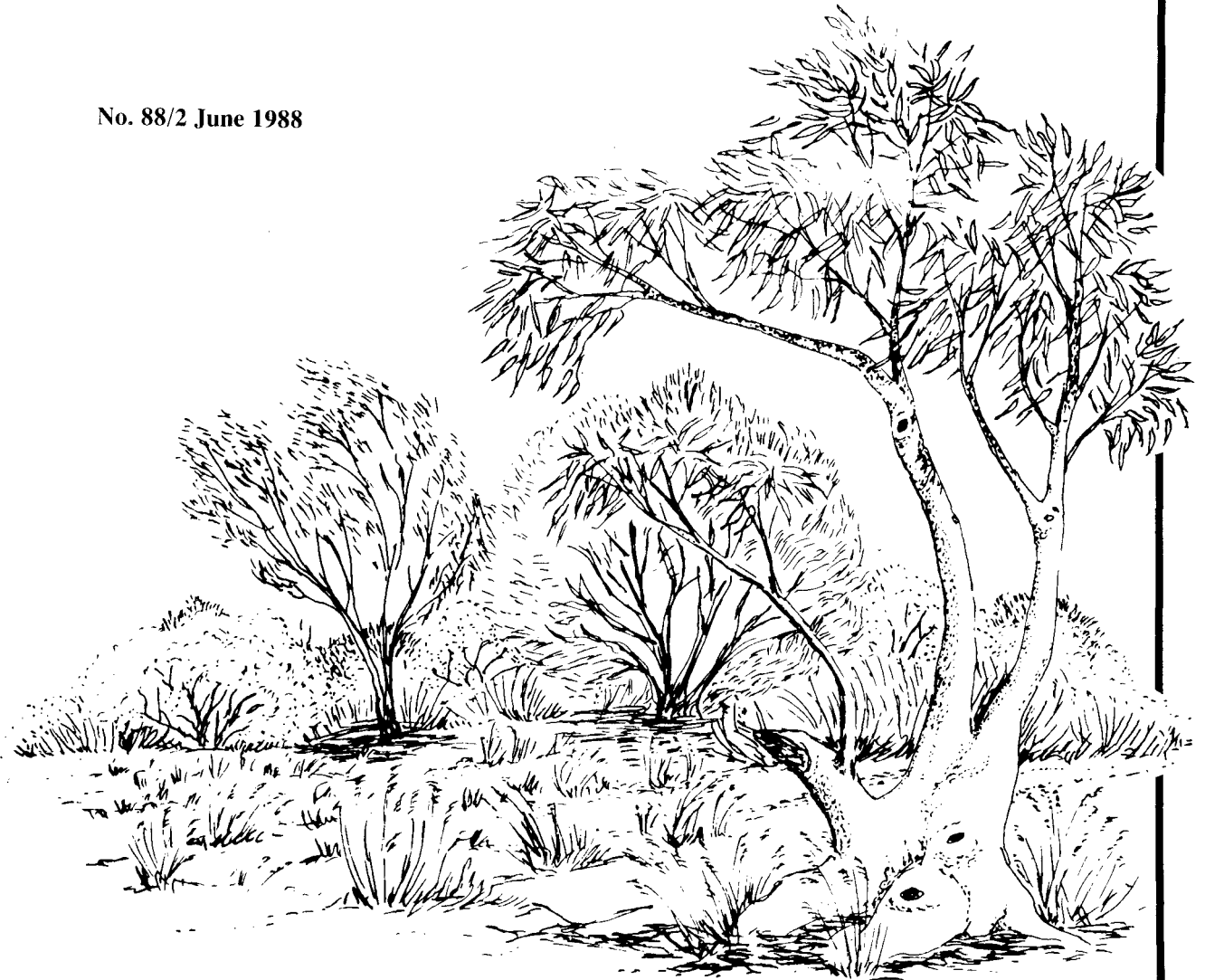


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Range management Newsletter

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EDITORIAL

Obviously most of you have been so busy preparing for Longreach that there just hasn't been time to put pen to paper. This issue is shorter than normal but we are going to press in anticipation of a larger issue following the Longreach meeting. Be forthright with your ideas and contribute to future issues.

In this issue our old stalwart Bill Bolton-Smith keeps us going with his Anecdotes from a Past Era. Bill's amazing run of stimulating articles may be coming to an end, although as editor I shall be encouraging him to keep digging into that treasure trove of memories. Meanwhile let's have some contributions from others of you, all of whom have valuable experiences and worthwhile ideas.

