

Australia's Largest Cave Systems in Judbarra-Gregory National Park, NT

As published in Caves Australia, No. 206, pp. 14-18. (December 2018). Official publication of the Australian Speleological Federation Inc.

By Garry K. Smith
Newcastle and Hunter Valley Speleological Society Inc.
and member of J-GKR(SIG)



Surface karst near the western end of Berks Backyard — Boab Valley. Photo by Garry K. Smith

Dedicated teams of cavers have been undertaking annual pilgrimages to Bullita for the last 29 years to explore, survey and document the vast cave systems.

The total length of surveyed cave passage reached 300km in 2017 and the expedition this year has mapped another 10km or more. This could not have been achieved without the perseverance and hard work put in by cavers who make up the ASF Judbarra-Gregory Karst Research – Special Interest Group (SIG) and the much-valued close relationship and assistance of Judbarra-Gregory National Parks staff and the Traditional Owners.

The caves are formed in several major karst block areas; Northern, Central, Southern and Spring Creek. Major creeks and rivers bisect the karst to define these boundaries, thus making cave connection of all areas virtually impossible.

Serious exploration of the karst at Bullita began in late 1990 with an Operation Raleigh Caving Expedition led by Storm and Smith from the United Kingdom. Then in 1991, members of the Top End Speleological Society (TESS) and Canberra Speleological Society (CSS) visited the area and continued exploring and mapping for several years. In 2005 the SIG was formed and continues to conduct annual expeditions to this present year. Kershaw (2012) provides an excellent account of the history of the exploration over the years.

A quick count back through records reveals over 100 ASF members and National Parks staff, have been involved in the surveying and explorations. This is an amazing achievement given



Garry K. Smith in underbirds near Station 18PM003 entrance BAA114 Bullita

the logistics of the very remote location, harsh conditions of the region and that all participants self-finance to participate.

Despite what has been achieved so far there is still lots to do and discover. Each year extensive new caves and significant extensions to known caves are discovered, adding many kilometres of new passage to the maps. Newly discovered caves, which often appear to be disconnected from the main systems, are constantly being linked up with other caves as connections are discovered.

The annual expeditions of a two week duration are typically held in July, during the Northern Territory's dry season. This period is chosen because in the wet season, vehicle tracks become impassable and many parts of the caves are flooded.

A campsite in the park is used as the main base for expeditions and there is sometimes a group of cavers who also set up an 'out-camp' to reduce daily access time to areas of more remote karst. A typical day at the main camp begins around 6.30am (half hour before dawn) enjoying breakfast as the first rays of sun peep over the horizon. It is a pleasant 10 to 15 degrees at that



*Stromatolite domes in karst near Berks Backyard.
Photo by Garry K. Smith*



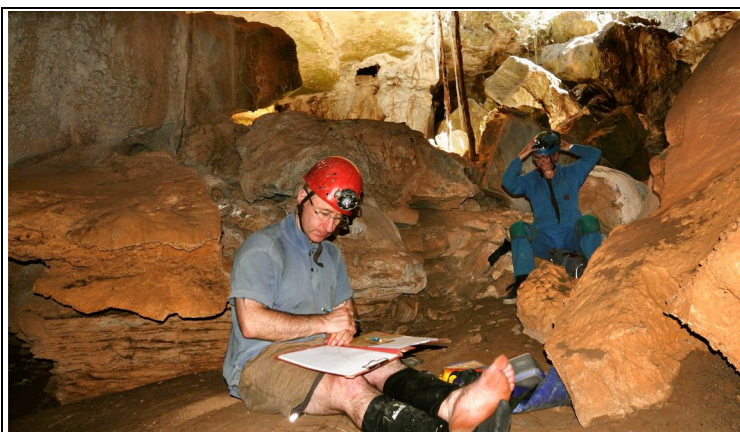
*Deciduous baob trees abound.
Photo by Garry K. Smith*



*Reto Zollinger and Yvonne Ingeme in Dingo Cave at Firemans chamber -Station 18PM064.
Photo by Garry K. Smith*



Ian Barnard surveying near the western end of Berks Backyard cave. Photo by Garry K. Smith



