CAVES AUSTRALIA

The Journal of the Australian Speleological Federation Inc.

Piping Caves
Cave Rescue Workshop
Granny's Cloak Moth

No. 217 • SEPTEMBER 2021

The Secrets of the Nullarbor Conference, to be held in Ceduna in April 2022 is now open for registrations!

Save yourself $30 and take advantage of the Early Bird registration, which closes at the end of January.
https://registration.asfconference2022.com

Made an interesting scientific discovery, had epic adventures, explored new passages, want to showcase your latest cave movie or simply want to tell us about your favourite cave?
Abstract submissions open:
https://asfconference2022.com/program/abstract-submission
All cave-related topics welcome.
On-line presentations are possible for those who can't make it in person.

We look forward to seeing you all in South Australia in April 2022!
But watch this space for future announcements on the conference format.
In the meantime, take a look at our Cancellation Policy page - we have a COVID cancellation policy that will give a full refund up until 15 April:
https://asfconference2022.com/info/cancellation-policy

Have any questions? You can check our FAQ:
https://asfconference2022.com/info/faq
Or contact event organisers at registration@asfconference2022.com

COMING EVENTS

COVID-19 is still disrupting international travel and events. Many events are now providing virtual attendance options. Information on UIS-sanctioned events can be viewed at http://tinyurl.com/y7rgb8ah

Don't forget that 2021 is the International Year of Caves and Karst. You can find more information about what's going on and what you can do to help the cause at http://iyck2021.org/

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ASF

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Cover: Katerina in Our Kedumba Cave, a piping cave at Katoomba NSW. Photo by Garry K Smith

CAVES AUSTRALIA

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ASF Executive

WANTED
ARTICLES FOR *CAVES AUSTRALIA!*

Whether caving, cave diving or generally just caving, *Caves Australia* readers are interested in YOUR story. It is only with YOUR contribution that we can produce a quality magazine for all to enjoy. For writing and style guidelines, contact the Editor or Production Manager.

President's Report

WHAT A LOT has changed since my previous President's report, which was written as caving areas in NSW were finally opening up again.

Now our members in NSW and Victoria are facing the challenges of lockdown again. We know some of our members may be struggling right now and it becomes increasingly important to keep in touch with our club and caving friends — by reaching out to offer help where you can or asking for help when you need it. Be creative and organise an online social event, share photos of past caving epics or simply check-in with someone with a good old phone call. Remember this will pass, restrictions will ease and life will improve in the future. Hang in there!

While caving may not be possible for many right now, it will be again one day. This could be the time to start planning the next adventure, or to read all those back issues of *Caves Australia.* Even join the ASF Facebook Group to watch Lachlan Bailey's true-life documentary about escaping lockdown by finding the master system joining Australia to New Zealand! Or to check out Jill Rowling's amazing 3D cave models.

Unfortunately, no restrictions have been placed on the threats to caves and karst areas with many conservation issues arising recently in areas including Kosciusko National Park, Yarrangobilly, and central Queensland. Our conservation commissioner Clare Buswell has been working hard with many of our members around the country to write submissions to protect the unique natural values of these areas. Thank you to everyone who's been involved. Don't hesitate to let us know about any threats to your local caving areas. The more voices we have advocating for conservation the better and the ASF is well placed to help.

Caving trips are still happening when and where they can. The ACRC rescue exercise and workshop went ahead in Exmouth in August as planned despite COVID-19 restrictions. Unfortunately, less than half the original participants could attend in person, but many were able to join the workshops online from interstate. Luckily Brian, our ACRC Commissioner, had the foresight to leave NSW before the current COVID-19 outbreak.

BRIAN EVANS

Tasmania's annual search and rescue exercise is also happening in September, as a joint event between caving clubs and the local emergency services. These training events are so important for building relationships which will save lives in the future. The ACRC can help with training and grants to help you organise an event in your State.

The annual Bullita expedition to the NT finally went ahead after COVID cancellations and postponements. Many kilometres of new passage have been surveyed and we look forward to reading about it in a future *Caves Australia* issue.

Surveying trips have also been continuing on Kangaroo Island in SA and nothing stops Tasmanians from enjoying wet, winter caving.

We all look forward to when we can cave and travel again. To get there sooner, I encourage all members to go out and get vaccinated if you are able and eligible to do so. Be safe, stay connected and keep dreaming of caving! — *Sarah Gilbert*

Our Kedumba and Crokers Creek Piping Caves

Karst (?) Caves in Non-Carbonate Rocks

Garry K Smith
NHVSS

WHAT ARE PIPING CAVES AND HOW HAVE THEY FORMED?

Piping caves are more common in quartzite and quartz sandstones than other types of non-carbonate rock. However, compared to carbonate caves, there are very few documented examples of quartz sandstone piping caves in Australia. A literature search has identified three previously known caves in NSW. They are the 82 metre long Hill Top Cave near the township of the same name, a 60 metre long cave in Ku-ring-gai Chase NP and the 35 metre long Endless Cave at Kincumber, north of Sydney.

Sandstone 'overhangs,' on the other hand, are relatively common in the Blue Mountains west of Sydney, but they are generally not considered true caves, which may be defined as 'any cavity large enough for humans to enter, which extends beyond daylight'.

True sandstone caves such as 'piping caves' are created by 'solution of silica and/or the cement along joints, faults and fissures, combined with physical erosion' (K&GU 2011) and are examples where the term 'karst' can be used despite being formed in a non-carbonate rock. Piping caves in quartz sandstone and conglomerate rock are relatively uncommon in southern Australia. However, there are more likely to be undocumented piping caves in remote locations of Australia's north, such as the Kimberley Region, Arnhem Land, Sturt Plateau and north Queensland, due to the increased solubility of silica in warmer climates.

Typically, the process begins with seepage through a porous layer or a crack in the rock strata, along joints or down the dip of bedding planes. Sandstone strata with a layer of poorly consolidated material capped by a harder layer of ironstone or conglomerate, are more susceptible. The partial dissolution of quartz grains and the breakdown of the matrix holding together the weakly bonded silica particles over time allows water to trickle through the slowly growing conduit.

As the pipe grows larger it allows an increased volume of water to flow through. Once a continuous channel is established, the increased flow becomes more turbulent, causing scour and other erosive mechanisms to come into play as larger particles of sand and gravel are carried through the conduit. 'Piping caves rarely attain a length of more than 100 m' (Klimchouk 2006).

The formation and development of these tubes or piping caves have most likely occurred in two phases, which Martini (1979, 2000) termed 'arenisation'.

Phase 1: Water seeps through a crack or porous layer of sandstone causing partial dissolution of quartz grains and breakdown of the bonding matrix into a friable rock along intergranular boundaries.

Phase 2: Speleogenesis proper by piping in the loosened material produced in phase one.

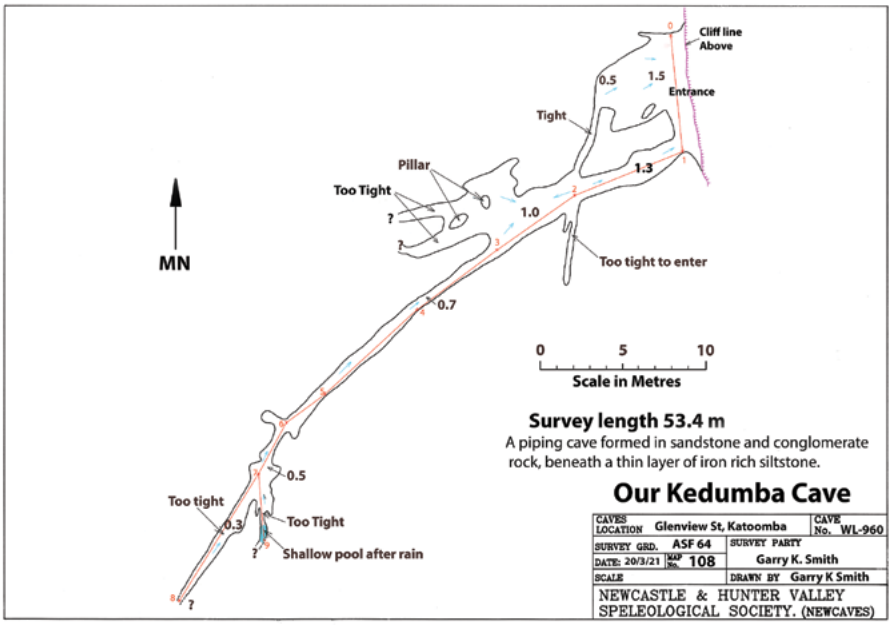
'Solutional attack during arenisation actually removes only a small proportion of the sandstone (about 10 to 20% of rock bulk) unlike in the solution of carbonates where a very large proportion of the rock is dissolved.' (Wray 2009).

The solubility of silica can vary greatly between the different silica polymorphs and is influenced by the solution pH and temperature (Wray 2017). For example, in cool, neutral pH groundwater silica concentration usually does not exceed 20-30 mg/l, but at higher temperatures, such as could be expected in near surface voids in the tropics, silica concentrations increase rapidly (Serezhinikov 1989).

DISCOVERY AND DOCUMENTATION OF TWO PIPING CAVES

Our Kedumba Cave (WL-960)

In early March 2021, while in the Blue Mountains, west of Sydney NSW, Katerina



Our Kedumba and Crokers Creek Piping Caves

and I were chatting to a local plumber. He mentioned a property where he had undertaken some work that had a cave in the back yard literally metres from the house. The plumber couldn't remember the contact details for the property owner but he could remember the street where the house was, so we set about doing a doorknock and eventually had a lead. Katerina made a phone call and soon arranged a time with the owner to visit and explore the cave.

The day arrived and upon talking to the property owner, we were told that three young men in their late teens or early twenties had explored the cave about 12 years earlier and believed they explored beneath the railway line after hearing and feeling the vibrations of trains underground.

The three stated they were studying speleology at TAFE, and one remembered playing at the site when young, before any of the houses nearby had been built. They spoke of looking for bones of creatures within the cave — perhaps antechinus. During the 17 years the property owner has been at the house, the cave had only been entered by those three.

