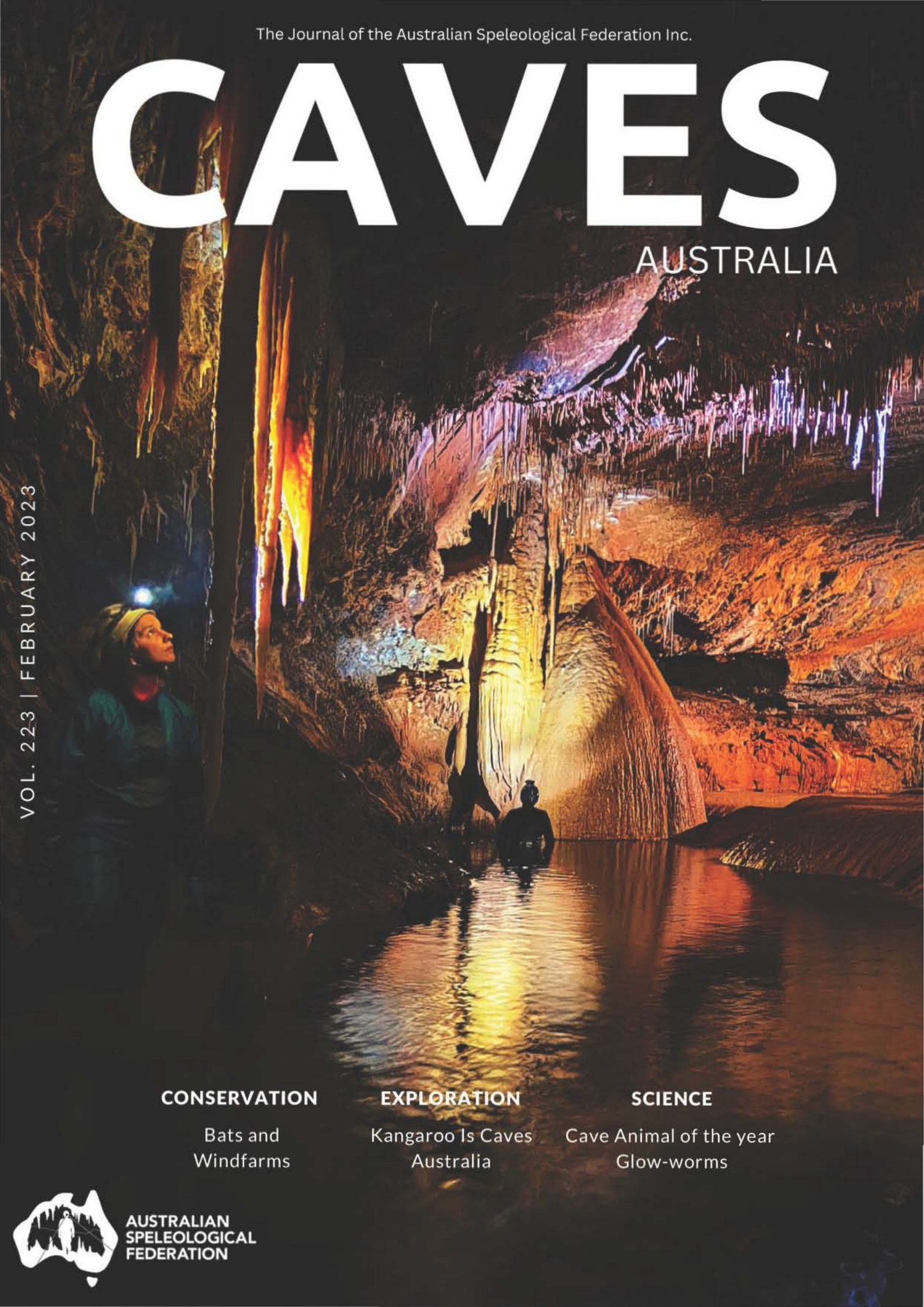
The Journal of the Australian Speleological Federation Inc.

CAVES AUSTRALIA



VOL. 223 | FEBRUARY 2023

CONSERVATION

Bats and Windfarms

EXPLORATION

Kangaroo Is Caves Australia

SCIENCE

Cave Animal of the year Glow-worms

AUSTRALIAN SPELEOLOGICAL FEDERATION

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CAVES
AUSTRALIA

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EDITOR, PRODUCTION AND ADVERTISING MANAGER::
NADINE MURESAN
EMAIL: ASF.CAVESAUSTRALIA@GMAIL.COM

PROOFREADING:
SUSAN WHITE
KEVIN MOORE
ALAN JACKSON

ASF: ASF.CAVES.INFO@GMAIL.COM
FOR ALL ASF PUBLICATIONS:
ASF.CAVES.SALES@GMAIL.COM
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COVER: LILITH STEWART AND CLARE MCCUTCHEON AT CROESUS CAVE, MOLE CREEK, TAS PHOTO BY NADINE MURESAN

Photo Nadine Muresan
in Kubla Khan TAS

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AUSTRALIAN SPELEOLOGICAL FEDERATION

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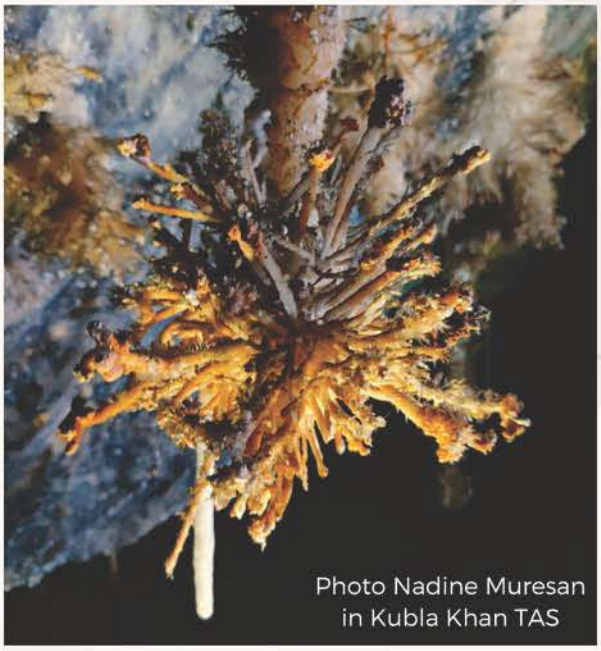

Photo Nadine Muresan
in Kubla Khan TAS

Photo Bogdan Muresan
in Shades of Death VIC

Photo Nadine Muresan
in Shades of Death VIC

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32ND ASF CONFERENCE SECRETS OF THE NULLARBOR

Still time to get your tickets for the 2023 ASF conference! Ticket sales are going well and it's shaping up to be a fun couple of weeks. We are working to get the conference program and post-conference caving firmed up for you, hopefully not too far off.

There is still time to submit an abstract and we encourage you to please send your title and short abstract directly to:

info@asfconference2023.com

If you have submitted an abstract via the portal and haven't heard back, please resend via email as we have had some incurable issues with it!

The merchandise shop is up and running so don't forget to pre-order your conference merchandise. Thanks for your patience and support and we look forward to seeing you all very soon in Ceduna.

32ND ASF CONFERENCE SECRETS OF THE NULLARBOR

The Merch Shop is Open!

ASF Conference **17th to 21st April 2022**, Ceduna SA

Abstract Submission is still open

Welcome BBQ 16th April

Field trips **22nd April to 1st May**, exploring the Nullarbor

Register now
for updates: www.asfconference2022.com

Photo by Bogdan Muresan in Shades of Death VIC

Editor's note

"The Danger of adventure is worth a thousand days of ease and comfort" – Paulo Coelho

Hello all and welcome to *Caves Australia* for 2023!

My name is Nadine Muresan, and I have decided to take over from the outstanding and slightly sarcastic Alan Jackson, who has done a fantastic job over the years of bringing us *Caves Australia* journals year after year.

A massive thank you has to go out to Alan for his support in this transition, filled with amazingly insightful and direct comments. It has been great taking on the reigns. I only hope "*Caves Australia* WON'T fall over totally" without him! Also, a huge thanks to Kevin Moore, who has been proof-reading everything in advance.

I look forward to bringing in the new year with a new look and can only hope to inspire some new and refreshing articles from people around the nation. I know there is lots happening both above and below the surface and I am very keen to hear and publish it.

I am a mum of an amazing 4-year-old little caver, Edmund, and my husband and I are members of the Victorian Speleological Association (VSA). Both starting our paths in caving in Romania, we now call Buchan our second home in Victoria.

There are lots of events coming up in Australia and abroad, with the most imminent being the 32nd ASF conference - Secrets of the Nullarbor. Have any questions? Contact event organisers at registration@asfconference2023.com.

There will be a slight change in the months when *Caves Australia* will be released in order to make space in-between *Caves Australia* and the amazing *Cricket* publication. The next *Caves Australia* will be coming out in early May so I will be asking for some amazing new articles early April.

Till then, bring on 2023, stay safe and LET'S GO CAVING!

Nadine Muresan

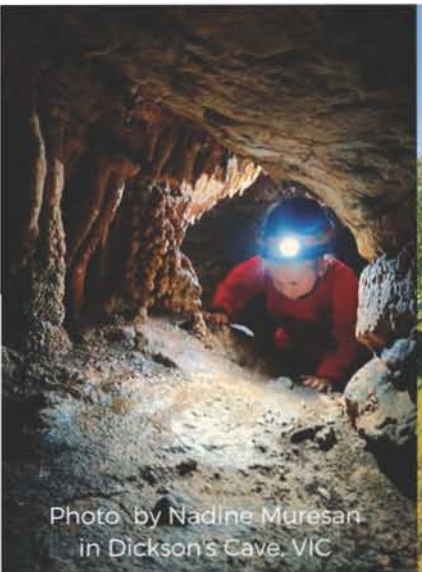


Photo by Nadine Muresan in Dickson's Cave, VIC

Photo by Bogdan Muresan Buchan, Potholes, VIC

Photo by Nadine Muresan in Honeycomb, TAS

Photo by Nadine Muresan in Honeycomb, VIC

Presidents Report – Feb 2023

Welcome to another year of caving, and it is shaping up to be a big one with lots happening within the ASF. The ASF would like to welcome Nadine Muresan to the Publications Commission team, as she has stepped up to take on both the roles of Publications Manager and Editor of *Caves Australia*. Nadine comes to the ASF with a journalism background and experience with the production of *Nargun* for VSA. She will be putting her valuable skills to use with the '*CA* Trifecta', by handling the production layout as well! I look forward to seeing the next evolution of *CA*. It has been wonderful to find another enthusiastic volunteer so quickly after farewelling Alan Jackson in the role late last year. Thank you Nadine!

The ASF has grown significantly in the past year with two clubs re-joining the Federation. The ASF warmly welcomes all members from the Sydney Speleological Society, and the Cave Exploration Group of WA. Both clubs became full Corporate Members of the ASF at the Council Meeting held via Zoom on January 8th 2023. SSS was one of the founding Clubs of the ASF in 1956, has been involved long-term with the NSW Speleo Council, and its members have made huge contributions to cave exploration and speleology over many decades. CEGWA is also a very active Club with its most recent focus being the exploration and documentation of caves in and around the Baxter Cliffs, WA Nullarbor (see *CA*222).

And a third welcome, to Melissa Hadley from NHVSS who joined the ASF Executive in January after the Council Meeting, and thank you to Daniel Lanssom for his time on the Executive last year. The ASF Executive remains largely unchanged in 2023 with: myself (President), Colin Tyrrell (Senior VP), Valdi Jonsson (Treasurer), Phil Maynard (General Secretary), Janice March (Executive Secretary), Rod Smith (Membership Secretary), Andrew Stempel (VP), Steve Milner (VP) and Melissa Hadley (VP). As always we can be contacted via: asf.caves.info@gmail.com.

I'm really looking forward to the upcoming conference in Ceduna (April 16-21) and seeing many of you there. It will be a wonderful celebration of caving, bringing many of our clubs together for the first time in four years! The program will include a range of talks, workshops and forums, Speleo Sports, mid-week activities in the Ceduna region, evening activities, Cavers Dinner and a week of remote camping and caving on the Nullarbor (April 22-29). There will also be a short Council Meeting to follow up on items from the January meeting.
Wishing you all fun and rewarding caving adventures in 2023, and I look forward to reading all about them in future editions of Caves Australia.

Sarah Gilbert
President

Caves, Surveying and Kangaroo Island

Clare Buswell
Conservation Commissioner

What a year it has been on Kangaroo Island, with cavers out in force with caulking guns and steel tags, taking on the ever-growing scrub to find cave entrances, that last year were easily walked to. Tagging was the priority for this year's work, facilitated by the Partnership Grant of $80,000.00 and a smaller grant from Friends of Parks of $5000. These grants have allayed some of the costs.

The physical tagging of caves on the western end of the island was a management request that aimed to provide them with a degree of certainty about what cave was what. Given that the project involves three types of cave identification: tagging, GPS locating and photo identification of the entrance areas; it can only be hoped that when the next bush fire comes through, we do not have to repeat this whole exercise.

The tagging trips were followed up with a 10-day cave surveying trip in Oct, with cavers coming over from NSW and Tassie for the event. Mind you, some ran the gauntlet of flood waters in NSW and those from Tassie had to deal with postponed boat crossings to get across the ditch.

