

The Journal of the Australian Speleological Federation Inc.

CAVES

AUSTRALIA

NO. 234 NOV 2025

**CAVE RESCUE
VICTORIA**

**NEW
NULLARBOR
BOOK
PUBLISHED**

**THE ASF
NEEDS YOU!**

CAVES

AUSTRALIA

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COVER: HEART OF THE NULLARBOR. THE NULLARBOR'S OUTSTANDING DARK SKIES ARE ONE OF ITS MESMERIZING ESSENCES AND THIS EXTENSIVE CAVE SYSTEM OF WORLD HERITAGE QUALITY LIES IN THE HEARTLAND OF THE NULLARBOR KARST WHICH IS THREATENED BY A PROPOSED COLOSSAL WIND AND SOLAR POWERED HYDROGEN / AMMONIA EXPORT VENTURE. PHOTO BY STEFAN EBERHARD



Cave Rescue Exercise in Dalleys Sinkhole at Murrindal Cave - Photo by Nadine Muresan



Te Anaroa Cave in the Aorere Valley NZ - Photo by Garry K Smith



Calcite Raft in the Snowflake Chamber AU-011 - Photo by Daniel Lansom

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AUSTRALIAN
SPELEOLOGICAL
FEDERATION

Table of Contents

President's Report <i>Andrew Stempel</i>	04
The ASF needs you! <i>Janice March</i>	05
NEW NULLARBOR BOOK PUBLISHED <i>Stefan Eberhard</i>	07
Australian Citizen Science Association Conference <i>Clare Buswell</i>	09
Cave Rescue Victoria <i>Nadine Muresan</i>	11
Planning an interstate trip Yarrangobilly <i>Wayne Revell</i>	13
A Trip to Easter and Moondyne Caves <i>Daniel Lansom</i>	16
Advances in Caving Equipment Over a Lifetime <i>Garry K. Smith</i>	20
Cave Explorations in the Ningbing Range, WA <i>Denis Marsh</i>	28

ASF Karst Conservation Fund Donataion

Extreme cuteness warning! Our brothers and sisters at Canyoning Australia have designed a super cute caving wombat sticker! This cute little guy is looking for a home on your helmet or water bottle.

Designed with love by Daniel Motyka and printed on premium matte laminated die-cut sticker stock.

\$1 from every sticker sold will be donated to the ASF Karst Conservation Fund.

You can grab your very own wombat sticker for only \$2 from <https://canyoning.org.au/store/p/caving-wombat>.



Henry deep in the long-overdue survey of Vandal Cave in the Junee-Florentine - Photo by Ciara Smart



President's Report



A very happy caver peering through the roof of Skull Holes in Kelly Hill Main Cave (K1), Kangaroo Island, SA. Photo by Megan Pryke.

Another quarter brings another wonderful issue of *Caves Australia*. I hope you've all been out on some great adventures. It's been a productive few months for me: a conference in Melbourne, a scientific expedition to the Nullarbor, mapping and research work on Kangaroo Island – and, somewhere in between, I also began a PhD.

The Citizen Science Conference held in Melbourne in October was a great success, with strong representation from many parts of the ASF. Valuable knowledge was shared, new contacts were made, and we came away with excellent ideas to support the ongoing development of our new Science Commission. Rather than go into detail here, I encourage you to read Clare's report in this issue (page 09).

I would also like to extend a heartfelt thank you to Courtney McClymont (WASG) for her contribution to the Executive. Courtney will soon be returning to the United States, and we will miss her candour, experience, and the wealth of professional insight she has brought to the Federation. We are deeply grateful for all she has given.

Our Nullarbor National Heritage Listing consultant, Anne McConnell, is on her way back from a successful engagement trip to the region. She met with numerous stakeholders, held many meetings, and we look forward to receiving her detailed report once she is back at a proper desk.

Most of you will now have seen the recent communication regarding upcoming access changes in parts of the Western Australian Nullarbor. I strongly encourage everyone to read the letters that have been circulated. These matters will be discussed further at the ASF Council Meeting in January 2026.

Speaking of the Council Meeting, several vacancies will be opening across the Executive and our Commissions. I encourage anyone with an interest to get in touch. It's not as daunting as it might seem, and the Federation benefits greatly from fresh perspectives, expertise, and enthusiasm. It's also a genuinely enjoyable experience – and for those who can't talk too much caving at home, it's the perfect outlet.

The ASF has also formalised a Working Group on Aboriginal Engagement. Its purpose is to strengthen and deepen our relationships with the Traditional Owners of the Country we explore. If you would like to participate in this important work, please reach out.

For expressions of interest in any roles or groups mentioned above, please contact:

asf.caves.info@gmail.com

I hope you are all well, well-caved, and looking forward to the upcoming holiday break. Thank you for all your hard work within your clubs and across the wider community. I look forward to catching up with many of you in the next issue of *Caves Australia* or at the Council Meeting in January.

As this is the final issue for 2025, I want to acknowledge and celebrate the many achievements of the year. Here's to a well-earned rest, time with family, friends, and your caving family.

Cheers to a fantastic year ahead. See you underground in 2026!

Andrew Stempel

The ASF needs you!

Janice March



AI created image

The ASF is a volunteer-run organisation of around 1000 members and apart from our 26 clubs Australia wide, we have many different far reaching commissions which are the ASF's activity centres. These all need fresh blood from time to time and the commissioners don't want to keep doing their jobs forever.

The ASF is currently looking for quite a few members to step up and offer their time and skills in various areas:

- Karst Conservation Fund (KCF) Commissioner
- KCF fundraiser
- KCF media person
- Safety, Leadership and Risk Management Commissioner
- Understudy for OzKarst cave and karst information database system maintenance and development
- Understudy for Publications Commissioner who oversees *The Cricket*, *Caves Australia*, and book sales
- Understudy for the Australian Cave Rescue Commissioner
- Understudy for the Conservation Commissioner

Executive Vice Presidents – Four are due for re-election or replacement at the upcoming council meeting on January 11, 2026.

Please contact someone from the Commission or the ASF Executive for a position description if you are interested in having a more active role in the ASF. Do it now! Email: asf.caves.info@gmail.com

Or go to our Volunteer Now form

<https://caves.org.au/volunteer-now/>

ASF members survey

ASF Member Satisfaction Survey – Have Your Say!

The ASF Executive wants to hear from you.

Tell us how well the ASF is fulfilling its purpose, what's working, and where we can improve. Your voice matters—thank you for taking the time to respond. Your feedback helps strengthen the entire caving community!!

https://docs.google.com/forms/d/e/1FAIpQLSe3VY0bU4nhmIC_N_LYtAvd-VpS7gKXHdlfEAdjBBrqweHgAQ/viewform

Friends of ASF

Janice March



"Friends of ASF" is a way of supporting the Australian caving community and learning more about what cavers are doing around the nation.

"Friends of ASF" are likely to be non-cavers (most cavers join their local club), outdoorsy people from all walks of life, could be former cavers or potential new cavers. They might be from overseas or university academics interested in caves and caving in Australia.

Do you know someone who would love to follow the stories of those at the exploratory front line? Well now they can subscribe to *Caves Australia* and receive digital updates via *the Cricket*.

Subscribe now on <https://caves.org.au/membership/>
Pay \$20 annual subscription fees. Receive regular ASF newsletters and magazines.

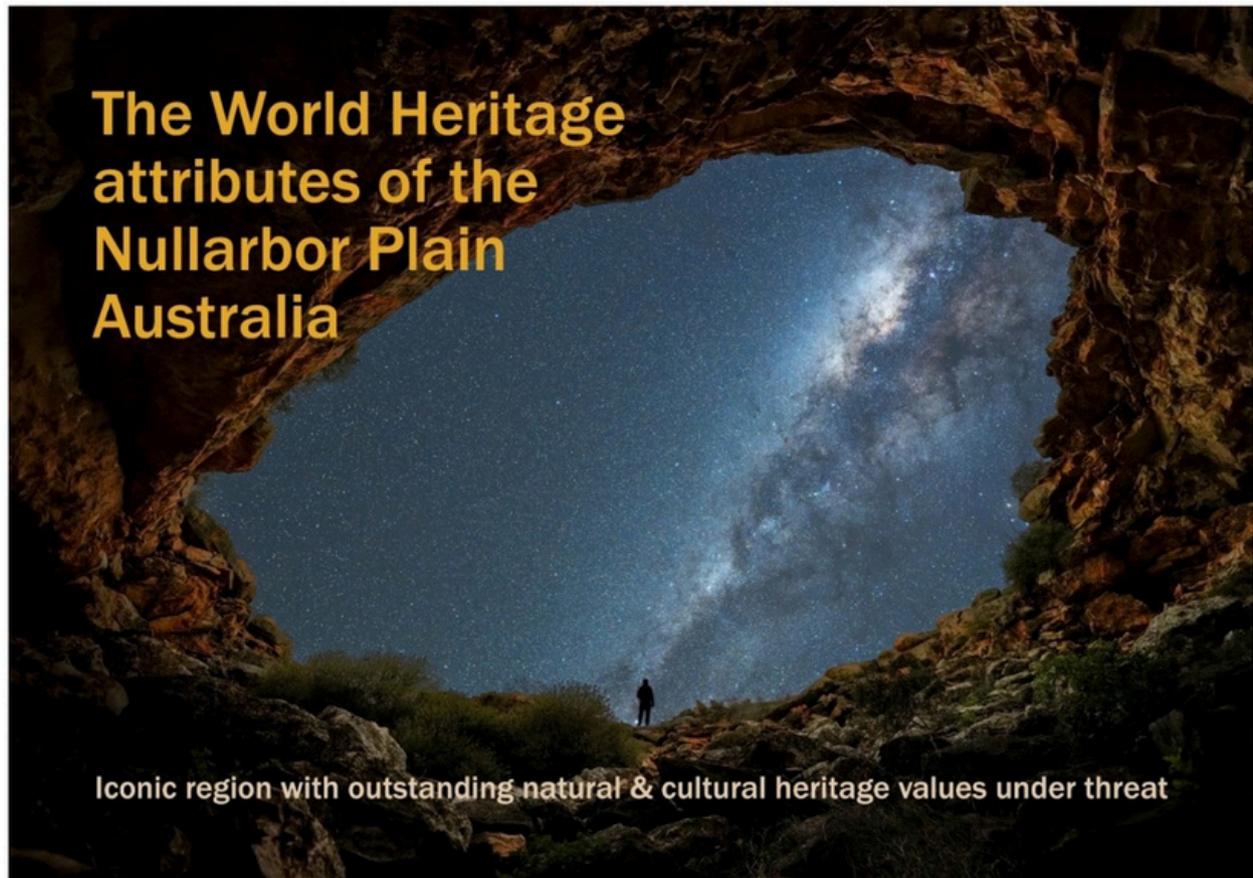
Keep abreast of ASF activities and conservation campaigns

Note: Friends of ASF are not club members and will not have insurance to participate actively in caving or ASF face-to-face activities.

