory-wide, but regionally specific, land monitoring program. This will see a revamped Pastoral Board receiving and acting on information about land use provided by various Departments. The technical details of how the Departments with an interest in monitoring will coordinate their activities have not yet been finalized.

Public access to significant areas on leases will be negotiated with individual pastoralists as will acquisition, or use, of land for other purposes.

The proposed changes are to go before Cabinet shortly. Land tenure in the NT, as with other states, has become a public issue and there will no doubt be further information and commentary in the broader media as decisions are made on new forms of land tenure and administration.

I grew up on a cattle station in north-west Queensland, then attended secondary school in Toowoomba and graduated in science from James Cook University (Townsville) in 1978. After working on the family property for a while, I moved to WA and spent seven years with the WA Agricultural Protection Board investigating the ecology of pest animals. I completed a post graduate Diploma in Natural Resources at Curtin University during this time. In 1990, I moved to Alice Springs to the Rangeland Production Section of the Department of Primary Industry and Fisheries. My current work is in rangeland monitoring and aligned projects.

My main area of interest is herbivore diets and their impacts on the landscape.

Politically, I am the classic swinging voter. No politician or party is assured of my vote.

Ambitions include owning a small prickly pear farm in a reliable rainfall, fertile soil area by early retirement. My wife's ambitions are never to buy a pastoral lease and for a biological control for flies!

Bruce Strong - Treasurer

Bruce is the author of "Henry Vere Barclay: Centralian Explorer", a 98 page historical account of one of the Centre's lesser known explorers. The biographical notes in the preamble to this book tell us that Bruce was educated in the Sydney region and then worked for six years in Papua New Guinea on soil surveys and mapping. He returned to Australia in 1973 and worked for the next seven years with CSIRO in Alice Springs, mainly in the area of nutrient cycling in the arid zone. In 1980, he teamed up with Bill Low on a consultancy to the NT Conservation Commission investigating the distribution and biology of the rabbit.

Research into the initial spread of rabbits into the NT aroused Bruce's interest into the wider history of the NT and Barclay in particular. Bruce 'retired' from active field work in 1987 to follow interests in conservation and our cultural heritage by opening a shop in Alice Springs promoting the environment. He is presently working with the National Trust.

Ashley Sparrow - Subscription Secretary

I was born in the Adelaide Hills, the cool high-rainfall part of South Australia. Further education was at the University of Adelaide (BSc Hons. 1984) majoring in botany and zoology, and a PhD in botany (1991) studying vegetation distribution in SA with emphasis on the mallee. I developed an interest in more arid environments through work at the university's Middleback Field Centre in the chenopod country near Whyalla.

Present employment with the CSIRO Centre for Arid Zone Research at Alice Springs is involving me in investigation of the changes to soil and plant patterns around watering points in the cattle country of Central Australia. Recent months have seen me enjoying the MacDonnell Ranges, coping with summer temperatures and hating the flies.

ARID ZONE WATER: A FINITE RESOURCE

Issues in Water Management No. 6

CONFERENCE SUMMARY

G Jacobson, for the Organising Committee

This conference, held in Alice Springs, 11-14 April 1991, was attended by 125 people representing a wide range of community organisations, government agencies, researchers and mining companies. It was organised by the Australian National University's Centre for Continuing Education, as the sixth in the series "Issues in Water Management".

The conference was opened by the Hon. Fred Finch, NT Minister for Transport and Works and the keynote address was given by the Hon. Ernie Bridges, WA Minister for Water Resources.

The conference drew attention to the special needs of arid-zone communities, which result from low population, remoteness, high climatic extremes and variability of available resources. This results in high costs of assessment, development and operation of water supply systems. On a national scale, arid-zone hydrological and water supply problems have been neglected relative to those of the major cities and agricultural regions.

Arid-zone water resources (mainly groundwater) are adequate overall for the present stage of development, but are subject to local depletion. In water-scarce areas, a variety of strategies can be used to conserve and manage water resources more effectively. These include 'appropriate horticulture' and 'water care' strategies, which have been used successfully in certain planned mining towns. Wider application, i.e. to 'normal' communities, requires that individuals and communities take responsibility for their water usage. Education, community involvement and appropriate pricing structure are necessary to achieve this.

Water supplies in remote small communities are commonly inadequate in quantity and quality. People living in remote communities have a right to basic safe water supplies. Special considerations apply to remote Aboriginal communities, where community involvement and 'ownership' of water supplies are necessary to ensure that cultural values are taken into account in developing appropriate technical decisions.

Arid-zone water features, such as rock pools, mound springs and salt lakes, are ecologically fragile and are increasingly at risk from tourism and other development. These water features need appropriate protection.

Further development and management of arid-zone water resources will require improved, publicly accessible, information systems such as water-bore data bases and groundwater resources maps. The conference also identified research and development needs, including techniques for improving water use efficiency and for widening the scope for

beneficial uses of saline water. Specific priority research needs are:

- better definition of arid-zone groundwater recharge with regard to the sustainable development of local aquifers
- the development of desalination technology appropriate for small settlements.

Selected conference papers will be printed in the Bureau of Mineral Resources journal. Further information can be obtained from Ms. Shirley Kral, Centre for Continuing Education, Australian National University, GPO Box 4, Canberra, ACT 2601. Ph: 06 2494580. Fax: 06 2573421.

CONSERVATION BIOLOGY IN AUSTRALIA AND OCEANIA

A conference on "Conservation Biology in Australia and Oceania" is being held at the University of Queensland from September 30 to October 4 1991. The aim is to increase communication and understanding between research biologists, conservation officers and policy makers. There will be three major elements in the conference proceedings. The plenary session will focus on research policy and the role of biologists. The symposia and contributed papers will review current progress and gaps in understanding of key biological and environmental issues. The workshops will address practical aspects of management and research.

Further information can be obtained from Dr. Peter Hale, Centre for Conservation Biology, University of Queensland, QLD 4072. Tel.: 07-3651391. Fax.: 07-3651655.

GRASSLANDS FOR OUR WORLD

17th International Grassland Congress 1993

This Congress will be held in New Zealand (Palmerston North, Hamilton and Lincoln) and Queensland (Rockhampton) from 8-21 February 1993. The Organising Committee has prepared a comprehensive booklet which provides information about Congress themes and tours and contains provisional registration details. Intending delegates are asked to complete and submit the Provisional Application form by 30 September 1991. The Organising Committee invites offers of papers from interested grassland workers. All contributed papers will be presented as posters but will be published in the Proceedings. A one page (A4) summary of intended papers should be submitted by 30 September 1991.

Further details, and copies of the program booklet, can be obtained from:

Secretariat, 17th International Grassland Congress, Agronomy Department, Massey University, Palmerston North, New Zealand.

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