



FRIENDS of the National Arboretum Canberra

NEWSLETTER Issue 45 December 2019

Dear Friends

In August this year I visited the **Edinburgh Botanic Gardens** and met with Shiona Mackie from the Edinburgh Friends Committee, RBGE. One of the topics of conversation was about the possibility of the FNAC becoming an Affiliate of the Friends RBGE. Since 2020 is going to be a very important year for them...they will be celebrating their 250th anniversary.....yes, that's 250th! We could be associated with them in some small way.

A botanic garden was established in Edinburgh in 1670 by two Edinburgh doctors, Robert Sibbald and Andrew Balfour. The Friends will be celebrating the botanical wonders of the 1770's exploration, the influence on botanical knowledge and the use of Australian and South Pacific tropical and subtropical flora.

There is to be a conference and a forum both to be held in Edinburgh in June. I might just start packing my bags now! I'll take this Affiliate membership idea to Council, so you can watch this space for a decision! This information was gleaned from the cover of the latest copy of Eucalypt, No 53, November, 2019.

2019 has been an action-packed year for all Friends groups associated with the National Arboretum.



Chief Minister Andrew Barr dropped in on the Friends' display at Floriade

A key Friends of the National Arboretum Canberra (FNAC) achievement this year has been the completion of the **Strategic Plan, the Memorandum of Understanding and the Annual Partnership Program** documents. Thanks to everyone who participated in these conversations and decisions and now we can implement the strategies.

The signing of the MOU will take place at the **End of Year combined celebration on 11 December** at the Margaret Whitlam Pavilion. I do hope you can come along to this memorable occasion.

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A special cake is being made and will be cut by Senior Director Scott Saddler and myself to seal our very special relationship with the NAC!

Another highlight has been the Friends sponsorship of a tourist bus. Articles further on will give you all the information about this sponsorship and badly needed resource for the Arboretum. Thank you Friends!

The latest **Harvest Group Stall** was held in the Visitor Centre recently. It was very well patronised and the innovative production of the *The Harvesters Book of Wisdom* sold extremely well. The Harvest Group plans, maintains and picks produce from the garden and forests. The garden, carefully looked after by the Harvest Group, is looking beautiful and is also productive all year round.

Warm Trees 2019 was a wonderful event back in June/ July under the baton of Jocelyn Plovits and teamed with our diplomatic partner, the Embassy of the Kingdom of the Netherlands. All those scarves, large and small, all those tulips down the Cutting. Did you know that those two pieces of art were requested for a display at Floriade? The decorated bicycle wheels in and around the Arboretum, particularly those at the Front Entrance were eye catching indeed and led to a conversation with Pedal Power. The Arboretum staff and many, many volunteers, not necessarily Friends, were the essential ingredients of ensuring the splendid success of Warm Trees 2019. Volunteer time added up to approximately 4206.5 hours! What a remarkable effort! And it's ongoing Jocelyn tells me...

Woollen donations have gone already to The Smith Family, RSPCA, Narrabundah Early Childhood Centre and 'Wrapped with Love'. Thirty scarves have been made into blankets to send to disaster relief around the world.

Now **Warm Trees 2020** will be led by a group of steadfast Friends under the watchful eye of Jocelyn. Our diplomatic partner will be Singapore. Scott Saddler and I have already met with the High Commission; agreement has been reached and planning is already well underway. You too can get started with your knitting ... the theme this year is red and white, and butterflies. The High Commission chose the colours and the butterfly design. Patterns are available.

You will be very pleased to know that our CEO (Community Engagement Officer), Lauren Brown won the Inaugural Award for Canberra Region Volunteer Managers. Congratulations Lauren and from a field of nine nominations.

The **Citizen Science** group has worked quietly away under the eagle eyes of Roger Hnatiuk. We are very grateful to these Friends and Volunteers for the hours of painstaking, diligent work that they complete twice a week for several hours each time. Your Council has agreed to support Roger's latest Citizen Science Project, more of which you can read further on.

Here's some useful trivia about **Christmas trees** for you since we are leading up to Christmas.