Please forward the link and invite your contacts to join and support the ASF.

NEW NULLARBOR BOOK PUBLISHED

Stefan Eberhard



Recently published, this spectacular new book features 96 pages of stunning Nullarbor images and informative text.

The purpose of this book is to draw attention to the World Heritage attributes of Australia's iconic Nullarbor Plain.

This book describes how the Nullarbor and its extraordinary cave systems meet all four of UNESCO's natural heritage criteria for Outstanding Universal Value.

The intention of this book is to raise public awareness and stimulate debate on the path to having World Heritage values fully canvassed and a nomination put forward by the Australian government. Such a nomination is long overdue.

This book comes now because the Nullarbor Plain in Western Australia is urgently threatened by industrialization. Copies of the book have been widely circulated to politicians, government departments and relevant organisations in Australia and internationally.

Co-published by Save The Nullarbor and the Bob Brown Foundation. Authored by Dr Stefan Eberhard and Geoff Law with additional contributions from Nullarbor expert scientists and photographers. The descriptive text is easy to read and informative, and supported by key references at the end of each chapter.

Soft cover, A4 landscape, 96 pages, 82 colour photos, 8 figures

ISBN: 978-1-7641404-1-6 (print)

Published 30 June 2025

RRP \$75.00

All book sale proceeds go towards offsetting the initial production, printing and distribution costs.

This limited first edition is available only while stocks last and includes free standard postage within Australia. For express and international postage costs enquire.

Order online at: www.savethenullarbor.org

Australian Citizen Science Association Conference, Melbourne. Oct 13-16, 2025

Clare Buswell, Conservation Commissioner



This conference came across the radar sometime in February 2025. My own interest lay around promoting the work of ASF members within the context of its 70 years of exploration and documentation of Australia's karst. Discussions with the newly formed ASF Science Commission Chair, Sue White and the KCF Director, Nick White, pushed the idea into the three of us presenting a panel on the citizen science of cavers. The ASF President came on board to promote the recent discoveries on the Nullarbor. The ASF funded three attendees, Clare Buswell, Chair Conservation Commission, Sue White, Chair of the Science Commission, Nick White, Director of the KCF, with the ASF President Andrew Stempel paying his own way. It was thus a high-powered delegation from the ASF. Our group presented four papers.

Citizen science in Australia concentrates on the biodiversity of what I call the six 'fs': fur, feathers, forest, frogs, fish and fungi. From that point of view, this conference did not disappoint. It had all of that, as well as talks from mangroves, to platypus, to invasive plants and algae.

Sue White's presentation addressed the aspects of geology and geomorphology that comprises karst landscapes and how speleological citizen science is fundamentally important for karst research and knowledge.

Nick White showcased the work of cavers on the Nullarbor, paying particular attention to the 20 years of exploration and documentation by the Victorian Speleological Association. These expeditions located some 3500 new caves, blowholes and rock holes. Nick's talk emphasised that the data collected showed that the blowholes occurred in an east-west band, with extinct megafauna being discovered in a number of caves and the many cultural sites located showed indigenous use of the Plain over extended time periods.

Clare Buswell highlighted the importance of financial support for multi-disciplinary citizen science studies of the caves and karst of the western end of Kangaroo Island. Grant funding of approximately \$85,000.00, including seed funding from the Karst Conservation Fund, was made available to the South Australian Speleological Council Friends of Parks and Nature group. Such funding is very rare in the context of speleology in Australia. For this project it enabled the discovery of 167 new caves, the finding of new species of sub-terranean vertebrate and invertebrate fauna, increased our knowledge of the wallaby skin trade that supported Kangaroo Islanders till after WWII, resulted in the creation of a visitor's guide to the geology of the island and much upskilling of members of the project.

Andrew Stempel similarly expounded on the links between exploration and discovery by speleologists and scientists. Again, using the Nullarbor as an example, Andrew showed how collaborative expeditions can aid in the creation of new knowledge by just looking at a bunch of mummified critters in a chamber in a cave.

The conference itself had a strong emphasis on education, the involvement of schools and the use of the grey nomad cohort in citizen science projects across the country. As a target group for ASF memberships, the latter is far easier for us to approach and involve than school groups. This is simply because governments have decided that caving, like horse riding, is a very high-risk activity and is thus not promoted within school activities or curriculums. However, even within those contexts, the use of dedicated apps to record what we find, which added to existing data bases in real time would mean a quicker route into the scientific domain. Such apps would increase the relevance of our work to the wider community.

The conference, with around 115 papers presented and 300 or so participants, presented opportunities to network. This we did, finding several endangered species: a geomorphologist, a taxonomist with spare money, and a European view. The latter is important considering the recent declaration of the International Day of Caves and for the possibility that it may open access to IUCN money. Importantly, we made contact with the Citizen Science Podcast journalists, the Earthwatch organisation - funded by BHP, and others who in past lives had connections with caving clubs or members thereof. One person had explored the caves in the Tindale area in the Northern Territory, almost coming to grief with a flooding event. Kelly Sheldrake from Conservation Council WA and a WASG member, presented on urban bats. I have previously been in contact with her re the WGEH, and with the Conservation Council itself re the ASF and its work.

The other reason for my attendance was to find ways to push the ASF's work in government policy settings and from this point of view I was pleased to go to the session on the use of UNEP's 17 sustainable developments goals. Within the local setting, these goals are important, as the Australian government has signed up to implement them. This gives the ASF another avenue to pressure the current deliberations on the EPBC Act to consider, for example, reserving subterranean strata/um of land, in much the same way we reserve parks etc. to protect habitat. This is not as silly as it sounds, as caves do not have visas when they may have an entrance on National Park land, but then go off-piste and stay with the neighbour. By reserving the subterranean strata, it could be possible to prevent dolines being used as rubbish tips and cave waters being overused in pivot irrigation schemes, for example.

Returning to the UNEP's goals, the speaker from Earthwatch used these goals to prioritise what citizen science programmes it develops and runs. The lesson here for the ASF, if we are to protect what we study, explore and document, is to reach out past our members and thus be relevant and engaging. Gathering data, cave surveying, fauna counts, surface exploration etc. is our bread and butter, but we must make this more user friendly to the outside world and ask ourselves about its relevance to those in the community in which we work. This is important in both recruiting more members, getting our message out, and getting the underground included in the currently inadequate biodiversity paradigm that ignores karst and all it offers, unless of course it contains one of the six fs.

Our posters, one on what the ASF is and does, the other on the threats to the Nullarbor, (WGEH, mining, overuse by agricultural activities) and the Cave Animal of the Year award poster, prompted a lot of interest, with associated merchandise moving reasonably well. It is my firm belief that we must continue this programme as it fits with the bio-diversity crowd, whereas rocks and speleothems simply don't cut it, (but I have plans to change that). Cave Animal of the Year is an important avenue to promote caves and karst, and we should not lose it.

The Australian Citizen Science Association runs a podcast, <https://citizenscienceshow.com/> and both Andrew Stempel and Clare Buswell were either interviewed at the conference or followed up shortly after it. The podcasts are available on Spotify at:

<https://open.spotify.com/episode/1wXZH1MZ7EpJpJl7pBcn1>

↓

I would like to thank Sue and Nick White for providing accommodation, and logistics.

Importantly, I thank my co-presenters for working so hard on presentations and posters. I know that we all spent a lot of time and energy on the work we presented. Finally, I thank the ASF for funding our attendance at this conference so we could promote the activities of our members and showcase our efforts in protecting Australia's karst and its caves.



Bunda Cliffs - Photo by Ken Boland

CAVE RESCUE VICTORIA INC.

Dalleys Sinkhole at Murrindal Cave Rescue

Exercise 11th of October 2025

Nadine Muresan



Group photo after the practice rescue - Photo by Edmund Muresan

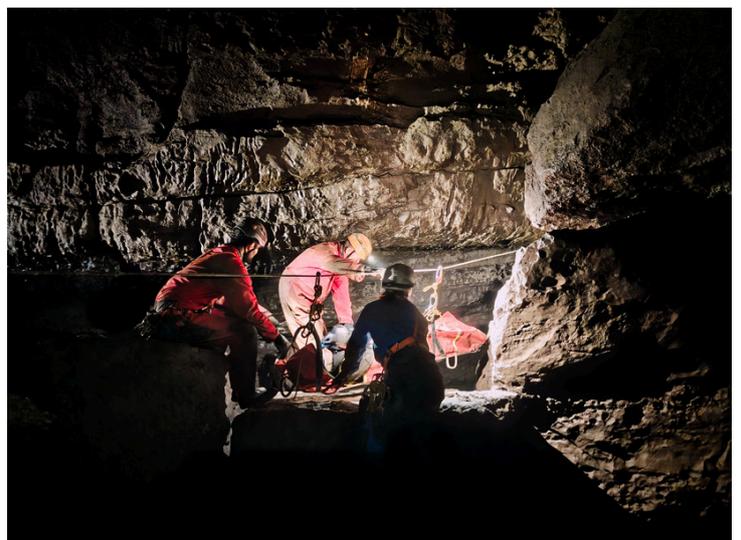
On 11 October 2025, Cave Rescue Victoria conducted a rescue training exercise at Dalleys Sinkhole at Murrindal Cave (3M-35) in the Buchan region of Victoria. The cave, located on private property within the Murrindal (M) Area, Pyramids Subarea, provided an ideal environment for a full-day session focused on skill development and technical refinement. A total of 23 participants attended the exercise.

