

The Journal of the Australian Speleological Federation Inc.

# CAVES

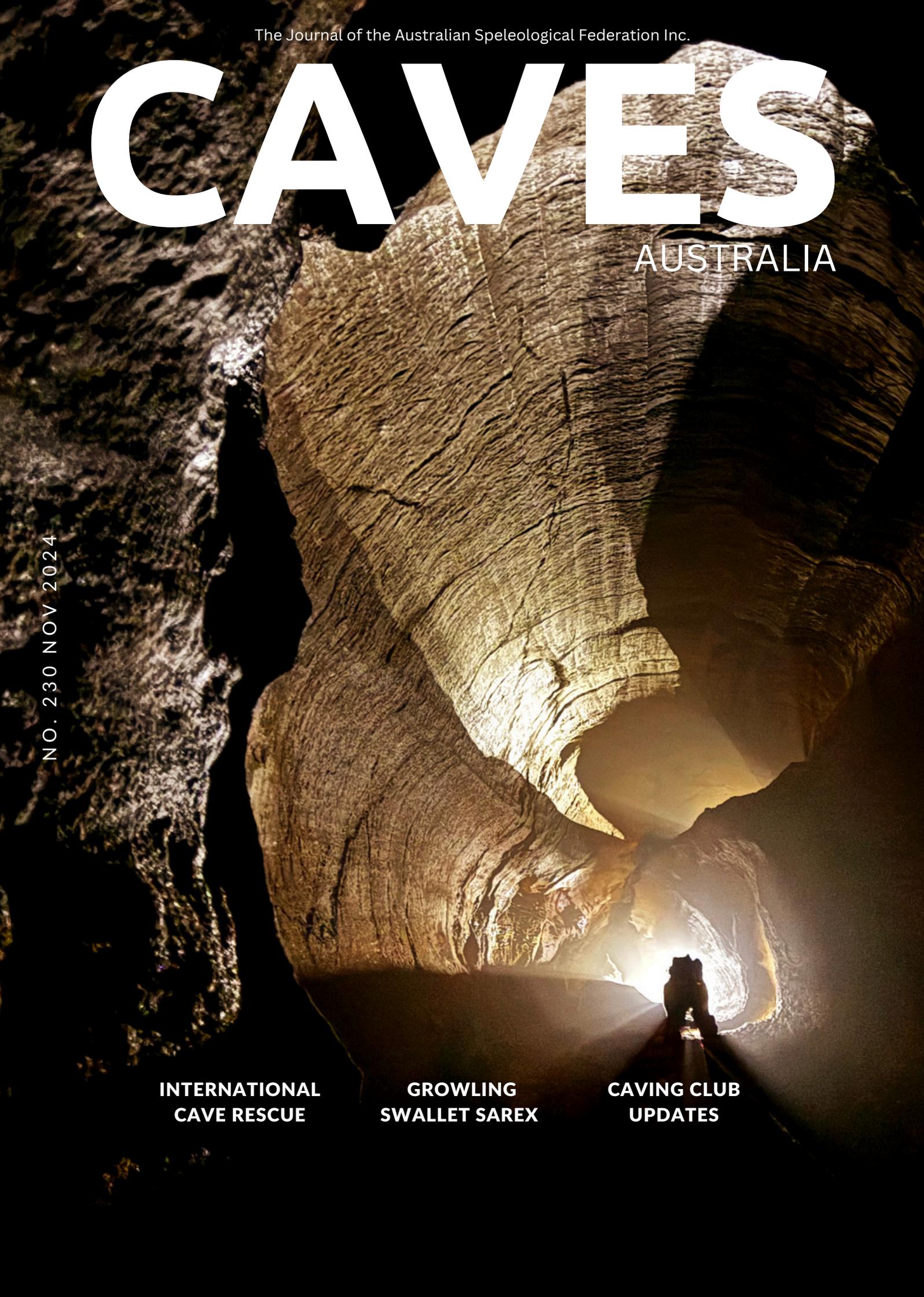
AUSTRALIA

NO. 230 NOV 2024

**INTERNATIONAL  
CAVE RESCUE**

**GROWLING  
SWALLET SAREX**

**CAVING CLUB  
UPDATES**



# CAVES

## AUSTRALIA

### CAVES AUSTRALIA

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### REQUEST FOR ARTICLES 2025

JANUARY

### ISSUE DATES FOR 2025

FEBRUARY, MAY, AUGUST, NOVEMBER

### MAGAZINE SUBSCRIPTION

DIGITAL CAVES AUSTRALIA IS INCLUDED WITHIN ASF MEMBERSHIP FEES.

COVER: DIDN'T DIE, WOULD REPEAT IN ACOUSTIC POT BUNGGONIA NATIONAL PARK - ALEX MOTYKA



Laura Trowbridge in Kubla Khan striking a pose - Photo by Nadine Muresan



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Fathers Cave, Buchan - Photo by Nadine Muresan



Getting muddy in Fathers Cave, Buchan - Photo by Nadine Muresan

# Editor's Note



Nadine pushing through Elk River Cave, Buchan - Photo by Bogdan Muresan

WOW, what a *Caves Australia* this November issue!!! Thank you to everyone who continues to support this brilliant magazine.

With this issue bringing 2024 to an end it is always great to look back at what the caving community has done this year. There have been many Cave Rescue events, amazing bones being discovered, new caves being found, and exploration in most states that I have heard from.

But looking forward is equally important, with the conference in January 2025 just around the corner I am so excited to see that we have around 100 participants so far with more people still booking. In this *Caves Australia* we have added more information on the caves that will be on offer and the still changing but becoming more secure program for the week. The people of Buchan are SOOO looking forward to the event so I can't wait! However, there is still a call for abstracts! As I suggested last *Caves Australia*, without presentations, a conference is hard to run. So please contact the organisers as soon as possible.

With the new year just around the corner please start thinking about showing off some of your clubs Christmas trips in the next *Caves Australia*. Until next time, let's go CAVING!

**Nadine Muresan**

# President's Report

Another December issue of *Caves Australia* and time to look back on all the achievements and adventures of our members over the past year. This year the ASF launched 'Friends of ASF' which is open to anyone cave-curious and who wants to keep in touch with the caving community, has an interest in speleological sciences or to find out how to get involved with their local club.

The great Nullarbor karst has featured strongly this year. Firstly, the Nullarbor blind cave spider, *trogloidiplura* genus, was announced as the 2024 Cave Animal of the Year (CA 227). Research is ongoing into the behaviour of these enigmatic creatures and the caves in which they live. As they exist in isolated populations, the species is under significant threat from disturbance to the cave systems by industrialisation by the proposed Western Green Energy Hub. The campaign to save the Nullarbor has been raising awareness of the region's uniqueness and beauty both above and below ground, and of the threats imposed on it. This important work led by the Conservation Commission will continue to be funded through the *Karst Conservation Fund*, and any donation large or small will go towards helping to preserve the region. There has also been an informative talk series hosted by the Conservation Commission including the screening of the stunning *On The Line, Nullarbor* produced by Sil Ianello and narrated by Dr. Richard Harris.

Essential cave rescue preparedness continues to increase across Australia with rescue practices and joint organisation exercises being held in Tasmania and Victoria, and several ASF members have also attended rescue events in Europe to bring back valuable knowledge of the latest techniques and rescue strategies (CA227). The need for this was unfortunately highlighted with a rescue at Jenolan earlier this year. It had a very successful outcome with the trapped parties walking out of the cave and was a demonstration of the valuable skills of the NSW Cave Rescue Squad (CA 228).

It's also a reminder to all of us that the unexpected can happen even with experienced caving teams and preparedness, training and building relationships with local emergency services are crucial to improving the response time and chances of success in any rescue. And of course, there has been plenty of caving happening in every club this year. Members have been to exotic caving locations for big cave exploration in Vietnam (CA229), scenic cave diving in Mexico (CA229) and closer to home WASG trip to Christmas Island (CA 227). Exploration and speleological discoveries continue in the Kimberley, Nullarbor and Mt Gambier karst regions, as well as significant extensions discovered in Tasmania's Porcupine Pot, Niggly Cave and Mt Cripps region (CA 227 & 228).

There are also some important and exciting upcoming events to look forward to in the New Year. The annual ASF Council Meeting will be held online on 5th Jan, and the Executive and Commissioners are busy preparing reports and proposals for clubs to consider. The next ASF Conference - Caving in the Moonlight - will be happening in Buchan, January 10-20th, packed with speleo events, talks and of course trips to the iconic Buchan caves. Most importantly it is an opportunity to reconnect and make new caving friends from all across Australia and to share our stories and adventures.

This will be my final *Caves Australia* report, as I'll be handing over the role of President at the upcoming Council Meeting. It has been very rewarding seeing the ASF grow during my time on the Executive, with additional Commissions and welcoming new, and returning, caving clubs to the ASF. I'm continuously impressed and humbled by the passion of so many people that volunteer their time to keep the ASF going and working to build such a strong caving community across Australia. I'm especially thankful for everyone who's been part of the Executive team, for your hard work and support over the past 4 years as President, and for your dedication to keeping the organisation moving forwards.

**Sarah Gilbert**



## **The 2025 Caving in the Moonlight 33rd ASF**

### **Caving options for pre, during and post trips 10th Jan - 20th Jan**

Please find a schedule below with more detailed times of when each cave will be running. Each cave will have its own sign-up page which will have limited spots per cave. It is first in best dressed. If there is a strong desire for one cave in particular we may consider running another trip where numbers permit. To access and sign up for the caves please go to:

[https://docs.google.com/spreadsheets/d/1vx6xaIRzdg3IGJf7TipWW6r4dI7TJ9nSF5dtx0\\_Ofek/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1vx6xaIRzdg3IGJf7TipWW6r4dI7TJ9nSF5dtx0_Ofek/edit?usp=sharing)

Please be advised that the caves have been colour coded into difficulty and time constraints.

### **Cavers' Dinner Theme**

The organisers are excited to announce that the theme for the caver's dinner is ... 80's Colourful! So dress with flare and bright colours.

### **Abstract Submission**

There is STILL space for an abstract submission and whilst the cut of date is technically 1st of December we would still very much love more. Should you wish to participate please add your title and short abstract below OR send directly to [asfconference2025@gmail.com](mailto:asfconference2025@gmail.com) attn: Abstract.

A conference is only a conference with presentations. So please put forward your abstracts as soon as possible.

**The Cartography Salon** is an exhibition of cave and karst-related maps. There is no restriction on method of presentation and innovative techniques are encouraged. However, the maps should be presented in printed format at the original scale. There will be a 3D category where maps can be presented digitally if such maps are registered. This category will be judged and rewarded separately from the 2D printed category. Judging occurs at the Conference. <https://www.asfconference2025.com/general-9>

### **Registration**

Please book online, remembering this pricing includes all the awesome presentations, delicious food, a T-Shirt and much much more!

<https://www.asfconference2025.com/booking>

### **Program**

Please find an updated program. We will release a day by day detailed program towards the end of December, kind of like a Christmas gift. Please be advised of the Workshop & Activities day along with the evening events.

	THURSDAY 9th	FRIDAY 10th	SATURDAY 11th	SUNDAY 12th Day 1	MONDAY 13th Day 2	TUESDAY 14th Day 3	WEDNESDAY 15th Day 4	THURSDAY 16th Day 5	FRIDAY 17th DAY 6	SATURDAY 18th DAY 7	SUNDAY 19th	MONDAY 20th
Morning 1		PreConference CAVING	PreConference CAVING	PreConference CAVING	Welcome presentation Presentations	Presentations	Workshop & Activities Day Cave Diving Demonstration	Presentations	Presentations	SPELEO ACTIVITIES DAY SRT Course	Post Conference CAVING	Post Conference CAVING
Morning 2							Underground Communication Self Rescue Workshop			Squeeze Test Crawl Competition		
Afternoon 1				Registration open		CAVING		CAVING	CAVE RESCUE Exercise			
Afternoon 2				Welcome BBQ						Cave Rescue Show		
Evening	Debrief for caving				Evening Activity	Evening Activity	Evening Activity	Evening Activity	Evening Activity	Evening Activity		
					TBA	Movie Night	Get to know your ASF Exec & Commissioners	TBA	Trivia Night & Auction Karst Conservation Fund	Cavers Dinner		

## Caving Program

	10-Jan-25		11-Jan-25		12-Jan-25	13-Jan-25	14-Jan-25	15-Jan-25	16-Jan-25	17-Jan-25	18-Jan-25	19-Jan-25		20-Jan-25	
	Friday		Saturday		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday		Monday	
	Morning	Afternoon	Morning	Afternoon	Morning	Evening only	Afternoon	No caving	Afternoon	No caving	No caving	Morning	Afternoon	Morning	Afternoon
Fairy & Royal - evening cave		From 6pm				From 6pm	From 6pm		From 6pm						
Lilly Pilly															
Murrindal															
Shades of Death - Show															
Dicksons Cave															
Wilson's Cave															
Honeycomb															
Slocombe's															
Shades of Death - Wild															
Elk															
Scrubby															
Dalleys															

### Fairy Cave (B5)

Time: Up to 2 hours underground.  
 Verticality: horizontal chambers and passages wheelchair access.  
 Equipment: No equipment required.

### Lilly Pilly (M8)

Time: Up to 2 hours underground.  
 Verticality: Mainly horizontal chambers and passages with stairs.  
 Equipment: Helmet, headlight.

### Murrindal (M7)

Time: Up to 2 hours underground.  
 Verticality: Mainly horizontal chambers and passages with stairs  
 Equipment: Helmet, headlight.

### Shades of Death (M3)

Tourist Section  
 Time: Up to 2 hours underground  
 Verticality: Mainly horizontal chambers and passages with many step stairs  
 Equipment: Backup light, sturdy foot ware

### Wild Section

Time: Up to 4-5hrs underground  
 Verticality: Mainly horizontal chambers and passages lots of crawling.  
 Equipment: Horizontal gear for an extended trip required.  
 Helmet, overalls/suit, head torch and backup lights, gloves, sturdy foot ware, caving pack, water, food, poo tube, first aid kit, thermals.

### Wilson's Cave (EB4)

Time: Up to 2.5 hours underground.  
 Verticality: Mainly horizontal chambers and passages with possibilities of super cool squeezes. Can be a walk in walk out cave  
 Equipment: Helmet, light and sturdy clothes, caving suit if keen on squeezes.

### Dickson's (M30)

Time: Up to 2.5 hours underground.  
 Verticality: Mainly horizontal chambers and passages with possibilities of super cool squeezes.  
 Equipment: Helmet, light and sturdy clothes, caving suit if keen on squeezes.

### Honeycomb (M41)

Time: Up to 4 hours underground.  
 Verticality: Vertical entrance but mainly horizontal chambers and passages with some vertical extension pitches.  
 Equipment: Entrance pitch of about 6m requires ladder or SRT. The rest of the cave (not pitches) only requires standard horizontal gear.

### Slocombe's (BA1)

Time: Up to 4 hours underground.  
 Verticality: Mainly horizontal chambers and passages with the ability to free climb to some upper galleries. 7m entrance pitch.  
 Equipment: Entrance pitch requires laddering or SRT for about 10m. The rest of the cave only requires standard horizontal gear.

### Elk River via Baby Berger (M14)

Time: 4-8hrs underground, 15min walk  
 Verticality: SRT competence (including donning/doffing your harness on a precarious ledge)  
 Equipment: SRT kit, (optional) 3mm full length wetsuit for the wet bit in drybag & tackle bag, lunch/snacks, water/pee-bottle. Suitable for cotton overalls with shorts & T-shirt underneath

### Scrubby Creek Cave (M49)

Time: 6 hours  
 Verticality: mainly horizontal chambers and passages, wet cave and requires wetsuit or multiple layers of thermals. Roof sniff and ladder climbing required.  
 Equipment: Helmet, head torch and backups, caving suit, wetsuit, gloves, boots, caving pack, water, food, first aid kit, thermals in a dry bag, poo tube.

### Dalley's Sink Hole (M35)

Time: Up to 4 hours  
 Verticality: mainly horizontal chambers and passages, wet cave often in ankle deep water  
 Equipment: Helmet, head torch and backups, caving suit, gloves, boots, caving pack, water, food, first aid kit, thermals in a dry bag, poo tube.

# The Grants Commission

Paul Osborne

The Grants Commission team is now made up of the Commissioners from ACRC, KCF and ASF Grants. Applications that come in on the generic application form and sent to:

[asf.caves.grants@gmail.com](mailto:asf.caves.grants@gmail.com) go to all three commissioners and decisions are made as to which commission is the more appropriate to process the application. The current commissioners are Brian Evans (ACRC) , Nick White (KCF) and Paul Osborne (ASF Grants).

There have been numerous applications that have come in during the year directed to one or another of the commissions and on occasion redirected to a more appropriate fund.

Additionally, I stood in for Brian (ACRC) for the grant application to attend the European rescue conference and also for a VRA application where there were possible conflicts of interest.

One application was directed to ASF Grants from SUSS re-funding for a Nullarbor fund raiser and redirected successfully to KCF.

The only application directly processed by ASF Grants has been one from Northern Caverneers for cave specific first aid training.

Current members of the Grants Commission are Steve Fordyce, Nick White, Greg Thomas, the ASF Treasurer Melissa Hadley and myself.

Just a reminder that all grant applications should be addressed to: [asf.caves.grants@gmail.com](mailto:asf.caves.grants@gmail.com) regardless from which agency an applicant is requesting funding.

This is the most efficient way of receiving prompt attention.

Each commission has varying amounts of funds available.

The team recognises that not all funding requests fall into one of the specific categories which is why there is now a check box on the application form for "Other"

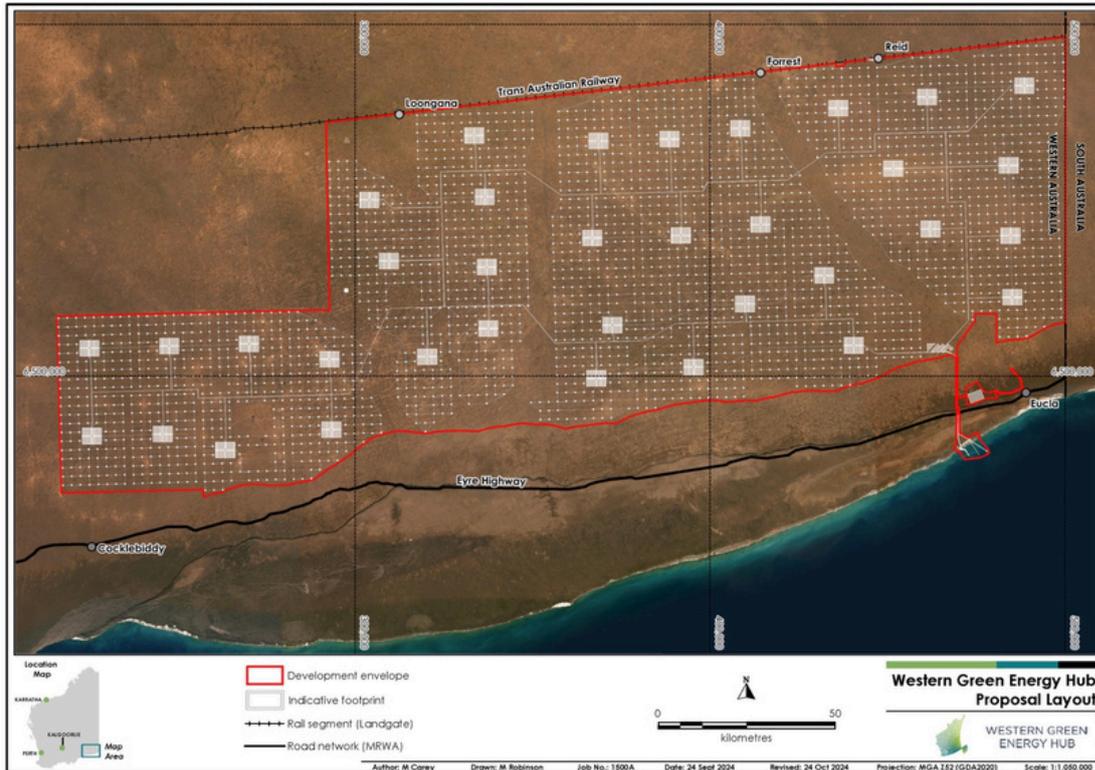
The Commissioners encourage communication from the membership regarding funding for projects. An initial enquiry is usually best to establish the likely success of the application before submitting the full application form.

The Guidelines, application and claim forms are available on the ASF website under "[Home](#) » [Administration](#) » [Commissions](#) » Grants"

In closing I am happy to continue in the role for another year should the Council wish it.

# STOP THE PRESS!!!

Clare Buswell



Sourced - Western Green Energy Hub Section 38 Referral Supporting Document. Oct 2024

## **Western Green Energy Hub Nullarbor Development Plans now public.**

On the 11 of November the WGEH submitted documents to the WA Environmental Protection Agency for public release.

This action by WGEH meant that public comments to the EPA were open for one week only. Members of the ASF have submitted comments urging the WA EPA to access the development, so that it will receive wider and longer public scrutiny.

For members of the ASF, it now means that we have access to these documents and that we will be able to use them in our campaign.

This industrialisation of the Nullarbor is truly frightening, and we have a lot of work to do both on the ground and politically.

For updates on this issue please see the Conservation Commission's web site: <https://caveconservationaustralia.org/>



Photo by Clare Buswell

# Getting to know your ASF committee

Colin Tyrrell

I was fortunate to do an Outward Bound course run out of Tharwa, Canberra in January 1980 and as part of that we did a day and a bit of caving at Wee Jasper.

Looking back at then, it was pretty primitive - helmets, and overalls (this was OK) but for lights we had been told to bring dolphin torches with an extra couple of batteries. Definitely not good by today's guidelines. There were a couple of people that ran out of light so it became interesting getting out. The abseil in was semi classic style with the rope going through a carabiner clipped to a belt - it was thrilling (maybe ...), rather than straight over shoulder and between the legs.

We did one of the Dip series and a couple of others. And this got me interested.

No more until around 2001. A couple of friends had been at me to join Blue Mountains Speleological Club for a couple of years and so I finally agreed, and went on a trip to Colong. For my first cave in years, this really got me going.

