News of Friends of Grasslands

Supporting native grassy ecosystems

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March–April 2019

2019 Small Grants Project Applications wanted!

Friends of Grasslands (FOG) is again pleased to offer a small number of grants of $500–$1500 each in 2019 to support projects that promote investment in the understanding and management of grassy ecosystems. Any individual or organisation can apply.

A grant might enable the recipient to undertake a small project, to meet some expenses with a project, to support training, and/or contribute to a larger project. Projects might include publications, research, education, on-ground work, advocacy, publicity and/or training.

FOG will publicise the projects it funds, and in addition may provide practical in-kind support if required. A grant recipient will need to keep FOG informed of progress, and provide support to FOG, for example by preparing a short article for the FOG newsletter, giving a talk to FOG, leading FOG visits to the project study site(s), and/or providing a copy of any relevant project output, e.g. research paper, information brochure, video, conference presentation, etc.

Grant applications must be submitted using our 2019 FOG Supported Projects Small Grants Project Application Form which can be downloaded from FOG's website at http://www.fog.org.au/supportedprojects.htm or via the Supported Projects or Grants link at the bottom of the home page at http://www.fog.org.au. This form also provides background information and more details on the grant process. For further information contact the FOG Supported Projects Sub-committee at supportedprojects@fog.org.au. Our Supported Projects team will be happy to informally discuss potential applications with you.

Closing date for applications is **Monday 15 April 2019**. Notifications of application outcomes are expected to be made by the end of May 2019. Grant funding will be made available to successful applicants based on their project implementation timelines.

2019 ANNUAL GENERAL MEETING Tuesday 19 March 5.30 for 6 pm

All financial members of FOG are warmly encouraged to attend the 2019 Annual General Meeting of Friends of Grasslands Inc., at the Conservation Council offices, 26 Barry Drive (Lena Karmel Lodge), Acton ACT, on **Tuesday 19 March**. The agenda is included with this newsletter.

Come at **5.30 pm** so you can chat with other members beforehand. Parking (free at 5.30) is available directly across Barry Drive. Afterwards you are invited to dinner at a nearby restaurant.

Election of the 2018 committee

Once again we would particularly welcome new faces on the committee to future-proof FOG. Any financial member of FOG may nominate office bearers and committee members, either before the AGM in writing with the nominee's written acceptance, or at the meeting itself. Please contact the Secretary (paul.archer@fog.org.au) *before 12 March* with nominations.

It may be helpful to know that FOG's committee meets at 5.30 pm on the 4th Tuesdays of March and every second month thereafter.

For inquiries and to RSVP (for catering for the AGM & for booking dinner afterwards), contact president@fog.org.au or phone Geoff on 6241 4065 or 0403 221 117.

Reminder, 2019 membership payments are overdue!

Thank you to everyone who has paid their 2019 FOG membership. I have attached a renewal form for those members from 2018 whose payments I have not yet received. Please let me know if you think you have paid, or let me know if you don't wish to renew your membership. We will be sorry to see you go, but we understand that circumstances can change.

Note: If you haven't received a renewal form from me (now or in December 2018), it is because our records indicate that you are paid up at least till the end of 2019. If you are unsure about your status, please feel free to contact me, Sarah, membership@fog.org.au; phone 0402 576 412.

Some of the beauty to be seen at Hall Cemetery woodland workparties

Milkmaids and Billy Buttons carpeting Hall Cemetery in spring 2017. FOG's workparties operate in the woodland *around* the cemetery (background of photo). In spring, the FOG team has a short walk among the flowers after the tea break. *Photo: John Fitz Gerald.*

Newsletter contents are listed on p. 14

Activities to look forward to

Sunday 3 March, grassland at Gundaroo Common, NSW

Please register to join an interesting early morning walk, **8.30 am on Sunday 3 March in Gundaroo, NSW**, with Alison Elvin and Sue McIntyre – two well-known and very knowledgeable FOG grassland people. The idea is to beat the heat if it ends up being a hot day.

Meet at the corner of Lot St & Judith St. The main gate to the common is beside the huge 'Gundaroo Commons' sign there. Parking should be good along the street before that junction. The walk should end at around 10.30 am, and then you may like to visit the local venues on Cork Street (e.g. Crowes wine bar, Cork St cafe, Gundog cellar door) for breakfast or a hot/cold drink, before setting off home.

You are welcome to bring any plant specimens you would like Alison and Sue to try to identify. If you do that, please ensure the specimens are sealed in see-through plastic bags (think 'weed prevention').

Please try and avoid bringing in weed grass seed, especially African Lovegrass which is so prevalent in Canberra at the moment.

Register with kat@fog.org.au, who will send you a Google map as a backup to these directions.

March twilight walk in Stirling Park, ACT

Three wildlife-survey walks will be held at twilight in Stirling Park, Yarralumla ACT, this year. **Saturday 16 March**, **7–10.30 pm** is the first of these walks. There will be observation only: no animals will be trapped or handled. To register, and find out meeting place details, contact jamie.pittock@fog.org.au.

April revisit to property near Deua NP, NSW

On **12–14 April weekend**, a FOG group will revisit the wonderful private property seen in December on the Shoalhaven River, to see what it looks like in autumn. See Alice Bauer's account of the FOG visit there last December, on p.12 in Jan–Feb *News of FOG*, http://fog.org.au/Newsletters/2019-01newsletter.pdf). This time, the group will also explore the nearby Wyanbene Caves area in Deua NP. You could stay at Berlang Camping Ground (no bookings required) with its amenities block, picnic tables, barbecue facilities, carpark, toilets. Or camp at the Deua Tin Huts ($10/person per night), or stay in the Tin Hut that FOG has reserved (the largest one: $65 per person for two nights when there are 6 people). Show your interest by contacting margaret.ning@fog.org.au soon.

May: Opera & grasslands at Morundah NSW

FOG plans to visit Morundah NSW, **10–12 April**, to attend the performance of Don Giovanni (opera by Mozart) at Morundah Theatre, on **Saturday 11 May** evening (see https://www.facebook.com/events/812645549092235), and to visit grasslands and Plains-wanderer habitat in the area. To register interest, contact margaret.ning@fog.org.au.

World Environment Day annual dinner

Conservation Council ACT Region's annual fund-raising dinner is on **Saturday 1 June**, at Gandel Atrium, National Museum of Australia. Former Senator Bob Brown is guest speaker. FOG will have a table (or two).

Mid-winter talks – in planning

FOG's annual mid-winter afternoon talks and tea will be in July this year, on ***Saturday 6 or 13 July***. Please pencil those into your diary.

2019 ACT *w*orkparties at Hall, Stirling Park and Yarramundi

Your help is needed and always welcome.