The event was led by Bogdan Muresan, who was the team leader. It was a great opportunity to allow both new and experienced members to gain valuable hands-on experience. We had a strong focus on strengthening our technical abilities and also getting some members to step up into leadership roles.

There were four teams, each given specific mission cards outlining their objectives and techniques required in their designated areas. Tasks included operating ziplines, z-drags, counterbalance systems, and conducting walking extractions.



Mayer setting up her system - Photo by Nadine Muresan



Moving the casualty using a zipline - Photo by Nadine Muresan

Overall Statistics

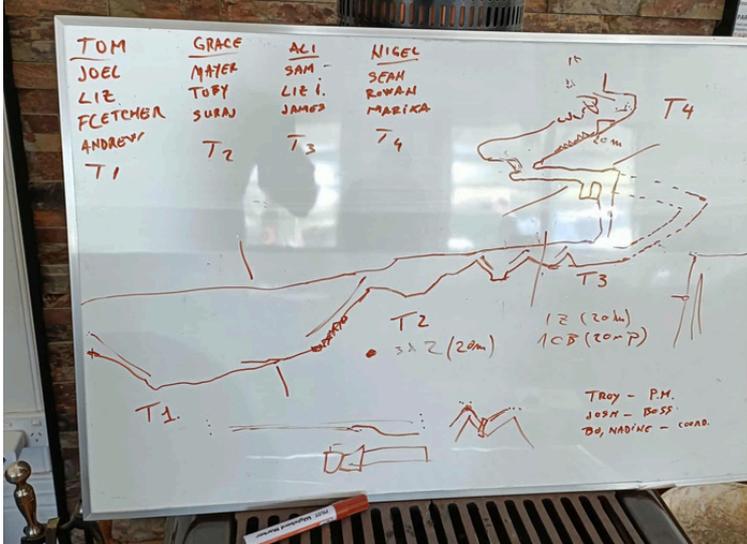
- Number of participants: 23
- Number of people in the cave: 21
- Approximate evacuation distance: 170 m
- Time in cave: 7 hours
- Total exercise duration: 8 hours 45 minutes
- Evacuation time: 2 hours 45 minutes
- Number of rigged obstacles: 7



Grace Mason being hauled using a counterweight system - Photo by Nadine Muresan

The training concluded with a thorough debrief (at the pub), during which teams highlighted strengths and identified opportunities for improvement. One immediate observation was the need for additional communication devices within the cave. We noticed that while communication between the surface and underground teams was strong during setup, it significantly decreased once the stretcher began moving, an area we will need to improve on in the future.

Thank you to everyone involved in the Cave Rescue Victoria team. This operation reinforces a key principle: only by practising and learning from our faults can we continue to advance and keep people safe.



Rough sketch of the layout of the cave and the teams - Photo by Bogdan Muresan



Grace has been brought safely to the surface - Photo by Edmund Muresan



Time keeping and running sheet of exercise - Photo by Bogdan Muresan

PLANNING AN INTERSTATE TRIP

YARRANGOBILLY, 26 – 29 SEPTEMBER 2025

Wayne Revell



Jersey - Photo by Wayne Revell

"If you want to come up to New South Wales, we'd be happy to host you." So started a discussion with Cindy at the 33rd ASF Conference, Caving in the Moonlight, in Buchan. Cindy Li is a sociable, energetic, and very capable caver from the Highland Caving Group, HCG (she is also a member of Sydney University Speleological Society, SUSS).

At the end of 2020, Tom Aberdeen had put in a lot of work to plan a Yarrangobilly trip, but post-COVID border closures and restrictions on cave access in NSW meant this plan was aborted. In recent years, VSA has only put on trips in Victoria and Tasmania, so it had been on my radar to lead a VSA trip to NSW. But, how to get started?

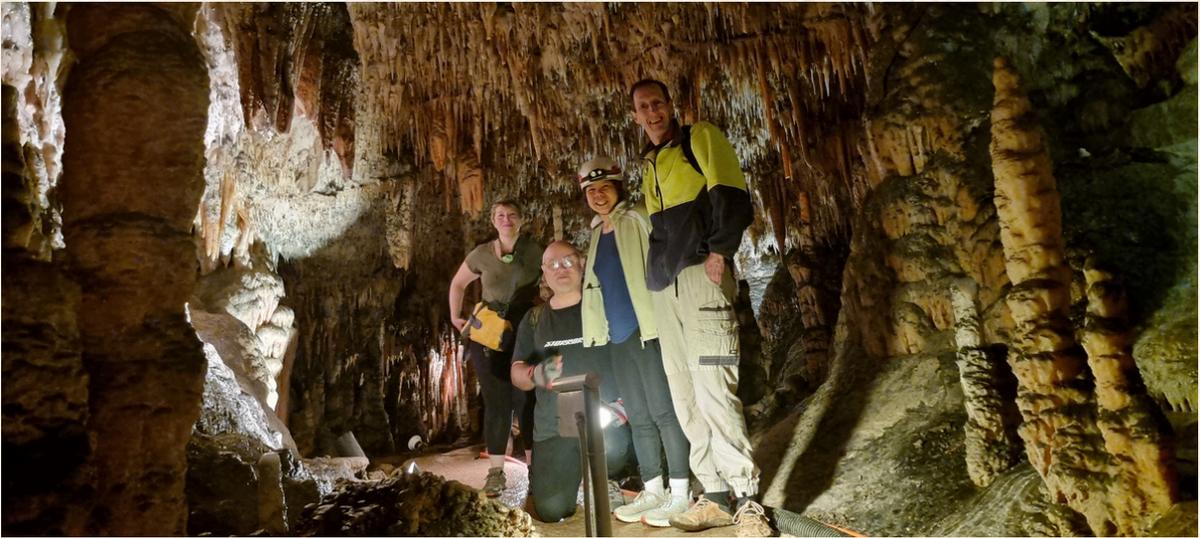
We'd collaborated with Lachlan Bailey and Brittany Meers of National University Caving Club, NUCC, on a few trips in the past, and I knew that they often went to Yagby (in fact, Tom Aberdeen originally corresponded with Lachlan when planning his 2020 trip). So, I set up an online chat with Cindy (HCG), Philip Fleming (HCG), Brittany (NUCC), and Lachlan (NUCC) - the "planning group".

Tom had sent me a lot of the planning work he'd done with Lachlan for the 2020 Yagby trip. I used this material as a starting point, but I still had plenty of questions. I posted these to the "planning group" online chat. Questions about cave access, accommodation, best caves to do. I even roped in Brittany to lead a VSA trip through Janus! Together we planned out a multi-club trip to Yagby.

The group suggested a bunch of caves to put on my permit: caves that are 'classic' Yagby - Eagle's Nest East Deep Creek and Restoration; caves that are nice half-day introductions - Old Inn, Coppermine and Mill Creek Swallet; and caves for a cruisy day after a weekend of hard caving - Castle and Harrie Wood. They also suggested I submit a permit for Janus, in the knowledge that I'd be unlikely to get approval (it's a popular cave with strict limits on access), however, they thought being an interstate club, we might have a chance at scoring this trip.

Permit applications must be submitted to the National Parks and Wildlife Service at least 2 weeks prior to a trip. I submitted the VSA permit just over 5 weeks before our trip (call me eager!). The permit is restricted to ten caves per permit, and one permit per club per trip (NUCC and HCG submitted their own permits). You can note on the permit if you'd like multiple entries for a particular cave (each entry must be on a separate day). The VSA listed: Y1/Y2 Eagles Nest (2 entries), Y5 Upper East Deep Creek (2 entries), Y7 North Deep Creek, Y10 Old Inn, Y12 Coppermine, Y26 Harrie Wood, Y29 Mill Creek Swallet, Y31 Castle, Y50 Restoration, and Y58 Janus Cave.

The reply came back three weeks later, and we had scored an entry into Janus! There were a few odd things on the permit, so I went back and negotiated with National Parks and Wildlife Service. These were quickly cleared up and the VSA had a good list of caves for our trip.



Jersey - Photo by Aranxta Gea Parreno

The "planning group" advised me that it is usual for clubs to compare permits once they get to Yagby, and to mix and match cave entries within the groups. So within the three clubs, we had a good mix of caves.

Lachlan sent me the relevant GPS coordinates for the caves, and on the trip, Philip provided detailed instructions on how to get to each of them.

In the end, and despite not being a public holiday in New South Wales (that was the following week), we had a lot of people turn up. HCG had 10 people, NUCC also had 10 people, VSA had 8 people, and SUSS, sneaking in at the 11th hour, had 2 people.

The next major decision was accommodation. The "planning group" advised me that it is common for cavers to stay at Cotterill's Cottage, with its main advantages are that it's free, and it's near the caves. The big drawback for us was that there are no showers! (We in the VSA are a bit spoiled by access to Homeleigh in Buchan and hot showers). So, the VSA looked around for accommodation. The other clubs all elected to stay in Cotterill's Cottage.

Ian McKay, who eventually had to bail on the trip due to work commitments, found and booked a nice little house in the town of Talbingo, 20 minutes from Yagby. It could house 10 and was just big enough for the VSA group coming on the trip.

A lovely little house, with a tight kitchen, two toilets and one shower, but we managed with bunk beds, sofa-beds, and a mattress on the floor. The house had an additional surprise of a couple of peacocks just down the road.

The VSA rocked up at our 'peacock' house on Thursday afternoon. On Friday morning we went up to Cotterill's Cottage to meet HCG, who'd arrived on Wednesday.

With directions from Philip, the VSA, with a group of 8, went out to Coppermine Cave in the morning, and then Old Inn Cave in the afternoon.

NUCC arrived over Thursday night/ Friday morning. This was a day of hard negotiations between the trip leaders, with everyone wanting to do the popular Janus and Eagles Nest caves. Eventually a compromise was reached, and the groups mixed – Janus cave, with 4 from VSA and 2 from NUCC, making a group of 6; Eagles Nest with 2 from VSA and 6 from HCG, making a group of 8; and East Deep Creek and Restoration with 2 from VSA and 6 from HCG, making a final group of 8. NUCC also sent groups into North Deep Creek, Old Inn, and Helictite Hole.



