News of Friends of Grasslands

Supporting native grassy ecosystems

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March & April 2021

Events …

Sat 27 Mar 8am-noon,
FOG @ Lawson Markets.
Inquiries:
rainer.rehwinkel@hotmail.com

Thurs 15 April, 6.30-8pm
Online forum - Biodiversity Conservation Trust & conserving our grassy ecosystems with Donna Hazell
Register: geoff.robertson@fog.org.au

Franklin Grassland
March 3 & 24, April 7 & 28
Wednesdays 9-11am
Register: margaret.ning@fog.org.au

Hall Cemetery
6 & 21 March, 3 April
Saturdays 9-11am approx,
Register: john.fitzgerald@fog.org.au

TCCS Blue Gum Point.
21 March 9am-noon
Register: jamie.pittock@fog.org.au

Gurubang Dhaura Park
27 March 9am-noon.
Register: jamie.pittock@fog.org.au

Top Hut near Cooma, NSW
Sat 10 April Mar 9.30am start
Register: margaret.ning@fog.org.au

Yarramundi Reach
Sun 11 Apr, 9am-noon
Register jamie.pittock@fog.org.au

The latest updates are found on our website at Calendar
http://fog.org.au/

Welcome new members …

Frances Sainsbury, ACT
Robyn Black, ACT
Stephanie Knox, NSW
Paula Sutton, Act
Cherryl Fleming, NSW

From the President …

This is my last newsletter message as President of Friends of Grasslands. I decided in the second half of 2019, maybe earlier, that I would not run for president at the 2021 AGM. Hence I have worked purposefully to ensure that FOG continues with a

- clear vision of what our long term objectives for grassy ecosystems are, so that they become commonplace in our landscapes, open spaces and roadsides, and in our countryside, city and home gardens;
- a strong commitment to undertake whatever it takes to make people aware of, appreciate and treasure our grassy ecosystems, and nature more generally;
- a strong sense of self worth and a can do attitude;
- a well coordinated, open and friendly organisation where everyone is welcome and can find a niche;
- a willingness to be courageous and to challenge structures when they need to change; and
- an openness to our first nation's people and a willingness to absorb their knowledge and values as part of our journey to restore our ecosystems.

I am pleased that we have a strong committee and a system of governance that is the envy of many; a strong advocacy platform; a fantastic range of on-ground projects; a strong range of communications products, grassy books for sale, and an open inquiry line; our grassy grants program - a small investment reaping rich rewards; our program of highly informative forums and a strong network of sites to visit; and a strong membership base of highly respected, open and generous people learning from country.

While people are always a little anxious about volunteering, may I say that from my experience, volunteering is highly rewarding, a way to learn new skills and gain a strong sense of self-worth. So if you are thinking of getting a little more involved, please do.


Jamie Pittock and some of his FOG team of seed harvesters - see Seeding @ Gurubang on p.10

I shall still retain a number of functions for now, but my hope is to bow out in the medium term. I have been breaking up the tasks in which I am involved and sharing them.

So finally, I wish to thank you all for your enthusiasm, leadership, honesty, tolerance, criticisms, love of nature and learning, foibles, and most of all friendship.

Geoff Robertson

Advocacy Report

Naarilla Hirsch

January

Queanbeyan-Palerang Regional Council released an amendment to the South Jerrabomberra Development Control Plan for comment. FOG's submission raised concerns about the very irregular boundary between areas of environmental constraints urban development and the increased likelihood of impacts of the urban area on conservation values. As well, no mention was made of bushfire management zones – FOG's view is that any bushfire management zone should be included in the development footprint and not in any area of conservation or environmental value was reiterated.

The ACT government invited public comment on Draft variation no 379 to the Territory Plan. This was in relation to zoning Gungahlin rural block 820 and part of Old Well Station Road as Nature Reserve as the Kenny Environmental Offset Site from the Gungahlin Strategic Assessment. FOG strongly supported the rezoning of the area with a view to its planned gazettal as Kenny Nature Reserve. FOG also supported the views of the Conservator of Flora and Fauna that consideration should be given to extending the nature reserve overlay to blocks 739, 655, 821 and 822 to further protect the Striped Legless Lizard population in the area.

Towards the end of last year, FOG received feedback on its submission on the draft Franklin Grasslands Landscape Plan. We were advised that the Landscape Plan is a high-level document that is designed to capture the key existing and proposed features of the site. Some of our suggestions were accepted but many of our detailed suggestions won't be explored until the project reaches the detailed design phase and the Management Plan is developed.

Once the Final Landscape Plan is accepted, PCS will bid for a construction budget. After this is obtained, the detailed design phase will start. FOG will have the opportunity to provide further input at this stage.

February

The Commonwealth is considering changing the EPBC listing of the Golden Sun Moth from critically endangered to vulnerable, and asked for public comment on this. FOG presented a number of arguments for not doing so at this stage. While current numbers of GSM and their area of habitat do exceed the IUCN criteria for this listing category, FOG considers that more latitude is needed for insects (given that the criteria were developed for larger animals). Other concerns relate to the viability of the moth: populations are fragmented and mostly small, they vary from year to year and attempts at translocation have not yet proved successful. ACT population data was based on 2017 information but, as we know, since then we have lost the York Park population and there are other development proposals in train that will impact on our local populations. We are yet to see that the offsets being provided will lead to no net loss of the moth in the longer term. Nor has there been consideration of the cumulative impact of the ongoing developments which are or will impact on the moth. FOG's view was that more information is needed and that more work needs to be done to address these issues before the moth's status is downgraded.

The full text of these submissions appears on our website.

Donations to support FOG

FOG makes small grants to researchers, educators and on-ground projects, known as grassy ecosystem grants, a highly effective way to support grassy ecosystems. It also supports FOG's TSR project.

To support these projects, you can make a tax-deductible donation to FOG Public Fund by:

Direct debit: BSB 633 000, A/c 153493960 (Bendigo Bank).

Please include your name and advise our Treasurer treasurer@fog.org.au.

Cheque: payable to 'Friends of Grasslands Public Fund',
Mailed to Treasurer, Friends of Grasslands Inc., PO Box 440, Jamison Centre, ACT 2614.

Note: if you want your donation to go to the TSR project please indicate this when you make your donation.

A receipt for tax purposes will be sent to you. You may also include a donation when you complete your membership application/renewal form. *THANKS*

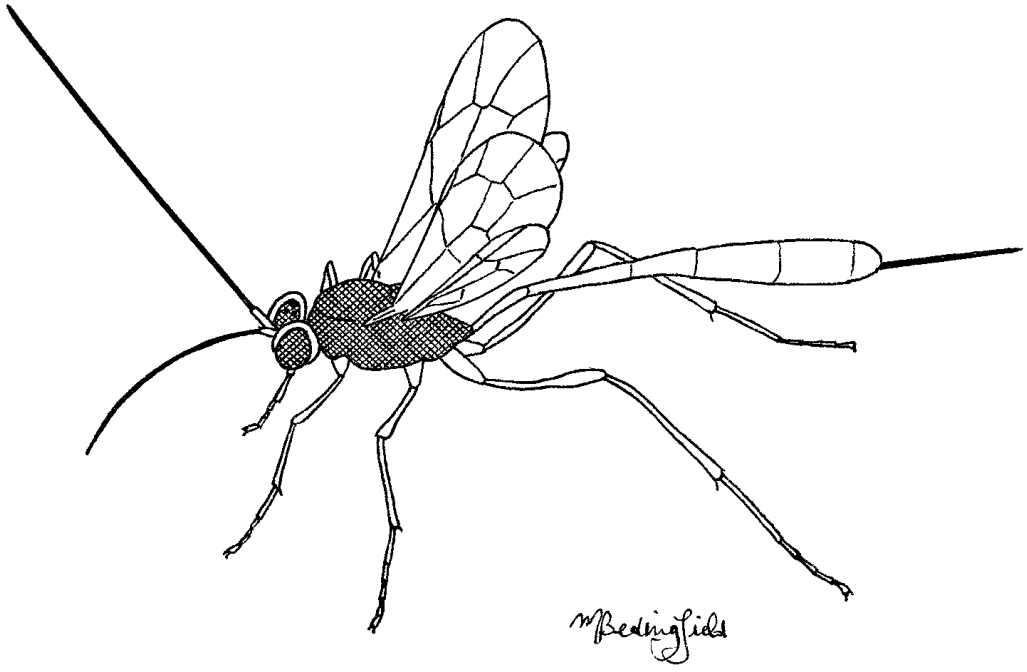
The Two-Toned Caterpillar Parasite Wasp and Symbiogenesis