All in all, sixteen people surveyed 60 caves, and there remains another hundred or so to go in the Kelly Hill section alone. This means that the sea caves in the West Bay area and the karst areas to be explored after examining the LIDAR flown in December 2022, will also be on the cave surveyor's radar.

As with new cave surveying processes, names for caves and their passages were invented over the course of the Oct 2022 trip. For example, we now have, K159, named 'Cavern Measureless to Man'; Surveyed by Lucy Stokes, Jim Crockett, Megan Pryke, well sort of. The description given to them was: two too-tight solution tubes. One was 30 cm in diameter or less, the other 40 cm and 1.6 cm deep. What was recorded on the cave surveying data sheet was the following:

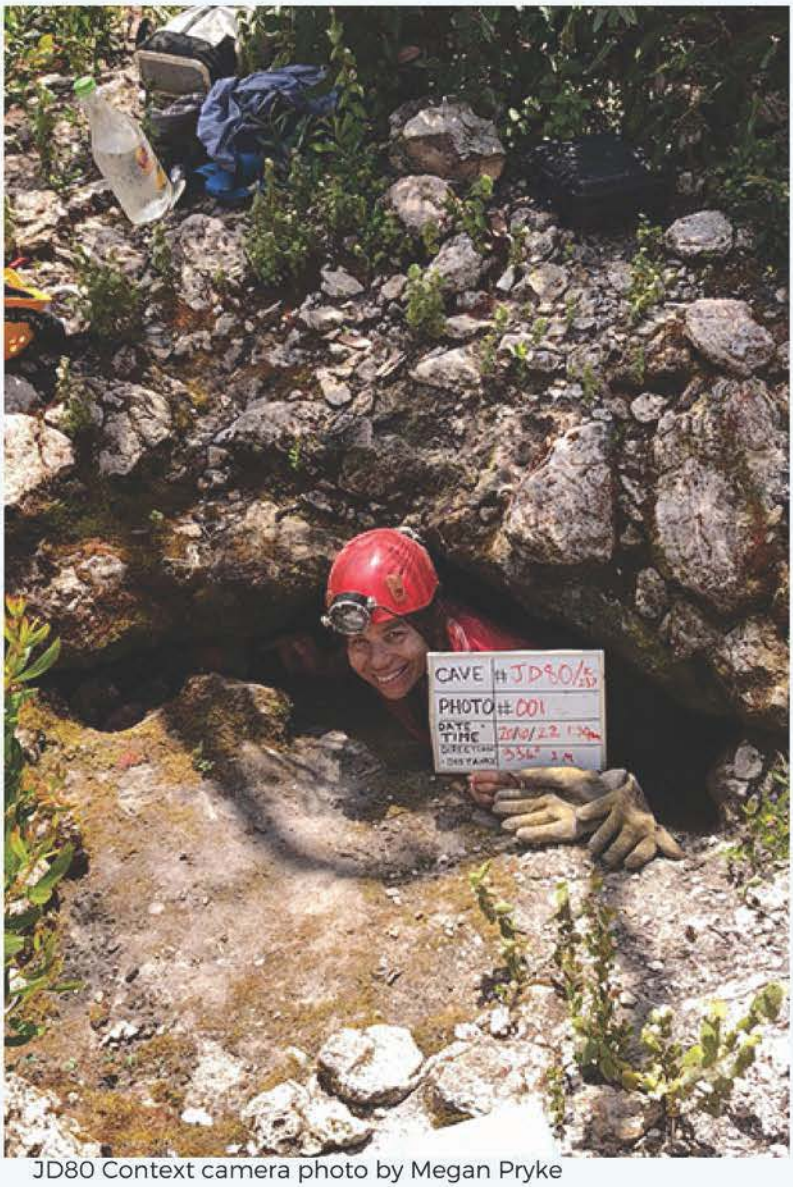
Megan, with a handline to help scramble down and up, lowered herself into the bigger tube. By sitting down and finding space to survey, she found a chamber and a bit more cave. Lucy and Jim stayed on the surface. Thus Megan, a woman, solo surveyed the small cave. A bit later Jim got in, nonetheless he did not help with the survey as the cave was pretty small, thus the cave was measured by a woman and remains "measureless to man."

The project has eight components, and we have been successful in starting five of them: LIDAR, cave tagging, cave fauna surveys, cave surveying and surface verification, and archaeology. We still have a lot of work to do on training people in the dark arts of ArcGis, Survex, and data wrangling.

The new LIDAR flight will provide hours of fun examining images for any possible shadow that looks like it could be a hole in the ground. Then of course, we have to surface trog to verify that it really is a cave.

In terms of financial dealings, those who attended the four trips this year contributed close to 1500 hours of volunteer labour time. This, costed out at the Friends of Parks rate of $45.10/hr, comes in at $67,650.00. If we were to cost out the cave surveying time at commercial rates and get paid for that, then we could all afford overseas holidays whenever we want!

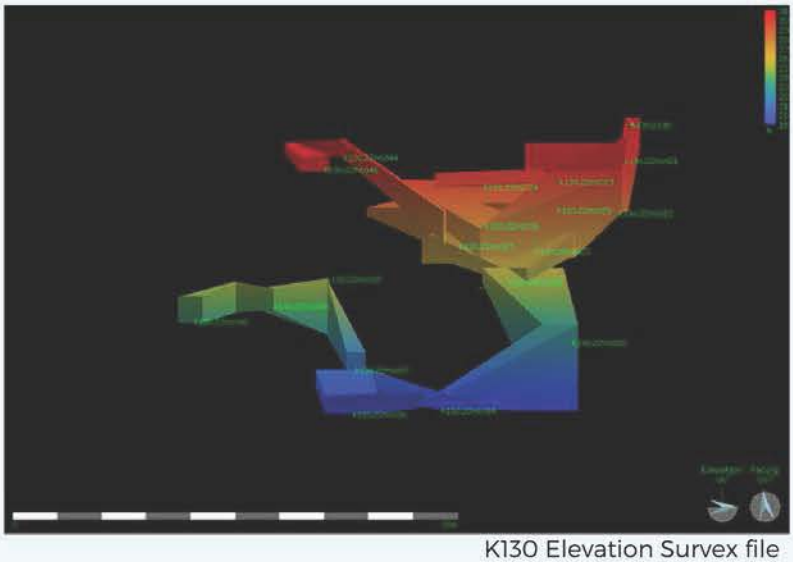
The last two years of work has supplied enough material to start on the interpretive trails app, that aims to promote the caves, karst and cultural heritage of the western end of KI. This app will be developed with help from the Kangaroo Island tourism group, members on the project and NPWS, It is funded in part by the Small Grant mentioned above.



JD80 Context camera photo by Megan Pryke

Finding a major tufa flow and springs along some of the coastline, has given an indication of what the hydrology is doing. This, coupled with the cave surveys, which are beginning to show the depth of the cave systems, is helping us to understand the area's geomorphology.

The work of Dr Keryn Walsh, in examining the wallaby skin trade, that supported many of the islanders on the western end of the Island from the early 1800s to the 1950s, will add yet another layer to the heritage story of the Island. Finding evidence of this trade in the caves around Kelly Hill has been an exciting development.

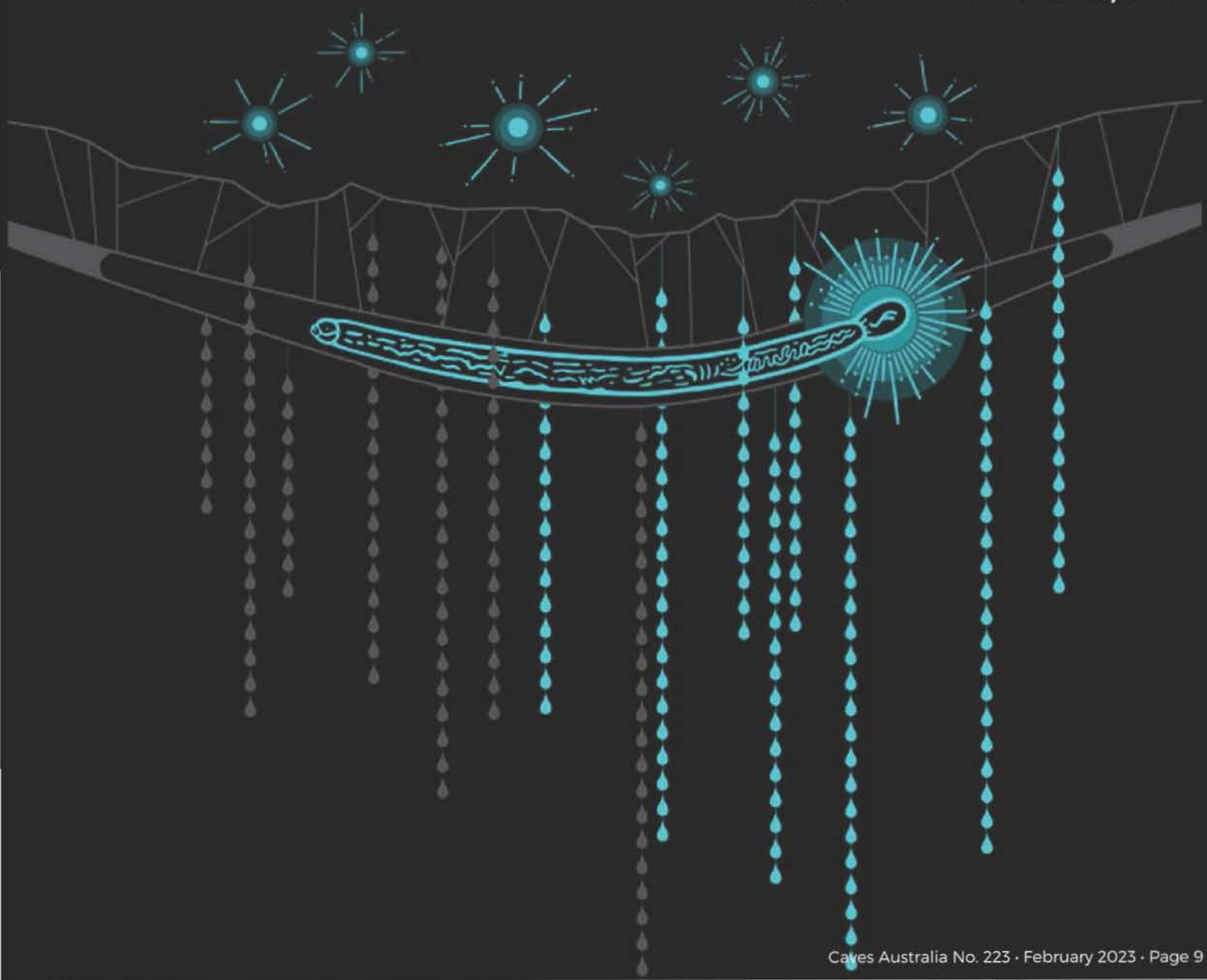

K130 Elevation Survex file

Exciting times lay ahead, and my thanks go to all those who have so generously given their time and dedication to this project. Our programme for this year involves more surface work and another 10 day survey trip in Oct. If you wish to be involved, then please contact me. You will be most welcome.

AUSTRALIAN CAVE ANIMAL OF THE YEAR 2023

This article is the text from the Cave Animal of the Year website which is largely based on text from my book *Living Lights The Glowworms of Australia and New Zealand*, published in 2013. My thanks to Associate Professor David Merritt, University of Queensland for his assistance with both these projects. David provided most of the research papers that I read to gain information to write the book text, read and commented on both the book and website text and provided photos. I am grateful for his kind support, encouragement and friendship over many years.

CATHIE PLOWMAN, NC



AUSTRALIAN CAVE ANIMAL OF THE YEAR 2023

Glow-worms
Arachnocampa genus

Charismatic, alluring, magical... glow-worms bring people much joy and happiness. Australia has eight species of glow-worms in the genus *Arachnocampa* and collectively they are our 2023 Australian Cave Animal of the Year.

Glow-worms are not worms at all. They are insects and, more specifically tiny flies, that have a four-stage lifecycle of egg, larva, pupa and adult.

The best-known part of glow-worm life is the larval stage where colonies of glow-worms have large numbers of beautiful blue lights often seen in dark places like damp caves and rainforests.

The scientific name of glow-worms describes some of the key features of the larval stage.

Arachno = spider, campa = worm-like

The 'spider' part of the name is of Greek origin and describes the sticky threads that the glow-worm produces and which, like spider webs, trap small animals that become the glow-worm's food. The 'worm' part of the name relates to the larva, which appears worm-like in its protective tubular nest that is home for most of the glow-worm's approximately nine-month life.

One genus, eight Australian species

Needing moist, cool habitat to survive, Australian glow-worms are only found in selected areas of the eastern states. Perhaps they were more widespread in previous climatic conditions but retreated to their current locations as the Australian climate warmed and dried. Isolated from other glow-worm populations, the eight different species that have now been described evolved their own physical peculiarities that differentiate them from each other.

Photo Garry K Smith
Glow-worms
at Gloucester Caves (2GL-2)

Here's a quick introduction to our eight species.