About the same time, I was invited to be part of an up-skilling program for guides (and a few extraneous others from NPWS) at Jenolan Caves. I was part of a few TAFE teachers involved. I was the only one exclusively working with the guides (the other teachers had to deal with the House and Admin staff). This really got me back into the cave scene, as I was there pretty much every Friday for several years - training the staff in various courses (I was not doing the caving or outdoor ones) and in the afternoons out with the guides with tours in all the show caves and Plughole adventure trip. The objective was to set up training programs for new guides. This gave me an amazing opportunity in the caves. Around 2006 I was asked to apply to be a casual guide, a position I still have to this day, having shown all the show and adventure (although Mammoth was the shortened school version) caves at Jenolan. It gave me a great experience. It is unfortunate, that back then a lot of cavers looked down on the guides as second class cavers, even though many of the Jenolan staff were members of caving clubs. I worked hard to get people to change their view. As adventure guides, we were more than the equivalent of club trip leaders. I am happy to say that that attitude has largely changed, especially as many guides are now part of NSW Cave Rescue.



Colin in the plughole tour at Jenolan - Photographer unknown

Parallel to this I was caving about once a month with BMSC, either on our own or joint trips (Looking back I think there were more joint ones than single club trips). Most of my caving has been at Jenolan, Cliefden and Timor.

In 2015, on a trip with students working in Vanuatu, I had the opportunity of visiting Millennium Cave, where we accessed the cave, a giant river passage, via vine ladders - a great experience.

I have also visited several show systems in the UK, Japan and China.

Outside of the caves, I have been active in the NSW Speleo Council, having been Secretary and President for many years and also on the ASF exec for around 15 years (I think) as Membership Secretary and currently as Senior VP.

I am a member of Blue Mountains Speleo Club and Newcastle and Hunter Valley Speleo Society.

I think my favourite caves would be Aladdin (Jenolan) and Murder and Main at Cliefden. But having said that any cave is a good cave.

I also have an interest in checking out disused railway tunnels (big man-made caves).

# Opinion: what's in a name?

Dave Wools-Cobb



Tyrolean lift - Photo by Catherine Stark

In Tasmania we have been training for Cave Rescue seriously since about 2012. Over the years since then we have unfortunately had three rescues, my own in October 2020 being one of them. There have also been several others in northern states. The caving community's preparedness for these situations definitely saves lives.

A gripe of mine is the terminology used for the subject of a rescue. I feel little thought has been given by many people, even in general and technical literature.

I could quote all sorts of dictionaries and be quite selective in which interpretation of various words that suited my purpose, however, to avoid boring you, I propose to use the "Pub Test". i.e. what sounds suitable to most people?

I strongly object to the term VICTIM.

Victim implies something has been done to you by something/some-one else. You can be a murder victim, a victim of a scam, however I feel it erroneous to consider being a 'victim' of an inanimate thing such as a cave. At best you may be a victim of your own error. My over-all philosophy is "shit happens". You slip, a foot hold breaks, a rigged rope knocks off some rock above, etc.

All too often I've also heard the term "PATIENT". This implies rendering a medical service.



Helicopter lift - Photo by Tasmanian Police



Dave's rescue - Photo by Catherine Stark

The ambulance officer, doctor, or first aider has this relationship with the person being rescued, but certainly not the other rescuers. I note that this person, ideally should remain with the subject of the rescue all at times, checking on them, informing them of what is about to occur and 'protecting' them from the rescuers and obstacles along the way. In fact, this person should be 'calling the shots'/in charge of the person being rescued. Yes, I have witnessed rescuers being a bit rough and careless! The subject of a rescue is NOT your patient.



Carrying stretcher again - Photo by Janice March

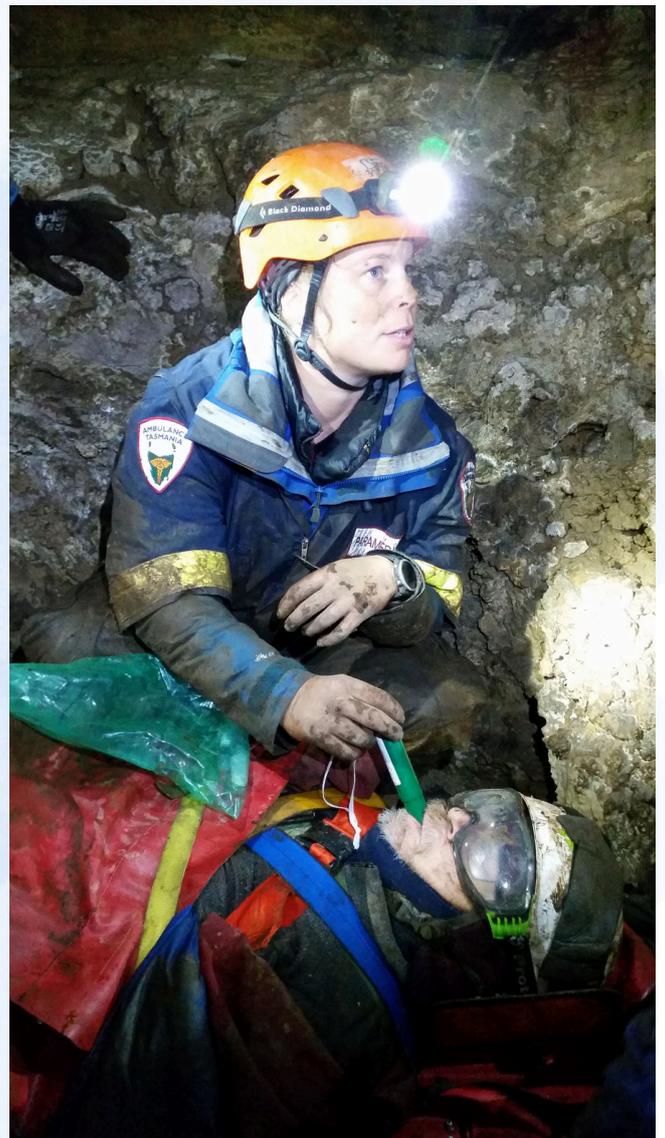
"PACKAGE" is another term I've heard. This is extremely impersonal and doesn't exactly exhibit much empathy to the subject. It's probably best suited to a body recovery.

I prefer the term CASUALTY. This does not imply blame, cause or relationship.

In a rescue, we are looking after and transporting a casualty. If that person is conscious, then their name can be used as both empathy and 'humanising' the casualty. We all like to hear our name and believe me, you feel extremely vulnerable when being transported in a stretcher!

Consideration should be given when speaking about the casualty when they can often hear what is being said. Things like "Oh shit, I don't know how we'll move him from here" is best said a considerable distance from the casualty! (No, this did not happen in my rescue).

So based on my own "Pub Test" I feel the term Casualty is the most appropriate unless someone can come up with something better.



Paramedic and Casualty - Photo by Janice March

# 2024 Growling Swallet SAREX

Jemma Herbert  
Photos by Alex Motyka

Attendees: Al Warild, Alan Jackson, Alex Motyka, Allie Fenton, Ashlee Bastiaansen, Bogdan Muresan, Brian Evans, Callum Herert, Ciara Smart, Dave Taberner, David Butler, David Rueda, Greg Tunnock, Henry Garratt, Janine McKinnon, Jemma Herbert, John Oxley, Karina Anders, Kenny Yap, Liam McArthur, Michael Fraser, Michael Glazer, Nadine Muresan, Phil Croker, Ric Tunney, Ronnie Sammut, Ruth Evans, Thomas Andrews

The intent of this SAREX was to practice some more difficult logistics than usual, and also enable a mad rescue sufferfest for those who wanted to. I designed the event to run overnight, with enough obstacles to keep us entertained for a good 30 hrs. I also planned to have people coming and going, so teams and tasks would need to be dynamically allocated. It didn't all play out like I imagined, and we only moved the casualty about halfway, but it worked well enough to be useful. Here's some things we learnt along the way.

### Conditions

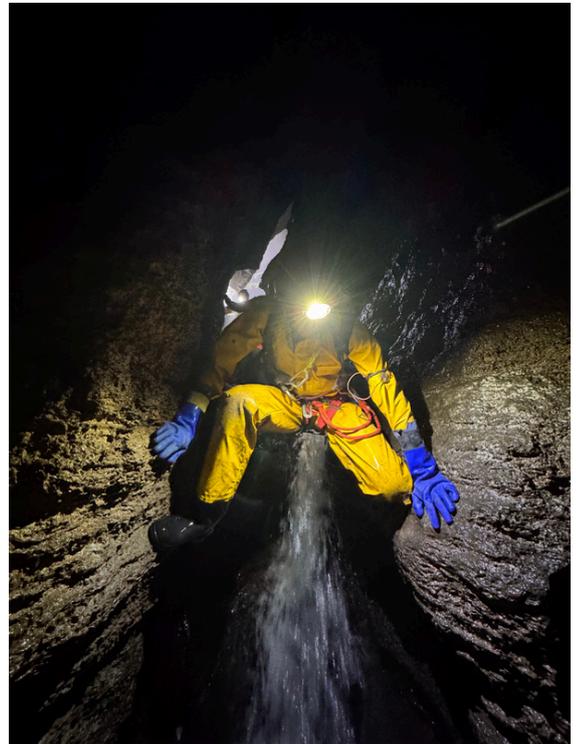
The weather forecast earlier in the week had been for a lot of rain on Friday and Saturday. It didn't actually rain as much as forecast, but the water was definitely up. We had designated commuter rigging teams and the ability to rig the high-water obstacles for safety, but it wasn't always easy or efficient. I expect we lost a couple people to the expectation of bad conditions, and some more people participated less actively than they otherwise might have. The difficulty of the cave (including conditions) obviously matters a lot to who can participate/be useful in a rescue or exercise.

### Teams

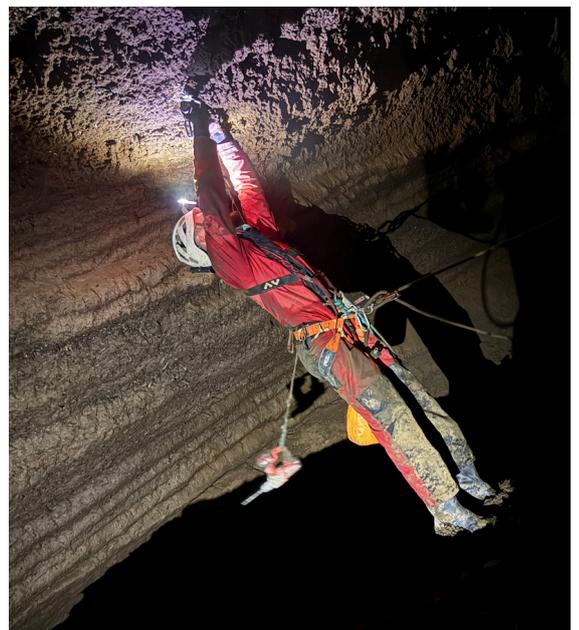
The week before the exercise we had 39 participants pencilled in. In that week we lost six. Some might have been scared off by the bad weather forecast, some fell afoul of my unclear RSVP request and never actually intended to come. So our 33 participants met in Maydena at 8:30am and split into pre-allocated teams. If Janice was here, we would have had a sign-in sheet and immediately realised we only had 29, and which 4 people we were missing. I didn't do that, so we only figured out who was missing when some people couldn't find the rest of their teams. A bit of rushed rejigging and disbanding of teams was done to get everyone sorted. The resultant teams were OK but not as ideal as the original plan. Lesson is to do the damn paperwork, send all those confirmation emails and bring a sign-in sheet (but improvising is not a terrible fallback).

### Navigation

The only people on the exercise who knew their way around the cave were Alan and Janine. That's probably fairly realistic, but we didn't handle it well. Janine was tied up in the comms team laying wire. Alan was prioritised to getting the hasty team into the casualty ASAP. Everyone in between, including the 'route marking team' got stalled when they couldn't find the route, or actively went the wrong way. In retrospect it would have been better to delay the hasty team a tiny bit, but getting them to mark the route, and be able to keep everyone else moving in the right direction. With so few people familiar with the cave, route marking needs to be prioritised even above getting the hasty team in.



David Roca trying hard not to swim in Growling



Bogdan doing some creative rigging -  
Photo by Oleksander Motyka



Karina drilling with impressive form

### Comms Line

Laying the comms line took a long time, as it always does. It's just a slow, fiddly job. I hadn't quite appreciated how long that takes. By 4 pm the comms had gotten to the Glow Worm Chamber. General enthusiasm for comms was waning, the next reel of wire was hidden in somebody's bag, somewhere in the cave, and there were rumours that the rigging was already pretty much complete up to this chamber, so the patient would be here "soon". The call was made to stop rolling out the comms line at that point. In actual fact, whilst the rigging had started into that chamber, the casualty didn't make it there until the next morning. A lot of comms were missed because the wire didn't go far enough. We got lazy and sick of it, but should have done better.

### Using comms

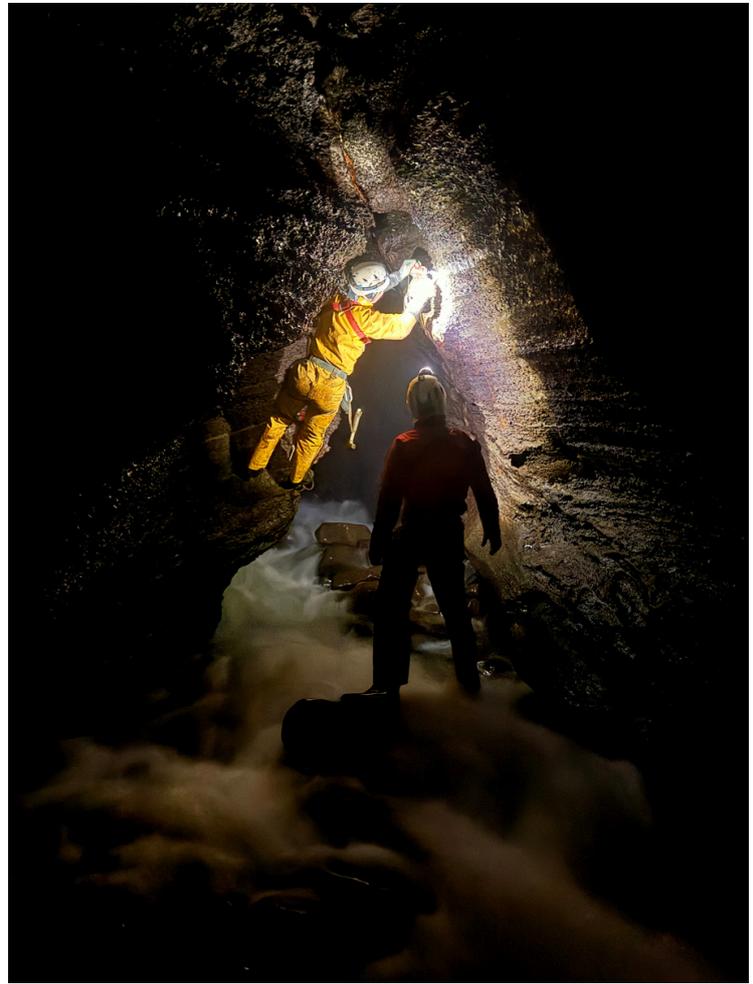
As always, some teams were really good and tried hard to meet comms schedules and give relevant updates, even when the wire wasn't immediately available. Other teams never even saw the wire and didn't bother. If we want messages from beyond the end of the comms line (e.g. runners back to the line), we need to establish that beforehand. Nobody ever wants to take time out of their very important activity that they're working on right now to go run a message to the surface which feels like it just goes into a black hole. We talked about this at the debrief, maybe it's because in a training scenario it feels unimportant, but maybe it will always feel that way, even when it actually is important, and we need to keep practicing. We were lucky to have Ruth and Brian (reluctantly) on Saturday, and Ashlee and John on Sunday, on the surface to staff surface command and comms, but it's a lame boring job and nobody wants to do it in training.

### Base stations

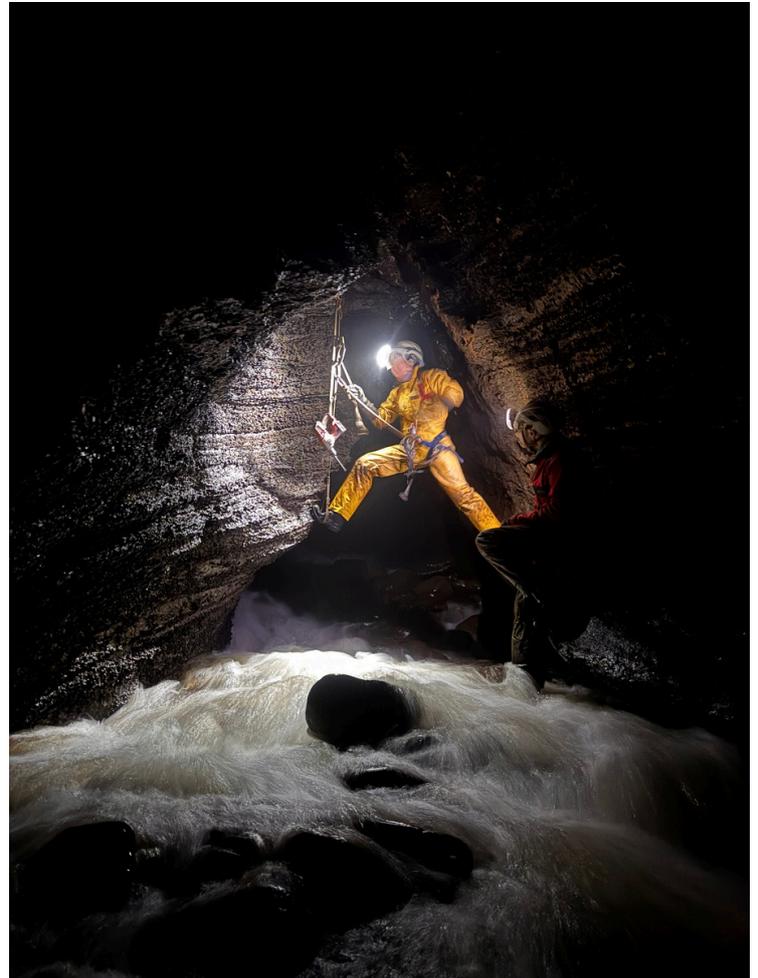
We had heaps more base stations than usual with VIC and NSW bringing extras. Audio was always really good, loud and clear. Nobody wanted to use a little actual Michie phone when a base station could be found. We should commit some money, get the other clubs to do the same, and make it worthwhile for that guy to build a big batch of them.

### Maps

We had a marked-up map of the relevant section of the cave each (thanks John), but it wasn't on waterproof paper. I promptly chucked mine into the bottom of a dry bag and never saw it again. It seems that others did too. It wasn't used for communication of locations (hence everybody calling the "glow worm chamber" the "international chamber"), and it seems it wasn't used (or at least wasn't sufficient) for navigation since people got lost anyway. Lesson is that if people need to use a map, the map needs to be waterproof enough to live in a chest pocket.



Fast flowing water with Karina and Bogdan



Karina rigging the lines

## Fatigue Management

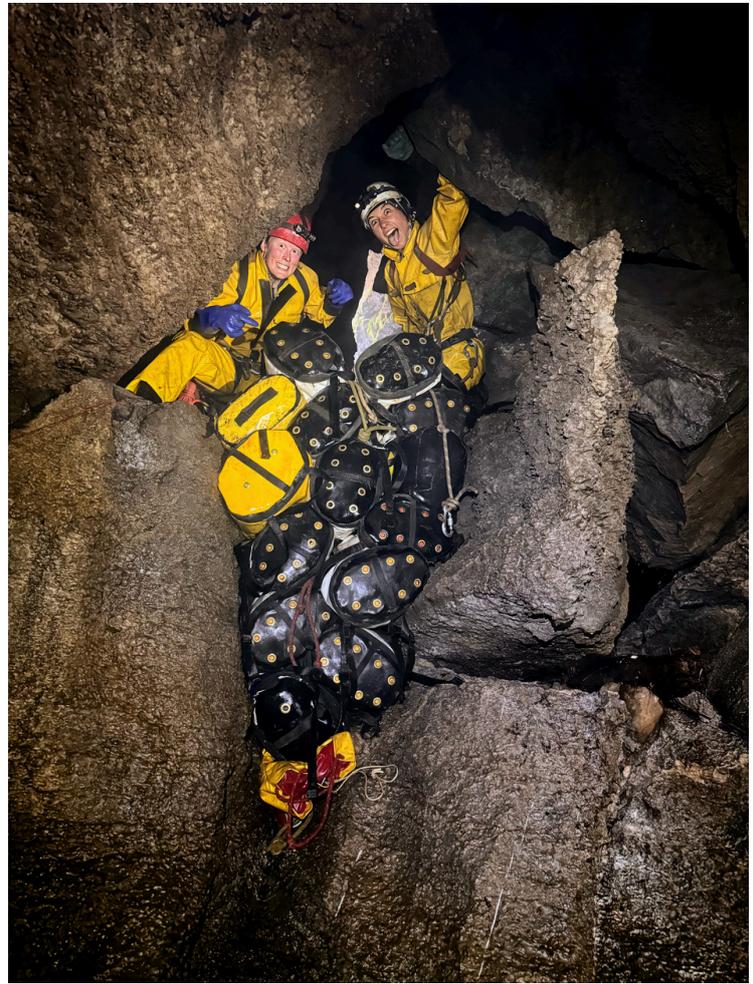
The briefing of the exercise was that we'd run overnight and anyone who wanted to could keep operating, but anyone was also welcome to just leave and go get some sleep. Of the five locals I spoke to, everybody was very keen to keep going overnight, so I assumed we'd have a solid overnight contingent. I was concerned that people might be a bit gung-ho, but actually our fatigue management was spectacular. Turns out those five were not representative of the group as a whole, and they were in fact the only five who wanted to stay overnight. There weren't enough people to effectively move the stretcher, so everybody got a good 8 hrs sleep instead. It seems that most people are quite conservative about their fatigue management and won't push too hard, at least at an exercise. If we really want people in the cave overnight, we'd need to allocate time slots and give people less freedom and more structure. More structure could also allow for staggered entrance times and fewer bottlenecks at the start.

## Logging

People were generally really good at logging themselves in and out of the cave and track. So we had a log on the surface of who was in the cave, but once the surface command went to bed the remaining cavers didn't know who else was left in the cave. That could have been solved with better comms to the surface, or better communication with the UGC by departing cavers.