Eagle's Nest - Photo by Zenon Platritis



Coppermine - Photo by Wayne Revell

Come Sunday, all in the VSA but Liz were a little tired, so we dropped Liz off at Cotterill's Cottage to hook onto a group going into Eagles Nest, while the rest of the VSA took an "easy" day and went down to the show cave precinct. I say "easy" in inverted commas, as we walked through Castle Cave, Jersey Cave, South Glory Hole, and Harrie Wood, finally ending up in the Thermal Pool.

And so ended a fantastic trip to the caves of New South Wales and Yarrangobilly. A big thanks to Cindy Li for inspiring me to get off my ass and organise the trip; to Lachlan Bailey and Philip Fleming for helping me plan the trip and providing lots of helpful advice; to Zee Platritis for leading the Eagles Nest trip; and to Brittany Meers for all the advice and for leading the trip through Janus.

Here are some take-aways if you are planning a trip to Yarrangobilly:

- Caving in Yarrangobilly requires permits for every cave. The permit application is submitted at least 2 weeks before to Paul "Bernie" Sims of NSW National Parks and Wildlife Service.
- Each permit can have up to 10 caves listed, though you can request multiple entries for a particular cave.
- Only 1 permit per club per trip.
- If staying at Cotterill's Cottage, note that on your permit and request the keys from National Parks and Wildlife Service.
- Talk with the other clubs coming to work out who should put what on whose permit.
- When you get your approval back for your permit, question and negotiate with National Parks and Wildlife Service, as sometimes there are admin errors.
- For each cave there is a limit on the number of entries for the year. For this reason, directly after your trip, it's important to let National Parks and Wildlife Services know which caves on your permit you didn't do. This free's up the entries on a cave for another club.
- The permit includes a vehicle permit to the cave areas, so there's no need to get a separate Parks Pass.
- Organise to pick up the physical copies of the permits and the keys to Cotterill's Cottage and the caves from the Yarrangobilly Caves Visitor Centre during their business hours.
- Keep the keys for the caves at Cotterill's Cottage with a log to note who has what keys. This also helps to track what keys to return upon departure.
- Be flexible when negotiating with other clubs. Meet up each morning and see what each group wants to do. Some of your group may go into a cave with another club.
- If you are around the show caves precinct area, call in and have a chat with the staff. You may be able to sweet-talk access to one of the show caves for free. The VSA managed to get a private tour of Jersey Cave. We went in between the scheduled tour times, turning the lights on and off as we went through.
- Complete the NSW National Parks and Wildlife Service Cave Trip Report and send it back to National Parks and Wildlife Service within two weeks of your trip. It's a simple form (mostly Yes/No questions).

A TRIP TO EASTER AND MOONDYNE CAVES

Daniel Lansom



The Bird - my favourite! AU-014 - Photo by Daniel Lansom

It was another wet and wintery weekend for the South West. Mother nature was continuing to drop heavy falls and squally storms between the capes, making it the perfect weather for us to get underground and visit some amazing caves!

We set off early (around 0730) from the WASG hut and made our way down to Jewel Cave in Augusta. Hannah had collected the keys the day before, so we were able to park up and get going well before the tourists arrived for the day. The entrance of AU-014 Easter cave is located a few hundred metres from AU-013 Jewel Cave and is shrouded by tall Karri trees. We organised our gear in the car park and set off into the bush.

On arrival at the cave entrance, I clambered down the slope to the gate. With key in hand, I reached in and attempted to unlock the lock, but it wouldn't budge. I tried all sorts of ways with no luck. I managed to pop my head low enough to have a look at the lock in which I saw that the numbers on the key did not match those on the lock... Bugger! Funny enough, the previous trip into the cave in late 2024 suffered from the same fate...

With no time to waste, we gave Alysha from the Capes Foundation a quick call and she was on her way to us with the correct key within minutes. We figured that Alysha would be at least 30 minutes, so I took the time to rig the rope at the entrance before we all headed back to Jewel Cave to keep warm and dry.

I was curious as to which key I had been given, and I had a sneaking suspicion that it was actually for Moondyne Cave. As we were planning on visiting Moondyne on Sunday, I took a brisk stroll out to the entrance to see if the key opened the lock. Success!

On my return I met with Alysha who gave us the correct key for Easter, and we were once again on our merry way.

With the gate now open, we each dropped down the tight solution pipe and into the entrance chamber before coming off rope and setting our harnesses aside. There was a god-awful stench of decay at the bottom of the pipe, but whatever it was, we couldn't find the source.



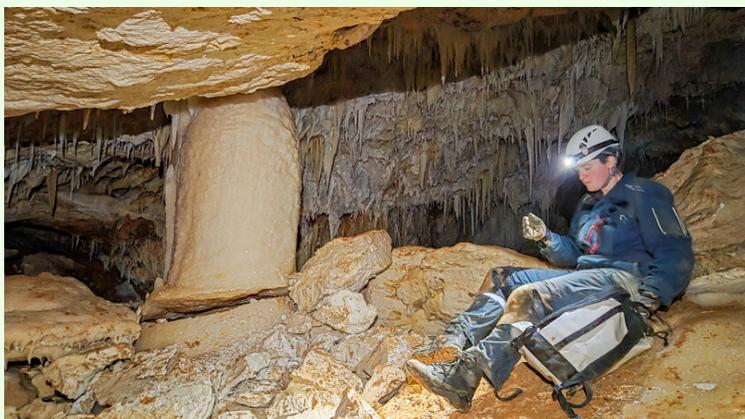
Courtney descends into Easter AU-014 - Photo by Daniel Lansom



Ascending the pipe AU-014 - Photo by Daniel Lansom

From the entrance chamber we began our full day journey. Following the track, we wound our way down to the lowest level and through the 1960's dig site that broke through into the rest of the cave. We passed the now dry cave pearls that also began forming at that time. We committed to the 'Gravel Grovel', a short crawl that is lined with pea gravel, and then continued to the 'Y Junction'.

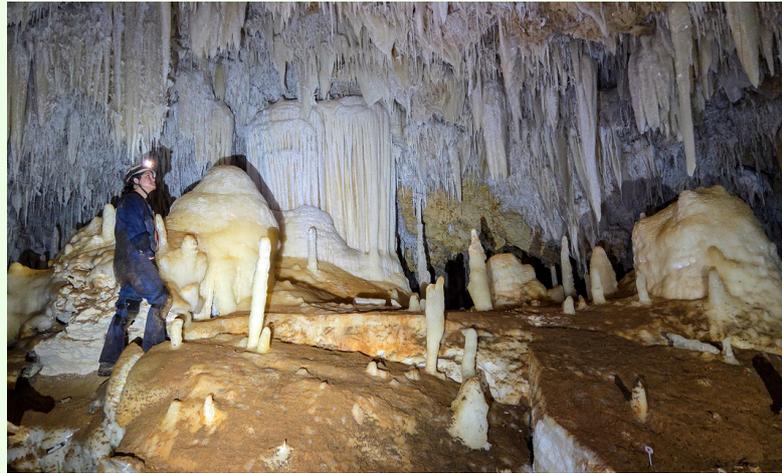
Once at the 'Y Junction', there is the option of splitting off into 2 separate tourist routes. One route heads left towards 'Tiffany's' and the other one heads right to the 'Gondalin Chamber'. For this trip we were heading left towards 'Tiffany's' and then onwards a short distance more to the 'Silver Bullet' where we would do some track marking.



Afternoon tea time at the Silver Bullet AU-014 - Photo by Daniel Lansom

The entire cave is littered with pristine speleothems, each chamber looking completely different to the previous. We continued our journey towards 'The Beach' and the 'First Duck'. In its heyday, the cave used to be very wet and would require cavers to negotiate this long, wet crawl by roof sniffing! Sadly, those days are long gone, and it's now a 30-metre crawl through damp dirt.

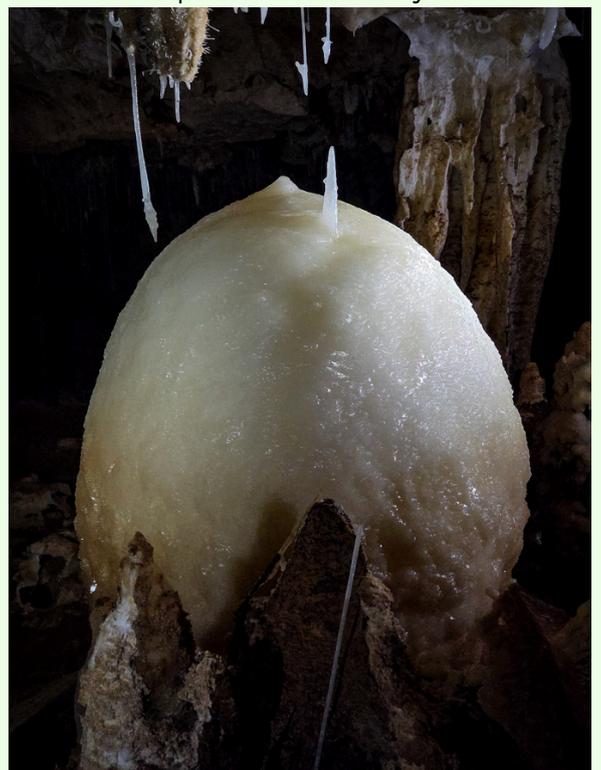
On the other side we enter the 'Motorway' which requires us to meander our way under the 'False Wall Crawl' and into the 'White Chamber'.



Courtney in the White Chamber AU-014 - Photo by Daniel Lansom

Here we paused to retake some comparison photos from the early 1960's. Thankfully nothing much has changed in the area over all years (apart from the headlamps!).

Continuing our journey onwards, we passed 'The Question', 'The Step' the 'Lemon' (or 'Answer') and the 'Bristles' where we paused for an early lunch.



The Lemon (or Answer) AU-014 - Photo by Daniel Lansom

With our stomachs full, we continued our journey onwards passing the 'Lemon Lake' (now dry), the 'Eagles Wing' and my all-time favourite, the 'Bird'.

This was the first area that we needed to install some track marking. We had the goal of track marking a short, but well trogged, distance of the 'CEGSA Extension' which led to some impressive shawls. This only took about 20 minutes to complete before we continued towards 'Tiffanys'.