Michael Bedingfield

The life cycle of the Two-toned caterpillar parasite wasp is complicated and involves using certain moths for larvae food and a symbiotic or mutually beneficial relationship with a virus. This wasp parasitizes the caterpillars of *Helicoverpa* species of moths that belong to family Noctuidae (owlet moths). One such moth is the Australian native budworm, *Helicoverpa punctigera*. Its larva feeds on a variety of plants but it is mainly known as an agricultural pest because it also feeds on agricultural and garden plants. When mature enough the caterpillar digs a small tunnel in the soil where it creates a small chamber and pupates. It survives the winter as a pupa underground, emerging as an adult in the spring to mate and create the new generation. The adult moth has plain colouring of white, grey or fawn. Those I have observed and photographed had a wingspan of about 3cm and came to my suburban home, apparently attracted to lights at night.

The Two-toned caterpillar parasite wasp is known by the scientific name of *Heteropelma scaposum* and belongs to the family Ichneumonidae. The common name derives from its colouring, it having a black head and thorax with the rest of the body being predominantly orange. The wings are clear and colourless. I have provided a drawing of the female adult wasp. It too came to my suburban home and was 10mm long in body length excluding the ovipositor. The female's ovipositor also acts as a stinger. As with all wasps, males don't have a stinger. Both the Two-toned caterpillar parasite wasp and Australian native budworm occur in the local region, and both have been recorded on Canberra Nature Map in the local grassy woodlands.

Wasps from the family Ichneumonidae have a symbiotic relationship with particular viruses. They parasitize insects from several groups, such as order Lepidoptera (moths and butterflies), usually attacking at the immature stages. The Two-toned caterpillar parasite wasp is a good example of a species from the Ichneumonid family. I mentioned this family in the newsletter article about beneficial viruses in nature in the November-December 2020 issue. I thought it was so interesting that I would go into more detail about it.



In simple terms, a virus has a core of nucleic acid, either RNA or DNA, which is surrounded by a protein coating. When it is outside the host cell it is called a virion. Viruses associated with the wasp family Ichneumonidae are called ichnoviruses.

The female Two-toned caterpillar parasite wasp uses the larvae of moths such as the Australian Native Budworm for food for her offspring. She pierces the body of the caterpillar with her ovipositor and lays one or more eggs inside the body of the caterpillar. At the same time she also deposits some of her symbiogenetic virions. Normally the caterpillar's natural immune system would create a capsule around such a foreign object and eventually kill the egg. But these virions, which only express wasp genes, act to prevent the defensive encapsulation process. The caterpillar continues to grow with the egg or eggs being dormant within its body. But much later, after the caterpillar has matured and has pupated in its underground cell, the wasp egg hatches. The wasp larva then begins to eat the host that soon dies. When the wasp larva has finished the available food and is fully-grown it then pupates within the caterpillar's pupal case. Later on the adult wasp emerges from the pupal case and makes its way from the underground chamber to the soil surface via the tunnel dug by the caterpillar.

Ichnoviruses are polydnaviruses ('poly-DNA') which means their genomes comprise many DNA segments. The amazing thing about these ichnoviruses is that they include some of the wasp's genes in their makeup. And similarly the wasps themselves have adopted from the virus some of the genes involved in viral replication and packaging. This partnership where there is a sort of merging of two entities and the sharing of genetic material is called symbiogenesis. The relationship between Ichneumonid wasps and ichnoviruses has developed over many millions of years. Braconid wasps from the Braconidae family have a similar contract with bracoviruses. They also parasitize larvae from several insect groups, but bracoviruses have a different origin to ichnoviruses and they are not related.

Viruses take over control of many of the chemical functions of a host organism's cells so that they can replicate and spread. Because of this they have a significant role in the evolution of the host's cellular chemistry and consequently the organism as a whole. The contribution of viruses to evolution on our planet is profound, but we still have much to learn.

References: http://web.gps.caltech.edu/classes/ge246/roossinck_natrev2011_goodvi.pdf
https://www.daf.qld.gov.au/__data/assets/pdf_file/0003/64677/Insect-Parasitoids-Natural-enemies-helicoverpa.pdf
https://www.daf.qld.gov.au/__data/assets/pdf_file/0005/72689/Insects-Helicoverpa-ecology-biology.pdf

Closeup - Enjoying La Niña

John Fitz Gerald

I'm sure we all know many plants in our grassy ecosystems thriving in a cool moist summer that is continuing well into 2021. Unfortunately this includes invasive species - African Lovegrass for example is a real worry having two favourable summers in a row. However, an upside is that many of the native *Eragrostis* species are also doing very well, *E. trachycarpa* and *E. parviflora* in particular in the ACT and region.

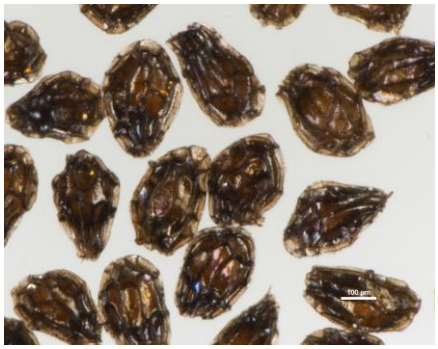
Therefore I've decided for this contribution and next to look close-up at a couple of thriving examples.

Pitcher-shaped black seeds of *Drosera hookeri*

My first choice is a native species which I noted in my ground-level closeup 4 months ago: *Drosera hookeri*. Then I was concentrating on rosettes of this annual or perennial tuberous plant that prefers damp places and seasons. These leaves of course went on to support flowering stems and then dry off above ground to become quite difficult to spot. I did gather some small black seeds and image them in my first micrograph. Seeds are cylindrical, roughly textured and have a narrow neck that flares out in a pitcher-like shape.

Rounded brown seeds of *Juncus bufonius*

Choice number two is another delicate species that has come up in huge numbers in many places - *Juncus bufonius*. Plantnet considers this species is "apparently a mix of naturalised and native forms" but, worldwide, that "no satisfactory taxonomic classification has been reached yet". Numbers this season are so large in places of low competition that it has almost grown as a dense and short 'lawn'; this is in some spots that were almost bare 12 months ago. This is an indication of a significant soil seedbank and a single plant can produce large numbers of tiny, brown, slightly translucent seeds - see picture 2.



