

*Journal of the*

# Australasian Cave and Karst Management Association



## The ACKMA Journal

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**EDITOR:** Steve Bourne

**SUB EDITORS:** Tony Culberg, Andy Spate

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**PRINTER:** Hansen Print, Smith Street, Naracoorte, South Australia 5271.  
Ph: (08) 87623699

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**FRONT COVER:** Aurora Cave entrance, Te Anau, New Zealand

**Photo:** Dirk Stoeffels

**Back cover:** AGM 2017 - names inside back cover

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## ACKMA Inc. OFFICE BEARERS 2017-18

### President

Dale Calnin Email: [president@ackma.org](mailto:president@ackma.org)

### New Zealand Vice President

Neil Collinson Email: [nz.vice.president@ackma.org](mailto:nz.vice.president@ackma.org)

### Australian Vice President

Andy Spate Email: [aus.vice.president@ackma.org](mailto:aus.vice.president@ackma.org)

### Executive Officer

John Brush Email: [executive.officer@ackma.org](mailto:executive.officer@ackma.org)

### Treasurer

Tony Culberg Email: [treasurer@ackma.org](mailto:treasurer@ackma.org)

### Publications Officer and ASF Liaison Officer

Steve Bourne Email: [publications@ackma.org](mailto:publications@ackma.org)

### Committee Member

Scott Melton Email: [committee@ackma.org](mailto:committee@ackma.org)

### Committee Member

Jodie Anderson Email: [committee@ackma.org](mailto:committee@ackma.org)

### Committee Member

Ann Augusteyn Email: [committee@ackma.org](mailto:committee@ackma.org)

### Webmaster

Rauleigh Webb Email: [webmaster@ackma.org](mailto:webmaster@ackma.org)

### International Affairs Officer

Andy Spate Email: [international.affairs@ackma.org](mailto:international.affairs@ackma.org)

### Public Officer

Cath Loder Email: [public.officer@ackma.org](mailto:public.officer@ackma.org)

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# EDITORIAL

Steve Bourne

A large portion of this journal covers the wonderful week in Te Anau, New Zealand, for the Guides Workshop and ACKMA AGM. I won't elaborate too much here, except to highlight the event attracted 60 members which is a great turnout to a location that does take some effort to reach.

The AGM saw the re-election of Dale Calnin as president, with Neil Collinson remaining NZ vice president. Andy Spate returns to the committee after a brief absence, although he did assume the role of executive officer in the lead up to the meeting. John Brush has taken this role on with Tony Culberg accepting the role of treasurer. Scott Melton and Ann Augusteyn have been returned as committee members joined by Jodie Anderson. Dan Cove, Tim Moulds and Deborah Craven-Carden, who stepped in as interim treasurer when Cath Loder relinquished the position mid-term, have stepped down and were duly thanked for their contributions at the meeting. There were no changes to the journal publication and website management with Steve Bourne and Rauleigh Webb retaining these responsibilities.

Dave Smith's contribution to ACKMA was recognised with Life Membership awarded - a small piece outlines some of his efforts in this journal.

The next ACKMA Conference will be held in Margaret River, Western Australia with the date now set for 6-11 May 2018, after Mark Delane kindly offered to host the event. I have been speaking with members of the Indonesian caving world regarding the possibility of holding a Mulu-style AGM of 2010 in that country. Lots of work to do yet to see if its feasible but it would make for an interesting experience.



*Lake Cave, Margaret River. The next ACKMA conference will be held at Margaret River in 2018.*

*Photo: Steve Bourne*

As well as from reports on Te Anau happenings, this journal includes articles from Scott Melton, Miles Pierce and a republishing of an article from the online scientific communication *"The Conversation"*. My partner Liz Reed and her colleagues have been awarded a sizable Australian Research Council (ARC) grant of \$669,000 as part of a project worth about \$2M at Naracoorte Caves. The media release read as follows:

## **Naracoorte Caves to be focus of \$2M research project**

A University of Adelaide-led research project will focus on the rich fossil history of Naracoorte Caves and cement its place

on the world science stage. Announced today, the project has been awarded \$669,000 by the Australian Government through the Australian Research Council (ARC)'s Linkage Projects scheme which promotes collaborative projects between universities, industry, government and other partners.