## Ambulance Tasmania (AT)

We had a paramedic to come along to the exercise, and he was awesome! There's been loads of work going on behind the scenes trying to make this happen for literally years. Recently some legends have been really pushing it within AT, and getting the paperwork that needs to happen done. We were totally stoked to have Kenny from AT along on Saturday. He wasn't allowed to go on ropes (there's more paperwork to do there), but was super competent and capable of getting all the way to the patient without needing ropes. He hadn't done any proper caving, but was really comfortable and interested. We're stoked to know there are such capable individuals in AT, and also for the milestone in policy this represents. For next time we'll need to think about how we package and transport all the gear a paramedic needs to bring into the cave. Kenny had a full 100 L pack, which we didn't manage to get in this time. It was also cool to get feedback from him that our casualty movement strategy is generally appropriate and even pretty cruddy stopping spots are workable for them.



Who is taking these out guys?



Ciara you look so comfortable

## Police

We also had a couple police, Callum and Thomas. They were great as always. Thomas is a machine and can carry about 5 times as much gear as any mortal person. Callum was given the lead of the route marking team, which was a bit harsh given he'd never been in Crowling Cave, but he managed admirably. Unfortunately they were both subject to their own fatigue management requirements and had to leave before we really got any rigging happening. They seemed happy to get to spend some time underground and we're always grateful to have them along and to get to stoke that relationship.

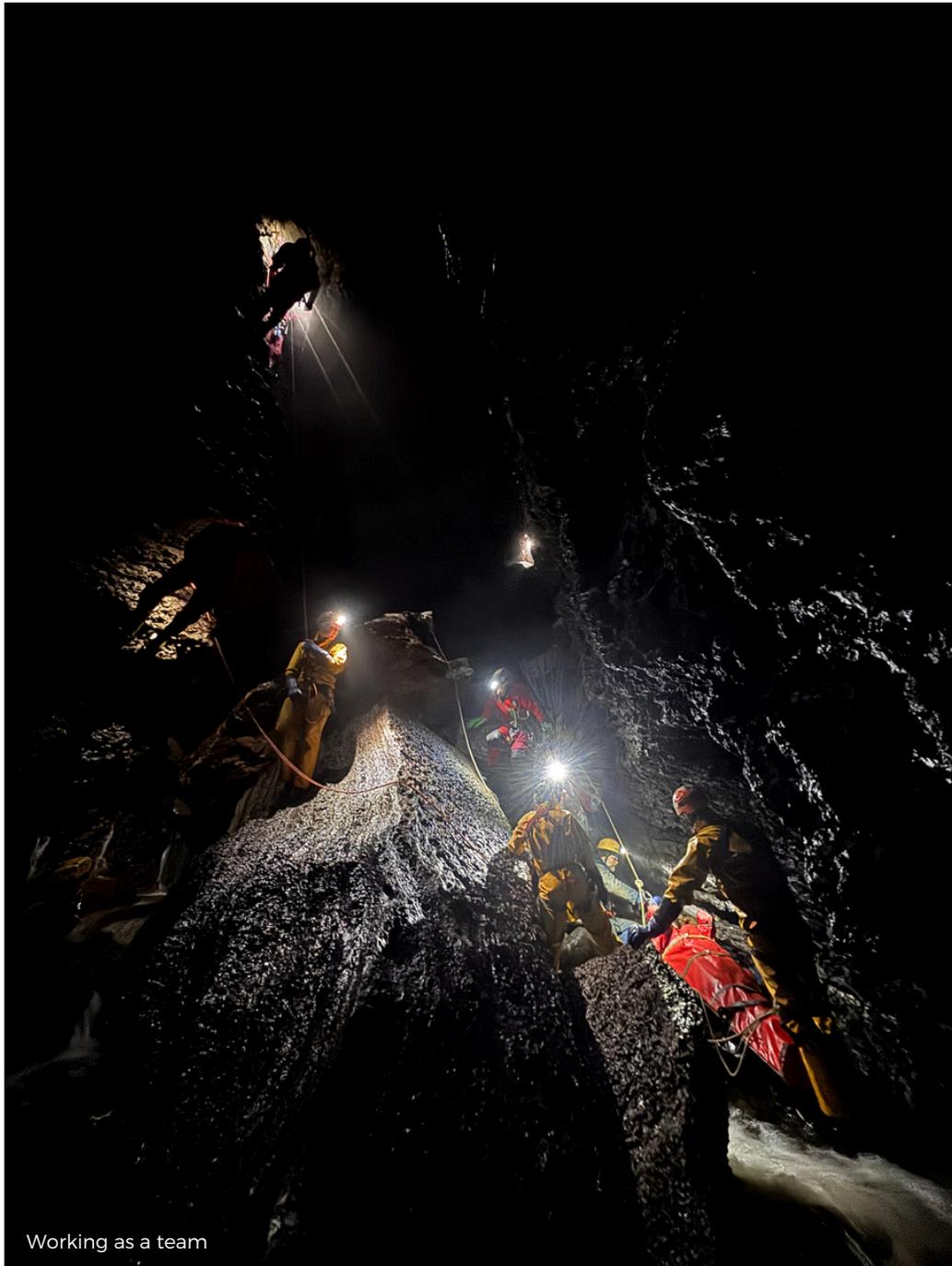
## Rigging

All the rigging I saw was excellent. Everything worked, safe and efficient. TAS and NSW are pretty consistent in rigging techniques. VIC does some things differently, and it was good practice for everybody working with others who do things in an unfamiliar way. If we have interest/time we could consider a basic skills refresher on the Friday before the exercise next time.

Some things our crew can take away to practice:

- 3-pulley transitions past Tyrolean corners. Avoids the risk of dropping the head end of the stretcher a full cow's tail length.
- Releasable (e.g. Munter) main attachments. Trades off a little height for easy transitions.
- Hauling vertically from feet. Gains some range when extra height for a transition is unavailable.
- Avoiding transitions altogether by hauling direct off Tyrolean.
- Hand signals for comms across a pitch. An illuminated person giving hand signals is much clearer than yelled instructions over distance.

This write up is all the learning points, which are naturally the bits that didn't go well. To just read this, it sounds like a total shit show, but overall, I think it was still fairly successful. People got to mingle and build trust in each other. People got to practice rescue rigging, comms and logistics. We got lots of lessons to take away. 6 out of 10, would try again with some mods.



Working as a team

# IN SEARCH OF THE CANNIBAL'S CAVE

Karl Brandt



A cannibal giant of Chinny-kinik's ilk

In 1921 renowned South Australian naturalist and conservationist, Tom Bellchambers, recorded the Indigenous legend of Chinny-kinik, the dreaded cannibal giant of the Murraylands.

Chinny-kinik roamed a vast mallee-covered plain to the east of the Murray River, catching and devouring anyone he encountered. His ravenous reign continued unabated until two of his uncles, members of the local clan whose numbers had been decimated, tracked his enormous footprints to a sinkhole in an area called Pekarra.

At the bottom of the sinkhole, the hunters discovered the entrance to a vast cave, and the following evening, with Chinny-kinik sheltering inside from a cold wind that blew from the south, they stacked the entrance with bundles of firewood and set them alight. Chinny-kinik's mighty struggles shook the earth as smoke wafted through his lair. The warriors added logs to the blaze to block the entrance, and soon the evil cannibal giant was no more.

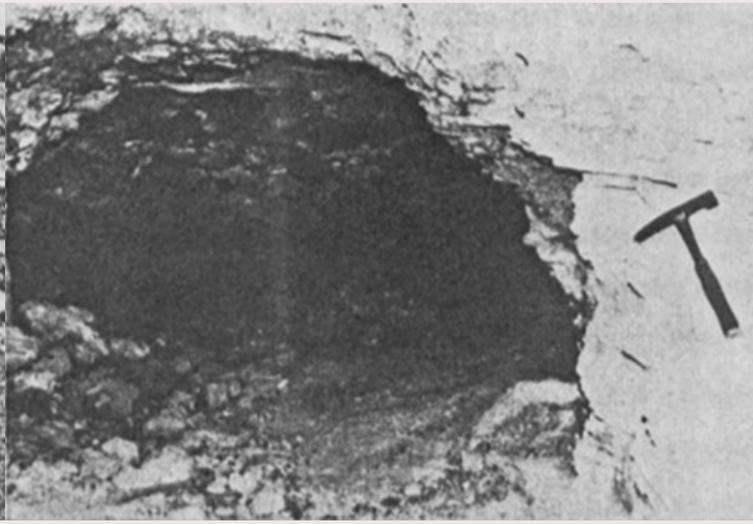
Bellchambers was determined to track down the legendary cave and narrowed the likely location to a fifty kilometre stretch of the western Murray Mallee, now a grain-growing and sheep farming area of South Australia, between the river towns of Swan Reach and Morgan and a fair way back from the river valley.

In a 1923 follow-up article for Adelaide's Evening Journal, Bellchambers appealed to readers familiar with the area to come forward with information on likely sinkholes. And now more than a century later, with the location of the cave remaining as elusive as ever, it's time to stir the pot and bring this meaty mystery to the boil.

While the name 'Pekarra' does not appear to correspond to a modern locality, there's the possibility it was misspelled at the time of its recording. According to Foster, Monaghan and Mühlhäusler's 'Early Forms of Aboriginal English in South Australia, 1840s-1920s', some Aboriginal speakers did not make a distinction between the sounds 'p' and 'b'. Instead of 'Pekarra', the cave site may in fact be 'Bakara'.



Bakara Cave entrance - Photo by R.M. Thompson



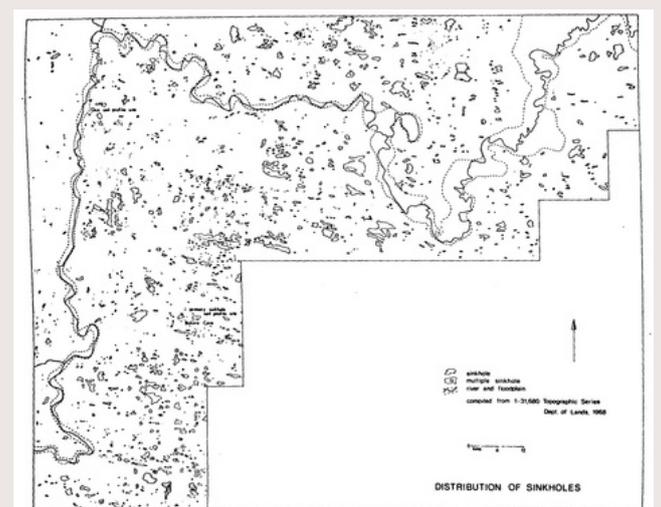
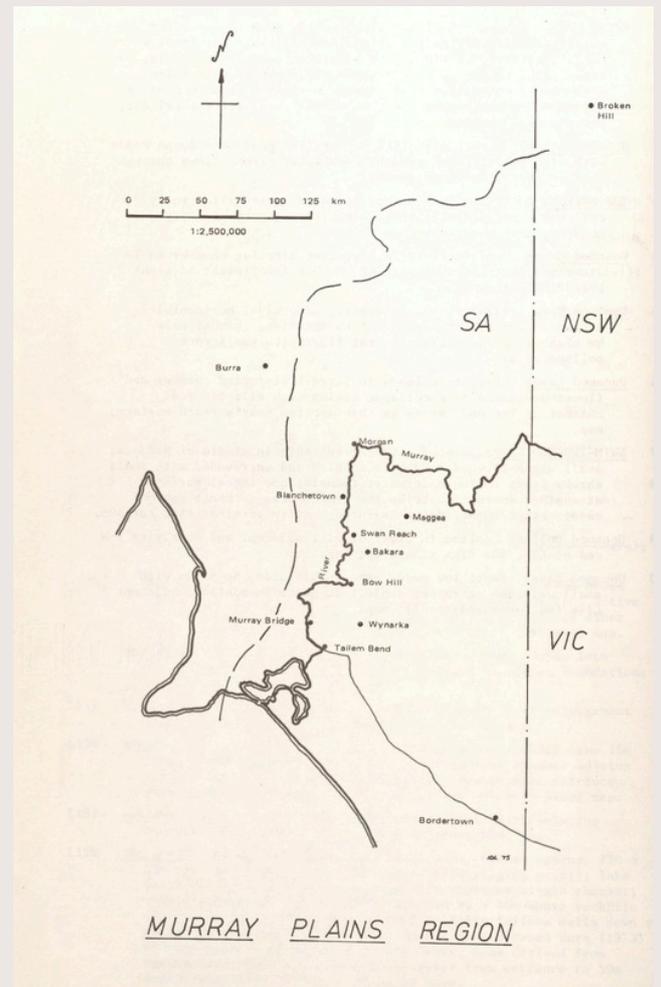
Tributary passage - Photo by R.M. Thompson

Bakara Well lies around twenty-five kilometres directly east of Swan Reach within the traditional boundaries of the now-extinct Ngayawang nation. The settlement dates back to the dawn of the 1860s when pastoralists sunk a well to help water the local sheep, but Indigenous occupation of the land stretches back thousands of years before that.

It wasn't until the early 1970s that Wayne Goedecke discovered the Bakara Well Cave, with members of the Cave Exploration Group of South Australia conducting surveying and mapping in February of 1976. The main tunnel, with a flat roof of standing height and crumbling limestone walls, splits into an extensive network of passageways beneath the calcrete surface.

The low sinkhole and gully leading to the collapse entrance to the south align with the description in the legend. Perhaps most notably, the southern position of the entrance would cause smoke from the hunters' fire to spread rapidly throughout the cave due to the strong wind that blew from that direction, sealing the cannibal giant's doom.

Now, all these years after whetting Bellchambers' appetite for discovery, the mystery of Chinny-kinik's legendary cave can finally be laid to rest.



Murray Plains Sinkholes

# VSA's Year So Far

Tom Elms (President)



Fun in Tasmania - Photo by Grace Mason

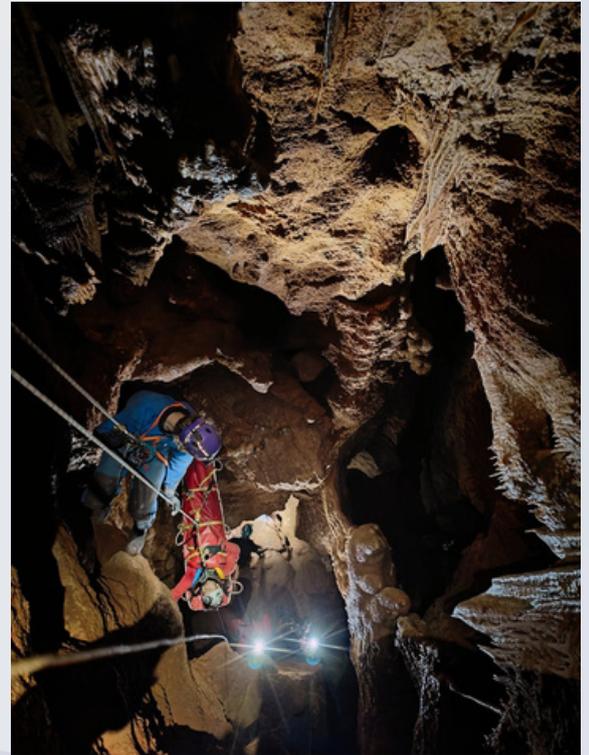


Beginners' Trip - Photo by Ruben

2024 so far has been an exciting year for the VSA and its members. From caving abroad to new discoveries in familiar places, our community has seen success across a variety of fields.

Travel has been a consistent theme, with numerous trips to Tasmania having taken place this year, along with some international endeavours. A large group ventured to Mole Creek in January, and again in March to visit renowned caves such as Kubla Khan, Sassafras, Lynds and Croesus. Further afield, Hamilton Caving Club hosted a VSA member in New Zealand, while another of our members ventured all the way to France to complete a Cave Rescue Instructor Course.

Rescue readiness has been a major focus this year, with multiple training days and rescue exercises being both organised and attended by our members. In May, a VSA group returned to Mole Creek for a simulated rescue out of Honeycomb Cave and again in October for STC's annual rescue exercise in the Junee-Florentine area. VSA member and Cave Rescue Victoria founder Bogdan Muresan has been hard at work organising additional exercises closer to home in Buchan. These have included multiple simulated rescue drills out of Honeycomb and Wilsons Cave, which hosted cavers from across Victoria and interstate.



Cave rescue practice in Honeycomb  
Photo by Nadine Muresan



Bogdan Muresan surveying -  
Photo by Nadine Muresan



Tom Elms and Nadine Muresan  
just hanging around - Selfie



Tim Ziegler presenting - Photo by Nadine Muresan



More fun in Tasmania - Photo by Nadine Muresan

On the science and research front, a team from La Trobe University conducted a microbiological survey of Scrubby Creek Cave in August with the support of VSA trip leaders. They hoped to identify extremophiles in sediment samples taken along the streamway passage. VSA committee member and palaeontologist Tim Zeigler has also led multiple expeditions to Buchan to recover fossil specimens. His most impressive work this year included the widely publicised 50,000-year-old short-faced kangaroo taken from a cave in Buchan that is now displayed at the Melbourne Museum. These fossil retrieval efforts continue to shed light on ancient ecosystems across Victoria.

Exploration and excavation continue to inspire VSA members across the state. Two successful dig projects took place at Buchan's potholes with support from Parks Victoria and traditional owners, aiming (but not quite succeeding) to locate the elusive Elk River upstream of its furthest surveyed point. Exploration extended further afield as well, with VSA teams discovering and surveying new karst features in limestone and volcanic areas across Western Victoria. Karst features have also been identified using Lidar technology in areas along the banks of the Snowy River and near Nurran in Eastern Victoria.

As we look forward to 2025, we can only hope for another year as good as this one!



Complete bones in Harry's Cave - Photo by Bogdan Muresan



Vince a little dirty out West - Photo by Marika Kahle



Fun beginners trip into Shades of Death - Selfie

# A year in the life of STC

(To paraphrase a classic)

Janine McKinnon (President)



Entrance doline Cauldron Pot - Photo by Janine McKinnon



The walk is always nice too- Photo by Janine McKinnon

And it's been another goodie, in this humble author's view.

If you are a regular reader of this magazine, you will have seen a few articles from members of STC (Southern Tasmanian Caverneers) in the past year. Mostly, they have been about exploration in our deep caves here in the south of the island, especially Delta Variant in the Niggly system. That is not all we have been up to though. No, not by a long shot...

Let's start at the beginning, so to speak, with beginner cavers. Generally, the plan of the training officers for quite a few years is to start with basic SRT training before a prospective member ever goes underground. Then the beginner gets taken on their first caving trip to somewhere with some vertical bits. This is not because we are cruel, but because almost all our caves have vertical bits very close to the entrance. If you don't like vertical, then you have a very limited life in STC. That's just how it is with our caves down here.

Several members of the club have taken trips of beginners to caves like Midnight Hole, Wolf Hole, Revelation Cave, top part of Khazad-Dum and a few other caves this year.

We have a steady trickle of prospective members and generally manage to keep one, maybe two, of them past the first few trips each year.



Locating old caves - Photo by Janine McKinnon



Rigging training - Photo by Janine McKinnon



Police rescue recruits getting ready  
- Photo by Janine McKinnon



Lake Pluto Wolf Hole - Photo by John Oxley



Police rescue recruits - Photo by Janine McKinnon

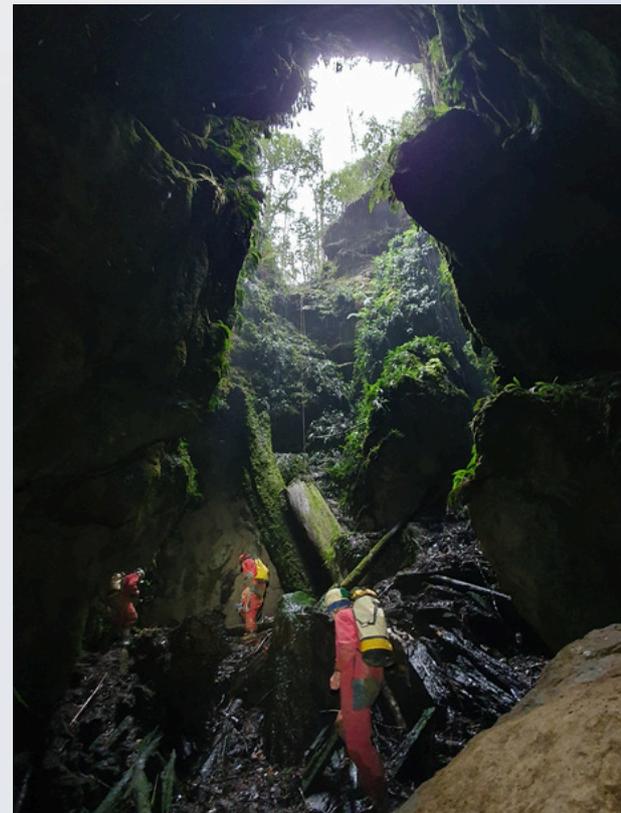
Trips have been run most weekends for sport, training, (Parks approved) permanent anchor placement, surveying or prospecting for extension passages. We are quite proud of the variety of caving we do. There's something for everyone, both in terms of fitness, skill level and interests.

After basic SRT training, advanced SRT training and rigging training are also offered to interested members on an ad-hoc basis, and we have a couple of very keen and capable new members doing trips (and theory sessions) this year to build those skills.

One of our new members has built a prototype waterproof surveying device. It is currently being field tested, while he also works on learning how to survey! Map drawing will follow soon, I have no doubt. He has only been in the club a year, and knew nothing about caving before that. Opportunities abound in our caving universe.

The Tasmanian Police Search and Rescue team have again included us in the training of their new (potential) recruits to their call-out list. In the last few years, they have included caving, and vertical caving, as part of their training. We go along on the practical days to give them an experience of being underground, and as the cave safety experts. As they will be involved (and nominally in charge) of any rescue, this is a good thing! We get to meet them and see what they are like underground, and they get to know at least a couple of our faces, and see how we do things.

On the science front this year, we have again been collaborating closely with a group of entomologists from Rostock University in Germany, who have been here something like eight times in the last three years studying *Anaspides Tasmaniae*, both above and below ground (I am beginning to be suspicious that they like it here and are stretching these field trips). We take them to many and varied caves to look for, and collect, specimens. Some of us have gotten quite good at spotting the little critters.