One of our eminent northern Australian scientists has just returned from overseas to inform us of his move to cooler pastures in the south. Congratulations Martin on landing the deputy directorship at Roseworthy. May I take this opportunity to thank you for your past contributions to rangeland science in the north and to the Range Management Newsletter. This issue contains a precis of Martin's world trip and details of his new position.

Basil Schur provides some stimulating and very relevant ideas on the nature of the dynamics of ecological systems. His comments on a recent tour of pastoral W.A. contain elements of promise, and disappointment for both the Pastoral Industry and the Conservation Movement. Some pastoralists have shown a willingness to consider pastoral resources as in need of conservation and the movement now recognises a role in our pastoral lands, but unfortunately there are still elements of mutual mistrust, each of the other. Serious pastoralists and true conservationists must come together if sustainable sys-

tems of managing our fragile rangelands are to be developed. Perhaps the theme of the Longreach meeting will have stimulated a few of you to put pen to paper on this issue - "Rangelands - A Fair Use, A Fair Go."

Of particular interest to those of you from northern parts will be the "Responses of Savannas to Stress and Disturbance" symposium and workshop to be held in Darwin in October 1988. The two day symposium will focus on the processes and management problems in savannas of the world. The three day workshop will cover numerous aspects of the ecology, management and future of savannas. Both are part of the IUBS/Unesco - Man and Biosphere Decade of the Tropics programme.

(H. G. Gardiner)

Editor

LETTERS TO THE EDITOR

Dear Mr. Gardiner

I was pleased that the Rangeland Society saw fit to publish my address to the Annual General Meeting of the West Gascoyne Branch. However I would like to correct an editorial insertion into the printed speech. In October 1988, I participated in a tour of pastoral areas which was organised by the Agriculture Department and not the Rangeland Society. It was through an invitation of the Hon. Julian Grill that an ACF representative attended the tour which was organised for the director of the NSCP.

On another point I am astounded by the bitterness shown towards to the Australian Conservation Foundation by pastoralists in the Pastoralists and Grazier's Association in recent months. At least one of these pastoralists is also a member of the A.R.S. This type of treatment

does not augur well for the cooperative approach to tackling conservation pastoral issues that I was recommending in my speech.

Yours sincerely
Basil Schur
ACF WA Project Officer

Dear Editor

I read with interest Wal Whalley's critique of the "*Clementsian or Climax paradigm*" of how the rangeland environment changes in response to disturbances (letters August 87, p.2). However the term "anarchistic paradigm" for "a conceptual model of ecosystem changes driven by random events including rainfall", although an improvement on the Clementsian model, is not a sufficient alternative for understanding how the rangeland ecosystem changes.

One of the most exciting developments in biology over the last two decades concerns studies revealing the self-organising behaviour of systems far from equilibrium point. These ideas stem chiefly from the work of a European scientist, Ilya Prigogine, who won the Nobel prize in 1977 for his work on the thermodynamics of non equilibrium systems.

His work has concentrated on the remarkable complexity shown by certain types of systems that are far from a static equilibrium point. These systems are characterised by being open to the environment, and having many self-regulatory (auto-catalytic) and self-renewing capabilities.

These systems have been called "dissipative structures" because they need a continuing input of energy to maintain them. Initially described for relatively simple oscillating physical and chemical systems, these non-

equilibrium theories have been found to apply to a wide range of biological, ecological and social systems.

There is now growing evidence, that ecosystems, such as rainforests, coral reefs, (and the less complex arid zone rangelands) are not systems in equilibrium (i.e. in "balance") but maintain their diversity and self-renewing capabilities precisely because they are far from equilibrium point. Fluctuations play an important role in the evolution of these complex systems. Random events may cause an unpredictable re-organisation of such systems to new levels of stabilisation, complexity and growth. This model corresponds to Wal Whalley's "anarchistic paradigm" except that much greater recognition is given to the self-organising attributes of such dynamic ecosystems as rangelands.

Certain types of disturbances or fluctuations push the system away from a meta-stable non-equilibrium towards equilibrium with disastrous consequences. Large scale erosion due to continuous over-grazing may be considered a pressure causing the rangelands to slide towards a simplified equilibrium. Likewise, the removal of any burning from certain arid zone types (e.g. the Tanami Desert) may lead to the simplification of fauna and flora diversity.

One of the most important features of the new perspective is the importance of non-linear or "positive feedback" processes. In the context of rangeland management, such positive feedback processes may lead to either rapid regeneration of rangeland condition, or alternatively, an accelerating slide to ecological catastrophe.