I kitted up and entered, determined to push the cave till the very end. Katerina decided to wait just a little way inside, while I crawled on with the passage becoming smaller and smaller, till I was only able to slither like a snake.

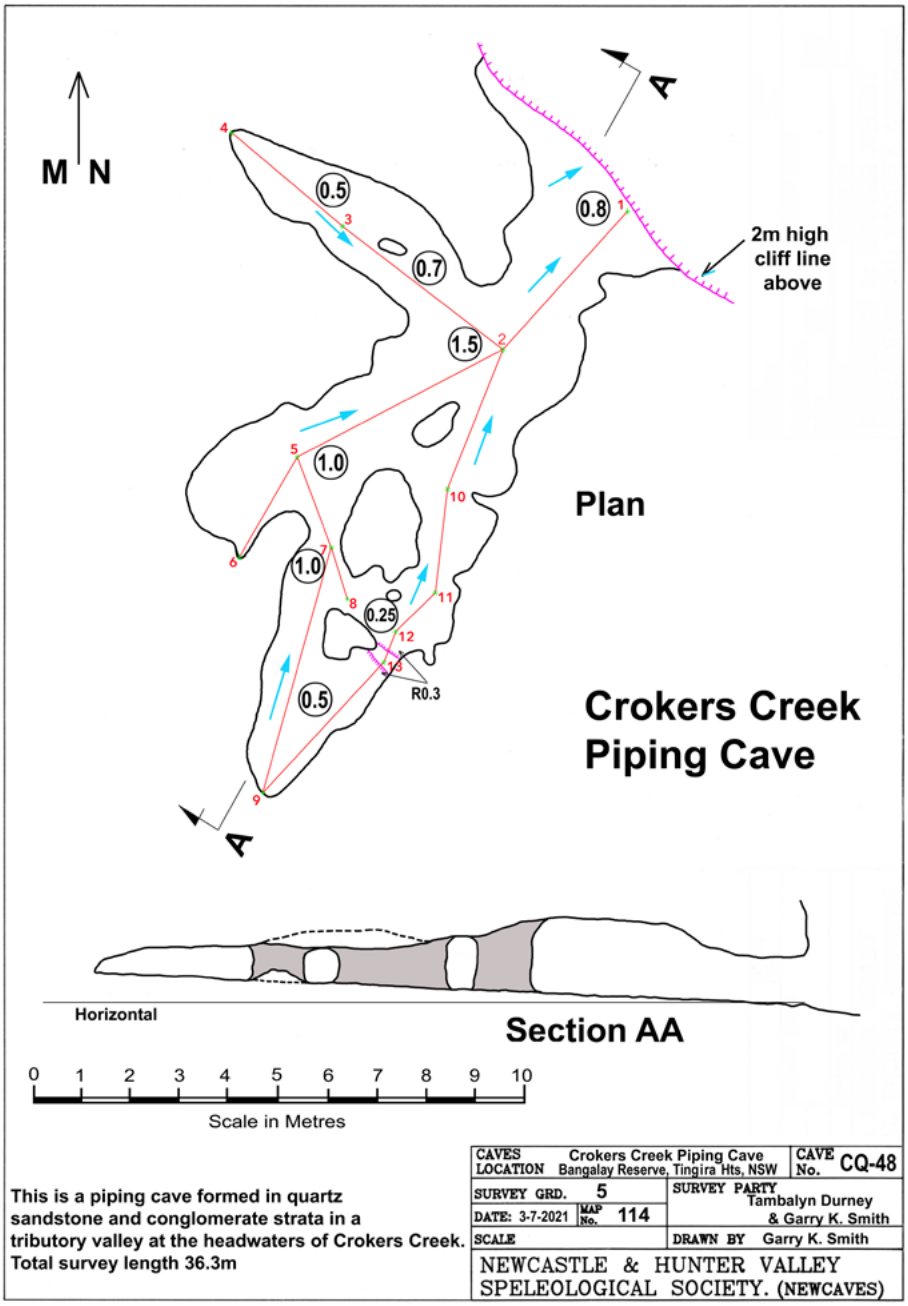
The passage became so tight that I had to remove my helmet, which became jammed between roof and floor and further on my torso became jammed tight between the opposing rock faces. Further ahead the passage just kept tapering down till only a mouse could get through. I had certainly reached the limit of where I could fit in the cave.

Sure enough, I could hear trains travelling overhead. There were no obstructions due to rock movement or collapse, the passage just became tighter and tighter with solid bedrock all around.

As I crawled around, this cave's origin became more apparent. It was an unusual piping cave in quartz sandstone and conglomerate with a band of harder, iron-rich siltstone along much of the ceiling. There were also cave crickets, spiders and several bird skeletons in the cave.

Another trip was arranged and Colin Tyrrell accompanied me on this occasion. It had been raining constantly for several days prior to this visit and it was still raining when we arrived. I surveyed the cave with Disto-X and Topodroid program on my android tablet, while Colin waited near the entrance.

A constant stream of water was flowing out of the cave and there was a curtain of water issuing from a crack in the ceiling about seven metres inside. Past this point the cave was still dry. It took about an hour to survey the cave passage, which was quite a struggle considering that most of the passage was very cramped and there wasn't enough room to turn around.



When the cave map is overlaid on Google Earth satellite view, the end of the cave comes close to the railway line above, but it does not go under it.

The cave entrance is just several hundred metres from the centre of Katoomba — quite unusual, given that it has not previously been documented by anyone from the speleological community.

A special thank you to the property owners for allowing us to visit and survey the cave. The owners have now called the cave 'Our Kedumba Cave'. Kedumba is the spelling used in the first anglicised version of the traditional owner's name for the area now known as Katoomba.

Our Kedumba piping cave has formed in Triassic quartz sandstone strata at the base of a five metre cliff. The layer of sandstone and conglomerate in which the cave has formed is capped by a 20 to 100 mm thick band of harder, less pervious, iron-rich siltstone, with layers of sandstones and conglomerates above.

Seepage over millennia through a crack or porous section of conglomerate and sandstone has allowed water to find a path from the hill above to the base of the small cliff. Eventually the seepage water eroded out the cave passage.

An entrance chamber measuring 5 m W x 6 m L x 1.5 m H, has a passage (1 m W x 1.3 m H) leading from the left side, which, over its length, gradually reduces in height to <0.3 m but remains approximately 1 m

GARRY K SMITH

Tambalyn Durney in Crokers Creek Piping Cave

wide. The total survey length is 53 m. The cave contains karst-like features through its full length, such as several sculptured pillars of bedrock and smooth curved passage walls. The floor is covered throughout in a mixture of clay, quartz sand and small diameter ≈<8 mm gavel. This cave becomes an active outflow after several days of rainfall.

CROKERS CREEK PIPING CAVE (CQ-48)

In March 2019, NHVSS member Peter Downes alerted me to a couple of caves in sandstone and conglomerate rock that he had found at Bangalay Reserve, Tingira Heights, NSW.

Surprisingly, they were just a few kilometres from where I live. It wasn't until July 2021 that I finally got around to surveying the smaller but more interesting of the two caves with Tambalyn Durney. Upon investigation it became apparent that this was another relatively uncommon example of a piping cave. See map and photos.

The cave, now named Crokers Creek Piping Cave, has a survey length of 36 m with passage height varying between 1.5 and 0.5 m. The passage is generally oval-shaped in cross section and there are five pillars of host rock in the cave. The floor is mostly sloppy clay with areas of loose, rounded gravel and some exposed conglomerate bedrock. This is typical of the arenisation process.

The cave contains several species of spider and a scattering of small animal bones.

During the survey and documentation, the cave had a small stream trickling across the floor and out the entrance. There were a couple of matchbox-size pieces of petrified wood lying on the floor which most likely had been originally part of the conglomerate strata before breaking free as the cave formed.

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Exmouth Australian Cave Rescue Commission Workshop

Brian Evans
ACRC

IN 2020, that strange year of infection rates, lockdowns and changing abilities to go caving, Ian Collette decided he'd push a lot of energy into running a cave rescue exercise at Exmouth in 2021.

'Could the ACRC support that with attracting eastern staters over? And running some out-of-cave sessions? And helping convince the WA emergency services that cave rescues were important and they should attend?' Good on him for the vision and the drive, persistence and organisation to pull it off.

2021 is proving a strange year again, so only two eastern-staters made it in (and that because we arrived in the state six weeks earlier, and had left NSW six weeks before that. Twenty-nine attended. A good number of SES and other emergency services members attended, although they were mostly cavers already.

The Cape Range offers multi-pitch vertical caves, hot and steamy conditions, and some hard access routes in the scrub on top of the range. The south-west does not offer that, so it was an excellent training location for those from the SW; however, it's nearly 1300 km and 13 hours to get there.

To make the most of the travel, two days of caving on the range were offered, followed by a day off in town, then two days of out-of-cave learning, followed by a big day's exercise. There was also a week of canyoning in Karijini before that for those who wanted it. Camp was made on the range on Sunday 15 August, with cavers looking at Spiral Cave, Pteradactyl, the Star Chamber and various others over the next two days. It was a good reminder to all of the heat and steaminess, and what a stack of pitches in a row is like.

The seminars had gathered presenters who were often unable to attend in person, so Zoom was used to bring them in, and also to broadcast the proceedings to those that were able to watch. This presented challenges technologically — one learning is that we definitely need a dedicated nerd whose only job is to run the technology; some separate webcams and microphones

JOHN TONA-MOORE

Pteradactyl pitches were mostly short, but numerous, and with interesting rigging.

would also have helped. It also meant the in-house participants got far too much of Brian's voice, but there was excellent participation and interest even across the wires. We peaked at 15 online participants in addition to the 30 in the room.

We're currently working on editing some video of the event, to make it available — it seems that will only be Thursday's presentations (first column in the table overleaf).

EXERCISE:

The good bit, of course.

