December 08

Grassy Groundcover Gazette

News, updates and on ground action

Paul's Piece

Greetings all!

Another year passes with more talk of this spring being the driest. You might remember me starting my last GG update bemoaning the lack of yet another autumn break. While this long dry spell of well below average rainfall across all our sites is something we have had to deal with in each of the nearly five years the GGRP, it certainly highlights the fact that our sowings have established and persisted under pretty extreme conditions, which is something few (me included) would have been prepared to predict up front.

I mentioned last edition that I was keen to try an autumn sowing (having conducted all up until this year in spring), and happily I am able to report on the progress of four of these that we carried out this year. Two of these sowings were in Gippsland; at Goon Nure (near Bairnsdale) and Boisdale Quarry (Andrew will presents a more detailed report of these sowings on pg 3) and one at Jo Western and Paul Killeen's Ravenswood property (near Bendigo) and Neville Oddie's Chepstowe property (past Ballarat).

We also sowed the first of up to 200 ha of grassy redgum woodland at our Pt Henry 'Moolapio' project this September (read Rod White's report on pg 4) and ran four very successful field-days in October at Werribee Open Range Zoo, Beeac, Laharum and Hamilton. There were a lot of very interested participants that attend each of these events to hear details of what has been happening at our sites and then go to at least one site for a visit to make up their own minds. I think it's fair to say that most of these very informed participants were encouraged to see how our direct seeding approach has established a number of grasslands that look very similar to many of the scattered remnants we are now struggling to conserve. My thanks go to Anna, Chris, Liz and Will and Proo for their wonderful assistance in make these days a reality.

Finally, I'd like to note that my colleague Jess Gardner has recently taken up a new and exciting job in the Philippines. Those involved with the GGRP will know what a lovely person and a dynamic worker Jess is. Jess oversaw activities at our western sites for three years and while it's great that others are going to gain from her talents, it's sad that she's no longer involved in the GGRP.

A bit of detail

I would like to talk about a few things I have noted at some of our sites - things that have been by-and-large happy surprises I think it would be fair to say. As mentioned above, in regard to the savage climatic conditions these sowings have endured these past four years, I am constantly impressed with the survival skills these native species exhibit.

Recently I was at one of our sowing sites near Minyip collecting data with the assistance of Rhonda La Brouque. At this site we have the two scrapes conducted in consecutive years side by side. Last year I remember looking at the 2006 scrape sowing after 12 months and thinking that while there were many of the things we sowed obvious as small plants, to look at; it seemed overrun by wild oats. Well this day we noted the 2007 sowing, and saw that after 12 months it also looked overrun with wild oats. But to my joy the 2006 sowing was fabulously clean (see picture of the two side by side). In fact it looked like a remarkably intact grassland remnant dominated by a native grass sward with a great many wild flower species within! It seems that after one year the oats had dropped right out, without any intervention on our part. Happy news indeed.

Wild Oats dominate last year's scrape sowing (tall yellow foliage in background), but are almost absent from 2006 scrape sowing (foreground).

On this business of scrapes, our Werribee Open Range Zoo site also produced something very interesting. Unlike most of our soil scrapes, which were cleaner than 2006 sowings onto ground that had received two years of herbicide weed control, the 2006 scrape sowing was very weedy after 12 months, with a whole range of weedy species. After looking at our soil test results it became clear that at this site had very high phosphorus levels (Colwell 70) and the 100 mm scrape was still in a zone with high P (Colwell 50). So we decide to scrape to a depth of 250 mm for our 2007 sowing. The difference when comparing weed loads at 12 months was dramatic. The area sown into the second 250 mm scrape was at 12 months much freer of weed competition (see pictures), highlighting the importance of nutrient limitation to weed competition (see Lisa's report p6 for some more detail).

View of 2007 scrape area and the bare ground between emergent native plants

I mentioned previously that we undertook a series of autumn sowings. I was very interested to see if this resulted in early germination and establishment as much grassland restoration theory predicted. At each of the sites there was effectively no emergence recorded until September (at one site there is still nothing emerged). Happily, those three where emergence has commenced look like developing well, however if Autumn sowings do not enable early establishment, perhaps spring sowings are more effective in that they allow for a period for winter weed control and still seem to supply conditions that result successful germination and emergence.