Tools are provided. You need to wear gardening clothes (including hat) and solid footwear appropriate for the work and the weather, and bring your own drinking water. The workparty convenor **provides morning tea**, making these into pleasant social occasions.

Please **register by two days before** the workparty so there are enough tools and tea for everyone, and so you can be told if the weather forecast has led to a cancellation. Workparties are cancelled if there is lightning; or there is heavy rain; or the forecast is for 35°C or more; or there is a total fire ban.

When you register, you'll be sent more details about the workparty: such as tasks, targets, and where to meet for Stirling Park in Yarralumla. (Hall Cemetery is near the Wallaroo Rd/Barton Hwy junction; and Yarramundi is at 245 Lady Denman Drive, ACT 2611.)

Hall Cemetery woodland 8.30 – 12

Register with john.fitzgerald@fog.org.au

DATES: Saturday 2 March
Saturday 6 April

Stirling Park woodland 9 – 12.30

Register with Jamie.Pittock@fog.org.au

DATES: Sunday 31 March
Sunday 14 April
Sunday 5 May
Sunday 26 May

Yarramundi grassland 9 – 12.30

Register with Jamie.Pittock@fog.org.au

DATE: Sunday 26 May (yes, same as Stirling Park).

The workparty tea break at Scriveners Hut, near Parliament House, on 17 February. (*L-R*): Andrew Zelnik, Paul Archer, Sarah Sharp, Sue Parr, Susan Archer, Bonnie Scott & Helen McAuley. *Photo: Jamie Pittock.*

FOG Advocacy

by Naarilla Hirsch

Three items for comment came up either just before or over the Christmas–New Year period. My thanks to John Fitz Gerald, Geoff Robertson, Sarah Sharp and Rainer Rehwinkel for assisting with the submissions for these.

December

1. FOG responded to the NSW Local Land Services survey on its draft management plan and interactive mapping tool. These are a significant improvement over what was previously available, although FOG had some issues with them. These included concerns about the compatibility of long-term grazing with retaining high conservation values, and recognition that many Travelling Stock Reserves rated as medium conservation value have the potential to improve their conservation value to medium–high, if not high, if appropriately managed.

January

2. The Commonwealth asked for comment on a draft approval for a proposed development at York Park in Barton. Our response was to yet again express our total opposition to approval being given to destroy York Park Grassland and to subsequently develop it. We believe the habitat of the York Park Grassland can be maintained and improved and, at the same time, be utilised as an open space for the enjoyment and education of community. FOG also stated that, in the event that York Park Grassland is destroyed, the conditions are inadequate to ensure that the Matters of National Environmental Significance are protected in perpetuity within the offset sites. FOG made a number of detailed comments on the draft approval, including some on the proposed heritage offsets.

3. In its response to the Development Application for Ginninderry Estate Stage 2, FOG expressed concern about the slowness in applying the proposed system of Fenner School Urban Laboratory Parks to the trees retained in the urban area, and in development of environmental offset management programs and the planned West Belconnen Conservation Corridor and its operating Trust and bushfire management.

The full text of FOG submissions appears on our website.

FOG matters

Welcome to our new members!

Tein McDonald NSW; Katerina Ziesak, NSW; Tim Scrace & Tina Hessey, NSW.

President's appeal

Geoff Robertson

As our AGM is approaching, it is an appropriate time to ask each of you to consider playing a greater role in delivering FOG services (unless you are already doing so), as we need your help, realising that any effort on your part requires some personal sacrifice.

I have been working on FOG's annual report and it makes me realise how much FOG achieves across its many activities: governance, finance and fund raising, administration, membership and record keeping, supported projects, workshops and field activities, on-ground work and surveys, newsletters and other communications, and advocacy and lobbying.

These achievements are the result of the efforts of many many people who draw on their commitment, resources, skills, judgement and time, but may also involve enduring stress and courageously facing personal fears. This commitment is usually centred on a passion for nature and a desire to deepen that knowledge and share the experience with others. The commitment is often one of many facets of a wider passion for life, personal generosity and commitment to others.

Volunteering can bring many rewards: deepening one's knowledge and experience, discovering a sense of achievement, finding support, encouragement and friendship, learning assertiveness (conquering personal fears, overcoming one's lack of confidence and sense of inadequacy), learning new skills, and influencing friends, decision makers and the broader community.

Being involved in FOG's deliberations as it devises its strategies, resources and program, provides an opportunity to develop and test one's ideas and skills, and to influence FOG's direction and program, and to influence decision makers outside FOG and the broader community.

There is much to do. We need to change an Australian culture which largely lacks interest in, or is even hostile to, grassy ecosystems and biodiversity more broadly; we need to make decision makers more aware of biodiversity and how their decisions impact, positively or negatively, on biodiversity; and we need to reverse the downward spiral in biodiversity funding. We need to get our heads around and contribute to proposals to replace the EPBC Act (federally) and the Biodiversity Act (NSW), and a host of related legislation and policies, should Labor win government federally and/or in NSW.

There are many tasks to which you can lend your skills. Some current FOG activists would like to play a lesser role in FOG and so there may be opportunities for you to contribute in almost any area of FOG activity.

If you are considering standing for the committee, we meet six times a year for two hours with some email communication between meetings to keep committee members informed and to make timely decisions. This is not a big commitment. Nevertheless the committee plays an important and essential role in overseeing and formulating FOG's overall direction. The committee is also a place to learn, and opens many doors if one wants to engage in FOG's many tasks.

If you would like to explore this more fully, or any issue in which FOG is involved, please don't hesitate to contact me at president@fog.org.au or by phoning 02 6241 4065, or other FOG committee members (*see page 14*).

Articles

Close up: Recognising some *Rumex*

John Fitz Gerald

Rumex plants are commonly named Docks and there are several species, native and introduced, that grow in our grasslands. They all have a leafy rosette and erect flowering stems. The character of leaves and stems is generally enough for field ID of species, but there are plants that don't fully fit one or the other description. One example is two species readily found locally: *R. brownii* and *R. dumosus*. *Rumex dumosus* is known as Wiry Dock because of its tangle of flowering stems, but some plants of *R. brownii* can also show dense and tangled stems.

I suggest that carrying a magnifying glass into the field to look at seed-carrying stems will solve most of this particular problem. The seed-containing structures of Docks are all 3-sided, thick nearer the stem and tapering to their tips. Most of their surfaces are quite highly ornamented.

Rumex brownii has remarkable texture on each of the three surfaces on every matured seed structure: photo 1 shows nine fruit still attached in two whorls around the green stripy stem. Also note the curved hooks coming from the sides and, diagnostically according to the description and key in plantnet.rbgsyd.nsw.gov.au, the tip of the fruit. The scale bar here represents 0.5 mm. These hooks are, of course, how the fruit and seeds become spread on our clothes and presumably on animal fur.