- *Arachnocampa tasmaniensis* was the first Australian species of glow-worm to be described. As the name suggests, it is found in Tasmania. Depending on the season, visitors to Marakoopa Cave and Gunns Plains Cave can delight in displays of glow-worm lights.
- *Arachnocampa richardsae* is named after entomologist Dr Aola Richards who did extensive glow-worm research in the 1950s and 60s. The species is found in several areas of New South Wales including the Blue Mountains, Bundanoon and Fitzroy Falls.
- *Arachnocampa flava* is readily seen in popular rainforest areas close to Brisbane including Natural Bridge and Lamington National Park.
- *Arachnocampa tropica* is, as its name suggests, found in tropical areas of far north Queensland where moist rainforests and granite caves provide habitat.
- *Arachnocampa girraweenesis* is named for the Girraween National Park in southern Queensland where it was first described. Its range includes several wet forest and cave areas in northern New South Wales including Barrington Tops and the Washpool National Park.
- *Arachnocampa otwayensis* is found in wet forests and damp sheltered overhangs in the Otway National Park in southern Victoria.
- *Arachnocapma gippslandensis* is found in rainforests in the Gippsland region of eastern Victoria.
- *Arachnocampa buffaloensis* lives in the Mt Buffalo National Park where an underground river cave provides its main habitat.

The genus has a ninth species, the well-known *Arachnocampa luminosa* which is only found in New Zealand and, despite some differences, is closely related to the Australian species.

Fireflies which also glow, are found in many areas, and are often called 'glow-worms'. But these are immature winged beetles and not closely related at all to *Arachnocampa*.

It's the glow-worm lights that people love

If it wasn't for their spell-binding lights, unless you're an entomologist or cave explorer, glow-worms would generally go unnoticed by people. Glow-worms are the larvae of a fly, and we generally don't pay much attention to flies unless they are pestering us. We certainly don't marvel at maggots which are the larvae of houseflies. But we become enthralled, lost in time with all cares forgotten, at the enchanting lights of glow-worms.

It's a total myth that glow-worm lights are caused by glow-worms burning their waste

It's a fanciful and often-repeated myth, that many of us have heard on cave tours and some of us were taught at school, that the glow-worm's light is caused by the animal burning its waste products. Wrong!

Photo by David Merritt

Photo by David Merritt

Photo Garry K Smith - 7P-7a Glow-worms, Peter Bannink in Mystery Creek Cave Tasmania

The myth probably has its origins in that the glow-worms light is produced in its tail, and in a structure called the Malpighian tubules. The Malpighian tubules do have light-producing cells as well as excretory cells, but they operate separately. The excretory cells regulate electrolytes and so function a little like a human kidney. And as for 'pooping', the glow-worm lowers its rear down one of its threads or 'fishing lines' and excretes its waste there. There is no link between waste removal and light production.

A glow-worm's light is produced by a complex mix of anatomy and chemistry

The light-producing cells in the Malpighian tubules are surrounded by a thin layer of respiratory tissue. The tissue draws in oxygen and works as a reflector by directing the light downwards. Oxygen combines with the enzyme luciferase, which is made in the light-producing cells; luciferin, which is a light-producing substance; and adenosine triphosphate (ATP) which is a metabolic agent for transporting energy in cells.
Scientists studying glow-worms do not yet fully understand the exact chemical reaction of the light production, but it produces light without heat and is very energy efficient.
The glow-worm controls its light and it can be brightened, dimmed or turned off. Glow-worm lights seem to be brightest when insect life is most abundant.

Photo by Garry K Smith - Glow-worms at Gap Creek Boulder Caves NSW

Sheltered cool, dark and moist places are essential for glow-worm habitat

Glow-worms have neither a hard shell nor thick skin and cannot survive high temperatures, low humidity or wind. Any of these would dry the glow-worm out. A moist cave, sheltered overhang, railway cutting, rainforest gully or abandoned tunnel (with limited air flow) are all suitable glow-worm homes.

Glow-worms also require nearby running water as habitat for small flying insects that will become their food supply. The less polluted the water the better, as it will support a greater variety and quantity of insect life.

The glow-worm's beauty is a lure to death

While humans marvel at the spectacle of glow-worm lights, for small flying insects the lights are a lure to their death. Insects such as mosquitoes, moths, springtails and caddis flies are drawn to glow-worm lights and become trapped in the sticky mucus threads or 'fishing lines' that the glow-worm builds. Once trapped, the insects are now on the glow-worm's dinner plate.

The threads and nest are produced in the glow-worm's mouth where salivary glands produce silk. First the glow-worm larva produces its tubular nest that it can move along, and then it makes about 70 sticky silk threads that are suspended from the nest, with droplets of mucus arranged on the threads. The threads vary in length from about a couple of centimetres to about 50 centimetres. The less air movement at a site, the longer the threads.

One researcher has suggested that the mucus drops on the glow-worm threads may have an anaesthetic effect on prey. The glow-worm can pull the thread in towards it with a series of contractile movements, and then secure the prey by producing some bracing threads and attaching these to the prey. The glow-worm then slides partially out of its nest and extends itself down the thread towards the prey. The prey is then gripped in the glow-worm's mandibles (jaws) and sawn into suitable lengths by its teeth. Once the prey is in small enough pieces the glow-worm sucks the juices out of it and then chews up the tougher portions. Any uneaten part of the prey is lowered onto a thread which the glow-worm cuts off and discards. Likewise, the glow-worm cuts off a thread after it has excreted its 'poop' onto it. Glow-worms readily make new threads and are continually replacing and maintaining their threads. Having the threads in good working order is an essential part of assisting their food supply.

This time-lapse video of the New Zealand glow-worm *Arachnocampa luminosa* shows the glow-worms' constant movement and web maintenance.
https://www.youtube.com/watch?v=JC41M7RPSec
(The New Zealand glow-worm is almost identical in physiology and behaviour to the eight Australian glow-worm species.)

Behind the glow-worm's lights are three other life stages

The larval stage is the longest, most obvious and most admired stage of glow-worm life. Like most of insect life, the other three stages of glow-worm life don't draw a lot of public fascination.

The glow-worm larva gradually changes to the pupa, which is like the glow-worm version of a teenager, a transition period from child to adult.

The change from larva to pupa commences with the larva removing its threads, these are now redundant as the adult does not eat. Also, the threads could be hazardous and entrap the adult when it emerges from the pupal case. The larva also constructs a circle of shorter threads around its nest, and these are thought to offer protection allowing the adult glow-worm time to emerge and dry its wings without being eaten by another cave invertebrate.

During pupation the larva structures of the glow-worm become absorbed into the body and adult structures such as wings, legs, antennae and eyes form. Female pupa form eggs in the abdomen.

Photo by David Merritt - adults

A short life for adult glow-worms

It can take from one to 13 hours for the adult glow-worm to emerge from the pupal case. Once their wings are dry, male adult glow-worms fly away from the nest, while the females stay partly in the protection of the pupal case ready for a male to arrive and copulate.

Adult glow-worms do not feed and only live for a few days. Males die soon after copulation and females soon after egg laying.

Photo by David Merritt

Photo by Garry K Smith Glow-worms in Cascade Cave Gloucester

The eggs are a link between the generations

The female lays about 130 sticky eggs which may be laid singly or in clusters, and generally on the edge of existing glow-worm colonies. Not all the eggs will survive—they may become food for other cave animals such as beetles, spiders and other insects. The eggs take varying times of one to three weeks to hatch, shorter periods in the northern climates and this is thought to be due to ambient temperature variations.

Larvae hatching from eggs vary between three and six millimetres in size and the tiny larva find somewhere to attach themselves and immediately commence building their nest and threads. They need to do this pronto to obtain food and protect themselves from drying out and being eaten.

A new generation of glow-worms has commenced, and people lucky enough to see them will be enthralled by their tiny glowing lights in the darkness.

Where to see glow-worms in Australia?

This list is not exhaustive and includes places where glow-worms are readily visible in caves, forests or abandoned tunnels. Forest areas need to be visited after dark to see the glow-worms.
Queensland: Cairns area, Lamington National Park, Springbrook National Park, Tamborine Mountain.
New South Wales: Dorrigo National Park, Blue Mountain, Fitzroy Falls.
Victoria: Otway National Park, Upper Yarra Valley.
Tasmania: Gunns Plains Cave, Marakoopa Cave and Mt Field National Park.

Learn more about glow-worms.

We wrote a small book. It's called *Living Lights—The Glowworms of Australia and New Zealand*, by Cathie Plowman with David Merritt. Purchase from the author at: hello@cavenaimaloftheyear.org.au

David Merritt is an Associate Professor at the University of Queensland and has spent decades involved in the study of glow-worm physiology and behaviour. Visit his website: Merritt Lab

You can enjoy glow-worms and help promote them and other Australian cave animals. We have got glow-worm merchandise to celebrate our 2023 Australian Cave Animal of the Year. Get in touch about our bookmarks, stickers and posters at: hello@cavenaimalofheyear.org.au

There are some beautiful videos of glow-worms on YouTube.

Photo by Garry K Smith Glow-worms in Cascade cave (2GL-2) at Gloucester Caves NSW

Photo by Alan Green CRS Bungonia - The exercise briefing

CAVE RESCUE TRAINING AT BUNGONIA CAVES: A MORE REALISTIC EXERCISE THAN PLANNED

Andrew Baker, Michael Fraser and Brian Evans
NSW Cave Rescue Squad Inc.

A thunderstorm during a recent interagency exercise at Bungonia transformed routine training into a more authentic situation. This created realistic pressure and an intense exercise, with learnings far exceeding expectations. This article details the events and valuable lessons, which are equally relevant for those on regular caving trips and those interested in cave rescue.

The planned component of the exercise:

Having been unable to hold a major exercise for several years as a result of the bushfires, flooding and the COVID-19 pandemic, the NSW Cave Rescue Squad (CRS) finally held an interagency exercise at Bungonia Caves 22-23 October 2022. Originally, the exercise was planned to be held at Jenolan Caves, but due to uncertainty surrounding ongoing road closures, a backup plan was instigated just a week beforehand. Unfortunately, due to the change in location, Blue Mountains Police Rescue Squad were unable to attend, although staff from Jenolan Caves Reserve Trust (JCRT) and Ambulance NSW (ANSW) were still able to participate. In attendance were 16 CRS members, three staff from JCRT and three NSW Ambulance Special Operations Paramedics. The Region 6 Coordinator (specialist squads) of the VRA Rescue NSW attended as an observer.

The exercise commences:

The weather forecast was checked on the morning of the exercise and rechecked at 11.00hrs. Rainfall of 7 mm was predicted by the Bureau of Meteorology (BOM).

The exercise commenced with a briefing at the ranger station at 0830hrs. After outlining the exercise objectives, roles and responsibilities, and environmental and risk management considerations were addressed, everyone relocated at the carpark only a couple of minutes down the road. Key safety messages in the risk assessment and briefing included the possibility of flooding, although it was noted that 'heavy rain events may result in water flowing in the entrance of the cave, but extremely unlikely to cause flooding' due to the nature of the chambers and passages that the exercise was being conducted in.

The 'situation' involved an 'injured' caver in Drum Cave (2B-13), a short distance beyond the top of the pitch into Drum Extension, which is a popular destination for experienced NSW cavers. The cave was divided into three sections (teams), with an additional team tasked with running communications (Michie phone) from the entrance control on the main walking track to the casualty.

- Team 1 was tasked with rigging access into the cave, then transporting the casualty from the top of Drum Extension across the Railway Tunnel up to the base of the second pitch. This involved lowering then lifting the casualty on a tyrolean, a belay up an incline, and manual handling of the stretcher.
- Team 2 was assigned the middle section of the cave, involving a vertical lift up the second pitch, two small climbs, and navigating a constricted passage (the 'Squeeze'). Their rigging was challenged by a lack of natural anchors; CRS don't typically place bolts in caves during training.
- Team 3 was tasked with lifting the casualty up the 50 m entrance pitch, as well as rigging a second set of access ropes to enable efficient egress of participants.

The ANSW paramedics completed their initial assessment and provided their report, relayed via Michie Phone to the surface, after which movement of the casualty commenced at 1430hrs and proceeded smoothly and efficiently. During the lift up the second pitch, the entrance controller advised that the Michie Phone was to be disconnected (1549hrs), due to the sudden arrival of storm conditions and frequent lightning. This was precautionary to protect users and equipment.

Photo by M.Fraser - Stretcher on the tyrolean at the base of the Drum Extension

The situation changes:

At the top of the second pitch, the casualty was replaced to avoid any one individual spending all day in the stretcher, and a 5-minute break was taken. A loud shout from further up the cave indicated a sudden change of cave conditions. The underground controller proceeded to investigate, expecting little more than a trickle, and was confronted with a pulse of water about to flow into the Squeeze. The initial prediction of 7 mm of rainfall for the day had become an unexpected downpour of 26 mm within a half hour period.

The person who had raised the alarm quickly passed through the Squeeze, remaining dry, while the underground controller hurried back with the news that the exercise was now suspended.

Photo by Alan Green - The stretcher nearing the end of the Tyrolean in the Railway Tunnel.