To wrap up, I'll talk about how things can 'jump ahead quickly' or 'take their time'... Our sowing site near Moyston is in very hard 'Gold Digging' country. The site itself was very weed dominated unlike many of our other sites that had been cropped or pasture. Our 2006 sowing seemed to have struggled with both harsh conditions and very high grazing levels from rabbits and wallabies. Imagine my surprise, when I arrived there recently with my colleague John Delpratt, to find a dense sward of wallaby grass covering the site.

John Delpratt standing up dense native grass sward.

Even on the unscraped area the capeweed which had covered the paddock had died off leaving only the native grasses. This is a great outcome and justifies the fantastic input that Marlene Shumann and her crew contributed to getting seed for this site. The second great leap forward was at David Franklin's property near Chatsworth. We've been happy with past sowings at David's but were very concerned that our 2007 sowing on a scrape had been severely compromised by high winds 'sand blasting' emerging seedlings. When I viewed this area last month I was greeted by a wonderful and rich sward of stipas and danthonia with forbs establishing within tussocks. The pictures I've included shows the incredible growth this area put on in the past few months.

Sward of native grasses (dominated by suite of wallaby grasses) covers our Moyston site at David Hermans. Among the grasses are a large number of forbs, many

common everlasting. These have been heavily grazed by rabbits and wallabies.

David Franklins 2007 scrape sowing in August and Nov this year.

As those of you who know me realize, I could go on about each site all day, but for sanities sake I'm going to call a halt. We have some very interesting contributions from others involved in the GGRP which will hopefully highlight the exciting GGRP things that continue to happen at our original and new and sites. So until next edition …

Cheers, Paul GR

Gippsland field day

On Monday the 24th of November a native grassland restoration field day was held in Maffra. It was pretty obvious that there is some keen interest in Gippsland as the day was well attended by the CMA, landcare, the local shire, local land holders, seed collectors and nurserymen.

The day started with an animated presentation from Paul Gibson-Roy who sparked everyone's interest with a method of revegetation that has not previously been seen on the Gippsland plains. We then went to have a look at a seed production area at the back of the Greening Australia office in Maffra in which many species were ripening up nicely (as happens at this time of year in native grasslands) and as a result many people came out with stipa and sheep's burr clinging to them! Lastly we went out to have a look at a site we had sown six months earlier at Boisdale where a lovely crop of diverse native grasses was coming up in an ex quarry site where previously even weeds wouldn't grow!

Native grassland enthusiasts at the seed production area at Maffra

I think the day helped people understand just how important the grass and forb layer is in vegetation communities and inspired many people in the Gippsland region to look further at the revegetation using grassland species. With the impending round of funding approaching it is a good time to start thinking about how this project can evolve. So if you have any ideas for projects in Gippsland that you would like to try, give me a call!

Andrew Wolstenholme

Ph: 03 5147 2688 or 0428 360 674

From little things big things grow …in Beeac!

There is nothing like seeing a project grow from what seemed the impossible, to the possible.

This is exactly what the 30 participants who attended the '*Grasslands Restoration Four Years On'* workshop held in Beeac in early October 2008 had the opportunity to do. The day had two major draw cards - Pauls natural enthusiasm, energy and fantastic knowledge of grasslands and their restoration and secondly, the small but yet still brilliant floristic display of grassland plants themselves.

On the day the whole story was told – from sourcing the seed, site selection, seed sowing, weed management, people management as well as machinery management - you can still see the bog marks in the field … not to mention all the many learnings that there have been along the way.

It's only when you look back on a project from the initial open paddock, to now, where you can see for yourself a species rich grassland in the making – that you realise, what an achievement! But it's the feedback from participants on the day speaks for itself:

"All information provided is new to me and helps understand relevant issues about the environment and land qualities"

"Looked at alternatives that I've not considered."

"Should be more workshops like this."

Congrats to all those involved in the project and those involved in the workshop – making it happen and participating!

Chris Gartlan

Grassland establishment at Moolapio

G'day for the first time from Moolapio (Point Henry, Geelong),

For those of you that are not aware of what is going on out this way, GA has teamed up with Alcoa to manage 520 hectares of land owned by Alcoa of Australia at Point Henry on the outskirts of Geelong.