Further cash and in-kind support is being provided by the Naracoorte Lucindale Council, the South Australian Department for Environment, Water and Natural Resources (DEWNR), the South Australian Museum, Terre à Terre, Wrattontully Wine Regions Association and the DST Group, bringing the total value of the project to about \$2 million. Researchers from the University of Melbourne and the University of Queensland will also share their expertise.

The project, led by Dr Lee Arnold and Dr Liz Reed in the University's Environment Institute and School of Physical Sciences, will provide a unique window into a key period of global climate change, animal extinctions and evolution of the modern Australian environment at the World Heritage-listed Naracoorte Caves. *"The Naracoorte Caves have preserved records of the local climate, flora and fauna for more than half a million years,"* says Co-lead Chief Investigator Dr Reed. *"Although scientists have been investigating these deposits for over 40 years, new multi-disciplinary studies and technological advances are now allowing us to look at these records in new ways. We have literally just scratched the surface."*

The project will integrate all aspects of the cave deposits, employing new approaches in geochronology, palaeontology and geochemistry to produce comprehensive ancient ecological and climate histories.

*"This project will have significant implications for understanding megafauna extinctions and will inform future conservation and climate change adaptation strategies,"* says Co-lead Chief Investigator Dr Arnold. *"It will also transform the scientific profile of Naracoorte Caves, ensuring socioeconomic benefits to regional communities through education, ecotourism and knowledge marketing."*

The time span and exceptional preservation of the fossils make the Naracoorte deposits significant on a global scale.

Naracoorte Lucindale Council Chief Executive Officer Dr Helen Macdonald says: *"This is fantastic news and a potential economic game changer for the community of Naracoorte. The value of the partnership to the Naracoorte Lucindale Council is the ongoing interest the research work will create in the World Heritage-listed megafauna fossil site, and the opportunity it provides for the community to create a science tourism hub."*

DEWNR Group Executive Director Science Sandy Carruthers says DEWNR had actively sought to partner with this team of internationally recognised experts whose objectives align with the state government's strategies to address climate change and biodiversity conservation. *"The project will greatly advance our scientific understanding of the fossil sites at the World Heritage Naracoorte Caves and will provide benefits to both the broader community and visitors to the site,"* she says.

South Australian Museum Senior Research Scientist Dr Mark Hutchinson says: *"With this funding the Museum will work alongside its research partners to increase understanding of South Australia's globally significant natural heritage. The Museum outreach program will then take this new understanding out of our laboratories and into the hearts and minds of regional and remote communities in South Australia."*

While in New Zealand, I spent some time discussing visitor numbers with various cave managers, and the pressure that high and increasing numbers places on the cave system and the capacity of the responsible agency to deliver a quality product. Scott Melton provides some insight into the busy days at Jenolan Caves and I hope future journals may include some discussion from other sites. I have visited Postojna Cave in Slovenia on two trips to Europe when the cave visitor numbers were 500-600,000 per year. Last year they passed one million visitors on 1 November! I can't imagine what that is like to manage on a daily basis and what this may be doing to the cave.

At possibly the other end of the spectrum, Mile Pierce's article covers the use of solar energy to light Federal Cave at Buchan Caves, Victoria - environmentally friendly and catering for low visitor numbers. I do like the concept of lighting caves with the sun!

The ASF continues to work on protocols to ensure white-nose syndrome that affects bats is kept out of Australia with the upcoming Speleology Congress. The latest piece of information is reprinted here as a ready reference for cave managers and those involved with pre and post congress excursions.

Australia Post is profiling four magnificent Australian caves in its newest stamp issue: Cliefden Caves, in New South Wales; Weebubbe Cave, in Western Australia; Undara Lava Tube, in Queensland; and Kubla Khan Cave in Tasmania. These have been added to cave-related items that proliferate in our house and sit proudly alongside the Slovenian bat stamps that bear my photos. I trust Australian Post paid the photographers, or at least sought their permission, for the use of these great images on these stamps. The first day covers with Kubla Khan photos look very nice. The Australia Post website has some brief information of the series as per below.