- ✦ Did you know that evergreen fir trees have been used in pagan winter celebrations for many thousands of years - long before the birth of Christ. During the Winter Solstice, branches were placed around the home as a reminder of the impending spring.
- ✦ The first decorated tree is believed to be one set up in the marketplace of Riga, Latvia, in 1510.
- ✦ Artificial Christmas trees were originally made from dyed-green goose feathers on metal wires or sticks, a concept born in Germany in about 1865. They're believed to have been a solution to a limit on the number of pines that could be harvested.
- ✦ American inventor Edward Hibberd Johnson, a colleague of Thomas Edison, came up with the idea of a string of electric lights as an alternative to the traditional tree decoration of lit candles. His first set, made in 1882, were red, white and blue.
- ✦ An average Christmas tree of about 6 feet will take some 6-10 years to grow.

Andrew Carter, our very own **Friends Forest** 'guardian' has sent this update: 'First plantings of *Allocasuarina verticillata* into the Friends Forest were in 2010. An enrichment planting was done in April 2013 to replace some failures from that first planting and more infill plantings were done in spring 2015. Many of the early fatalities in the trees related to damage from the larvae of wood boring insects. This was exacerbated by cockatoos who were seeking out the larvae as a food source and in doing so damaged the young trees even more. As those early planted trees have grown the incidence of borer and cockatoo damage is just as prevalent but the impact on the larger and

stronger trees is not as significant. Those earliest plantings are now well established and starting to look like trees.

In the autumn of this year it was decided by the management team for the Forest that small areas of high density plantings would be established as trials. Those of you familiar with natural occurrences of the weeping *allocasuarina* on sites such as the slopes of Mt Ainslie would know that it is found in dense groves rather than single isolated trees. These trial plots are an attempt to replicate those groves within the Friends Forest. Two plots in amongst the existing trees were planted, mulched and then fenced to exclude rabbits, hares and kangaroos. Seedling survival has been very good, greater than 90 percent, and we now wait with interest to see how they survive this dry year and subsequent years.'

There are now some wonderful **new seat locations** on the recently launched Tracks and Trails. Call me about the possibility of sponsoring a seat (or a picnic setting), each having a truly magnificent view from the Arboretum.

The latest picnic setting sponsor, Adele Meier, is thrilled with her location adjacent to the Eagles Nest sculpture. She invites you all to share her picnic setting with the 'TREE-mendous' view....and it is!

Season's Greetings to all the Friends of the National Arboretum Canberra. An enormous thank you to each and every one of you for whatever contribution you have made as a Friend in 2019 ... that's our purpose ... to support the National Arboretum. We do it so well!

See you there soon.

Kind regards
Trish

Trish Keller, OAM, FACE, FACEL
Chair,
Friends of the National Arboretum
Canberra

Mrs Keller's Garden

The first Central Valley Garden and its seat with a wondrous view, was donated by Trish Keller, OAM, and dedicated to the students in her classes and schools over her 40 years as a classroom teacher and principal in the ACT Department of Education and Training. The garden is planted with Golden Oregano (*Origanum vulgare* 'Aureum') which is reputed to keep the goblins away.



Chief Minister Andrew Barr, Trish Keller and Scott Saddler at 'Mrs Keller's Garden'

My luck with *Metasequoia*

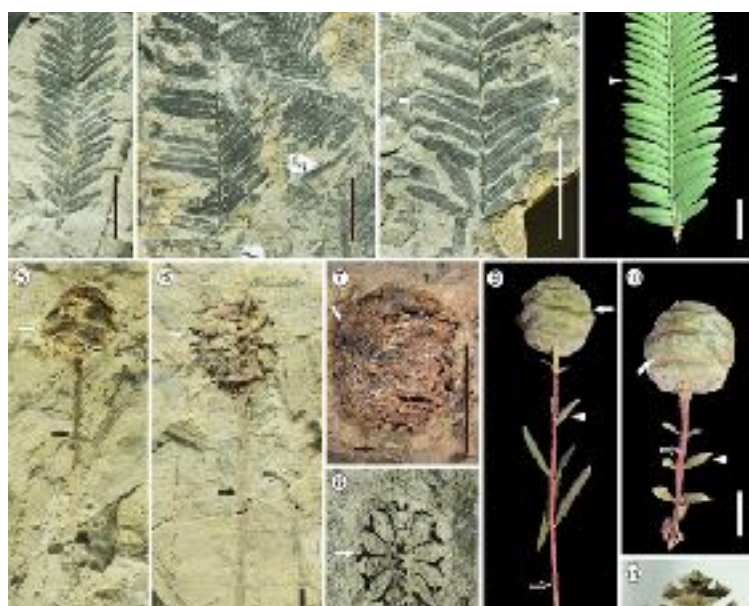
by Li Wang, Visiting Scholar [Arnold Arboretum, Cambridge, Massachusetts, USA]
September 9, 2019