Wrinkled dark seeds of *Orobanche minor*

My third choice is a somewhat larger plant, most definitely introduced, and considered a minor weed or pest: *Orobanche minor* or Lesser Broomrape. Unlike the first two, it does not necessarily need a wet place but seems to prefer some shade. It has germinated and flowered actively this summer and is now showing as brown dry flower spikes, dense in some patches of our natural areas. Soil seedbank again comes to mind and sure enough, each seed capsule splits to release a large number of tiny, wrinkled, dark seeds - see picture 3. Given our mini-forests of brown spikes, we won't be rid of this pest anytime soon!

I know some readers enjoy plant images alongside seed micrographs but, to save space, I'll leave you to dig for your own - I recommend Canberra Nature Map which has 10-100 photos of all 3 species. Micrographs were taken at the National Seed Bank of the Australian National Botanic Gardens. They can be reproduced freely if attributed and linked to the Creative Commons licence CC BY. The scale bars near the bottom of each image represent: Pic 1, 2 and 3 = 0.2, 0.1 and 0.1 millimetres, respectively.

Links: https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Juncus~bufonius
https://canberra.naturemapr.org
http://creativecommons.org.au/learn/licences/

Forecasting the spread and impact of exotic plant species

Kyle Hemming

Kyle is completing his PhD at University of Canberra on climatic, landscape, and human impacts shape the distributions of native and exotic plant species. This article gives an overview of the four chapters of his PhD. In 2018 he was a recipient of a FOG grassy ecosystem grant which contributed to materials for the experimental component of his PhD.

Chapter 1: Developing a method to forecast invasion.

Exotic plant species can have severe impacts on the ecosystems they invade. Forecasting the locations where exotic species can spread to can be used to identify high-risk areas for targeted monitoring and control efforts. A common means to identify high-risk areas is to build species distribution models. Such models estimate species' environmental tolerances by linking locations where they have been observed to local environmental conditions. These tolerances are then extrapolated across areas of the landscape to identify areas the species can invade.

The problem is, there are thousands of potential invaders and many areas in which they can invade, which is challenging to deal with given current species distribution modelling methods. The aim of my PhD was to develop a species distribution modelling method which could overcome this challenge.

Species richness is the number of different species in a particular area. I figured areas that support high native species richness might also be capable of supporting high exotic species richness. The idea being, if an area is suitable for high native richness but has only a few or no exotic species, it would be particularly vulnerable to being invaded.

I tested this idea using Australia's native and exotic grasses (*Poaceae* family), grouped into species with C3 and C4 photosynthetic pathways (Figure 1). C3 and C4 pathways respond differently to Australia's climate, so this provided me two groups to compare if native and exotic species were supported in similar numbers in the areas that exotic grasses have managed to invade.

This is indeed what I found. Both native and exotic C3 species richness was high in places particularly suitable for C3 grasses: cool, temperate regions of southern NSW, Victoria, and south western WA. But this also means there weren't many areas that were particularly vulnerable to further invasion. However, for the C4 grasses, much of central arid and tropical northern Australia have low or no exotic C4 richness but are highly suitable for C4 grasses, so the invasion potential in these regions is high.

Chapter II: Application to Australia

Since native richness appeared to work as a template for exotic invasion potential for the grasses, I hypothesized that native richness could forecast exotic species richness more generally, so I applied the same concept to a further 20 plant families. It worked for about a third of the families, again highlighting northern Australia as a hotspot of invasion potential. But there were many families for which it did not work, possibly because features other than climate and landscape are important factors for native richness. For example, many families had a native richness hotspot in the temperate southwest WA, but not in comparably temperate NSW or Victoria. Although the exotic species appear to be following this trend, I cannot (yet) say why.

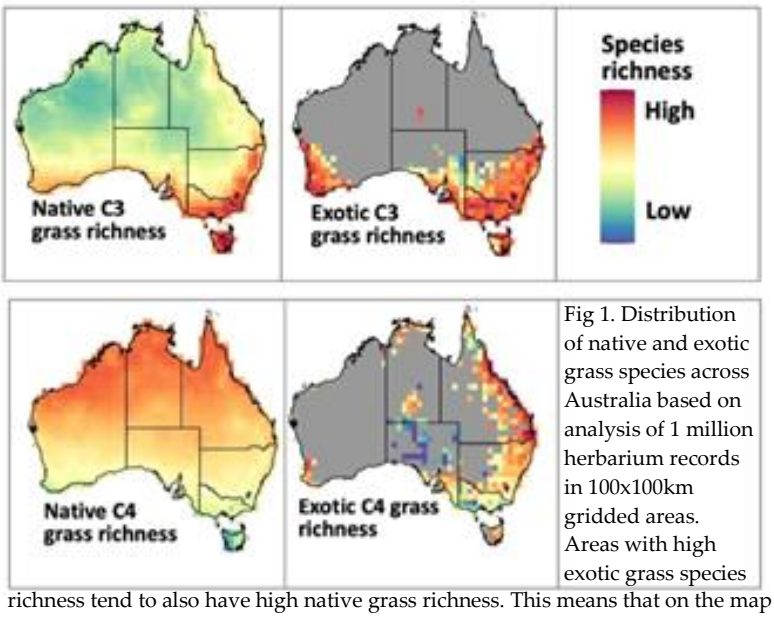


Fig 1. Distribution of native and exotic grass species across Australia based on analysis of 1 million herbarium records in 100x100km gridded areas. Areas with high exotic grass species richness tend to also have high native grass richness. This means that on the map of exotic grass richness the areas with low (cool colours) or no exotic grasses (grey colours) should be vulnerable to inavasion. For C4 grasses much of the northern tropics, central and western regions have the potential to be invaded.

Chapter III: Application outside Australia

I then applied the native richness method overseas. New Zealand is overrun by exotic C3 grasses, so I applied my "Australian native" C3 template developed in Chapter I to see if that could identify locations in NZ where exotic C3 grasses could invade further. I was able to identify suitable areas for invasion but like in Chapter II there seems to be additional factors that NZ's exotic grasses are responding to.

Chapter IV: Predicting Impacts of Invasion

Now that I established exotic plants can invade, the next part of my project was to look at their effects on native species. Here in the ACT, native temperate grasslands are impacted by exotic species. In temperate grasslands, there are indications that water availability may play an important role in facilitating exotic species dominance. If exotic impact on native species is higher with higher water availability, then we can predict exotic species' impacts in wetter years or areas for targeted control and monitoring efforts.

To test the effect of invaders and water availability, I chose three common exotic grasses African Lovegrass *Eragrostis curvula, Phalaris aquatica*, and cock's-foot *Dactylis glomerata* on a community of commonly co-occurring native grasses, red-leg grass *Bothriochloa macra*, windmill-grass *Chloris truncata* and lobed wallaby grass *Rytidosperma auriculatum* (Figure 2). I planted mixtures of the native grasses in pots with and without each of the three exotic grasses at the University of Canberra's (hail-resistant) glasshouse (Figure 2). There were 34 species-density combinations replicated four times in randomised blocks across three water treatments, low, medium, and high, totalling 3,600 individual grasses across 408 pots. The grasses were grown between August 2019 and April 2020. I harvested the aboveground biomass of the native species, dried them, and weighed them. I had the expectation that the heavier the dried biomass, the better performing the individual.

Fig 2. Grass growth set-up at the University of Canberra's glasshouse. Pots had mixtures of native-exotic competition and were blocked to receive different water levels via an automated irrigation system.