Rumex dumosus is also quite textured but does not have the 'hookiness' and neither the spike nor the hook at the tip: see photo 2, with fruit, a little smaller than those above, that have been stripped from the stem. This image also shows the glossy, tapered, 3-sided seed of this species, with a scale bar 1 mm long.

I hope that now readers know these features, you will have added confidence in your field ID of these native Docks.

I also picked some of the introduced weedy Dock, *Rumex crispus*. This is usually a far bigger plant, so is unlikely to be confused with the two natives, but I was curious about its fruit structure. Again the dried fruit (stripped from stem) are 3-sided and tapered, but the surface has no spikes or hooks: see photo 3. Instead, each of the three sides has a bulge that looks a bit like a micro-peanut shell and is called a tubercle (as was the tiny structure on *Panicum* leaves that I showed readers in the last *News of FOG* (fog.org.au/Newsletters/2019-01newsletter.pdf). The freed Dock seed at bottom right of photo 3 is like that of *R. dumosus*. At the top left, the seed remains within the fruit but visible because two of the three valves are pulled back. The scale bar here is 0.5 mm long.

All images by John Fitz Gerald.

1. *Rumex brownii* – stem carrying whorls of hooked fruit.

2. *Rumex dumosus* – stripped fruit and one seed.

3. *Rumex crispus* – stripped fruit and two seeds, one still held in its fruit.

Eastern Grass Owl, flying on silent wings at night and roosting in long grass by day

Michael Bedingfield

Most owls like to roost and nest in trees, but Eastern Grass Owls spend their daylight hours hiding out in the dense vegetation of their chosen habitat, which is mostly tall grass.

They roost on the ground or on a platform of trampled grass using thick tussocks as protective cover. In an established roosting area they may have several such platforms with associated tunnels that they build through the vegetation. A breeding nest can be one such platform of trampled grass or a scraped hollow on the ground. This way of living is unique among Australian owls. Their preferred habitat is mainly tall grasslands in grassy plains, floodplains or swampy areas. They also take advantage of agricultural land and will inhabit sugarcane, sorghum and fallow rice fields.

This bird has the scientific name *Tyto longimembris*. It is not found in the local ACT area but has been recorded in all Australian states except Tasmania. The strongest populations are in north-eastern and northern Australia, mainly Queensland, and close to the coast. In NSW they are found mostly in the north-east. They also occur throughout eastern, southern and south-eastern Asia, as well as New Guinea and the western Pacific islands. Though the species has been declared vulnerable in NSW, there is no concern for its future elsewhere in Australia. Possible predators are foxes, feral cats and feral pigs. Its closest relative is the African Grass Owl *T. capensis*, which lives on that continent and has very similar looks and habits.

Both Grass Owls belong to the Barn Owl family Tytonidae, members of which have their facial feathers formed into a disc that is usually heart shaped. This arrangement is designed to help capture sounds and their hearing is acute. Eastern Grass Owls hunt at night, flying on broad silent wings that have feathers especially designed to muffle any sounds from their moving wings. They travel with a slow flapping and gliding flight, roughly four or five metres above the ground and hover intermittently. They listen for any noise or rustle coming from the movement of animals on the ground. While they have good night vision they depend more on sound when hunting for food. When prey is detected they will plunge downwards with head and legs extended forward and wings held back, capturing the animal in their sharp talons. Eastern Grass Owls feed mainly on rodents, but may also take other small animals. Their numbers are known to fluctuate widely depending on the rodent populations. Numbers tend to build up during mice plagues when they will congregate in the affected area. When the food source has dwindled they will disperse again to suitable habitats.

The drawing I have provided is of the Common Barn Owl, *T. alba*, which is also closely related to the Grass Owl and is found locally. It occurs all over Australia and in most parts of the world except where it is very cold or very dry. It is coloured brown and fawn above with markings of black, white and grey. Below it is white with darker markings. It is very similar in appearance to *T. longimembris* and can easily be mistaken for it, with the differences being in the colour of the plumage, the length of the legs and the size of the eyes.

The Eastern Grass Owl is much the same size as the Barn Owl. The adult body length from beak to tail tip is about 35 cm with the female being slightly larger. It is dark brown above with pale spots, and creamy white with brown spots below. The legs of the Eastern Grass Owl are longer than those of other Barn Owls, reflecting the needs for foraging in its chosen habitat. It also has smaller eyes. The main calls include a cricket-like chirping or a hoarse wavering reed-like screech. Photos of the bird may be viewed at the references given below.

I found out about the Eastern Grass Owl in Peter Slater's book *Rare and Vanishing Australian Birds*, published in 1978 by Rigby. At that time it was considered to be rare but this was mainly because it is not often seen and very little was known about it. It is hard to find in its dense grassy habitat and it has quiet nocturnal habits as well. It is usually discovered by accident when flushed out of its hidden roosting places. The bird has a very interesting life indeed and it is great that we know more about it these days.

References

https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10819

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https://en.wikipedia.org/wiki/Eastern_grass_owl

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https://www.brisbane.qld.gov.au/sites/default/files/conservation_action_statement-grass_owl.pdf

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Latitudinal differences in research habits of grassland ecologists

Rachel Standish & Scott Strachan

We have been working on a research project at Murdoch University in Perth, Western Australia, in collaboration with local, national and international colleagues to explore whether ecological concepts and theories in the academic literature are influenced by the places where authors live and work. Our study contributes to ongoing efforts to develop a global perspective of grassland ecology.

This project was partly funded by a supported-projects grant of $1500 from the Friends of Grasslands.

We focused on the terrestrial grassland ecology literature because it is extensive: native and modified grasslands (e.g. post-agricultural) are widely distributed throughout the world and, consequently, ecologists have often used grasslands to test ecological theory. We know from personal experience that ecologists often think about a local grassland when presented with an unfamiliar theory. The curious ecologist will wonder if the new theory applies to their local grassland and will set about testing it. A new theory gains traction and becomes established when it resonates with ecologists working all over the world.

We were interested to study the development of ecological theories (e.g. see Box 1) that have been tested in the world's grasslands.

First, we asked: how much of what ecologists study about grasslands depends on where and when they work and who they work with? We used latitude to characterise places where ecologists work because it correlates with climate that in turn determines the geographical distribution of plants and of people.

Academic literature on grasslands

To identify studies of grassland ecology we searched the Scopus database (1900–2016) using a string of key words that incorporated an exhaustive list of terms used to describe the world's grasslands (e.g. prairie, rangeland, savannah, pasture, grassveld). The Scopus database was fit for this purpose because it holds an extensive, continually updated, and searchable literature on grassland ecology. We identified papers that were not original tests of theory (e.g. reviews, letters to the editor) using a second string of key words and excluded these from our analyses. Our filtered search uncovered 22,426 papers published in the period 1900 to 2016 with the first appearing in 1916. We analysed publishing trends according to the primary author's latitude, publication date and word usage.