Back to Daylight - Photo by John Oxley



Prof Stefan Richter and Christoph Hoepel - Photo by John Oxley



On the way to the cave - Photo by John Oxley



Ashlee likes the cave in Wolf Hole  
- Photo by John Oxley

Also, a couple of our members continue to be significantly involved in the slow and methodical extraction of megafauna bones (amongst many others) in a cave they discovered. This is an important discovery, and very scientifically exciting. The collaboration between STC, NRE (government authority), and professional palaeontologists is inspiring.

We have been contacted again this year to be safety/cave expert consultant on a Tasmanian University Extreme Sports Medicine course (rescue in a cave category) - this is the third year.

We have been contacted by the media several times (ABC mostly - they lurk in our facebook group) for radio interviews, or TV in one case. These have been good-news stories, which is not only a change from normal, but an excellent opportunity to show the general public that caving isn't all disaster and rescue.

Have I covered everything we have been up to? Nope. If you want to join the lurkers, you can join our facebook group. Most of our trips are advertised here, and post-trip photos uploaded. We have around 600 members in the group, so they aren't all STC members! Only a very small number are. People do like to lurk and follow what's happening, nothing wrong with that.

It can be found here:

<https://www.facebook.com/groups/SouthernTasCavers>

Our club magazine comes out quarterly and includes almost all trips run by the club. I like to think it's an informative and enjoyable read, with lots of pretty photos to look at. All issues since mid-2017 are publicly available there:

<https://southerntasmaniancaverneers.com/spiel/>



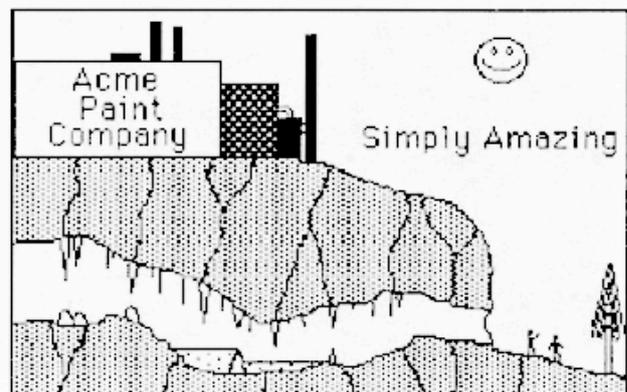
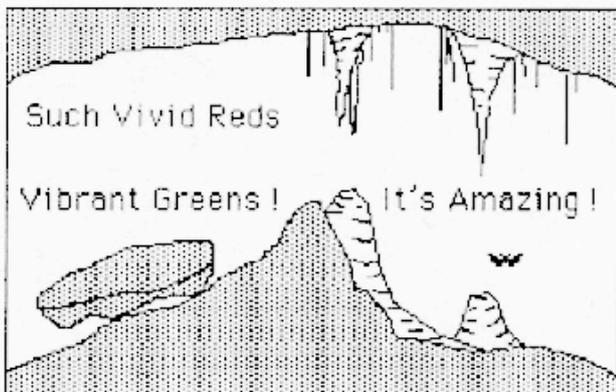
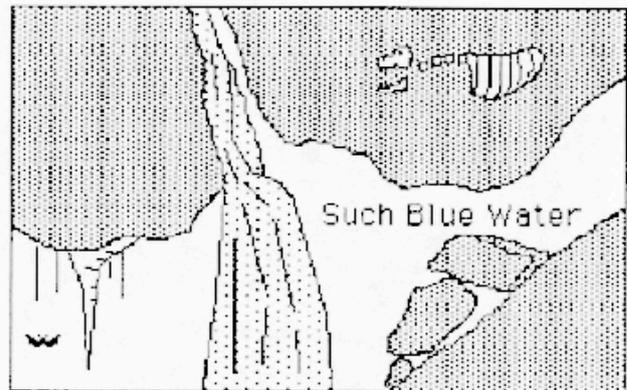
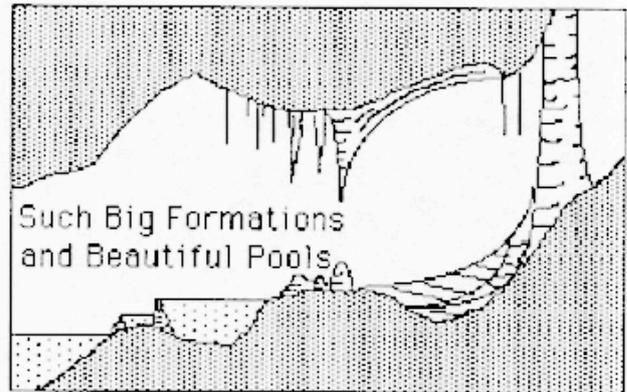
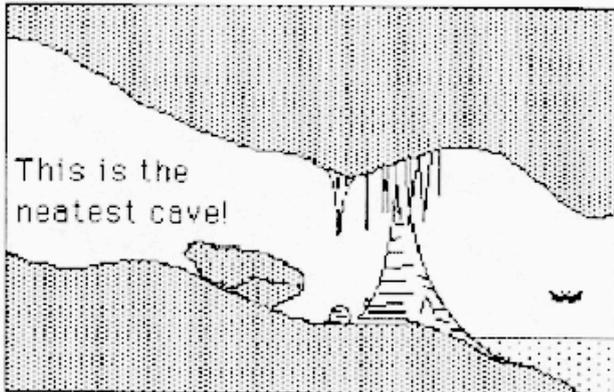
Rescue Practice on Mt Wellington Organ Pipes  
- Photo by John Oxley



Christoph Hoepel anaspides collection -  
Photo by John Oxley

# ONLY A CAVER

David Herron



# Creating new connections in the Caving Community: Pomborneit/ Mt Porndon Caving Trip Report

Sarah Baeffel



Figure 1: David Salter excavating cave entrances on his property

New cave entrances discovered on a property in Pomborneit lead to a weekend adventure to Western Victoria. David Salter contacted the VSA to come and investigate two holes found in a basalt boulder laden property. He had done hours of background research and was excited to investigate the presence of possible Pahoehoe lava tubes through the property. He had spent many hours excavating these spaces and was excited for potential leads. Nigel Cooke mapped the larger excavation whilst the rest of the group did further digging on the other hole. Even though there is potential for leads nothing seemed to open up into larger chambers – but you never know!

Trip leader Susan White provided a wealth of geological knowledge on ancient lava flows and Western Victorian cave structure and Nayeli and Aliza, two university researchers collected bacterial moulds from the caves visited. Back in the labs, these bacterial moulds were investigated to sequence DNA of the bacterial and fungal microbiomes endemic to lava caves around the world. Also joining the team were Marika, Janeen, Kristen, Nick and Vince, who each had different levels of experience and expertise. It was great talking around the campfire about a huge range of topics. Nick White logged GPS coordinates of the new caves visited, and collected fungal samples from our boots to investigate the impact of transfer of fungi into caves by cavers. It was fantastic to have the academic members present to enrich our knowledge of the area and its formation.

The afternoon was spent on local farming properties. David had developed relationships with local owners which allowed VSA access to areas previously unseen by the club.

On the first property we explored a basalt boulder cave approximately 15 m long. In the time allocated, we only just had time to survey line plot half of the cave and Vince began to follow a possible lead. Depressions on the surface indicated possibility for other collapsed caves in the area. It would be good to do further exploration of this site and we are thankful for being invited onto the property by the owners.



Figure 2: Aliza, Geology/Biology honors student in granite boulder cave



Figure 3: Trip team including Nick, David, Marika, Nayeli, Eliza, Janeen, Nigel, Vince and Kristen



Figure 4 Aliza and Nayeli at Arch Cave



Figure 5: Impromptu rigging into Rubbish Cave

One Dome cave was our final stop, late in the afternoon. Situated in lush farmland, the lava blister cave, approximately 10-15 m in diameter, was a hideout and training area for troops back in the days of war. The domed roof was highlight! Vince Bolte located and photographed a number of bones. David also took us to a large depression that he hypothesised was an exploded lava blister nearby.



Figure 6: Straight line survey by Sarah and Marika

The next morning saw us returning to the lush farmland where we entered the spectacular Arch cave. Home to a community of Southern Bent-Winged bats, we used red headlamps to reduce our impact in the cave. This huge lava tube cave, 100 m long, is framed by a picturesque arch in the front and we felt dwarfed walking through the immense cavern.

After this adventure, we finished off with Rubbish Cave. This cave had been used as a dumping point for farm equipment and rubbish for at least one hundred years. Vince Bolte and Nigel Cooke created an impromptu rig, and we trampled through the pile of rubbish down into the cave. The cave opened to a larger chamber with an interesting crack passing through the floor. The cave roof gradually descended to a flattened passage studded by the corrugated lava drips that caught on clothing and made the progression difficult. The interesting jewel we found was a white fungal fruit located near the back of the cave.

Overall, a fun weekend investigating areas that have not been accessed by caving clubs for an extended period of time. These community connections are so valuable in allowing access to areas of interest. Thanks to David and Wendy Salter who provided amazing accommodation and hospitality and farmer Andrew donated the most amazing milk and double cream from his dairy farm. It's these types of connections that help boost greater understanding by the local community, sharing of information from academics and preservation of the precious cave biome.



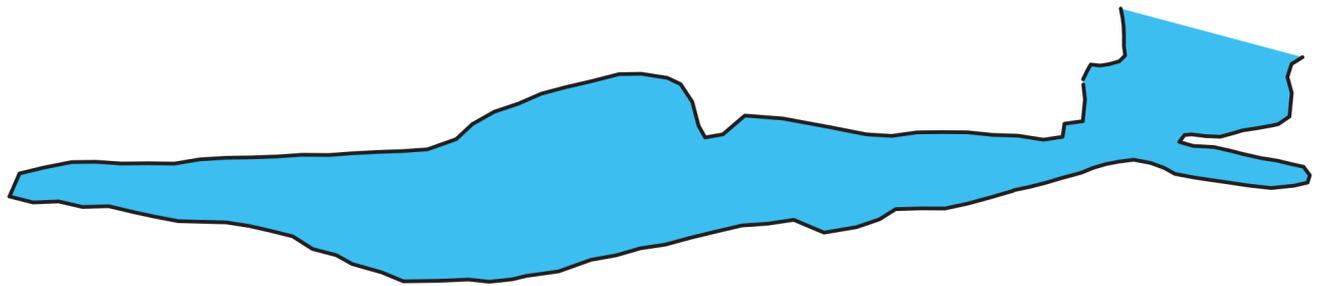
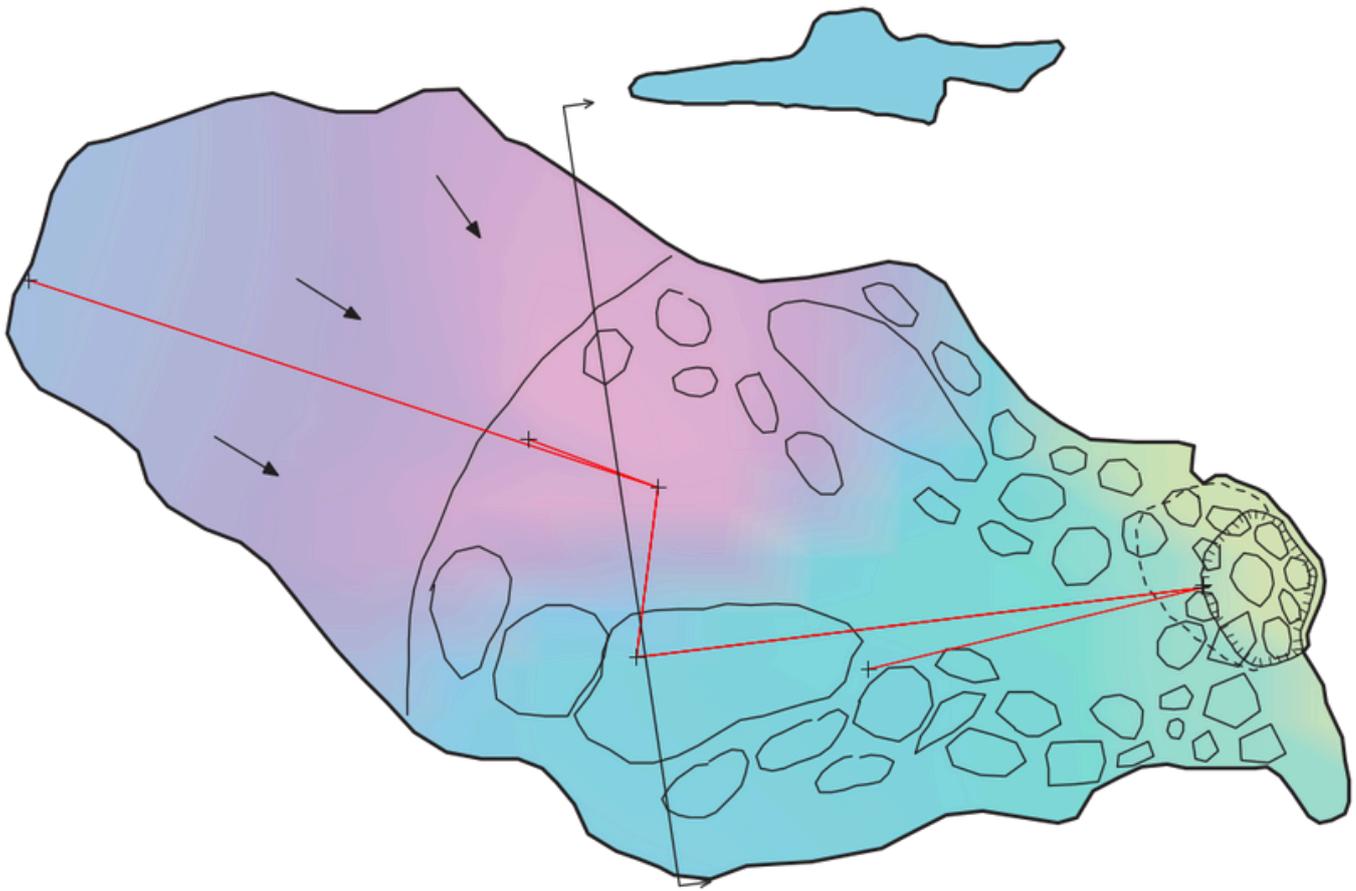
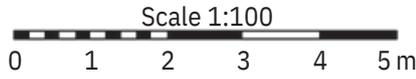
Figure 7: Bones in One Dome Cave



Figure 9: One Dome Cave Entrance



Figure 10: Over a hundred years of rubbish encroaching on the cave entrance



North Elevation

# One Dome Cave

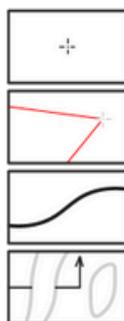
Scale: 1:100

Length: 30m

Depth: 3m

Surveyed by: Sarah Baeffel, Marika Kahle

Map Author: Nigel Cooke

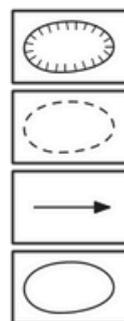


Survey Station

Survey Leg

Outer Wall

Cross Section

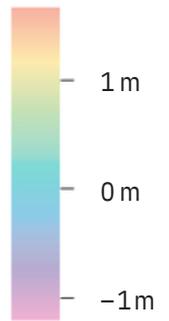


Pit

Chimney

Sloping

Rock



1 m

0 m

-1 m



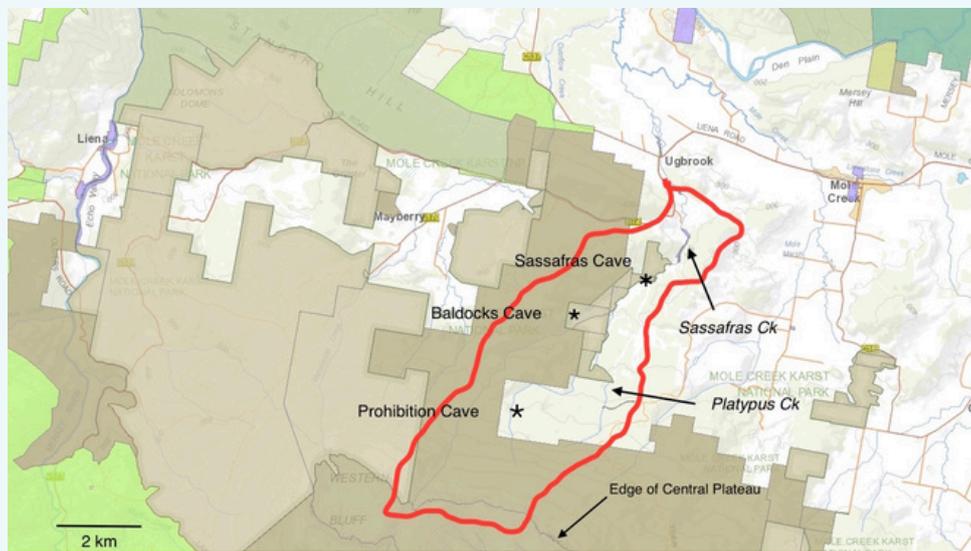


Figure 1: Approximate outline of the Sassafras karst subsystem catchment and main features, courtesy the LIST map. Note: conservation areas and national parks are shown in brown shades; these blocks are now included in the Tasmanian Wilderness World Heritage Area.

## Sassafras cave system

### A case study in conservation, cave stewardship and community at Mole Creek

Article and images by Deborah Hunter

#### Forward:

*Cave access and conservation of caves and landscape processes across the wider Mole Creek karst have a long and complex history (to be covered at the coming Buchan conference 2025), but as a case study, the Sassafras subsystem is especially complex and interesting.*

#### Mole Creek overview

The Mole Creek karst in northwest Tasmania extends approximately 26 km east-southeast to west-northwest, between kooparoonia niara/ Great Western Tiers to the south and the Mersey River 10 kms to the north. Over 450 caves are known, located mainly within low ridges separating the glacio-fluvial valleys of the lowlands and on the foothills and slopes of kooparoonia niara. Most drainage is underground.

At Mole Creek, streams drain underground from non-karst topography above the limestone contact. The karst experiences annual rainfall of 1250 - 1400 mm. The climate system is Mediterranean: dominantly winter-wet, with warm dry summer-autumn seasons, modified periodically by El Nino Southern Oscillation (ENSO) fluctuations.

#### Sassafras drainage subsystem and its caves

Sassafras is one of 12 drainage subsystems of the Mole Creek karst (Figure 1). Spectacular geological contact stream-sinks such as Flowers Pot, Prohibition Cave and Gimlis Grotto carry flows to lower elevations. The lower Sassafras subsystem contains the well-decorated Sassafras, Baldocks, Cyclops and My caves, important to caving clubs, schools and commercial tours as beginner caves. These classic caves have little vertical development and range from simple river caves to networks of fossil and active river passages.

Entrances to these well-known caves tend to lie proximal to the valley margin, consistent with past glacial and periglacial influences on cave development. An ephemeral overflow stream can be seen on the surface between Cyclops Cave and Sassafras Cave for much of the year. It is joined partway along this course by a spasmodically active tributary that passes Baldocks Cave. It then follows an apparent glacial meltwater drain at the hillside margin of the hummocky valley floor, terminating at Sassafras Cave's upstream (inflow) entrance. Water is poached into the underground on the way, through the deep glacial gravels. A dry and abandoned drainage line continues past the inflow for another few hundred metres as far as a bedrock confined pinch and gravel mound near Sassafras Cave's main (outflow) entrance. Here a further episodic tributary joins from the farmland and plantation. Sassafras Cave's resurgence is seasonal, but its surface stream bed is joined a short distance further north by perennial karst springs draining Mayberry polje (sub-catchment) to the west, breaching the surface divide. The combined flow is known as Sassafras Creek, which drains both sub-catchments past the caravan park to the Mersey River.

#### Aboriginal significance

The lowland area surrounded by the classic Sassafras subsystem caves presents as an Aboriginal cultural landscape consistent with other cultural landscapes of the Tasmanian Wilderness World Heritage Area (TWWHA). It is a garden-like mosaic of grassland, woodland and forest (Figure 2).



Figure 2: At the Sassafras access road's end: the section of surface overflow channel between Cyclops and Sassafras Caves, fenced off but excluded from reservation. Heritage tree and other native eucalypts mid distance, plantation and pasture on adjoining private land to the left and alpine catchment in the distance.

The “edge” effect of lowland and highland, grassland and woodland, maximises resources available to living beings. At the end of the access road, a giant hollowed *Eucalyptus viminalis* sits amid a paddock beside a creek. Six lesser trees are spaced nearby. Following on-site inspections by eucalypt experts and ecologists, the big tree’s age is unknown but may exceed the oldest known age of 300 years identified in formal research of *E. viminalis*. Unfortunately, it is located on the road reserve, not within the TWWHA. Its form suggests it is a cultural tree nurtured by Aboriginal custodians within established grassland and cared for as it grew. It is now a wildlife hotspot teeming with bird and mammal species.

The present-day Aboriginal custodians of the pallatorre Country are the Kooparoona Niara mob. Learning more while walking this Country with elder Uncle Hank Horton, two cultural trees with “base stones” were identified. The big tree and location mark the site of an important ceremonial and gathering place. Other Aboriginal groups would have been invited here for special cultural occasions. It lies at the junction of a pathway to/from wylatter, the former Aboriginal settlement near Mole Creek township, and the trans-kooparoona niara pathway (DEC, 1992; Robinson, in Lloyd, 2012), a route used by Aboriginal groups to traverse their rangelands along the base of the escarpment.

### Landscape conservation

Small “scenery” reserves around cave entrances were declared early in colonisation, indeed Baldocks was once used for gas-lit tourism (Haygarth, 2015). Now conservation tenure is contiguous over the forested Sassafras/Mayberry divide up to the highland escarpment. This status better protects hydrological, ecological and chemical processes and allows for improved control over visitor access and management by the local Parks and Wildlife field centre. This aspect is enhanced by relative remoteness of cave access, being two kilometres of gravel road past a locked gate plus bushwalking.