The challenge for managers of the rangeland ecosystems is to encourage those processes that appear to optimize the capacity of the rangelands for self-renewal and self-organisation. This involves a creative management ap-

proach, which is able to take careful advantage of irreversible events and patterns of events (such as a succession of above average rainfall years).

But most importantly, there is an urgent need for scientists and rangeland custodians to identify those fluctuations or management practices that are acting counter to the maintenance of non-equilibrium complex systems.

My own impression is that, although there are considerable soil conservation efforts being made by some WA pastoralist groups, the overall picture of rangeland condition in the Kimberleys, Gascoyne and Murchison districts is one of encroaching desertification.

Finally, I would like to challenge Wal Whalley's claim that most "greenies" hold a "Clementsian" view of ecological succession. In my experience as WA Project Officer for the Australian Conservation Foundation, I have come to know many conservationists with a deep respect for the dynamic, creative and self-regulatory properties of ecosystems.

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1) Erich Jantsch *"The Self Organising Universe"* Pergamon Press, Oxford, 1980.

2) Allen, T.F.H. and Thomas B. Starr (1982) *"Hierarchy: Perspectives for Ecological Complexity"* University of Chicago Press.

3) Clements, F.E. (1916) *"Plant Succession; An Analysis of Vegetation"* Public. Carneg. Institute, Vol.242.

4) Nicolis, G. and Prigogine, I. (1977) *"Self Organisation in non-equilibrium systems: From dissipative structures to order through fluctuations."* Wiley, Interscience, New York.

5) Zadeh, L.A. (1984) *"Landscape, Ecology"*.

Yours sincerely
Basil Schur
Cottesloe, WA

OVERSEAS TOURING

Martin Andrew 26 May 1988

Last year I undertook a CSIRO-funded study tour of rangelands and range-related research around the world.

I spent 3.5 months at Utah State University with the range plant ecophysiology group learning to use the 'root periscope' technique for studying root growth. The periscope is an essentially simple device (but complex to make) which allows one to see below the ground through buried glass tubes. Since one Periscope can be used to read many tubes (which are relatively inexpensive to make) the technique is not expensive. Though tedious to use, the periscope does offer promise as a way to find out new and important information about what our range plants do under the ground, where most of the competition between plants seems to take place: e.g. do the roots grow at the same time as the shoots, or do they grow out of phase?; how quickly do they grow to take up pulses of nutrients?; how much is root growth affected when the shoots are grazed?; to what extent do co-existing plant species avoid competition by using different parts of the soil profile or by growing at different times?

I spent about six weeks travelling through various range science centres in California, Canada (Edmonton), Kansas, Colorado, Arizona, New Mexico and Texas, and I attended the combined U.S. ecological societies' meetings in Ohio. After a week visiting plant ecologists in Britain, I spent a week in each of the following African countries: Mali, Nigeria, Kenya and Zimbabwe, to see something of tropical rangelands relevant to those I have been working with in northern Australia for the last 10 years.

I have written a comprehensive (51 pp) report of my trip in which I draw my

information together under numerous, wide-ranging topics, including: fire ecology, woody weeds, below-ground processes, grazing systems, export systems, the role of Australia in African development, implications of environmentalism, plant physiology, and a list of forthcoming and potential visitors to Australia.

This report has had wide circulation, but if you have not seen it and wish to, or if you need more information, please write to me at CSIRO, PMB 44, Winnelie, NT 5789 before 1 July 1988, or at Roseworthy Agricultural College, Roseworthy, SA 5371, thereafter.

Martin Andrew

Dr. Martin Andrew will take up the position of the Associate Director at Roseworthy Agricultural College on 4 July 1988. Roseworthy teaches and researches in rangeland-related topics through its Faculty of Natural Resources (of which Dr. Vic Squires is Dean). Roseworthy's other strengths include agriculture and wine science.

Martin completed his Ph.D. in 1978 from Adelaide University under Dr. Bob Lange, studying the impact of sheep around watering points in chenopod shrublands on Middleback Station, Whyalla. Since then he has been with the Tropical Crops and Pastures Division of CSIRO, based in Darwin, studying the ecology and management of the tropical rangelands of north-west Australia. His most recent work has been with the use of fire for managing tropical rangelands. Martin has been a member of the Society since its inception.

As the senior academic at Roseworthy, Martin will be responsible for planning and monitoring all of Roseworthy's courses. He will be pleased to hear from anyone with comments or suggestions about Roseworthy's present educational profile, or how it should change in the future.