Hotspots for grassland ecologists

Ecologists in the temperate northern hemisphere latitudes have published three times as many papers as ecologists who have lived and worked at other latitudes (Figure 1). Ecologists living in the United States of America (30–40°N), Europe (40–60°N), Australia (30–40°S) and the United Kingdom (50–60°N) wrote the majority of papers on grassland ecology between 1961 and 2016. Their productivity likely reflects each country's expenditure on ecological research and development. Since the mid-2000s, authors living in China (30–40°N) have increased their contribution to the global literature on grassland ecology reflecting increased investment in ecological research and development.

Dr Jodi Price and Mr Tim Morald recording data in modified grassland at Pingelly, south-western Australia. The site is part of a globally distributed experiment on the effects of nutrient addition and herbivore grazing on grassland dynamics (https://nutnet.org/).
Photo: Rachel Standish.

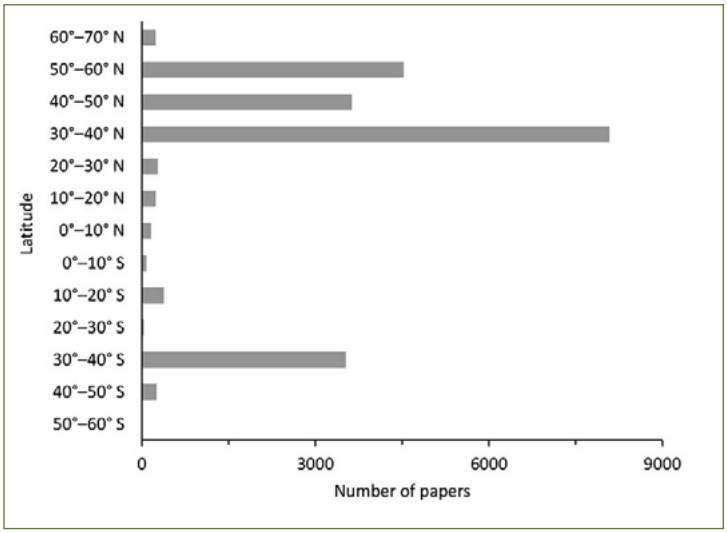

Figure 1. Number of papers published on grassland ecology between 1961 and 2016 according to latitude of the lead author at the time of publication. The top three contributing countries per 10° latitudinal band were as follows; numbers of papers appear in brackets after each country.

60–70°N: Finland (228), Norway (198), Iceland (10);
50–60°N: United Kingdom (1436), Germany (960), Sweden (420);
40–50°N: Spain (999), Canada (998), France (605);
30–40°N: United States of America (5993), China (1156), Japan (325);
20–30°N: India (214), Taiwan (21), Hong Kong (18);
10–20°N: Mexico (140), Venezuela (33), Puerto Rico (17);
0–10°N: Ethiopia (42), Malaysia (19), Colombia (18);
0–10°S: Kenya (39), Tanzania (12), Indonesia (10);
10–20°S: Brazil (309), Zimbabwe (46), Zambia (10);
20–30°S: Botswana (15), Namibia (7), Swaziland (4);
30–40°S: Australia (2491), South Africa (548), Argentina (420);
40–50°S: New Zealand (255);
50–60°S: Falkland Islands (1).
There were no other records for latitudinal bands 40–50°S and 50–60°S.

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Latitudinal differences in research habits of grassland ecologists, continued

What topics do grassland ecologists study?

There was considerable overlap in word usage among authors at different latitudes, and some notable variations (Table 1). For example, 'forest' appeared frequently, particularly in the northern hemisphere papers. Authors publishing at latitude 30–40°S (including Australia) mentioned 'fire' frequently, and authors publishing at latitude 20–30°S (including China) used 'carbon' more frequently than authors elsewhere. Interestingly, Australia-based and New Zealand-based authors frequently reminded their audience of the location of their study by including 'Australia' or 'New Zealand' in the title, keywords, or abstract whereas authors publishing from the United States of America or United Kingdom mentioned the location of their study less often.

Grassland ecologists collaborate more than ever

While we anticipated an increasing tendency for ecologists to collaborate, the results are striking! Since the mid-1990s, papers by groups of collaborating ecologists living and working in different parts of the world have steadily increased, and now out-number papers by individual ecologists or groups of ecologists living and working in the same place (Figure 2).

This tendency to collaborate with ecologists from elsewhere is likely to have significantly affected the development of general theories in grassland ecology. Working with ecologists from different places helps to reduce the influence of regional perspectives on the development of ecological theory especially if colleagues can visit each other's local grasslands and discuss ideas on-site. The South African ecologist might share the importance of limited soil nutrients for driving grassland dynamics whereas the Spanish ecologist might share the importance of land-use history.

What theories have been tested in grasslands?

Ecology is awash with theories. One of the oldest theories in ecology, successional theory, has a long history of being tested in grasslands. Our records indicated a rise in the mid-1990s,

Rachel's American colleague Dr Jennifer Funk measuring gas exchange on grasses at a site in Cape Town South Africa that is well-known to our collaborator Professor Will Stock. Visiting one anothers' study systems and sharing ideas ultimately improved our understanding of grassland ecology; and specifically, in this case, the traits of weeds in Mediterranean-climate regions.
Photo: Rachel Standish.

Table 1. The six most frequent words used by authors in their title, keywords and abstract to describe their research on grassland ecology.*

Latitude	Words
60–70°N	Forest, species, soil, effect, studies, plant
50–60°N	Species, soil, forest, plant, use, **differ**
40–50°N	Species, soil, forest, plant, use, effect
30–40°N	Soil, species, forest, plant, use, effect
20–30°N	Soil, species, forest, tree, differ, **carbon**
10–20°N	Species, soil, forest, plant, use, tree
0–10°N	Soil, species, forest, tree, studies, use
0–10°S	Species, soil, use, forest, differ, tree
10–20°S	Species, forest, soil, plant, area, use
20–30°S	Species, soil, studies, **vegetation**, use, area
30–40°S	Species, soil, use, plant, **fire, vegetation**
40–50°S	Soil, species, plant, forest, New, Zealand

*Latitude is where the primary author was based when the papers were published. Between 1961 and 2016, the number of papers published in 10° latitudinal bands ranged from 33 to 8083 papers; latitude 50–60°S has been excluded as there was just one paper. Words are listed in order of frequency of usage, from most to least frequent. Effect includes 'effect' and 'effects' and differ includes 'differ' and 'different'. Words particular to latitudes appear in bold, likely reflecting cultural and economic drivers of ecological research.

