

News of Friends of Grasslands

supporting native grassy ecosystems

July - August 2001



FOG'S COMING EVENTS

FOG'S 2001 PROGRAM

Saturday 28 July, 2pm - Grassland Earless Dragon - Lyn Nelson will present information about her part-time PhD project on the endangered Grassland Earless Dragon (*Tympanocryptis pinguicolla*). The research is focussing on life-history differences between populations near Canberra and Cooma and their relationship with the thermal environments at the two altitudes. Her work is examining differences in temperature selection, field metabolic rates, recruitment and population structure, growth and body size, and diet. Afternoon tea provided. At Mugga-Mugga, Symonston.

Saturday/Sunday 25/26 August - South coast grasslands A weekend of south coast grasslands with Rainer Rehwinkel, including the unique Eurobodalla Headland grassland. Rainer describes these grasslands as follows:

Scenically and floristically different to the grasslands we are accustomed to in the Tablelands are the coastal headland grasslands of the NSW South Coast. I have visited several of these over the last few years, and a treat awaits those FOG and SGAP members who wish to join us in August.

The grasslands are similar in many ways to those on the Tablelands, with *Themeda* dominating. The associated trees and shrubs of course are quite different, with *Acacia sophorae*, *Westringia fruticosa*, and *Banksia integrifolia* being conspicuous. Of course, many of the intertussock forbs are also quite different to those we expect on the Tablelands, with *Selliera radicans*, *Centella asiatica* and species of *Lobelia* and *Scaevola* being amongst the most obvious. The best prize of the weekend will be to uncover the threatened *Thesium australe*, which I have recorded at one of these sites. It may, of course, be a little too early to detect this species. Grass species that will be novel to higher altitude eyes are *Imperata cylindrica* and a species of *Sporobolus*.

Scenically, of course, these headlands are

superb. Where else can you be in a grassland and see albatrosses wheeling above the breakers of the Tasman Sea? I was particularly impressed with the scenery in the Bingie area, where the shrublands and grasslands interspersed with large granite boulders have a distinct Kosciuszko feel, with the exception that the sea crashes against the boulders at the feet of the headlands!

I propose that we meet at 11:00 at South Moruya Head on Saturday the 25th of August and at 10:00 at Bingie Bingie Head on Sunday the 26th. From these locations, we can strike out to other sites on each day. These times will give those travelling down from Canberra time to get there each day. For those who are planning to overnight, there are a number of reasonably cheap units, motels, etc, at Moruya. I will provide more detailed directions to the starting points closer to the event.

8/9 September – Riverina grasslands Please see below for an invitation from one of our FOG members who lives in that area.

Have-you-been-a-wandering-along-a-mountain-track.....?"

Well that may be OK, but give that away this year and come wandering out to the plains country of the Western Riverina of southern NSW to wander amongst some very large expanses of diverse grasslands. There is a FOG field weekend proposed for the second week of September around the Hay/Deniliquin area to experience first hand the native grasslands species including Downy Darling Pea (*Swainsona swainsonoides*), Small-flowered Goodenia (*Goodenia pusillifolia*), Hard-headed Daisy (*Brachyscome lineariloba*), Yam Daisy (*Microseris lanceolata*), Rough Burr-daisy (*Calotis scapigera*), Pale Beauty-heads (*Calocephalus sonderi*), Grey Sunray (*Rhodanthe corymbiflora*), Woolly Plover-daisy (*Ixiolaena tomentosa*) and Bristly Sea-heath (*Frankenia serpyllifolia*). There are of course many, many more. All welcome.

Saturday 22 Sept - Grasslands in the Young area with Rainer Rehwinkel Please note that this activity has been **cancelled** and replaced by an invitation for FOG members to attend the following October long weekend activity.

Friday, Saturday, Sunday and Monday 28-30 September to 1 October – NPWS/NPA biodiversity survey at Dananbilla in the Young area NPWS and NPA are looking for volunteers to help with this targeted flora and fauna survey in the Dananbilla Nature Reserve and adjacent public and private land. Come and help out for some or all of the days – we'll try to arrange transport - accommodation will be mainly camping. It should be a wonderful learning experience. Phone Margaret if you are interested, and she will keep you posted re developments.

Saturday 6 October, 2pm - Orchids at Gungahlin Hill A compact grassy woodland remnant which contains a surprising number of spring orchids.

Saturday 20 October, 2pm - Kowen Forest

Saturday 16 November - Theodore grassland We'll visit a grassland site in Theodore.

Saturday 1 December, - In pursuit of the Golden Sun Moth We'll visit Belconnen Naval Station.

8/9 December – more Monaro grassland gems

Don't forget the STIPA CONFERENCE 28-29 Sept – more details on page 3.

Important notes on coming events:

- Please put firm dates in your calendar.
- For all outdoor activities, don't forget your hat, sturdy walking shoes, sunblock and drinking water.
- For insurance purposes, sign in/out at activities.
- For any information about activities (including times, venues and carpooling details), please contact Margaret Ning on 6241 4065 (home) or 6252 7374 (work).
- To make program suggestions, contact Margaret.

IN THIS ISSUE

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NEWS ROUNDUP

Grassy ecosystems grants

The second round of the Grassy Ecosystems Grants has been completed, and the Federal Minister for the Environment has announced the successful projects. Thirty projects valued at \$460,126 will be funded for this round. Fifty one projects were submitted for funding - two from ACT, one from ACT/NSW, 17 from NSW, 12 from SA, six from Tasmania and 13 from Victoria. Results were: NSW: 10 projects funded, totalling \$136,491.50 SA: 8 projects funded, totalling of \$132,735 Tas: 5 projects funded, totalling \$25,400 Victoria: 7 projects funded, totalling \$165,500

Senator Hill has also given in-principle support for the allocation of \$162,088 to 5 projects to be targeted and re-worked through a supplementary assessment process as suggested by the NAP. The grants program has been approved for another year through the allocation of \$500,000 for a third round. The third round opens for Expressions of Interest on 4 August 2001.

Rainer on community radio

On Saturday 7 April Rainer Rehwinkel discussed local grassy ecosystems' flora on community radio 96.7FM. Rainer stressed the importance of lowland temperate grasslands and their lack of recognition until recently. He talked about some of the more interesting flora species and developments in grassland conservation. He went on to say that it is important to capture the best grassland sites to ensure they are there for future generations. It was a great education opportunity and FOG was mentioned in the course of the interview.



Coolleman Ridge Parkcare Group

On Sunday 8th April 2001 Coolleman Ridge Parkcare Group celebrated its 10th birthday. There was a little of everything: weeding, planting, plant identification, herbicide use, whipper-snipper use, and refreshments. Congratulations to Bess Sledge for all the energy she has put into the group over all those years, and for being the driving force behind the group's success.

Conder 4A – the continuing saga

Some damage was done to a very good part of the Conder 4A site during April by BMX enthusiasts. An area about 40 metres by 7 metres was mown quite short. Two large holes were dug and the earth moved to the mown section to create two mounds. Rocks and old logs were also moved to help create the 'playground', and there was wear and tear to the vegetation.