I measured the impact of each of the exotic grasses on the native community in two ways. First, I measured how well the native community performed on its own versus how well they did in the presence of each exotic grass, with the greater the difference the greater the exotic impact. Second, I measured whether this difference increased with increasing water availability. Native community biomass was impacted by exotic neighbours in the two ways we expected (Figure 3). In Figure 3, the 'Native community' dot point shows how well the native community did without exotic neighbours at the Low and High water availabilities. Then each of the three points to the right show how well the native community did in the presence of the exotic grasses. If these dot points fall below the dashed line, this suggests that the native community was impacted by the presence of the exotic grass neighbour. Cock's-foot had a strong impact on native community performance in both the low and high water availability, indicating it is an all-round strong competitor (for an example, see Figure 4). Interestingly, *Phalaris* had a positive impact on the native community under low water availability but had a strong negative impact under high water availability. And the results suggest lovegrass also had a greater impact with higher water availability..

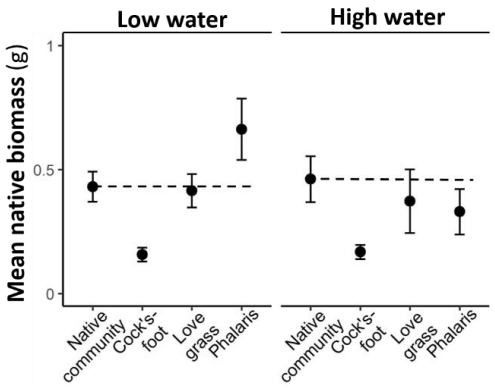


Fig 3. Native community performance with and without exotic grass neighbours across two water availabilities. Each dot represents the mean native dried biomass of pots. The dashed lines indicate how well the native community performed relative to no exotic neighbours, with the other dots below the dashed line indicating negative exotic impact.

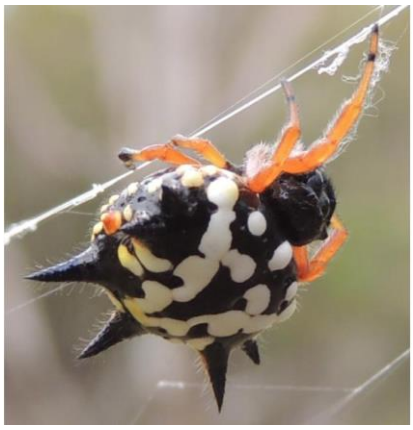
Overall, I have developed a new method to forecast the invasion potential of exotic plant species across Australia. Northern and central regions of Australia appear particularly vulnerable. I have also shown that invasion can lead to impact. I showed that exotic grasses have an impact on a community of native species, and that this impact is greater under higher conditions of a key resource. For the ACT, this information highlights that native grassland communities may be more susceptible to the effects of invasion in wet areas or seasons (such as this year's spring), and that these could be prioritised for monitoring and control efforts.

Fig 4. An example of the extreme competitive impacts in the study. On the bottom left is windmill-grass, on the right cock's-foot both from the same pot.

Corrections

With apologies, we wrongly labelled the images (ie.reversed the names) in Michael Bedingfield's wonderful feature. The top image is the Jewel or Christmas Spider, while the bottom one is the Pointy Crab Spider.

Speaking of images of spiders included in our last issue, we published a photo by Leon Pietsch on our front page and labelled it as a Spectacular Crab Spider *(Thomisus spectabilis)*.



Jewel or Christmas Spider

Leon has since informed us "After I put several pictures of the spider up on Canberra Nature Map, Yumi Callaway wrote 'Of the crab spiders I'm familiar with, I would suggest that this is a female *Zygometis xanthogaster* (one of its common names being Milky Flower Spider) which is a species that is noted to be quite variable in appearance.' When I poked around on the internet, I couldn't find any better ID than this. When compared to the Spectacular Crab Spider, the white colouring seems the same on both, but this one has a significantly more rounded abdomen than the triangular shape of the Spectacular.

I took the attached photo 10 days after the original one, and it shows significantly more markings on the white body and legs of the spider. Either the markings developed over the period, or there was more than one spider in my blue devil."

Pointy Crab Spider

Recent FoG Events

Gurubang Dhaura (Stirling Park)

31 Dec.

The FOG National Lands Group held its last event for 2020. According to Jamie Pittock "nine stalwarts fronted up this morning to plant the last 100 of 400 native plants to restore the lakeshore at Attunga Point in Canberra. The culturally and biologically significant site is being reclaimed from the weeds. A motto for 2021?". The work party was organised at short notice to finish off the planting work unfinished at the last work party - such commitment!

Canberra grassland tour – *Geoff Robertson*

On Sunday 8 November, eleven FOG members joined Maree Gilbert and Brett Howland for a walk through West Jerrabomberra Grassland to see for ourselves the impact of ecological burning. Access to the southern end of the reserve, off Lanyon Drive, was tricky but thanks to Maree's directions we managed to assemble at the entry, ready to start by 1.30pm. This event had been scheduled for 23 August, but was rescheduled twice due to inclement weather.

Maree and Brett came armed with simple but excellent documentation on Mulanggari and Jerra West grasslands describing the timing of burns, plant response, what had been learnt and recommendations, including some great photos, statistics and burn maps.

At Jerra West, patch burns had been conducted in 2015 (one), 2016 (two), 2017 (two), 2018 (three) and 2019 (one). The 2015 fire was in spring, while all the others were autumn burns. Each patch had only been burnt once. At Mulanggari, an autumn burn was conducted in each of 2016, 2017 and 2018 - in 2017 there was also a spring burn.

No burns were conducted in 2019 due to drought. A map of Jerra West burn is included.

One tentative conclusion is that burning increases native plant diversity. Data for the Jerra West 2016 spring burn show that plant diversity was 4.1 exotic and 7.44 native species per plot before the burn, increasing to 13.92 exotic and 17.38 native species after the burn. Overall results for Mulanggari show that for the spring burn 2015, native species diversity increased by 32 percent after one year and 64 per cent after two years. Data for the autumn 2017 burn show an increase of 69 per cent in native species after one year (no data for two years).

However, in the autumn 2016 burn, there was a decline of 24 per cent in diversity (in a high quality area) after one year which was reversed in the second year and rose by nine per cent. The control (non burnt) areas also show an increase of twelve per cent in the first year after the initial survey.

The lessons learnt at Mulanggari were: plant diversity declined following fire in areas with the highest diversity; striped legless lizard numbers declined post fire, but recovered after two years; and the greatest benefit took place with cooler burns in moderate quality areas. The lessons learnt at Jerra West where there was high thatch and low bare ground prior to burning were; plant diversity increased over 200% following a spring burn; diversity increased more following a cool burn (2017) rather than a hotter autumn burn (2016); and wild oats declined and has not recovered following spring burns.

The conclusion drawn from their data is that burn results are best when: high quality area (NTG) has declined, there is a high amount of thatch, low bare ground, low starting native species richness, cool season autumn and spring burn, and high proportion of area burnt.

The work and results are highly encouraging. My personal observations are: burning leads to increased native plant diversity, but initially after the burn in high quality areas there may be a setback in both diversity of plant species and number of fauna individuals; burning of wild oat weedy areas certainly had a big improvement by removing seed and wild oat thatch; and care needs to be taken with statistics to understand what is behind the numbers.

Franklin Grasslands

At the time of writing, two Franklin Grasslands work parties had been held so far in 2021. These were attended by ten (27 Jan) and seven people (3 Feb). The main activities have been selected weeding in areas opened up by removing blackberry and phalaris. Working bees will continue on the first and fourth Wednesdays of the month. On 20 February, the ACT government burnt a significant area of the reserve - it will be exciting to how the fire has impacted the reserve. Unfortunately, it clashed with other activities and so members of the Franklin Grasslands work group could not attend. Suzanne Orr MLA will be organising a Clean up day on Saturday 13 March, 10am-2pm. This would be a good opportunity for FOG members to attend to show their support.