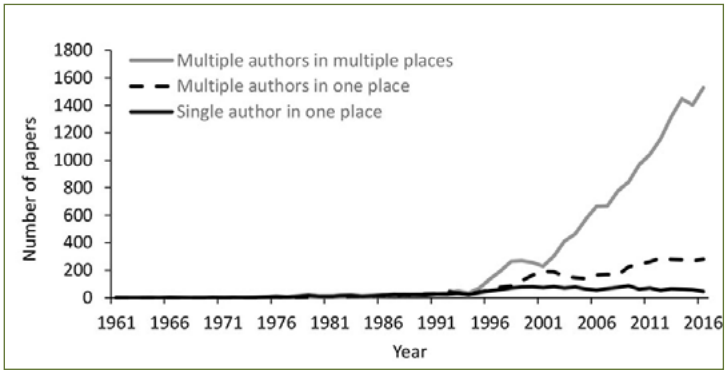

Figure 2. Number of papers published between 1961 and 2016 by ecologists working by themselves and with other ecologists in the same or different places.

Of the top five countries that contributed most papers, Chinese and Spanish ecologists collaborated more frequently than ecologists in the United Kingdom (UK), Australia, and the United States of America according to numbers of multiple-author papers as a percentage of the total papers published per country from 1961 to 2016: China 99.7%, Spain 96.5%, USA 90.3%, Australia 88.9% and UK 86.7%.

While ecologists from all five countries tended to collaborate with ecologists from different places rather than the same place, this tendency was particularly pronounced for Chinese ecologists (84.7% multiple-author papers had multiple affiliations), followed by American ecologists (79.8%), UK ecologists (78.1%), Australian ecologists (76.3%) and Spanish ecologists (71.9%).

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Latitudinal differences in research habits of grassland ecologists, continued

coinciding with the rise in papers testing disturbance theory. Both remain popular theories in contemporary papers, followed by tests of niche theory, ecosystem function and island biogeography. All five theories have relevance to the restoration and conservation of grasslands, which could have contributed to their popularity (Figure 3, Box 1).

Conclusions

Our review shows that ecologists living and working in the northern hemisphere have contributed more empirical papers to grassland ecology than ecologists in the southern hemisphere. Ecologists tend to study similar topics regardless of latitude. We discovered that ecologists collaborate more than ever before and especially with ecologists from different places. We identified five key theories that ecologists have commonly tested in grasslands all over the world. The next step in our research is to explore whether these theories have been tested in some parts of the world more than others. Our work provides a historical basis for ongoing efforts to develop a global perspective of grassland ecology.

Acknowledgements

We would like to thank FOG for providing a research grant. The grant was used to pay Scott R. Strachan for his help with data analyses. We acknowledge our co-authors Eric Seabloom, Eric Lind, Elizabeth Borer, Suzanne Prober, Jodi Price, Jennifer Firn, Joslin Moore, Sally Power and Glenda Wardle for their contributions to this research.

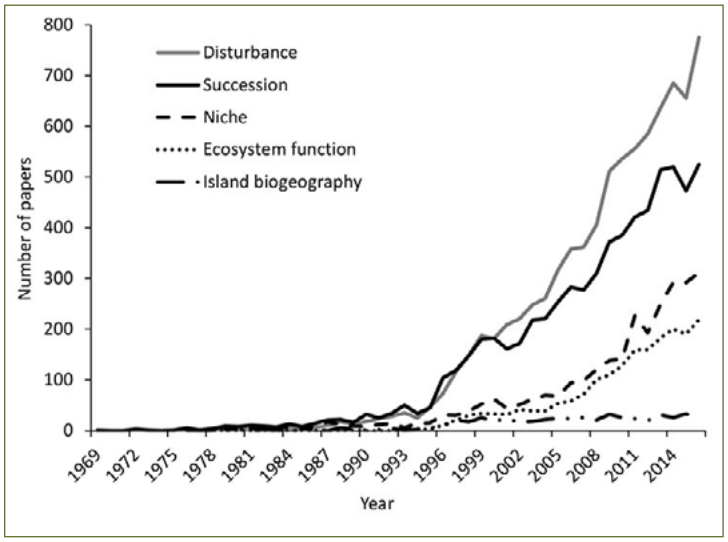

Figure 3. Number of papers published between 1969 and 2016 testing five key ecological theories (Box 1). Other theories have also been tested in grasslands, including neutral theory, theory describing competition, facilitation, recruitment limitation and herbivory, to name a few.

BOX 1: Five key ecological theories applied to grasslands (Figure 3)

Disturbance theory: Grassland communities respond to disturbance events (e.g. fire, drought) in ways predicted by species' life histories and characteristics of disturbance (e.g. intensity, frequency).

Succession theory: Describes directional changes in grassland communities over time. Ecologists study factors that affect these changes such as ant-mediated seed dispersal, which in turn, affects plant species' arrival into a community. Succession can take decades (e.g. old-field succession) to centuries (e.g. succession on lava flows after volcanic eruption).

Niche theory: The niche describes the environment in which a species can survive and reproduce. The fundamental niche is defined by a plant species' tolerance of key environmental factors such as temperature and soil moisture. No species occupies its entire fundamental niche because of interactions with other species (e.g. competition) or failure to disperse to suitable environments. The range of environmental factors in which a species is actually distributed is called the realised niche.

Ecosystem function theory: Ecosystems include organisms and their environment. Ecosystem function theory considers the movement of energy and materials and factors that contribute to the stability of functions at a range of spatial and temporal scales. For example, grassland ecologists have studied the contribution of biological diversity to ecosystem function at plot to landscape scales.

Island biogeography theory: The number of species living on an island will be determined by island area such that species extinctions will be balanced by colonisation of new species. This theory has been applied to patches of vegetation in fragmented landscapes too (e.g. agricultural landscapes where native 'island' patches are surrounded by a 'sea' of farmland). In this context, large patches close to seed sources are predicted to maintain more species and to receive more colonists than small, isolated patches.

FOOTNOTE: Rachel and her students have been filmed for a segment on ABC's *Gardening Australia*, about recovery of native vegetation near a formerly proposed highway that was to be called 'Roe 8' (https://www.abc.net.au/news/2016-10-11/roe-8-highway-extension-in-western-australia-explained/7923658). The segment is scheduled to be in the *Gardening Australia* program on **Friday 15 March, 7.30 pm**, repeated the following Sunday at 1.30 pm. It can also be watched on ABC iview after it is first broadcast.

A collective of cicadas?