A significant part of this exciting project is to re-establish close to 200 hectares of Basalt Plains Grassland, on what is currently cropping land.

After a successful seed collecting season last summer we managed to sow 3.9 hectares in September of this year. Of this, 1.6h was scraped to a depth of 100mm (determined by a 6 month scrape trial leading up to site preparation) and sown with a mixture of forbs and grasses, while 2.3h was not scraped and sown only with grasses. As well as this we sowed grasses between a row of a recently direct-seeded shelter belt in order to monitor the effect this has on weed control between rows.

Mixing the seed

Loading the hopper

And we're off!

This brings us to the present, 11 weeks after sowing. As yet nothing appears to have come up in the Grassland Establishment area. Despite this, weeds are under control and the soil is holding together rather nicely, so with a bit more of the wet stuff from the sky, we have our fingers crossed! The row sown with grasses in the new shelter belt, where the site is more sheltered and appears to hold a bit more moisture, is more promising with numerous Stipa species appearing.

Paul's EXCITED(!) after sowing

Now, with the onset of the seed collecting season, it's all happening again. Early signs are good with lots of Stipa out there, as well as Danthonia and forbs, and hopefully a bit of Themeda a bit later on. The bandicoot has already had the cobwebs blown off well and truly, with a pretty successful trip to some tasty roadside remnants early this week collecting Stipa (close to 7 full Wool Bales!).

2008 Stipa season looking promising

Hopefully we get enough seed to sow another 4 hectares in Spring '09, which will really set us up to achieve our ambitious goal of at least 12 hectares by the end of our first 3 years here at Moolapio.

Rod White

In need of some good news

Those of us in South west Victoria who are interested in native grasslands were desperately in need of a good news story after the destruction of large areas of significant remnant grasslands at several sites in our region this year so almost 30 of us turned up to listen to

Paul and to visit the Hamilton site in mid October. Paul's reputation for putting on a good show is growing so along with the die-hards like myself who have been interested in the GGRP for a few years there were a number of new faces from rural properties, local and other government agencies.

We were not disappointed the data and photos from the different sites was interesting, heartening and to some of us very surprising. Despite the specific difficulties that each site presents very few problems seem to be insurmountable and in the most difficult sites and inhospitable environments there were obviously great successes with grasses and wildflowers flourishing.

The advantages of establishing seed production sites with controlled environments using local provenance seed was made clear when Paul detailed the amount of genetically appropriate seed that was produced at various sites despite the dry seasons, compared with the difficulty and potential negative environmental impacts of ongoing collecting from the wild.

Paul has an inspiring way of telling even the unpleasant facts in a way that does not offend and he looks for the positives from mistakes. This was highlighted when he spoke of an unfortunate and serious mishap at the Hamilton site where through human error a section of the experimental site was sprayed with herbicide and killed.

Paul used this event to highlight the enormous commitment that the landholders involved with GGRP have made and that despite the great advances in knowledge and techniques for establishing native grasslands that have been made by the GGRP project grassland re establishment is still a very costly business.

The site visit was just as inspiring as the lecture room presentation with a number of the wildflowers such as the rare *Leucochrysum albicans* (Hoary sun ray), *Chrysocephalum apiculatum* (Common everlasting) and *Bulbine bulbosa* (Bulbine Lily) in flower. This site had previously been an experimental clover growing site and much of this species remained obvious but many native grasses were evident. Although most native grasses were fairly short it was clear that there were high establishment rates and some such as the *Austrostipa* sp (Spear grasses) were in flower. The site that had been sprayed had been resown and the establishment rate of grasses and wild flowers was high.

Chrysocephalum apiculatum and Leucochrysum albicans sown Spring07 in Hamilton

I have had opportunities to visit this site fairly frequently and the changes that I notice at each visit are significant. I was there again on Dec 9th and was astounded at the changes during the last two months. The area was covered with tall, lush looking native grasses, mostly *Austrodanthonia* species with fewer numbers of Austrostipa species and *Themeda triandra*. Wildflowers such as *Wahlenbergia* sp. and *Chrysocephalum apiculatum* provided a colourful understorey and species such as the *Bulbine bulbosa* and *Leucochrysum albicans* had set and were shedding seed.