At 7:50 am Saturday, I received a text message asking me to meet at incident control. Being excellent cave rescuers, we all had our bags packed ready for a rescue (that might come at any time) and were meeting before 8 am.

It seems that a party had gone out to survey in C254 on the previous day and had not returned. A rapid access team had been deployed and provided the information that the cavers were in the cave and two had injuries. Incident control had maps. Be self-reliant until late this evening.

The access walk was a hard two hours, and up about 200 vertical metres, although Darren had much improved the route I'd taken on the recce — it was down from three hours hard walk, and with much less steep, loose stuff!

About seven hours were spent stabilising the casualties (one of whom made a spectacular recovery), rigging for the rescue, and extracting one in a stretcher, and then using the hauls to extract the other casualty.

The rescue went reasonably smoothly, although Darren spent a long time in his stretcher in transitions between pitches. The rescuers were frequently working with people they did not know, and working with multi-pitch for the first time, but all agreed that while there were things to learn, we did successfully extract the casualties and worked well with common purpose.

Personally, it was excellent to train with a new crew of rescuers and to see another group that could help out a fellow caver when an incident happens. They were well-equippped, well-organised and led, and were definitely outside their normal comfort zone of single pitch entrances and horizontal cave.

Please, cave rescuers, when Covid relaxes its grip again, take every chance you can to train in another state — they and you will learn a great deal from each other, and it's not unlikely that we'll need to work together nationally on some remote rescue… ACRC has grants to support this.

A huge thank you to Ian, but also Daniel, Darren, Tess and Ruth, all of the presenters and participants.

SIMON DAVIDSON

The first cavers start returning to the surface.

SIMON DAVIDSON

'OK, Darren — here's the place to have your accident.'

Exmouth Australian Cave Rescue Commission Workshop

DANIEL LANSOM

Gathered in the Tennis Club, keen to learn more of cave rescue.

PRESENTATIONS

1. Tassie – the real story of coordinating Mt Cripps	Alan Jackson
2. 2018 Tham Luang Cave Rescue	Craig Challen
3. Rescue co-ordination simulation: Camooweal	Craig Challen, Brian Evans, Rod OBrien
4. Media	Brian Evans, Paul Osborne, Corey Hanrahan
5. De-obstruction – theory only	Brian Evans
19. CaveLink	Clare Buswell, Daniel Lansom
15. Not quite gold standard! Some strategies that work in NSW…	Andrew Baker, Brian Evans
11. How it would be, working with Wapol?	Arni Regtien
12. Nullarbor event – Murra el elevyn	Kim and Karen Woodcock
14. Incident management	Arni Regtien
13. Rescue pre-plan: Herberts Pot	Deb Hunter
16. Roles of Incident Control and liaison	Arni Regtien
17. Desktop scenario	Arni Regtien
18. The tools ACRC has built so far...	Brian Evans
20. The roles we need for cave rescue…	Brian Evans

Most presentations are included in the ACRC Dropbox: https://tinyurl.com/ykxd8fdd

DANNY WILKINSON

After the debrief on Sunday: thirty cavers, many of whom also wear hats with SES or Police SAR.

COVID-19, Technology and the Great Escape

Bob Kershaw
ISS

THIS IS a classic saga of armchair/computer caving at its finest. At least until we were able to undertake the caving expedition to ground truth the armchair work.

During the Great COVID-19 lockdown of 2020 for the Sydney and greater metropolitan and surrounding local government areas in New South Wales, (and not to be confused with the Great Lockdown of August 2021) I was able to undertake a study of literature from the Western Australian Speleological Group's (WASG) newsletters and a copy of a trip report from 1974. This revealed that James Countney's trip with Peter Roberts from WASG on 17th and 18th August 1974, an unpublished paper, titled Kununurra Area Prospects, which was a summary of the area north of Kununurra, concluded that the Ningbings is not worth further exploration. (The half page report and reference in the WASG newsletters 1974 is not available as I am writing this at Karajini National Park in remote Western Australia.)

I note that SRGWA did some work in the area later, but only found and tagged a few small caves.

At the same time as I was undertaking the literature review, a chance remark during a phone call by the recovering David Wools-Cobb, regarding the use of Light Detection and Ranging (LiDAR) Digital Elevation Model (DEM) where structures and vegetation are stripped away from the surface to provide a 'bare earth' view, to assist him find new cave entrances in northern Tasmania, made me commence a search of LiDAR data and its availability for the general public to use especially in the north of Australia. (See website: for ELVIS - Elevation - Foundation Spatial Data at: https://elevation.fsdf.org.au/).

So during the COVID lockdown I had something to keep me occupied and learning how to input LiDAR information into ESRI's GIS program and make colour coded relief models and later with 2 m contour intervals, I was able to examine the southern Ningbing area for potential cave entrances. But first, I checked my theory of locating new caves with existing caves and LiDAR at Bungonia, Jenolan Caves and Wombeyan Caves and I was able to determine only where the large entrances were due to the poor LiDAR imaging for those areas, but my methodology in finding potential caves worked. I also tested my methodology on Mole Creek and Flinders Island were the accuracy is very good – 1 m accuracy. More success!

The next question was 'How do I examine and list potential caves for an area covering more than 30 km^2 in the NingBings?'

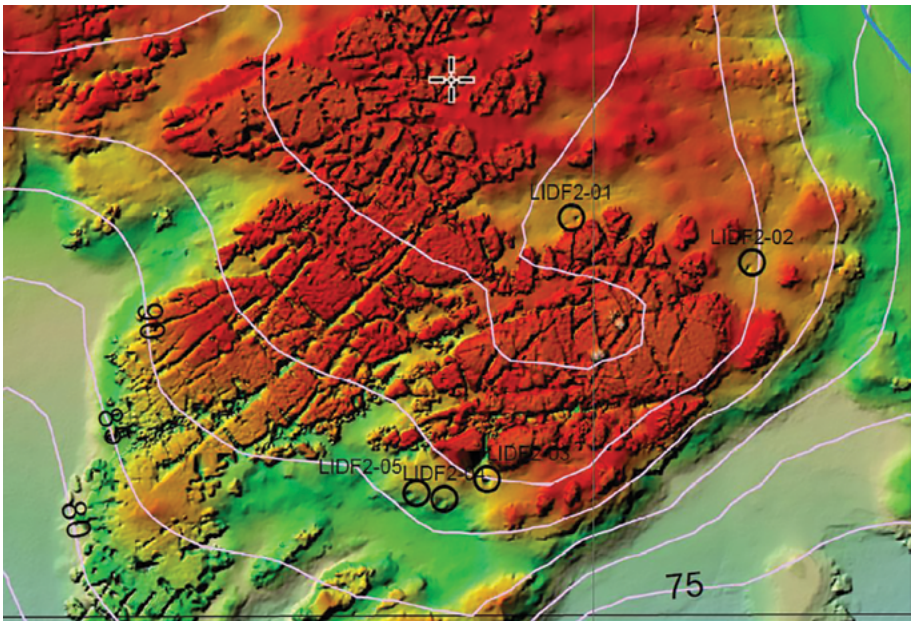
The answer came during a video meeting of prospective cavers for the 2021 trip. Break the area up into 1 km square grids, give them alphanumeric identifying codes and examine each grid one at a time, placing a circle around prospective entrances and giving each a unique identifier. GPS references were organised for each of the more than 200 potential caves.

Figure 1 shows a 5 m contour interval; the contour interval was altered to 2 m for the expedition.

The colour gradient shows red where the highest areas are and green are the lowest areas – in my GIS, you can set the vertical elevation of colour relief to what you want. A LiDAR DEM image of Kangaroo Island by FUSSI/CEGSA has been created in gray scale.

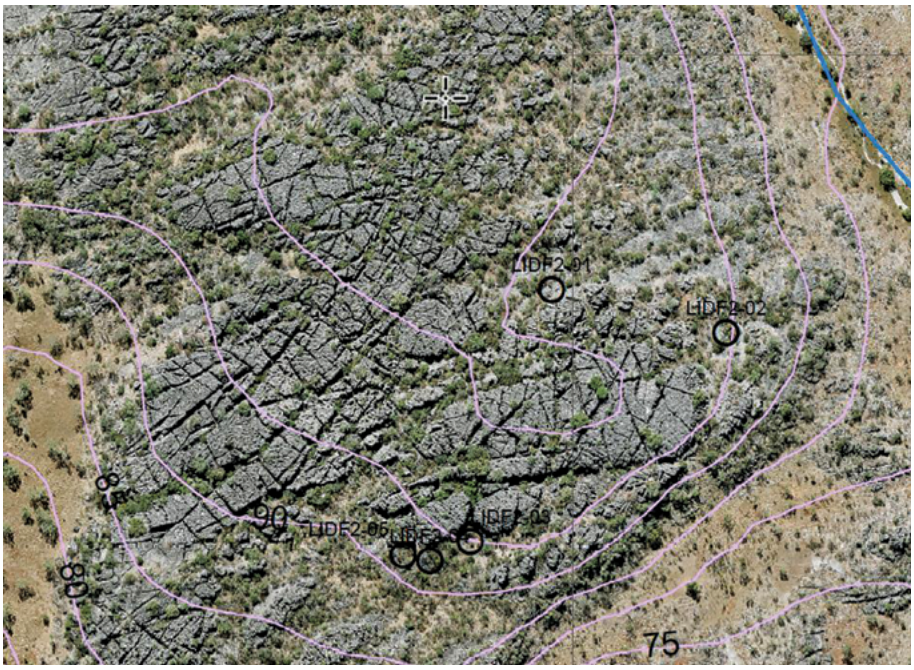
The aerial photo image extracted from the LiDAR DEM information for the same grid provides no clue as to the existence of a cave in the circled areas. F2-01 and 02 are rifts on a pavement area. They did not go. F2-03 was tagged KNI154 and produced over 1 km of cave passage. F2-04 is a large opening at the end of a long rift.