Peering into 'Tiffanys' is a large, dry pool full to the brim of Dog-tooth Spar. Unfortunately, photos just don't make it look anywhere near as impressive as it is. Like the shop - you look, but don't touch!



Tiffanys AU-014 - Photo by Daniel Lansom

Tiffanys is where the traditional tourist route of the cave ends, as it becomes a lot more friable and the formations begin to disappear. That is, until you reach the 'Silver Bullet', or a large calcite stalactite that has sheared at the base. Our goal was to install track marking to the 'Silver Bullet', which isn't too far from 'Tiffanys'.

To our surprise, the route had already been very well track marked! We added a couple of extra markers to remove potential confusion before commencing our journey back to the entrance.

On our return, we passed by the 'Heligmite Table' which is a large undercut slab of calcite riddled with Heligmites and Helictites.



Heligmite Table AU-014 - Photo by Daniel Lansom

As we were doing very well for time, we decided to pay a quick visit to the 'Epstein Sculpture' and 'Straw Forest' just past the Y Junction. This chamber had been the site of previous restorative conservation works that required removal of mud from speleothems. The straws in this chamber were exquisite and well worth the detour.



Shower of Straws AU-014 - Photo by Daniel Lansom

Following a late afternoon tea, we began our ascent back to the entrance chamber and out the cave. One by one we climbed the rope with Courtney being last. Just as she was climbing through the gate, her camera popped out of her top pocket and descended back into the depths of the cave... Bugger!

With Courtney out, I quickly descended back into the cave and commenced a search for the device. To find the camera, I had to try and think like a camera and wonder where I would land after a 15-metre fall. Thankfully the camera was bright red, so I spotted it very easily.

Remember that stench that was noted earlier in the day? Well, I located the source of the smell... a poor frog who had met its demise by falling through the tiny hole in the gate. Poor fella!

With the rope pulled and the gate locked we returned to the cars at around 6:00pm. It was a solid day of caving if I do say so myself.



More Straws AU-014 - Photo by Daniel Lansom

On Sunday the same group travelled back to Jewel Cave to meet up with Alysha (from Capes Foundation) and visit AU-011 Moondyne Cave. The goal for this trip was to transport a load of rainwater drums into the cave to allow for future restorative conservation works within the cave.

We met at the cave for 0900 and commenced filling the 9 collapsible drums. Once filled we had to carry the drums to the entrance of the cave. This took around half an hour; however, it felt like much longer due to the heavy weight of the drums.

Once at the entrance, I set up a simple lowering system to slowly lower the drums in. We intended on placing the drums in strategic places in the 'dark side' of the cave which is virtually (and painfully) the furthest extents of the cave.



Mel & Courtney carting water through the rain - Photo by Daniel Lansom

Lowering the water into AU-011 - Photo by Daniel Lansom

For a well-deserved rest after carrying the drums to the cave, we decided to take a short detour and have a look at the 'light side' of the cave. These chambers are not as low as the dark side, and the limestone does look apparently younger. At the back of the main chamber there is a short crawl that leads through to the 'Snowflake Chamber'. This chamber is chock full of formation that has been delicately dusted in calcite raft.

With the air feeling a little heavy, we took the opportunity to test the CO2 levels, and the device went berserk! It had triggered just over the set limit, and it was reassuring to know that we weren't just unfit...



Snowflake Chamber AU-011 - Photo by Daniel Lansom

As we were returning to the drums we heard a bonk, bonk, bonk-bonk-bonk. One of the drums had rolled off the path and into the abyss – location unknown. We searched the lower chamber for about 15 minutes and nearly gave up hope, but Mel then spied it!

With drums in hand, we continued ferrying deeper into the cave. Lucky for us, Moondyne Cave is an ex-tourist cave and still has all of its original infrastructure installed. This meant that getting the drums through the cave wasn't particularly hard.

We moved 2 drums to the very back of the cave where some mud-covered flowstone was located, and the rest of the drums were placed along an old offshoot that is now closed to foot traffic. While in the area we removed the old track-marking and fishing line.

With the drums in place and the work completed we made our way to the Jewel Cave café for a well-deserved coffee before commencing the return journey to Perth.



The Light side AU-011 - Photo by Daniel Lansom

Advances in Caving Equipment Over a Lifetime

Article and Images by Garry K. Smith

Over the last 60 years there have been huge advances in caving equipment. As a Scout, then Venturer in the 60s, I was caving with what we now consider as primitive equipment and other gear like helmets were generally considered unnecessary.

Caving without helmets or gloves was the norm, torches were hand held incandescent globe torches and hand lines were 25 mm, three strand sisal rope and an abseil device was a single carabiner. So, let's look more closely at the individual bits of caving gear and how technology and safety has improved over the years.

One can always argue that specific pieces of equipment were available in Australia or overseas before the time periods mentioned here, however this article covers caving gear used by myself and others around me at the time.

Also covered is a brief history behind the development of some equipment which we now take for granted.

Lighting

In the early 1960s hand held incandescent globe torches powered by 2 x D cell batteries were common and if one had plenty of money, then a huge Eveready Dolphin torch with a 6 V lantern battery would put the user into the serious caver category (Fig 1). If one was really affluent, they could lash out and purchase a carbide lamp. Nothing like warming the backside of the person you were following closely behind in a squeeze.

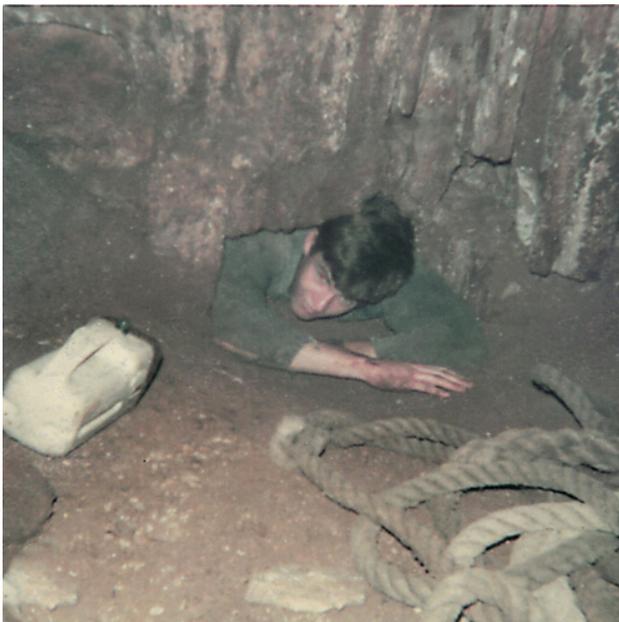


Fig 1. Caving in the 1960s with Eveready Dolphin torch, 25 mm sisal rope and no helmet.

Then along came the small head torches with an incandescent globe and AA battery pack attached to the helmet. Head mounted torches freed up the hands to get around the cave more safely. They were lightweight but tended to run out of power after a couple of hours. One could tell the battery was fading as the light became progressively dimmer and before long the caver was having trouble seeing a metre or so of passage. One tended to keep replacing the batteries as though they were bullets being inserted into an automatic rifle magazine. Certainly it was good to be close to another caver with a torch or you had to replace the batteries by feel in total darkness. Possessing a spare torch was rare. Even with new batteries it was hard to see much in a large chamber, however this could be overcome by having a group of people shining their torches in the same direction.

The Oldham miner's safety lamp with a heavy wet cell lead acid battery attached to a solid leather waist belt and a thick cable connecting the battery to a headlamp clipped on the helmet (Figs 2A and 10), became common in the Australian mining industry from around the early 1950s. They were very expensive but I lashed out and purchased one around 1970. It was a huge leap forward in technology for me, as the miners light with its large battery lasted far longer than the AA battery pack headtorches. The setup was durable and the light remained bright on high beam for more than 8 hours and at least 20 hours on low beam. The headpiece contained two separate globes of different brightness and beam angle. This had a big advantage when illuminating something close and then being able to change to a bright narrow beam for longer distances. There were however a number of drawbacks. The thick cable would inevitably get caught on protruding rocks, especially in squeezes. The battery was heavy, cumbersome and particularly annoying in squeezes.

Instead of purchasing new lead acid batteries when they failed, cavers like myself made what were called sewer light battery holders out of PVC drainage pipe and fittings (Fig 2B). These were designed for three D-size alkaline batteries and were much lighter than the original miners lead acid battery. There was still the problem with the cord getting caught on objects.

The NiCad (nickel cadmium) rechargeable batteries while providing good performance characteristics suffer from a 'memory effect' that required users to discharge them completely before recharging to retain their full capacity. Also cadmium is a toxic heavy metal that poses environmental and health risks, hence these batteries have been largely superseded by the NiMH rechargeable batteries.

During the late 2000s and 2010s rechargeable lithium-ion (Li-ion) batteries of various sizes began taking a great share of the market as they became more affordable. They are now being used to power a wide range of electrical equipment including caving lights. These batteries have a high energy density and excellent frequent-cycling capability. However, they carry a risk of fire and explosion if damaged, faulty, or charged incorrectly due to the flammable chemicals within their electrolyte.

Batteries for head torches

Battery technology improved with the alkaline non-rechargeable batteries, being superseded by rechargeable nickel cadmium (NiCd) developed in the 1950s, but they didn't get a strong foothold until the late 1980s. Further advancements came with the development of the rechargeable nickel-metal hydride (NiMH) in 1990, followed by the lithium-ion (Li-ion) in 1991. Non-rechargeable alkaline batteries were still available in the 1990s as they are today, however rechargeable batteries work out far cheaper in the long run despite their higher initial cost. The one disadvantage was that many of the rechargeable batteries did not hold much of their charge longer than a few weeks or at most a couple of months. So if charged and left sitting in a cupboard for a week or two they would be flat.

Around 2005-2006 Sanyo developed a low self-discharge NiMH battery they called Eneloop. The current versions of these AA and AAA rechargeable batteries hold up to 90% of their charge after 12 months sitting on the shelf and are reported to be good for 3000 recharges. Eneloop batteries were originally made by Sanyo and later acquired by Panasonic in 2009. These batteries were somewhat revolutionary at the time, solving memory cycling problems suffered by other rechargeable batteries. Other reputable brands are now producing NiMH rechargeable batteries with similar performance statistics. There have however been counterfeits of the Eneloop batteries and other well-regarded brands sold around the world, but they typically fall well short on performance of the genuine products. NiMH are the most common rechargeable battery sold in shops these days.