This site is on government owned Research Station land and therefore has the potential to be of ongoing value to the community for research and education as well as providing genetically appropriate and diverse seed of native grassland species for this region.

We hope that the GGRP project will continue for years to come and opportunities to monitor and if necessary manage this site will continue.

Liz Fenton

Patience is a virtue

Andrew Wolstenholme

At the start of May this year we sowed two sites in Gippsland. One was an improved pasture with lots of annual rye grass (at Goon Nure) and the other was and ex quarry site that looked like a moon scrape where not even the weeds would grow (at Boisdale).

As the months after we sowed wore on and we hadn't had any rain I started to become very worried. What would happen to the seed if there was no rain? Especially the diverse mix of native daisy seed that we had put in which I was afraid wasn't viable over longer periods of time. Then there was strong wind which not only further dried the sites out but because there had been no rain and little germination there was nothing holding the soil together and so the sandy soil at Goon Nure started to blow away and I was worried the seed would blow away with it. I even tried using a water truck to wet it down which had minimal impact. Meanwhile the Boisdale site had very little evidence of germination.

By the end of August we had still not had any rain but the ground at Goon Nure had been locked down with Rye grass with the occasional wallaby grass coming through, but you know it is dry when even the cape weed struggles. At least it wasn't blowing away now. In November we went out to have a look at both the sites again. Wow! What a transformation! We still had had very little rain (besides on the weekend just before we went to have a look) but the difference was staggering.

At Goon Nure where we had scraped there were clustered everlastings and native flax coming up by the score as well as a diverse range of native grasses.

They might be small but a large number of forbs and grasses have established on the scraped area

In the area we didn't scrape there was a sea of wallaby grass (still with Rye growing through it), but as Paul said, the game was definitely on! At Boisdale there was a great coverage of a diverse range of grass species and with a bit of imagination you sense that it will look magnificent in a year or so after everything has established. So it seems that with grassland restoration patience is definitely a virtue.

A good crop of native grasses coming through at Boisdale

The Werribee Zoo Site:

Impact of two different soil-scrape depths on weed and indigenous plant emergence.

Hi all. Paul and I thought you might appreciate an update on some work that we have been doing at the Werribee Zoo site over the last couple of months. My name is Lisa Rasmussen and I have just finished a short research project with Paul, as part of a Masters of the Environment at Melbourne Uni.

As you may recall, the Werribee Zoo site has had the highest levels of phosphorus and nitrogen of all thirteen sites with a very high weed load. There has always been concern that the initial 100mm scrape done in 2006 might not have been deep enough to adequately deal with these problems. To help determine the best way to approach sites like this with such high nutrient and weed loads, a deeper 250 mm scrape was conducted in 2007 so that findings at both sites could be compared at a later date.

Over recent months we have compared twelve-month data from these two sites (percentage vegetation cover, biomass and vegetative count data from 8 random 1 m^2 plots at both scrape sites), to determine the impact of the deeper scrape on both native and weed emergence

Results

34 species were sown at the 100 mm scrape in 2006 and 28 species were sown at the 250 mm scrape site in 2007. 64% of species sown (18 species) were present at the 250 mm scrape site and 56% of species sown (19

species) were present at the 100mm site at 12 months. The most commonly identified species at the two different scrapes are listed in Table 1. Mean number of species at any 1 m^2 plot was 9 at the 100 mm scrape and 11.6 at the 250 mm scrape. This difference was not statistically significant.

Species at 100 mm scrape	Total *	Species at 250 mm scrape	Total *
Austrodanthonia sp	*25*	*Austrodanthonia sp*	*36*
Oxalis perennans	*16*	*Linum marginale*	*21*
Calacephalus sp.	*14*	*Bulbine bulbosa*	*12*
Vittadenia cuneata	*9*	*Austrostipa sp.*	*6*
Chloris truncata	*5*	*Themeda triandra*	*5*
Austrostipa sp.	*3*	*Ptilotis spathulatus*	*4*

Table 1: *Top 5 species most commonly identified across 8 plots at the 100mm and the 250 scrape sites at Werribee. (* no. of species over 8 plots)*

Werribee Zoo GGRP site: 100mm scrape site at 24 months (L) 250mm scrape site at 12 months(R) (Photograph taken 16/8/08

Biomass

Figure 1 below shows the mean total biomass of sown grasses and forbs and non-sown grasses and forbs at the 2 different scrape-depth sites (100 mm and 250 mm. A one-way ANOVA analysis found a statistically significant difference in the percentage biomass of non-sown forbs at the two different scrape depths with a far greater weed burden at the shallower scrape (p=0.001 and r2=56).