For the expedition, A4 size laminated hard copies were made for each group trekking the surface with the LiDAR DEM image on one side and the aerial photo image on the reverse. I also made good quality georeferenced pdf maps using the GIS that can be imported into the AVENZA maps app for use on smartphones. John and Greg used the AVENZA maps app and added detail that we have yet to extract — see Figures 3 and 4 from AVENZA. Another member used the hard copy aerial image



BOB KERSHAW

Figure 1: The colour relief map of grid F2



BOB KERSHAW

Figure 2: Grid F2 Aerial photo taken from the LiDAR DEM information

to navigate without compass or GPS over many kilometers of another map sheet on one day of the expedition.

Now to the 'Great Escape', or lack thereof, where we were able to 'ground truth' the LiDAR DEM images.

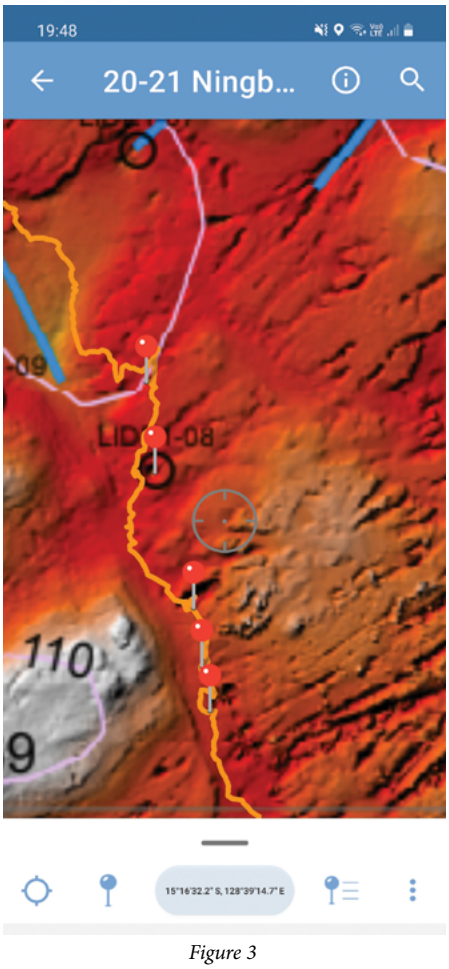
Brian, Ruth, Greg and Bob K who had left NSW early, crossed the WA border with no problems on 25th June 2021. Bob and Anne who left Tasmania early crossed the WA border later on the same day. But David Wools-Cobb got turned back. He had travelled through Victoria without stopping but had not been out of Victoria for more than 14 days. He had dinner with Brian and Ruth the night before in Katherine. So much for G2G passes. His car, at the time of writing is in Adelaide and he at home, otherwise he may not have been allowed back into Tasmania unless he quarantined for two weeks. Elise and Caitlyn did not get to leave Wollongong due to the NT closing its borders to NSW residents in late June as a COVID outbreak began. Alison and Andrew were caught up in a Darwin lockdown and returned home. Other members of the team could not get out of NSW or would not get passes to get into other states because of the NSW COVID outbreak. We did meet up with the WA contingent and local Kununurra personalities over this weekend as well.

Monday 28th June

We were awake at 5 am Northern Territory (NT) time to meet with the Carlton Hill Manager at 7.00 am NT time. Despite Carlton Hill being in Western Australia (WA), it works on the NT time zone. After the Induction meeting at Carlton Hill we arrived at camp 10 am, had breakfast, set up camp and had a swim in a pool that had the highest water level ever seen by us since we commenced caving in the Ningbing region in 2007. Into bed at 8.45 pm NT time or 7.15 pm WA time!

Tuesday 29th June

For the rest of the trip we were up around 5.00 am to 5.30 am WA time each



BOB KERSHAW

Figure 3

morning, leaving camp about 7 am and into bed around 7.30-8.00 pm.

John, K ('K' name withheld for security reasons) and Brian headed to KNI132 'Wonderland Cave'– an entrance we found on the last day of the last trip and half surveyed the cave. Named 'Wonderland' because it is just that and the fact that there is a looking tube about 80 cm in diameter, that joins in from the top of an adjacent rift.

Bob, Greg, Bob and Anne went to KNI132A- 'The Looking Hole'. But they ended up finding KNI133, a small cave at the end of a large rift and surveyed it. Later they were supposed to finish a survey from 2019 with 400 m of going passage! But, later that night, they found out that the 400 was overwritten on the 2019 sketch map as 400 mm dia! However, they did enjoy finding their way around the cave.

Wednesday 30th June

We walked to Siggins Springs and surrounding area to ground truth the LiDAR searches. Brian and Bob found a small hole and tagged it KNI150. Only a few meters in diameter but we found one! We then walked to existing caves - KNI65 for a look at the entrance and check against the LiDAR image and later we headed to KNI51 to remove the instruments in the cave so that the temperature and humidity data loggers could be returned to the USA for analysis. Back to the cars after HOT return walk at 33 degrees and swim in the pool about 2.45 pm.

Thursday 1st July

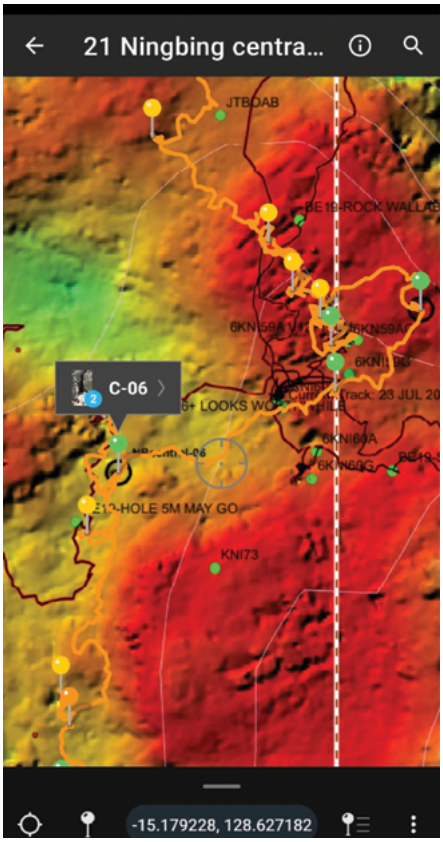
This day we looked for a small cave noted in the Countney paper of 1974 but could not find it. Back to the creek bed and watched Double Barred Finches, Long Tailed Finches and Diamond Doves drink at a small pool. A Merton's Water monitor made this place home and so did at least 20 cane toads hiding in a crevice that John found.

Over to a LiDAR rift that we tagged KNI152 and surveyed – but it was only a crawly passage. However, it was another cave found from the LiDAR search. Mind you, there were a few blind valleys and holes that did not go anywhere on the negative side of this ledger count.

Cattle were being herded in the region of the caves and camp and about 100 head were herded through the camp on this day!

Friday 2nd july

Brian and Greg searched for vertical holes in the central karst area while the rest of the group headed to the south again. Some LiDAR holes went a short distance and some new ones found in the area. John



BOB KERSHAW

Figure 4

caught about 20 cane toads in the pool we visited a day or two earlier and were euthanised and buried under a Boab tree.

Bob and Bob surveyed a small rift KNI153 and we found a cave tagged in 2001, KNI68 on the way back to the cars. Later in the week, Bob reorganised some GPS readings from 2001 and Brian and Greg went directly to KNI69, near KNI68 a few days later.

Saturday 3rd July

Brian and Greg returned to the central karst area while John, K and Bob K walked to a LiDAR hole and tagged it KNI154, an open rift with many leads, surveyed 400 m and found a large ghost bat colony.

BOB KERSHAW

John with his nemeses

Sunday 4th July

Brian, Greg and Bob P headed to KNI68 to survey it with Distos and the Topodroid App while John and Bob K headed back to KNI154 and surveyed 350 m of passage with lots of great formations. We left the cave at 3 pm and arrived at camp at 4 pm after a 'Garfield Day'- lots of BIG SMILES from the caving in KNI154!

Monday 5th July

Brian and Greg returned to KNI68 and found KNI69 as well. John and Bob took Bob P and Paul to the other end of the grike of KNI154 and found a fantastic Great Bower Bird nest. They continued to survey KNI154 and found the ghost bat roost area and a huge guano pile.

Tuesday 6th July

K, John, Bob P and Bob K returned to KNI154 to finish surveying the cave. More beautiful formation was found near the end of the cave. Bob K crawled thru a small passage that needs to be surveyed next expedition that led to the huge ghost bat guano pile from another direction and will close a future loop in the survey.

Wednesday 7th july

Bob K, John and Bob P went for walk to KNI132A (the Looking Hole entrance to Wonderland) to survey it and the associated grike.We decided on a half day of rest and so returned to camp at 12.15 pm. Brian and Greg headed to KNI132 and found going leads leaving more for the next expedition!

Thursday 8th July

John, Bob K and Bob P headed to KNI154 area to check two LiDAR holes and they tagged one KNI155 that is a 'Kylie Mole' cave — (for those who remember the satirical comedy) it goes and goes… well, it just goes. This is in readiness for the next expedition. Back to the car at 10 am on a very hot day for a second half day of rest and to commence a pack up after a very successful expedition thanks to modern technology.