Metasequoia glyptostroboides (dawn redwood) is my favorite plant. Our first meeting was in a primary school textbook. The green, feather-like, leafy shoots were displayed against the clear water of a lake. It looked so fresh and light, and quickly attracted my attention. At that time I knew its name was Shui-Shan (水杉, meaning “water fir” in Chinese). When I became an undergraduate student at Sichuan University in Chengdu, China in 1999, I first saw real *Metasequoia* trees. They grow in front of the teaching building, a great example of Chinese traditional architecture, and they create a peaceful environment for study.

I became a PhD student of Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (CAS) in 2006, and did my *Metasequoia* research with Professor Qin Leng. She is a *Metasequoia* specialist and cooperates with Dr. Hong Yang from Bryant University. They collected many *Metasequoia* fossils around the world, from the Canadian Arctic to Japan and from the Palaeocene to Pleistocene. Through these excellently preserved fossils I could travel deep into the



Metasequoia growing well near the Hunnewell Building Visitor Centre at the Arnold Arboretum. Photo by Li Wang



Morphological comparison of fossilised *Metasequoia* leafy shoots and female cones from central Yunnan with those of modern trees. Figure is from Wang et al, 2019. *Review of Palaeobotany and Palynology* 264: 64-74

ancient ages. I was fascinated by the evolution of their leaf morphology and the immense beauty of their micro-morphology. In order to compare the leaf morphologies of the fossils and living trees, I climbed two *Metasequoia* trees to the top to collect samples. When I observed them under the microscope, I found exciting morphologies similar to the fossils. I also found a method to prepare the brittle cuticle of the fossil leaves.

In 2010, at the Third International *Metasequoia* Symposium in Osaka, Japan, I visited the Osaka Museum of Natural History and was lucky to see Dr. Shigeru Miki's slices of *Metasequoia* fossils. These proved useful in finishing my PhD thesis: “Morphology and anatomy of *Metasequoia* leaves and their environmental significance:

evidence from comparative studies of fossils and “living fossil.”

In the spring of 2011, I received an exciting email from Professor Dr. Zhe-kun Zhou, a botanist and palaeobotanist at the Xishuangbanna Tropical Botanical Garden, CAS. His paleoecology group found *Metasequoia*-like leafy shoots in central Yunnan: a great find! So I went to Yunnan, and became a post-doctoral fellow under his direction. After numerous excavations at the field outcrop, I opened a siltstone and a very beautiful female cone appeared. Joyfully, I immediately called Prof. Zhou with my belief that the fossil was actually *Metasequoia*! At last we found evidence that the intensification of



Metasequoia tree (number 0002) in Xiaohe Village, Lichuan City, in China's Hubei Province.

Asian monsoons caused *Metasequoia*'s disappearance from Yunnan. Now it grows naturally only in the narrow boundary of Hubei, Chongqing, and Hunan Provinces in Central China, where the monsoon season is weaker and precipitation in spring is greater than in central Yunnan.

When I visited the *Metasequoia* population in Lichuan City, Hubei in late autumn 2018, I preferred going through the smaller paths in the forest, which were covered in thick “snows”—the fallen leafy shoots of the dawn redwood. I was astonished by the great quantity of leaves produced and sent drifting back to earth every year! When you look at the distant mountains, you see such beautiful scenery—standing out against the green background are coppery red *Metasequoia* trees growing towards the blue sky. Here is a pure land on Earth.