The chamber currently housing the majority of participants was large and would never fill with water. However, the inflow could potentially block their exit through the Squeeze. Equipment and the stretcher were stashed in higher locations and these participants retreated through to the entrance chamber.

Negotiating the Squeeze required getting quite wet. The previously dry entrance pitch was transformed into an impressive waterfall.

Whilst those with experience caving in wet conditions (found in many Tasmanian caves and further abroad) found the new situation quite exciting, albeit a little unpleasant, the conditions and waterfall were an alarming sight for some.

To communicate up and down the pitches, each team carried UHF radios. This enabled clear, though multi-stage, communication with the surface, where underground participants learned of a second storm, and continuous downpour of rain.

As the rainfall eased, it was agreed to send two suitably experienced hydrophilic members up the ropes to the entrance chamber. The force of the water challenged their ascent, but they made good time up the pitch. This was an important turning point. Once they were safely up, a second pair of CRS members made their way up to assist at the top, followed by an ANSW paramedic and another CRS member. These six would join the three existing members positioned in the entrance chamber, forming a team tasked with securing the safe passage of those below.

A lot was happening at this time. At the top of the entrance pitch in the entrance chamber, Al Warild was rigging a dry route. Options for an 'assisted prusik' (and ultimately haul) were investigated, additional warm clothing was sourced, whilst the radio communications ran hot with requests and updates. Participants below the wet entrance pitch took stock and sheltered from the wind and spray.

The dry route traversed further out across the top of the entrance pitch and finished at the last rebelay, bypassing the very wet top and middle sections of the pitch. Although ascending the bottom section still required getting wet, this was mainly from spray rather than the direct flow. With the route complete, people started ascending in pairs. Water levels were also finally starting to recede.

All of this took time, and a few people had become quite cold prior to the lowering of warm clothing. Initially, the most competent members were sent up, followed by pairings of an experienced member with a less experienced member. As a precautionary approach, four people were hauled up. Finally, the two remaining ANSW paramedics ascended out, and with the minimal personal and ANSW packs hauled out, the exercise coordinators ascended.

Photo by Tina Willmore - Water flowing into the chamber beyond 'The Squeeze'.

Photo by Alan Green - Ascending the bottom section of the entrance pitch.

Everyone was out of the cave at 2030hrs, with a quick debrief held back at the carpark. The following morning, a small clean up team re-entered the cave to complete derigging pitch 2 and the entrance pitch, and haul the packs and stretcher out.

Hydrological observations:
Unlike many NSW karst environments, the limestone plateau at Bungonia is not surrounded by non-carbonate terrain, but rather is adjoined by deeply incised valleys of Bungonia Creek and the Shoalhaven River. Consequently, surface streams are intermittent and rainfall is the only means of recharge. The B13 entrance is in the bottom of a large doline, with a very small and localised catchment of approximately 9 ha.

Interestingly, during the initial thunderstorm, water was pouring down the entrance pitch and main passage, however a side passage (formations after the squeeze) was dry. Upon returning on Sunday morning, the main passage was dry, however considerable flow was pouring out the side passage.

Lessons learnt:

- Radios – UHF radios were a crucial back up, utilised when the Michie Phones were disconnected due to the electrical storm. However, tethers on two radios failed and one became damaged while prusiking up the waterfall.
- Warm gear – We needed additional dry warm gear on hand in the event an expected dry cave turned wet. It's worth noting that, while this cave clearly carries water, very few people experience this.
- Stress/changed plans etc. – An exercise like this, with plans evolving as conditions changed, helps to build resilience for exercise leaders and participants alike. This is much more realistic to an authentic situation as plans change with new conditions and additional information.
- Placement of people (experienced at top) – Fortunately, three exceptionally experienced CRS members (including the Captain) were positioned at the top of the main pitch when the storm hit. They were able to assess and implement changes needed to assist participants out of the cave safely.
- Risk assessment – Although flooding was included in the risk assessment, most participants who had previously visited this cave in dry conditions were surprised by the sudden transformation of the cave caused by the storm.
- Interagency relationships – Having more frequent interagency exercises will build trust and understanding of our different skillsets. A dedicated liaison officer would keep all parties' thoughts and worries in sync, thereby ameliorating concerns.

This is a cautionary tale applicable to the wider caving community, to appreciate how unexpected weather patterns can create an abrupt and hazardous transformation of a cave. We shudder to think what may have happened if it had been a largely novice group in the cave. As a result of many years of rigorous training, CRS is fortunate to have many capable leaders, and when the exercise became disrupted, people were able to step up to the occasion and handle the situation competently and in a professional manner. Well done to everyone involved.

A short video 'Cave rescue exercise flash flood in Drum Cave' can be viewed at: https://www.youtube.com/watch?v=ztt2EtrWB98

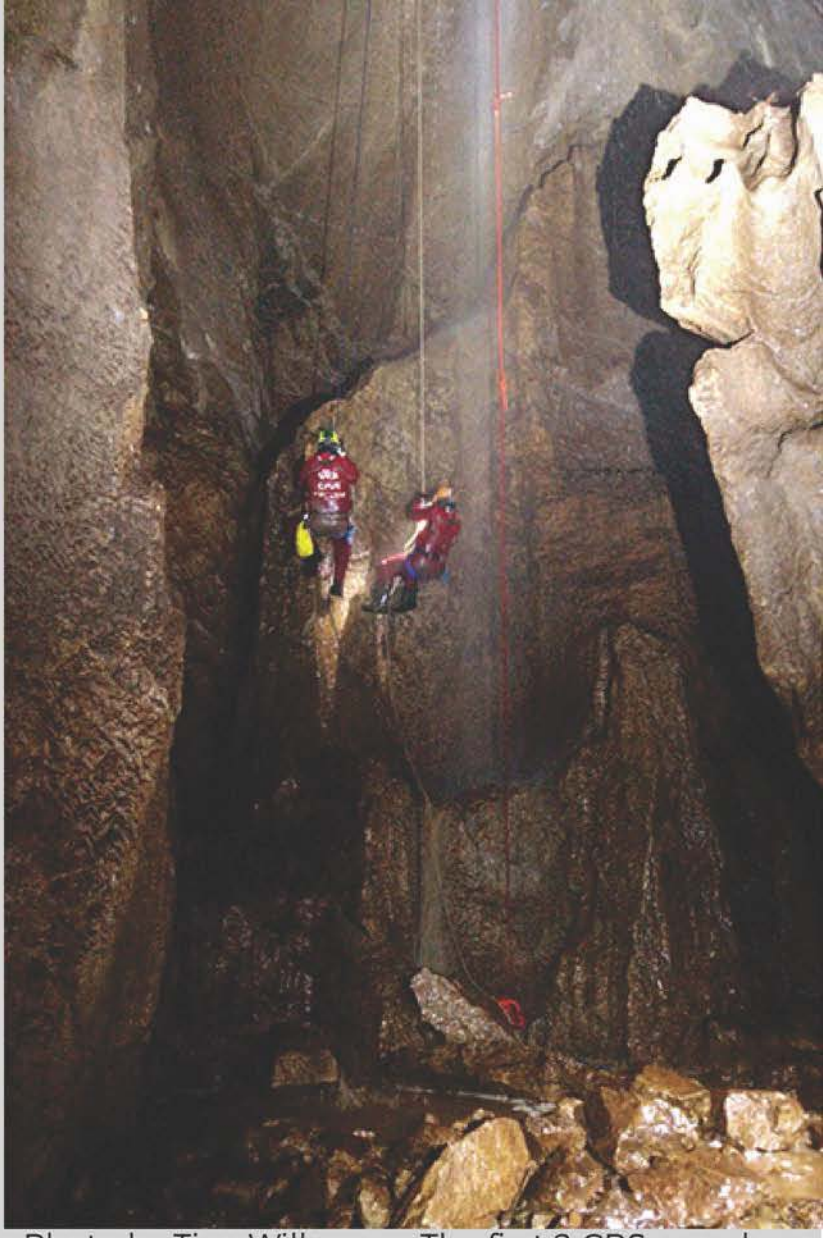
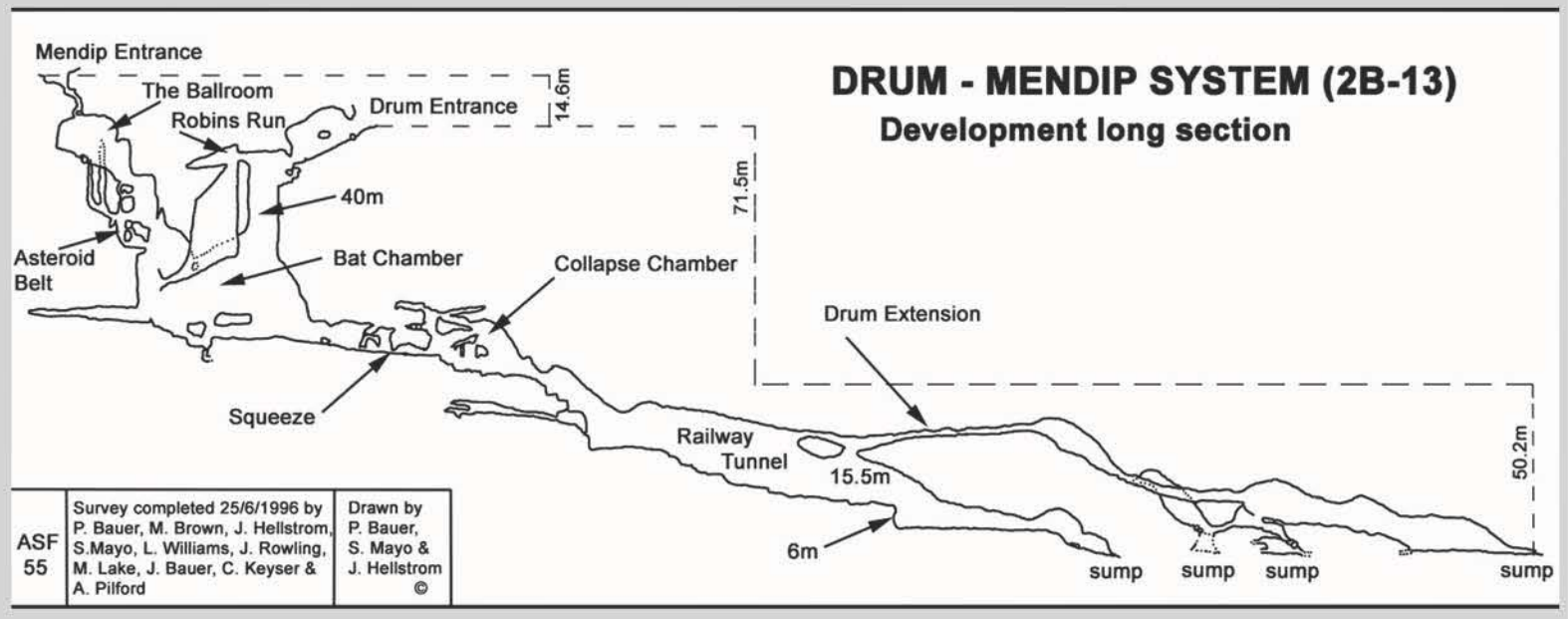


Photo by Tina Willmore - The first 2 CRS members begin ascending the entrance pitch waterfall.



'Map of Drum Cave (B13). Reproduced with permission from Bauer and Bauer (1998) Under Bungonia

Bats and Windfarms

A brief overview of the proposed 'Hills of Gold Windfarm'

Garry K. Smith NHVSS

The number of wind turbines is rapidly increasing globally as the demand for renewable energy grows. While wind power plays a vital role in reducing carbon emissions, it also has negative consequences for the environment. These include noise and visual pollution, habitat fragmentation, wildlife displacement and direct collision risk for bats and birds. Then there is the issue of disposal of the turbine blades when they reach the end of their useful life.

Wind Energy Partners Pty Ltd (ENGIE) is pushing to have their 'Hills of Gold Windfarm' built on the ridgelines in the middle of four karst areas (Timor, Crawney Pass, Glenrock and Barry). These areas contain significant caves and the township of Nundle to the north. This ridgeline is the divide between the Hunter Valley to the south, Manning River to the east and the Peel River to the north in NSW. The project site borders with the Crawney Pass NP and the Ben Halls Gap Nature Reserve. While NHVSS is not opposed to windfarms in general, this particular proposal has many detrimental environmental aspects which ring alarm bells, to the point that the majority of our members feel it should not be constructed in the proposed location.

NHVSS has made a number of submissions against the installation of this huge windfarm comprising 70 wind turbines. The windfarm, if constructed, will involve the bulldozing (total destruction) of 2.067 sq km of native vegetation (including old growth forest) plus 2.8 sq km of other vegetation. A total of 4.87 square km of vegetation is to be cleared, to build the proposed windfarm. This would result in loss of animal habitat (particularly threatened and vulnerable species habitat), soil erosion which may affect downstream karst areas and river systems, and the impact of spinning turbine blades on airborne creatures. The Environmental Impact Statement (EIS) identifies thirteen threatened terrestrial fauna species that were directly observed within the development footprint. In addition there were a number of species of microbats and at least two species of raptor most at risk of collision.