In awe of native grasses – *Geoff Robertson*

Thirty-one people attended Martin Royd's property *Jillamatong* to hear me talk about our (Margaret's and my) passion for native grasses (20 Feb). We began by handing around samples of about ten native grasses. I have given this presentation twice before and updated it for NSW Upper Shoalhaven Landcare Council, Braidwood. The sessions were presented in three parts: Oz grasses and their habitats; identifying grasses; and managing of native grasses for conservation and production. While the sessions had been given as a powerpoint presentation previously, Rebecca Klomp, who organised the day, had the slides printed as three booklets. Margaret was mobbed by people asking questions on plant identification. There was a strong demand for *Grassland* and *Woodland Flora.*

Following the session we went for a drive around Martin's property where we stopped at many places to look at his abundant native grasses - used for grazing and seed production. Martin is well known for his regenerative agricultural practices focused on a number of principles including rehydration. FOG had visited *Jillamatong* over a decade earlier. This was also an opportunity to hear from Dan and Karmen Ganter who run a business in selling native seeds - they had many insights to offer.

That afternoon Margaret and I visited the property of Frank and Jenny Egan - another example of a rehydrated property. They started with a highly overgrazed property, but through great husbandry and managing their grasses, they now have a highly diverse grassland pasture - with a good sprinkling of forbs. We were very impressed by Frank's approach and knowledge. Both Martin's and Frank's approaches are excellent examples of combining native grasses and production. In each case both had replaced poor exotic pastures and somewhat poor areas of river tussock with diverse species of native grasses. Grassland conservationists can learn a lot from these examples.

Some facts and figures from Hall Cemetery 2020

John Fitz Gerald & Margaret Ning

We'd like to share with readers some information about FOG's work in the woodlands at Hall Cemetery:
A small group of volunteers put in 410 hours of weeding work in addition to the four scheduled Saturday FOG work mornings. Volunteers worked in ones and twos and turned out on many days - on average over the year the woodland was visited twice each week for additional weeding.

Given an important grant from the ACT Chief Minister, FOG was able to engage the contract group EnviroAg to spot spray for about 27 hours. Their principal, Richard Bland, did a great job treating Sow Thistle with the organic herbicide Slasher - it has worked a treat. FOG has continued to use Slasher on rosettes of Spear Thistles (estimated over 550 plants, prior to flowering) where again it is most effective. We also cut unopened seed heads from, then pulled up roots of, hundreds of Prickly Lettuce plants.

The Themeda grassland in the cemetery core grew lush and tall in the cool moist summer. This vegetation has still not been mown, as the ground remains wet. The Tarengo Leek Orchid population in the grassland bounced back into active flowering after a very meagre year in 2019.

The frequent volunteer visits, with repeated sweeps through the woodland in weed searches, resulted in some nature sightings that could interest readers:

- juvenile pied butcher bird (photo JFG) was seen on the cemetery gate in early Jan 2021. According to information from Canberra Ornithologists Group, this species is near its south-east limit in the ACT, so it's nice to have this event recorded by photo at Hall , and posted on Canberra Nature Map, and

- Key's Matchstick Grasshopper (in Sept) - an uncommon native.

Sow thistle area before (26 May 2020 - Jenny Clarke) and after (12 Feb 2021 - JFG). The area was weeded manually by Jenny and Graeme and flowers were initially bagged by them before they could throw seed. Later plants were either removed entirely, or cut and daubed.

Grass Identification in Ngunnawal Garden

15 Jan - twelve people assembled at Margaret and Geoff's garden in Ngunnawal for a session on viewing and identifying local native grasses. This was the second occasion we have visited their garden - it was organised about the same time last year (10 Jan). When planned, it was considered it would be a low key activity on a hot summer day. As it turned out, with our extremely mild summer, it was a perfect day.

Margaret with her wonderful knowledge showed the garden's 28 native grass species from 21 genera - these included: Anthosachne scabra, Aristida ramosa, Austrostipa densiflora, A. bigeniculata and A. scabra, Bothriochloa macra, Chloris truncata, Cymbopogon refractus, Dicantheum sericeum, Dichelachne sp., Digitaria brownii, Echinopogon ovatus, Enneapogon nigricans, Eragrostis brownii, E. parviflora and E trachycarpa, Lachnagrostis filiformis, Microlaena stipoides, Panicum effusum, Poa labillardierei and P. sieberiana, Rytidosperma pallidum, R. richardsonii and R. sp2., Sorghum leiocladum, Sporobolus creber. Themeda triandra. and Tragus australianus (admittedly not a local native). She described the features of each and how to readily distinguish the different species. Also in the garden is a plant of Serrated Tussock, kept seedless, but available to show how one might identify it when it is not in flower or seed.

This was followed by a relaxed morning tea which suited people with a sweet tooth. Thanks M&G for your knowledge and hospitality.

Seeding @ Gurubang Dhaura

16 Jan Jamie Pittock reported on Facebook that he was "Spending this weekend harvesting kangaroo grass seed and sowing it onto degraded land to see if we can improve revegetation. Here is our Friends of Grasslands team of ten this morning at Gurubang Dhaura (Stirling) Park in Yarralumla. I don't know how Indigenous Australians managed to harvest so much. We only got four sacks full after 90 minutes! Time to consult the Traditional Owners?" The images say it all!

TOP Hut – *Margaret Ning*

On Saturday 9 January eight people visited FOG's Top Hut TSR site where we spent most of the day spraying thistle, and attacking tragopogon and flatweed. The group also made mental notes of other likely weed problems. We will be doing similar things at our next visit planned for the 27 March. On Sunday six of us visited a Kosciuszko National Park site near Sawyer's Hut, which had been badly burnt in the 2020 fire. It had an amazing flower display. Then we visited Kiandra Cemetery and were rewarded with an extensive plume grass grassland.

Near Sawyer's Hut KNP (Lauren & June)

Kiandra Cemetery KNP (photos by MN).

The future of grassy ecosystems

18 Feb

Our second online session on *The future of grassy ecosystems* featured Assoc. Prof. John Morgan (Dept. of Ecology, Environment and Evolution, La Trobe University) speaking on *Looking to the future - where should we be focusing our efforts for grassy ecosystem conservation and restoration?* while Dr. Paul Gibson Roy (Manager Ecological Restoration, Kalbar Operations) spoke on *Seed Production: underpinning innovative approaches to restoring species-rich native grasslands*. Twenty-three people attended.

John posed the question - where do we see grasslands headed in the next 20 years? There are 900 grassland plant species in Victoria, 39 species of which have been found in recent years. These account for a third of Victorian plant species. None of the species have so far gone extinct, but his analysis suggest that they could do so unless we undertake enhanced protection and restoration. What else should we do? John has five recommendations, and readers should look at his YouTube presentation to understand why. The five key points: (1) inch flora (small annual grassland plants); (2) enhancing function within grasslands; (3) recovering woody species in grasslands; (4) reconnecting grasslands; and (5) enhancement of poor sites.