Whilst total biomass of sown grasses and forbs was greater at the deeper scrape and the biomass of non-sown grasses was less, these differences were not statistically significant.

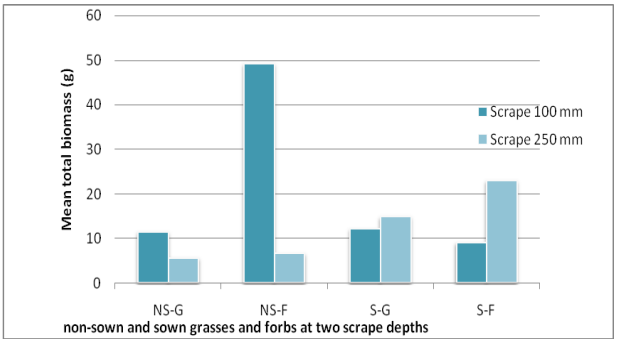


Figure 1: *12 month mean total biomass of sown grasses and forbs and non-sown grasses and forbs at 100 mm and 250 mm scrape depths at Werribee Zoo (GGRP site)*

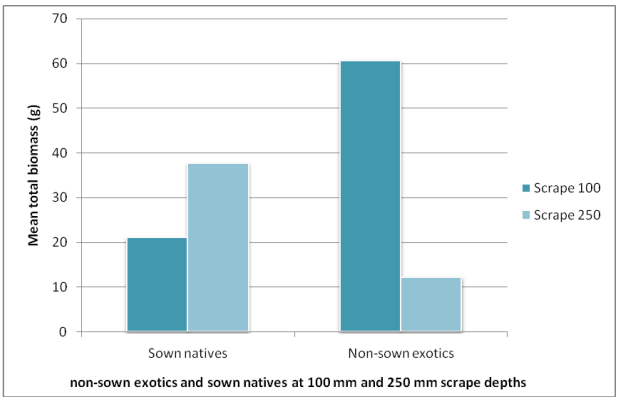


Figure 2*: 12 month mean total biomass of sown natives and non-sown natives at 100 mm and 250 mm scrape sites at Werribee Zoo (GGRP site)*

Percentage Vegetative Cover

At the 250 mm scrape site, the percentage cover from weeds was significantly less (p=0.01). There was also a corresponding greater percentage vegetative cover contribution from sown forbs and grasses, which on a one-way ANOVA analysis showed a trend towards significance (p=0.08). Whilst the percentage cover of bare earth was greater at the 250 mm scrape site, the difference was not significant.

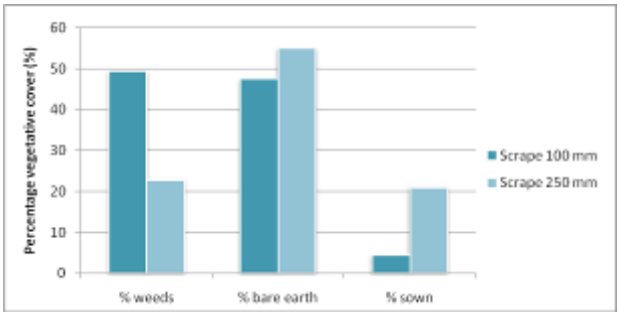


Figure 5: *Percentage vegetative cover at 12 months at 100 mm and 250 mm scrape sites at Werribee Zoo (GGRP site)*

The following photos demonstrate the significantly reduced weed load with a large percentage of bare earth at the 250 mm scrape site, allowing room for further recruitment.

Photographs of 250 mm scrape site at 12 months (27/10/08)

Discussion

Before discussing results, it is important to note two key limitations. Data for the different sites was gathered by two people with different levels of experience. This means a certain level of operator difference in the data will be present. Also, due to timing constraints, the 250 mm scrape site data was collected 11 months after sowing and the 100 mm scrape site data was collected nearer to thirteen months after sowing. This means that there was almost a two-month difference between collection dates which would certainly have affected results, particularly given that the 250 mm scrape data was collected in late August as opposed to October, hence missing significant spring growth.