*Cliefden Caves are located along the Belubula River in New South Wales. Cliefden is one of the most significant cave systems on private land in NSW. It is the site of the first discovery of limestone on mainland Australia, in 1815 and houses an abundance of fossil deposits. The stamp features*



*the golden stalactites and stalagmites of the Clown Room in Cliefden Main Cave.*

*Weebubbe Cave is located near Eucla in Western Australia and is a culturally significant site to the Mirning people. It was formed millions of years ago and is the deepest cave in the Nullarbor. The lakes of this underground cave have incredibly clear water.*

*Undara Lava Tube, situated in Undara Volcanic National Park, south-west of Cairns, Queensland, is one of the longest lava tube cave systems in the world and the longest in Australia. A hollow tube was formed from a single flow of molten lava, around 190,000 years ago. Surviving segments of the tube form caves and arches, including Mikoshi Cave which is pictured on the stamp. Access is by guided tour.*

*Kubla Khan Cave is part of the Mole Creek Karst National Park, north of Cradle Mountain, Tasmania. Kubla Khan Cave and its formations are named after the Samuel Taylor Coleridge poem of the same name. More than two kilometres in length, Kubla Khan's incredible features include the Silk Shop shawl formations, one of which is visible on the stamp.*

## ACKMA Awards

Andy Spate and Tony Culberg

At the recent AGM at Te Anau, New Zealand, Andy moved to reactivate and formalize the ACKMA Awards so that members are made more aware of what they reward and the selection criteria.

1. The former annual award for the best contribution in the ACKMA Journal for the preceding year be resurrected and named the **Elery Hamilton-Smith Award**. The award will be judged by the Publications Officer and one other Member of the Association nominated by the Committee. It is suggested that the Award will be by paper certificate unless the Committee otherwise determines. It was noted that any articles contributed to the Journal by members of the judging panel would be automatically excluded from consideration.
2. The support of students or other worthy persons for their attendance. The level of support to be determined by the full Committee with the money coming from ACKMA's Life Members' Fund. The Award will be termed the **Ken Grimes Award** in recognition of his long-term contribution to better understanding of caves and karst.

The recipient will be required to make a presentation to the conference as a condition of attaining the award. The Committee will call for nominations for the award not less than six (6) months before the date of the commencement of the Conference. Nominations will be considered by sub-committee comprising 2 or 3 committee members and the conference convener. There need not necessarily be an award at each conference.

So get writing, people, for the first Awards! Let's see some contributions from those who have not written before. And let's hear the news from your work site, please. For the second, please think about students, researchers or other valuable people who might be helped to attend a conference for both their benefit and ours. Any suggestions should be sent to the ACKMA President.

# SIXTEEN LEGS



Remember the Sixteen Legs exhibition at the ACKMA Conference at Naracoorte Caves in 2015? Sixteen Legs is an inter-linked suite of educational projects focussed on the world of Antipodean caves and cave biology. There is an education pack available including books and lessons linked to the Australian Curriculum for both primary and secondary schools. There is the documentary which I have still not seen, but from the trailers shown at Naracoorte and the reviews, is

an outstanding piece of work. The *Enter the Cave Exhibition* is still available to show at your cave site or perhaps a town near you.

**For further information, a sample lesson, ordering details and general enquiries please contact: Katrina Wills on 0439 840 758 or [sixteenlegs@bigpond.com](mailto:sixteenlegs@bigpond.com).**



## Cliefden Caves

Cliefden Caves, New South Wales, are a step closer to receiving formal protection with the New South Wales Heritage Council recommending the Cliefden Caves Area be listed for its Natural and Cultural Landscape values. The ASF has done a tremendous amount of work and we hope this is rewarded with the heritage listing of the area.

***The three most important things for bats when they are looking for a cave?***

***Echolocation, echolocation, echolocation***

*(thank you to John Cleese for this one)*

*An aerial view of Bat Cave, Naracoorte*

*Photo: Steve Bourne*

## CAVE GUIDE TRAINING SURVEY

**Andy Spate, Dave Gillieson, Scott Melton, Jodie Anderson, Cathie Plowman and Ann Augusteyn**

A small group within ACKMA – Andy Spate, Dave Gillieson, Scott Melton, Jodie Anderson, Cathie Plowman and Ann Augusteyn – has been discussing the adequacy of cave guiding following the highly successful guiding school at Capricorn Caves in 2016. Unfortunately schools such as this do not reach out to all ACKMA people or to other guides across Australia and New Zealand. Nor do we know what training is given to guides. Or what they might want. ACKMA regards itself as a professional body – thus we should push for professional and well trained guides talking about caves and karst across Australia and New Zealand – and beyond.