RESPONSES OF SAVANNAS TO STRESS AND DISTURBANCE

The two-day Symposium will be open to the public and will be concerned mainly with processes and management problems in savannas of the world, especially in comparison with Australasian savannas. The discussions will concentrate on comparing and contrasting processes in various savannas. As a starting point and an aid to this endeavour we have tried to organize the papers by savannas of similar basic resources (on the Pam-An plane, Plant Available Moisture-Available Nutrient, p.40, Biology International, Special Issue 10, Frost, P., et al, editors).

The Symposium will also include sessions on the implementation of research into the management of savannas, including a demonstration of management computer software packages. Contributed Posters will be on display.

The three-day Workshop will include 40-45 invited participants. The program is yet to be finalized but will likely include discussions (and possibly writing) on such topics as

- Functional Groups of Plants and Animals
- Logistics and Methodology of Collaborative Research
- Rehabilitation of Savanna Lands
- The Long-Term Trends and Future of Savannas
- Implementing Research into Savanna Management
- Conflicting Land Use Demands (wildlife conservation, tourism, grazing, mining, cropping, lifestyles, etc.)

The Workshop session will be held in Kakadu National Park. Although the time is limited for sightseeing, we will visit Ubirr Aboriginal paintings (more than 20,000 years old) and arrange an optional small boat cruise to view wildlife. Further, the workshop will include scientific excursions to the CSIRO Kapalga Field Station in the Park and Manbulloo Field Site outside Katherine, for a range of research from conservation/tourism to cattle production, and from 1200 mm to 900 mm rainfall per annum.

Brian H. Walker

Chairman RSSD

SYMPOSIUM IN DARWIN (Session Topics Only)

Monday 10 October

Session 1: Moist and Wet Savannas of the World

(Key interactive processes; thresholds and limits; key management issues)

Session 2: Australia's Northern Savannas: A Case Study of Processes

Discussion: Comparisons of Key Processes in the Australian Savannas with Other Wet Savannas of the World

Tuesday 11 October

Session 3: Dry Savannas of the World

Discussion: Comparisons and Contrasts of Key Processes

Session 4: Incorporation of Research Findings into Management of Savannas

A. Economics, Sociology and Extension **B.** Computer Tools for Management (Introductions and Handouts)

Decision Support Systems and Expert Systems Other Data Analysis Packages: Botanal, Patn, Decoda

Demonstrations: At the University College of the Northern Territory

Computer Demonstrations of the above Software Programs:

SCHEDULE FOR SYMPOSIUM, WORKSHOP & EXCURSION

Sunday 9 October

6.00 pm Registration and Refreshments Hotel Darwin, Poolside

7.30 pm Bar-b-que Dinner (\$15) Hotel Darwin, Poolside

Monday 10 October

Symposium Papers, Beaufort Hotel Ballroom

Session One: WET SAVANNAS OF THE WORLD

(Key interactive processes; thresholds and limits; key management issues)

Noon Lunch provided in room adjacent *Poster on display in Foyer area*

Session Two: AUSTRALIA'S NORTHERN SAVANNAS: A CASE STUDY OF PROCESSES

5.30 p.m. Reception to be hosted by Northern Territory Government Ground Floor, Chan Building, Mitchell Street.

Evening Free

Tuesday 11 October

Symposium papers, Beaufort Hotel Ballroom

Session Three: DRY SAVANNAS OF THE WORLD

Noon Lunch provided in room adjacent *Posters on display in Foyer area*

Session Four: INCORPORATION OF RESEARCH FINDINGS INTO MANAGEMENT OF SAVANNAS

Evening

7.30 for 8.00 pm Conference Dinner *(venue to be selected)*

Wednesday 12 October

Field trip Kakadu National Park

7.00 am Depart Darwin

Travel along Arnhem Highway to Kakadu National Park, a brief visit to a fauna park is scheduled

10.30 Arrive CSIRO Kapalga Research Station

Morning tea/site tour/lunch

2.00 pm Depart for Park Headquarters

2.30 Arrive Park Headquarters, observe displays/short address from ANPWS staff/afternoon tea

3.30 Drive to Obiri Rock to observe Aboriginal art in this natural gallery

5.30 Depart Obiri

6.00 Check in to accommodation at Kakadu Four Seasons Hotel (Crocodile Inn in Jabiru)

7.30 Dinner/Discussions

Thursday 13 October

Optional: Faunal Cruise on Large Billabong

6.15 Depart Kakadu Four Seasons Hotel for Cooida

7.00 Cruise Yellow Waters Lagoon - observe flora & fauna

9.30 Return hotel

Workshops - Meeting Room, Kakadu Four Seasons Hotel

9.30 am Program to be arranged (B. Walker)

