

STEP NEWSLETTER SEPTEMBER 2022





Acacia pycnantha Golden Wattle, both left and right side, Acacia decurrens Early Black Wattle in centre

From the President

I am very happy to report that Forest 20 has now been re-opened to the public, just in time for us to host guided tours along the Wattle Walk as part of Wattle Week activities. Many thanks to STEPpers and volunteers from Friends of the Arboretum who gave up part of their weekend for a walk in the sun, bathed in the colour and scent of the wattles. (See item)

There are still some paths, and locations within the Bush Tucker Garden, which require remediation. The majority of the paths have been repaired and stabilised by Iconic Tracks and Trails and we appreciate the work they have done. (See item)

Despite the cold and wet conditions, there has been considerable activity undertaken by STEP volunteers. Jennie Widdowson has overseen a project to enhance the Ephemeral Wetland area (though ephemeral is currently somewhat of a misnomer). Excess *Carex, Juncus* and *Poa* had begun to "invade" the water area, so a huge (and muddy) effort has been made to reduce this biomass. (See item) In addition, a channel has been constructed to divert water from the Boundary Road into the wetland. While there is still more work to do, it is worth a visit just to hear the delightful frog chorus.

Another destination in Forest 20 created by STEP volunteers is the Gallery of Grasses (see item) where we are soon to have information signage.

The excess water along the dam side of Forest 20 has caused the demise of several *Acacia* species. Considerable hard work has been undertaken to dig blue metal and excess crushed granite into these sites to improve drainage. We appreciate the assistance of Pete Mealy and other Hort crew members.

Also in this newsletter is a report on a visit by the staff of Cool Country Natives.

Despite the cold and soggy weather and the prediction of the return of a Spring la Nina, we remain optimistic that our regional botanic garden will continue to attract visitors and demonstrate the wonderful floristic diversity of the Southern Tablelands.

Judy Smith

President STEP

Wattle Walk activities

The Wattle Walk at Forest 20 has suffered some plant losses during the last two wet years. several species such as :

Acacia obtusifolia, Stiff-leaf Wattle

Acacia lanigera, Woolly Wattle

Acacia kettlewelliae, Buffalo Wattle

Acacia buxifolia, Box-leaf Wattle

Acacia genistifolia Early Wattle

These species have all either totally disappeared or are in poor condition. In order to replace the plants, extensive remediation has been undertaken by STEP volunteers. First the heavy clay and old waterlogged planting sites are dug out, then other materials are incorporated. These include gravel, small rocks, and blue metal stones. They are mixed in with the clay and returned to the planting holes.

New plants have been sourced and replanting will take place in spring. The Wattle Walk has been used for guided tours. Fortunately, enough of the species, particularly those planted on the northwest perimeter, are growing well enough to show their form, foliage, and flower characteristics.



Judy Smith (left)welcomes Wattle Walk visitors to Forest 20 on Sunday 28th of August, photo Andy Russell

Four separate Wattle Walk took place to celebrate Wattle Day on September 1st. Jane Cottee, Georgie Till and Andy Russell took the groups through, on the last Saturday and Sunday of August plus Thursday 1st of September. The tours were well attended (about 35 came to visit) and provided an excellent opportunity to showcase the entire area that STEP volunteers care for. It was lovely to see members of the public walking through the recently reopened paths of Forest 20. Several individual groups were spotted strolling around and everyone gave positive feedback about the hard work and concepts behind Forest 20

Jane Cottee

Visit from Cool Country Natives staff

In late July several STEPpers hosted a visit from staff from Cool Country Natives (CCN), a plant nursery in Pialligo specialising in hardy and cold tolerant native plants. STEP maintains a close relationship with CCN as one of our main sources of plants from the Southern Tablelands. The group discussed our progress with repair and maintenance of Forest 20, and our need for a wide-variety of local plants as we recover. The visit assists CCN with their staff development program and builds our relationship with a key supporter.