ANNE PENNINGTON

Catlle being herded through our campsite

CONCLUSION

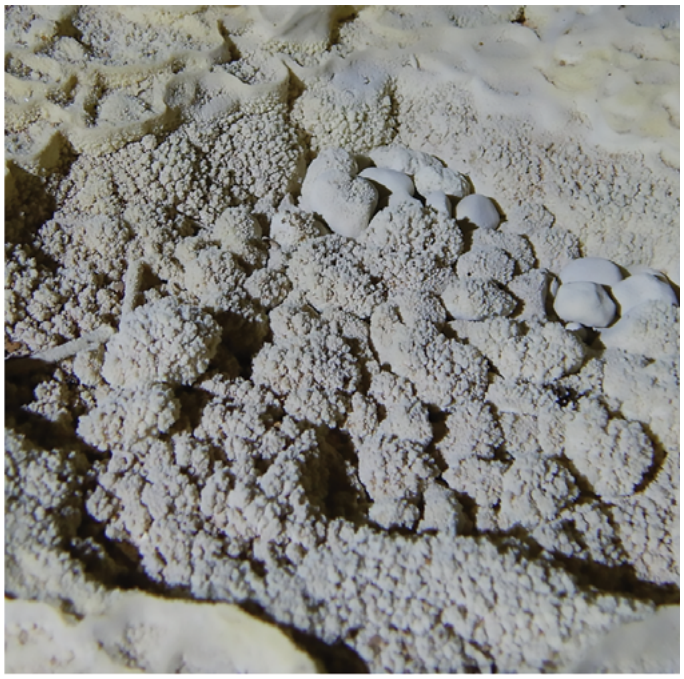
James Countney's trip with Peter Roberts from WASG on 17th and 18th August 1974 and their unpublished paper Kununurra Area Prospects concluding that the NingBings is not worth further exploration have, with the aid of 21st century technology, been proved wrong.

The area is proving to be a very worthwhile karst region indeed now that we have ground-truthed some areas. There are at least 180 prospective holes we did not locate on the 2021 trip, so there are still more caves and surprises to be found during future expeditions. We cannot wait to get back next year!

The statistics for the LiDAR searching

BOB KERSHAW

Indside KNI154



BOB KERSHAW

'Coral balls' similar to those found at Bullita and cave pearls

BOB KERSHAW

Splash cups/holes in the floor KNI154

BOB KERSHAW

John Cugley beside a wall of formation in KNI154

is about two to one against a going cave but that is better than blindly walking over the surface in search of caves and finding nothing.

Give ELVIS a visit and if you see dark blue images for your karst area of interest, like that of Flinders Island or the agricultural area to the north of Kununurra or the east coast of Australia, then you may be in for a treat! Give it a go and be 'DEMed'!

Please feel free to contact the author if you want more information regarding the use of LiDAR, DEM and GIS, but please bear in mind that the author is new to this as well/

Cave Rescue Preparedness

Cave-Link and Michie Phones in Tasmania.

Janice March
NC
Clare Buswell
FUSSI

CAVE RESCUE preparedness in Tasmania has been advancing over the past 10-15 years with six-monthly northern practice days and annual southern rescue scenarios organised to boost skills and maintain interclub relationships.

It was tested in October 2020 at Mt Cripps and this experience has heightened our resolve to remain prepared for any eventuality.

More casualty-warming gear, deobstruction equipment and rigging kits have been purchased, catalogued and made available. The communications gear had an update to make it more ready to 'grab and go' with 2000 metres of Michie phone wire on caver-friendly reels in the north and 1000 metres in the south.

Our commitment to the importance of communications in a cave rescue was recently demonstrated when we asked Clare Buswell from South Australia to bring down the Cave-Link communications system for a hands-on trial at a northern Tasmanian practice day. It had previously been used in Tasmania in November 2019 when several South Australians came to the scenario at Growling Swallet. Eighteen cavers from all four Tasmanian clubs participated in the recent practice day at Honeycomb Cave, Mole Creek and spent about three hours in small groups learning how to use the Cave-Link system.

Clare had supplied us with the current instruction manual, but was also present to explain in more detail what the capabilities of the system are. She was interested to see what we found unclear in the manual, so it can be further improved.

My group started setting up one unit just outside the cave in a pocket of thick scrub which was not very conducive to laying out the antenna wire in a straight line for 20-30 metres. This unit was later moved to a large grassy patch where the antenna's orientation and length could be altered more easily. The system told us that we only had a 'Poor' connection, but nonetheless with only 100 m between the above-ground and in-cave units, we received the text messages almost instantly.

SIL IANNELLO

Jess Bayles and Sil Iannello waiting for Cave-Link messages

We tried reorientating one antenna and this did not help because we had initially aligned them to be parallel as is recommended. When we lengthened the blue antenna, we improved the connection to 'Moderate', and more troubleshooting with the earthing of the metal plates may have further improved the connection.

The Cave-Link system can send text messages between two points through the rock to a distance of about 1000 metres or more under ideal conditions.

The GSM phone connection was tried and we did manage to send a text message from inside the cave, but it was not received until later that day when the receiver's phone with an Optus SIM card was back in an Optus mobile coverage area. Manually listing some handy mobile numbers to call for testing and emergency purposes would be useful.

The mobile phone connection is important for the first responders to the casualty to communicate with a medic at a hospital several hours away. Direct messages can be relayed via multiple Cave-Link units if required and there is no 'Chinese whispers' effect. The texts can all be printed afterwards to add to all the records associated with a rescue: entry logs, photos with date/time, and Michie communications logs, to name but a few.

At a recent meeting of all the volunteer organisations that police can call upon, our

JANICE MARCH

Practising stretcher transitions in the trees

local police search and rescue chief had been informed that the Cave-Link would be in Tasmania for cavers to familiarise themselves with.

He actually drove to Mole Creek to see it in action, and spent an hour or two observing and chatting to us above ground while we practised comms (both Michie phones and Cave-Link) and, perhaps more spectacularly, he saw us rigging tyroleans between trees, which was the other skill-set boosted that day.

Feedback from cavers was very positive with everyone surprised at how simple Cave-Link is to use, and everyone could see how it complements the Michie phone system. It would be very useful if there was ever a big cave rescue in Australia.

Thanks to ASF's 50 per cent travel grant for cave rescue enablers, which covered part of Clare's costs to fly to Tasmania for the weekend. A big thank you to Clare for bringing the boxes of gear on the plane with the many logistical problems that involves and for taking a weekend away from her busy life in South Australia for our benefit.

A NOTE FROM DEB HUNTER (MCCC):

Tasmania is to have a resident Cave-Link unit soon, which will be important for rapid deployment to the site of a casualty in any cave. It will be available anywhere in Tasmania, for both regular training and authentic situations. It is being purchased by MCCC. Tasmania's cavers have been rapidly up-skilling and amassing contemporary rescue equipment over recent years.

THOUGHTS ON COMMUNICATIONS AND CAVE-LINK SET-UPS

One of my aims for the weekend was to hand over the Cave-Link units and have people set them up on their own. The aim being to show that anyone can set it up and use it. You don't need to be any more tech savvy than being able to use a mobile phone, roll out a couple of bits of wire, read a compass and press some buttons. As a teaching method it worked, as all found the system quite easy to set up and use. I gained some useful feedback on the setup instructions and even managed to get down a cave. In times of mainland COVID restrictions what more could be asked? I thank the ASF for the funding of my airfares and Tasmanian cavers for their hospitality and opportunity of showing off this great piece of communications equipment.

Importantly, a great deal of discussion over the day revolved around setting up the antennas of the units and as Janice has already alluded to, improving their efficency.

This was done firstly by making sure the metal earthing plates had good contact with the ground and not simply placed on top of the grass or placed unevenly on a couple of rocks underground. The goal is to send the most electricity as far as possible through the rock. The better the earthing, the stronger the power.

Secondly, laying out the antenna wires to the full length improves the transmission signal. Although it is important to get a good signal strength, transmission will ALWAYS occur as the data is being transmitted in very small blocks of 2 bytes of data each, at a rate of 6.5 blocks per second. Each block contains additional data which allows the receiving unit to check that the 2 bytes contain no errors. If an error is detected the receiving unit will request that the block be sent again.

OK, I have mentioned computer speak, but this is pretty simple stuff so don't let your eyes glaze over, just read on.

The units tell you what sort of antenna signal is being transmitted: Bad, Poor,

Moderate, Good, and Excellent. A bad or poor antenna signal means that more errors will occur and it will take more re-sends and thus a bit more time, think in seconds, to correctly transfer the blocks of data. Thus the poorer the antenna alignment, the slower the transmission of messages, (i.e. more tries have to happen), and thus more battery power used.

Cave-Link automatically controls the transmission power. Higher power means fewer transmission errors, but this also consumes more power from the battery. Cave-Link adjusts the power to a level at which 50 per cent of the blocks are transferred correctly at the first try. If antenna conditions are very poor Cave-Link will increase the power to the maximum and still require many tries to send each block. Poor antenna conditions will result in a big increase in battery power usage.

You can check the Link Quality Transmission (LQT) and the energy used, as it is recorded at the end of each sent message and for received messages, only the Link Quality Reception (LQR) is shown.

To simplify, let's look at a few examples of antenna alignment quality, using the same number and the same message to transmit blocks of data.

Example of a high quality link:

LQT 017/002/001
017 = Number of blocks of data
002 = No. repetitions of blocks
001 = No. repetitions of receipts.

Almost no repetitions with minimal transmission power used:

38 = 6 mWs /Bit

The message took 3 seconds to send because 6.5 blocks of data can be sent per second. (17+2+1=20 blots of data /6.5= 3.07secs)

Example of moderate quality link:

Remember it is the same message as in the first example, but the alignment of the antenna has been changed.

LQT 017/015/018
017 = Number of blocks of data
01 = No. repetitions of blocks
01 = No. repetitions of receipts.
50 = 100 mWs/Bit

The message took 7.6 seconds to send. The energy consumption was over 16 times greater than for the high quality link

Example of poor quality link:

LQT 017/242/415.
017 = Number of blocks of data
242. = No. repetitions of blocks
415. = No. repetitions of receipts.
transmission power
74 = 25119 mWs/bit ca. 25 Ws/bit

The message took 104 seconds to send. The energy consumption was over 4000 times greater than for the high quality link.

In this last example, to transmit the actual 17 data blocks, transmission of a total 674 blocks was required. As 6.5 blocks can be sent per second: 674/6.5 = 104 sec.

This latter example is similar to two people yelling down a cave passage with one trying to send a message and the other saying 'can you repeat that', until they finally get through to each other, 1 minute 44 seconds later. They have to shout loudly and repeat many times, using a lot more energy!

It helps, when preparing cave rescue pre-plans that you create an antenna map in advance, that is where you will get the best connections between the units. If for example you know where Midnight Hole runs in relation to the surface, and you have an accident on the second last pitch, you can plan in advance where you can place the units and run out the antennas to get the best signals.

