# National Rock Garden

# **Celebrating the Geological Heritage of Australia**

# **Newsletter No. 8**

# March 2014

Recent Developments Garden Design Update Federation Rock Update Rock of the month – Anna Creek Sandstone Australian Landscapes – Garden of Stone & Hassans Walls Reserve



#### **Recent developments** Brad Pillans, Chair of the NRG Steering Committee

The last several months have been a busy time at the National Rock Garden, beginning with the opening of the Federation Rocks display, by the ACT Chief Minister, in October last year. While that opening was the very successful, and the culmination of many months work, it has been more recent events that have dominated media coverage of the NRG. I refer, of course, to the theft of one of our rocks on February 13<sup>th</sup> and the arrival of two more rocks on February 27<sup>th</sup>. This breaking news, described more fully, below, is the reason that we held off sending you our first newsletter for 2014, which would normally go out in January/February.

I was the first to discover that one of our Federation Rocks had been stolen, when I visited the NRG on the morning of Friday 14<sup>th</sup> February. The rock was definitely in place the previous morning, when it was sighted by another NRG Steering Committee member, so it is almost certain that the rock was stolen, under cover of darkness, on the night of Thursday 13<sup>th</sup> February. Needless to say, we are all shocked by this gross act of vandalism, which has caused thousands of dollars of damage. May I suggest that an appropriate punishment for the thieves, if they are caught, would be a public stoning!

Fortunately, the theft of one rock was quickly followed by the arrival of two more – two large blocks of Banded Iron Formation from WA to complete the Federation Rocks display. The combined media coverage of the two events has been wonderful for the NRG, but we would rather have less media coverage than lose one of our most loved rocks.

## Garden Design Update

In Newsletter No 6 (July 2013) we reported that we had contracted the internationally renowned landscape architect company Taylor, Cullity, Lethlean (TCL) to prepare a concept design for the site at the western end of Lake Burley Griffin.

Since our first meeting with TCL we have continued to work towards the development of a master plan for the garden. The master plan will be an *overview* of the garden and communicate the overarching themes and concepts that will influence the layout.

Gardens are usually designed with plants as the focal points, whereas the focal point for the NRG is the rocks! Our rocks will tell the story of how Australia was formed and how the nation was shaped: From the deposition of sedimentary rocks that contain spectacular fossils, to inland rivers drying over time and becoming desert, to how indigenous Australians lived with the land. From wealthcreating minerals from early gold mining in Ballarat and Bathurst, to the influences on immigration and the grand buildings during those boom times; and to the more recent minerals industry. From its molten beginnings more than 4 billion years ago through to what we see today, our continent is the product of geological processes that resulted in a great diversity of rocks and minerals, as well as the preservation of early life forms, and the formation of our iconic landscapes. This in turn provided the setting for 50,000 years of human habitation and cultural development. These elements will be represented in the garden by many different rocks, collected from all over Australia, that tell fascinating stories, providing the basis for a unique sensory and educational experience.

We have had extensive consultation with stakeholders and are getting closer to launching the master plan. Stay tuned for the next update on the NRG design.

## Federation Rocks Update

The National Rock Garden unveiled the Federation Rocks on 20 October 2013. Distinguished guests, government representatives, friends and volunteers helped celebrate this milestone event.

Installation of the Federation Rocks display is one of the many steps towards establishing the National Rock Garden.

Ms Matilda House, Ngambri-Ngunnawal elder, gave the welcome to country. If you missed the unveiling Brad Pillans, NRG Chair talked about his love of rocks and in closing the ceremony he thanked the following people:

- The Chief Minister, for her generous support of the Federation Rocks Display, especially the persuasive letter that she sent to the other leaders, all of whom responded positively to her request.
- The Australian National University, Vice Chancellor Professor Ian Young for his financial support at a time when University budgets are being squeezed.
- Dr Doug Finlayson, well-known Canberra geologist, and his wife Caryl, for suggesting the concept of a National Rock Garden.
- Mr Andrew Smith, Acting CEO of the National Capital Authority, and Mr Gary Rake, former CEO, for supporting the project from the outset, and, most importantly, allocating the land for the NRG.
- Dr Chris Pigram, CEO of Geoscience Australia, for significant in-kind support from his organisation.
- Nationally and internationally recognised landscape architects, Taylor Cullity Lethlean.
- Members of the NRG Steering committee, Friends of the NRG, plus all our volunteers, donors and sponsors.
- The the Geological Society of Australia and its members for their generous financial support.



Participants received show bags that included examples of the Federation Rocks.

Federation Rocks inauguration. Photo courtesy, Sue Fletcher



Each rock attracted a close up inspection with loops, cameras, mobile phones and tablets –technology for every age! Photo courtesy, Sue Fletcher

#### **Banded Iron Formation – BIF**

At the time of the Federation Rocks unveiling, the display was short one rock: a specimen of Banded Iron Formation (or BIF for short) from Western Australia.