During Canberra's hot summer, cicadas emerged from the soil, climbed nearby trees, split and abandoned their old coats (seen here in Stirling Park) and emerged as winged adults. *Photo: Jamie Pittock.*

Comment

ABC *Catalyst*: 'Allergy Clinic'

I watched a good episode of the ABC TV science show *Catalyst* that was broadcast on 12 February. It was well done and focused on many aspects of allergies, their identification and treatment. I recommend that you catch it soon on ABC iview (https://iview.abc.net.au/) if you missed the show on air, even if you are lucky enough not to suffer from this common health problem.

One of the topics featured was allergic reaction to grass pollens, and the report delved into work of Professor Janet Davies, Head of Allergy Research at Queensland University of Technology and Investigator on the NHMRC AusPollen Partnership. One of her foci is to develop inexpensive techniques to quickly and reliably test for allergic responses to grass pollens, in the hope that one day such testing will be accessible by a routine trip to a GP. Another focus for her is the better forecasting of pollen loads in the air. Both of these aspects were explored in *Catalyst* in a very informative way.

However, one aspect of the coverage tempered my enthusiasm: namely, the repeated use of the term "Australian sub-tropical grass pollen". Usage of the term was not specific, and was potentially misleading. When you hear this term in the broadcast, please translate it to "pollen from grass grown in sub-tropical Australia".

I have been in contact with Prof. Davies and refer you to details in a 2014 publication of hers*. These confirm that allergenic reaction in humans for sub-tropical grasses is overwhelmingly due to species introduced into Australia and cultivated widely. A possible exception is *Cynodon dactylon*, or Couch – see next paragraph. I think that the broadcast shows Prof. Davies being interviewed holding a Couch inflorescence. Her paper states that the reactions to grass pollens in sub-tropical regions are more severe than in temperate regions.

Cynodon dactylon is a worldwide species, but does have forms that are considered endemic in northern Australia. Web searching will tell you Couch is worldwide and invasive in many countries, going under the common name Bermuda Grass in the northern hemisphere. Information at the website 'Environmental Weeds of Australia' goes as far as to say:

> 'The majority of current opinion is that at least some forms of green Couch (*Cynodon dactylon* var. *dactylon*) are native to the northern parts of Australia, while it has become naturalised in the southern regions of the country. However, the most recent research suggests that even the "native" forms present in northern Australia probably came from a very early (i.e. possibly pre-European) introduction'.

Therefore, I'd argue that Couch is not a native species in grasslands, and therefore that it does not discount any claim that grass species with allergenic pollens are dominantly (or wholly?) introduced into Australia.

Readers may remember that in September 2017 I took exception to a journalist who became overexcited about Canberra's grasslands and pollen (see *News of FOG* Nov–Dec 2017). I won't go that far with this *Catalyst* episode, but I do feel that lack of specifics in their approach is not helpful to FOG's objective of bringing more people to appreciate and be comfortable in Australian native grasslands.

After you follow up with iview, let me know what you think.

*Reference

Davies J.M. (2014). Grass pollen allergies globally: the contribution of subtropical grasses to burden of allergic respiratory diseases. *Clinical & Experimental Allergy* **44**, 790–801.

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Of interest

Land-carers on Tuggeranong Hill

Michael Bedingfield has sent this news from Vera Kurt, the coordinator for the ***Friends of Tuggeranong Hill*** *(FOTH). Vera calls Conder 4A 'Michael's patch', because of his enormous contribution in having it set aside from urban development over a decade ago.* (*See News of FOG, Nov–Dec 2016, at* www.fog.org.au/newsletter.htm.)

On Sunday the 10th of February, seven keen members of FOTH met and worked for three hours at the site formerly known as Conder 4A on Tuggeranong Hill Reserve, attacking the weeds in a vigorous manner. They did a lot of briar rose, privet and sundry garden escapees, including a few grevilleas. They also removed a fair bit of rubbish. They focused mainly on the lower area although they did cover quite a bit of the patch. They were a very keen group; hardly even liking to stop weeding for a drink! Vera said she would probably schedule a follow up next year. Their efforts are very much appreciated.

Conservation Council running walks in four of ACT's natural spaces during April

https://conservationcouncil.org.au/heritage-walks/

The Conservation Council ACT Region is holding walks during the 2019 Canberra Heritage Festival, to show participants some of 'the natural treasures of the ACT Region'. Their walks will explore 'some of the lesser known natural "spaces" in the ACT as well as new aspects of some old favourites'. Expect some or all of each walk to be 'off-track'.

Bookings open on Wednesday 13 March.

Red Hill Nature Reserve
Sunday 14 April 2019, 10.00 am – 12.30 pm.
Red Hill Nature Reserve protects Box–Gum grassy woodland, and has interesting history.

Kama Nature Reserve
Tuesday 16 April 2019, 7.30 – 9.30 am.
Box–Gum grassy woodland and grassland restoration trials; an area known for its birds.

Kinlyside Nature Reserve
Thursday 18 April 2019, 10.00 am – 12.00 pm.
Box–Gum grassy woodland, Pink-tailed Worm-lizards and Golden Sun Moths ... and sheep.

Mulligans Flat Nature Reserve & sanctuary
Sunday 21 April 2019, 3.00 – 5.00 pm.
Box–Gum grassy woodland; and reintroduced mammals and birds.

More detail is given under each walk title at the web address above.

Recent FOG activities

Theodore Grassland Thursday 31 January

Margaret Ning

It was an inspired suggestion, to shift our Theodore grassland activity to the cooler time of 8 am. While it was unfortunate that a couple of people could no longer make the new time, we were at least able to go ahead with the activity. I think we would otherwise have called it off, as the forecast was for 35 degrees.

Even with an 8 am start, all eight of us took advantage, whenever we could, of being in shade to discuss things. The shaded flora saw a lot of us on the day!

My main observation for the site is that it has the most abundant display of *Tricoryne elatior* I have ever seen. While none of it was currently flowering, its abundance was still readily apparent, once we had our eye in.

Theodore grassland, part of Tuggeranong Hill Nature Reserve, is a lovely grassland that I have visited four times in the last two years. The site is a curious mix of grassland and grassy woodland areas, with the latter including some very rocky parts that scream 'Pink-tailed Worm-lizard'. In an open area of the grassland, you can find Theodore's axe-grinding grooves, an important piece of Aboriginal cultural heritage. We briefly moved into the full sunlight to look at the grooves.

Over the last two years a species list of around 80 native plants has been compiled for the site. It is a site where visits at different times of the year can still yield new interesting and uncommon plant species. After an April 2018 visit, *Fimbristylis dichotoma*, a small sedge, and *Laxmannia gracilis*, a relatively inconspicuous lily, were added, for example. On this 31 January visit, the *Fimbristylis* was widespread across the site although most plants were past their prime.