Michael Bedingfield contacted Environment ACT, and two of their officers came out to visit. But unfortunately, at this point of time the site is in legal limbo, and they could do nothing. So Michael and the FOG committee chose to approach the press in order to raise public awareness.

The Valley View and Tuggeranong Chronicle ran short stories on the event, mentioning the special environmental values of the site, and pointing out that a public place should be set aside so that the children involved could enjoy this activity without damaging the environment. We were very careful to not direct any blame on the children who were quite unaware of the effect of their actions.

When Michael visited the site with one of the reporters, the children were there and he was able to show them photographs of the area in full flower. He explained to them why it had been set aside, the effect such disturbance has on the flora, and the way weed invasion occurs in this circumstance.

On Saturday 5 May we conducted a working bee at the site, with members of FOG and Conder Community Landcare Group participating. Well over a tonne of dirt, rocks and timber were put back in their rightful places.

Joint Environment ACT/CSIRO Workshop on the Biological Control of Weeds

This workshop, held on 1 May, concentrated on the latest developments in control agents for some major problems, in particular; St John's Wort, Patterson's Curse and the *Onopordum* thistle species. In the ACT, biological control agents have been released on these plants.

Biological control of weeds is the use of natural enemies, such as insects, to control a pest plant. They are introduced to Australia with the aim of eventually reducing the density of the weed to a manageable level, a process that could take ten years. The point was made that not all weeds can be controlled biologically and that biological control is not the magic answer.

From the cautious comments made at the workshop it is apparent that there may be some long term hope for Paterson's Curse and the *Onopordum* thistle species, where biological agents have established in the ACT. For instance, the Root Weevil is having success in managing Paterson's Curse. There is clearly a long struggle to redeem native grasslands under threat from these weeds.

WGWG

The Woodlands and Grasslands Working Group of the Conservation Council (WGWG) has been concerned with a range of local issues centred around the development of East O'Malley and attempts to save further areas in that locality, the re-development of Sutton Road and the future of a truly remarkable piece of remnant native vegetation on Percival Hill. (The last is not far from an Action Plan No. 1 grassland site.) The Group continues to have an interest in ensuring there is a strategic approach to conserving woodland and grassland throughout the ACT and hopefully, in the Australian Capital Region.

Percival Hill

WGWG recently visited the summit of Percival Hill, which can be accessed from Schow Place, Nicholls. Part of the area is a Brittle Gum (*Eucalyptus mannifera*), Scribbly Gum (*E. rossii*) grassy woodland which has an interesting understorey including Kangaroo Grass (*Themeda*) and large swathes of Red Anther Wallaby Grass (*Joycea pallida*) along with a number of shrubs. It also includes small patches of the

daisy Hoary Sunray (*Leucochrysum albicans*), not something that you see every day in the ACT. The Department of Urban Services plans to graze the summit area which could seriously impact on this almost pristine little gem. ACT for Trees has asked the Conservation Council to support a campaign to prevent grazing on this remnant. (More on Percival Hill on page 4.)

Stipa's next conference - September 27th-28th at Dookie College, Victoria

The Stipa Native Grasses Association is convening its Second National Conference, "Our Valuable Native Grasslands, Better Pastures Naturally" on September 27th-28th at Dookie College, Victoria. The program is:

Wednesday 26th

Native grasses ID afternoon; not part of the official conference program but all welcome to attend and there's no charge.

Thursday 27th

PRODUCTIVE USE OF NATIVE PASTURES
History of Australian native grasslands; How it was, how it is (Ian Lunt) Farm scale economics of native grasses (Jim Crosswhaite) Personal experiences managing native grasses (Bill & Debbie Hill) Grazing management and its influence on root depth of native grasses (Meredith Mitchell) Effective pasture cropping (Colin Seis) Harvesting and sowing of native grass seed (Andrew Briggs) Personal experiences with native grasses (Millie Nichols)
CONSERVATION AND BIODIVERSITY
Managing Terrick Terrick National Park (Mark Tscharke) Managing grassy woodland remnants on farms (Geoff Tonkin) Seed Collection and provenance (Cathy Waters) Native grass seed industry (Peter Włodarczyk) Ecology of repair and management of native grasslands (Colin Hocking)

In the evening there will be a Cocktail Party and Poster Session followed by the Conference Dinner.

Friday 28th.

WATER USE

Soil water balance: past lessons for future learning (Christine Jones) Salinity in the Goulburn Valley Region (Mark Cotter) Approaches to managing the water balance of grasslands (Bill Johnston)

After lunch there will be workshop sessions discussing issues that have been brought up over the 2 days and a tour of local

properties and sites of interest.

All this including 2 nights accommodation, meals and conference proceedings for only \$280 if you register before 1/9/01 (5% off if you are or become a Stipa member). The registration form and more details can be found at <http://www.stipa.com.au/announce.html> or contact Mike Byron at conference@stipa.com.au

CONSERVATION MANAGEMENT NETWORK NATIONAL CONFERENCE

(Here is a more comprehensive report on the Conservation Management Network workshop held in Canberra on 5-6 March, which we briefly discussed in the last newsletter.)

The National Reserve System Program (NRSP) of Environment Australia and the NSW National Parks and Wildlife Service organised a workshop in early March in Canberra for people involved in creating and managing networks for fragmented vegetation.

For the past two and a half years, Ecological Interactions (Drs Suzanne Prober and Kevin Thiele) and the NSW National Parks and Wildlife Service have been working jointly to develop the Conservation Management Network (CMN) model. They have been assisted by a project steering committee. The project followed on from the earlier work of Drs Prober and Thiele, first with CSIRO, Division of Plant Industry and later as private consultants.

The Grassy Box Woodlands Conservation Management Network has been trialing the model on the western slopes of NSW. The Grassy Box Woodlands were chosen for the trial because of the severe distribution decline of these ecological communities since settlement and the small proportion that is protected in formal reserves. Due to their location on prime agricultural land, acquisition will always be expensive and difficult. The communities are fragmented, and fencing areas on their own will not be sufficient, but rather specific management is required.

A number of groups throughout Australia have been undertaking similar projects. The Canberra workshop was a chance to bring some of the people together to discuss links.

A number of case studies were presented along with presentations by a wide variety of speakers on important aspects of protection and management:

- Partnerships – who and how
- Recovery Planning – under state and federal legislation
- Role of liaison officers
- Links to the National Reserve System
- Landholder needs/recognition
- Role of non-government organisations
- Covenanting programs
- Incentives
- Long-term management
- Socio-economics
- Conservation objectives
- Ecological management
- The role of networking
- Interaction of conservation and production goals

Where to now?

- Some draft guidelines for running Conservation Management Networks were discussed at the workshop and will be further developed over the next six months.
- Dr Kevin Thiele gave a presentation to the 'National Forum – Taking Care of the Bush: Nature Conservation on Private land' workshop in Perth in late March 2001.
- Feedback was given to the ANZECC Private Lands Working Group.
- The pilot on the Grassy Box Woodlands CMN has NHT funding until June 2002 as part of a broader Grassy Box Woodland project. The trial will be used to provide feedback and evaluation of the model.