### Caver management

Honeycomb Cave and caves at Sassafras carry most beginner trips at Mole Creek, within and outside the caving club scene. A booking system now applies to these “Experienced Leader” caves (Cave Access Policy, DPIWE, 2014); also track definition, distribution of cave notesheets and party number limits. Only Baldocks is gated. Other wild caves of Sassafras are zoned “Self-reliant.” Irregularly visited by clubs, most are secluded in thick bushland and no management measures are imposed.

### Dawning of environmentalism

Mole Creek really became known as a caving destination following the formation of the Tasmanian Caverneering Club in 1946 and Australia’s inaugural national conference in 1957, when Honeycomb Cave was mapped. Knowledge of the Sassafras subsystem improved with a resurgence of interest in cave exploration at Mole Creek in the 1980s and 1990s. It took the combined systematic efforts of those days, political action and bureaucracy behind the scenes to ultimately lead to the expansion of conservation tenures seen today at Sassafras and across Mole Creek.

Environmentalists have lobbied for appropriate boundaries of the TWWHA and reduction of native forest logging since the non-contentious TWWHA core was listed in the early 1980s. Since then, various iterations of the Great Western Tiers National Park proposal 1990-2023, sustained efforts to harness community support (e.g. Hunter, 1982; Kiernan, 1984; Deloraine Environment Centre, 1992; Lloyd, 2012) and caving club documentation of the karst values (Lichon, 1992, 1993a, 1993b, 1993c), the Sassafras forests achieved conservation tenure, replacing forestry tenure. Finally, fencing and purchase of a riparian reserve linking the caves was funded by the Karst Forest Program in 2008 (Dept CC,E&W, undated). This facilitated addition of Sassafras drainage subsystem to the TWWHA and consolidation of conservation tenure by 2016.

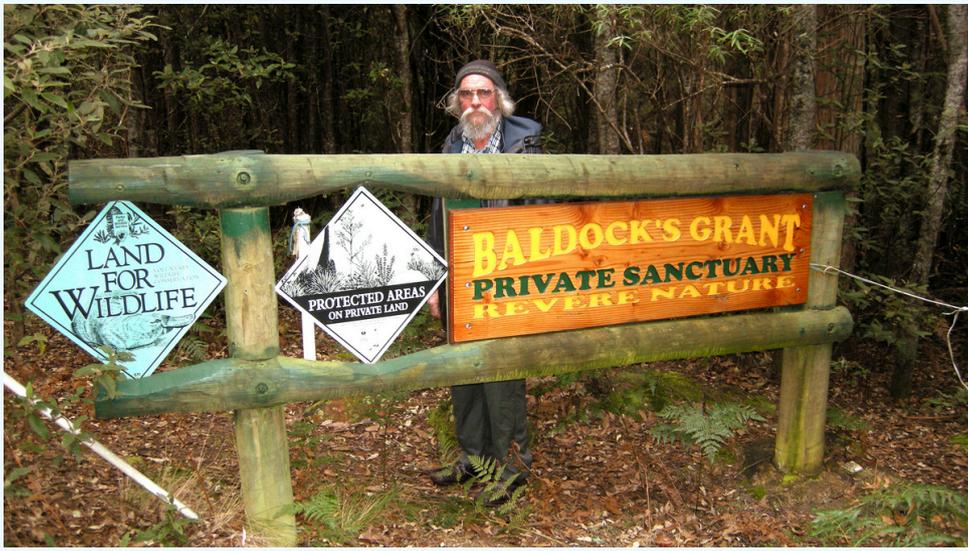


Figure 3: Karl Irwin (dec.), philanthropist of Baldocks Grant Private Sanctuary.

Its values are consistent with the rest of the TWWHA and contiguous native vegetation covers the divide from lowlands to highlands on kooparoonia niara / Great Western Tiers.

Mixed private and conservation tenure across Mole Creek is still problematic. Private land use practices can affect caves at Sassafras.

### Cross-tenure issues

A former municipal rubbish tip located in dolines of polygonal karst above the Mayberry underground drainage route was only forced to cease operations following sustained political and media pressure during the 1980s. For the duration of the use of the site, abattoir waste was dumped in these dolines and rats were controlled by poisoning. The spring water was abstracted for household and dairy use downstream and children played in Sassafras Creek at the caravan park.

Pollution, erosion and sediment flux are still problematic due to changed hydrologic regime with climate change and runoff from grazing land. The value of the new riparian reserve was compromised when 2.1 hectares of newly fenced off overflow stream between Cyclops Cave and the junction of the Baldocks overflow (Figure 2) was excluded by the actual purchase survey in 2008. New ownership (2022) has resumed farm stock access to the creek. This and more intensive cattle grazing has resulted in eutrophication of the stream flowing into Sassafras Cave.

While municipal planning now recognises most of the karst as a contiguous “high conservation” status landscape (Meander Valley Council, 2018), forestry is a “permitted activity” outside Council’s control. Large monoculture plantations of exotic *Eucalyptus nitens* lie at mid- and low altitudes across the adjoining private land (Figure 2). Even-aged broadacre tree monocultures efficiently intercept rainfall, hence reducing groundwater recharge.

This in turn reduces flow in cave streams, threatening endemic cave fauna habitat. Disturbance during harvest risks siltation of adjacent caves.

Nevertheless, three well-located covenanted private blocks are helping conserve karst processes. One on a ridgeline above Sassafras Cave, another at Quarry Cave above the Mayberry resurgences and Baldocks Grant Private Sanctuary. Private Sanctuary is the highest possible protection covenant in Tasmania (Figure 2). Situated on the karst contact, Baldocks Grant protects deep dolines, Gimlis Grotto streamsink and Platypus Creek, which sinks approaching My Cave and Glow-worm Cave.

### Climate change

Climate change has adversely affected Sassafras caves, landscape and hydrology. While the total annual rainfall is unchanged (author’s 43-year rainfall records, Caveside), it comes more often in high magnitude events, with longer dry spells between. This contributes to annual drought in overland flow between Cyclops and Sassafras caves, where this was uncommon from the 1970s through the 2000s. Platypus have not been sighted for some years. The effect is exacerbated by changes to alpine peatland runoff regimes and plantation interception of groundwater recharge effects.

Climate change has increased the susceptibility of western Tasmania’s forests and peatlands to wildfire (Wickramasinghe et al., 2024). A fire caused by dry lightning strikes in 2016 burned thousands of hectares of alpine peatland catchment above Sassafras. Prior to the fire, the ancient peat moorland above Sassafras acted like a sponge, storing water from storm events and releasing water through dry weather spells. Because loss of the peat left bare rocky pavements, runoff following storms has increased, resulting in high energy flow surges over the lowland glacial gravel beds. Active erosion gullies developed rapidly in the vicinity of Baldocks Cave (Figure 4).



Figure 4: Example of erosion gullies in glacial gravels near Baldocks Cave, with St Patricks College revegetation volunteers.

The increased energy of overland flood events has substantially exacerbated erosion along the length of the ephemeral stream, where it is now clear that insufficient margin was allowed for revegetation when the riparian reserve was fenced off (Figure 2; Figure 5). The increase in high magnitude flow surges was not foreseen at the time. The undermining of fencing may provide an opportunity for negotiation of a realistic fence setback to allow future revegetation to stabilise the bank.

White gums (*Eucalyptus viminalis*) are showing drought stress (“gingering”). Sap leaks from a weakened cambium, compromising the rise of sap to the trees’ crown. While many affected trees die, resistant trees suggest opportunity to propagate the best stock for use in revegetation.

Thin residual soils confined to pockets in outcropping limestone overlies much of Sassafras. These soils, with large organic component, are very susceptible to destruction by fire. In the face of climate change, it is more important than ever to prevent wildfire on this karst forest.

### Community

Increasing security of conservation tenure and a heightened sense of environmental ethics spurred progressive iterations of community care since 2009. From trials in fencing revegetation against browsers (Parks, Natural Resource Management (North) and WildCare, in Rose & Rose, 2021) to Central North Field Naturalists flora surveys, several community organisations and cavers have been involved. A guide to ongoing revegetation works and weeding at Sassafras funded by Friends of Great Western Tiers/ kooparooniara aims also to engage neighbours (*Sassafras Creek Conservation Program* briefing document, Rose & Rose, 2021).

The Plan grew from St Patricks College environmental and speleology camp programs of the author’s ecotourism business. Scotch Oakburn College have joined the effort.

### Future

Improvement of neighbour relations and further revegetation at Sassafras is urgent.

Tasmania’s combined environment groups maintain commitment to the future dedication of conservation area tenures to national park, to prevent logging and mining and in keeping with outstanding Tasmanian government commitments to UNESCO regarding the World Heritage management.

### Acknowledgements

In addition to those already mentioned, special acknowledgement is due to Rod Pearce (dec., Tasmanian Land Conservancy), David Hayward (SPC) and Sally and Herbert Staubmann (Habitat Plants), Phil Gregg (dec.) in our karst contact investigations and Karl Irwin (dec.), environmental warrior of Baldocks Grant Private Sanctuary, for inspiration in keeping up the fight.



Figure 5: Erosion of the surface channel undermining fencing

## References

- Deloraine Environment Centre (1992): *Plains to Plateau: cultural and natural heritage in the Deloraine district*. Deloraine, Tasmania.
- Department Climate Change, Energy and Water (undated): *The Mole Creek Karst Forest Programme*. <https://www.dcceew.gov.au/environment/land/forests/mole-creek-karst-forest-programme> Accessed 7 November 2024
- Department of Primary Industries, Parks, Water and Environment (2014): Cave Access Policy. < nre.tas.gov.au >
- Haygarth, N (2015): *Wonderstruck: treasuring Tasmania's caves and karst*. Forty South, Hobart.
- Hunter, D (1984): *The Effects of Development on Karst Resources. Interim Report*. (Unpub.) Save Quamby and the Tiers Campaign, Deloraine.
- Kiernan, K (1984): *Land Use in Karst Areas: Forestry Operations and the Mole Creek Caves*. Forestry Commission, Hobart.
- Lichon, M (1993): *Exploration in the Sassafras Area*. Illuminations 2 (p 25). Mole Creek Caving Club, Tasmania.
- Lichon, M (1994a): *Sassafras Area Explorations*. Illuminations 3 (pp 19-27). Mole Creek Caving Club, Tasmania.
- Lichon, M (1994b): *Ferns and Bryophytes of Sassafras Ridge*, Illuminations 3 (pp 29-32). Mole Creek Caving Club, Tasmania.
- Lichon, M (1994c): *Sassafras sinkhole features and their ecological communities*. Illuminations 3 (p 33). Mole Creek Caving Club, Tasmania.
- Lloyd, S (2012): *The Edge: a natural history of Tasmania's Great Western Tiers*. Friends of Jackeys Marsh, Meander, Tasmania.
- Meander Valley Council (2018): Tasmanian Planning Scheme - Meander Valley Local Provisions Schedule (LPS) (2017), karst appendix. <https://www.meander.tas.gov.au/assets/docs/Reports-Strategies/Planning/Meander-Valley-LPS-Appendix-A-s.35-Notice-Modified-September-2018.PDF> Accessed 9 September 2024
- Rose, K and Rose, M (2021): Sassafras Creek Conservation Project Briefing Document.
- The Great Western Tiers National Park Campaign, Australian Conservation Foundation, Tasmanian Conservation Trust, The Wilderness Society. (1995): A Great Western Tiers National Park: an extended proposal. Tasmanian Conservation Trust, Hobart.
- The Western Tiers Interest Group, The Jackeys Marsh Residents Association, The Wilderness Society, The Australian Conservation Foundation, The Tasmanian Conservation Trust (1990): *The Great Western Tiers: the case for conservation. A proposal for a Great Western Tiers National Park*. Deloraine Environment Centre Inc. Deloraine Tasmania.
- Western Tiers Campaign (1993): Towards a Great Western Tiers National Park Management Plan. Deloraine Environment Centre, Deloraine.
- Wickramasinghe, A, Boer, M, Cunningham, C, Nolan, R, Bowman, D and Williamson, G (2024): *Modelling the Probability of Dry Lightning Induced Wildfires in Tasmania: A Machine Learning Approach*. Geophysical Research Letters Vol 51/16.



Fig 1. Cave pearls covering the floor in Cathedral Cave (KNI080) - Ningbing Range, WA. Largest is 70mm dia.

## Cave Pearls

Article and images by Garry K. Smith

Cave pearls are concentrically-banded concretions that typically form under a drip point or in a shallow cave pool (Fig 1 & 2). They can range in size from as small as a sand grain up to 15 cm or larger in diameter. Given the right conditions such as in Son Doong Cave, Vietnam some pearls have grown to “the size of basketballs” (Jenkins 2011).

In limestone caves they are mostly composed of calcite and/or aragonite, however in caves formed in other bedrocks “cave pearls can be composed of other minerals such as goethite, whitlockite, carbonate-hydroxyapatite, smithsonite, and hydrozincite” (Hill and Forti 1997). As the majority of cave pearls are formed in limestone caves and consist of calcium carbonate ( $\text{CaCO}_3$ ), this article generally refers to pearls coated in layers of calcite. However, the coating could be aragonite - (precipitation is favoured from Mg-rich waters) or coatings of the previously mentioned minerals, depending on the cave geology where the pearls are located.

Historically cave pearls have also been called ‘pisolites’ or ‘oolites’ in published literature, but these terms should be reserved for the geological description of rocks. These terms are further discussed under the heading ‘Above Ground’ in this article.

### Appearance

Cave pearl shapes can vary considerably from spherical to cylindrical, through to irregular forms. Around the world there are also recorded instances of hexagon and cubic shaped cave pearls. They are usually white or grey but depending on the cave geology may be a range of other colours. Pure calcite is opaque or translucent white, while yellow, orange, red, brown and black occur when introduced impurities such as organic compounds (e.g. tannin) are deposited along with calcite or are composed of other minerals.

Spherical cave pearls usually develop around small and compact nuclei, such as sand grains (Fig 3A), while cylindrical or irregular pearls tend to have larger, elongated or irregular nuclei (Fig 3B&C). Therefore, cave pearls that begin growing around larger nuclei, tend to retain that overall shape but become more rounded as the carbonate layers are deposited.

The outside surface texture of cave pearls can range from smooth, hard and shiny, through to a soft and crumbly coralloid.

### Origin

Cave pearls are found in a range of locations from on top of flowstone floors through to immersed in shallow cave pools. A pearl starts growing as calcite is precipitated out of solution around a nucleus that may be as small as a grain of sand or larger objects such as a pebble, piece of bone, shell, broken cave straw etc. (Fig 4).



Fig 2. Steve Bourne observes cave pearls in a shallow pool under a shower head in Drunken Forest Cave, Mulu, Sarawak

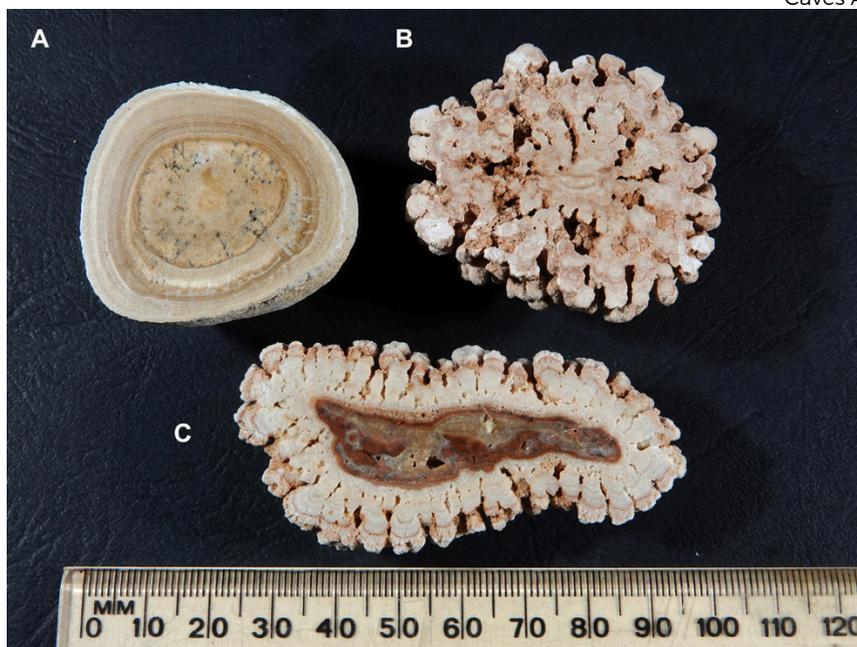


Fig 3. Sectioned cave pearls. Note the shape and size of their nuclei. A and C are from the Cook Islands, B is a coralline ball from KNI090 cave, Ningbing Range WA. Note, 3C is a cave pearl formed around an elongated nucleus - a shattered piece of dark coloured calcite.

As successive concentric layers of calcite are deposited on the outside of a cave pearl, it becomes larger and more rounded.

The internal structure can range from fine-crystalline concentric rings (Fig 3A) through to a coarse-crystalline dendritic structure (Fig 3B). Location of a pearl, solution saturation and temperature can have a big bearing on its morphology and composition.

Smooth, polished pearls form under active drips that hit or splash on them (Fig 1 & 8) or where water circulates rapidly past them as they grow. Their concentric growth layers are usually made up of small calcite crystals. Rough coralline or cauliflower looking cave pearls form under quieter conditions such as completely immersed in a shallow pool (Fig 3B, C). The coralline type (Fig 5) sometimes called 'coral balls', appear to be more common in tropical karst. When sectioned these coralline cave pearls have laminated, outward- expanding columns that may branch as the pearl grows larger (Fig 3B, C).

This is because deposition of calcite from saturated solution, due to diffusion of carbon dioxide ( $\text{CO}_2$ ) to the cave air, is enhanced by warmer conditions and air movement. However, a range of cave pearls of various morphology can still be found across both tropical and arid cooler climate karst (Fig 6).

Cave pearls can even form with unusual shapes such as some found in Pau Atea Cave, Atiu Island - Cook Islands. The initial cave pearls have formed in the shape of a flattened sphere, however a thin horizontal flange ( $\approx 1$  mm thick) of calcite has grown out from the pearl presumably when the pool water level has remained stable and calm for a lengthy period of time (Fig 7).

In some instances, the growth of cave pearls can be influenced by microbes. Jones (2009) studied cave pearls from dried-out rimstone pools in Old Man Village Cave on Grand Cayman, British West Indies.



Fig 4. A currently dry gour pool containing snail shells at various stages of being coated in calcite to become cave pearl nuclei. KNI159 cave, Ningbing Range - WA

He found that the growth of cave pearls in this cave involved both abiogenic and biogenic processes influenced by water flow. Microbes trapped and bound detrital grains to the surfaces of the cave pearls and indirectly mediated precipitation of the fibre crystals. His study determined that, "Despite the lightless environment of the cave, the evidence clearly shows that the microbes and their associated extracellular polymers (EPS) played a critical role in the growth and development of the cave pearls."



Fig 5. Coralline cave pearls ~50mm dia, each weighing 85g from KNI090 cave Ningbing Range WA. See section Fig. 3B

The occasional small movement of cave pearls due to vibration from drips or flowing water, prevents them from becoming attached to each other or to the cave floor. Partly submerged cave pearls that are directly impacted by falling drops, are continually, vibrated or moved, possibly even gradually rotated, preventing them from adhering to the cave floor, as new layers of calcium carbonate are deposited over their surface. At the same time calcite layers are being added to the flowstone and bottom of cave pools on which they lie.

When the pool dries up they may remain dormant for many months or years, until  $\text{CaCO}_3$  saturated water once again flows into the pool or drips onto the pearls.

It should be noted that the gradual movement, even possible rotation, of a cave pearl due to water drops or flow, does not round or polish them. They become rounded because the outer layer of fine calcite crystals is growing in all directions at the same time. The rounded shape is promoted because the greatest amount of calcite can be deposited on the smallest surface area, thus promoting a round form even if the initial nucleus was an irregular shape. As mentioned earlier, this depends on the size and shape of the nucleus and number of calcite layers.

When a cave pearl is sectioned, the growth layers become quite obvious and may be defined by variations in colour or crystal structure (Fig 3). These layers or rings typically indicate the seasonal weather pattern or cycles of wet and dry, summer/winter, which are responsible for the changes in water supply, degree of calcite saturation and introduced impurity.

Beneath a single drip point a shallow depth depression may occur on the cave floor. This depression may become coated in calcium carbonate and could contain cave pearls.



Fig 6. Various shaped cave pearls collected from Pau Atea Cave - Atiu Is - Cook Islands. Note 6A is turned on its side to show shape is like a flattened sphere

An individual pearl may sit in its own 'cup' or a group of pearls may sit in a 'nest', so called because the cave pearls look like birds' eggs in a nest (Fig 8). The cup or nest, technically fits the description of a conulite, a calcite (or other secondary mineral) coated drip depression (Smith 2023). However, cave pearls besides being in cups or nests, can cover small or large areas of a cave floor (Fig 9) or pools, measuring up to tens of metres in length and width. One such example is in Sistema la Ventae cave, Mexico where an estimated 10 million pearls exist in a single large pool (Hill and Forti 1997).



Fig 7. Cave pearls 20mm dia, of similar cross section to that in 6A, however a thin horizontal flange of calcite has grown out from the pearls. Pau Atea Cave, Atiu Is, Cook Islands

While in the Cave of the Marbles (Gruta de las Canicas) Tabasco, Mexico, it has been estimated that 200 million cave pearls (averaging 1-1.5cm diameter) cover the cave floor up to a metre or more in depth (Houston et al. 2008). To date it has not been determined why such vast quantities have formed and why they have not cemented together.