The Gallery of Grasses at STEP, September 2022

The Gallery of Grasses project began in July 2020. Its aim is to demonstrate the diversity of our collection at STEP by planting out rows of spaced plants so that the diversity of the species can be compared.

At present we have 20 species. These encompass 5 sub-families and 8 tribes in the classification of the grass family (Poaceae), already a good representation of the native grasses of the Southern Tablelands of NSW.

This is how our present collection of grasses fits in the broad classification of the family

Family Poaceae	Subfamily (Ps type)	Tribe	Species
	Pooideae (C3)	Aveneae	Dichelachne crinita
		Poeae	Poa labillardierei
			Poa sieberiana
			Poa induta
			Poa ensiformis
		Stipeae	Austrostipa bigeniculata
			Austrostipa scabra
			Austrostipa densiflora
	Ehrhartoideae (C3)	Ehrharteae	Microlaena stipoides
	Danthonioideae (C3)	Danthonieae	Rytidosperma caespitosa
			Rytidosperma carphoides
			Rytidosperma pallidum
			Rytidosperma pilosum
	Chloridoideae (C4)	Pappophoreae	Enneagon nigricans
		Cynodonteae	Chloris truncata
			Sporobolus creber
	Panicoideae (C4)	Andropogoneae	Sorghum leiocladum
			Bothriochloa macra
			Cymbopogon refractus
			Themeda triandra

Grasses in their pre-flowering (vegetative) phase have a similar structure – a bunch of stems (tillers) and generally narrow elongate leaves. However, when in flower the diversity of flowerhead (inflorescence) types (eg spikes, racemes and panicles, spathes) and arrangement of the flower groups (spikelets) and the characteristics of the flowers themselves (glumes, lemmas, paleas and awns) and of the seed (caryopsis) are used in the classification of grasses. So, the familiar Kangaroo Grass (*Themeda triandra*) has a spatheate inflorescence (two reddish bracts at the base of the spikelet) and a spikelet of 7 flowers, 6 of which are male flowers producing pollen, and a single, awned bi-sexual floret that produces a seed. One can speculate why this arrangement is fitting. Grasses are predominantly open- or wind-pollinated, in contrast to many other flowering plants, in which insects or birds carry pollen between flowers, a more directed process. The spread of grass pollen for seed production is more of an undirected process and therefore requires more pollen to ensure fertilisation.

The collection also demonstrates a further distinction – that between the pre-flowering phase when grasses look the same, and flowering, when grasses display a wide range of flower arrangements.

In the collection we have relatively simple paniculate grasses like the Austrostipa (Spear grasses) and Poa that have single florets in the spikelet, next to more complex arrangements like that in *Themeda triandra* (Kangaroo Grass).

Other divisions among grasses may also be evident when they are grown together. Species like the Austrostipa tend to develop earlier in the season ie. flower in spring and are generally dormant in summer. This contrasts with the later, summer flowering species like *Themeda* and *Bothriochloa*

A further distinction related to the above is that between what are termed "C3" and "C4" grasses. C3 grasses have a default biochemical pathway of incorporation of CO2 into the plant (C3 referring to the fact that CO2 is incorporated into compound with 3 carbons), while in C4 grasses have a "turbo-powered" photosynthetic pathway, in which CO2 first appears in a 4-carbon compound. The C4 grasses have a specialised leaf anatomy that has the effect of maintaining high CO2 levels in the leaf that in its turn leads to higher photosynthetic efficiency than in C3 grasses. The details of the C4 pathway, now a basic element in the



grass story on the planet, was first elucidated by two CSIRO scientists working in Canberra in the 1960's.

The C4 pathway has evolved many times in plants and is thought to have arisen in response to survival under moisture stress and changing atmospheric CO2 levels. The C3-C4 distinction is also related to the geographic distribution of grasses in Australia. The grass flora of the hotter, sub-tropical and tropical regions of central and northern Australia is predominantly C4 (*Astrebla, Eragrostis, Sporobolus*) while the cooler, temperate regions of southern Australia is mainly C3 (*Austrostipa, Rytidosperma, Poa*).