On Thursday, 27<sup>th</sup> February the BIF that makes up the last of the Federation Rocks arrived at the NRG. Actually, it was two rocks, each weighing about 11 tonnes, generously donated by Fortescue Metals Group and sourced from their Solomon mine in the Pilbara region of northwestern WA. Formed in the very latest part of the Archean Eon, approximately 2,500 million years ago, these are the National Rock Garden's oldest rocks, so far. They are also our furthest travelled rocks.

Formation: These rocks began life as sediment that was deposited from dissolved iron in an ocean with a low-oxygen atmosphere. The alternating bands show see-sawing between oxygen rich (dissolved iron precipitates) and oxygen poor (silica precipitates) sea water, as the activity of early cyanobacteria (blue-green algae) varied.

Significance: It is the distinctive, spectacular precursor of the globally significant Pilbara iron ore deposits and therefore one of Australia's most important rocks. Pilbara BIFs are said to contain the world's largest concentration of iron ore—many billions of tonnes



Banded Iron Formation from the Pilbara in Western Australia, Photo courtesy Brad Pillans



The Federation Rock display, Photo courtesy Brad Pillans

#### Bendigo Metasandstone: Fools Gold?

The Victorian contribution to the Federation Rock display is the Bendigo Metasandstone consisting of three large specimens from the Kangaroo Flat Gold mine near Bendigo. Unfortunately, sometime on Thursday, 13<sup>th</sup> February, probably under cover of darkness, the whole of the quartz reef block was ripped off the top, and taken away. The distinctive block weighed nearly a tonne and would not have been easy to steal. Faint tyre marks confirm that, most likely, a light truck with a crane or hoist was backed up to the display and the whole block was lifted off. The before-and-after photos clearly demonstrate the damage to the display.

While the stolen rock did contain small specks of visible gold, if the thieves were hoping to make their fortune they will be disappointed to learn that the total gold content (a few grams) is worth only a few hundred dollars.

Understandably many committee members, volunteers and National Rock Garden supporters were disappointed about this crime. The police have been investigating but at the time of writing, the rock has not been recovered, despite wide media reporting of the theft.



# Bendigo Metasandstone Before and after

#### Not all was lost

Within 12 hours of the theft, we reached out to media outlets in an attempt to use the 'bad news' as an opportunity to build awareness for the rock garden and to focus on the theft and vandalism, making it harder for thieves to hide under a rock (pun intended). As volunteers working with the media, it can be an interesting experience; success is difficult to define and securing media coverage depends on multiple factors, as a 'story' can be bumped by bigger news.

We posted the 'news' on the National Rock Garden and Geological Society of Australia Facebook pages. Over 5 days we attracted more than 5,500 views to these pages and many shares and comments.

We also placed news items on different online pages for television, newspaper and radio, including national, state/territory and regional media outlets. The response was interesting - a number of

media providers contacted us and stories ended up in not only traditional media and online, but also in unanticipated locations such as: Channel 10's, *The Project* and in the *Business section of The Australian.* The media focus became 'Who knew we had a National Rock Garden?' Google searches on the theft netted numerous online posts. The twitter world also picked up our posts which created another wave of online comments about the Rock Garden.

If you liked the NRG Facebook page you were informed relatively early and you may have seen the Zeega, by April Chan. A Zeega is a storytelling platform that can be used to create mash-ups of images, audio, moving pictures and text.

View our first Zeega: 7 things you didn't know about Australia's National Rock Garden, and thanks again to April Chan. We suggest you follow the link and turn up the volume on your computer. http://www.abc.net.au/news/2014-02-19/zeega-7-things-you-didnt-know-about-the-national-rock-garden/5269226

### Rock of the Month – Anna Creek Sandstone Mike Smith, National Museum of Australia and Australian National University

The importance of grass and acacia seeds as grain for grinding to flour led to substantial demand by Aboriginal groups in the desert for replacement grinding slabs. In some areas, this demand was met by specialised grindstone quarries, which fed finely finished millstones into the long-distance exchange networks snaking across the interior. The most striking concentration of these millstone quarries is in the southern part of the Lake Eyre basin, where there are at least ten quarries including major complexes at Anna Creek, Tooths Nob and Innamincka.

The Anna Creek quarry is known to the Arabana–Wankangurru people as *Palthirri-pirdi* (lit. millstone [*palthirri*] quarry [*pirdi*]). Mythologically, this 200-m-long narrow outcrop of finegrained grey-white sandstone is said to represent a fish bone. In geological terms, it is a Neoproterozoic sandstone, a minor part of the basal member of the Skillogalee Dolomite. The slabs were dug out of the outcrop in a series of shallow pits to reach the unweathered sandstone. The slabs were roughly shaped by flaking to thin them and to rough out an oval shape. The slabs were then finely finished by hammer-dressing to create elliptical slabs up to 50 cm long.