*Phil Maynard and Melissa Hadley in underbirds entrance.
Photo by Garry K. Smith*

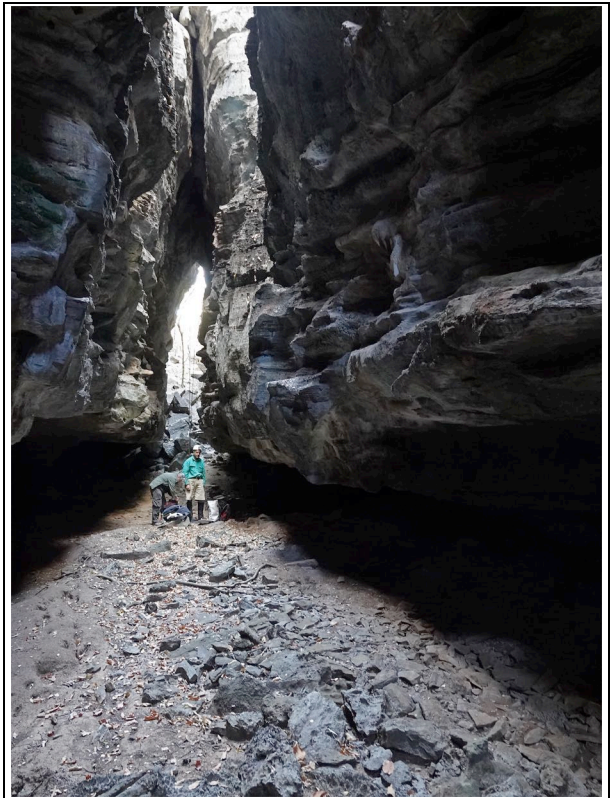
time of day. Then the pace picks up as people begin preparing and packing food, water and caving equipment, filling out location logbooks, collecting maps of previously surveyed caves and punching in waypoints and entrance locations into their GPSs. By 8 am we are driving to the starting point for walks to the caves. The walk can be as little as 10 minutes or as long as 2 hours, depending on the karst area visited.

Most times groups are in the cool of the underground by 10 am as above-ground temperatures often reach over 30°C in the middle of the day. After our day of exploration, surveying and photography in the pleasant cave temperature, we emerge from the underground late afternoon to allow time to walk back to the vehicles around 5.15 pm. After returning to camp the fire for the water heater is lit followed by a rotation of people through the two

showers. Dinner is cooked, batteries are recharged then finally there's time to relax and sit around socialising and exchanging stories of new exciting cave discoveries. Clothes washed



Melissa Hadley in Dingo Cave near station AK19. Photo by Garry K. Smith



Surface grike near station 18MP011. Photo by Garry K. Smith

before going to bed are dry before the sun rises, so one can wear the same caving clothes each day. By 10 am most people are off to bed.

The karst at Bullita was created by an ancient life form which caused the precipitation of calcium carbonate from saturated seawater to form stromatolites. Today rounded stromatolites domes created over eons by microscopic photosynthetic organisms (cyanobacteria) some 1.6 to 1.0 billion years ago, are visible on the surface where the cap rocks have eroded away. These layered structures, up to 15 metres in diameter, can even be seen on images taken from orbiting satellites. One could say they are the only fossils on earth visible from space. Cyanobacteria were responsible for changing the earth's atmosphere from a carbon dioxide-rich to the present-day oxygen-rich atmosphere and allowed life as we know it to evolve (Smith 2018).

Below ground, the layered Proterozoic dolomitic limestone has been dissolved away to create a myriad of passages. The extensive maze caves have formed in



Ships Graveyard Chamber, Dingo Cave. Photo by Garry K. Smith



Melissa Hadley in Scout Cave, Bullita — station 18IB108. Photo by Garry K. Smith

and under the major outcrops of Supplejack Dolostone member of the Skull Creek Formation (Martini & Grimes 2012). Often different passage levels connect and separate again in an intertwined three-dimensional maze.