I am lucky for having the chance to conduct research at the Arnold Arboretum of Harvard University, and design interesting morphological and physiological experiments. Here I see my good old friends again: the earliest living *Metasequoia* trees to be planted outside of their native valleys in China. Along the Chinese Path in the Explorers Garden is a small *Metasequoia* grove. It looks so similar to the *Metasequoia* path in Guihua Village, Lichuan City, which gives me such strong feelings of nostalgia. Growing in the front of the Hunnewell Visitor Center, *Metasequoia* trees have become landmarks of the Arnold Arboretum. Every morning when I look at them, I am encouraged by their grand and elegant appearance. They welcome everyone coming to the Arnold Arboretum, and symbolize discovery and the Arboretum's role in sharing the beauty and wonder of nature.

Li Wang, PhD, is a visiting researcher, part of a program with the Chinese Union of Botanical Gardens that brings scholars annually to the Arnold Arboretum. Li's research at the Arboretum is supported by the Chinese Union of Botanical Gardens, Xishuangbanna Tropical Botanical Garden (XTBG) and its Herbarium, and the Chinese Academy of Sciences (CAS).

This article is reproduced with kind permission from the Arnold Arboretum of Harvard University and Li Wang.

Keeping in STEP

At the time I wrote an item for the previous newsletter, I was not able to include information about the Workshop we held for Regional Botanic Gardens in our area on 31 August. Titled "Pitfalls, Problems and Progress of Community-run Regional Botanic Gardens" we had delegates from Southern Highlands (Bowral), Burrendong (Wellington), Shoalhaven Heads and the Goulburn Wetlands group. Some delegates came to Canberra on Friday and that evening we had a most enjoyable meal together getting to know each other and sharing stories.

The next day's Workshop was very productive. Bill Handke was our moderator and he kept us on task, effectively prompting the direction of the quite lively discussion. Prior to lunch we took a guided walk through STEP, led by David Shorthouse. This was followed by lunch at the shed: soups, crusty bread and fruit. Thanks to Heather Green, Mike Smith, Marg Bourke and Robyn Black for their organisation of this.

The feedback we have received has been very positive and I am sure that we can continue to strengthen ties with these and other regional groups. It is evident that despite the different sizes and organisational structures of the various groups, we have much in common and we look forward to similar events in the future.

While I was away, there was a significant event – the official opening of the Bush Tucker Garden. Minister Steel attended and planted a *Hardenbergia* bush in keeping with the theme of this garden. Damper, jam and *Hardenbergia* tea added to the atmosphere of the occasion.

The continuing dry conditions have limited the normal spring planting and we are working hard to ensure that other plants survive this difficult time.

As our AGM approaches (Sunday 24 November, 11 am) it is timely to acknowledge



Minister Chris Steele MLA and Senior Director NAC Scott Saddler planting *Hardenbergia violacea*

the work of some committee members who are standing down. Lainie Shorthouse has been a great stalwart (and past representative on the Friends' Council) and while she is not going to be on Committee, I know she will continue to be a valuable presence at our working bees. Heather Green has been our Minutes Secretary for two years and has been very efficient and effective with the organising and reporting of our meetings, as well as taking a very active role with the logistics of our activities such as STEP into Plein Air, the luncheon for our Workshop and other events. Last but not least we pass on huge thanks to Terry Murphy for his horticultural skills, his organising of potting days and the considerable work he (along with Bill Handke) put into the construction and fitout of our new shed. Thank you all – your efforts are much appreciated.

By Judy Smith

Bush Tucker Garden

Official Launch

The Bush Tucker Garden is set in Forest 20, the Southern Tablelands Ecosystems Park (STEP) and was officially opened on October 30 by Minister Chris Steel, MLA.

Local elder Aunty Violet gave the welcome to country and Richie Allan provided a smoking ceremony and catering with a morning tea featuring flavours from the Bush Tucker Garden. These included Mountain pepper damper, Saltbush, lemon myrtle and pepper berry damper, and Native Bush Spice damper, all served with lemon myrtle cream and native raspberry jam.



The smoking ceremony was conducted by Richie Allan.

The Garden features a basket weaving area, as well as a range of berries, grasses and other native plants. It offers a great opportunity for all visitors to learn about local Ngunnawal culture, with plants that have been used for thousands of years as food, fibre, shelter and for their aromatic and medicinal qualities.

All Bush Tucker Garden plant species have been selected from the '*Ngunnawal plant use*' publication that was developed in consultation with Ngunnawal elders and community, as well as ACT Government and Greening Australia.



Guests enjoying the bush tucker morning tea.

Photo Mike Woolley.