Paul's presentation complemented John's. He presented a series of slides of highly diverse and functioning grasslands - he then mentioned that all these were restored grasslands. These have now persevered for some time now and have been colonised by grassland species not in the original seed mix. Many people have put in many hours to make this success story. However, this effort has stalled. The key is seed production, and as we cannot get seed in sufficient quantity from wild populations, we need to create, as has been done in the United States, an industrial approach to produce a diverse range of quality seed. Removing nutrients and weed seed is part of the approach. His slides focussed on linking roadside grasslands and numerous examples of large scale seed production. Despite the amazing work that has been done, Paul considers that we have dropped the ball - we need to look at all that has been achieved and to come up with a coherent strategy. Imagine wildflower corridors in Canberra! He urges us to be brave in pushing forward.

Earlier versions of these sessions were given at the Woorndoo Land Protection Group's Online Community Day (27 Nov) and may be found here: John Morgan and Paul Gibson Roy. I would urge you all to watch these sessions - you will see grasslands through new eyes.

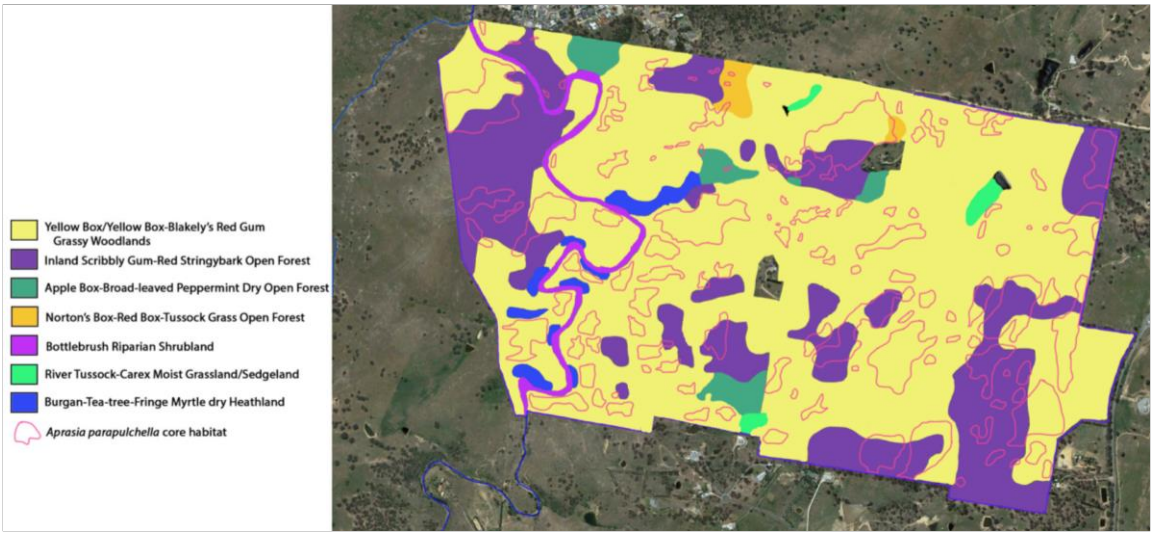
Wandiyali Restoration Trust, online forum

21 Jan - Eleven people attended our first on-line forum! The aim of these forums is to engender a discussion (hopefully followed by action) of our vision for grassy ecosystems, and to learn about what is happening on-ground, what research and experiments are taking place, what novel findings and solutions practitioners are coming up with, etc.

We were fortunate with our first forum to have Carolyn Larcombe - long time resident, landowner and conservation manager - to speak on the Wandiyali Restoration Trust. The privately owned Wandiyali Environa Wildlife Sanctuary (near Queanbeyan), managed by the Trust, aims to maintain and restore nationally endangered ecological communities and species, to erect a predator proof fence, to reintroduce endemic flora and fauna, to provide founder and exchange populations of these species for similar restoration programs, and to engage, stimulate and educate the (local) community. Local landowners and the Trust entered into offset and other programs to work towards these objectives, and much progress has been made in weeding, planting mid storey plantings, and restoring habitat, implementing Indigenous / ecological "cool patch" burning.

Carolyn provided information on the vegetation communities, strategies, plans, and success of the Trust's efforts to date. Her presentation provided much information of the Trust's experience. She enlightened us about the frustrations faced by endeavouring to undertake such an ambitious project. The Trust has undertaken many projects under bio banking and other programs, and often there are conflicting objectives, methods and rules to implement each project. Nevertheless, as a good manager she is steering the Trust through these many obstacles.

For more on the Trust, see Wandiyali. This site also contains information about how you might donate funds and become more involved in this exciting project.



News Roundup

Biolinking vegetation corridors – *Sue Ross*

In an article about the connection of rural, and other, plantations the author Stephen Murphy, describes the benefits of improved biodiversity. He talks about 'islands' of trees and other habitats which don't provide sufficient continuity for a variety of birds and insects to move about in and through. He encourages understorey plantings for wildlife support including natural predators that contribute to improved plant health. Read more at biolinking.

Co-habitating grassland snake species

A research article by Nicole Hansen and Damon Oliver (published in the *Australian Zoologist September 2020)* recorded the aggregation (togetherness) of a pair of adult threatened Little Whip Snake and a pair of juvenile Eastern Brown Snake under an artificially placed masonite board at Turallo Nature Reserve. This is a first for these two species. The article suggests that there may be a thermal or anti-predatory advantage for the whip snakes.

Early warning of winter events

We have two interesting FOG winter events planned, so you may like to save the dates. On Sat 12 June, we plan a visit to FOG's Canberra grassy on-ground projects. The day will be devoted to understanding how each contributes to our knowledge and recovery of grassy ecosystems and provides an opportunity for visitors to learn about the vision and strategy behind each, its history, trials and errors, discoveries and learning experiences, and its adaptive management plans. At each site there will be a handout and walk to some key areas. The program for the day will be tight and participants can attend some but not necessarily all the sites - also we will take time out to have lunch somewhere. We plan to visit Hall Cemetery, Franklin Grasslands Reserve, Gurubang Dhaura (Stirling) Park and Yarramundi Grassland.

Sat 14 August our presentation will be *Reading a Grassland Landscape* and *Learning Aboriginal Cultural Science* with Geoffrey Simpson.

Everywhere in this country we are being invited to learn about Aboriginal wisdom and connection. Black and white views of Australia were well presented at the National Museum of Australia's exhibition on HMB *Endeavour*'s 1770 voyage (to finish on 26th April) which invites us "to explore views from the ship and shore on the 250th anniversary of the journey".

Geoffrey Simpson, who has been a long-term mentor to FOG on its exploration in understanding of traditional land management practices, says it may be just a matter of saying hello and a readiness to learn and show respect. Geoffrey grew up knowing his Aboriginal heritage but had to search deeper to better learn it. He started on a journey to understand Aboriginal practice and he has shared his learning, stories, life and values, with many Aboriginal and non-Aboriginal people along the way.

Some years ago, when he worked for the Murrumbidgee Catchment Authority (MCMA), he arranged cultural heritage stewardship agreements over properties, including Garuwanga. That led to FOG's, K2C's and Monaro landholders' connection with Ngarigo traditional land manager Rodney Mason, and the publicising of Rod's work in Charles Massy's *Call of The Reed Warbler.*

He is now in the Fire and Cultural Science team within the NSW Department of Planning Industry and Environment. There he is developing the science behind bringing a cultural voice to landscape management. Geoffrey describes Cultural Science "as spending time with people in the bush, learning our stories and participating in the experiences together, with the aim of reconnecting people with their dreaming and country. The emphasis is on relationships and connecting with country and each other. Combined with this is learning of traditional ways of managing country such as the use of fire, and using technology such as camera traps to deepen understanding of the behaviour of fauna on country". FOG has participated in some of the events connected with this cultural science work out at Rick Farley Reserve learning lore, lessons, connection and ceremony.