Fig 8. 'The Birds Nest' of cave pearls, Mollocks Chamber, Temple of Baal, Jenolan NSW. Note the 10c coin for scale

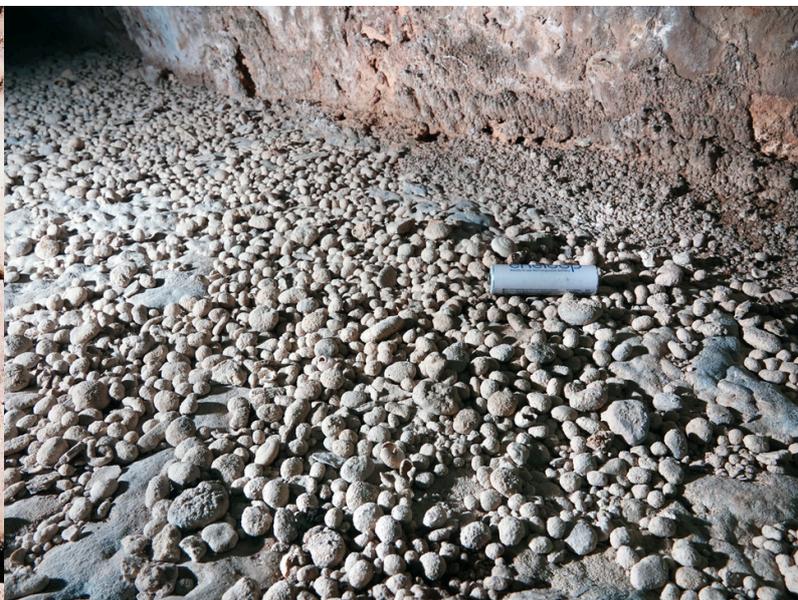


Fig 9. Cave pearls cover an area of gradually sloping flowstone floor in KNI083, Ningbing Range WA. Note AA battery for scale.

One could question how cave pearls totally submerged in a shallow rimstone pool (gour pool), do not adhere to the bottom as the drips are not physically hitting them to cause movement, and prevent adhesion. From available literature it appears the answer has not been conclusively determined however a possible explanation follows.

"... The Russian caver and mathematician Vladimir Maltsev claimed that pearls are prevented from sticking to the pool floor by acoustic waves, produced as a drip enters the pool" (Self 2012). Unfortunately, Maltsev's calculations and hypothesis were never published. An interesting observation was that the drip sound is not caused by the drop impact on a pool surface, but by the implosion of a cavitation bubble produced as the drip punches through the surface. The further the drop falls before impacting water the greater the compression wave produced. These compression waves travel through the whole body of water, unlike mechanical waves of a surface ripple. If Maltsev's theory is correct, it explains why totally submerged cave pearls are not fused to the floor of a pool as they continue to grow (Figs 10,11). However there does become a point in time where a cave pearl will become fused to the calcite floor beneath it, whether at the bottom of a pool or on flowstone. This is typically when a cave pearl becomes too large to be moved by water drops or compression waves, or there are simply no drips to cause movement, yet there is still calcite deposition occurring around its base.

To add some food for thought, ponder the mystery speleothem (Fig 12), which without physical examination appears to be a large cave pearl. The unusual translucent calcite ball (~5 cm diameter) known as 'The Palantear' in Spider Cave, Jenolan NSW, sits under a drip point, on what appears to be a calcite stand attached to a sloping rock coated in a layer of mud.

The mud has been splashed up to form a spiky crown shape on one side and is coated in calcite. It appears that a small shallow rimstone dam holds a shallow pool of water under the ball when water drips onto the Palantear. I am definitely not suggesting that this very unusual and iconic speleothem should be disturbed in any way for study. Some oddities will just have to keep us guessing.

Calcite pearls can be found in old mineshafts or audits. They may have the same appearance and have formed by the same process as those in caves, however can not be technically classified as 'speleothems' due to the definition of the term; a secondary mineral deposited in a cave. An example being the calcite pearls in a lead mine, beneath limestone strata in one of the Durham Dales of the northern Pennines, UK, a picture of which appears on the front cover of 'Cave and Karst Science', V.39, No.1, April 2012.

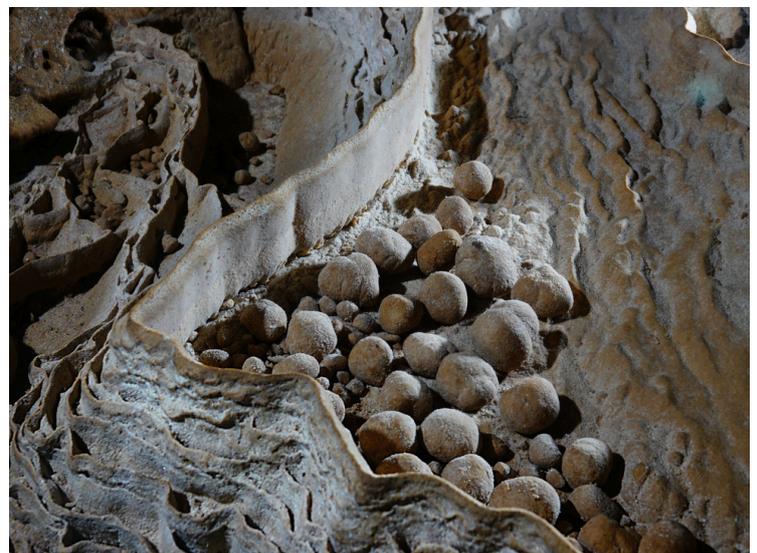


Fig 10. A shallow rimstone dam full of cave pearls in Pau Atea Cave, Atiu Island, Cook Islands.

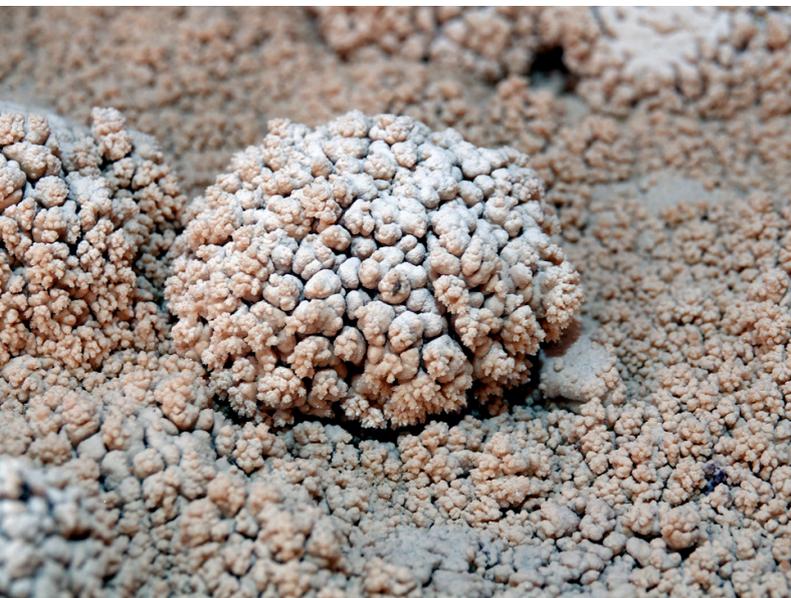


Fig 11. A 70mm diameter coralline cave pearls that has not yet attached to the cave floor. Pool was dry when photographed. KNI184 cave, Ningbing Range WA

### Above ground

In calcium carbonate-saturated streams and seepage areas above ground, similar looking pebbles to cave pearls are quite common. Although not speleothems, they have formed by the precipitation of calcium carbonate around a nucleus. Travertine dams and cascades will often form in above-ground  $\text{CaCO}_3$  saturated streams with low to moderate flow rates (c.  $20\text{--}100\text{ cm s}^{-1}$ ). Rounded, concentrically laminated pebbles can form in the pools behind the dams, as calcite layers are deposited around mobile fragments of gravel or organic material (Fig 13). These pebbles, if they are  $>2\text{ mm}$  in diameter are called oncoids (if both the shape and the laminae are irregular) or pisoids (if they are subspherical with laminae of relatively even thickness) (Pentecost 2004). If they are small and subspherical they are ooids. Rocks composed of oncoids and pisoids cemented together are called oncolites and pisolites respectively; these names are often used improperly as synonyms for oncoid and pisoid.

In oncoids the calcite deposition has been aided by cyanobacterial growth (similar to stromatolites). More information regarding the role of cyanobacteria in deposition of  $\text{CaCO}_3$  from solution can be found in *Caves Australia No 203, 'Karsting Light on Stromatolites and Thrombolites'* (Smith 2018).

### History

John Hill (1748), was the first to describe these concretions as 'balls' that looked like polished marble. When broken they had, "a vast number of crusts, all of the same thickness and neatly and exactly cohering together ....." with a nucleus.



Fig 12. 'The Palantear' formation in Spider Cave, Jenolan, NSW. Is it a cave pearl or not?

Dawkins (1874) was the first to describe rounded concretions from a cave in Wales. He says they were located in cave pools and should be called 'cave pearls' due to their lustre.

Over the years cave pearls have been referred to by many names including: vadoids, ooliths, oolites and pisolites to name a few. As previously mentioned some of these terms should not be used to describe cave pearls as they are geological terms to describe rocks.

### Acknowledgements

A special thankyou to WA. Parks and the traditional owners for granting a scientific permit to collect a couple of cave pearls for study purposes. The pearls were collected during the 2024 Ningbing Range cave documentation trip, organised and facilitated by Bob Kershaw.

Some cave pearls had also been collected from Pau Atea Cave - Atiu Island - Cook Islands, during a 2018 research trip to gain an understanding of what drives rainfall in this part of the world by interrogating past climate records. This trip was part of the Australian Research Council (ARC) Discovery research project "South Pacific and Australian hydroclimatic history recorded by stalagmite calcite fabrics", being led by Silvia Frisia and the field work on Atiu by Andrea Borsato.

Thank you to Katerina Fulton for proof reading this article.



Fig 13. A 40mm diameter pisoid. A mobile fragment of gravel in the creek bed has been coated in concentric layers of calcite. Note smooth outer surface on right and polished section on left. Sample from Rossiters Creek, Windy Gap, NSW.

### References

- Dawkins W.B., (1874), *Cave Hunting: Researches on the Evidence of Caves Respecting the Early Inhabitants of Europe*: London, Macmillan and Co., p.66-67
- Hill J., (1748), SPARS, Series III, Stalagmodiaugia, *A General Natural History Or, New and Accurate Description of the Animals, Vegetables and Minerals of the Different Parts of the World Etc. (Vol.1) The History of Fossils*. p.370-373
- Hill C.A. and Forti P., (1997), Speleothems – Cave Pearls. *Cave Minerals of the World (Second Edition)*, National Speleological Society. p.84-85
- Houston S., Mozley P.S., Campbell A.R., Boston P., (2008), Petrology and Chemistry of Cave Pearls from Gruta De Las Canicas (Cave of the Marbles) Tabasco, Mexico. *Geological Societies of America Abstracts with Programs*. V.40 (6), p.479
- Jenkins M, (Jan 2011) Conquering an Infinite Cave, *National Geographic* V.219, Issue 1, P.104-125. January 2011
- Jones B., (2009) Cave Pearls – ‘The Integrated Product of Abiogenic and Biogenic Processes’. *Journal of Sedimentary Research*, V. 79, p.689-710.
- Pentecost A., (2004) Travertine, *Encyclopedia of Caves and Karst Science* Ed. John Gunn, p.1574-1578,
- Self C., (2012), Correspondence – Cave pearls. *Cave and Karst Science*, Vol. 39, No. 2, p.93.
- Smith G.K., (2018), Karsting Light on Stromatolites and Thrombolites. ‘*Caves Australia*’, No. 203, p.11-13
- Smith G.K., (2023), Calcium Carbonate Rafts, Cones and Conulites: Speleothems and Calthemites. *Helictite*, 48: 1-10

# The Economic Tea Leaves of Karst Conservation

Clare Buswell

Reading the economic fortunes or otherwise of those with vested interests in developing industry on Australia's karst is akin to reading the tea leaves in one's morning cuppa. You may find more clarity talking to the dog. Some eighteen months ago Andrew Forrest, via his Fortescue Metals Group, announced to the world that he had purchased the largest sheep station in the country, Rawlinna Station on the Nullarbor.

His interest was to develop the station as a renewable energy hub, mainly solar. Yet at the end of October this year, he has moved on, claiming that the long, drawn-out development approvals processes had put an end to this dream. He now intends to explore "long-term green energy opportunities in the Nullarbor and southeast WA". The issue, for those of us with a long-term stake in the Nullarbor's future, is where these energy opportunities will land.

Will Andrew Forrest extend his stake in the Western Green Energy Hub (WGEH) via his direct ownership of one of the WGEH partners, CWP Renewables?<sup>2</sup> In this light, Forrest's relinquishment of Rawlinna station and his statement of intent makes sense, given that a lot of the hard yards of negotiating the WA land and environmental laws have, via the WGEH, been in train now for about three years. Whereas the Rawlinna plans had to start from scratch.

The WA government's response to Forrest's withdrawal from Rawlinna was to cite the Land Administration Act which the government stated, 'seeks to prevent large tracts of pastoral land being concentrated in private hands'<sup>3</sup>. This seems to suggest that Twiggy was not going to be successful in leasing Rawlinna in the first place. Note that pastoral land is leased and not privately owned.

## Hydrogen Energy

There has been a bit of cooling nationally on the mad rush to produce hydrogen as the next great energy source. Over the past 3 or so months, Andrew Forrest has shelved plans to produce 15 million tonnes of it a year from 2030 onwards, and along with AGL pulled out of using hydrogen to replace coal at the aging Liddell power station near Newcastle, NSW. AGL will now go it alone and use battery and solar instead. Forrest's companies, however, retain strong interests in hydrogen projects overseas and in the Pilbara<sup>4</sup>.

Despite the actions of Andrew Forrest, Minister Bowen signed a trade deal with the German government worth \$600 million for shared investment in Australian hydrogen projects so that Germany could reduce its dependency on Russian gas<sup>5</sup>. Such a trade arrangement is long term and must be seen in the light of \$200 Billion worth of proposed hydrogen projects in Australia finding buyers for the currently expensive fuel<sup>6</sup>.

What does all this mean for the WGEH project? In reality, these machinations will mean little as the WGEH has chosen to produce its own electricity to produce its ammonia and some hydrogen. It is the current costs of electricity used to produce hydrogen that are the cause of investor hesitancy. From that point of view WGEH can wait it out until the market is willing to buy, what for WGEH may well be the most cheaply produced hydrogen and ammonia around.

The greater stumbling block for WGEH is the fact that Peter Newman, the person WGEH used to support the launch of the WGEH, and Professor of Sustainability at Curtin University, recently pointed out to the export hydrogen industry that:

*'[Hydrogen] escapes, it's so hard to store and transport. It corrodes everything, it loves oxygen, it's always trying to turn itself into water. To turn it into a liquid you have to cool it to minus 250 degrees. It's just incredibly difficult engineering'*<sup>7</sup>

None of these economic or engineering arguments mention the environmental costs of industrialising the soils or irreplaceable karst of the Nullarbor and its associated species loss. It's these environmental arguments that ASF Members must take to politicians of all persuasions.

[1] Smith H. 'Andrew 'Twiggy' Forrest's Fortescue Metals pulls out of Rawlinna Station sale'. ABC News. Sat. 2nd Nov. 2024 <https://www.abc.net.au/news/2024-11-02/andrew-twigg-forrest-fmg-pulls-out-of-rawlinna-station-sale/104552082?>

[2] CWP Global became CWP Renewables after it was purchased by Twiggy Forrest's company Squadron for \$4 Billion late 2022. Australian Financial Review. Dec. 7th, 2022.

[3] Smith H. Op Cit.

[4] Seccombe M., 'Hydrogen's Hurdles'. The Saturday Paper. July 27th-Aug 2nd, 2024. p. 8.

[5] Macdonald-Smith A. & Hall J., 'Australia Signs Hydrogen Deal with Germany'. Australian Financial Review. Sept. 14th-15th. 2024. p. 22.

[6] Ibid. p. 22.

[7] Seccombe M., Op Cit., p. 8.

### Hills of Gold Windfarm

Other oddities around government decisions relate to the approval of the Hills of Gold windfarm in NSW. This windfarm has raised the ire of many locals over a six-year period and the back and forth of submissions, public consultation, more submissions and more reports from the developer, reminded me of Sir Humphrey Appleby's view on inquiries, that you only hold them when you have the result you want.

Members of the NHVSS, the ASF Conservation Commission and ACKMA raised objections to this development based on unacceptable impacts on bat habitats. Approval to build 65 wind turbines was granted in September of this year. The only way it can now be prevented from going ahead is for those who made submissions on the matter, appealing the Independent Planning Commission's decision in the Land and Environment Court of NSW.

### Beetaloo Basin

Gas fracking developments in the Beetaloo Basin, an area that covers 2 million acres, that is, twice the size of Sydney, is back in the news, causing a headache for members of UniSuper. For those who wear both caving and UniSuper membership hats, you may want to get active and push UniSuper to demand that it stops supporting the development of gas pipelines in the Basin via its 9 percent holding in the APA Group. UniSuper is APA's largest shareholder. Why does this matter, I hear you ask?

The gas fracking development approved last year by the then Labour NT government, will not only extract 262 billion litres of water per annum from the karst aquifer that sits under it, but increase domestic emissions of CO<sub>2</sub> by up to 49 million tonnes per year.<sup>8</sup> The water loss will affect Mataranka Springs and Daly River karst areas. UniSuper prides itself on its green credentials and investments, and the power of its membership to force change in the environmental space. Supporting APA pipelines and by association, gas fracking, strongly suggests that the super fund has a bit of homework to do, if it does not want to be accused of greenwashing.

### Valuing the Nullarbor

Over the course of the last four months, The Commission has run two public zoom events. The first on the Values of the Nullarbor saw a panel discussion outlining those values and the launching the ASF's film, *The Nullarbor on the Line*. The second event was a Retrospective on Twenty Years of VSA Nullarbor exploration. Both sessions were well attended. For the first event 180 people were present of which 100 were not from the caving community. The second event was attended by 56 people although 80 registered, with the majority from within the ASF's membership. It is the intention of The Commission to run a similar series next year, the aim of which is to push cave conservation out into the big wide world.

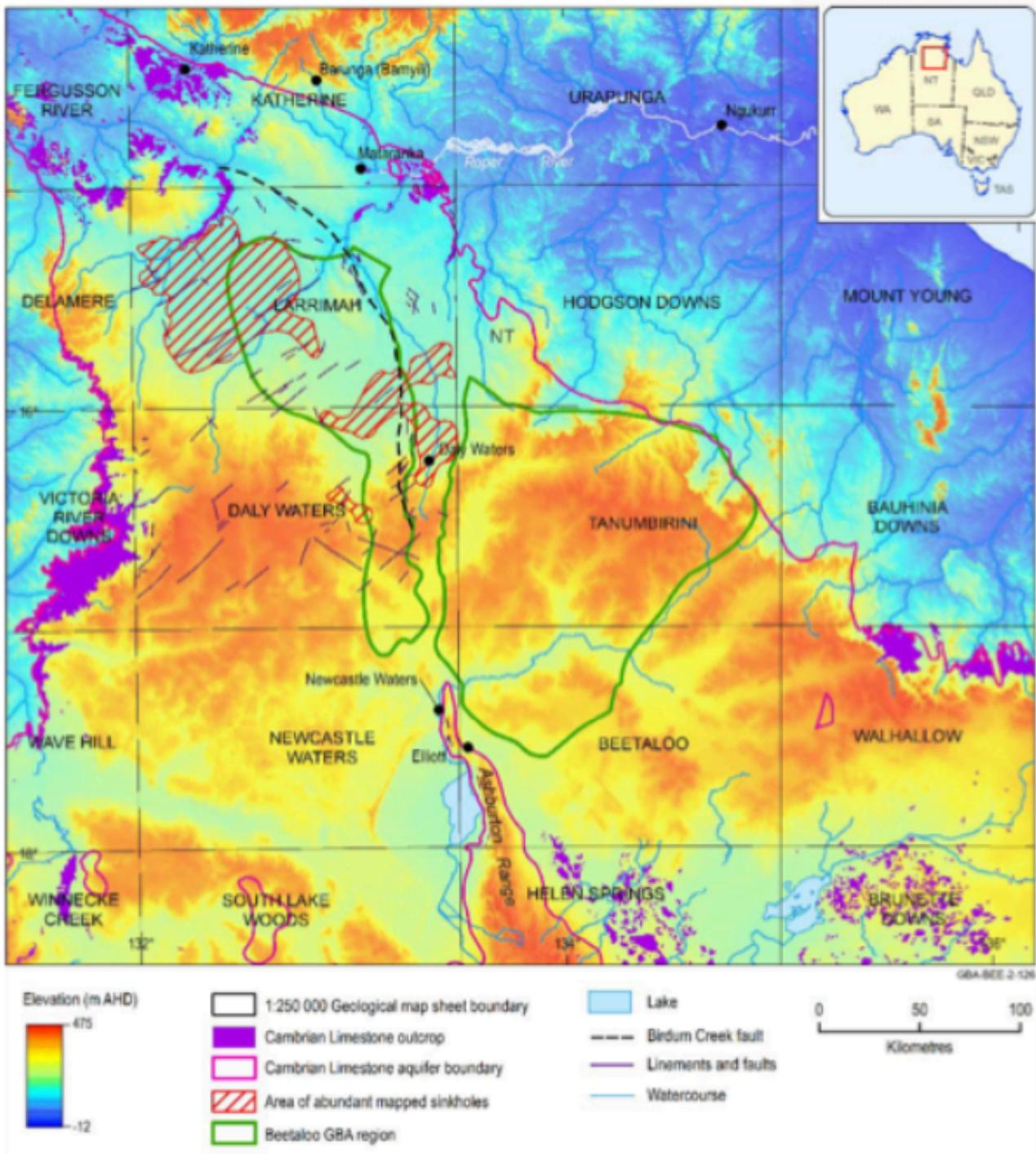
### Campaign for the Nullarbor.

In June of this year Cathie Plowman made a fabulous push for donations to the ASF's Karst Conservation Fund's Nullarbor Campaign. Taking advantage of the KCF's tax deductible status and timed to coincide with the end of the financial year, Cathie's campaign brought in approximately \$25,000. I would like to thank everyone who donated, no matter how small or large the donation. I can assure you that your donation will go towards the ASF's application to nominate the Nullarbor for national and then World Heritage status. We still require significant donations for other areas of the campaign, namely the production of campaign material and possible legal representation down the track.

It is important that the members of the ASF work out a way of not being wedged between access on putting a stop to the Nullarbor's industrialisation. Further, this campaign will need to be highly cognisant of legislative changes in both WA and at the Federal level. In WA, at the moment, the government wants to decrease opportunities for the general public to be able to comment on development proposals. The WA Government is now allowing companies to start parallel approvals processes around permitting, e.g., allowing water, land clearing and mine lease permitting to run alongside the EPA approvals process. This is aimed at speeding up the approval process. Also note that, the WA EPA has recommended against only two of 100 oil and gas proposals over the past 40 years.<sup>9</sup> We are living in interesting times.