"It's a great opportunity for families and garden enthusiasts to walk through a Bush Tucker Garden, and be inspired to grow native plants in their own backyards. Local plant species are adapted to the Canberra climate that also attract and support native fauna."

Ngunnawal culture will be shared through educational programs and activities for children and adults.



Traditional Ngunnawal woven items displayed at the launch. Photo Mike Woolley.

Tracks and Trails Launch

An additional 12km of multipurpose tracks and trails were launched by [Andrew Barr ACT Chief Minister](#) on September 27. [Pedal Power ACT: Canberra Region Cycling](#), Sage Education and Childcare and the Australian German Playgroup also joined in the day's celebrations.

There is now a network of over 20km accessible by foot or by bike that will lead you through over 90 forests. Dogs on leash are welcome!

What's your excuse? Get out there today and have a stroll.



Chief Minister Andrew Barr launches the new Tracks and Trails

Forest Bathing

At the final Friends meeting for the year on November 12 we had a fascinating and relaxing presentation from Julianne Evans on the topic of *Shinrin-Yoku*, or Forest bathing.

Julianne Evans is a trained Forest Bathing guide and alternative educator based in Canberra. She has a background in alternative medicine and trained in Forest Bathing in 2017 with the Association of Nature and Forest Therapy (ANFT) California USA, after which she started *Shinrin-Yoku*, Canberra.



Try one of the new trails to expand your experience of the Arboretum.

She followed this up in 2018 with further training with the International Nature and Forest Therapy Alliance (INFTA) based in Victoria, Australia.

Forest Bathing refers to spending time taking in the atmosphere of the forest for the purpose of enhancing health and well-being.

Julianne explained the background of this nature therapy approach which was developed in Japan during the 1980s to address stress related illnesses and has now become an established approach to preventive health care and healing in Japanese medicine.

A forest bathing walk is slow and meditative, focussing on the sensory experience of being immersed in a forest and allowing participants to cultivate their connection with the natural world, and thereby help decrease stress levels, heart rate, blood pressure, and improve overall wellbeing.

For more information you can visit the [Shinrin-Yoku Canberra page on Facebook](#).

And if you would like to look further afield there is a superb [National Geographic article](#) here.

Volunteering Australia Awards

Our congratulations to Lauren Brown on winning the 2019 Volunteering ACT Award for Volunteer Manager! It was exciting to see Lauren being acknowledged for her hard work and vision to engage the diverse groups of NAC volunteers. We also acknowledge the initiative of our FNAC Chair, Trish Keller, for writing the award application for Lauren and making the nomination.



Volunteering Australia Award Winners 2019

Hero Tree Planting

It was a glorious Canberra spring day when Professor Brian Schmidt, Vice Chancellor of the Australian National University, joined with Chief Minister Andrew Barr to plant an *Araucaria cunninghamii* (Hoop pine) on the ceremonial terrace. Professor Schmidt is an enthusiastic tree planter on his own property, but was pleased to have had the hole prepared for him on this occasion.



nulla tours



An exciting new feature for the Arboretum will be the new 14 seater bus, sponsored by the Friends, which should be operational in early January 2020.

The name of the bus 'nulla' means 'any tree' in Ngunnawal language. The 'n' symbol is pronounced like the 'ng' in sing.

The initial tours will be limited to the Forest Drive Bus Tour, taking a loop covering Wide Brown Land and Dairy Farmers Hill. Future tours will include the Cork oaks, STEP and the southern forests. Other possibilities for the future include morning or afternoon tea tours using bush tucker produce, and sunset tours. Guides and bus drivers are being trained to run the tours..



Discovery Kitchen Garden Update

Over the past five months the temperature has ranged from minus eight degrees to 38 degrees celsius and there has been very little rain. If anyone has any doubts about climate change then they are not gardeners or farmers!

In the Discovery Kitchen Garden, the Flanders Ladybird poppies (see right) were still flowering well for Remembrance Day 2019. These poppies added an unmissable and spectacular focus for many visitors' photographs.

In addition to the Flanders poppies, colour was also provided by Iceland poppies, cornflowers, sweet peas and pansies all of which were set off by the brilliant white of the cascading alyssum edging the garden and the profusely flowering marguerites.