LED lighting

The big leap forward in lighting technology was when Light Emitting Diode (LED) lighting began replacing the incandescent globe. Oleg Losev had invented the first LED in 1927 which was only used in specialist electronic and laboratory equipment. They were small and compact but did not produce a lot of light. Then in 1962 an American engineer Nick Holonyaks, developed a LED that produced visible light suitable for a wide variety of uses. But they still weren't suitable for torches or general lighting because only red, green and yellow LEDs could be made (Lightbulbs Direct 2025, Torch Depot 2023).

It took several more decades before the invention of the blue-light LED in 1990 by Japanese scientists Isamu Akasaki, Hiroshi Amano and Shuji Nakamura, that created the ability to produce a white LED light. This is because without the full spectrum of light, white light is not possible (UCL 2015, Lightbulbs Direct 2025).

By 2010, LED technology had advanced sufficiently in terms of brightness, robustness, efficiency (longer battery life) and reduced cost, that they started to become common in head torches. By 2015 there were very few incandescent globe headtorches in the outdoor camping stores.

In the caving community there was a rush to get these new technology head torches that provided a brighter light source for many more hours, while still using AA or AAA batteries.

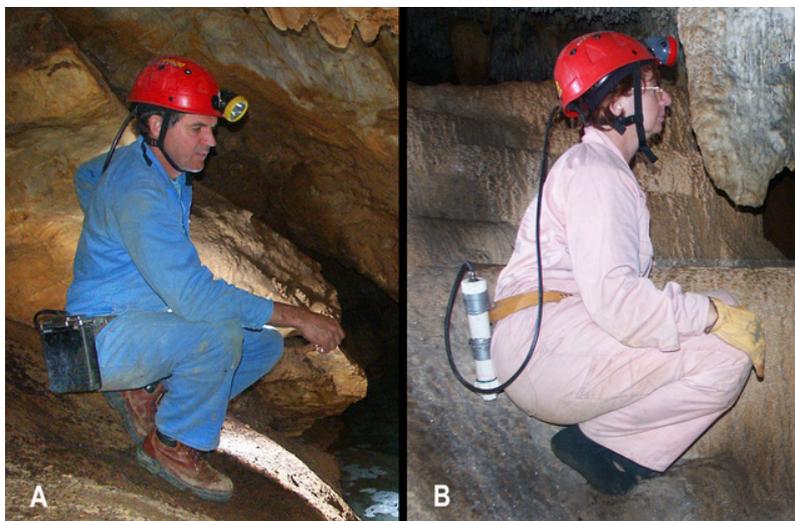


Fig 2. (A). Oldham miners safety lamp, with heavy lead acid battery pack and cable to light on helmet. (B) The lead acid battery has been replaced with a homemade PVC battery hold for D size batteries.

Then came the advances in batteries and development of LED lights which bring us to the modern light weight, high performance head torches which we have today. So let's look more closely at the batteries and LEDs.

However, there was a problem with many of the LED torches that suddenly stopped working without warning when the battery power got low. This could happen at the worst moment as the caver was performing a tricky manoeuvre underground.

Head torch manufacturers did acknowledge that this was an issue and began building in technology that indicated when the batteries were running low on power. For example a flash of the main beam would occur when the battery power was getting low. Other indicators included a small green light on the battery pack that changed to red when the battery charge was low. One disadvantage with this indicator is that the user can't see the colour change as the light is on the battery pack attached to the back of their helmet.

Single Rope Techniques (SRT) gear

Abseiling and prusiking gear in the 1960s was certainly archaic, compared to the equipment available today. Harnesses were commonly made from 12 or 14 mm sisal rope with the two ends spliced together to form a loop that could be placed around the waist and between the cavers' legs (Figs 3 & 4). They were typically called a nappy or sit harness. Later these harnesses were made from seat belt webbing (Fig 6) with the two ends of the tape tied together by a tape knot. A single carabiner at the front held the sisal or webbing loop tight around the waist to form a harness. A disadvantage of this type of harness is that the attachment point is below the person's centre of gravity. Hence when abseiling it was easy to end up hanging upside down, particularly if one had a small backpack on.



Fig 3. 1960s Abseil harness made from 14 mm sisal rope with ends spliced together to form a loop.



Fig 4. Abseiling on a 12 mm sisal rope in 1969 with equipment entailing a sisal rope loop harness, one carabiner, leather strap over the shoulder of a boiler suit to reduce friction burns and a pair of gloves. This is before the time that the piton or cross crab became part of abseiling gear and helmets were rarely seen.

In the early 60s the abseiling rope (made of 12 mm or 14 mm sisal) went through the carabiner and then over the abseiler's shoulder and across their back for extra friction. The friction burns and pressure of the rope running over the abseiler's shoulder was incredible, so many cavers during the 1960s sewed strips of thick leather over extra padding onto their overalls (Fig 4). This extra padding on the shoulder reduced rope burn and trauma to their body. However, it was still excruciatingly painful on a descent over 20 metres. By the late 60s the innovation of using one or sometimes two rock-climbing pitons, clipped into the carabiner, created extra friction on the abseil rope (Fig 5). About the same time the use of 2 carabiners (known as cross crab) method came into vogue (Fig 5). Both these methods meant that lighter people could do away with having the abseil rope go over their shoulder, however larger people still needed the rope over their shoulders and back to maintain control of their descent. When the munter hitch was first introduced as a belay knot some people abseiled using the knot so they didn't have to purchase an extra carabiner or piton (Fig 5).

I now shudder at the thought of the natural fibre sisal ropes made from the Agave Sisalana plant, which we abseiled on during the 1960s. They were either 12 or 14 mm diameter and of a 3-strand twisted (laid) type. When one abseiled on them there was a whirring sound as the bumps of the lay strand whizzed through the carabiner and over the piton.

Abseiling without thick leather gloves was suicidal as the friction through the carabiner, piton and over the shoulder was often not enough to descend in a controlled manner. One had to rely on applying extra friction with the gloved hands to maintain some speed control during descent. Even then many people had rope burns through their thick leather gloves.

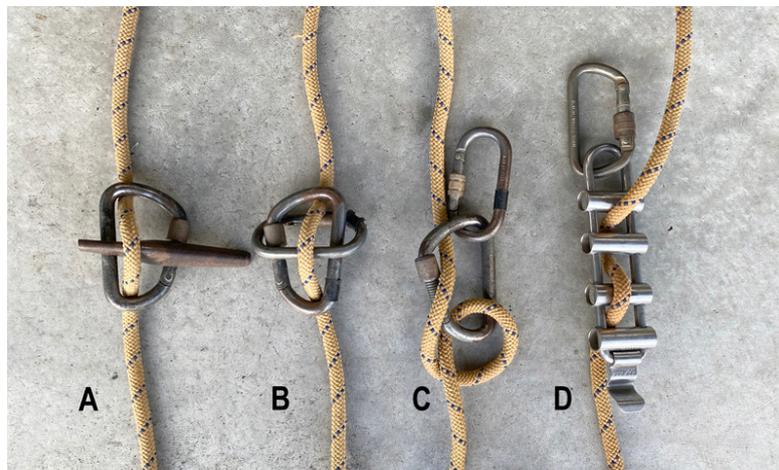


Fig 5. Early abseiling setups. A. Carabiner and piton, B. Cross crab, C. Munter hitch, usually used by abseilers who only had one carabiner, D. Four bar rack.

By the late 70s to mid 80s aluminium 'Figure 8' and 'Whaletail' abseiling devices had become popular in Australia. Figure 8's tended to twist up the kernmantle ropes on long abseils (Fig 6).

Next came abseiling devices like racks (4, 5 or 6 bar) which totally did away with the need to run the trailing end of the abseil rope over the shoulder. This device provided scope to vary the amount of friction on the rope for more controlled descents. However, there were people who preferred to abseil at much faster rates than could be considered safe. Some of the early racks and carabiners were made of aluminium. Abseiling on dirty ropes would quickly wear deep groves in the aluminium, rendering the equipment unsafe.

In 1953 Edelmann and Ridder of the Edelrid Company in Germany, developed the first marketable kernmantle rope that revolutionized rope work in mountain sports (Edelrid 2025, Flory 2015). This type of rope consisted of the kern (core) and a mantle (sheath). Then in 1962, Carl Benk of the same company, developed the bicolour rope, which provided a way of distinguishing ropes with different properties (Edelrid 2025). Edelrid continued with their innovation and developed the first kernmantle dynamic rope in 1964. However nylon fibres are hydrophilic, meaning they absorb water. Studies showed that the most advanced nylon ropes lose between 10 to 50% of their strength when wet.

In 1966, Edelrid again made history when the company produced the first water-repellent kernmantle rope (Bright 2014) and in 1994 they develop the floating rope to satisfy the growing demand of canyoneers (Edelrid 2025).



Fig 6. In 1993 an abseiler, with a harness made from a length of webbing tape (very loose fit), abseiling on a Figure 8. Note that carabiner is in a very bad load orientation. The head torch containing C size batteries was one of the early versions of helmet mounted lights, before they became smaller with AA batteries.

By the mid to late 1960s nylon sheathed kernmantle ropes, became more common in Australia particularly amongst the speleological community. At first there was hesitation in their effectiveness, strength and wear resistance. One of the big selling points was that the kernmantle ropes were lighter, did not rot and their breaking strain was much higher than natural fibre ropes of the same diameter. Users had to consider whether to purchase static or dynamic ropes for caving or climbing. It soon became clear that generally speaking static ropes were more practical in caves unless the caver was undertaking a lead climb. The dynamic ropes being more practical in breaking a person's fall by stretching, thus not causing the sudden stop of a less stretchy static rope.

When kernmantle ropes first came into use in Australia there were a number of incidents among people accustomed to abseiling at speed on sisal ropes. When they transitioned to nylon ropes, the friction generated would heat their abseil device and melt into the rope if they stopped in one place.