There are some vast caverns so large that even the brightest lights don't illuminate them and one can but marvel at the huge expanse of rock suspended above. Among the largest examples are Mega Chamber 1 (107 m long x 24 m wide x 14 m high), Mega Chamber 2 (103 m long x 15 m wide x 15 m high) and the Giga Chamber (140 m long x 54 m wide x 7.4 m high). The two Mega Chambers were photographed during the 2018 expedition, using 5 flash units held by cavers spaced at intervals down the chamber and communication with the models was via 2-way radios. It took a while to set up the photos and everyone had to stand perfectly still for the 10-second exposure.



The Giga Chamber — North Dingo System (140L x 54W x 7.4H). Photo by Garry K. Smith

Much of the park's caves comprise huge passages, which when exploring can feel like an underground bushwalk, with something new and exciting around every corner. For those who like extra physical challenges, there are still plenty of areas to be found with crawl and squeeze passages. In many places there are multi levels (up to five levels in SOGS Cave) of three dimensional maze.

Giant tree roots penetrate cracks in the limestone and hang down from the ceiling like fireman's poles, but they are in fact the life support for trees above. In places beams of light may penetrate cracks in the 20-30 metres of limestone above and provide a dazzling light display at certain times of day.

Above ground is stunning with massive deciduous boab trees (*Adansonia gregorii*) scattered across the landscape and huge areas of tower karst, with razor sharp fluting. Straw-coloured cane grass can grow to head height and crackles and snaps as the first person pushes their way through on the walk to a cave entrance.

It doesn't take long before paths are formed through the grass as cavers walk to and from caves each day.

Wild donkeys screech in the distance and flocks of cockatoos squawk as they fly overhead. The flies can sometimes be of irritating proportions during the middle of the day, so hat fly nets are a blessing. Carrying drinking water is absolutely essential in this dry landscape, because even the caves are waterless at this time of year. Despite the harsh conditions, this country has a beauty of its own. Broad expanses of blue sky, straw-coloured grass, leafless boab trees, white flowering gums in bloom and stunning-shaped rocks of the tower karst are a photographer's paradise. Even at night, one only has to glance skyward to see the bright star-filled sky and the Milky Way in all its spectacular glory without the glare from city lights.

So what is the future for new discoveries and continued surveying?

Consensus among those attending the expedition this year, is that much more exploration and surveying is still to be done. There are still promising areas of limestone karst visible on satellite photos, where speleologists are yet to visit.

Existing caves continue to be linked up by new passages, there are hundreds of question marks on the maps where passages lead off and nobody has had time to explore or survey them. Sefton (2017) reported that as of the end of the 2017 expedition the three largest connected cave systems in the park were:

- The Bullita Cave System in the Central karst block at over 123 km of continuous surveyed passage, making it presently the 19th longest in the world
<http://www.caverbob.com/wlong.htm>
- The Prometheus System in the southern karst block, which includes North and South Prometheus, Claymore, Two Fishes, and Atlantis caves, is over 57 km.
- The Dingo System of the northern karst, at approximately 41.5 km.

Once the more than 80 pages of survey data from this year's expedition have been processed these figures will certainly increase. The three cave systems continue to grow in survey length as new passage is discovered and smaller caves are incorporated into bigger systems. Theoretically it is possible that many of the smaller caves with say 5, 10 or more km of surveyed passage will become part of larger caves as more links are discovered.

The Judbarra-Gregory karst covers an area about 30 km long by a maximum width of 1 km, but generally only a few hundred metres wide. It is a substantial area by Australian standards.

All of the achievements to date were not have been possible without the efforts of dedicated members of the Judbarra-Gregory Karst Research SIG and the support of the National Parks staff and indigenous community.

There are SIG members who have participated in 10, 15 and even 20 years of expeditions. Their knowledge and expertise are pivotal in providing guidance to newcomers who are keen to



Solar Bore campsite, early morning. Photo by Garry K. Smith

assist and hopefully willing to take over the reins in the future as senior members are no longer able to participate.

There have been studies on the geology, hydrology, flora and fauna, both above and below ground, but there is still plenty to be done.

To gain a position on an expedition, one must first apply to the SIG committee or be recommended by an existing member of the SIG. Long term survival of this group is ensured only if there is a steady influx of fresh enthusiastic speleologists willing to take on the challenge.

It should be especially noted that all caving in the Judbarra-Gregory National Park requires a special permit from the Parks and Wildlife Commission - NT, and that there is a very real chance of becoming lost in the multi-level maze cave systems without survey maps and guidance by cavers who have past experience at Bullita.