A CMN Web Page is under construction www.conservation-management-network.net. The web page, which will be up and running soon, will be used as a forum for feedback on the draft guidelines.

EASTER IN SOUTH-EAST NEW SOUTH WALES

Alan Ford

The Canberra Ornithologist Group's Easter excursion in 2001 was based around Timbarra, a property near Merimbula owned by Alan and Lyn Scrymgeour. There were two places that stood out among the range of magnificent habitats that we sampled.

Rocky Hall Reserve

This small reserve on the bank of a creek contains a lower storey that appears to be dominated by Fleabane (*Conyza sp.*) at first sight, but it contains substantial patches of Kangaroo Grass (*Themeda triandra*), *Poa*

sp., the daisy Austral Bear's Ear (*Cymbonotus sp.*), a *Geranium sp.* and Stinking Pennywort (*Hydrocotyle laxiflora*) and probably other plants. This makes up part of what is a small remnant of Manna gum (*Eucalyptus viminalis*) woodland. It is probable that the creek floods the area from time to time. Despite the patchy understorey and the lack of native shrubs, the reserve did contain birds, clearly dependent upon the magnificent trees.

The Pambula Beach Lagoon

This dunal freshwater lagoon is located a few hundred metres from Pambula Beach Road on its northern side. It is part of recent extensions to Ben Boyd National Park.

It is surrounded by tall Woollybutt (*Eucalyptus longifolia*) and Forest red gums (*Eucalyptus tereticornis*) and has a range of plants allowing for a wide variety of birds. Apart from the Azolla on the lagoon, it contains a Wild parsnip, (*Trachymene anisocarpa*), which is uncommon in the area.

NSW NPWS says that it is one of only four major stationary barriers in southern NSW and is an excellent example of this type of formation. The wetland is located at the southern extent of the Merimbula Bay barrier dunes which began accumulating some 7-8,000 years ago as sea levels rose and stabilised in their present form about 5,000 years ago. The lagoon is filled entirely by rainwater and runoff from the surrounding area.

PERCIVAL HILL VISITS ON 16 NOVEMBER 1999 AND 21 APRIL 2001

Jean Geue

This remnant Brittle Gum (*Eucalyptus mannifera*)/Scribbly Gum (*E. rossii*) woodland is located on the side of Percival Hill uphill from the golf course developed for the Harcourt Hill estate. The dominant trees are *Eucalyptus mannifera* and *E. rossii*. Most are much older and more widely spaced than the trees on Black Mountain and Aranda Bushland. This and the absence of Red Stringybark (*E. macrorhyncha*) create a different ambience. There is a diverse understorey with relatively few weeds. The weeds include small hawthorns and briar that could easily be removed by an enthusiastic parkcare group with a few work parties. The worst phalaris patches have been replaced by golf course greens.

The rest of Percival Hill on the Barton Highway side of the fence has reasonably good native grasslands with scattered mature gum trees, some natural regeneration of trees and landcare plantings on the hillside facing Gundaroo Road. There is enough challenging briar and phalaris to keep a parkcare group alive.

My visit on 16 November 1999 with ACT for Trees and the Con Council was just to the edge of the *Eucalyptus mannifera*/*E. rossii* woodland and we looked at the up market town house development proposed. My second visit with the same groups took in all the side of the hill facing the golf course. We saw the adjoining endangered grassland no 8 from the top of Percival Hill, but did not go down to look at it. The grassland currently is urban open space and does not seem to be part of the proposal to add Percival Hill to Canberra Nature Park. We checked out the Percival Hill paddock on the Gungahlin side of the hill and it is much weedier and lacks the diversity of the Barton Highway paddock.

Apparently, Parks and Conservation is keen to graze the hill. Perhaps they should read the latest FOG newsletter (May-June 2001 received 23 April see pages 5 to 7). The article on rangelands flora concludes that there are a significant number of species which are particularly sensitive to grazing and are only found 8 to 12 km from watering points. 'They [graziers] must consider the impact of installing new watering points in areas inhabited by plants and animals which are unable to withstand pressures from livestock.' Grazing may not be appropriate on Percival Hill especially if it hasn't been grazed for more than ten years and especially in the paddock on the Barton Highway side.

I would like to see a 'Friends' group interested in lobbying as well as weeding established by local people and would be happy to help in starting it. This parkcare/landcare group could develop ownership in the conservation and long term care of Percival Hill and other remnant vegetation in the Harcourt Hill development including the remnant Snow Gums.

TALAHENI - THE 20 YEARS WAR

Alan Ford

On Saturday 29 April FOG was the guest of John and Robyn Ive at their property, Talaheni, north of Hall on a visit concerned with restoring vegetation and fighting water tables and salinity. The afternoon commenced with

a visit to a prominent salinity demonstration site near Dicks Creek not far from our destination. This is a mini wasteland which does show, quite dramatically, the effect of rising water tables and the subsequent salinity problem which infests the Yass River catchment.

The party, which included members of Murrumbateman Landcare, then went to Talaheni to hear about the work that the Ive family had done to combat rising water tables and salinity in the last two decades.

The property is an operating sheep and cattle concern of around 250 hectares (600 acres) and one of the first things John told us on our 2 hour tour was that 50 hectares are fenced off from domestic stock to enable either regeneration or tree plantings to thrive. This is part of a program to provide corridors for wildlife which are gradually covering the property as well as making a fundamental contribution to controlling the water table. (There were still some interesting areas of Red anther Wallaby Grass (*Joycea pallida*) to examine along the way).

The hard work is having an effect- at one high measuring point, the water table had not risen above 12m for a number of years; in lower areas the water table levels have dropped by 1-2m over ten years, showing that the tree plantings (some 20,000 planted over the past 20 years) were beginning to work. Some of the restored areas have required major engineering works; in other areas the lowering of the water table has seen perennial grass cover return which was now having a further beneficial effect on controlling the water table.

The property has around 80 native plant species on it, and we noticed a number of those on our travels, adding as we went.

Thanks to the Ive family for showing us a model restoration project in action.

HIDDEN NATIVE FLORA IN AUSTRALIA'S RANGELANDS - APOLOGY/CORRIGENDA

In our last newsletter, we printed an article by John Layton 'Hidden native flora in Australia's rangelands' which discussed a CSIRO study looking at the effects of grazing on native flora in rangeland areas. Unfortunately, most of the following paragraphs were accidentally omitted from John's article, and by including them here, we hope you will now be able to enjoy the

article in full. The omitted paragraphs should have started on page 6, in the left-hand column, in the second paragraph. Our apologies to John and Jacqui Stol for this fizzle.

"Here, on the southern tablelands, many of the paddocks have lost much of their native grasses and forbs [non-woody plants other than grasses]," Stol says. "What you see mainly are pastures dominated by exotic grasses such as phalaris and ryegrass. We know that in the ACT many of our native grasses and forbs don't respond well to consistent heavy grazing and will decrease over time."