A rather frightening experience, until users learnt to change their abseiling practices away from the need for speed. Also synthetic kernmantle ropes are more susceptible to abrasion wear on rocks, than sisal ropes, so required more care at rub points (Fig 7).



Fig 7. Kernmantle ropes that suffered sheath damage due to insufficient or no protection on rub points.

But the problem became widely recognized in the 1980s as modern kernmantle ropes, especially those with heat-sensitive nylon or Dyneema sheaths, became more common. Abseiling (rappelling) techniques had to change as long, fast, or multi-pitch descents increased friction and the chance of melting into ropes. Modern climbing literature and safety organizations acknowledge the risk of heat damage from friction which can cause the sheath to melt, glaze, or stiffen, compromising rope integrity.

The advances in rope technology over the years has delivered huge benefits, with modern ropes up to half the weight and three times the strength for a given rope size, when comparing sisal to kernmantle. See Figure 8 and

Table 1.

Rope diameter in mm	Rope type and material	Weight (g/m)	Weight (Kg) of 50m length	Manufacturers stated breaking strain
14	Sisal 3 strand twisted	130g/m	6.5Kg	10.79kN - 13.31kN
12	Sisal 3 strand twisted	105g/m	5.25Kg	9.12kN - 9.81kN
11.2	Blue Water II – Static (kernmantle) Polyamide core/polyester sheath	90g/m	4.5Kg	31.9kN
11	BEAL Industrie Static Rope – (kernmantle) 100% Polyamide	73g/m	3.65Kg	32kN
10	Edelrid Performance Static - static (kernmantle) 100% Polyamide.	66 g/m	3.3Kg	25kN

Table 1. A comparison of historic and modern ropes, with various diameters, weights and their advertised breaking strains. These are the ropes depicted in Fig. 8.



Fig 8. Evolution of ropes over the years. Depicted ropes are not all the same length. A. 14 mm sisal, B. 12 mm sisal, C. 11.2 mm Blue Water II (static kernmantle), D. 11 mm BEAL Industrie Rope (static kernmantle), E. 10 mm Edelrid Performance (static kernmantle).

Both the kern and mantle of kernmantle ropes are made from synthetic fibres like polyester or polyamide (PA), the latter being varieties of nylon or aramid. These synthetic materials provide excellent strength, flexibility, and abrasion resistance for the manufacture of vertical access ropes. Combinations of these materials and a rope's weave can be varied by rope manufactures to produce tailored ropes with specific dynamic or static properties.

Polypropylene rope generally has a significantly lower strength than nylon and polyester rope, however it is buoyant and can be made at low cost, so is especially useful in marine environments, but not for vertical access ropes (Flory et al. 2015). Polypropylene has a poor UV resistance, low abrasion resistance and tendency to become brittle.

At the same time that rope technology was evolving, so had the abseil and prusik devices. Today we have a huge range of double and single rope abseil and ascending devices on the market, so many it is not practical to detail them here.

In the mid 60s I was taught to prusik up a rope using three prusik loops. At the time I was led to believe that this was the first method developed – however I can't verify the authenticity of this. Using 3 prusik loops to ascending a rope is slow and tedious. Two long prusik loop for the feet and a shorter one that goes under the arms and around the cavers back (Fig 9). This short loop can be quite painful as almost all of one's weight is hanging by the 6 or 8 mm diameter sling.

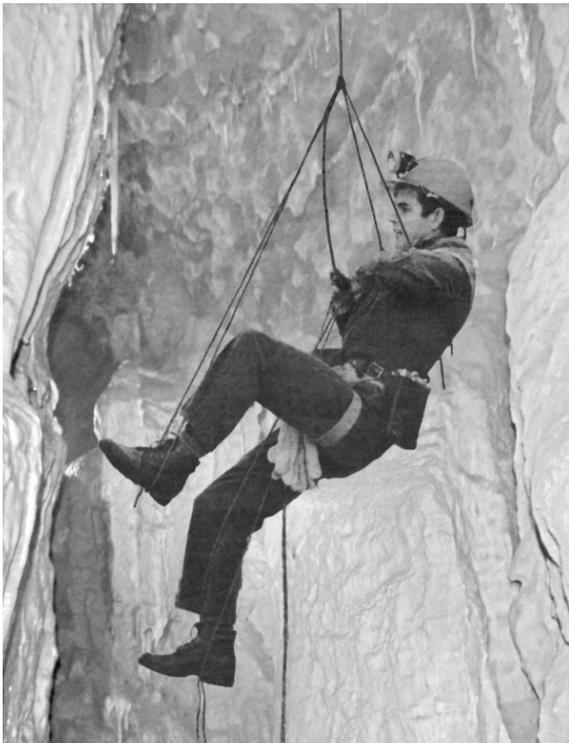


Fig 9. Demonstrating the original method of prusiking with 3 prusik loops as believed to be used by Dr. Karl Prusik in 1931.

A disadvantage of the three prusik loop system is that one can completely become detached and fall if they lift both arms in the air. Thankfully new methods of using the prusik knot were developed and in Australia we transitioned over to using two prusik loops. One loop attached the carabiner on the harness, to the main rope and the second loop went around one foot, through the harness carabiner to the main rope. This method meant that the persons weight was held by the harness and they did not fall when lifting their arms.

Today we have all manner of mechanical prusiking devices. Prusik loops for climbing have become somewhat redundant and possibly even a curiosity to the younger generation.

There has been a huge range of SRT caving equipment developed over the years for vertical caving. Besides SRT gear, there are ladders and scaling poles, both of which underwent significant development and manufacture by Sydney caver John Bonwick. Manufacture of the light weight Bonwick caving ladders began around 1960. They are still extensively used by Australian and overseas cavers.

History of the Prusik Knot

The knot now known as the prusik knot had been in use on sailing ships for several decades before being used in mountaineering. Prohaska (1991) says that ascending a rope by using friction knots was practiced by American tree surgeons prior to the mid 1800s. The knot appears to be first used on footloops to ascending ropes while mountaineering by a French mountaineer E. Gérard and this was published in the 1928 French publication *La Montagne* (Cavinguk 2025). It was then known as the Gérard hitch.

The knot was then supposedly independently reinvented by Dr Karl Prusik and published in an Austrian mountaineering journal of 1931 (Prusik 1931). Use of the knot allowed completion of otherwise unobtainable objectives in mountaineering, by throwing a rope over an obstacle which could then be prusiked to the top, with the aid of loops of rope and prusik knots. After the 1931 article it was widely known as the Prusik knot.

The name Prusik, “has since become an adjective and a verb, applied to all methods of ascending ropes, as well as the loops used to make the knots” (Cavinguk 2025).

The first use of the prusik friction knot in a cave was possibly in 1938, when French caver Pierre Chevalier prusiked up a pitch in the Dent de Crolles system after a ladder failed to pull up correctly. He had made loops made from strands of the main hemp rope to prusik up the pitch. (Cavinguk 2025)

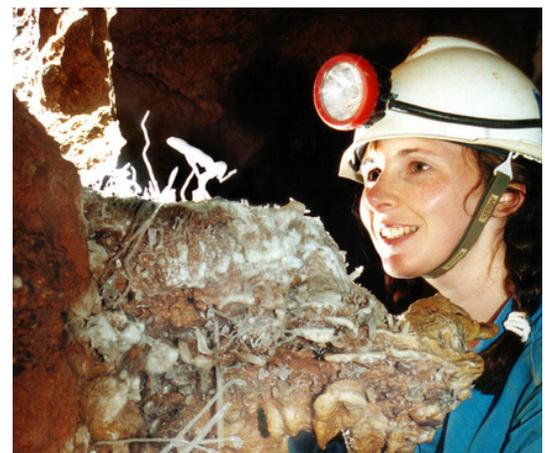


Fig 10. A caver wearing an industrial helmet with the brim cut off and 2 point attachment chin strap. Light is the Oldham miner's safety lamp.

Clothing

In the 60s and 70s the caving clothes of choice for a large majority were heavy cotton overalls or “boiler suits” as they were typically called at the time. Knee pads were extremely rare and people just accepted that one had to cave carefully and try not to damage their knees and shins.

In the modern era for wet and cold caves we have brightly coloured caving suits made of Cordura or PVC that have superior advantages of less weight, quick-drying properties and warmer than cotton overalls. These modern synthetic material caving suits are particularly wear and tear resistant. Velcro has replaced the historic zippers, buttons and clips. Also knee and elbow pads are sewn into the garment.

Helmets

I recall helmets were typically not used at all in the mid 60s, in-fact it was unusual to see someone with a helmet. Industrial helmets became more in vogue during the early 1970s. The trend was to cut the rim from the front of the industrial helmet (Fig 10) and often worn back to front. There were many instances of helmets falling off, so people started wearing elasticised chin straps with single attachment points on either side of the helmet. This also caused problems with loosely fitting chinstraps allowing helmets to be knocked off backwards and the chin strap almost choking or decapitating the wearer.

Later-on light weight bike helmets lined with polystyrene foam came into vogue. They had four-point attachment webbing chin straps that solved the choking issue. Of course these days we have far superior light weight helmets, that are impact rated, fully adjustable internal banding to fit the wearer's head and adjustable non elasticised four point attachment chin straps.

Surveying

In the 1970s, surveying was very basic with the use of a steel or fibreglass tape measure, compass and inclinometer (clino) (Fig 11). Even home-made inclinometers, utilising a protractor, string and weight, were used if one could not afford the real thing (Fig 11). Every distance, bearing and inclination reading had to be meticulously written on paper, then the true lengths had to be calculated before the cave maps could be hand drawn. This was a very very slow process and even basic maps seemed to take for ever to complete. The first laser distometers (typically abbreviated as disto) did speed the process up with taking measurements, however bearings and inclinations still had to be measured with a compass and clino, which took quite some time.

Beat Heeb invented the DistoX in 2008. He designed and built a custom board that could be installed into the commercially available Leica Disto A3 to make it a DistoX. It served as an all-in-one device for cave surveying by combining a laser distance meter with a tilt-compensated digital compass and clinometer. Today there are a number of devices like the Leica DistoX that can measure distance within a millimetre accuracy plus bearing and inclination with one click of a button. This is without even going over to the cave wall or object which is being measured. It is also far better for cave preservation without physically needing to stretch out the old fashion tape measure.