We hope to expand the collection in the future through seed collection and propagation, and supply from native plant nurseries (Cool Country Natives).

Wal Kelman

Plan for rehabilitation and development of the eastern

end of the STEP wetland

Following the inundation of gravel in the wetland, it was decided that a number of changes and developments could be made to redirect and catch excess water from Boundary Road and the path beside the wetland. Additional creeks, a pool and a bog will be developed to demonstrate different types of wetland areas and their associated ecosystems. So far, with the continuing wet weather, it has been too soggy to do any planting, but a start has been made on the additional earthworks. The area marked as gravel on the plan below will be excavated to about 20cm deep, narrowing to nothing at the edges. The gravel washed from the paths in the higher areas of STEP can be removed from the area to remain as grass and used to fill the excavated area, but a coarser gravel will also need to be added to ensure that it is does not wash away during storms. In the flatter areas nearer the main pond, the finer gravel should be fine. The earth removed by the excavations can be deposited between the gravel area and the planted area towards the path to form a mound and then eventually mulched .Additional channels may be excavated to run between the path and the Poa island next to the steppingstones to help with drainage. A pool has been excavated at the base of the rocky drain to help to slow the water flow. Lythrum and Carex could be planted here.

Suggestions for plantings

Possible additional trees and shrubs (species that can tolerate water logging or are found along riverbanks) to be used for shade and habitat for wildlife:

Eucalyptus blakelyi Acacia pravissima Leptospermum juniperinum Leptospermum obovatum (seedlings available at western end of wetland) Grevillea juniperina (one already on Poa bank) Bossiaea bracteosa Pomaderris pallida Lomatia myricoides A selection of these species could be planted in the mulched area between Boundary road and the poa/rock area and also on the mounded mulched area (smaller species).Additional rushes could be added for diversity and comparison:

Possible species are:

Carex appressa (plenty of this already)

Carex fascicularis (in pots near main body of water - need to be planted out)

Carex bichenoviana (plenty of small plants available at western end of wetland)

Carex inversa (available in other areas of STEP)

Carex gaudichaudiana

Baloskion australe

Schoenoplectus validus (available near entrance to STEP)

Juncus australis and Gahnia sp.

Various species could be planted along the edges of the gravel, in the area between the poa/rock area and in the space above the buttercups.

The area below the Lomandra that edge the path could be used for planting various small flowering plants. It could also be used to demonstrate differences between similar species. The different forms of Grevillea lanigera already planted can be used to point out the diversity in the species. Other possibilities are different species of pelargonium (some already planted) and different species of buttercups (one species already planted). As there are already *Goodenia pinnatifida* growing there, it could be useful to plant some Velleia paradoxa for comparison. Other similar species could be added over time.

As there are currently no fern species in the wetland, it would be worth investigating if these could survive, especially once there is more shade. Possible species might be *Blechnum sp*. and *Adiantum sp*.

Additional work in thinning the current Poa and Carex in the areas either side of the main wetland is in progress as the rain-soaked ground allows. Changes and other developments will be made as the area



**Plan is not to scale

Plan of eastern part of wetland (showing proposed changes/additions

Article and plan Jennie Widdowson

STEPpers maintain their great recovery effort in Forest 20

Over the last six months when Forest 20 has been closed to visitors, STEPpers have been very busy repairing garden beds and renewing many parts of the path system, the latter in close cooperation with Arboretum staff. Without this consistent and dedicated work we would not have been able to re-open Forest 20 to visitors in time for this year's Wattle Day celebrations. Although many of our original plantings have been lost due mainly to waterlogged soils over an extended period there have been many welcome surprises uncovered by STEPpers during their weekly Working Bees. We have concentrated much of this work along the edges and corners of paths, so that where present, displays can welcome visitors as they flower this year. As you will see in the illustrations, STEPpers have excelled in their work to recover many species that themselves have shown great resilience in the face of prolonged water-logging, and competition from invasive weeds. Some examples of this work include:

1 Weeding substantial grass and biomass from under surviving plants

- 2 Remove debris, dead growth and weeds to display each species more clearly
- 3 Uncover surviving plants enabling supplementary plants
- 4 Discover species that had "disappeared" under gravel and rampart grass growth



5 Remove/ thinning growth that obscured visual access to the ephemeral wetland and recovered edge habitat.



Left Pomaderris pallida (Pale Pomaderris)shrubs cleared of weedy

undergrowth; Right Corner of Area H, Poa fawcettiae (Smooth blue snowgrass) and Ammobium alatum (Winged everlasting)





Left Complete uncovering of Eryngium ovinum Blue devil. Right Lemon beauty-heads, Calocephalus citreus discovered under dense grass growth.

Right, Removing/thinning growth that obscured visual access to the ephemeral wetland and recovered 'edge' habitat



Article and photos Judy Smith

Path Reconstruction

The protracted and sometimes intense rainfall over the last year has resulted in widespread loss of plantings and extensive damage to our path network at STEP. This path network comprises mostly a mix of compacted crushed granite and clays. With occasional maintenance by STEP volunteers, this material has withstood the ravages of weather and foot traffic for many years.

The soil over much of STEP has remained saturated. Both seepage and sheet flow have severely damaged the mineral paths at STEP. The frequent and intermittent heavy rains have scoured many paths making them unsafe to use. For this reason, STEP has recently been closed to the public. The work required to remediate the path network at STEP is substantial. Consequently, the NAC has engaged contractors to conduct the required work. The first stage was conducted several months ago with modifications to the drainage system to redirect water from the large car park above Forest 20. The concrete apron and riprap rubble drain were reformed. A 'French drain' was also installed along the allee to redirect subsurface seepage away from Forest 20. Both measures should help to reduce water flows through Forest 20.

Other measures that have been implemented have been the installation of coarse aggregate and geotextile fabric under sections of path that had become saturated. This appears to have been an effective measure. An increased number of 'rollovers' to divert water from the paths have also been installed to good effect. Recently, many sections of our paths have been restored in order to provide access to visitors for Wattle Day on 1st September 2022. More *work is required to restore our paths and so some sections will remain closed to the public for now.*



Planning the path restoration Photo Andy Russell Right Restoration works in progress Article and righthand photo by Terry Murphy

Peas Please

There are 129 species of native peas in the Southern Tablelands (across 28 genera). And over the years we have planted 30 species at STEP (from 16 genera). Alas, as native peas don't like having wet feet, the Great Overflow and

the unfortunate near-constant waterlogging of the Central Garden in recent months have meant that we have lost most that were planted in those sections, including 3 specimens of the rare and endangered Murrrumbidgee Bossiaea (*Bossiaea grayi*). However, all has not been lost. When we constructed the Gathering Node at the new entrance, we mass planted the area below the rock retaining wall with 16 species of native peas, but only after building up the area with loam. Those peas, in the main, are looking good – we can expect a steady and progressive flowering over the next 1-4 months. For those of you who can't wait that long to see native peas putting on a wonderful display, then go to Noosa, where these Hovea and Pultenaea are now flowering.

Some peas have been hard to source, so it was to our great delight that the Australian National Botanic Garden agreed to provide us with some seed and cuttings of a couple rare peas - including the aforementioned Murrumbidgee Bossiaea. Terry will be propagating these when the weather starts to warm up a bit more. Up till now, Cool Country Natives Nursery out at Pialligo has been providing stock and propagating peas for us.





Above and top right, Pultenaea sp. Flowering in the Noosa Qld. area.



Right Hovea heterophylla Common Hovea flowering at Noosa Text and photos Bill Handke

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