"However, it is not so easy to survey the plants of the outback. The difficulty in understanding the grazing and watering-point impacts on native rangelands plants is that if we had surveyed the plants, especially during drought – which is a common feature of these areas – we would mainly have got the perennial or long-lived plants. We would have missed many of the ephemeral plants, such as the Western Australian wildflowers which only appear in spring after adequate rains."

In order to gain an overall appreciation of the rangelands flora, including seeds of plants that may lie dormant in the soil for several

years before adequate rains trigger their germination, the researchers adopted a novel strategy. As they surveyed the standing rangelands plants, they collected thousands of soil samples which they took back to glasshouses in Canberra. Although a truckload of rangelands soil is unlikely to captivate the average home gardener, Landsberg, CSIRO's senior plant ecologist, suspected a cornucopia of rangelands flora lay within the collected soils. The challenge for the team was to get the hidden seeds to germinate and to grow the plants through their lifecycles.

PONDERING THE WONDERS NEAR CONDER

Michael Bedingfield

Each day I like to go for a short walk, and during the last spring and summer, whenever I could, I would go somewhere different, exploring the hills that form a wide arc around Conder. My time living out here has opened my eyes to the richness and variety of the local flora, and I took with me my camera and species lists and monitored the native plants I saw.

Because of the size of the area, I decided to break it up into a number of sites, with convenient boundaries. My limitation for the exploration was that it should be within walking distance of Conder. A simple map is provided for the following sites:

- T - Tuggeranong Hill,
- H - Hills east of Theodore (part of Tuggeranong Hill Reserve),
- L - Power Line reserve,
- F - Foothills to Mt Rob Roy east of Conder,
- W - Wrights Creek, including 100 metres each side,
- B - Rob Roy foothills east of Banks,
- M - Rob Roy foothills between fire trail & Monaro Hwy,
- V - 'Wombat Creek', part of site F,
- P - Conder 4A, near Ponds, and
- E - Conder 9, near Eaglemont Retreat.

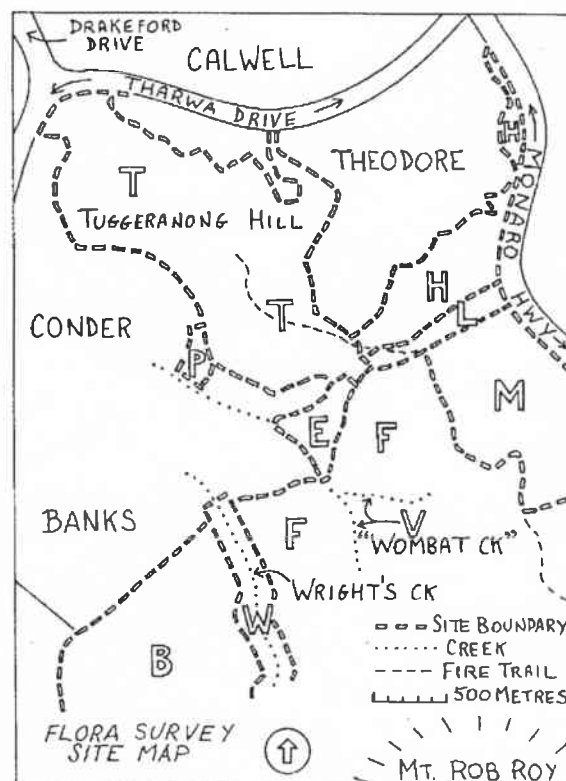
Among the sometimes rugged hills there were the delights of many new discoveries, of plants I had never seen before, and my native plant list for the area stretched out to over 250. As part of the process I tried to get photographs of all species and so far I'm only a few short of this.

The area is predominantly grassy woodland, with some large open grassy areas and secondary grassland. (A secondary grassland is one created by removing the trees from a grassy woodland.)

The large size of most sites means there is a variety of micro-ecosystems for each and thus the number of species found can be high.

A summary table is provided (next page at end of article), giving species numbers for each site. Sites vary in size from 8 to 200 hectares. The lowest number of different plants found was 138 on Theodore hills (H), and the highest was site F with 183. Of species recorded for the whole area, there are 72 which are regarded as significant (as per the article in the our newsletter for Jan-Feb.) Some of these are doing very well, but unfortunately, the majority are extremely thin on the ground, justifying their classification.

All orchid species are regarded as significant, being intolerant of grazing. Fifteen different orchids have been identified, most being present in very small numbers. Examples are the Hyacinth Orchid (*Dipodium punctatum*), of which I saw only 4 plants, Donkey Ears (*Diuris*



semilunulata), 2, and the Wax Lip Orchid (*Glossodia major*), just one, which doesn't come up every year! Exceptions are the Common Onion Orchid (*Microtis unifolia*), which is, true to its name, common, but is less highly regarded; Sun Orchids (*Thelymitra* spp.), which are shy flowering and secretive about their identity but are found irregularly; and the Tiger Orchid (*Diuris sulphurea*), which can be found in small numbers in several places. But the special find was a healthy population at one site of at least 100 plants of the rare Wedge Diuris Orchid (*Diuris dendrobioides*), with plants showing many shades of colour from very pale to rich purple.

In some places there are a lot of lilies and in others the native shrubs are making a comeback. Another rare plant which is easy to find is the *Fimbristylis dichotoma* (an attractive sedge of grassy ecosystems - see drawing in FOG's May/June 2001 newsletter). This occurs in good numbers on several sites, but especially in the Power Line reserve. On Tuggeranong Hill there is a modest but viable, and probably expanding population, of the uncommon Yellow Burr-daisy (*Calotis lappulacea*).

Wrights Creek, the site of our 'Conder Wander' last spring, is particularly good, so I kept it as a distinct site. In order to make a comparison, I did a few walks up 'Wombat Creek' (an unofficial name, justified by the population of this well known earth-moving mammal), and it is quite good too.

I will point out, however, that despite the diversity of native flora in the area, it is not pristine. For example, the top of Tuggeranong Hill is thick with thistles, and the Eaglemont site has a very severe infestation of the noxious weed St John's Wort. And up one of the gullies toward Mt Rob Roy I found a Marijuana plant, sitting in a pot, its owner having split the scene!

An interesting statistic is that so far close to 80 species have been recorded on *all* sites, which says something about the uniformity as well as the variety in a healthy grassy ecosystem.

With the good rains of early February, there was a flush of new growth, especially of the grasses. I revisited some places hoping to find something which wasn't obvious before, and updated previous population assessments. And there was the occasional new plant over which to ponder, with the help of my library, to work out a positive identification.

Some sites have been given more attention than others, and the data presented here is not meant for comparative analysis of the sites, but simply to show what a wonderful array of native flora is present in the area. The frequency with which I come across new species would indicate that there is still much more to find in the coming seasons. There is also a wealth of abundance beyond my walking distance closer to Mount Rob Roy, to be investigated by someone with longer (or younger) legs than mine.

Unlike Rainer Rehwinkel's 'Rapid Assessment Method', which has been mentioned before in this newsletter, my method could best be described as a 'Slow (or very slow) Assessment Method'. But for anyone who has a love of nature it is a very rewarding process.