October and November were busy months in the garden as many of the plants that had been flowering from late winter and early spring including borage, peas and snow peas, ornamental kales and all winter brassicas needed to be removed to make space for new seedlings of summer vegetables, herbs and flowers such as tomato, chilli, climbing beans, miniature pumpkin, eggplant, nasturtium, calendula, French marigold, basil (purple and green) and parsley (curly and flat-leafed).



As sweet peas and cornflowers matured and set seed, plants were removed with the sweet peas being cut off at ground level and leaving their roots with nitrogen nodules in the ground for other plants to access. Seeds were collected and dried to be either packaged for sale or kept for sowing in the future.

In the next few months, visitors to the Discovery Garden will be delighted by bright yellow dwarf sunflowers planted in three of the mobile planters (daleks). One of the large daleks contains a finger lime, dwarf pomegranate and Warrigal greens as groundcover. The other contains a finger lime with tiny fruit developing and strawberries as underplanting. The borage that had been growing there had been removed. Children love searching for ripe strawberries!



Market Stall

A very successful Harvest Group market stall was held on Saturday, 23 November 2019, where a profit of over \$2,000 was made. Many of the products sold were from the Discovery Kitchen Garden. These included seedlings grown from collected seed including Tomato Mortgage Lifter, Jack Be Little miniature pumpkin, climbing spinach, Warrigal Greens, calendula, alyssum, cornflowers and globe artichoke. Packets of seeds for some of these plants were also sold.



Two new products were introduced at this market stall. One was a beautifully presented booklet put together by Colette Mackay containing information about the history of the Harvest Group, the fig forest, the Discovery Kitchen Garden and the harvested produce. It also contains a thank you from Colette Mackay, our Harvest Group Leader, to those volunteers who have helped in the Garden, harvested the figs or cooked some of our many jams and other items we have for sale. Included in the booklet are many tried and true recipes for making jams and preserves, useful tips and many lovely photos. The booklet is a bargain at \$5! Just 60 copies were printed to test the market and these have sold very quickly so watch this space next year!

The other new product was a packet of three laminated female decoy butterflies (identified as female by the two black dots on their wings) and wire attachments. These are a natural pest control for deterring white cabbage butterflies from laying eggs on plants, particularly brassicas. The real butterflies are territorial and will not lay eggs on plants where there is another female butterfly. That is the theory and it does seem to work. The butterflies can be wound to the top of bamboo stakes and inserted near plants at risk. This product was also a bargain given the amount of time involved in making it!



Children enjoyed trying on the Christmas decorations at the market Stall

The other good news is that now all the Discovery Kitchen Garden tools and equipment have been relocated to a new Harvest Group storage area in the service court. There is a combination lock on the door providing a safe working environment and a secure storage space. The space will also be used to store equipment and bottles for the fig harvest and also our jams and other produce for Market Stalls. Many thanks to the Friends Council and the Arboretum, especially to Scott, Amalie and Darren for enabling this much awaited positive upgrade to be realised.



Photo: Colette Mackay

With the unseasonably hot weather, watering has been, and will be, a priority for the garden. **It would be greatly appreciated if you are a Friend with a little time to spare during the week and who would like to assist with this vital task, if you contact the Arboretum and become a Harvest Group volunteer.** It is both a mentally and physically healthy and rewarding experience being in such a beautiful location, one of the best in Canberra! Another benefit of volunteering at the Garden is seeing the fleeting beauty of the glorious cactus flowers in bloom! Join us and see for yourself!



The plan for the next few months is to nurture the vegetables, flowers and herbs over the summer with fortnightly feeding of *Seasol Powerfeed* so they produce good growth and a bumper harvest. Planning for autumn sowings of winter crops will commence from the beginning of the new year so there is never a down time nor a dull moment if you are a gardener!

Happy Christmas and New Year to you all and of course, happy gardening!

(Article and photos by Ange McNeilly)

Citizen Science

Lauren Brown recently had an article on Citizen Science at the Arboretum published in *Roots* magazine. For the full article you can see *Roots: Botanic Gardens Conservation International Education, Volume 16, no 2, October 2019*.