[8] Wooton H. 'UniSuper faces uprising over its support of gas'. Australian Financial Review. Sept 28th - 29th 2024. p. 4.

[9] Morton A., 'Gas Project Resistance will be Sunk Without Full Political Backing'. The Guardian Weekly, 16 August. 2024. p. 28.



Areas with sinkholes and near-surface structures identified on 1:250,000 geological map sheets in the Beetaloo GBA region.

Source: Evans TJ, Radke BM, Martinez J, Buchanan S, Cook SB, Raiber M, Ransley TR, Lai ÉCS, Skeers N, Woods M, Evenden C, Cassel R and Dunn B (2020) Hydrogeology of the Beetaloo GBA region. Technical appendix for the Geological and Bioregional Assessment: Stage 2. Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia.

# The International Cave Rescue Commission and European Cave Rescue

Article and images by Brian Evans

The International Cave Rescue Commission was having its first conference since 2015. It was the first time that Australia had been represented since Grace Matts and Joe Sydney were there last millenium.

The ASF kindly supported me with dollar-for-dollar funding for my travels. Our ASF subscriptions at work! I hope I am able to bring good value back to the ASF membership...

Since it's obviously a bloody long way from Oz to Europe, I set up get-togethers with caver-rescuers from a couple of European nations to see what else I could learn.

*'Mostly, I learned that what we do in Australia is within the range of variation of what's happening in cave rescue around the world. Yep, for every interstate 'discussion' that we have here about appropriate techniques, there's an international equivalent argument, and we're all adapting local skills, conditions and traditions to the needs for lightness, flexibility and effectiveness in cave rescue.'*

I've brought back a lot of learnings, photos and observations. There were some email summaries while I was travelling; I'll be doing some papers at Caving in the Moonlight and this is the first in a series of three reports for *Caves Australia*.

Before I get detailed, I'd best give you this disclaimer: I think this is what I learned! There were plenty of language challenges. I spoke to some people, but not others, and I certainly could NOT claim that this is the definitive explanation of what's happening in any of these nations...

So, let's start with Slovenia. The first cave rescue team that I visited, and they took me training!



T-shirt provided 2024 Slovenia



Selfie of the group



The organisation of cave rescue JRS. Jamarska Reševalna Sluzba. Slovenian Cave Rescue. The somewhat serpentine critter in the schooner glass is an olm. A troglodytic salamander (that's a flavour of amphibian not found in Australia). They're very cool, 30 cm long, cave-specialised predators. Slovenia is very proud of them. No, I don't know why it's in a schooner!

<https://www.jamarska-zveza.si/index.php/foreigners/crs>

## Slovenia

I'd met Maks Merela of the Jamarska Reševalna Služba (JRS) during a International Cave Rescue Commission meeting at the 2017 International Congress of Speleology in Australia.

I figured that they had a much busier, and well-supported cave rescue organisation, and we could learn something from them...

I contacted him. A huge thanks is due.

Maks arranged for me to spend the weekend with maybe 40 of the team, at the second of their three annual weekend rescue training sessions. At these training sessions, they are training both new people in cave rescue (trainees) and adding extra training and assessment to those that graduated as "probationers" two years ago, and bringing them to full members.

This was excellent. I met a heap of Slovenian caver rescuers. They were generous to a fault.

They were also as professional, competent and effective as you'd want if ever you needed their services! Much as we try to do here.

Some of them had almost no English, and you can assume that my Slovenian was limited to a few words!

I saw their training techniques, vehicles loaded with gear and heard explanations of how they have organised themselves, and arranged some level of funding...

1.They ONLY do cave rescue, but have a place under civil defence, therefore defence, so they have access to some rather more military stuff than we would expect!

2.They do 10-15 significant cave rescues/year! Yes, that's in a nation of ~4 million. They do have lots of karst (the word comes from here!) and many caving tourists, but this is a lot!

3.The organisation is registered for cave rescue under the EU (only one in Europe), which gets them good funding, but it also means that Slovenians cannot respond to rescues in other nations unless they are requested by the host country via the EU (which nations do not find politically palatable! - Cavers in neighbouring countries can respond internationally as interested caver-rescuers, rather than on behalf of their nation - so political pride is not a problem!)

4.This also gives them the bureaucratic status to support ESA astronauts training in Slovenian caves, which also brings in money! Yes! Slovenian Cave Rescue provides logistical and specialist technical support for ESA astronauts to spend a week or so in a cave to train tolerance to unusual environments.



Figure 2: An olm, a "baby dragon" or a *Proteus anguinus*. If you've not met these flashy troglobites, look: <https://www.postojnska-jama.eu/en/wonderland-stories/baby-dragons-secret-stories/>

### How caving in Slovenia is organised

Clubs belong to a national body, in much the same way as here, but the clubs are more like an Australian sporting club, with access to grant money and support frameworks, because people going caving is just like people playing football!

The national body for caving (not just cave rescue) also gets government funding, and reports on caves and caving to the government. Again, think Australian Sports Commission!

They, in turn, make grants available to clubs (x5) to undertake projects, including the exploration and survey of caves.

Cavers have described ~15 000 caves nationally and about 2-300 more each year.

I understood that there are a few hundred active cavers, in a national body of ~1000, a nation physically smaller than Tassie, with a pop of ~4M.

### The formal training system

Caving and cave training is very formalised, with theory tests, practical training sessions and mandated periods of practice. Plenty of people take it up, and, from what I could see, many stay involved. I think I understood that there is a government-mandated training framework - rather different from our, mostly, laissez-faire approach.

Apart from the formal, written exams, compulsory training and practical assessments, there's a rigorous time obligation: members must spend 2 years at each level they've qualified for before they can do the next level of training!

Something like:

2 years with club to become "caver"

2 years as caver before rescue training

2 years on probation before retrain and exam to become caver-rescuer

2 years to become a rigger

2 years to become team leader

There are multiple teams and small voluntary national executive. I think I understood that there are a few (<10) paid employees who support the volunteers on the teams. I think that there are teams formally rostered "on-call" at all times.

An annual income of €120 000 is "tiny". They also average another €30 000 from other sources and there's grants for specific things, including money from ESA to support astronaut training

They are "Certified" by the EU, and the only cave rescue group in Europe to be so. This enables significant income. Unfortunately, this means that they can only respond when "proper channels" are followed, so they are unable to respond out of the country. (For proper channels to be followed, another nation has to formally ask the EU for help, who can then formally ask the JRS. This means that the bureaucrats of the country where the rescue is, feel that they need to acknowledge that their own agencies are "not good enough"! ...and that's politically unpalatable ☹)

So the recent multi-national rescues in and around Europe have not involved Slovenians. This is something regretted by both Slovenian cave rescuers and those from other countries who did attend - caver rescuers from other countries spoke with respect as to the Slovenian competence.

### Gear, vehicles and bases

There are five regional bases, with a vehicle pre-loaded with likely first-response needs - enough to rescue from -700m; and then a headquarters base, also with a "warehouse" vehicle pre-loaded, but including more gear, and the types of stuff that's not used so often.



Rescuers supply their own helmets and lights. They then label them with their name and "graduation number"



Each base has a van for response.

This seats eight, has a Nest along the side windows, and the back is packed with gear for initial response. There's room for five people's personal gear in the back, as well.

The two white bags are first response equipment for casualty and rescuers... The black cases are drills and comms.



Bag 1 had first response Medi gear. First aid. Bag 2 has accomm: tent, bags, fuel, food for 24 hours for Dr and casualty

The “warehouse” van. It’s bigger, has only three seats up front, but a lot more gear.



They replace the casualty’s helmet with one that has an integrated visor rescue responses.



### Their rescue communications systems

I was very interested in this – effective in-cave communications are very challenging, and a substantial part of what control agencies like police, want from us. Australia does not have enough communication devices or systems for its caver-rescuers, and other agencies have also been approaching the Australian Cave Rescue Commission (ACRC) regarding how they can get hold of effective systems. It’s a significant improvement we can make to our preparedness...

“Modern” wireless systems seem to be effective, but are built by nerds without a sound economic base and become unavailable. A few military-type equivalents are out there, but have military-type price tags. Various flavours of phone system are the most common, and in many ways, the most effective, for our caves. They are typically very robust, and were built in substantial numbers (although also not on a commercial scale) so there are plenty out there, even if there’s still not enough! They also have their advantages and disadvantages.

This is an area that Australia needs to improve, and that a body like the ACRC can help the whole country with...

Slovenia has several systems (itself an indication of the challenges for caver-rescuers)

### 1. Michie phone equivalents

They use a Romanian 2 wire telephone – about €200/handset Similar to a Michie phone although amplified. It’s a two wire system. (that’s ~AUD400 each)

- The wire is carried in small pack, flaked in...(not on a reel – worth investigating this!)
- It’s very loud.
- “waterproof” = IP67 (“can be immersed in 1 metre of freshwater for up to 30 minutes”).
- Powered by an 18650 battery sealed in with 4 thumbscrews.
- There’s an on-off switch with an indicator light. The battery lasts months in pack when forgotten.
- There’s a waterproof membrane under speaker. PTT on side.
- They’ve been using them for nearly over 20 years with no issues
- They don’t strip the wire, just use needle screw clamps that puncture the insulation.
- The wire is thicker, and multi-stranded with thicker insulation, so they only fit 300 m in a ~25 L pack
- Different approach. The phone line is taken in, with handsets pre-placed at specific points. Individuals call entrance as they pass each point. Maybe team leader has handset extra, if a large and complicated sector.

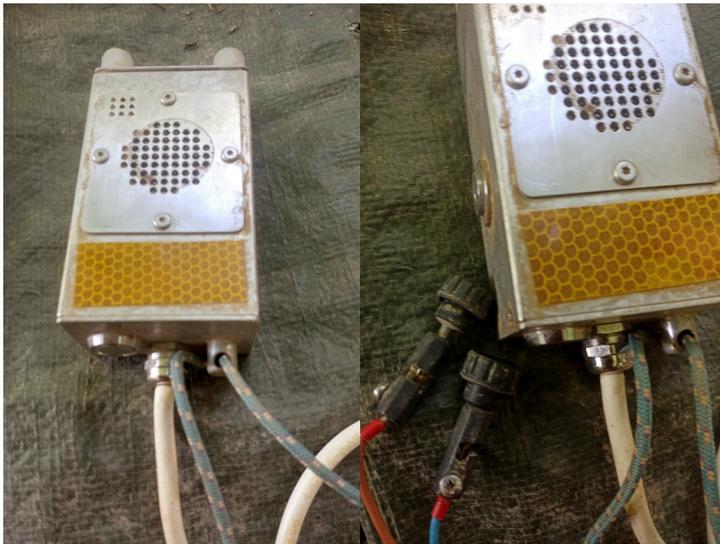


Photo above left - Above is a basic kit.

Photo above right - They do NOT use a reel for wire – instead, flaking 300m of twin-core into a ~25L pack. They have thinner wire for rescues that need to go further in.

Photo below left - The VoxPhone handset. Like a MichiePhone, but two-wired, and amplified like the Michie base stations. Waterproof. Made by Romanians.

Photo below right - The white cable coming from the handset is stripped back to give the blue and brown at left. Each signal/earth wire is then equipped with a screw needle connector that pierces the insulation on the main wire.



Above photo on the left - The cell phone modem.

Above photo on the right - StarLink unit, with dish and interface to wifi

Below photo on the left - The in-cave unit. Attaches to the VoxPhone wires and provides wifi in the cave. This box is about 6 kg and includes battery power for days.

Below photo on the right - A phone or tablet connected to the wifi can communicate out to the surface, or beyond...

**2. Data transmission on Michie Phone**

- Italian design of circuitry
- They have built their own in 2 pelican cases and have proved the system can carry "internet" 4.5 km underground
- It links to a Star link system via wifi-phone adapter unit or telephone... So the entrance system can connect to the world.
- The Starlink system struggled to see satellites through the heavy forest cover at our camp so this remains a weak point.

Photo below left - Data-over-voxphone unit for the entrance. About 5 kg.

Photo below right - It connects the through-cable transmissions from out of the cave to wifi, cell phone and StarLink. A computer or tablet connected through the wifi controls the link.



### 3. SpellCom

This is a system the ACRC had received advertisements for. I thought that it looked interesting.

It's a system that uses RF over short distances between repeater nodes. It's primarily designed for mine systems. This means that a wire does not need to be routed into the cave, but that a network of nodes is placed. Nodes can communicate with each other over many metres, but only in close to line-of-sight (L.O.S.). They can also be connected by wire, for example, in a rockpile, where many nodes would be needed to maintain L.O.S.

<https://sybet.eu/systems/spellcom/>

- Handsets have the advantage that they can be used anywhere within range of the node, and automatically shift to a new node when the new one provides better signal.
- Each node weighs ~250 g, and is powered by an 18650. They offer about 2-3 days of continuous use, and much longer if the units can enter sleep mode.
- The Slovenians had one to trial. They did not think it was suitable for cave rescue, but were certainly interested.
- Something similar was supplied by the American military for (the dry) parts of the Thai cave rescue.
- I have a quote for 5 handsets, 20 nodes, cradles and adapters: A\$35k. That would be OK for many cave rescues in Australia, although 20 nodes would not get deep into a complicated, or particularly tight cave, and we really need effective comms that will be quick to deploy in most states. Not one, nationally!

Below photo on the right - The Sybet Spellcom system. The small box on left is ~3 kg and holds 10 nodes (repeaters). The large box is a similar weight and contains 3 handsets, their charging cradles + wired links.

Below photo on the left - Node units. Each will run continuously for a few days on an 18650 battery.



Photo above - Apologies - I did not get a quality pic for this one. It's the bigger box. You can see the three handsets that are the interface between users and the system. The blue-capped wires enable wired links between nodes.

### 4. CaveLink

This is a through ground radio system. FUSSI has a set in South Australia. The Kiwis likewise have one. Mole Creek Caving Club sourced sufficient money approximately three years ago, and ordered a set. Unfortunately, they have been delayed, and then unavailable, ever since. The word is that the designer/builder became ill and is no longer making them. His son is re-designing it and including access to other ground systems. It is now expected to be available next year...

### Techniques

I watched many small groups practicing, and being assessed in setting up tyroleans and counterbalances. They were very professional and competent. The things they do different to us:



Photo above on the left - Instructors/Assessors looking on with satisfaction.

Photo above on the right - All anchors are always triplicated. Yes, three independent slings around the same bombproof tree!

Photo below - Much of the team gathered near the hut at briefing.



Photo above - UHF radios were carried by all the instructor/assessor team (it was a big, open shaft and cave). They were protected inside these simple, relatively waterproof and padded, pouches.

Photo below - They keep hauls relatively short (to reduce spinning and communication difficulties). So there are many counterbalance controllers and systems spiralling up the walls. Each one passes on to the next, so that the stretcher is always on two.



Photo above on the left - Using a Basic as progress capture on the haul for a Tyrolean seemed a default technique.

Photo above on the right - They commonly use belayed stretcher carry/pass techniques, like us.

In the large shaft (-30 m deep, 10 m diameter) I saw practice in, there were ~8 separate counterbalance teams around the walls. The casualty was always on two systems, being lifted on one, but already clipped ready to transfer to the next. At the top of each, the casualty was controlled as their weight was transferred to the new, clipped to the next, then unclipped from the previous.

This was very neat and efficient and the casualty moved smoothly, and was always near operators but it needed many operators, lots of anchors and very well-practised operators. I can't see it working in a tight, or even worse, loose shaft.



Photo above on the left - All haul lines are marked like this. A figure 8 and barrel knot for stopper. Not the fusion knot as the marker.

Photo above on the right - The stretcher's protective case is rolled up and placed behind the knees of the casualty in the stretcher. Apparently much more comfortable.





Photo above - Casualty always close to several operators. Many controllers and haul points.

Photo below - This one finished to a tyrolean a few metres above the entrance, and then traverse to landing.



Photo below - They sometimes use a double rope tyrolean to reduce stretch when the floor will get in the way.



Photo below - In this a pic, a surface practice of a bend in a tyrolean. They run the tail rope through a pulley at the bend and clip it to the head support pulleys.



Photo below - Figure 4: Another poor quality pic. The anchors: 8 x 78mm, Raumer, I think. Not temporary!



### **Anchors and de-obstruction**

They do NOT use concrete screws. They do use 6 mm Raumer inox expansion bolts. They're vaguely similar to a dynabolt, and remain in place as a stud and nut, so not temporary. They use three when bolts are the only anchor.

<https://www.raumerclimbing.com/en/products/classic/stainless-steel-hang-fix-bolts/#/page/1>

For deobstruction, they do not use caps. Instead, a sub group, of about 10, have full tickets for plastique, and are supplied with it from the military. They use 2-3 kg a year, including practice, and 50 g is the max needed for a shot. It's frequently used in rescues. Some members have blasting tickets and bigger bang capability.

Further information and a great video  
It sounds like an excellent place to cave . There are a bundle of caves >1000 m and a few >1500 m

<https://www.jamarska-zveza.si/index.php/foreigners/crs>

They managed to make a high quality video of a real rescue: Primadona. An alpine cave from which they had already made a deep rescue claimed another casualty. They asked a hard caver who was also a videographer to attend. They knew that the rescue would make news and got excellent footage live in the cave, then added interviews, some re-enactments and models to beautifully describe a serious cave rescue. 17 mins, sub titled in English.  
<https://youtu.be/6SFZmQjJ9Xo?si=QFA2NyQ98k22zsjE>

I've placed a bundle of pix, with comments to explain, at:  
<https://drive.google.com/drive/folders/1GuD8IbzpTHZWH73JB8YU4emeeOhB3NAp?usp=sharing>

# Relocating and Documenting the Caves and Karst of Western Kangaroo Island, Post the 2020 Bushfires

Clare Buswell



A Friends of Parks Small Grant of \$5,500.00 was allocated to the South Australian Speleological Council Friends of Parks Group (SASC FOP), in late 2021 and field work relating to this grant was carried out over the course of 2022, 2023 and in April 2024. The project had three aims:

- 1) Relocate lost and incorrectly numbered caves and karst features, using aerial and LIDAR imagery, drones, and on-ground survey within the vicinity of the Kelly Hill Conservation Park, Flinders Chase National Park, and the Mount Taylor Conservation Park.
- 2) Training of the volunteers in ArcGIS integration and aerial imagery analysis.
- 3) The development of a geological trail app to explain the karst and other geological landforms of Kangaroo Island. This part of the project links into the Re-imagining of the Western Kangaroo Island parks and assists in developing best practice cave and karst management for the Kelly Hill CP.

Prior to the 2020 bushfires, 130 caves were known. The information concerning these caves had been documented, using a combination of cave descriptions, photos, in-cave and on-ground surveying methods. This information had been supplied to National Parks over the preceding decades and was stored at the Kelly Hill Caves office. Due to the impacts of the bushfires, which burnt the office to the ground, these records were lost. The request from National Parks was for the SASC FOP Group to relocate caves that it now had no data on and were on its estate.

Our group searched the Cave Exploration Group of South Australia (CEGSA), records for information on the known caves on Kangaroo Island. These records informed the basis of our work, further facilitated by the use of LIDAR and the purchase of ArcGIS software.

The circular indentations shown in Figure 1 could be caves, depressions, blind dolines, or simply a hole created by a burnt tree stump.

The use of available LIDAR, flown late 2020, combined with little vegetation cover, provided both a significant amount of information and ease of access for ground truthing. Hours were spent pouring over LIDAR images, which showed possible cave entrances, drainage, and numerous shadows, all of which had to be investigated.

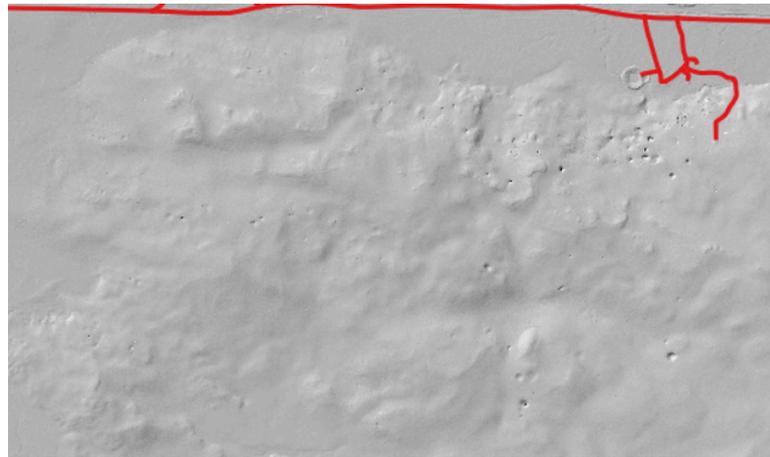


Figure 1: A LIDAR image of the area around Kelly Hill area. Red lines are roads/tracks

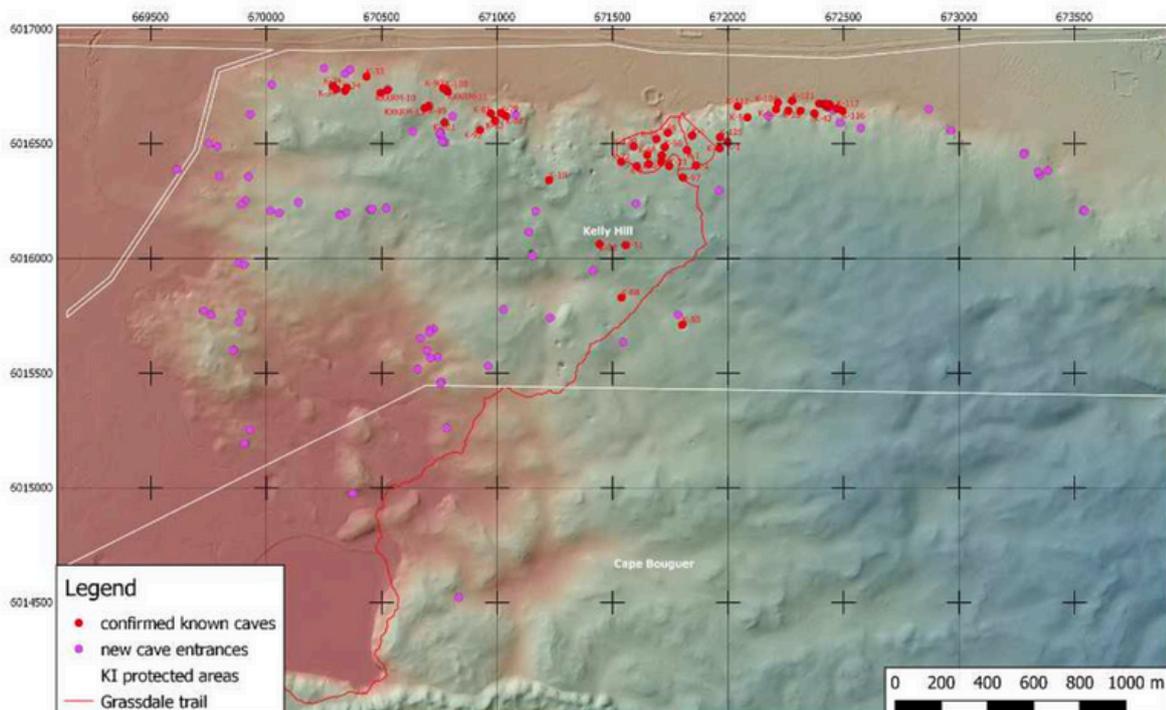


Figure 2: LIDAR image with identified features imposed over it for the Kelly Hill area.