Photo by Garry K Smith - Eastern Horseshoe bats at Crawney Pass caves

Photo by Garry K Smith - Fig 2 - A cluster of 500 Bent Wing Bats in Main Cave at Timor

There are only eight species of microbat recorded in the project EIS study, however at least 12 species of microbat have been recorded in the Timor area (Hoye 2008; Rutledge *et al*. 2008), just kilometres from the project site. This indicates that the EIS study was not conducted over a sufficient time period nor covered a sufficient area to be credible.

NHVSS members have observed and reported in the *Newcaves Chronicles*, very large populations of cave-dwelling bats (numbering in the thousands) in caves at Timor, Crawney Pass, Glenrock Station, Ellerston, Barrington and
Barry (Figs 1 & 2). The proposed windfarm is within the nightly feeding range of both the Eastern Bent-wing Bat (Miniopterus schreibersii oceanensis) and the Eastern Horseshoe Bat (Rhinolophus megaphyllus), cave dwelling bats which reside in the above mentioned caves. However, both cave-dwelling and forest bat species will be impacted by the proposed windfarm.

The EIS mentions nothing about the large regional population of Bent-wing Bat and their flight paths between the significant roost sites at Barrington Cave (Tomalla), Main Cave (Timor), Barry Cave (Barry Station), Bats and Bandicoot Cave (Glenrock Station) and Crawney Pass Caves.

Barrington Cave has in the past been observed to have hundreds to thousands of Bent-wing Bats (Rutledge 2003; Helman 2002; Scott 2001). Numbers are seasonal as they migrate between sites. Caves in the other above mentioned areas have been recorded with similar numbers exceeding a thousand individuals.

Photo by Steven Nowakowski - Example of clearing during a Wind Farm construction in Far North Queensland

Very little has been mentioned about the Crawney Pass limestone caves, which are roosting sites for microbats less than 1.5 kilometers from the turbines. It is well documented that both micro and mega bats fly considerable distances in search of food each night. The proposed windfarm is well within the nightly foraging range of cave-dwelling bats as well as the forest bats. Also, the EIS does not consider the countless disused mines, adits and rock shelters where colonies of microbats may be resident close to the windfarm site.

The impact on threatened forest-dwelling bat species identified in the EIS, such as the Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat and Yellow-bellied Sheathtail Bat would be substantial. The Yellow-bellied Sheathtail Bat and Eastern False Pipistrelle rely on mature hollow-bearing trees offered by the native forest woodlands along the ridges proposed for construction of wind turbines. Likewise, the Eastern Coastal Free-tailed Bat relies on mature trees with hollows or loose bark to roost under. Loss of suitable habitat is unacceptable to these vulnerable species.

There are far too many issues to cover in this article, so I will briefly cover a couple of NHVSS's concerns with examples of relevant studies from abroad.

Bats at risk

A recent UK study found that windfarms negatively affected over 30 bat species and have potential consequences for bat population viability, particularly species which already have low numbers (Richardson *et al.* 2021). Insufficient studies matching pre and post construction data have been undertaken in Australia to measure the impact of windfarms on bat and bird populations, particularly in areas within close proximity to wooded and vegetation areas where bats reside and forage.

Despite over a decade of research on bat fatalities at wind farms around the world, relatively little is known about why wind turbines kill bats (Richardson *et al.* 2021). Lintott *et al.* (2016) surveyed 46 windfarms across the UK and found that pre-construction acoustic surveys, which form part of Environmental Impact Assessments, are poor predictors of bat casualties at windfarms. Their study determined that "bat activity recording during pre-construction surveys may not accurately reflect activity levels post construction". The study also mentioned that bats may be changing their behavior around turbines and even attracted to windfarm sites because of ultrasound emission from turbines and increased prey availability. There may also be other yet to be identified reasons for the increased bat activity around windfarms.

Photo by Steven Nowakowski - Example of clearing during a Wind Farm construction in Far North Queensland

The study by Richardson *et al.* (2021), determined that even if bats were foraging closer to the ground, they would still be at risk of collision with the blade tips as they neared the ground. The turbine blade minimum sweep height above the ground at many sites where bat kills occurred, was 30 m above the ground and the bats were also being killed with blades with a clearance of 40 m above the ground. Their study looked at bat activity and bat kills across locations at 23 British windfarms and included a broader UK survey of bat activity around wind turbines.

A presentation of a study by Simbolix (Stark and Muir 2020) of post construction windfarm strikes of bats and birds across 10 Western Victorian windfarm sites containing 764 turbines, found that each turbine on average killed between 7 and 10.8 bats per year. This may sound like a small number of bats, but if one multiplies an average of 10 bats x 764 turbines = 7640 bats per year. This can devastate bat populations. In addition to the bats, each turbine killed on average between 5 and 6.7 birds per year. However, these figures only consider the carcasses found during periodic searches and could not determine how many carcasses were removed by scavengers. The study averages the strikes over all turbines including those in areas with fewer bat populations, so it would be expected that specific turbines located near large bat populations would have a much higher mortality rate.

It would be logical to assume that the Hills of Gold Windfarm EIS bat survey is considerably lacking as it only determined there were eight bat species in the area, however a survey at nearby Timor Caves undertaken by Hoye (2008) identified an additional four micro bat species. The EIS bat survey using acoustic bat recognition, was undertaken at just a few selected locations around the project site and over a relatively short period of time. It is inconceivable that this short survey could be considered as adequate. As determined by extensive studies overseas, a pre-windfarm assessment is not a predictor of likely bat fatalities, if the windfarm is constructed.

The above comments have only given cursory consideration of potential bat impact with wind turbines. The potential turbine blade impact with flying foxes and birds, would no doubt be significant if turbines are constructed in the proposed locations.

The wind power industry may sight measures they could put in place to reduce bat strikes. One measure is called curtailment, which requires wind turbines to stop spinning during limited periods of low wind and high bat activity (Stock 2022). In NSW this appears to be only a voluntary procedure not a legislative enforceable practice and its implementation only reduces the number of bat kills, not eliminates them. However bird strike numbers remain high as they continue to fly in higher wind speeds.

Photo by Steven Nowakowski - Example of clearing during a Wind Farm construction in Far North Queensland

Vegetation and vulnerable species.

The proposed wind farm would have a significant impact on the threatened ecological communities of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland. The Hills of Gold Windfarm EIS states that there are also endangered and vulnerable fauna species found on the study site. "Thirteen threatened terrestrial fauna species were directly observed within the Development Footprint, including Koala, Greater Glider, Spotted-tailed Quoll, Southern Myolis, Large-eared Pied Bat. Little-Pied Bat, Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat, Little Bent-wing Bat, Large Bent-winged Bat, Greater broad-nosed Bat, Eastern Cave Bat and Gley-headed flying-fox.

In addition to the threatened fauna species directly observed within the Development Footprint, the detailed habitat assessments identified a high likelihood of occurrence for an additional four fauna species; Booroolong Frog, Border Tick-tailed Gecko, Eastern Pygmy Possum and Squirrel Glider. The field surveys identified two species of raptor most at risk of collision, Nankeen Kestrel and Wedge- tailed Eagle."

The clearing of 4.86 sq km of established vegetation (including a substantial amount of old growth forest) will enable soil erosion to occur, which could affect the downstream karst areas that contain caves and specialized eco systems. Building a windfarm is not justification for clearing habitat of these threatened and endangered species and others not listed above. There are plenty of other localities around NSW where hills have been denuded of vegetation in the past due to early agricultural practices.

It is worth having a look at the two short videos at the following link, which show the permanent destruction of native vegetation and loss of wildlife habitat which occurs during the construction of a wind farm.
https://www.rainforestreserves.org.au/kaban

Worn-out turbine blades a recycling nightmare

An issue rarely raised is, what happens to the wind turbine components such as the blades when they reach their use by date and have to be replaced? Turbine blades are constructed of a composite of fibreglass and resin to withstand hurricane-force winds. They have a life span of 20 to 25 years in which time they become fatigued and their strength is compromised. The problem of disposal becomes an issue at the end of their useful life. At present there is no feasible way of recycling the material, nor disposing of them. As Tom Leonard (2022) reveals, there is a graveyard where 4000 worn-out giant turbine blades cover a 25 acre field in Sweetwater Texas, USA. Each blade can be 300 ft (100 m) long and weigh 8 tons. The scale of the immense mountain of discarded turbine blades is hard to visualise. Have a look at the article and photos at https://www.dailymail.co.uk/news/article-10558375/TOM-LEONARD-Graveyard-green-giants.html and another article with graphic images of 870 turbine blades being buried by bulldozers at the municipal landfill in Casper, Wyoming.

https://www.bloomberg.com/news/features/2020-02-05/wind-turbine-blades-can-t-be-recycled-so-they-re-piling-up-in-landfills?leadSource=uverify%20wall

Researchers are looking for ways to separate the resin from the fibres or possibly grind the blades into small pellets to use in other products, however to date no viable large scale process has been identified (Leonard 2022).

Given the situation in the USA and no doubt other countries around the world, it is reasonable to expect that Australia is heading down the same path of what to do with damaged or worn out turbine blades in the future.

The 'Hills of Gold Windfarm' EIS states there are currently 114 operating wind farms in Australia, another 26 in construction and 70 in the pipeline. So unless a way of recycling or an environmentally friendly method of disposal is found, there will be huge mountains of waste turbine blades in the future. The Hills of Gold Windfarm will be using turbine blades of 83.5 metres in length and when installed the overall tip height will be 230 metres AGL.

Conclusion

While the concept of renewable energy from windfarms makes sense at first glance, there are many long-term hurdles that still need to be overcome to make this technology truly renewable e.g. recycling of worn out turbine blades.

Even if one sets aside these long-term issues, the proposed 'Hills of Gold Windfarm' is one that has far too many detrimental aspects which environmentally outweigh the possible benefits. The proposed windfarm if constructed will mean the total destruction of huge areas of native vegetation including habitat of endangered and vulnerable fauna. There is very high likelihood of many airborne bat and bird deaths due to impact strikes. It makes far more sense to construct such windfarms on land that has historically been stripped of vegetation to create grazing land.

Clearing large areas of old growth forest along ridge tops creates erosion issues, destroys more vegetation that produces oxygen for life on earth, and destroys fauna habitat. The overwhelming detrimental aspects of this proposed windfarm, falls far short of being environmentally sound.

Preliminary environmental assessment – Hills of Gold Energy Project. Example of crane instillation of turbine blades

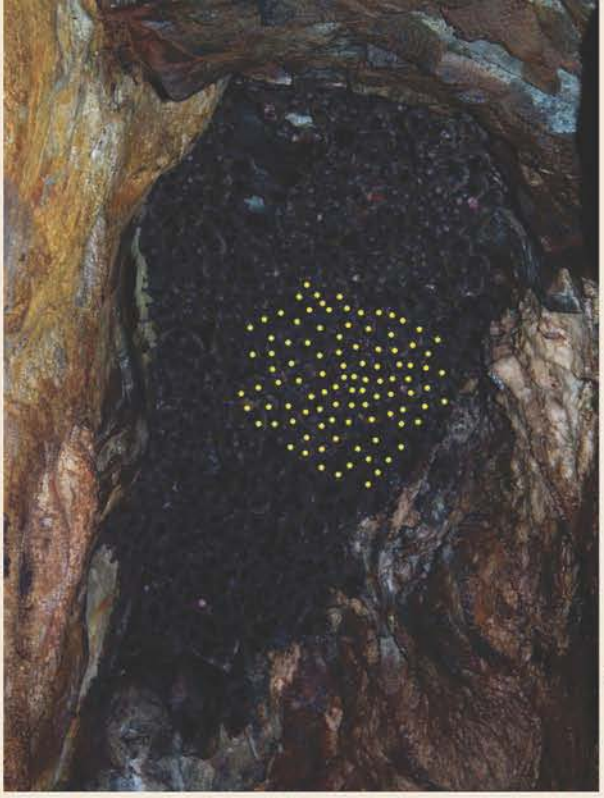


Photo by Garry K Smith - Bats in Main Cave at Timor- 100 counted with dots

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Photo by Bogdan Muresan
Size comparison DistoX2 on the left
Bric4 on the right

Bric4 review after 1000 shots

Bogdan Muresan VSA

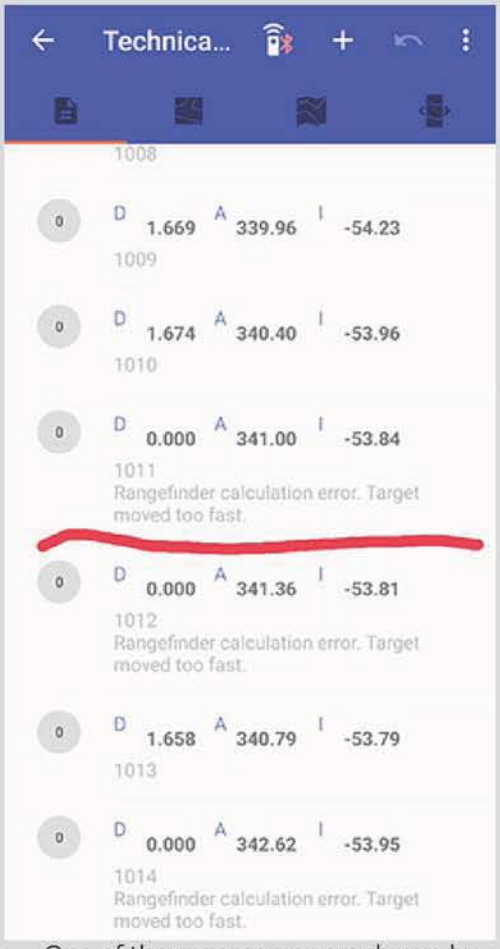
Most of the cavers know by now what a DistoX2 is, or at least have heard about this revolutionary survey device. It has definitely made cave surveying more efficient, easier and more accurate. However, this device doesn't get produced anymore, at least not by the original producers. The next best thing might turn out to be the "next better thing" and it is called Bric4. This device is produced in USA and its biggest advantage over the DistoX2 is that it is available. Bric4 is built in a rugged, waterproof Pelican 1015 case. It cannot be removed from this case. For full details and specifications please google "bric4 cave survey" (https://www.bricsurvey.com/) and you'll find the producer website. My intention here is just to provide a subjective review, likes and dislikes for this device and maybe answer some questions that other cavers might have.