Author: Lauren Brown

AUSTRALIAN CASE STUDY: NATIONAL ARBORETUM PARTNERS WITH CITIZEN SCIENCE VOLUNTEERS

The National Arboretum Canberra in Australia was established in 2006 after major bushfires burnt across the Canberra region destroying many of Canberra's suburbs, pine plantations and nature parks. The vision for the National Arboretum is '100 Forests and 100 Gardens' showcasing 100 mostly monoculture forests of rare, threatened and symbolic trees from Australia and around the world.

Local citizen science volunteers are attracted to the Arboretum for its diversity, dynamic ecosystems, easy accessibility and networking with like-minded people. Equally, citizen science volunteers provide the Arboretum with valuable data to assist the ongoing development and management of the site and are highly valued for their contributions and expertise.

Officially opened in 2013, the National Arboretum Canberra contributes a major biologic outcome, one based on a wide diversity of monoculture forest tree species that represent global biogeography, ethnobotany and species of international concern with both IUCN Red List and some State or country listings.

In 2001 and 2003 major bushfires across the Canberra region caused severe damage to many of Canberra's suburbs, pine plantations and nature parks. The establishment of the now National Arboretum was recommended on locations of the burnt out land, after government consultation with community and experts.

The National Arboretum Canberra development started in 2005, inspired by the original masterplan design for Canberra city. The vision of a '100 Forests and 100 Gardens' involved establishing 100 mostly monoculture forests of rare, threatened and symbolic trees from Australia and around the world.

~ STEP volunteers maintain our regional botanic garden and participate in citizen science @NationalArboretumCanberra

Local citizen scientist volunteers are attracted to the National Arboretum for its diversity, dynamic ecosystems, easy accessibility and networking with like-minded people.



← Interpretation and education by volunteer guides
©National Arboretum Canberra

To assist in development of the 250 hectare site, a National Arboretum volunteer program was founded in 2006 by the Friends of the National Arboretum Canberra. In the last financial year, volunteers provided over 20,000 hours of work across a diverse range of activities. These volunteers have enabled crucial public interpretation of the site including events and tours, improved horticultural operations via forest working bees and also provided valuable citizen science research.

The National Arboretum is a Canberra landmark, only six kilometres from the CBD, and is closely connected to the Canberra community. Local citizen scientist volunteers are attracted to the National Arboretum for its diversity, dynamic ecosystems, easy accessibility and networking with like-minded people. Reciprocally, citizen science volunteers provide the National Arboretum with valuable data to assist the ongoing development and management of the site and are highly valued for their contributions and expertise. The diverse project examples below illustrate some of the current and evolving volunteer citizen science projects at the National Arboretum Canberra.

FROGWATCH RESEARCH

Working with the local FrogWatch group, citizen science volunteers document the frog fauna on-site, focusing on monitoring frog biodiversity in four of our wetland areas. The project examines long-term changes in the frogs of the Arboretum and their responses to climate change, habitat changes as our landscape changes from pine forest to grasslands and forests and woodlands, and to changing management practices. Currently, the Arboretum has seven of the nine native frog species found in urban Canberra.

WOLLEMI SEED PROJECT

This year is the fourth year of monitoring the production of seeds in one of our most special forests, Forest 32, *Wollemia nobilis*, or the Wollemi pine. We have nearly 90 trees in the forest. Each year a portion of them produce cones which are bagged with a unique identifier by a team of citizen science volunteers. The seeds from these cones are then sorted into viable and non-viable groups, counted and weighed by the volunteers. Seeds are stored at Mt. Annan Botanic Gardens in Sydney and then progressively released for worldwide distribution. The National Arboretum has a unique opportunity to learn more about the reproductive biology of this species through this project.

TREE MEASURING PROJECT

The Tree Measuring project commenced in 2009 with citizen science volunteers, a few years after the first forests were planted at the National Arboretum. The project aims to provide a quantitative, long-term record of tree growth as measured by height and diameter, completed on an annual cycle. Understanding individual tree species growth patterns on the National Arboretum site, and how their health is trending through time, is important information to both managers of the collection and wider science and conservation communities.