SITE	T	H	L	F	W	B	M	V	P	E	Area total
Number of species	173	138	142	183	179	141	165	151	165	172	256
Number of significant species	40	21	31	34	37	22	41	23	43	45	72
Approx. size in hectares	200	50	16	150	30	100	100	20	8	16	690

THE GREAT SALINITY DEBATE: PART II -

Why the recharge-discharge model is fundamentally flawed

Christine Jones

(Christine Jones is Rangelands Officer, DLWC, PO Box 199a, Armidale NSW 2350 e-mail: cjones@dlwc.nsw.gov.au. These articles have also been printed in Holistic Management™ Australian Quarterly Newsletter, the Stipa Newsletter, The Australian Farm Journal, and Grass Clippings.)

The recharge-discharge model which has been used to describe the changes in water balance since European settlement is based on false assumptions concerning i) the nature of pre-European vegetation and ii) the way water moves in the landscape. The use of this flawed model as a basis for strategies to combat dryland salinity underpins the poor success rates achieved to date.

Native vegetation

We hear a lot about the clearing of native vegetation in relation to dryland salinity. Most people assume that the words "native vegetation" mean "trees and shrubs". Contrary to popular opinion, the historical record clearly shows that in the early years of European settlement many of the higher rainfall areas of temperate Australia were grassy woodlands, that is, widely spaced trees with a grassy understorey.

The explorers and early surveyors described the richness and diversity of this vision splendid, with grasses frequently up to their horses' bellies. Many of the hills were recorded as being grassed to their summits, having only thinly scattered trees, or being treeless. The descriptions of the grassy vegetation were remarkably similar across the temperate parts of eastern, southern and south-western Australia, and the comment was invariably made that, unlike many parts of America where clearing was a pre-requisite, here most of the land was immediately ready for grazing or the plough.

Early settlers could not have anticipated the rapid deterioration in the quality and diversity of groundcover and the decline in soil quality that accompanied European style grazing and cultivation. In parallel with the loss of grassland habitat was the extinction of 20 previously common species of small marsupials and the near extinction of a myriad of others. The significant role that these native fauna played in soil enhancement is not widely recognised. In combination with the cessation in aboriginal burning and soil disturbance regimes, the widespread loss of the thousands of small animals that loosened soil, buried organic matter and consumed emerging tree seedlings, produced massive changes to the ecology of the Australian landscape. So much so that today's "remnant vegetation" probably bears little resemblance to the plant communities in existence 200 years ago.

Europeans were caught unawares by the sudden explosion in the numbers of trees and shrubs which followed settlement. In 1848, Thomas Mitchell, Surveyor General for NSW, described *"thick forests of young trees, where, formerly, a man might gallop without impediment, and see whole miles before him"*. Observations of regrowth were reported many times thereafter by other observers across southern Australia. For example, Howitt (1890) described the tree regrowth in Victoria *"...After some years of occupation, whole tracts of country became covered with forests of young saplings...and at present time these have so much increased, and grown so much, that it is difficult to ride over parts which one can see by the few scattered old giants were at one time open grassy country"*. Subsequent generations found it necessary to clear this regrowth in order for agricultural activities to proceed.

The changes in the quality and quantity of the groundcover since European settlement

have had enormous implications for water balance in the Australian landscape. The diverse perennial grassland communities which proved so productive for early settlers could respond to rain at any time of the year. Furthermore, the soil organisms which proliferated in response to the high root biomass and the activities of the grassland fauna, produced humic materials and microbial gums which glued soil particles together, creating a crumb structure which resisted erosion. Soil microbes also produced plant growth hormones which stimulated root growth and enabled plant roots to penetrate clay subsoils. The many pore spaces in these healthy, living soils enabled them to hold large volumes of water.

The movement of water in the landscape

Dryland salinity is the result of a water cycle that is out of balance. The salt is an unwelcome fellow traveller with rising groundwater, and even though serious in its own right, salinity is merely an indicator of a more deep-seated problem. It is therefore extremely important that we look very carefully at what is happening at the landscape level, sooner rather than later.

In comparison with pre-European times, there is now LESS water entering **aquifers** in the HIGHER parts of the landscape (and hence LESS **fresh groundwater** available to feed springs and streams), MORE **runoff** and lateral **subsurface flow** on undulating country (which may be intercepted by dams and contour banks and may not necessarily reach rivers other than in periods of high rainfall) and MORE **recharge** to water tables in the LOWER parts of the landscape (Fig.1, Part B).

This is almost the opposite of the widely accepted recharge-discharge model on which most salinity "solutions" are based. The recharge-discharge model depicts MORE water entering deep drainage in the higher parts of the landscape with the removal of the original native vegetation, which is assumed to be trees, which in turn are assumed to be deep rooted. This excess water then apparently travels underground, collecting salt along the way, to emerge as discharge at the break of slope or in low-lying areas (Fig. 1, Part A). Although the model appears seductively simple, there are no biological or physical mechanisms by which these processes can occur at the landscape or regional scale.

"Recharge" in the upper catchment

Imagine that you're standing on the side of a

fairly steep hill in the pouring rain. The hillside is completely bare. Where does the water go? Straight down the side of the hill, taking soil with it. Not directly **into** the soil and into "deep drainage" as the recharge model tells us will happen if there are no trees. Any water that does infiltrate will also run downslope on top of the subsoil as lateral flow, under the force of gravity. If there are rocky outcrops, some water will seep through cracks, but this will only account for a small percentage. The remaining water has no mechanism for becoming recharge until it reaches the lower parts of the catchment.

Now imagine that there are trees on the hill, but no grasses or other groundcover. Where does the water go? Again, straight down the side of the hill, perhaps a little more slowly. If there's leaf litter, at least some of the rain will infiltrate, but it will then also travel as lateral flow unless the soil is high in organic matter.

Finally, imagine that the hill is covered with dense tussocky perennial grasses which have deep, fibrous root systems. The soil is well mulched and you can't see any bare ground. Where does the water go? The V-shaped grass architecture, in combination with high levels of organic matter both in soil and on the friable soil surface, will facilitate the rapid infiltration and storage of rain as it falls. The chance of water moving downslope will be significantly reduced. The water held in pore spaces between soil aggregates in the root zone will be available for later use by the grassland plants and the soil community of invertebrates and microorganisms.

A small amount will slowly percolate through the subsoil (or enter cracks in the parent material) and provide clear, filtered water for springs and streams. It is extremely important for future generations that this process continues. When the water runs on the top of the ground instead, or on top of the subsoil, we get into the all too familiar flood/drought cycle, with rivers carrying either too much or too little water, while freshwater aquifers are shrinking.

Recharge in the lower catchment

The conventional recharge-discharge model has provided landholders in the lower parts of the landscape with a scapegoat for their own inappropriate (although unintentional) land management practices. Where there are annual crops or pastures, or where

perennials are overgrazed, enormous amounts of water enter the groundwater below the break of slope. Despite this, the tendency has been to point the finger at others higher in the catchment and blame them for all the recharge.