The understorey differs over the seasons, and after the spring flowering finishes the grasses take over in diversity as well as abundance. Our visit proved that late January is a great time to view our area's native grasses. Of the 18 native grass species on the species list, 16 of them were in flower.

On this occasion we also added seven new species to the species list, including *Digitaria brownii*, which was widespread at the site. This led us to discuss what species we thought we had been looking at in the past, when only its vegetative parts must have been evident. It has a very distinct appearance and growth habit, but I am still wondering ... Red Leg Grass?, *Dichelachne*? or what?????

The main weeds at the site are St John's Wort and African Lovegrass, but even they do not need a massive amount of intervention. There are also a couple of dozen native garden escapees that could be removed by a serious cutting and daubing session. A small amount of TLC would yield huge results.

...continues on next page

At the start of the visit, looking south across the site. *Photo: Geoff Robertson*.

One of Tuggeranong's treasures, the Aboriginal axe grinding grooves. *Photo: Andy Russell*.

Looking north across this open grassland. *Photo: Geoff Robertson.*

Theodore Grassland continued

The site was looking fabulous. Its diverse range of both forbs and grass species had presumably benefited from December's and January's rains. The inter-tussock spaces were perfect, the basic *Themeda* understorey was at a healthy height and flowering, and there was no sign of a hammering from any kangaroos.

By the time we called it a day just before 10 am, the temperature had already reached 29 degrees.

Some native garden escapees at Theodore Grassland. *Photo: Cath Blunt.*

A rocky outcrop, mid-morning,Theodore Grassland.
Photo: Geoff Robertson.

And ... An exciting sighting near the western scrape at Yarramundi, in December 2018

It isn't really a consequence of the 'Demonstration Revegetation' project, but close to our western scrape when I was there checking regrowth in December I sighted a **Perunga Grasshopper** *Perunga ochracea*. This was the first logged sighting of the species at Yarramundi Grassland since **2005**!

The photos I took that day are on Canberra Nature Map, at https://canberra.naturemapr.org/Community/Sighting/3878636.

John Fitz Gerald

February update on FOG's 'Demonstration Revegetation' at Yarramundi Grassland, ACT

John Fitz Gerald

Continuing the story of FOG's small-scale demonstration of the 'scrape and sow' technique for regenerating native grasslands. Episodes 1 and 2 were in News of FOG Nov–Dec 2018 and Jan–Feb 2019.

It has mostly been a waiting game at the Yarramundi Grassland scrapes over the past two months. However, sowing will occur one morning in April, during the week April 8–12.

Any interested volunteer *who so far has not contacted* john.fitzgerald@fog.org.au, should do so *now if you would like to be kept advised* of the final date and would like to help with the sowing work.

Just as an advice, the ACT Government will do some filming of this sowing event as part of their documentation of outcomes of the ACT Environment Grants.

Over the past two months, weeds in and around the scrapes have been controlled with herbicide and their seeds have been collected and removed. Full control has not yet been achieved.

Unquestionably more interestingly, readers might like to know that some native plants regrowing in the scrapes have developed enough to flower and set seed. One of the most exciting (and a little unexpected) is Australian Bindweed, *Convolvulus angustissimus*, with a few plants producing one or two bright pink flowers; one has actually dropped mature seed.

Other natives in seed are *Cynoglossum suaveolens* and *Panicum effusum*. All this, of course, happened without FOG adding a single new seed into the scrapes. Very promising.

A papery capsule from Australian Bindweed in one of the two Yarramundi scrapes. The capsule has split open and released a few chunky black seeds, around 4 mm long.
Photo: John Fitz Gerald

Launch of 'Welcome to our Yass Gorge'

Geoff Robertson

On 7 February, a new (70 page) book, *Welcome to our Yass Gorge*, was launched at Banjo Paterson Park in Yass, NSW. The book tells the fascinating story of Yass Gorge, described as 'a natural history and cultural asset in the centre of Yass'. The authors are FOG members Geoff Robertson and Ryl Parker, and many FOG members and others well known to FOG are recorded as contributors to the book. Seventy people attended the launch. The book was published as part of a Kosciuszko to Coast (K2C) project on the Gorge which was undertaken with the assistance of the NSW Government through the NSW Environment Trust.

The book describes how best to experience the Gorge, and discusses its history, geology and physical features bisected by the amazing Yass River, and the importance and beauty of its Natural Temperate Grasslands and River Red Gum and riparian vegetation, its many species of native grasses, wildflowers, birds, reptiles, fishes and frogs, and, importantly, its threatened species. The book aims to be an easy read: one half of it comprises images to reveal the landscapes, plants and animals of the Gorge, and much more. A map of the Gorge illustrates its pathways and many features – an ideal way to learn about and experience the Gorge. The map also highlights the location of signage situated at several sites around the Gorge.

The book contains much material on Yass Gorge's traditional owners, the Ngunnawal People, who since the white settlers arrived have not been treated well. The book describes their recent association with the Gorge; what they have to teach all of us about their traditional land management practices, still highly relevant to the Gorge's future management; and their bush tucker, the first Australian food and one of many now available in Australia.

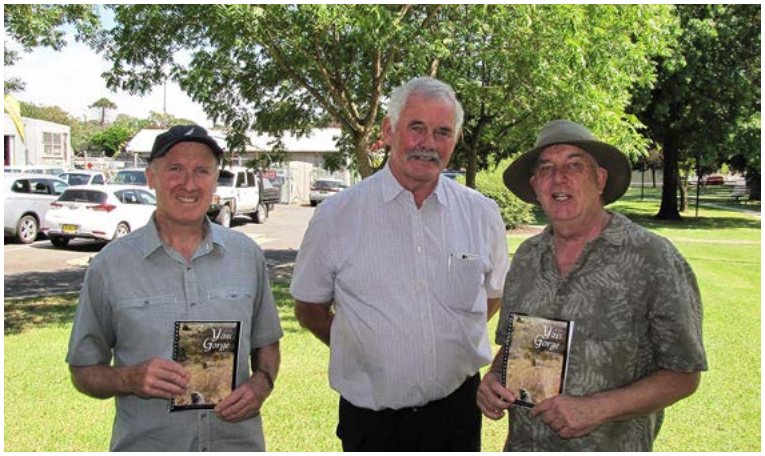
In the mid-1980s, the Gorge was weed infested and difficult to visit. Since then many individuals, groups and Yass Valley Council have worked closely together and removed weeds, planted new plants, and put in major pathways and facilities so that the Gorge is now a pleasure to visit and experience. The book describes the many projects that have taken place, and illustrates how many small efforts may transform areas like the Gorge. It also describes visits to the Gorge by schools, scouting groups, and members of landcare, grassland and bird groups, and ways the Gorge may be used for learning and enjoyment and to contribute to its care.