Bric4 is definitely more expensive than a DistoX2. It's about $1230 Australian dollars plus shipping, about $40 dollars. Having worked with Disto X a lot I somehow came to dislike calibrating it and that was my biggest worry about Bric4 as well, I did not want another tool that's so temperamental. It is not. Bric4 is, in my experience, much easier to calibrate. I have done my first quick calibration on it in about 5 minutes and it worked on the first try. Unlike DistoX2, you do not need additional devices for calibration, it's all done on the Bric4 with the touch of a few buttons. That's, for me, an advantage.

It has a larger screen and you can see the last five measurements on this screen at all times. You can also scroll down and see more measurements if required. This might be helpful for people that transfer measurements manually onto paper.

It has "redundant sensors and advanced error detection", that's how the producer describes it. In practice, this means more accuracy. If your phone, tablet, metal or any other magnetic interference is present it will tell you that there's an error. Compared with DistoX2 this is great as DistoX2 will continue to give you data and you'll have no idea that there's an error. The distance sensor will give an error as well if there's interference. I found this very helpful especially at the cave entrance where there's grass present. If the laser beam is partially touching a blade of grass, it will not give you a measurement. Also, if you're slightly touching another object in the way of your target, like your caving suit, boot, rock or colleague, etc. it will give you an error again. For me, this translates to peace of mind. If I'm missing something due to lack of attention, the device will pick it up for me. Also, it has a different beeping sound for a good measurement and a bad one, that means that I can pick it up even when someone else is taking the shots for me. DistoX2 will give you data no matter what, good or bad, in my experience. It also has an incorporated thermometer and a clock so you can see the temperature and time on the screen at all times. A nice touch and helpful for extra data collection.

Another helpful option is that you can trigger a measurement from the survey app or you can delay the shot from the device itself (this is also available with DistoX2 but not from the app) . This means advanced precision, if that's what you're after, as the device can be rested on a surface or tripod and not have the shake from pushing the button.



One of the common errors shown by the Bric4


Photos by Bogdan Muresan Size comparison Disto X and Bric4

Photo by Bogdan Muresan Size comparison for laser point from 2 m distance

For obvious reasons, a major advantage over the DistoX2, is that it is waterproof and rugged. This is amazing for cleaning as well. I run the Bric4 under water and wash it like crockery, no stress. Cleaning the DistoX2 requires more attention, patience and time.

It's not all good and no bad. I found the size of the Bric4 annoying at the beginning, especially after working with DistoX2 for a long time. Unlike the DistoX2 the Bric4 can be uncomfortable and awkward to hold as it's bigger. Also, the button is on the back side, the opposite side from the screen. Because of its size, it doesn't always fit where a DistoX2 will fit, like in a corner where a station might be. It's a matter of getting used to it and choosing stations accordingly. It also doesn't fit as easily in a chest pocket and can be tiring if you like to have it hanging around your neck.

Some people complained that the laser red dot is smaller than the one on the DistoX2, I found it to be bigger and I never had a problem seeing it.

In terms of the apps, the producer says it's compatible with TopoDroid, CaveSurvey, Sexy topo and Qave. I'm mainly using Qave and if you want it to be compatible with Bric4 you have to make sure you download the latest version as the previous version will not work. I'm also using TopoDroid X and that works ok; I haven't used the old version with Bric4, so I can't say if that works ok or not.

Overall, although it's quite expensive, I am happy with the device and I think it's worth the money. I have both DistoX2 and Bric4 for most of the survey trips but I'm always going for the Bric4 these days.

Just one of many Niggly/Delta Variant teams

JF-761 DELTA VARIANT AND JF-237 NIGGLY CAVE UPDATES

STEPHEN FORDYCE VSA/STC
(PHOTOS BY STEPHEN FORDYCE UNLESS OTHERWISE CREDITED)

Introduction

Many in the Australian caving fraternity would be aware of 7JF-237 Niggly Cave which held the mantle of Australia's deepest cave for several decades, of 7JF-36 Growling Swallet which was connected to Niggly Cave in 2019 (see *Caves Australia* 209, p5), and of 7JF-761 Delta Variant which was also connected into the system in July 2022 (see Caves Australia 221, p5). Each subsequent connection increased the Australian depth record slightly – to a point where we now reckon it to be just over 400m (a final determination is pending some more exploration).

I've recently come back from an extended summer trip to the Junee-Florentine in Tasmania's southwest (where these caves are), and a total of ten days (and seven nights) were spent in the Niggly/Delta part of the system. With some interesting developments at base level, this seems like a good time for a meaningful update. Plenty of good stuff happened in Delta Variant over the second half of 2022 as well (after the big connection). Excruciatingly-detailed reports for each trip are published in the *Speleo Spiel;* this is meant to be a summary of the interesting stuff.

As such, I'm going to chicken out of trying to name everyone that's been involved. Suffice to say it's been a spectacular (and spectacularly fun) effort by the Southern Tasmanian Caverneers (STC) and associates. I'd better lay out the de-facto nomenclature which has emerged:

-A "Niggly trip" involves doing things in the large horizontal stream cave at base level, even if accessed via Delta Variant

-A "Delta Variant trip" is focussed on the high level horizontal and vertical passages accessed via either the 7JF-761 Delta Variant original entrance (now de-rigged), or the alternate entrance 7JF-758 Negative RAT Hole

-Both caves are also part of the 7JF-36 Growling Swallet system, and since that's the lowest number, technically it encompasses everything.

Recap

Niggly Cave can be loosely described as a cave with two sections – 350 m vertically down, and then a lot of horizontal cave at the bottom, including 2 km of big "master cave" streamway passage. Niggly base level enjoyed a renaissance in exploration from 2016, with about 5 km of survey being added to date, some of it in very nice cave indeed (but much of it bloody awful). The project has continued through a few different iterations of objective and personnel but it's hard remote caving and for meaningful exploration to take place, underground camping (typically four days/three nights) has been required. The impacts on the cave have been carefully considered and minimised – we carry out our poop and camp below the flood line.

In early 2022 a big swallet was discovered just above the Niggly entrance and named Delta Variant – it featured a cringeworthy series of COVID-related names for pitches and features. At the end of July 2022, it was connected into the mystery waterfall in Niggly by a big team (with much media fanfare) and the inaugural through trip also de-rigged the novelty-worn-off Niggly entrance.

The two recent camping trips to base level brought the total awfully close to 20, not counting all the daytrips.

Camping underground isn't so bad

A New Entrance – 7JF-758 Negative RAT Hole

Delta Variant was found to have a surprisingly extensive network of high level passages – most caves in this area are pretty adamant about going down very quickly. When the survey data was compared with high resolution LIDAR data for the area, one survey station was so close to the surface that it was apparently 3 m ABOVE the surface – earning it the name "Negative Dig", with all sorts of hilarity around that. Some tweaks to the data shifted that to 1.5 m below the surface, but with potential survey error from 600 m of nasty caving, it still wasn't a sure thing.

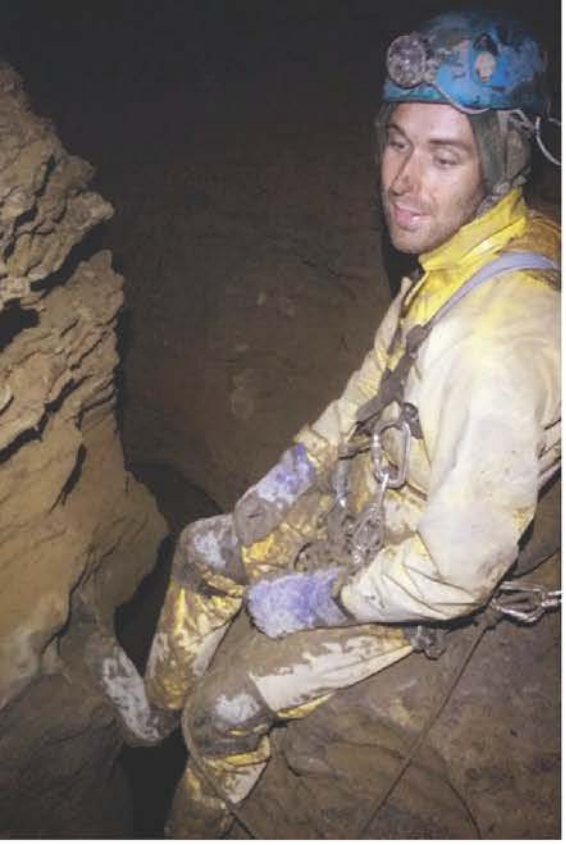
Some surface surveying also shifted the 40 m deep 7JF-449 Perfect Pitch Pot (which incidentally was featured on the cover of *Caves Australia* 181 in 2010) to a position which was ripe for connection into the system. Alas, a few winter trips wallowing in sloppy filth in Perfect Pitch Pot, and a tight rifty aid climb up the Phosphorescent Phlegm Pitch in Delta Variant were unsuccessful in making it happen (although a sound connection was later noted).

Eventually the stars aligned for an all-in assault on Negative Dig, and a radiolocation kit (originally built by Peter Robertson) was borrowed from the Victorian Speleological Association (VSA). Comms between surface and cave were quickly established via cheapo UHF radios, which was interesting because it's not meant to go through rock. The signal bounced (or whatever) a surprisingly long way along the tunnel as well, perhaps 25 m. This actually made it a bit useless for fine-tuning of location, but great for general comms. The underground party could also hear thumps and scrapes from above, but it was hard to tell exactly where from.

The radiolocation kit was set up and worked well, the surface party locating a spot on the surface definitive to within half a meter. This eventually turned out to be about 1m away horizontally from the underground station, and about 10 m above it. It took a LOT of effort by a lot of people over several long sessions, but thanks primarily to the tenacity of Petr Smejkal, eventually human traffic was possible. Several more long sessions made it slightly more comfortable for humans, and it was duly tagged JF-758 and named Negative RAT Hole.

Negative RAT Hole is now the preferred entrance, as apart from the squeezy entrance pitch, it's possible to walk most of the way to the top of Daily Cases with a large bag on your back in about 20 minutes. The sodding Test Station Queue meander (and 50 m Quarantine pitch) have thus been consigned to the annals of history.

Photo by Djuke Veldhuis - Radiolocating!



Lachlan takes a break on Vaccine Strollout to contemplate life (and the 160 m void under him)

Airy Traverse and Parallel Pitch Series

Those who stuck around until the end of my ASF Zoom presentation late last year might remember some theorising about a traverse over the top of the 163 m "Daily Cases" pitch. Well it took several leisurely trips but the hair-raising Vaccine Strollout rift was traversed, and the final section aided by Henry Garratt's youthful enthusiasm and brute force across a pit 160 m deep (it's now one hell of a scary tyrolean traverse). Ken Behrens Corridor was gained, and excitingly, it was on the same hard layer of bedding plane as previous development, with a solid floor, and continued along horizontally, a small stream joining from the side.

The big excitement here is that the Black Supergiant pitch (191m) in Niggly is not far away and has an aven above it – the true top (and ultimate length) of Australia's longest pitch is unknown. Perhaps water originally followed that hard bedding plane to the actual top of the Black Supergiant, if so this would make the total pitch length about 250 m. Wow. Ken Behrens Corridor has got to within about 30 m horizontally, but then had other ideas and is dropping down another pitch series. Currently it's only a 10 m pitch plus another 30 m or so, and still well above the current Black Supergiant pitch-head. Mysteries may be solved or compounded, there is a fair bit left to do here (including possibly more traverses above pitches).

Rigging Bonanza in Delta Variant

With Delta Variant now providing the new route to the Niggly master cave, considerable effort was put into really optimising the rigging (which will likely be there for several years). This was no trivial exercise as there are approximately 400 m of rope and 50x concrete screw anchors! The 163 m "Daily Cases" pitch has eight rebelays with considerable swing (rub potential) but this was finally pronounced nice. The canyon-like section afterwards ("Close Contact") had a number of climbs converted to pitches, and a nice assortment of safety/access lines added in anticipation of heavy bags and tired cavers. The final waterfall pitch into Niggly also saw some adjustments to make it a lot more user-friendly than the hasty rig on the connection trip.