Note that you do not have to have the above unit situated directly above the below unit.

OTHER MUSINGS ON CAVE COMMUNICATION SYSTEMS AND RESCUE

There are moments in a cave rescue where comms are at their most critical, you could say. The first moment is that of alerting the outside world that an accident has occurred and the second is the continuous need for in-cave to surface communication.

ALERTING THE WORLD

There are of course many ways to skin the in-cave comms cat. If you don't carry any sort of communication device with you and problems arise then you are going to have to rely on runners to relay the initial accident message to the outside world, as per the call out for the last Tassie rescue. If you are lucky your mobile phone will do the job.

However, given that this country has such a number of places where communicating with the wider world is very problematic via mobile phone, for example sections of the Nullarbor or parts of Yarrangobilly or Bullita, then cavers have to be flexible in what is used. It is not a situation of one size fits all.

From this point of view everything goes in the mix: satellite phones, walkie talkies, InReach, EPIRBs, Spot devices, flares, mobile phones.

So let's have a brief look at some of them:

Satphones

Main complaint is that they are expensive. Well, yes and no. There is a connection fee to the network, as with all types of phone, Spot, Inreach communication systems, and then there are the call charges. The cheapest way of communicating with a Sat phone is to ring up your designated contact person and say: ACCIDENT, RING ME NOW. Hang up and take their call as it doesn't cost them any more to ring a Sat phone number than a mobile phone number, and it doesn't cost to receive calls on a Sat phone. (Read your Sat phone plan to verify.)

Cheapest way after that is via text message to and from the Sat phone.

EPIRB

Also guaranteed to alert the world, but you can't give any real details of the situation, only that something has happened and a location point on the surface.

Walkie talkies

Much maligned but prepare to be surprised. They DO work underground and here you need to go forth and experiment. They are good for inter-pitch comms, and of course above ground. Next time you are out, take a couple of 5 Watters with you and investigate.

Put one in your pack and if there are any other users on air you can talk to them if needed.

Spot devices

Depending on what you purchase, these are usually only one way systems connected to your contact person/s via the International Emergency Response Coordination Center in the USA. The Spot X does, however, send text and short emails.

InReach

Allows you to send and receive messages from worldwide mobile numbers, email addresses and other Inreach devices. There is a charater limit of 160 charaters. The device can be paired with your mobile phone via a couple of apps and this means you can use the keyboard on your phone to type messages.

You can embed your location in your messages.

People can respond to your messages via the usual mobile phone process or email. Simple.

Whatever alert system you are going to use, test it out in the field. If you are going to work with inter agencies in rescue situations, learn their lingo.

Know the phonetic alphabet and pro words, (no duff, sit rep etc). All this just adds a shinier gleam to the skills that cavers have in rescue situations.

Japanese Bath Houses, Bulldozers and Solar Panels

Clare Buswell
Chair ASF Conservation Commission

AUSTRALIAN MUSEUM/G B BAKER

The little bent-wing bat — already endangered and further threatened by mine development

CAVERS in this country have fought some of Australia's longest, and mostly, not publicly remembered, conservation battles and given the events of the last nine months, could be forgiven if we think we are living in a Groundhog Day world.

In February this year, the Conservation Commission working collectively with ASF Clubs, ACKMA and other advocacy groups managed to put a stop to the funding of the proposed mountain bike track from Talbingo to Yarrangobilly Caves in NSW. Just as we all celebrated, along came a far bigger issue for the same area, with a NSW government proposal to increase visitor levels to the show caves, introduce wild cave tours with an adventure caving passport, place Japanese bathtubs by the Yarrangobilly River and other inappropriate developments.

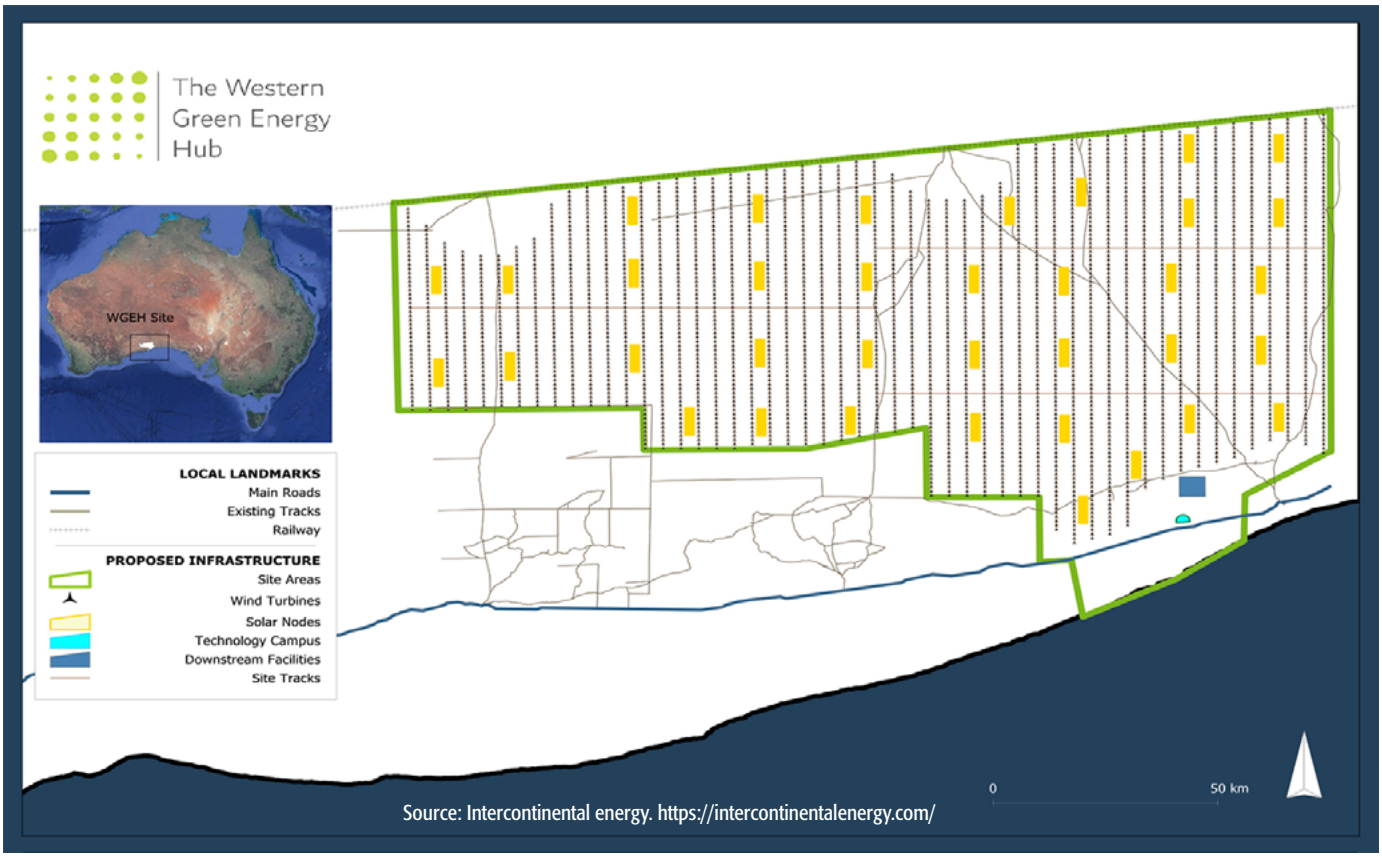
Submissions for this grand plan closed in late August and we now await the government response.

The fight to save Mt Etna is perhaps the foremost of conservation battles that ASF cavers have undertaken. It started in 1965 and ended in 2008 with Mt Etna being declared a National Park. In early August of this year a proposal by the mine's current owners, The Caves Quarry, (TCQ) to expand the mining of road base on the western side of Mt Etna, (away from the karst), was presented to the Livingstone Shire Council.

Once again, the Conservation Commission, ASF members involved in the earlier Mt Etna campaigns, some local cavers and ACKMA put their collective experience and knowledge together and formulated a response.

As such, we hope that the mine operators would be responsible and look to be protecting what remains of vegetation habitat for both the endangered *Macroderma gigas* (ghost bat) and *Miniopterus australis* (little bent-wing bat).

From the look of the proposed expansion, Mt Etna will be surrounded by mined



Source: Intercontinental energy. https://intercontinentalenergy.com/

land on all but the eastern side.

Once again, we watch these developments, as for some of us Mt Etna is considered sacred ground.

Acts of Parliament make scintillating bedtime reading and recently the South Australian Government's Aboriginal Lands Parliamentary Standing Committee undertook an inquiry into the State's Aboriginal Heritage Act.

This Act comes into play when cavers wish to explore caves that could be listed as protected by the Act, for example, Koonalda Cave on the Nullarbor, and when we find items that could be of importance to Aboriginal heritage.

The Conservation Commission welcomed the opportunity to comment on the problems encountered when working with this Act, such as the inordinate timelines and costs involved in searching the archives and lack of communication from the Department itself.

Meanwhile, back in WA Ben Wyatt, former State Treasurer, resigned from parliament just before the State election in March and has taken up a position on the Rio Tinto Board. (He also sits on the Woodside Board)

The McGowan Government is slowly progressing a new Aboriginal Heritage Act through parliament and has earmarked $10 million in the next budget to set up the administration of the new Act[1]. Aboriginal people are continuing to take Rio and other big miners to task over the appalling attitudes to Aboriginal heritage[2]. This is a space for all of us to watch.

Now it seems we are faced with yet another major conservation issue and this one will require efforts from all those with an interest in the protection of the Nullarbor.

A proposal by Intercontinental Energy, CWP Global and Mirning Green Energy, a fully-owned subsidiary of Mirning Traditional Lands Aboriginal Corporation, for a 15,000-square-kilometre wind-and-solar energy hub on the western edge of The Bight and extending inland towards Norseman to produce green energy.