Certainly, some water has travelled downslope, but the lower parts of the landscape normally account for the major portion of the total land area, as well as for most of the recharge if conventional cropping or conventional grazing are the major land uses. The fact that the eruptions of saline water are often at the break of slope doesn't necessarily mean that all of the water came from above – it simply means that the rising groundwater put backward pressure on any water moving downhill and there was nowhere else for it to go. This phenomenon can be demonstrated by placing a piezometer above the high water mark on the beach. As the tide comes in, the water level rises in the tube. If you were only observing the water level in the piezometer and couldn't "see" the tide coming in, it would be natural to assume that the water had moved downslope from the sand dunes behind.

In the lower parts of the landscape, fibrous-rooted perennial grasses and associated organic components will again hold most of the rainfall in the root zone, where it can increase the productivity of a wide range of enterprises. Remember, a pulsed grazed native pasture base will be more nutrient and water efficient than a high input introduced pasture and will complement, rather than compete with, pasture cropping, viticulture, horticulture or silviculture. If the main land use is grazing, a diversity of cool season (C3) and warm season (C4) perennial native grasses will provide year round productivity, stability and drought tolerance, provided the management is appropriate (refer Part I this series). A small amount of water will still go through to deep drainage, but that's what was happening 200 years ago.

Discharge

The rate of movement of water in underground aquifers depends on many factors, but in most situations takes between 300 and 1000 years to travel one kilometre. For water to travel 50 km underground could take up to 50,000 years. If you have saline discharge on your property, the chances are that recharge also took place there. The good news with respect to this local hydrology scenario is that landholders can have some control over their own destiny where dryland salinity and other land degradation processes are concerned.

In some places freshwater aquifers are drying up while saline water tables are expanding. How could those two things be happening at the same time? It can be explained quite easily if the recharge-discharge model is in fact upside down. The conventional model states that recharge occurs high in the catchment and discharge occurs lower down. The available evidence suggests that there is very little true recharge at the top (albeit too much lateral flow, which adds to the discharge at the bottom) and that **both** recharge and discharge are occurring in the lower parts of the landscape. Unfortunately this has resulted in some of the freshwater aquifers beginning to backfill from enlarging saline aquifers below.

The current situation

The recharge-discharge model as shown in Fig.1 (Part A) is being taught in schools across Australia today. A whole generation of children will grow up believing that it is their duty to plant trees in the upper parts of the landscape to "prevent recharge". Meanwhile, dryland salinity will continue unabated.

Furthermore, our children are being led to believe that all trees have deep tap roots, as depicted in salinity models. The tap root of the seedling tree degenerates over time, and although some fine roots may occasionally follow rock fissures, most mature trees of the species commonly found on hillsides do NOT have a tap root. More usually, up to 90% of the root mass is concentrated in the top 50 cm of the soil profile. Once the water has run off a hillside covered in trees, there is no way the trees can get it back.

The recognition of urban salinity as a mostly local hydrological phenomenon has clearly demonstrated that we don't need a fool on the hill, or even a hill, or even an agricultural landscape, to encounter water balance problems. In the urban context, dryland salinity results from the combined effects of activities such as watering shallow rooted lawns (all short grasses are shallow rooted) and rain falling on impermeable structures such as rooftops, paths, driveways and roads, and becoming runoff. That is, urban salinity is the result of excessive runoff added to excessive recharge *in situ*.

I fail to see much difference between this and the expression of dryland salinity in agricultural landscapes. Planting trees on a hill 20 km away will do little to resolve the problem in either the agricultural or the urban context. Trees and shrubs form an integral and ecologically valuable component of

grassy woodland vegetation and I am by no means dismissing their importance. My concern is with the promotion of broadscale tree planting (mostly same-age monocultures) as a panacea, not only for dryland salinity, but for all land degradation problems. In a healthy perennial grassland soil, there may be 50 tonnes of biomass (roots, soil organisms and humic materials) below ground for every tonne of biomass above ground. In forests, there is far more organic material above ground than below. The fact that we can only see the biomass above ground may explain the distorted image many people have of these respective plant communities.

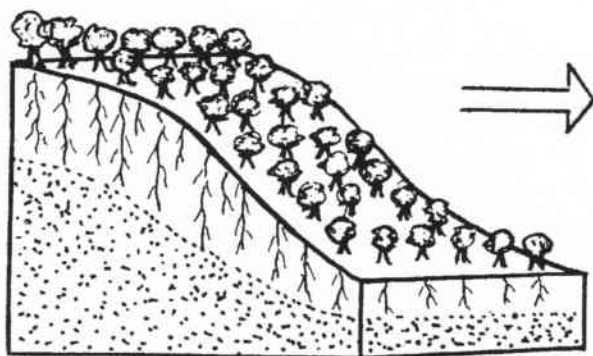
We certainly do have to mimic the native vegetation to restore hydrological balance, but let's get the facts right. The vegetation of the temperate zone was almost exclusively perennial 200 years ago, but Australia was not a forest. The majority of aboriginal people were not forest dwellers. Neither do we have to be. How many rural communities will be lost in this mad rush to return Australia to a land of trees we never had?

The aboriginal people lived in a diverse and dynamic grassy ecosystem. So can we. Grasslands produce more food than forests and the intuitive response would be to manage the landscape to favour grassland species. To refer to the pre-European vegetation as "natural" or "pristine" totally ignores thousands of years of prior habitation, exceptional observational skills and active management to achieve desired outcomes. Australia has been mismanaged for the last 200 years. Now it's crunch time.

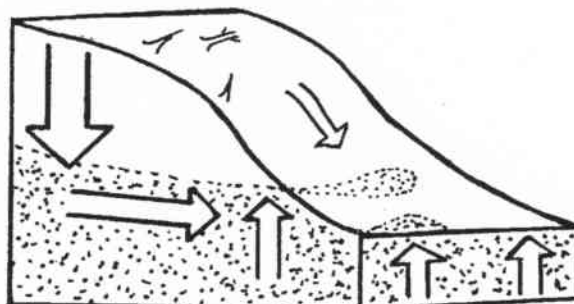
In our low and variable rainfall environment, the increasing reliance on high water use plants or engineering solutions to "dewater" soils makes neither ecological nor economic sense. We can restore water balance and improve soil health, nutrient cycling and productivity if current agricultural and horticultural activities are conducted in an appropriately managed perennial groundcover base. That's the topic for the next issue.

Acknowledgments

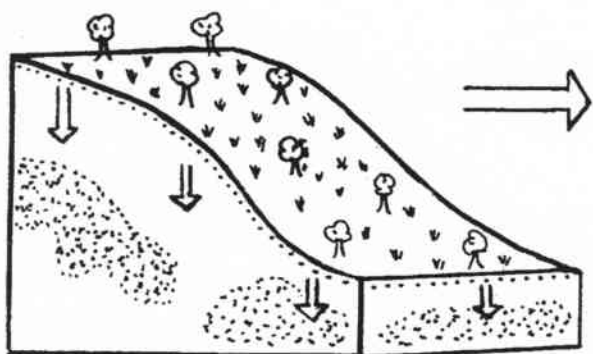
The compilation of this article would not have been possible without the vision, critical thinking, historical perspective and encouragement provided by many people. While all errors in interpretation are mine, I am particularly indebted to Allan Savory, Darryl Cluff, Greg Martin, Stephen Hailstone, Wal Whalley, Pam McGregor and Bruce and Suzie Ward.