We shortly will be asking all ACKMA members to respond to a survey asking cave guides and managers what training is currently provided and what they would like to be delivered. We will be reaching out to others working in show cave operations.

The ACKMA Committee has endorsed the survey and it will be administered by Committee members Ann, Scott and Jodie.

ACKMA's aim is to develop 'tool boxes' for cave guide professional development. It may investigate and perhaps implement more formal certification for cave guides – such certification may well be available from a NSW TAFE or similar sources. Some show cave operations already require such certification for their guides.

As an incentive to complete the survey ACKMA will be offering free conference registration to the Margaret River WA ACKMA conference 2018 to one person drawn at random from those who participated in the survey.

We expect the survey will be administered by hard copy in the Journal and electronically using 'Survey Monkey' or a similar program. We urge all members to take part in this survey and urge you to invite non-ACKMA members in your workplace to participate as well.

*Editor's note: The Cave Guide Training Survey will be published in the September ACKMA Journal.*

## National Day of Caves and Karst

The National Caves Association, which represents more than 80 show caves in the United States, Bermuda and Barbados, declared June 6 as National Day of Caves and Karst to increase awareness of the roles both play in our lives and the environment. It listed 5 reasons to encourage people to visit at least one cave over the summer break. These are summarised below - perhaps ACKMA could run a similar campaign??

### 1. See things they've never seen before.

No two caves are alike.

### 2. Spend quality time with family.

Some of the best family memories are made during summer vacations and staycations. Exploring caves with kids not only means quality time together, it can spark an interest in science and nature that will last a lifetime. Bonding opportunities exist as well when family members share a challenge such as going deep underground for an adventurous wild tour.

### 3. Cave tours are educational.

Most guided tours teach guests about the history of that particular cave and the surrounding area, as well as its geology, the positive impacts of bats and the importance of cave conservation. *(well they should!- Ed.)*

### 4. Spending time in nature has many benefits.

Multiple studies show that nature boosts our mental and physical well-being. Benefits, particularly when paired with exercise, include restored mental energy, better vision in children, improved concentration, sharper thinking and creativity. Spending time in natural spaces has been linked to increased energy, improved cognition, reduced anger and stress, lower blood pressure and slower heart rates.

### 5. Caves are fun.

These aren't your grandfather's cave tours. Options for exploring and spending time in caverns are increasing each year.