Similar work was also undertaken for West Bay in Ravine des Casoars, where sea caves were identified, and a number of smaller caves tagged over the course of 2022/23.

### Achievements:

Over the course of 2021/23 the team of cavers involved, around 30 people, discovered another unknown 163 karst features, in addition to the known 130, making a total of 293 for all of Kangaroo Island. From these 198 cave entrances in the Kelly Hill Conservation Park were tagged. Tagging involved: photographing the entrance, recording the GPS location for each cave and associated entrances, tagging it with a steel disk and finally physically surveying the cave.

Our group followed the Australian Speleological Federation's established, national protocols for recording cave entrances and tagging caves. Figure 4 shows an example. The white board records: feature/cave number, camera owner, date the photo was recorded, distance and angle the photo was taken from. This method is critical as it allows for historical records of cave entrances to be made from the same angle and distance. GPS coordinates are taken at the cave entrance itself or if not possible, surveyed back to the entrance.

A brief survey and/or sketch of the cave entrance was made, and other prominent features recorded. This included if the cave is accessible to humans, water egress, the presence of vertebrate, or invertebrate fauna, (in the Kelly Hill area that can include tiger snakes and bees), and air flow.

To facilitate data recording methods, a considerable amount of time was spent setting up protocols and templates for ground surveying methods, cave surveying methods and a cave identification schema so as to streamline data processing, mapping, and fauna surveying.

The purchase of ArcGIS Pro software for the grant's activities, was pivotal to the success of this data management. In particular the license allowed those working on ArcGIS to:

- Produce surface maps vital to both planning pre-trip, as well as to those in the field.
- Manipulate complex data sets, such as LIDAR and Digital Elevation Models.
- Overlay the cave survey data collected to assist in understanding how the various cave systems interact.

The purchase of the licence gave us access to *ArcGIS Online*, which allowed maps to be shared between team members without them needing to have the skills associated with using ArcGIS Pro.

Importantly the licensing gave access to *Field Maps*, a mobile application that allowed our members to view, collect and edit information in the field on their mobile phone. This limited transcription errors as data did not have to be transferred from paper to computers.

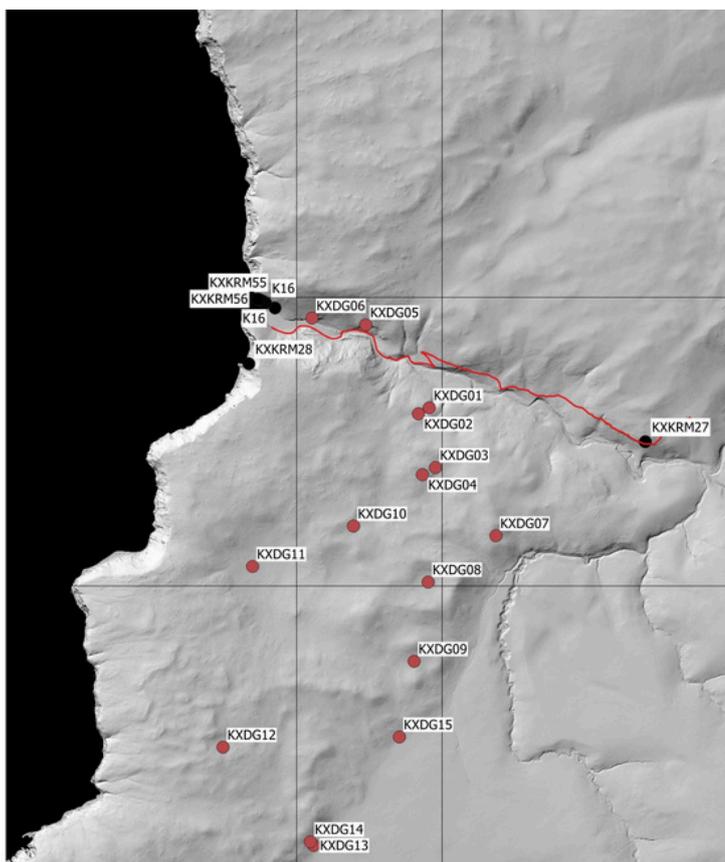


Figure 3: LIDAR image of the Ravine des Casoars area with possible caves identified



Figure 4: Cave tagging method

Further, the purchase of ArcGIS enabled the layering of data and ultimately showed how tagged (and later fully surveyed) caves related to each other. Coupled with the cave surveying programme Survox, the data is showing depths of caves at Kelly Hill and how they relate to the hydrology that is intersected by the South Coast Road, then sinks underground, re-surfacing on the coast, a considerable distance from the caves at Kelly Hill.<sup>1</sup>

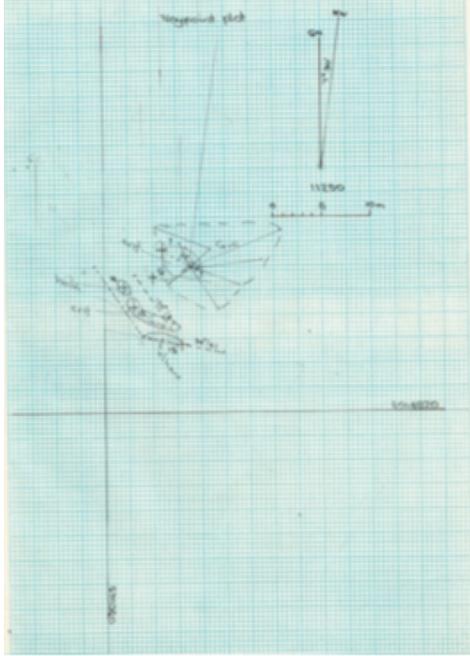


Figure 5: Cave map produced from field sketch.

The work of the group coincided with the redevelopment of the show cave and associated infrastructure at Kelly Hill. Two members of the team, Clare Buswell and David Gillieson, were involved with the development of the new signage that now adorns the walk up to the show cave.

Importantly, our involvement helped with the geo-heritage trail digital app that was conceived as part of the grant. Although the app was initially viewed as a way of promoting the karst of the western end of Kangaroo Island, it has long been understood that the geology found on Kangaroo Island is both complex and fascinating. It is thus deserving of a guide dedicated to explaining its complexity in simple terms to tourists and school groups alike.

David Gillieson worked on both the imagery, and text for the guide. He completed it late 2023, and Heiko Maurer translated it into German. Both editions are available for download from: <http://sasc.info/kangaroo-island/>.

Our work coincided with the International Year/s of Caves and Karst. This International Year, set up and promoted by the International Union of Speleology, aimed to bring to the world's attention the values of caves, karst hydrology and karst conservation. As such the SASCFOF group promoted the work on Relocating and Documenting the Caves and Karst of Western Kangaroo Island, post the 2020 Bushfires, on the International Year of Caves and Karst website. It was the only scientific programme from Australia promoted at this level.

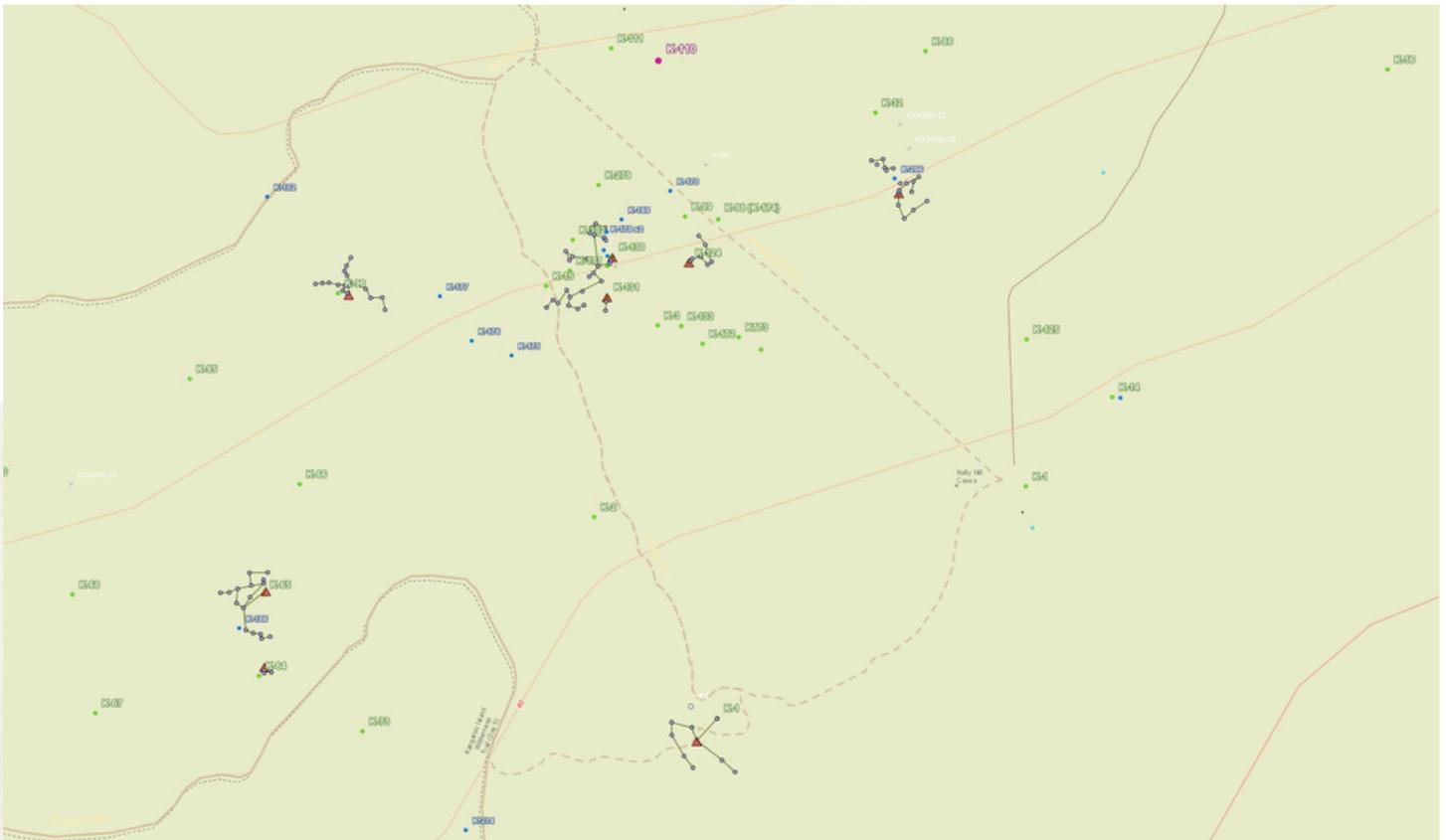


Figure 6: Data processed using ArcGIS showing the relational positions of ground-truthed, tagged and surveyed caves near the Kelly Hill show cave. Produced by Matt Smith. August 2023.

### In conclusion

The grant from Friends and Parks, allowed cavers from all over the country to travel to Kangaroo Island to ground truth cave and karst features on the Western End of the Island, concentrating around the Kelly Hill Conservation Park and the Ravine des Casoars area of Flinders Chase.

A dedicated group of seven worked behind the scenes facilitating trip coordination, protocol development, data processing, learning the dark arts of ArcGIS and promoting the project nationally. We calculate the behind the scenes activity alone, contributed \$18,720.00 of volunteer labour time, (one day a week of 8 hours = 416hrs x \$45.00/hr), with the field work contributing about \$32,400.00

There have been conference papers presented, and articles published in both local and national caving journals.

New LIDAR flown in 2023 has kept the group busy ground-truthing more sites on the Vivonne Bay side of Kelly Hill in early 2024. Thus the work of cave tagging continues. It is slow work as the famous Kangaroo Island *Acacia Paradoxa* is back, along with the rest of the post-bushfire enabled scrub. We welcome the continued involvement of cavers around the country in this project.

[1] Gillieson, D. Maurer H. and Crowley G., 'Karst and cave development at Kelly Hill Conservation Park'. Conference Proceedings. Cave and Karst Management in Australasia Conference 23. Tākaka, New Zealand, 2023. pp 25-32. Australian Cave and Karst Management Association.

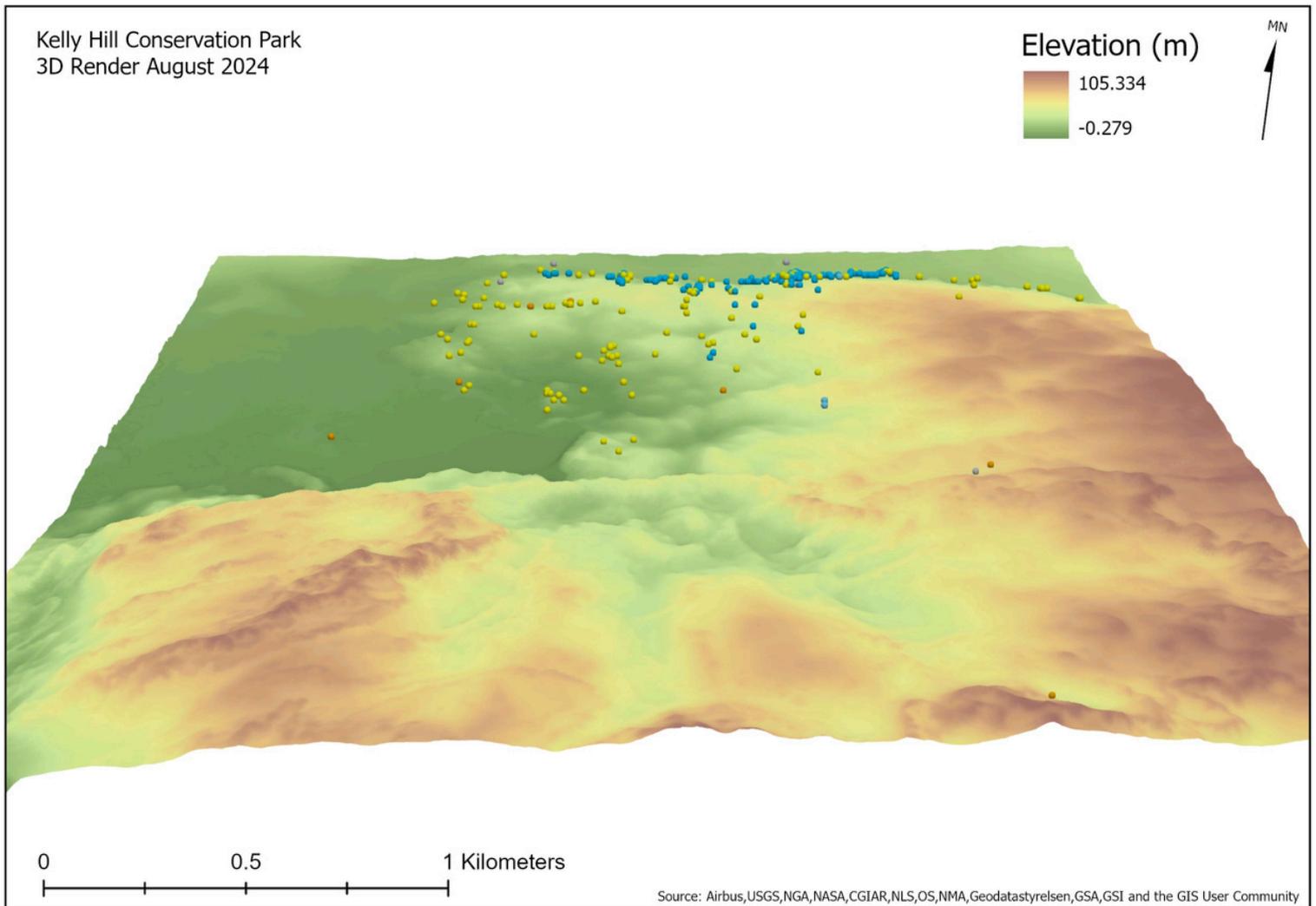


Figure 7: Generated with LIDAR. Figure shows cave locations at Kelly Hill Kangaroo Island. Diagram: Matt Smith.  
Blue dots known caves as of June 2021, yellow dots ground-truthed caves and or features, as of March 2024

# Cave Rescue Victoria

Bogdan Muresan





Unloading gear at training station - Photo by Nadine Muresan



Practising is the key - Photo by Nadine Muresan

Over the extent of this year, Victoria saw an increase in focus in cave rescue. Although Victoria doesn't have many or any significant caves in terms of length and depth, it arguably has the highest number of cavers. The Victorian Speleological Association (VSA) is the biggest ASF affiliated club by membership and there are a few other non ASF clubs running monthly caving trips in Victoria. This seems to me a good reason to focus on perfecting cave rescue techniques locally and that's what we're working on.

Over the 8-10 of November weekend we ran the third cave rescue exercise of this year and the best so far, in my opinion. As with the previous ones we broke it down into two parts: one day of learning techniques and one day of applying them as part of an organised cave rescue exercise. On the learning day, Friday, we focused on lifting systems and zip line transitions, with the new participants learning from scratch and the experienced ones perfecting their knowledge. In the evening, we watched a PowerPoint presentation about the newly established Cave Rescue Victoria Inc. and about how a cave rescue operation is organised.

On Saturday morning, the simulated cave rescue incident was presented: a caver had a fall in one of the caves and sustained a compound lower limb fracture. As the rescue coordinator, I divided the rescuers into 3 teams; 1) SRT 2) Medical 3) Evacuation team. A communication team, an access rigging team (SRT team) and a medical team. The first team deployed was the medical team. This was only theoretical because, this being a simulation, the casualty wasn't actually in the cave yet. Then the SRT team and the communications team were deployed.

The SRT team's mission was to fix and install access rigging for the rest of the teams. This is of utmost importance in a cave rescue. The members of SRT team need to rig irreproachably, as many cave rescuers will transit the cave with large, heavy bags multiple times throughout the exercise. The comms team followed closely behind installing the phone wire and the phones. Then, at 20 minute intervals, teams were deployed. Each team had a mission to: rig for evacuation of the stretcher, evacuate the stretcher and de-rig. Once every team was ready and we got the green light from the surface command, the patient was packed into the stretcher by the medical team and the evacuation began. Half-way out, we stopped and repacked the patient as he was uncomfortable. More fictional pain medication was administered as well. The total evacuation time was one and a half hours and the total time spent in the cave by rescuers was five hours.



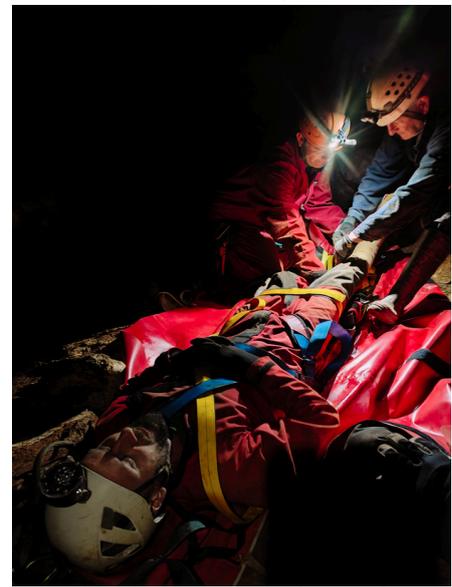
Timed pickoffs - Photo by Nadine Muresan



Liz using her skills - Photo by Nadine Muresan



Zipline to move casualty through the chamber  
- Photo by Nadine Muresan



Rebandaging casualty for comfort  
- Photo by Nadine Muresan

At the previous exercises, we had to focus primarily on evacuation systems because most of the cavers started from scratch, no stretcher evacuation knowledge. This time, with the core group of people already skilled, we could finally focus on the logistics part of the rescue operation: communication and control from the surface. Things did not run perfectly but a hierarchy of command was very obvious and communication with the surface was miles better than the previous exercises. I was satisfied with everyone's effort and for the first time I saw the stretcher moving efficiently and without noticeable problems. Big thanks to all 18 people involved. At the end of the day, after cleaning the gear, we all indulged in catered yummy food as we had to test the caterer for the upcoming ASF conference. We all liked it; I hope you will too.

In order to better focus our cave rescue efforts in Victoria, we quickly came to the conclusion that a separate association is needed. This is not the first time that this idea was circulated and not even the first time a rescue association existed in Victoria. The need for such an entity was obvious over the last decades and each generation did their best. Now it is our turn. As of 1 October 2024, Cave Rescue Victoria Inc. was formed and functions as an incorporated association. It is only small now and its focus is to create a core group of trained cave rescue technicians supported by a larger caving community. In order to achieve this, we plan to organise a series of courses each year to qualify members in cave rescue. These courses will follow the French system of training and the French style of SRT and rescue.

I have trained following this scheme both in Romania and France and went through the cave rescue technician course under Bernard Tourte, the head of SSF (French cave rescue association). This is the system that I know and can teach others in Victoria. This is why Victoria operates slightly differently than NSW and Tasmania but it is in line with the French system and most other European countries. At the conference, in January, we will run a cave rescue exercise in an easily accessible cave. Interested cavers can attend, either to just watch or to be part of a rescue team. Also, an outside demonstration will take place for spectators. Depending on time, a half day workshop might happen as well.



Yummy dinner celebration - Photo by Nadine Muresan



Power Point presentation - Photo by Nadine Muresan



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