Morning/Afternoon teas and Luncheon will be served A Bar-b-que dinner is planned

Friday 14 October

**Field Inspections and Discussion
- Kakadu to Katherine**

7.00 am Depart Cooida for Katherine via the Kakadu Highway

9.30 Morning tea: Pine Creek *(or elsewhere in route)*

11.30 Lunch and inspection of Katherine Research Station

2.30 pm Travel to Manbulloo (Afternoon tea on site)

6.30 Check in to accommodation at the Paraway Motel

7.30 Dinner/Discussion

Saturday 15 October

7.30 am Depart Katherine

11.00 Arrive Darwin

In time for afternoon flights to Sydney, Canberra, etc.

Notes: A commercial bus (Greyhound) departs Jabiru for Darwin at 4.00 pm on both Wednesday and Thursday (arrives Darwin approx. 7.00 pm)

A similar bus departs Katherine for Darwin at 4.30 pm on Friday (arrives Darwin approx. 8.00 pm)

An option exists for people to spend extra time in Katherine on their own accounts. Tours of varying duration of Katherine Gorge depart frequently, buses depart Katherine for Darwin at 1.00 pm, 4.30 pm and 6 am.

ANECDOTES FROM A PAST ERA NO. 6

by Bill Bolton-Smith

Woody weeds and assessing rainfall patterns.

May I first welcome Ted Hayes with his memories of the Alice Springs area and urge others to join in - it is lonely here!!

Graham Harrington (RMN Aug 8) and Alan Wilson (RMN Nov 87) (both of whom I know and would describe as earthy "Rangeland Scientists") have prompted me to digress for a while from an earlier plan of sorts and add some thoughts to their comments on some of my past articles and attempt to justify my stand on drought stocking vs heavy stocking in the first few good seasons following a drought. I welcome their comments because they open the subject up for further discussion.

Graham relates drought stocking and general overstocking to scrub or "woody weed" encroachment and warns about the loss of top soil during droughts, while Alan relates to improvement in the general condition of western New South Wales country in the period from the 1940's on and woody weed encroachment to improved rainfall as well as the other factors I had mentioned. In fairness Alan, I had also mentioned the improvement of rainfall as a factor although perhaps with not the same emphasis (see page 10 para.4 RMN April 87).

In fairness also, although I do not have access to the publications mentioned in Graham's article, I do notice that the works of Mott as quoted deal with "Soil seals in tropical tall grass pastures of northern Australia." Hardly rele-

vant to relate work done in that area and that climate to what I was talking about in the West Darling area of New South Wales.

Now to the advent of woody weeds on Wilangee Station. I well recall the first woody weeds (Hop Bush, Turkey Bush etc.) which appeared on Wilangee and other areas of the West Darling. It was in the late 1940's when we first noticed Hop Bush plants on Wilangee. I remember it because we were so excited to see a new shrub or tree growing, that we could only see it as a further source of fodder, as shade for stock and as further protection for the soil. It did not occur to us then that it may not be all that attractive to stock and may one day become a problem. How easy it would have been to get rid of it then if only we had known.

The thing that is so clear in my mind is that in every place I know of where it first appeared there was a known history of continuing heavy stocking.

One area was just outside our western boundary (the border fence between New South Wales and South Australia) where Kidman used to walk large mobs of cattle from Quinyambie Station to Cockburn for railing to market. They had to walk about 90 miles with only one drink on the way. This water was approximately 72 miles north of Cockburn and also north of Wilangee country.

Because of this long dry stretch they were not spread out to feed over 1/2 mile to 1 mile wide, but were forced onto the fence and strung along in a string

about 200 yards wide and 1/2 mile long and made to keep walking to cover the distance in the shortest possible time to get to the next water.

The pressure on that strip at that time (say up to the mid 1950's) was enormous and of course would have been more so in good seasons than in bad because the main market was for fat stock.

Another area was on Wilangee where there used to be a peculiar sort of lane to allow stock from about 3 miles away to have access to a tank for water. The lane was about 200 yards wide at the tank and extended in a wedge shape to about 1-1/4 miles wide at 3 miles away where it opened out into a paddock about 3 miles square.