FIGURE 1 A: the widely promoted recharge-discharge model**Prior to Settlement**

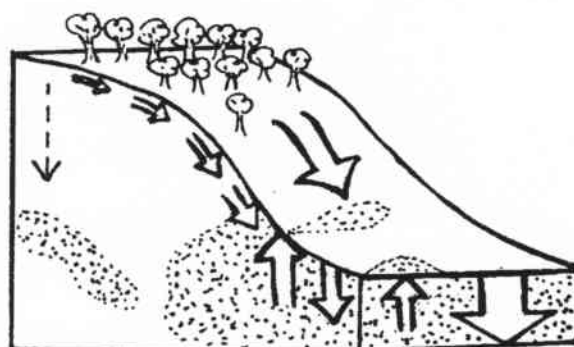
Deep rooted trees use large amounts of water and keep water table in balance.

Today

Tree removal results in water table recharge in upper catchment and discharge in lower catchment.

Figure 1 B: A more realistic model**Prior to Settlement**

Healthy perennial groundcover, fibrous root mass and associated humic materials HOLD water where it falls with some percolation to groundwater.

Today

Loss of healthy groundcover in both upper and lower catchments results in more runoff, lateral flow, recharge and discharge. Replenishment of elevated aquifers may be reduced.

Next time: Part III **Soil organic matter: past lessons for future learning**

EXTRACT FROM "CANBERRA: A NATION'S CAPITAL 1954"

(Edited by Harold L White, prepared for the Thirtieth Meeting of ANZAAS, 1954. Continuing the chapters written by Professor Lindsay Pryor.)

SCLEROPHYLL FOREST

It is convenient to separate the sclerophyll forest into dry and wet sclerophyll.

Dry Sclerophyll Forest

There is one alliance, *E. macrorrhyncha-E. rossii*. It reaches its best development on the Gourock Highlands, the larger ridges of the Canberra ridge and plain area, the Murrumbidgee fault scarp and the lower Cotter valley. It occurs, in general, at altitudes of from 2300 to 2900 feet. The forest seems to require damper conditions than the savannah woodland and temperatures similar to those

of the *E. melliodora-E. blakelyi* alliance; its absence from the south of the Territory is due apparently to the lower temperatures. Soil deficiency of some kind probably accounts for the distribution of the alliance within the climatic zone, which would otherwise be occupied by the savannah woodland.

The dominants rarely exceed 70 feet in height and form a closed canopy. The bole persists

to a greater relative height than in trees of the savannah woodland, and the crowns are much smaller and rather flat-topped or irregular. The influence of aspect on the distribution of the associations is very marked, *E. rossii* often occurring as an almost pure stand on exposed sites facing the north-west and giving way to *E. maculosa*, *E. cordieri* or *E. macrorrhyncha* where there is more shelter.

Tall shrubs, such as *Pomaderris sieberiana*, *Acacia falciformis* and *Exocarpus cupressiformis*, occur occasionally, but they seldom form a stratum. The small shrubs are abundantly developed in a more or less continuous layer about 3 feet high. There are many species, a large number of which have hard ericoid leaves. Some of the more common are *Brachyloma daphnoides*, *Pultenaea styphelioides*, *Leucopogon virgatus*, *L. biflorus*, *Leptospermum triloculare*, *Styphelia triflora*, *Hibbertia obtusifolia*, *Mirbelia pungens*, *Dillwynia ericifolia*, *Gompholobium huegelii*, *Grevillea lanigera*, *Hakea sericea*, *Acacia vomeriformis*, *A. buxifolia* and *Rovea heterophylla*.

Sometimes a few species grow a little above the general height of the small shrub stratum, tending to form another storey. These include *Acacia diffusa*, *A. lanigera* var. *venulosa*, *Daviesia corymbosa* and *Indigofera australis*.

In some places *Xanthorrhoea australis* forms an almost pure stratum about 4 feet high. When it is present other shrubs are very sparse. The grass *Danthonia pallida* alone is sometimes plentiful with *E. maculosa*; shrubby species are then much reduced.

The ground stratum is very sparse or entirely absent. Sometimes a few plants of *Poa*

caespitosa are found, and localized patches of *Dichondra repens* and *Hydrocotyle laxiflora* occur. In spring a number of orchids may appear on the otherwise bare ground - for example, *Diuris maculata*, *Glossodia major*, *Caladenia carnea*, *Calochilus robertsonii* and *Pterostylis* spp.

The community has been damaged by fire and in places by partial clearing, but on the whole it is much less altered than the savannah woodland.

Mention should be made here of the *E.*

The E. fastigata-E. viminalis Alliance

This alliance occurs on the mountain slopes of the two parallel western mountain ranges at elevations of between 2700 and 3800 feet. It is poorly represented southwards of Naas, disappearing as does the dry sclerophyll forest. There are few recording stations available in this area, but it is probable that the rainfall ranges from 35 to 45 inches per annum. The occurrence of the alliance at the northern end of the ranges indicates that it needs a higher temperature than is

experienced to the south, where it fails. The general coastal distribution of related communities also supports the view that temperature is important.

As in the dry sclerophyll forest (and even more markedly), the dominants differ according to aspect. They grow to about 140 feet and have butt diameters of up to 5 feet. The crowns form a closed canopy, and approximate the



Another victim of salinity as seen at Ive's property Talaheni, north of Hall. This FOG outing on April 29 looked at restoring vegetation, fighting water tables and salinity. This superb photo taken by Jean Geue.

cordieri association, which cannot easily be classified as either dry sclerophyll forest or savannah woodland. It is the chief representative of the alliance south of the Tidbinbilla valley and towards Naas, replacing the usual *E. macrorrhyncha*-*E. rossii* community, which apparently does not develop because the temperatures are too low. There is considerably more grass present than in the dry sclerophyll forest but less than in the savannah woodland, and conversely there are fewer of the small shrubs that are so typical of the dry sclerophyll forest.

Wet Sclerophyll Forest

There are two alliances readily separated by floristic and minor structural differences, namely, *E. fastigata*-*E. viminalis* and *E. gigantea*-*E. dairympleana*.

shape of the crowns in the dry sclerophyll forest. In the most highly developed community of this alliance, the *E. fastigata*-*E. viminalis* association, there is below the dominants a rather discontinuous stratum of *Acacia melanoxylon* about 60 feet high, below which again is a tall shrub stratum (20 to 30 feet high) of *Hedycarya angustifolia*, *Olearia argophylla*, *Prostanthera lasianthos*, *Bedfordia salicina* and *Pomaderris apetala*, in various proportions.