On 14 August, FOG's traditional winter presentation, we will meet in the morning (at a site to be chosen) and view the landscape through a cultural/scientific lens. After lunch we will reassemble at Mugga and hear from Geoffrey on *Learning Aboriginal Cultural Science*. There will be many opportunities to ask questions and to draw on others' experience. For inquiries about both contact geoff.robertson@fog.org.au

Recent changes in advertising events and notices

In recent newsletters, we have included on the front page, a summary of imminent events and work parties, but have ceased to publish details of events. We have done this for several reasons, but mostly to coordinate our growing program and to reduce the pressure on the newsletter. So the newsletter will be an alert for upcoming events, a report of events that have taken place, and from time to time will publicise some upcoming events.

We have redesigned our *Events and Notices* bulletin - so that is the place to find out about upcoming events and important notices. This is republished in our calendar on our webpage. Please take time to read these as they include important information of interest to members.

One important notice published recently, urges all of you to take part in a survey by Julia Rayment, a FOG member, on "the Invasion of exotic perennial grasses into threatened ecological communities". Click here for more information and jrayment@uow.edu.au to take part in the survey.

We may increasingly make use of special bulletins. Recently, we circulated a special bulletin on FOG establishing a membership register, as required by new ACT Government legislation. Please confirm that you have no problems with what is proposed with our membership officer membership@fog.org.au, or let her know of any concerns.

Our AGM will be held on 16 March. Papers will be circulated to you about this shortly. If you also want to join us after the meeting to dine out, please contact margaret.ning@fog.org.au.

Feral horses in Kosciuszko

20 Jan. Reclaim Kosci received 15,712 signature on its petition calling for the overturning of the law protecting feral horses in Kosciuszko National Park. It reported strong support for a review the *Kosciuszko Wild Horse Heritage Act*. in its statement it mentioned that "Mr Barilaro seems to have accepted that the status quo is indefensible based on the latest facts. He now says he could accept a decline in the brumby population even to as low as 600 but he is allowing himself a lot of wriggle room about the pace of reduction in numbers. The government should reconsider the *Kosciuszko Wild Horse Heritage Act* forced through by Mr Barilaro in 2018 which protects the brumbies even though they are a feral animal." The report stated "the e-petition will be formally tabled in the NSW Legislative Assembly on 9 February and the ministerial response is due by 16 March".

Final Samuel's EPBC Report released

The final Samuel's report into Australia's environment laws was presented to the government in October last, and was released by the government on 1st Feb, without any comment or indication of whether or not it would accept its recommendations.

Readers will be familiar with the efforts of many stakeholders, including FOG, to lobby for a strengthening of the Environment Protection and Biodiversity Conservation (EPBC) Act and Graeme Samuel's appointment to undertake a review of the law. FOG's submission of 10 March last may be found here.

The Samuel's report was rather scathing, pointing out Australia's natural environment is in an overall state of decline and "has suffered from 2 decades of failing to continuously improve the law and its implementation". There are thirty-eight recommendations - these seem to be largely consistent with what FOG and other groups advocated, although how the government may interpret and implement them is a complete unknown. Two that are emphasised are: developing and implementing National Environmental Standards and the establishment of an Environment Assurance Commissioner. In a neat piece of footwork, Samuel recommended that some decisions should remain with the relevant minister - this should be rare and the minister should state his/her reasons for the decision.

Samuel recommended devolving approval powers to the states and territories - something FOG opposed in its submission. This may work provided, there is very strong oversight from the Environment Assurance Commissioner and strong National Standards. The final report is available here.

Is Glyphosate harmful?

A report, published 20 November, *Glyphosate, a chemical to understand* (found here Low report), written by Tim Low, author of *Feral-futures,* for the Invasive Species Council attempts to reconcile the conflicting findings, and consider the outcomes if Australia bans glyphosate.

Tim Low states that glyphosate plays a major role in the control of agricultural and environmental weeds, but its use carries health risks, and he agrees that some of the intense international criticism is warranted. It could, he states, be a carcinogen. However, court cases against the herbicide that have been successful have involved people being repeatedly drenched, from times before the product came with clear safety instructions.

Tim Low considers "if used correctly, current research suggests it is unlikely to cause cancer in humans" and quotes findings by the International Agency for Research on Cancer and the Australian Cancer Council. On the other hand a ban could do much more harm than good. Interestingly the article points out non-chemical methods of control, especially steam spraying, can be used but have limited effectiveness, and there is the risk of burns. A ban on glyphosate would have serious environmental consequences. Weed invasions would increase in areas of native vegetation including national parks, and erosion would increase on farms, he states.

For those interested in this debate, the report may be found here Low report.

Lawson North

The proposed housing development at Lawson North east by Defence Housing Australia (DHA), which would destroy natural temperate grasslands and grassy woodlands and habitat for threatened species, has gone a little quiet.

In our November-December issue we reported on the action that FOG and the Conservation Council had undertaken in writing to DHA and other agencies seeking that the proposal be withdrawn. The letter was signed by 110 organisations and individuals. That article also reported on the responses that we had received. Meanwhile we have been lobbying behind the scenes talking to many others and our political leaders. A small group has continued to meet to monitor the situation and to plan any response.

Meanwhile we have learnt that DHA are reworking their proposal, which is likely to re-emerge. A Conservation Council 'conservation exchange' will be held on 23 February, with speakers Geoff Robertson, Rainer Rehwinkel and Helen Oakey to bring people up to date. On Saturday 27 March, FOG and others will hold a stall at the Lawson's Markets to provide updates to local residents.

Light Rail Stage 2A & moth

Nick Fuller (Canberra Times 5 Feb) in an article titled *The Federal Government gives environmental approval to light rail Stage 2A* provides an update on Canberra's light rail, but points out that it is not without its environmental challenges. He mentions that "some environmental groups have raised concerns the light rail would threaten the critically endangered golden sun moth *(Synemon plana)*. A total of 4.76 hectares of low-quality habitat will be cleared; the Government has promised to restore habitat on nearby sites, and to buy and retire 82 species biodiversity credits in accordance with the NSW Biodiversity Offsets Scheme (BOS).

He quotes "Friends of Grasslands, a community group dedicated to the conservation of natural temperate grassy ecosystems in south-eastern Australia, was concerned that offsets might not be effective, but could instead result in a loss of biodiversity. President Geoff Robertson noted that this would be the first time the ACT Government had proposed offsets via the NSW BOS. He wanted the ACT Government's Offsets Register to include information about the golden sun moth offset credits to show the credits would ensure no net loss of golden sun moth across the landscape." A more full background may be found in FOG's submission 10 Sept 2020.

Nutritious Native Grass Seeds

In our July 2020 issue, p 9 we discussed using native grains in dough baking. In September 2020 Dr Angela Pattison and colleagues of the University of Sydney Institute of Agriculture reported on a one-year feasibility study that found that native grasses could be grown for mass consumption, after researchers tested 15 different species "from paddock to plate" in north-west New South Wales.

Native millet, or panicum, turned out to be the best all-rounder: easy to grow and harvest, easy to turn into flour and "significantly more nutritious" than wheat and is gluten free.

The study involved researchers in ecology, food science, social science, marketing and business. They also found that native grasses had environmental benefits. As perennials they sequester carbon, support biodiversity and preserve threatened species and habitats, but the researchers say all these benefits need further study.