The energy generated from this development is for the production of hydrogen and ammonia to replace fossil fuel use in the transportation industry, trains, trucks and planes for the production of minerals and chemicals for export.

1 Media release: Aboriginal Heritage Bill funding confirmed in State Budget. 18.8.21. https://tinyurl.com/udc4r45t

2 Brad Thompson. Rio accused of another heritage failure. *Australian Financial Review.* June 26-27 2021.

The estimated cost is $70 billion with final investment decisions to be made in 2028. The map shows the extent of this development.

Despite this long lead time, these projects have to carry out major impact assessments, and it is here that the importance of the speleological community's knowledge is paramount in placing pressure on both the Western Australian and Federal governments to either stop this project, or at least mitigate its excesses.

As such I am calling for cavers to help the ASF Conservation Commission begin the process of planning for what will be another intense conservation effort.

For links on the Western Green Energy Hub see:

https://tinyurl.com/2xfxdf2u

For links on renewables:

https://tinyurl.com/2r6vps8s/

PLEASE HELP

Contact me via the ASF Conservation Commission as your help is needed in conserving, protecting and biting the ankles off crazy devlopments that impact caves and karst.

Granny's Cloak Moth
(Speiredonia spectans)

Garry K. Smith
NHVSS

MANY cavers would have sighted these moths in the twilight zone close to a cave's entrance.

They are often overlooked as they aren't as attention-grabbing as bats and other creatures that inhabit caves. A little more investigation reveals a lot more intrigue about these moths than first meets the eye. For instance, how do the moths cohabit in caves with predatory bats?

During daylight hours, these moths are frequently found in the twilight zone of caves and abandoned mines, including those inhabited by bats that prey on them.

They are also frequently found hiding in sheds, under buildings, drainpipes, culverts, hollow trees and other dark places. The moth is native to Australia and is commonly found from the Northern Territory, through the Atherton Tableland, Queensland, and the eastern states to Tasmania — see the map. Strays have been recorded on Norfolk Island (Holloway 1984), and in New Zealand. They have been sighted sheltering in caves at sea level through to high elevations (1500 m ASL) on Mt Kaputar NSW (Warrant et al. 2016).

The moth was first described by Guenée (1852) and until recent times it was listed under the Superfamily *Noctuoidea,* Family: *Noctuidae,* however, in early 2021 the *Speiredonia spectans* moth was placed into the Family *Erebidae* as a result of DNA sequencing. Other moths in this family are found in Australia, Asia and the Indo-Pacific.

Adult moth wings have delicate scalloped edges and a wingspan of about 7 to 7.5 cm. From a distance they look like a boring dark brown moth, but up close they have intricate zig-zag wing patterns all over. Each forewing has a pronounced spot that looks like an eye complete with eyelid.

If the forewing spots are interpreted as eyes, then those on the tailing edge of their hind wings might be thought of as nostrils of some large reptile. The large wing spots could also be interpreted by the moth's predators as owl's eyes, a larger predator.

GARRY K SMITH

This eye pattern may cause an attacking predator to hesitate or perhaps withdraw.

The outstretched wing shape could resemble a dead leaf when it comes to background wing tones in certain lighting. However, to human eyes their wings can often appear to have a deep purple-blue sheen over much of the upper wing surfaces. Their camouflage characteristics may well be enhanced when viewed through the eyes of a predator that can see in the ultraviolet end of the spectrum.

The wing scales appear to have a finely grooved pattern that diffracts light to give the appearance of different colours depending on the angle of view. In the right lighting situation (especially with flash photography), the wings may appear a bright purple colour.

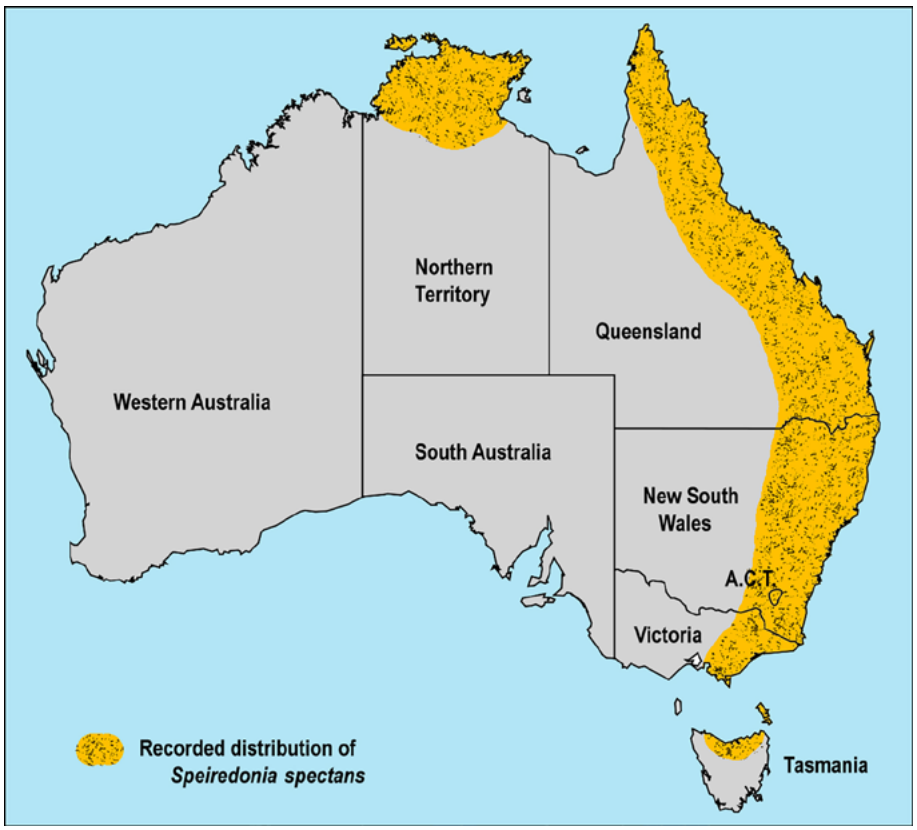
The adult moths are quite gregarious and like to congregate in groups of at least a dozen or more while resting during the day. A group of moths is called an eclipse. All the individuals tend to orient themselves in the same direction, when at rest.

On a wall they are usually head-up so their wing pattern has maximum impact, looking like a face to deter predators if approached from slightly below. Their grouping behaviour is probably related to pheromones and their nocturnal habit with a need to find a dark place to hide during the daylight hours when predatory birds are active. Once the moths find a secure place they don't appear to travel very far in the subsequent days.

Very little is known about their biology (Common 1990, Monteith 2007); however, the caterpillars have been found feeding on hickory wattle *(Acacia implexa, Mimosaceae),* and yellow tulip *(Drypetes deplanchei, Euphorbiaceae).* It is thought that the caterpillars may also feed on other host plants due to the appearance of moths in locations where these plants are not found. The caterpillars have long, flat bodies that have brown coats with spots that are black or black and white.

The question of how these moths cohabit in caves with insectivorous bats is quite intriguing. Pavey and Burwell (2005) suggested that *S. spectans* cohabits with bats, avoiding predation by being able to detect their echolocation calls and escaping to the walls of the day roosts.

Studies found that *S. spectans* has supersensitive ultrasonic hearing that can detect the specific wavelengths of echolocation calls from some species of microbats, who are their predators. In response, they can



Distribution Map of S. spectans
– derived from Atlas of Living Australia *(ala.org.au) and Fullard et al. 2008.*

dart evasively to avoid being the bats' next meal. This strategy gives the moths a fighting chance in open skies where free-flying bats locate and attack their prey by what is known as aerial hawking.

Fullard et al. (2008) found that *S. spectans* routinely shared its day roosts with little bent-wing bats *(miniopterus australis)* and eastern horseshoe bats *(Rhinolophus megaphyllus),* that dine on insects. Fullard and his team filmed bats and moths in disused mineshafts and found that the moths did not fly when bats were active.

In lab experiments playing recordings of active bats, they determined that *S. spectans* is able to hear most of the calls of these two cohabiting bats, whose echolocation calls are dominated by frequencies ranging from 60 to 79 kHz.

They also observed the auditory responses of one moth to the exceptionally high echolocation frequencies (150–160 kHz) of the dusky leaf-nosed bat *(Hipposideros ater)* and determined that *S. spectans* is unable to detect most of its calls.

This suggested that auditory constraint, in addition to the greater flight manoeuvrability of *H. ater* renders *S. spectans* vulnerable to predation by this bat to the point of excluding the moth from day roosts where the bat occurs.

A gleaning *H. ater* would be able to take a moth that is unable to hear the bat until late in its attack sequence and was still moving its wings after landing on the wall [hipposiderid bats require movement to detect their prey (Link et al. 1986)].

However, it is more likely that the *H. ater* is not gleaning, but capturing the moths on the wing. Neither *R. megaphyllus* nor *M. australis* bats were observed landing on the walls to capture moths (i.e. gleaning), thus allowing the moth enough protection to successfully cohabit with these bats (Pavey and Burwell 2005, Fullard et al. 2008).

Fullard et al. (2008) found that the moths minimise encounters with bats by not overlapping their cave exits at the same time as the bats; i.e. the moths did not fly when hearing the airborne bats. Another consideration enabling cohabitation may be the physical inability of aerially hawking bats to attack insects in the narrow confines of a cave.

The moth's super-sensitive 'ears' are the tympanic organs located on the thorax. The ears have two sensory cells with identical tuning curves, and different sensitivity thresholds provide sound localisation.

To work out audible range, Fullard et al. (2008) took measurements of the moth's auditory receptors response to various recorded bat calls.