The book contains a list of native and non-native plants and animals found at the Gorge, compiled from surveys and by groups and individuals over time. FOG has visited the Gorge several times over the years and has undertaken plant surveys there. The book also describes how citizen science can add to our knowledge of the Gorge.

The book is free, and limited copies are available (inquiries: info@fog.org.au).
It may also be downloaded from:
https://www.dropbox.com/s/rfbun5bsvi8oqj3/Welcome%20to%20Our%20Yass%20Gorge%2C%20Final.pdf?dl=0

L-R: Ken Bell (Ngunnawal Elder & Chair of Buranya Corporation), Geoff Robertson (FOG), Ross Webster (Friends of Yass Gorge (FoYG) & Yass Area Network (YAN)), Karen Williams (President, K2C), Rowena Abbey (Mayor, Yass Valley Council), Hon. Dr Mike Kelly (Federal Member for Eden–Monaro). Photo: Andrew Zelnik.

Jill McGovern (FoYG & YAN, front row, right end), with Geoff Robertson (left rear) and Ken Bell (right rear) presenting the book to local primary and high school children. *Photo: Andrew Zelnik.*



L–R: John Briggs (NSW OEH & K2C), Ross Webster (FoYG) and Rainer Rehwinkel (FOG). *Photo: Andrew Zelnik.*

Commentary

ALG in the suburbs

Geoff Robertson

Geoff writes here about the article in the Canberra Times in January, reporting dense African Lovegrass along roadsides this summer. The article is online at https://www.canberratimes.com.au/environment/conservation/the-aggressive-african-lovegrass-disrupting-canberra-s-ecosystem-20190110-p50qit.html

On the morning of 10 January, I received a call from Steve Evans of the *Canberra Times* (CT) to ask my 'expert' opinion on African Lovegrass (ALG; *Eragrostis curvula*).

I offered to show him a patch. That resulted in the article noted above, called 'The aggressive African lovegrass disrupting Canberra's ecosystems' (12 January, CT), in which Steve Taylor (ACT Parks and Conservation Service), Dr Arnold Dekker (of Sutton Landcare and FOG) and I (FOG) were quoted. On the following Tuesday I was interviewed on ALG by Richard Perno (Canberra radio 2CC).

I believe that this was good publicity on a complex issue. While ALG seems uncontrollable, it is controlled in the greater part of the ACT, (Namadgi, Canberra Nature Park, and many rural leases), as are other grasses – such as Chilean Needle Grass (CNG) and Serrated Tussock (ST).

At the 21st Australasian Weed Conference (2018), Steve Taylor, Jenny Conolly and Renee Brawata (all of the ACT Parks and Conservation Service) presented a paper, 'Collector app mapping to assess effectiveness of invasive grass control'. It is online at http://caws.nzpps.org/awc/2018/awc201811811.pdf and reports on their successful efforts to control ALG, CNG, and ST in Canberra Nature Park grassland reserves with the aid of the new *Collector for ArcGIS* App.

The Bush Heritage property 'Scottsdale', near Bredbo NSW, has had remarkable success in controlling ALG. Low-dose boom spraying with the herbicide flupropanate in native grass and ALG pastures has 'rolled back' ALG, allowing native natural temperate grassland (NTG) to reemerge in some areas, although in other areas annual weeds have reemerged.

At Old Cooma Common (Cooma NSW), where FOG has played a major role, ALG has been kept at bay by periodic spraying. There are numerous other examples of ALG control. Interestingly ST, which is as invasive as ALG and CNG, is largely controlled in the Canberra region.

While there are many factors in the spread of ALG, Canberra's mowing regime is rapidly expanding ALG and CNG. I recall when ALG and CNG were absent from Gungahlin; then one day I saw two plants of ALG in the front lawn of a Ngunnawal house. Now these grasses are widespread, mostly in areas subject to frequent mowing by government-funded workers.

Top: Unmown Lovegrass looks like a mist as you drive by. *Below:* Up close, you see the 'mist' consists of thousands of seeds. *Photos:* Liz Harrison.

I believe that the ACT Government will in the near future need to devise a plan to control these grasses. However, I would be unhappy if this was at the expense of other biodiversity objectives.

How could it be done? Public education, a small team of spot sprayers, and a mowing regime that does not mow using unclean mowers in clean (or mostly clean) areas. This would cost about $300,000 – $500,000 per year, but over 10 years these approaches should reduce these weed grasses to a low manageable level.

Volunteers, using Collector App, may be of great assistance.

What would replace the nasty grasses?

Other native and exotic grasses are likely to replace these nasties readily, and, interestingly, native spear grass, wallaby grass and windmill grass are already highly competitive on our nature strips and roadsides. Our knowledge of sowing and growing native grasses is rapidly increasing. Native grasses often require less biomass control (mowing) than do exotic grasses. There are many win–wins.

Ginninderra Peppercress!

FOG member, professional biologist Alison Rowell, featured in the *Canberra Times* having found Ginninderra Peppercress at a 'new' location in Symonston ACT.

https://www.canberratimes.com.au/canberra-news/why-this-unremarkable-native-canberra-shrub-is-a-sign-of-the-times-20190206-p50w3i.html

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advocacy@fog.org.au

Website matters: webmanager@fog.org.au
FOG's comprehensive website gives: the calendar of FOG happenings; information about grasslands and grassy woodlands; proformas for applications & orders; all advocacy submissions; all newsletters (including the most recent).

Dates to note, March – July

Sat 2 March	Workparty at Hall Cemetery woodland
Sun 3 March	Walk at Gundaroo Common, NSW
Weds 13 March	Bookings open for Heritage walks
Fri 12 March	Committee nominations (written) due by now
Sat 16 March	Twilight walk at Stirling Park, ACT
Tues 19 March	FOG AGM, Canberra
Sun 31 March	Workparty at Stirling Park woodland
Sat 6 April	Workparty at Hall Cemetery woodland
8–12 April	Sowing Yarramundi 'Reveg' scrapes this week
12–14 April	Revisit property near Deua NP, and caves
Sun 14 April	Workparty at Stirling Park woodland
14, 16, 18, 21 April	Heritage Festival walks in grassy woodlands
Mon 15 April	Closing date for applications for project grants
Sun 5 May	Workparty at Stirling Park woodland
10–12 May	Visit Morundah NSW, opera and grasslands
Sun 26 May	Workparty at Stirling Park woodland
Sun 26 May	Workparty at Yarramundi Grassland
Sat 1 June	World Environment Day dinner
Sat 6 or 13 July	Mid-winter talks and tea (in planning)

In this *News of FOG* ...

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