Orchid sightings

The rains this year have resulted in an explosion of weeds but also in a great flowering of our treasured native species. I should make mention of two special orchids. At one FOG visit we saw a small population of a Buttercup Doubletail orchid *(Diuris aequalis)* - vulnerable (Commonwealth) and endangered (NSW). The sighting was an extension of its known range.

On several occasions we also visited the site of an un-described leek orchid, on the Monaro Highway, found on a FOG survey in 2000. David Jones in 2000 suggested this was *Prasophyllum* aft. *truncatum.* Three plants have been visited annually - its numbers varying from zero to seven. Disappointing that more were not seen after the better rains, but maybe amazing that it is still hanging on after twenty years. Nearby is a small population of the beautiful purple *Diuris dendrobioides* - the seven plants seen this year were variable in colour and hue. Sightings of it since 2000 have also varied from zero to seven.

Cockatoos feeding on onion grass

In the Conversation (18 Feb) there is an interesting piece by Gregory Moore, a Doctor of Botany, Uni of Melbourne, on Cockatoos eating onion grass, prevalent in many grasslands. "Onion grass is a significant weed, and I estimated in a recent paper that one bird gorges on about 200 plants per hour. A flock of about 50 birds can consume 20,000 plants in a couple of hours. This significantly reduces the weed level and may make expensive herbicide use unnecessary. So if you have a large amount of onion grass on your property and are regularly visited by sulphur-crested cockatoos, it would be wise to let them do their weeding first." article here

Photographing flowers

For those who like to take photos of flowers, to illustrate their features, the Australian National Herbarium provides some guidelines *Composing a photo — some thoughts for flower photography.* It is well worth a look composing flowers. Janet alerted the newsletter to this.

New solanum arrival in ACT

The *ACT & SE NSW Invasive Plants* Facebook page has reported that Red Buffalo-bur *(Solanum sisymbriifolium)* has been recently discovered in the ACT at EPIC and the Racecourse. As many readers know, one strategy to stop weeds is to identify new arrivals and notify our ACT weeds unit. So look out for this.

Seven solanum species are recorded on Canberra Nature Map (local solanum). Five are local native species (including one that is very rare) and two exotic species (both described as weeds). Red Buffalo-bur has not been recorded on CNM yet. Solanum is a member of the nightshade (Solanaceae) family - solanum has around 1,400 species, most of which occur in South and Central America. Many are sold to local gardeners as decorative plants and many of us grow them as tomatoes, spuds and maybe eggplant.

Managing saffron thistle

Bob Freebairn an agricultural consultant at Coonabarabran, in an article *Saffron thistle control strategies for future years* (the Land 8 Feb) outlined what is well known about the devastating impact of saffron thistle, as are attempts to control it. He outlines his experience with native grass pasture with winter legumes and spraying with gramoxone, which he states prevented near 100pc reseed. He also compares this with other approaches commonly used. The article requires careful reading as Freeman's use of gramoxone is only part of the strategy to suppress the thistle. Click here for full article or e: robert.freebairn@bigpond.com

New population of Small Purple-pea

In a release on 16 March, Local land Services announced that a new population of small purple pea *(Swainsona recta)* has been found on private property south of Mount Arthur, near Wellington, following rainfall in the area.

The plants were located near a known patch of the species and were in a section of property that had stock excluded due to drought. Central West Local Land Services Officer Libby McIntyre said the find was important for efforts to preserve the habitat of the endangered plant. "We have been working with land managers to preserve habitat of the Small Purple-pea around the Wellington area as part of a five year project funded by the National Landcare Program," Ms McIntyre said. "Finds like the one near Mount Arthur are important for us to understand current populations, such as how many are left, where they are and what conditions they like to grow in.

The Small Purple-pea, is familiar to many FOG members as the ACT is a stronghold for this endangered plant. The LLS release describes the pea as a small perennial herb which flowers usually between September and early December and grows to around 30cm in height. It has hairless leaves divided into up to six pairs of 10mm long narrow leaflets, each with a pointed tip and a single leaflet at the end of the tip. It has a hot pink to purple coloured spray of flowers which make it easily seen when flowering conditions are right. The Small Purple-pea used to be widespread across SE Australia but is now limited to isolated populations around Wellington, Mudgee and Queanbeyan. The plant goes dormant over the summer months so it can be difficult to find when not in flower.

Meeting with Rebecca Vassarotti MLA –

Geoff Robertson

On 14 Jan, I met with Rebecca Vassarotti MLA, Minister for the Environment, and her advisor, Paula Sutton. Before the meeting, I sent her some briefing notes incorporating material from committee members and others. Having previously observed her participation in a ConCouncil election forum, I was impressed by Rebecca's ability to thoroughly research her subjects. I discovered that her and my Italian ancestry had arrived in Australia in the early 1880s from north Italy.

She and Paula said they welcomed the briefing notes and had a number of issues on which they wanted FOG's views. We walked through my briefing notes and Rebecca and Paula paid close attention and raised many questions. There were no raised eyebrows or suggestions that some of our issues were off the table - just a willingness to listen. Topics which raised greater interest were Lawson North, the north road at the airport, our experience with offsets, our views on a protected area network (which was on our list), and our views on Indigenous land management.

Rebecca was obviously interested in developing policies around the issues that we raised. This was a very pleasing first meeting.

More on the Volcanic Plains

News of Friends of Grasslands has been reporting on the failure of the Victorian Government to honour its *Melbourne Strategic (Grassland) Assessment,* a failure condemned by Victoria's auditor-general (see p11 of our Sept-Oct 2020 issue). Adrian Marshall's, well known to many FOG members, piece in the Conversation 13 Aug (updated 19 Aug) considers that "these historic grasslands are becoming a weed-choked waste. It could be one of the world's great parks". For those who want to keep abreast of this issue, we highly recommend his analysis - see a weed choked waste.

Contact us

General & media inquiries: *info@fog.org.au*. T. 0403 221 117 / 02 6241 4065 (Geoff Robertson)

Membership to join or renew, inquiries: membership@fog.org.au

Events & work parties: Calendar. To attend an event, register with event organiser.

Book sales: Order forms: Grassland & Woodland Floras. Inquiries: booksales@fog.org.au.

Small grassy ecosystem grants: Latest on grants. Inquiries: supportedprojects@fog.org.au

News of Friends of Grasslands: Latest & past issues. To submit articles & news items newsletter@fog.org.au

Events & notices bulletin: to submit material *ebulletin@fog.org.au*

Advocacy: Read latest submissions. To inquire and assist, contact: advocacy@fog.org.au

Tax deductible donations: Donations

Website matters: *webmanager@fog.org.au*

Projects, work parties & contacts:

- **Hall Cemetery**: *john.fitzgerald@fog.org.au*
- **Scrivener's Hut, Gurubang Dhaura (Stirling) Park, Blue Gum Point & Yarramundi Grassland**: *jamie.pittock@fog.org.au*. More info.
- **Franklin Grasslands**: margaret.ning@fog.org.au
- **Travelling stock reserves & Old Cooma Common**: margaret.ning@fog.org.au
- **Scottsdale monitoring**: *linda.spinaze@fog.org.au*
- **Ginninderry scrape monitoring**: *john.fitzgerald@fog.org.au*

Health & Safety: *info@fog.org.au*

Correspondence:

- **Postal**: PO Box 440, Jamison Centre, ACT 2614
- **Email**: *secretary@fog.org.au*

Payments & accounts: treasurer@fog.org.au

More info on FOG: annual reports. For info on committee, contact: *secretary@fog.org.au*

Friends of Grasslands Inc.
PO Box 440, Jamison Centre ACT 2614