In wetter gullies this stratum dominates a tree-fern stratum about 6 feet high of *Dicksonia antarctica*, while *Blechnum* spp. often forms a dense ground cover. Where less damp tree-ferns are replaced by shrubs about 8 feet high of *Lomatia longifolia*, *Coprosma billardieri*, *Acacia rubida*, *Olearia lirata* and other species, while the

ground cover is a dense mat of *Poa caespitosa*, dotted with many isolated plants, such as *Viola hederacea*, *Geranium pilosum*, *Veronica calycina*, *Hydrocotyle hirta*, *Ranunculus* sp., *Brachycome* sp. and *Dichondra repens*.

This structure is somewhat modified in the drier associations, but tall shrubs of 20 feet, small shrubs of up to 6 feet and a more or less dense grass stratum are present, except in the very driest *E. dives*-*E. maculosa* association; there the ground cover is limited to a few plants of *Halorrhagis* sp., *Tetratheca ericifolia* and evenly distributed but sparse *Poa caespitosa*.

Most of these forests have been severely burnt in the past; in some places the dominants have been killed and in most the undergrowth is in an unstable condition. One marked effect of fire on the composition of the community is the reduction of *Acacia melanoxylon*, which is rather sensitive to fire. No doubt other species have been considerably reduced, while others again, such as bracken, *Acacia dealbata*, and *Cassinia aculeata*, have increased greatly in number.

The *E. gigantea*-*E. dalrympleana* Alliance

This extends from the northern to the southern boundary of the Territory on the western mountains, from the upper limits of the *E. fastigata*-*E. viminalis* alliance at about 3800 feet to about 5000 feet. The annual rainfall is from 40 to 50 inches and the alliance thrives in areas of low temperature. Snow falls every year and lies for some weeks.

The influence of aspect upon the distribution of the associations is again very marked. The dominants are mainly *E. gigantea*, *E. dalrympleana*, *E. pauciflora* (a mountain form rather different from the tree of the plains) and *E. dives*. The largest trees reach a height of about 140 feet and form a closed canopy.

The structure is a little less complex than in the *Fastigata*-*E. viminalis* alliance, and in only a few of the gullies bordering that alliance does a small tree stratum of *Acacia melanoxylon* appear. A continuous shrub stratum about 5 feet high is usually present, consisting often of one or two of the following in different places: *Persoonia rigida*, *Coprosma hirtella*, *Lomatia longifolia*, *Daviesia corymbosa*, *Acacia falciformis*, *Helichrysum stirlingii*, *Olearia myrsinoides*

and *O. megalophylla*. Fire influences the abundance and distribution in the stands of these shrubs at any particular time. They often



Above: Damage caused by BMX riders making a track at Conder 4A site (photo Michael Bedingfield) and Below: The keen workers fixing the damage. Good work folks! (photo Jean Geue)

dominate a layer of small shrubs about 2 feet high, chiefly *Bossiaea foliosa* and *Daviesia ulicina*; the hemicryptophyte *Veronica derwentia* is also common.

The ground stratum is a dense turf of *Poa caespitosa*, similar to that of the *E. fastigata*-*E. viminalis* alliance, the chief associated species being *Viola hederacea*, *Geranium pilosum*, *Ranunculus* sp., *Lomandra longifolia*, *Dianella tasmanica*, *Oreomyrrhis* sp., *Clematis aristata* (often a climber), *Brachycome* sp., *Lagenophora stipitata*, *Euphrasia brownii* var. *alpina* and *Pratia irrigua*. In the drier types of forest *Tetratheca ericifolia*, *Stylidium graminifolium*, *Halorrhagis tetragyna*, *Pimelea linifolia* and *Goodenia hederacea* are associated with *Poa*.

Damage to this alliance by fire is as extensive and severe as in the previous one.

NEXT TIME - The minor communities and Plant Communities following settlement

NEWSLETTERS RECEIVED

In the latest *Danthonia*, the Australian Network for Plant Conservation (ANPC) is seeking input and ideas about general topics and course content for some plant conservation master workshops they will be running soon. If you're interested, phone ANPC on 02-6250 9509 for more information.

The Native Grass Resources Group have a brief guideline for C3 species establishment, which lists steps and timing for growing these species from seed in the ground or in pots. *Native Grass South Australia* has a number of interesting articles, including one on the historical importance of native grasses, another on a project to map native grassland in the Southern Mount Lofty Ranges, and a third on a project (at Harrogate) using rotational grazing in native pastures. As well as Chilean needle grass (*Nassella neesiana*), Texan needle grass (*Nassella leucotricha*) and possibly another US needle grass (*Jarava plumosa*) are becoming problems in South Australia. The journal has some nice drawings comparing the seeds of these needle grasses with those of a couple of local spear grasses. Another article describes some research done at the University of Queensland on the effect of smoke

on germination of NSW native grasses. Of the twenty species studied, germination of eight was significantly increased by smoke (including *Poa labillardieri*, *Panicum effusum*, *Themeda triandra* and *Austrostipa scabra* subsp. *falcata*). Only six species studied had neither amount nor rate of germination affected by smoke, but the researchers weren't sure if this was due to lack of a smoke dormancy mechanism or to different triggers than were used in the study. The research suggests that smoke from grassland fires provides an important germination cue for a range of native grasses.

Don't forget that you can contact Margaret if you want to have a look at any of the newsletters discussed in this column.



FRIENDS OF GRASSLANDS INC*Supporting native grassy ecosystems***Address: PO Box 987, Civic Square ACT 2608**Web address: http://www.geocities.com/fog_act**Your committee:**

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**FRIENDS OF GRASSLANDS
NEWSLETTER**

You have read this far, so we must have kept your interest. If you are not a member of Friends of Grasslands why not subscribe to the newsletter? It comes out six times a year and contains a lot of information on native grassland issues.

You can get the newsletter by joining Friends of Grasslands. You do not need to be an active member - some who join often have many commitments and only wish to receive the newsletter.

However, if you own or lease a property, are a member of a landcare group, or actively interested in grassland conservation or revegetation, we hope we have something to offer you. We may assist by visiting sites

and identifying native species and harmful weeds. We can suggest conservation and revegetation goals as well as management options, help document the site, and sometimes support applications for assistance, etc.

Of course you may wish to increase your own understanding of grasslands, plant identification, etc. and so take a more active interest in our activities. Most activities are free and we also try to arrange transport (or car pool) to activities.

If you are already a member, why not encourage friends to join, or make a gift of membership to someone else? We will also send a complimentary newsletter to anyone who wants to know more about us.

**HOW TO JOIN
FRIENDS OF GRASSLANDS**

Send us details of your name, address, telephone, fax, and e-mail, etc. You might also indicate your interests in grassland issues. Membership is \$20 for an individual or family; \$5 for students, unemployed or pensioners; and \$50 for corporations or organisations - the latter can request two newsletters be sent. Please make cheques payable to Friends of Grasslands Inc.

If you would like any further information about membership please contact Margaret Ning, or if you would like to discuss FOG issues contact Geoff Robertson. Contact details are given in the box above.

We look forward to hearing from you.

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