It is also important to appreciate that twelve-month data can only present a very early and small part of the overall picture. These sites need to be reviewed for several years to properly assess the outcome of different scrape depths on species establishment and species diversity.

Overseas studies have found that different scrape depths (70-400 mm) have been required at different sites, depending on the history of land-use, in order to adequately remove the weed seed bank at that site and return nutrient levels closer to undisturbed levels. Choosing 250 mm was somewhat arbitrary and was partly governed by what was technically possible at the site.

Of all thirteen sites in the GGRP, the most successful sites to date have had low phosphorus levels (levels closer to 15 mg/kg), whilst the least successful sites have correlated with high phosphorus levels. Of all the sites, Werribee had the highest phosphorus levels (77 mg/kg) prior to any scraping. A 70 mm scrape reduced levels to 49 mg/kg, still way above desired levels for the successful establishment diverse grasslands. Similarly, Nitrogen levels are negatively correlated with increases in species diversity. Increases in soil nitrogen lead to dramatic changes in grassland species richness from diverse communities to monocultures. Given time and resource limitations, this study was not able to measure nitrogen and phosphorus levels at the two scrape sites. Further work is required to determine if the 250 mm scrape was in fact sufficient to bring phosphorus and nitrogen levels to desired levels.

The key finding from this small project was that at twelve months, there was a statistically significant difference in both the non-sown forb biomass and the weed percentage cover, with a greatly reduced weed load at the 250 mm scrape site compared to the shallower 100 mm scrape site. At the 250 mm site, it is worth noting that average counts of non-sown forbs were actually

higher that at the 100 mm scrape (107.3 versus 89.5). Whilst these weeds were very small (<1 cm in height) and barely contributed to biomass, it is particularly important that counts, biomass and percentage cover continue to be measured on a yearly basis, in order to follow what happens to the balance of exotics versus sown grasses and forbs over time. Second and third year results from scrapes at other GGRP sites are extremely positive. It would appear that overall, in the context of reduced nutrient load, a pattern is emerging in that by the second and third year, exotic counts drop off dramatically, with sown grasses and forbs becoming well established and with significant recruitment after the first year into available gaps (Gibson-Roy, personal communication, 19/11/08)

Both scrapes found similar levels of plant emergence. 56% of species initially sown were present at twelve months at the 100 mm scrape site and 64% at the 250 mm scrape site. Several species were present in the mix in very low numbers at both sites and may not have germinated simply because of low numbers sown. This would help explain these rates to some extent.

These twelve-month results are encouraging with respect to achieving successful large-scale grassland restoration at sites with high nutrient and weed loads. The results from the 250 mm scrape indicate that the deeper scrape can certainly significantly reduce weed load at these sites and is also suggestive that the deeper scrape enables higher levels of sown native emergence. Further studies will be required to properly assess reductions in phosphorus and nitrogen with a deeper scrape and to continue to track both native grass and forb establishment and recruitment and weed load levels over time.

Lisa Rasmussen

Exporting Expertise to GAQ

In the first week of November I accompanied the native grass seeder up to Brisbane as part of an ambitious seeding program GAQ are undertaking to revegetate hundreds of hectares of land made bare as part of a new network of water pipes installed to distribute recycled water around south-east Queensland.

The first day was spent conducting site visits to determine the areas appropriate for the Seeding machine, taking into account both slope as well as soil type/condition.

After an initial delay in the arrival of the machine, we organised delivery to the first site where the tractor was waiting. Following a bit of messing about fitting the machine to the tractor we were ready to get some trial seeding underway. Initially we were going through far too much seed due to a great bulk of it being clean, so we had to up the amount of sand in the mix substantially, eventually reaching a point where the desired amount of 30kgs of seed/hectare was consistently being sown.

At this point my job was done, as little as it was, and I headed back down south.

The feedback I have received from GAQ is that the machine continues to exceed expectations, getting the job done in a timely fashion.

So yeah, a brief conversation at the Veg Futures conference in October with a member of the GAQ crew led to the situation where equipment and expertise has been shared between states. It's what we talk about as a national organization that we need to do more of, and hopefully it will continue into the future.