The development of the DistoX marked the start of fully paperless cave surveying. Programs were developed such as: Pocket Topo (approx. 2008), CaveRenderPro (2011), Abris (2013), Aragonite Cave Compass (2014), TopoDroid (2014), Cave3D (2014), Qave (2014), CaveMeter (2014), CaveSurvey (2014), SexyTopo (2015) and CaveAR (2020) (Cave Surveying Apps 2022).

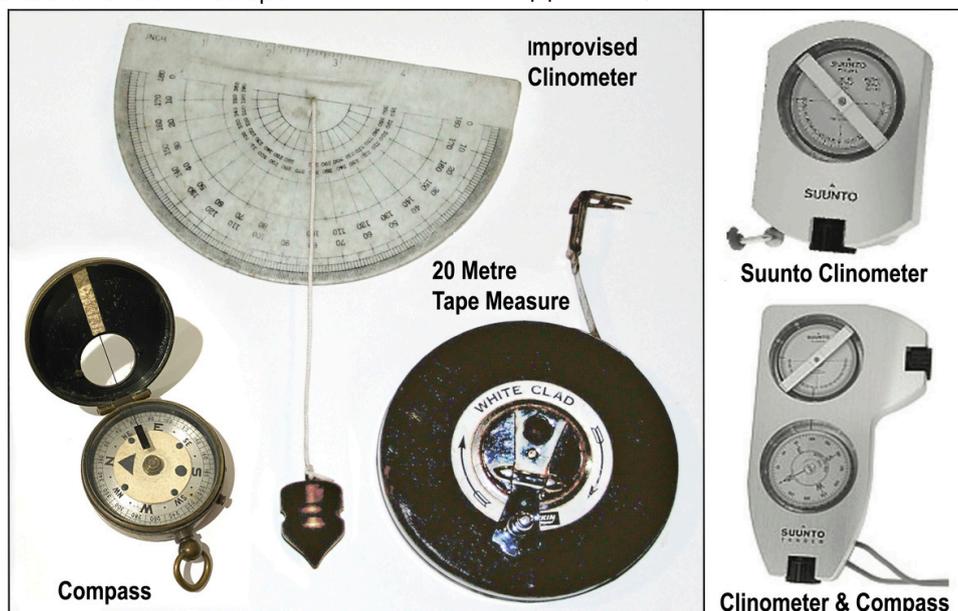


Fig 11. Surveying equipment from the 1960s - 1970s.

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These programs had various degrees of complexity and adoption by the caving community. Some had just a short life span before their developers discontinued updates and support.

The one that stood out to me was the program TopoDroid developed by the Italian caver Marco Corvi. It was first released in 2014 (Trimmis 2018, Cave Surveying Apps 2022). The program (an Android compatible app) is free to download and use.

In conjunction with a DistoX using Bluetooth connection to an Android smart tablet or phone with the TopoDroid app installed, we could now do in minutes what took hours in the past. The splay and leg readings of a survey are downloaded instantaneously without any physical connection between devices. The program converts the laser distance readings to true horizontal and vertical lengths so that the plan and section views of a cave survey can be easily drawn as the splay and leg shots appear on the tablet of a phone screen. Since the release of the first version, Marco Corvi along with an international group of speleologists have continued making improvements and updates to the program over the years.

There are currently a number of other laser distometers such as DistoX, SAP5, BRIC4, and DistoXBLE that are compatible with the Topodroid program. Thus the process of surveying has become more accurate and many times faster than using the old methods.

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Fig 12. Cavers geared up with typical modern day SRT equipment.

Cave Explorations in the Ningbing Range, WA - June/July 2025

Denis Marsh



Bob Kershaw and Marilyn Scott approaching karst block tower -
Photo by Denis Marsh



Karst block tower - Photo by Denis Marsh

Illawarra Speleological Society (coordinated by Bob Kershaw) has run annual expeditions to the Ningbing Range in the East Kimberley region of WA since 2007. Following an enquiry in January 2025, I was invited to join this year's expedition, to run from 23 June to 11 July 2025.

Group members included Bob Kershaw (ISS), Marilyn Scott (MSS, NHVSS, CSS), Denis Marsh (OSS), Alison Scobie (ISS), Peter Downes (WASG, NHVSS), Cathi Humphrey-Hood (MSS, CCC, NHVSS), Rod O'Brien (SUSS, NHVSS), and Les Wain, (ISS).

This was the second expedition to the Ningbing in 2025, with an earlier scientific expedition group led by John Cugley visiting the area in May/June with Professor Rhawn Denniston (accompanied by two geology honours students) from Cornell University, USA, undertaking stalagmite dating work.

The Ningbing limestone outcropping exhibits typical tropical tower karst features, extending to around 80 m above the surrounding alluvial plain and dissected into numerous separated/scattered massive limestone blocks and cones which have undergone extensive dissolution of their surface exposure and along joints and fractures. Many block tower members have breakdown scree slopes and large boulders around their base. Extensive *rillenkarren* (erosion solution fluting) are ubiquitous across much of the surface at higher margins of the limestone, inhospitable and dangerous when exploring for caves. *Kamenitza* (or solution pans) up to 15 cm deep and 1 m wide were also noted on some higher margins. The solution processes have created many deep grikes or fissures, often undermined by caves. Large clefts in the block towers give the appearance of individual limestone blocks moving/breaking apart or subsiding.

These processes in association with the tropical monsoonal climate have played a significant role in the formation of the numerous fissure caves developed along the joints and fractures. Many of the currently known caves also have complex phreatic maze passage development at elevations well above the current alluvial plain. This phreatic development is typically formed below water table level suggesting the periodic burial of much of the karst by alluvium and subsequent erosion and considerable lowering of the surrounding lowland plain over millennia. Typically, caves have base level development at or closer to current alluvial plain level and can often exhibit signs of flooding and silting during monsoonal wet seasons. Caves commonly have multiple entrances and often they connect internally to grikes/rifts with inner skylight (daylight) chambers. Speleothem presence is highly variable between caves with some well decorated with a good variety of formation types represented, while others have little to no decoration. Some contain expansive wall sections coated in cave coral and or coralloids. As our visit coincided with the dry season, speleothems for the most part were inactive, however it is expected that many could be active during wet seasons.



Surveying in KNI163 - Photo by Denis Marsh



Bob Kershaw entering KNI201 - Photo by Denis Marsh

For intrepid cave explorers, searching for caves in the Ningbing Range poses numerous challenges and hazards. Firstly, getting to Kununurra in WA from Orange NSW, involves an arduous road trip of 3,500 km over around seven days. Then it is another 100 km of variable dirt road/track through pastoral lands to our camp site at the "Gorge". On arrival, there is an adjustment to the tropical climate and the need to manage heat stress, with daytime temperatures climbing above 30 deg. C. It snowed in Orange only a few days before I left home.

Once there we were constantly assaulted by things that either wanted to bite us or pierce or tear our flesh, and when you are on blood thinners like me, by the end of a day climbing over the karst exploring for caves I often appeared as though I had been in a war zone. Bites included ever present ticks that burrow into the skin and refuse to be dislodged easily, mozzies, snakes (active even at night), armies of Green Tree Ants that hung in unsuspecting ambush among the vegetation, invisible mites among leaf litter that cause severe itches and rashes, spiders, wasps and bees (as Bob discovered when we ventured unknowingly too near a hive; "What's that sound?" "S#*t"). Spiky seed heads of Black Spear Grass (or Tanglehead) (*Heteropogon contortus*) are another skin piercing threat to be well avoided. Wait-A-While vines could be considered a good rival for the Blackberries back home as their reverse hook thorns tended to dig in and tear flesh rather than just pierce skin. Bob cautioned us about the extreme toxicity of the bright red and black Crab's Eye Bean (*Abrus precatorius*) seed pods with one bean more than enough to kill an adult if the hard outer seed coat is cracked.

Possibly the greatest risk of injury however was traversing the limestone outcrops and jagged, razor sharp rillenkarrren on top of the limestone range. Being attired most often in shorts for comfort on the warm days, demanded the essential wearing of knee height heavy duty gaiters to give a level of protection against potentially severe lacerations with any stumble. All these hazards present well before entering any cave, requiring careful risk management.



Rillenkarrren surface erosion on karst - Photo by Denis Marsh

The Ningbing Range as I found is undoubtedly an area with amazing potential for finding lots of previously unknown caves. Some two hundred caves had so far been recorded in the Ningbings up to the time of our visit. Caves are documented and numbered with the prefix KNI. While the lure of making more new cave discoveries was prominent in our minds, Bob also held aspirations of catching up some of the backlog of outstanding surveys and maps of caves discovered on previous expeditions.



Rod O'Brien in KNI163 - Photo by Denis Marsh



Chamber in KNI163 - Photo by Denis Marsh

In summary, this current expedition resulted in a further 20 caves tagged, plus, several other cave entrances were found but not tagged (nor explored) due to time constraints. In addition, some eight to ten deep vertical rifts/shafts descending up to 30 m to what appeared to be possible chambers, were also located but were not numbered or descended during our trip. Surveys were completed of five previously known caves, (KNI200, KNI89, KNI197, KNI198 & KNI151), plus around 150 m was added to the survey of another known cave KNI163 (Marvellous Cave), now over 1,000 m in passage length and still going.

A total of 10 of the newly discovered caves on our trip were surveyed, (KNI201, KNI205, KNI206, KNI207, KNI208, KNI211, KNI212, KNI213, KNI217 & KNI220), and two others (KNI202 & KNI203) were partly surveyed. Rod O'Brien and Peter Downes cave dived KNI151, a karst resurgence pool leading to a flooded cave with 38 m of underwater passage. Unfortunately, our three-week trip to the Ningbings managed to add further to a growing backlog of unexplored and/or unsurveyed caves, which along with the opportunity for more new cave discoveries, only points to the need for more subsequent expeditions to the Ningbings in coming years. I think I may have been bitten by a newly discovered Ningbing fascination bug.



Cathi Humphrey-Hood descending pitch watched by Rod O'Brien -
Photo by Denis Marsh



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