Henry's obligatory hero-pic on the tyrolean

The Magic Beanstalk is a water-powered counterbalance system to pull bags up 150 m of Daily Cases and perhaps in the distant future assist cavers – it is rigged separately to the personnel rigging but close enough to make for some amusing spiderweb moments. Several attempts to commission the Magic Beanstalk led to spectacular tangles (even with the successful use of 2-way radios) and the regrettable scenario of having to climb 150 m twice in a row. With better spreading of load/counterweight at top and bottom, and some upgrades to better pulleys and solid water containers, the system seems a bit more workable – but we had been burned too many times to actually try it on the last ascent.

A good way to tackle Daily Cases is to just grin and bear it

The rigging anchors are almost all concrete screws, for minimal impact

It may yet become the stuff of caving legend, but the Magic Beanstalk is currently best described as a work in progress.

In the course of this fandangling a toaster-sized rock was dislodged near the top of the pitch, and the first successful communication over 150 m of echoing waterfall pitch was fortuitous (and lifesaving). My single call of "Rock" was clear enough for Henry to understand and run away from the drop zone, receiving only a spray of shrapnel in the back of his legs. A sobering reminder of the importance of simple and clear calls, and immediate reaction (and of avoiding dropping rocks in the first place!).

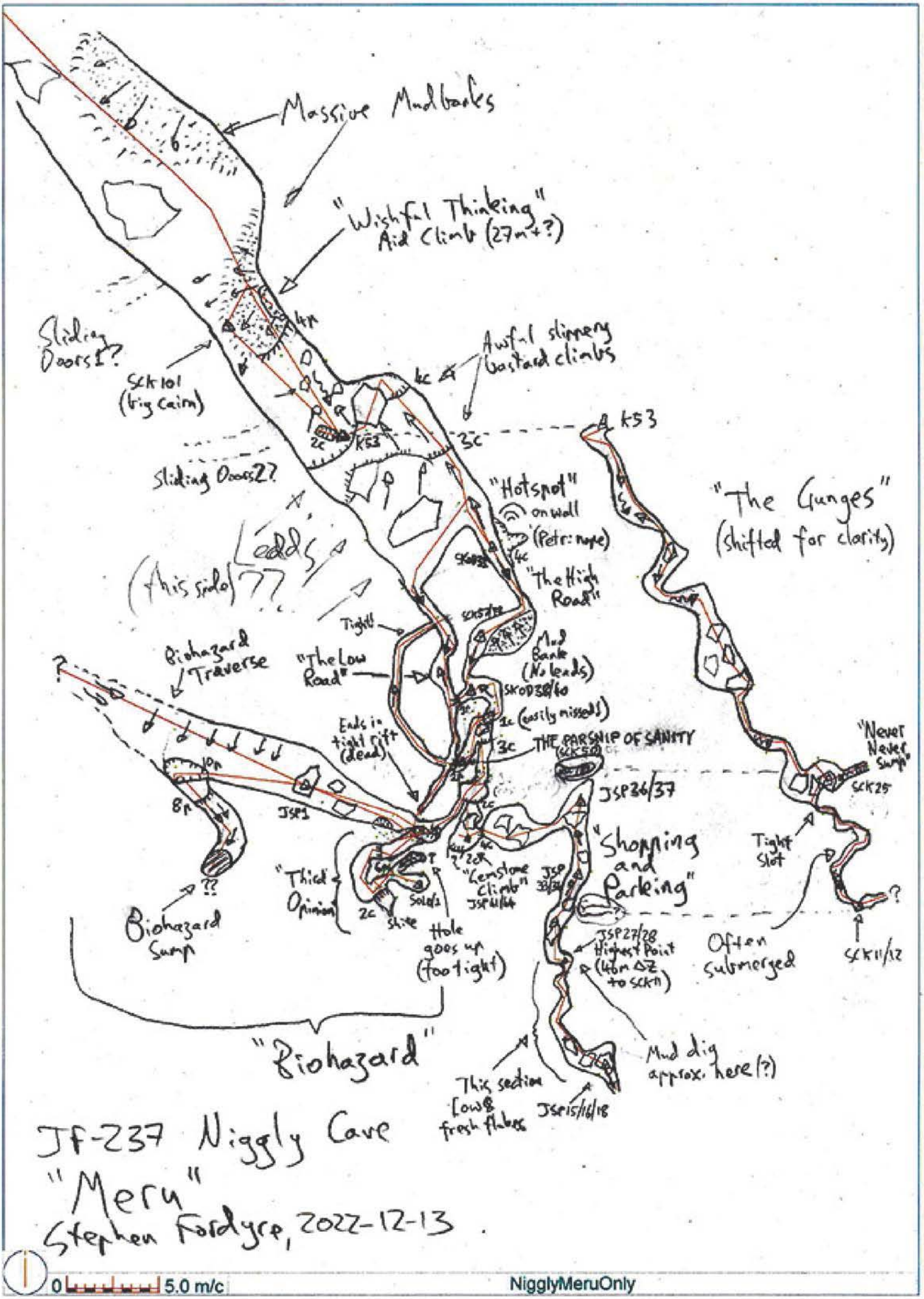
Meru – the impossible rockpile

The big stream running through Niggly carries water from both Growling Swallet and Porcupine Pot, and it creates some spectacularly big and open passage which is a joy to walk along (or jog, if you like). It disappears under a huge and complex rockpile and isn't seen again until it comes out of the Junee Cave resurgence, 5 km away (and it takes less than 24 hours in winter). So there is a very big prize waiting there if you can get past the rockpile, which was recently named "Meru" – if you haven't, watch the documentary, it's pretty inspiring.

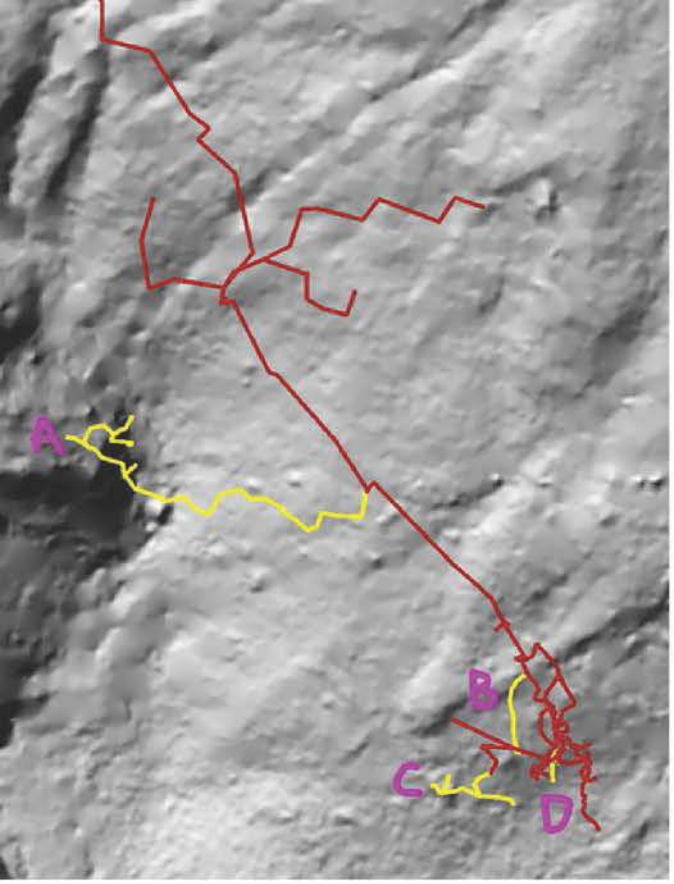
This rockpile was cursorily checked by everyone who went there over the years, but it didn't get a whole lot of attention until we finished off Atlantis and shifted focus in 2020. Since then, the main goal of the project (and the last six camping trips) has been to systematically explore, survey and map this rockpile, in the hope of finding a way past. The survey data had a major tidy-up and a draft map was made before the efforts of January 2023, this helped a lot in getting our heads around a jumbled mess of mud, rockpile and horror. Just as importantly, it means that anyone picking up this project later will have the benefit of all the groundwork (pun intended).

With most of the passages visited, surveyed, and examined in relation to each other, the recent trips were intended to push some of them a bit harder. To that end, we went to great efforts to dive the Biohazard Sump, and to aid our way up the Gemstone Climb. There was also a lead from the 1990s that still needed to be relocated and surveyed (Sliding Doors), and some other areas to check.

The Niggly/Delta Variant connection team



Interim map of Meru as of 2022-12



The downstream end of Niggly currently, with recent survey in yellow. A is Sliding Doors, B is Butterfly Effect, C is Dental Exception, and D is Sketchy Evens.

Sliding Doors and Butterfly Effect

We did a (long overdue) thorough sweep of the south wall of the whole section between the Tennis Court and Meru rockpiles, which proved illuminating. The way through this large mostly streamless section of base level master cave is through and around large boulders and mudbanks, and the south wall in particular is often obscured. In 1993, Rolan Eberhard and Jeff Butt found a passage (but didn't survey it) leading away from the master cave along here. Our recent dye tracing and survey results had suggested a decent-sized stream running south of the master cave, and perhaps there would be a way into it.

We found three leads heading away from the master cave, all at the base of the passage in rockfall. "Butterfly Effect" is a 50 m passage with clean washed cobble floor (aka flood overflow!) going underneath Biohazard and ending with upwards muddy rockpile, or onwards clean washed rockpile. Loose but scary.

The second lead that was found, we couldn't relocate, despite several attempts! But right where expected was the one discovered in 1993, at base level behind some big rocks. We headed on in, through a surprisingly tight but squishy diagonal mud squeeze. There followed a surprising amount of spacious, mostly walking passage (230 m of survey in total). We had increasingly high hopes for this well-documented but much-neglected lead – and it was named "Sliding Doors" for the movie of the same name where a small decision leads to two vastly diverging life paths.

Obviously formed by a stream, it is an enlarged meander, in some places up to 8 m high, but with solid flat ceiling visible. Other places are only 1 m high. There looked to be a few upper level bypasses but nothing worth climbing up to. The floor and walls are noticeably muddy, without recent signs of flowing water, and the survey shows this passage converging with the master cave. So it's quite conceivable the stream it once carried runs parallel with the master cave for longer and converges later – that possibility is quite exciting, as it might bypass the Meru rockpile (as theorised by Jeff and Rolan too).

Towards the end, a mud slope joined the passage from the right, but it was going upwards and died at an aven. Back at base level, the horizontal passage continued onward, but in a muddy horizontal slot which narrowed quickly to become impassable. But from this otherwise unexciting hole came the sound of a goodly stream – which was given the suitably mythical name of "River of Babylon". The slot was worked on for three hard hours on new years day and thus named "Auld Lang Slime". It's... inconclusive.

Jemma enjoying life in the Meru rockpile

Diving the Biohazard Sump, reaching Dental Exception

This sump is a static pool (no stream) the size of a bathtub accessed by untold misery climbing up inside the Meru rockpile, only to reach a 15 m pitch going back down to base level. It's interesting though because it's at the bottom of Biohazard, an actual chamber with solid rock walls which seems to be parallel (and converging with) the master cave and Meru rockpile. I was the diver, and used a much-reduced kit (7 mm wetsuit, 3 L steel tanks, and not a whole lot else) – the complete kit fit in two very heavy caving bags.

A strong team for the new year trip was a good excuse to get it done, but the universe had other ideas and one of the tanks emptied on the way down (the brass DIN plug came loose AND the valve was knocked open). Plan B was for a bantam-weight four person team to get it done, but with a few pull-outs, Plan C saw a two person effort (but with a bounce daytrip by others to help get the gear out). An entire three-day camping trip was dedicated to the dive, only the dive, and nothing but the dive, but it got done. It was a spectacular effort of will by everyone involved – special mention to Ciara Smart for being the lynchpin.

It was… interesting – the dive itself was only 7 m long and 1.5 m deep, but led to another static pool, and no sign of the expected stream. Some mud-choked (but free of rockfall) passage ran parallel to Biohazard, and a strange loose sand slope leading to a big aven with a possible horizontal passage gave hints of strange things happening in flood. So while the aid climb is a red hot lead, it's behind a sump at the very end of the rockpile, and best described as desperation squared. We have some other leads which might just get us there a different way – worth trying first anyway.

The Biohazard Sump (home side pool)

Beyond the sump

Finally out, after the fortune cookie had run its course

Aiding the Gemstone Climb, reaching Sketchy Evens

Way up in the Meru rockpile was a chimney about 6 m high. We had some gear issues and lost a lot of mojo, but eventually the beta was eaten and the stoke was sent up the unpleasant climb, and the static rope secured to dubious anchors with many rubs. To be fixed next time.

From the pitch head, there was a tight wriggle sideways into a room and some upward slimy chimneys easily free-climbed, leading to a larger horizontal section which looked very like the nearby Shopping and Parking section. It's less muddy and/or fresh black flakey rock, and this actually turned out to be a new high point in the rockpile, some 50 m above stream level. To the south it crapped out, but it also curved around to the north-east, where we wriggled between fallen blocks and sloping ceiling to a constriction point too tight (just) to get through. Beyond it looked quite a bit bigger, but it would need modern digging techniques to get through. The survey indicates this may actually be separate to Shopping and Parking, but that might be worth another poke too. A piece of tape (blank) on a cairn was left where it would be obvious from the other side.