Quarrying activity at Anna Creek was clearly intensive as numerous quarry pits crater the outcrop. In 1897, Thomas Worsnop calculated that 1354 t of stone (1032 m3) had been excavated from the main part of the quarry, which he estimated represented the production of about 71 000 millstones (he allowed for 25% wastage and used field observations that showed the largest millstones measuring 46 . 30 . 8 cm). Worsnop only dealt with part of the quarry, and as the quarry pits extend along the entire length of the outcrop, the actual production rate of millstones may have been 3–4 times this figure, perhaps around 200 000 millstones. The full extent of trade in this stone is yet to be established. Field surveys and oral accounts point to a wide distribution of Anna Creek grindstones across the southern part of the Simpson Desert, especially in the Kallakoopah Creek area, and possibly also into the Mann–Musgrave Ranges (where the well-known *Ngintaka* Dreaming refers to attempts by Pitjantjatjara people to negotiate access to the trade in millstones from the east).

The development of Aboriginal economies, based on native grain as a staple food, around 3000–4000 years ago, and the major expansion of seed-grinding and processing within the last millennium, required the provisioning of large areas of sandy desert with grinding slabs. The large-scale production of grinding slabs in the Lake Eyre basin alone represents production of perhaps 1–2 million millstones over the life of these quarries. And within this economy, *Palthirri-pirdi* with its fine white sandstone was a major centre of production.

For further information on the Lake Eyre basin quarries, see M Smith 2013, *The archaeology of Australia's deserts.* 



The famous Anna Creek (Palthirri-pirdi) millstone quarry showing some of the quarry pits and other workings. Image courtesy Colin MacDonald.

#### Australian Landscapes Garden of Stone National Park and Hassans Walls Reserve.

On the Western side of the Blue Mountains and to the north lie the Gardens of Stone National Park and Hassans Walls Reserve. Here you will find the Capertee Valley, the widest enclosed canyon in the world, and pagoda rock formations: a combination of the hard ironstone and soft Narrabeen sandstone weathering at different rates, resulting in the unique pagoda rock formations. Hassans Walls Reserve has two types of pagoda formations — plated and smooth pagodas.

#### The Geology

These parks sit on the western edge of the Sydney Basin. Most of the rocks of the Triassic Wianamatta Group and underlying Hawkesbury Sandstone have been eroded, and remnants can only be seen in the southeastern quarter of the Wollemi National Park, leaving the older Narrabeen Group of sandstones and claystones exposed. Rivers have eroded numerous valleys, with sheer cliffs up to 300 m high. Along the base of the cliffs in some of the river valleys the yet older Permian Illawarra and Singleton coal measures are visible. Remnants of the volcanism that occurred in the Sydney Basin in the Late Cretaceous and Cenozoic can also be seen. Diatremes, the cores of extinct volcanic vents, have weathered faster than the surrounding sandstone and formed saucer-shaped depressions that hold richer soil than the surrounding landscape (eg, Gospers and Davis Holes). Basalts, that once covered most of the basin, remain as a cap in places, forming peaks like mounts Coricudgy, Pomany, Coriaday and Monundilla (courtesy Michelle Cooper and Sue Fletcher).

If you have an interesting landscape photo and description to share, please send it to <a href="mailto:rockgarden@gsa.org.au">rockgarden@gsa.org.au</a>



Pagoda rock formations, Hassans Walls Lookout - Lithgow. Image courtesy Sue Fletcher.

# Feedback and further information

The Geological Society welcomes feedback and suggestions on the development of the National Rock Garden. See the feedback boxes on the National Rock Garden web site –

www.nationalrockgarden.org.au

# Tax deductible

The National Rock Garden is a registered Charity and all donations are tax deductible. Making a donation to the National Rock Garden is a great way to reduce your tax and feel good too! To make a donation, please visit the NRG website or phone (02) 9290 2194.

# Sponsoring the National Rock Garden

Building the National Rock Garden will take the participation of many volunteers, involve different tiers of government, provide work for contractors, designers and builders and ultimately involve many organisations and people. As highlighted above, we need major donors and sponsors to work with us as we build this national monument in the nation's capital. If you or your organisation would like to be financially involved, please contact Prof. Brad Pillans, <u>brad.pillans@anu.edu.au</u> or Sue Fletcher, <u>sue@gsa.org.au</u>

#### **Newsletter** – compiled by: Brad Pillans and Sue Fletcher, National Rock Garden

The newsletter is circulated twice a year, ordinarily December/January and June/July. New "friends" are welcome and can be added to the email circulation list by contacting the editor. You don't have to be an earth scientist. Members of the public, students and educators with an interest in the evolution of the Australian continent are all welcome. Newsletters are also posted on the National Rock Garden web site –

www.nationalrockgarden.org.au



*Keep up with the latest NRG news, rock movements, rocks of the month and a whole lot more. Like us on Facebook* https://www.facebook.com/pages/National-Rock-Garden



To recognise, acknowledge and celebrate Australia's rich geological heritage in a parkland setting within the nation's capital, and demonstrate to present and future generations of Australians the diversity of the rocks and minerals that contribute so significantly to the nation's landscapes, heritage and prosperity.