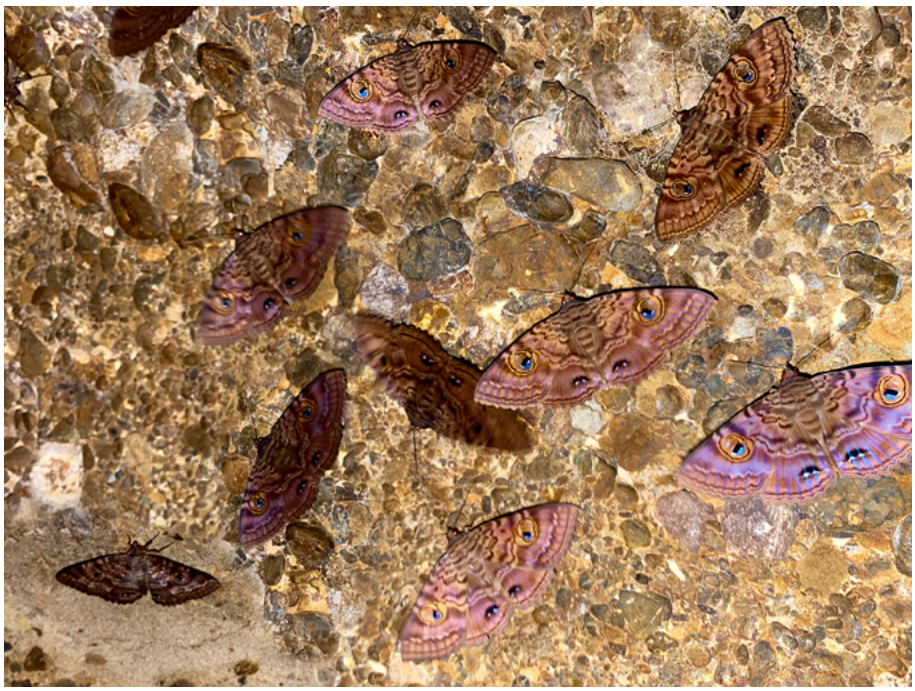
To aid its hearing *S. spectans* characteristically rests with its wings elevated from the surface of the cave wall, thus exposing its ears and increasing its ability to hear approaching bats.

Cane et al. (2018) found that wings of nocturnal moths reflected ultraviolet (UV) light significantly more than diurnal species and that imaging in UV above 360 nM is possible with conventional photographic equipment.

However, when researching for this article, the author used two digital cameras to photograph *S. spectans* under two separate very bright UV flashlights of 365 nM and

GARRY K SMITH

Granny's Cloak Moth with four parasitic mites (circled)



GARRY K SMITH

This photo of many moths facing the same way on a wall shows their resting habit in a group, as well as showing that the moth looks different colours from dark brown to purple, depending on the reflected light angle from a bright camera flash. When viewed with just a caver's head torch, they often look a dull dark brown because of the angle of reflected light. A group of moths is called an 'eclipse'.

Scientific classification	
Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Lepidoptera
Superfamily:	Noctuoidea
Family:	Erebidae
Genus:	*Speiredonia*
Species:	***S. spectans***

395 nM wavelengths and found no appreciable enhancement of wing features.

Occasionally *S. spectans* have been found to host the parasitic bright red mites that are found on the bat species which cohabit caves. See the photo on the previous page with four red mites on wings and body.

An extensive literature search for information about the granny's cloak moth raised more questions than it answered.

Personal observations identified that the moths were stationary when first located but quickly started vibrating their wings at a high frequency when disturbed.

I strongly suspected this was a way of warming up the wing muscles ready for flight.

The assumption was verified by Dr. Ted Edwards who provided the following information:

'The shivering is to warm the flight muscles up to an active temperature, probably around 32°C or a bit more. The shivering is very effective because the moths breathe by a series of spiracles down the side of the body, shivering improves oxygen access. Most important though, because they do not access oxygen by the same system as mammals (lungs), the moths can shut off the supply of blood to the abdomen with no ill-effects. It means they only have to warm the flight muscles and not the whole body. The system can also be used to reduce overheating in flight where the blood is allowed to flow into the abdomen that acts as a heat sink.'

The shivering wings may also have other yet to be identified benefits.

Is this a deterrent to predators by making the eye images appear to be an angry reptile or owl? Does the high frequency wing vibration before flight, distort a hunting bat's sonar to produce a false signal?

Little is known of the moth's life span, nor the four stages of its life cycle: egg, caterpillar, pupa and moth.

There are many unanswered questions about this species that warrant more research into this iconic moth found so often in Australian caves.

ACKNOWLEDGEMENTS

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Dr. Ted Edwards for helpful information regarding the habit of *Speiredonia spectans* wing fluttering. Ted worked as a Lepidopterist with CSIRO, Australian National Insect Collection, from 1970 to 2000 and since then has been a Post-retirement Fellow and Honorary Fellow with CSIRO.

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Lands of Karst published

Free download

A book of nice photographs, *The Lands of Karst. A Visual Story* has just been published and is available for free download at http://www.karst.edu.rs/en/.

It is a contribution to the International Year of Caves and Karst declared by the International Union of Speleology and supported by UNESCO and numerous institutions and organizations.

The book comprises several hundred colour photographs from six Lands of Karst — Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, and North Macedonia, which had been recorded by more than 70 geologists, speleologists, biologists, archaeologists, mountaineers, professional photographers or simply amateurs — karst and cave lovers.

The editors of this story are Neven Kresic and Zoran Stevanović who, following the rule 'a picture is worth a thousand words,' prepared very short informative texts for ten chapters featuring photographs of noisy rivers, wild mountains, silent lakes, the sea, limestone walls, rough surfaces, fountains of life and windows to unknown, magic chambers, underground creatures, wildlife, and past and present human inhabitants.

The photo at right is of Rokino bezdana pithole in Jezerane, Lika, Croatia.

For a printed copy for those that want to hold the book in their hands, go to: https://tinyurl.com/cuyheeje

— Dr Susan White OAM
Helictite Commission Chair

DINKO STOPIC

ASF Award Nominations

Nominations are invited for ASF Awards to be conferred at the 32nd ASF Conference, and may be made by an individual, a group of individuals, or by a caving club or society.

1. Edie Smith Award: For outstanding service to Australian speleology over a long period of time (typically more than 10 years) in any field of speleology.

2. Award of Distinction: For recognition of those who have made an especially notable contribution to speleology in fields including conservation, exploration, expedition leadership, research, etc.

3. Certificate of Merit: For valuable service to speleology above normal involvement, possibly limited to individual club level.

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For more information on how to make a nomination:
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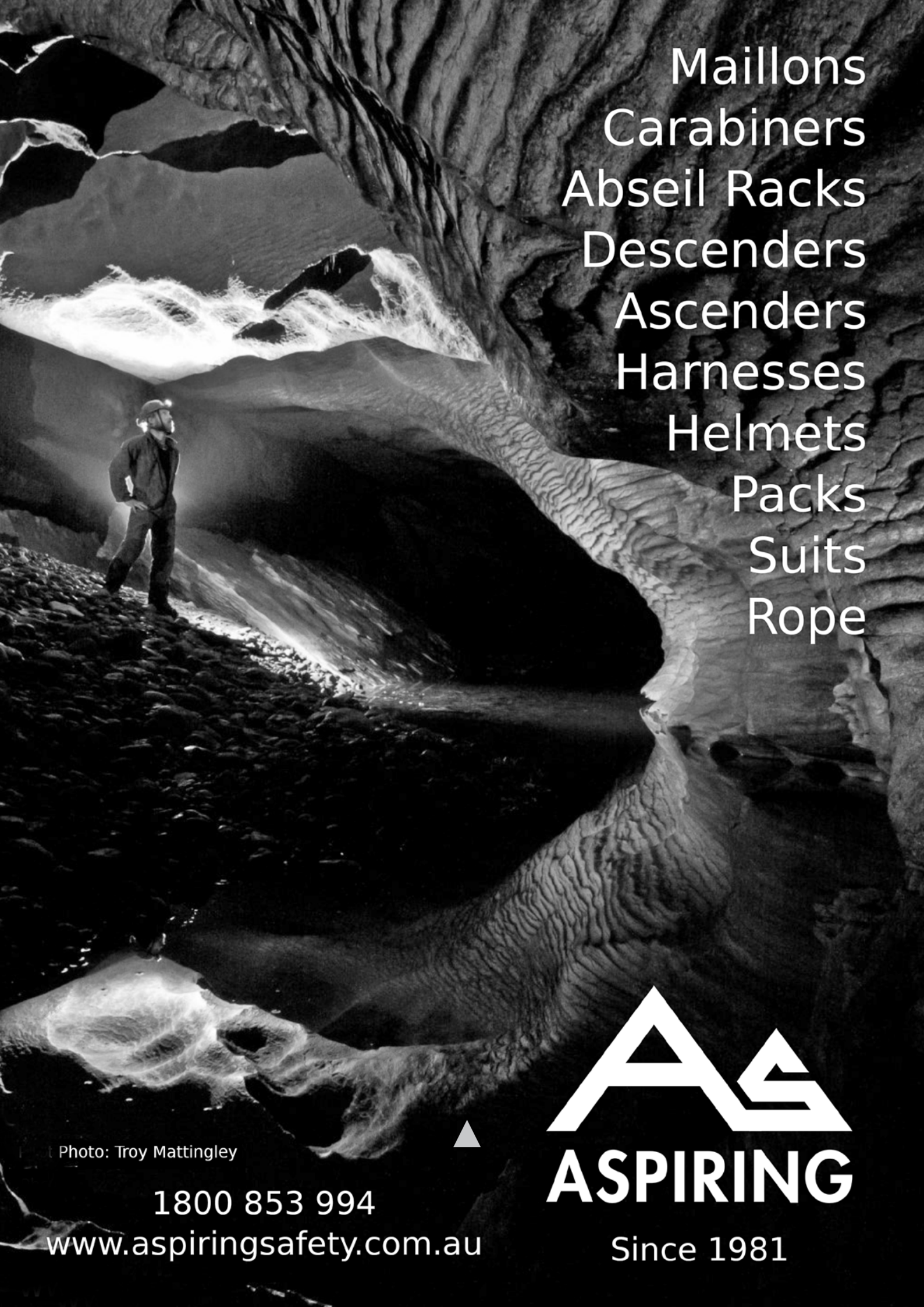
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