General Silliness

The caving in Niggly and Delta Variant is hard, wet, cold and muddy, and caving with only a moderate bag is a rare luxury. Fun was had of course, but it never hurts to have a bit of silliness to take our minds off the misery at hand, especially when that was what we had to look forward to in the morning. So, beyond the usual sorts of caving shenanigans, we enjoyed:

-Theme songs. To be played, sung and bastardised at every opportunity. Catchy, positive, ear-wormy, topical, a bit annoying is good too. The new year theme song was "Caveman Dave", an apt kids song by Big Block Singson, and the later trip theme song was "Don't Worry Be Happy" sung by Bob Marley.

-Fortune cookies. A useful way to forecast the days events. However can backfire "You will express your anger towards men" was unfortunately prophetic.

-Party banner. It was New Years Eve after all (and we partied hard until 9 pm)

-Excellent and copious food. Including a range of desserts including chocolate mousse, crème brulee, unicorns and rainbows.

The drill wasn't just used for aid climbing

Happy new year! (or to be precise, "Party Ahoy")

Just some of the old ladders removed

Growling Swallet Rigging Updates

I'm going to sneak this in too. Veterans of classic southern Tassie trips would likely have done Slaughterhouse Pot and/or Ice Tube through trips, requiring the traversing of some ancient and terrifying ladders dating back to the '90s. The Ice Tube ones have been removed and replaced with standard SRT ropes, and the Windy Rift ones are up next. Huzzah!

Crème brulee with rainbows

Impending Karst Battles

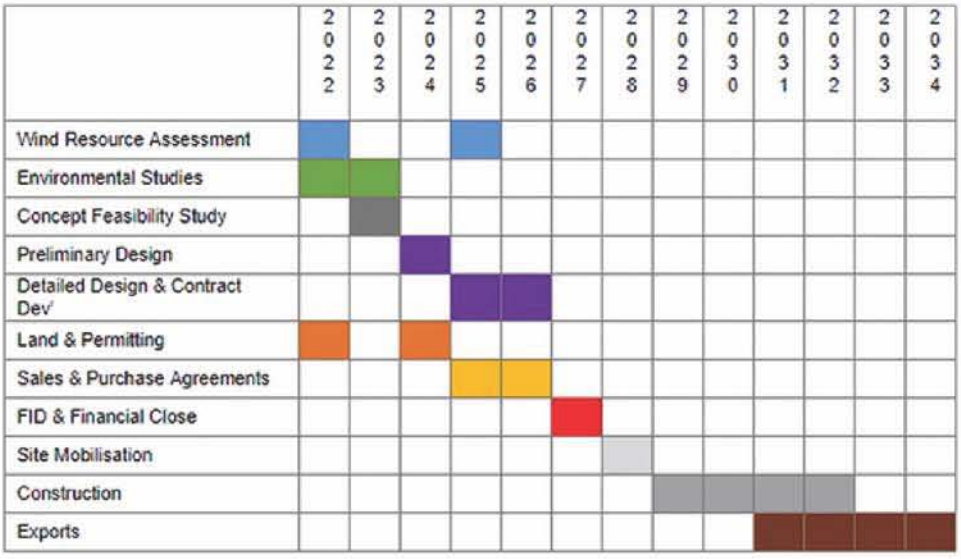
Clare Buswell

In late November last year, the Conservation Commission organised a Zoom meeting with Ray Macdonald, Western Green Energy Hub (WGEH) project director, Andy Munro (WGEH's external relations person), Garth Humphries from Biota Environmental Sciences and 25-or-so members from ASF and ACKMA. The meeting was recorded so that others could view the meeting later.

WGHE outlined the project and their underlaying philosophy, which is avoid problems by moving things. They admitted that they do not understand the geology nor the geomorphology. Nor have they started any investigation of it. However, they intend to use Ground Penetrating Radar, towed behind trucks, LIDAR flown by drones, to find caves. They will not be sharing what they find.

The Project's Construction Protocols.

Whilst not yet decided by Inter Continental Energy (ICE), we now have an idea of what to expect and its timeframes.



Construction of the full ~70GW project is intended to take between 15-20 years,

Construction looks like the following:
Footings for the wind turbines will be precast, so no concrete trucks. However, they have no idea yet as to where aggregate will be sourced. Two construction villages will form bases for the work force built at: Madura and Eucla. Construction will be set back from the escarpment by 10 km. The desal plant, based on the coast near Eucla, will release its brine into the sea.

There will be electrolysis plants situated within each of the 40 or so planned solar farms. Piping of water from the desal plant to each electrolysis plant will mean lots of piping which will be buried. All cabling will be overhead. Turbines will be 150 to 170 metres at hub height with blades 50 m long. Turbine heights will be 200-220 m high! Each turbine will be 2 to 4 km apart.

Eighty five percent of the energy produced will be used to produce hydrogen and ammonia within the project itself. The ammonia will be exported.

The meeting facilitated an internal Conservation Commission discussion concerning how much information the ASF would be prepared to hand over, that is, data held by individuals of the ASF, Karst Index Database and in club records, and the monetary value of this data. The aim would be to get fair value, security of location information, copyright, and ongoing land access to continue the work.

It was further discussed that any information and or dealings that we have with consultants, should be addressed in a formalised, legal fashion. We will not enter into confidentiality agreements as was requested by WGEH.

This formal approach stems from the fact that companies such as ICE and consultants seem to expect data to be handed over freely. Further, formal agreements would also cover us if an alternative native title group or faction accuses the ASF of handing over 'sensitive' material without appropriate authority.

Time is of the essence for the ASF on this issue. Given ICE's timelines we really have until the middle of next year to put a stop to this issue.

Koonalda Cave

On-going issues surrounding the destruction of world significant Aboriginal art found in Koonalda cave, have been in the national headlines over the past couple of months. This Commissioner has been working with Mirning elders, archaeologist Dr Keryn Welshe and the media to get South Australian politicians and relevant government departments to commit to action and dollars to protect the site. For years members of the ASF have been informing relevant south Australian government departments that the existing gate is woefully inadequate.

I have now been informed that we have had some success and that razor wire has been installed over a section of the gate to fill a possible gap and that monitoring cameras have been installed. This is commendable, and I am pleased that the Commission' involvement has produced a long-needed outcome. However, there is a need for detailed management plan, and training of those tasked with managing the site have the skill base needed to manage it.

I recently meet with Dr Susan Close, Deputy Premier of South Australia and Minister for the Environment to brief her on both the physical issues involved and the problems with the 44-year-old SA Aboriginal Heritage Act as she was to meet with Mr Kyam Maher, Attorney General and Minister for Aboriginal Affairs and Reconciliation. Dr Close came away from the meeting stating that she would emphasise to Kyam Maher, how interpretations of Parliamentary Acts create myths that seem to become facts when applied in the field. The result, in the case of Koonalda Cave, has strangled management, speleological visitation, and research actions.

Jenolan.

Yet again, money is being thrown at a karst tourism project to bring in the tourist dollar. In this case about $8.5 million to build a new interpretation/reception building, fix aging infrastructure, and improve walking tracks etc. However, the big problem of road access into Jenolan Caves remains. The Five Mile Road will become an emergency one-way road, and what is known as the Two Mile, will become the main access route into the Jenolan caves Precinct.

There are plans for the removal of infrastructure in Nettle Cave and Devils Coach House, mainly due to rock fall and for a non-guided tour of both those caves to include Arch Cave. The Commission, working with members from the NSW Speleological Council and ACKMA, placed submissions stating that in order to improve outcomes both organisations must be consulted before any work commences. These outcomes involve the protection of cave biota during construction work, better management of self-guided tours and issues pertaining to cave lighting.

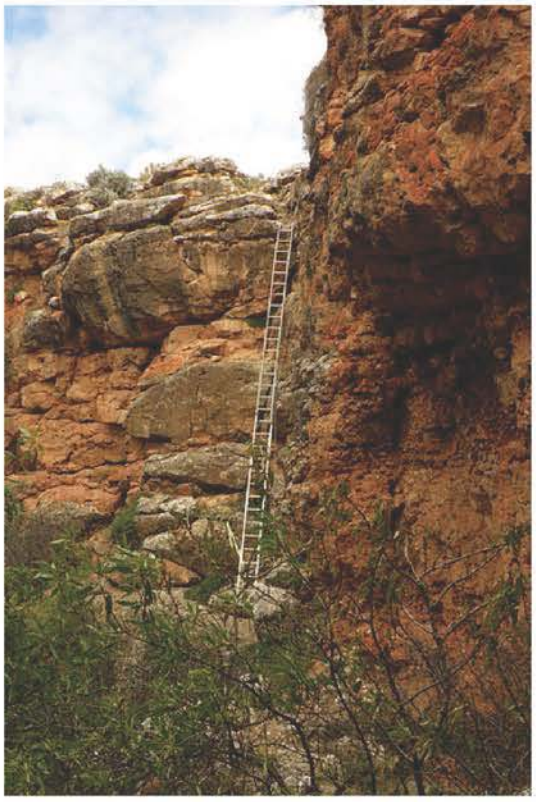
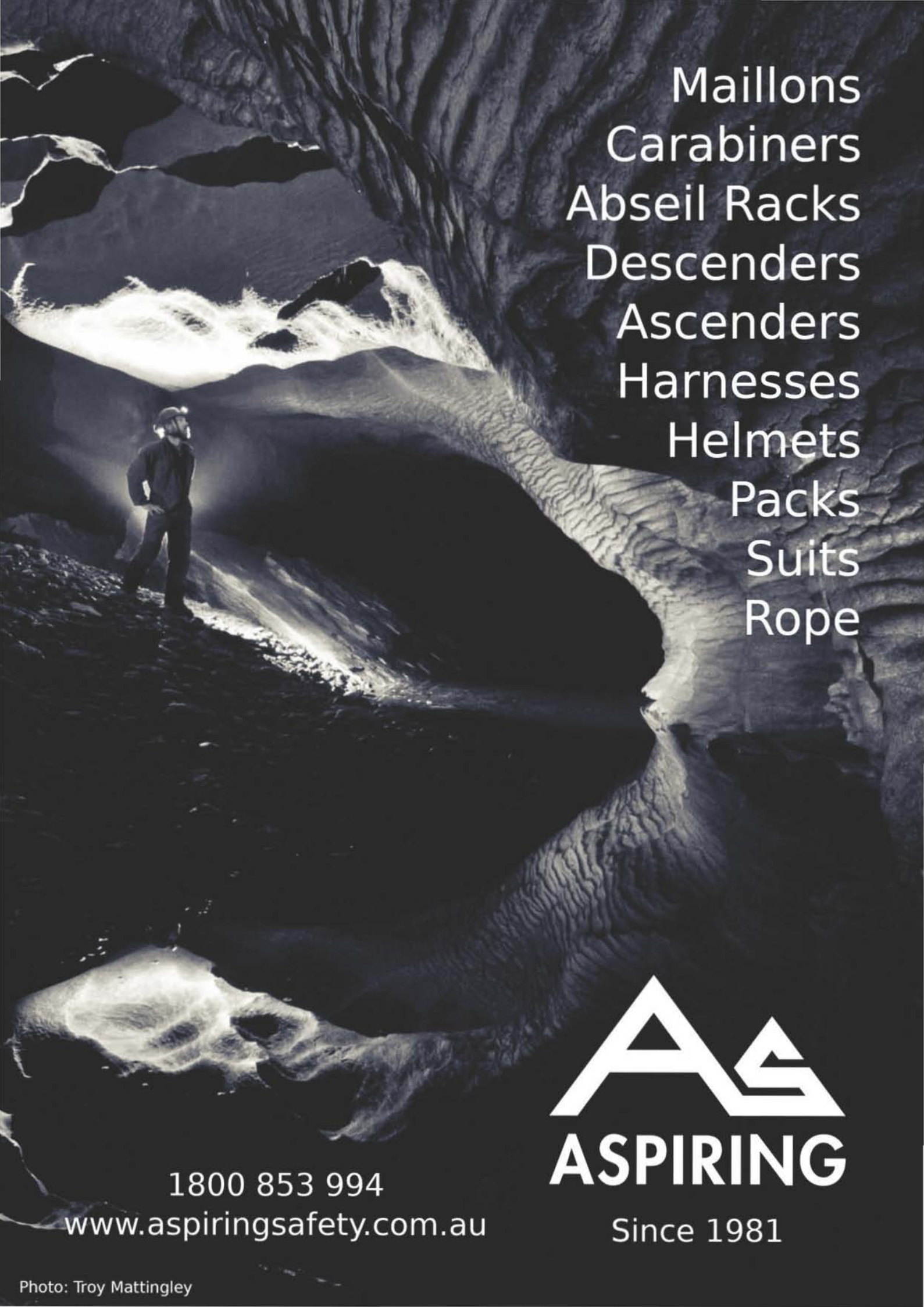


Photo by Clare Buswell - Accessing Koonalda Cave.

Help Needed!

The conservation commission needs your help: I need people to help with websites, media, and legal issues.

If lots of you give me a little of your time to help, it will create a more effective Commission and result in better outcomes for us all. Come on get involved, give me 4 hours a month! You can do it.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