This lane would also have been used mostly in good seasons because the tank filled with water from Campbell's Creek which had to run about 14 miles in a steadily sloping creek and man made drains to get there, so it only filled with a good heavy rain. The rain had to fall back in the Barrier Range and not necessarily on the country around the tank.

The tank leaked badly because of sand just below the clay bottom and only lasted about 9 months after filling so it is reasonable to assume that the sheep would be put out there in fairly large numbers when water was available and the sheep would eat and tramp out that lane to a much greater extent than would have applied outside it.

There are other examples in which the story is much the same, a known history of continuing heavy stocking especially in the good seasons. I quote these examples to illustrate my argument that more damage is done by over-use in good seasons than is done by keeping stock on in a drought.

The case of the disappearing top soil I believe I covered in my Anecdote No.4 article which appeared in RMN November 1987 and would not have been available to Graham and Alan when they wrote in. I will not enlarge on that now.

Studying Rainfall Records

Alan Wilson rightly points out that the average rainfall in Broken Hill from 1888 to 1945 (57 years) was 223mm (8.92 inches) and from 1946-1986 (40 years - or is it 41 ?) had climbed to 271mm (10.84 inches) which is quite an improvement.

I do not have access to such long records for Wilangee or Broken Hill but I do know that Broken Hill's average rainfall was about 1-1/2 inches (37.5mm) better than we had at Wilangee. However that is beside the point at the moment.

The point I wish to make is that in any study where an attempt is made to relate to rainfall records to the likely feed situation at any given time, it is necessary to have access to daily registrations rather than monthly or annual totals or averages, because the intensity of the rain has a large bearing on its usefulness for improving feed supply and water storage.

It is possible to have say 1-1/2 inches of rain in a month in one fall on one day or in many smaller daily falls. It still shows as 1-1/2 inches for the month. Likewise it is possible to have what looks like a good yearly total of say 7 inches wherein there are a number of daily falls of over 1 inch, or it can fall in many daily falls of 1/2 inch or less.

Naturally, within reason and on the flatter softer country the more intense rain does more good and any smaller falls after that will do good, but small falls in isolation long after the last decent fall are of very doubtful value.

A case which I will always remember was in the notorious drought of the mid 1940's in the Broken Hill area. At a time when the properties from Broken Hill to Wentworth were virtually denuded of stock (and most other things) we were running the working horses from a number of properties on Wilangee and supplying ration sheep to many people down there. We were just getting into trouble in 1944 when, on February 6th, we had 223 points of beautiful solid rain over the whole property. This filled all tanks and grew sufficient feed to restore all stock to good strong condition. From then on we had only light falls with 25 points being the highest until August when we had 93 points on one day and 46 about a week later. We finished with 10 inches for the year. Some say that often a good thunderstorm is the only difference between a good manager and a bad one. How true !!

Now in 1945 we had only 446 points for the year. The monthly records show 122 in June, but that fell over 4 days so was very light. I recall that we lost hundreds of freshly shorn weaners in those cold, wet conditions. We had to wait till January 1946 for a good drought breaking rain.

I think everyone has heard of the big drought in the 1940's, but we were saved by one day's rain and actually had less severe droughts in that time. Our big drought (our worst from 1919-1982) was in 1953-1954 and virtually no one has heard of that drought. We were among the worst hit of only a handful of properties which were badly affected by that one.

A closer look at the available rainfall records for Wilangee (1932-1982) and breaking them up into 10 year averages shows the following:

From 1932-1939 (8 years) average 683 points, with 1 year over 10 inches (1169 points). 1940-1949 average 600

points and not 1 year over 10 inches. 1950-1959 average 735 points and 3 years over 10 inches. Remember we had our worst ever drought in that decade, but we also had our biggest ever flood in Campbell's Creek and the greatest show of wildflowers I saw in my time there. From 1960-1969 the average was 741 points with 3 years over 10 inches. Now in 1970-1979 the average jumped to 1089 points, up 348 points (87mm) with 6 years over 10 inches and 1752 points in 1973, 2124 in 1974 and 1169 in 1975. That, in my opinion, is the decade that made the main difference in the figures quoted by Alan Wilson, although the other decades do show an steady upward trend.

The moral is, of course, that averages can be dangerous. Remember the man who drowned while crossing a river with an average depth of only 17 inches !! and much more than averages are needed before a proper assessment of rainfall effects can be made.

This raises the interesting question, "When does a drought start?" Most of us can work out when it finishes but what are the criteria for when it started ?

We say the day the last decent rain stopped. What do you say?

See you.

W. Bolton-Smith

10.1.88