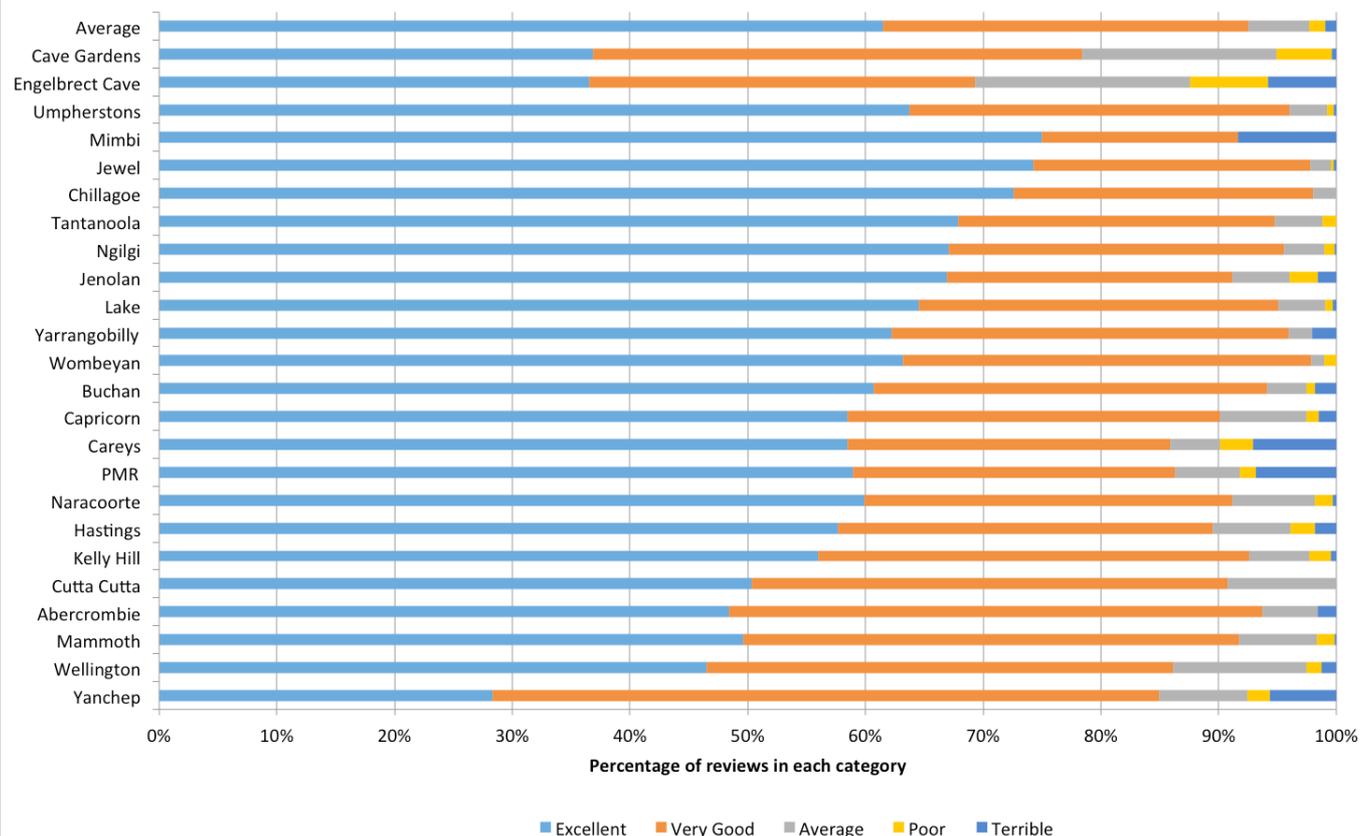
## TRIPADVISOR

Andy Spate

Having an idle afternoon at Te Anau when I should have been doing other things, I have looked at all the TripAdvisor comments for those sites in Australia that I know of with cave and karst tourism values. These data were found on 21 May 2017. I did not read all the 8937 reviews! But, it would be interesting to do so. Issues with staff seem to be a recurring theme where there were not-so-good reviews. Because of the huge variability in sample sites (=number of reviews for each site) any statistical conclusions should not be drawn.

I emphasise very strongly that these are TripAdvisor reviews – they are unstructured and complainants are more than likely to be those that submit reviews. But the results seem to indicate the opposite – we seem to be doing well in presenting our caves. Nothing in these data suggest that we are doing much wrong – contrarily we are going well. Presented for your information.

### TripAdvisor reviews for Australian Caves



# PRESIDENT'S REPORT

Dale Calnin



It was an absolute privilege to attend the 2017 ACKMA AGM held in spectacular Te Anau in New Zealand. It was an unforgettable week and one of the most enjoyable ACKMA gatherings that I have had the pleasure of attending and I have no doubt that this journal will be rich with articles rightfully praising the efforts of our New Zealand hosts.

It was indeed a sensational ACKMA event and all would not have been possible without the tireless efforts of our wonderful Te Anau hosts. Congratulations to Neil, Laura, Lucy, Thomas and the rest of the amazing Real Journeys team and thank you for your warm hospitality, and for sharing with us the beautiful part of the world that you live in.

ACKMA gatherings are always a fantastic time and it was great to catch up with the 60 or more ACKMA attendees and to hear of all the exciting things happening in their respective patches. Cave operations in Australia are very busy places with always something exciting happening. I do believe we need to profile this better and I therefore strongly encourage all our cave sites to be more vigilant in sharing all your good news stories in cave and karst management in the ACKMA journal.

As to the business of the weekend itself, both the Executive Meeting and the AGM were highly productive sessions and I would like to commend the committee for its work particularly in addressing the issue of ACKMA membership and helping to implement a viable business and financial framework for the future.

One of the highlights was certainly Dave Smith's ACKMA Life Membership Award, recognising his many years of dedication and service to cave and karst management. Thoroughly deserved and on behalf of everyone Dave, congratulations and well done.