↑ Volunteer sorting viable and non-viable Wollemi Pine seeds
©National Arboretum Canberra



Our Tree Measuring citizen scientist volunteers are now analysing the past 10 years of research to provide the National Arboretum with data on the health of the trees, as well as their responses to climate with respect to temperature and rainfall and horticultural treatments. The height of many of our forests are now beyond the physical reach of our volunteers and their measuring tools, which has led to further partnering with the Australian National University (ANU). The ANU have now completed the first aerial mapping of the entire National Arboretum by drones armed with sensors including UV and Lidar. These drone measurements will continue to provide height data to monitor tree growth. Further development of these aerial technologies will assist in the rapid identification of plant stresses resulting in efficient and targeted maintenance programs to facilitate better tree growth and health.

DATA COLLECTION

Many of our Tree Measuring volunteers are passionate researchers and have recently joined a new citizen science volunteer group called the Data Collection Group. This group is now undertaking a tree audit across the National Arboretum's 250 hectares with advanced GIS technology and a customised asset management app. The group will also be responsible for mapping environmental weed populations. The maps will integrate with local government management strategies and help secure financial assistance for weed management.

SOUTHERN TABLELANDS ECOSYSTEMS PARK

Our Southern Tablelands Ecosystems Park (STEP) is located in Forest 20 and is planned and managed by STEP volunteers, an all-volunteer community group, in partnership with the National Arboretum. STEP features native trees and understorey plants that represent the ecological communities from the local area. Our 'STEPpers' provide their time, botanical expertise, funds, and energy and have brought the concept of a regional botanic garden to life within the National Arboretum. STEP participates in the Arboretum's Tree Measuring project and also contributes by maintaining the ephemeral wetland which is part of our FrogWatch project. In future years, STEP hopes to work in three-way partnership with the National Arboretum and the local Parks and Conservation Service in a recovery program for 44 hectares of yellow box/red gum woodland next to the STEP site. This is an excellent example of how a volunteer community group has the capacity and skills to work with the local government to enhance and support a government project.

While the National Arboretum does not yet have a permanent science research staff position, it is possible to create quality, statistically-relevant data and critical living collection management information by engaging with citizen science volunteers. By partnering with local universities and working with volunteers, particularly students and retired science research staff, the National Arboretum Canberra has been able to produce robust science research programs. One of the many benefits of this symbiotic relationship is that citizen science volunteers are highly skilled, flexible, innovative and able to grow with the organisation. For more information about our citizen science volunteer journey please contact arboretum@act.gov.au.

← STEP wetland in the early years
©National Arboretum Canberra

→ STEP wetland now – a wonderful frog habitat
©National Arboretum Canberra



Our Tree Measuring citizen scientist volunteers are now analysing the past 10 years of research to provide the National Arboretum data on the health of the trees



↑ Volunteers measuring trees
©National Arboretum Canberra

AUTHORS

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How to join the Friends

Visit arboretumcanberra.org.au to join online or to find out more about the benefits of being a member

OR

Email your details to: contact@arboretumcanberra.org.au and pay by funds transfer or cheque

OR

Complete the Application Form and mail it to:

The Secretary, Friends of the National Arboretum Canberra,
PO Box 48, Campbell, ACT 2612, and pay by funds transfer or cheque.

☐ **Bank details for funds transfer:**
Westpac, Petrie Plaza, Canberra, ACT: BSB 032 719.
Account: 375379 – please include surname in description.

☐ **Cheques payable to:** Friends of the National Arboretum Canberra Inc.

Membership type	1 year	2 years
<input type="checkbox"/> Individual	\$45	\$80
<input type="checkbox"/> Household	\$55	\$100
<input type="checkbox"/> Concession	\$25	\$40
<input type="checkbox"/> Club/Association*	\$100	\$180
<input type="checkbox"/> Business*	\$500	\$900

* Please see website for details

Membership Application Form

Membership type:

Title: First name:

Last name:

OR

Club/Association/Business name:

Address:

..... State: P/code:

Email address for newsletter and updates:

Phone: Mobile:

Number of parking passes:

Total amount payable (include membership/s and parking pass amounts): \$

Signature:

Date:

Parking Pass	1 year
<input type="checkbox"/> Friends' Annual	\$27.50 per vehicle (2018)
Parking Pass	\$28 per vehicle (2019)

For a parking pass, please include your vehicle's registration number.

Note: An Individual Member is entitled to apply for one Parking Pass at the Friends' discounted rate and a Household Member is entitled to apply for two Parking Passes at the Friends' discounted rate.