Really positive experience,

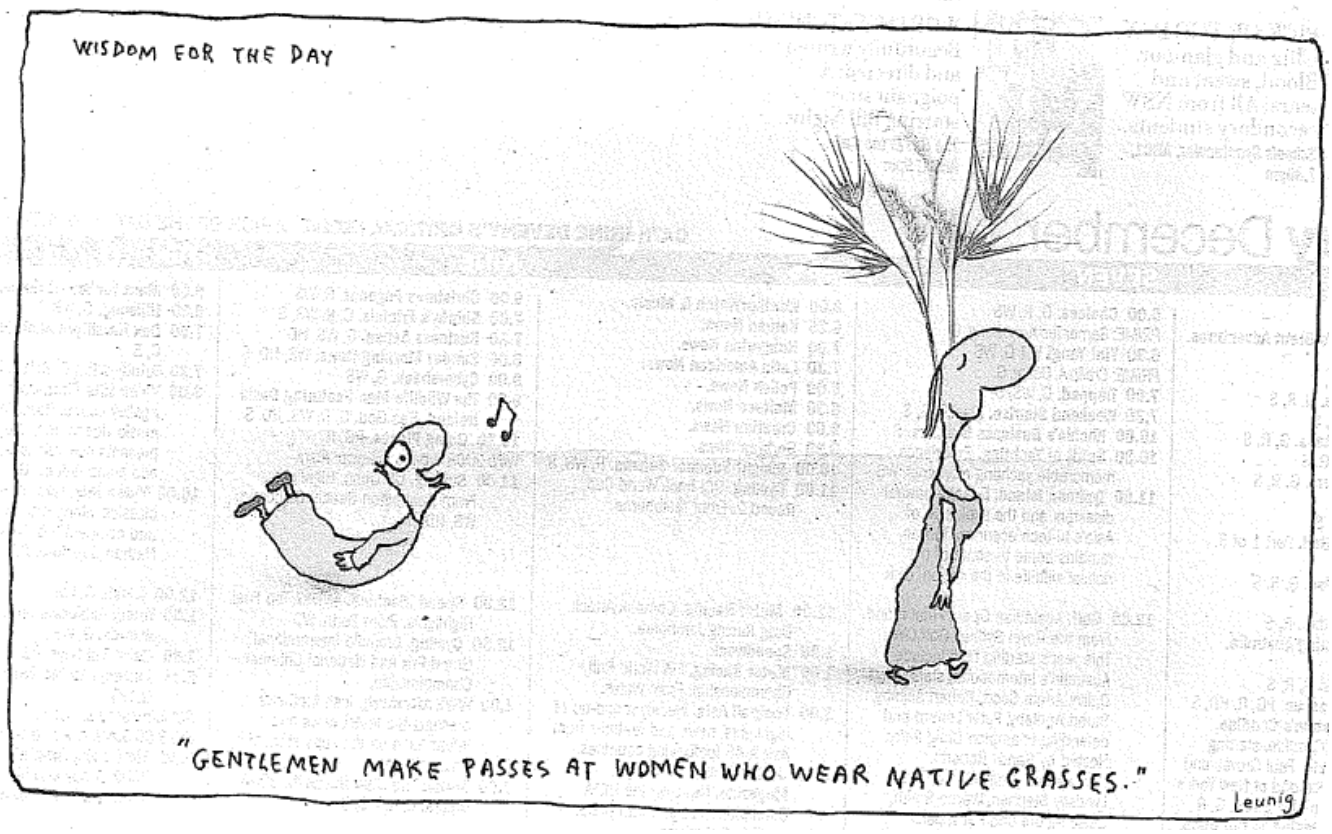
Cheers, Rod

Editors note:

Due to popular demand ... back issues of the Grassy Groundcover Gazette are now available on the website. www.greeningaustralia.org.au

The project is under 'our solutions, biodiversity'. Enjoy

Natalie Cook



Let's leave the last word to Leunig (The Age, Sat 13 December 2008). Thanks for all your great feedback and contributions to the GGGaz in 2008, and all the best to you and yours for a healthy, happy 2009. *Natalie*

Want to know more about the GGRP?

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