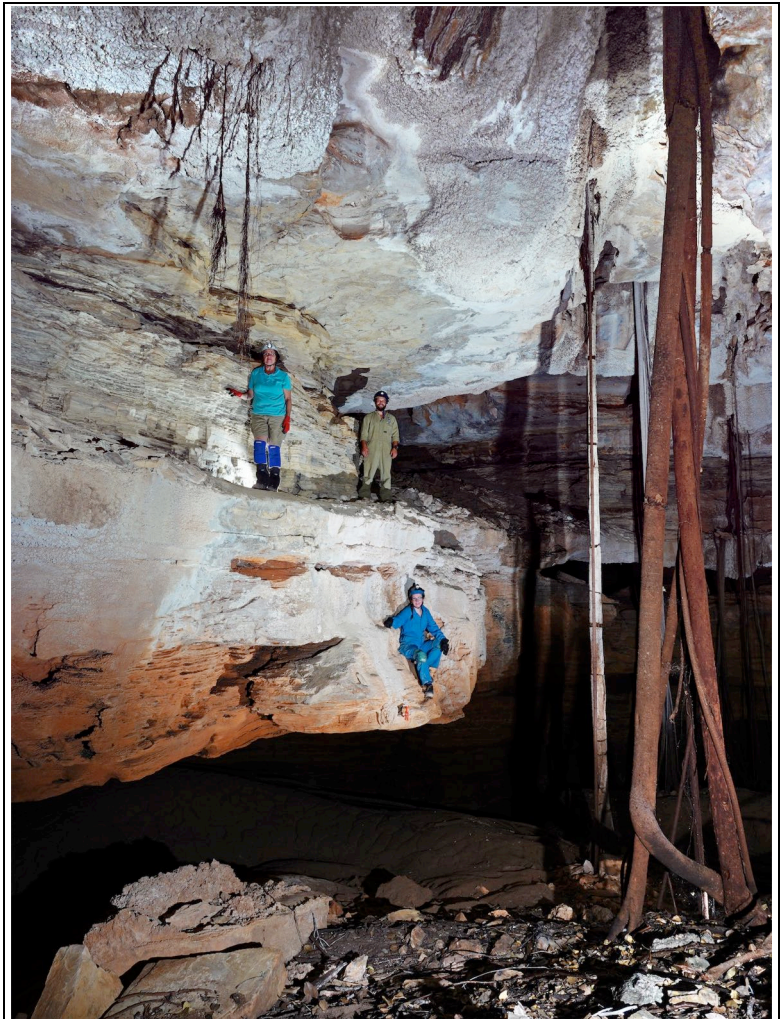
Acknowledgements

Expedition members are indebted to the Park Staff and traditional owners of the Judbarra-Gregory National Park for their continued support and encouragement of our activities within the park.

Thankyou to Mark Sefton, for checking the accuracy of this article and Andrew Baker for checking the readability.

References

- Grimes K. 2012 Introduction: The Judbarra/Gregory Karst. *Helictite*, 41: 1-4, Journal of Australasian Speleological Research. ISSN 0017-9973.
- Kershaw, R. 2012 A History of Cave Exploration in the Judbarra / Gregory National Park. *Helictite*, 41:5-14, ISSN 0017-9973. Journal of Australasian Speleological Research. <http://helictite.caves.org.au/pdf1/41.Kershaw.History.pdf>
- Martini, J., and Grimes K. 2012 Epikarstic Maze Cave Development: Bullita Cave System, Judbarra / Gregory Karst, Tropical Australia. *Helictite*, 41:37-66, ISSN 0017-9973. Journal of Australasian Speleological Research.
- Sefton, M. 2017, Judbarra-Gregory Karst 2017 Annual Expedition. *Espeleo Bulletin*, December 2017, pp. 4-6.
- Smith G. K. 2018 Karsting light on Stromatolites and Thrombolites. *Caves Australia*, 203: 11-13, Published by the Australian Speleological Federation.



Firemans Chamber at station 18PM46 - Dingo Cave Bullita.
Photo by Garry K. Smith