It was great to see some new members added to the executive committee. A lovely blend of youth and experience with the appointments of Jodie Anderson to the committee and Jordan Wheeler to take on the position of Membership Officer and of course, Andy Spate to Australian Vice President and Tony Culberg to the important position of ACKMA treasurer. I take this opportunity to also acknowledge the valued contribution of outgoing committee members, Treasurer Deborah Craven-Carden and Executive Officer Dan Cove.

The decision to proceed with the ACKMA Cave Guide Survey to help enhance training for better cave guiding I feel is a real positive of the organisation and I encourage all those involved with cave guiding to support this wonderful and worthwhile initiative. I strongly believe that ACKMA's guidance again in this area will be most beneficial and well warranted for all.

The 22nd ACKMA Conference will be held in the beautiful Margaret River Region of Western Australia and promises to be another event not to be missed. Congratulations to Attractions Manager Mark Delane and Margaret River Busselton Tourism Association for their successful bid and I am sure it will be very well attended by our ACKMA members.

I am looking forward to continuing to work with the committee as we continue to further the objectives of our association and I congratulate them on their energy and enthusiasm displayed already since our meeting at Te Anau. There are exciting times ahead for ACKMA and I look forward to seeing you all at Margaret River Western Australia in 2018.



*The AGM at Te Anau Scout Hall with the leftovers(!) of lunch in the foreground. We were well catered for.  
Photo: Steve Bourne*

# SWEET AS: PART 2

## ACKMA AGM, TE ANAU NEW ZEALAND

Steve Bourne



*One of the many glorious views we enjoyed during the week, from near Key Summit.  
Photo: Steve Bourne*

When I wrote up the ACKMA Waitomo conference of 2013, I headlined the report “Sweet As”, in reference to a colloquial New Zealand saying for something “great” or “excellent”. The AGM at Te Anau was different for sure, as it was predominantly field trips without the papers of the conference, but was nonetheless an excellent learning experience for all attendees. Te Anau is in the deep south of New Zealand on the edge of Lake Te Anau and the Fiordland National Park, which in itself is part of a larger World Heritage Area. “WOW” was uttered more times than you could count. This is an incredible part of the world! The following is a short summary of the week long adventure.

Getting to Te Anau requires a reasonable amount of effort and patience but as noted above, one is well and truly rewarded. My travel started at 12.30 pm Tuesday 2 May, arriving in Te Anau at 6.30pm Wednesday 3 May. My travel group included Nick Heath and Matt Cooper from Kangaroo Island whom I met up with in Adelaide, and Andy Spate whom we met in Melbourne. This group expanded in Auckland for the leg to Queenstown with the final arrivals here the Capricorn Caves crew and Lana Little from Chillagoe. Once loaded onto the coach, we had just another 2½ hour coach ride to Te Anau. Despite some travel weariness, we enjoyed a reception barbecue and met the Real Journeys team. Their leader and convener of this AGM, Neil Collinson, had suffered a fall when a ledge gave way beneath him in Te Anau Cave on Anzac Day, severely breaking his ankle. This could have presented significant difficulties for hosting the ACKMA contingent, however Neil’s team stepped up admirably and the week’s

activities passed without a hitch (for us at least). Sometimes you don’t know just what your people can achieve until the space is made and Neil reflected on this on the last evening – more on that later.

On Wednesday, Day One, we convened at the Department of Conservation (DOC) park headquarters adjacent to the holiday park where most of us were staying. Park ranger Lindsay, in charge of biodiversity, provided an outline of DOC’s work managing the largest National Park and World Heritage Area in New Zealand. I did enjoy his description of biodiversity



*Lunch at Key Summit  
Photo: Steve Bourne*

management which 'mostly involves killing things'. After this introduction, three groups were formed to experience three different walks; Key Summit, Hollyford Track and Kepler Track. I was in the Key Summit walk, headed by guide Anja who had an incredible career of guiding across many different countries. We enjoyed lunch at the top of the Key Summit walk, which in reality is surrounded by many much higher peaks and some incredible scenery. On the walk down a rabbit crossed our path and I asked the guide if it be OK to stone the rabbit, in other words, assist in the biodiversity work outlined by Ranger Lindsay in the morning. No one would ever believe this story except it was witnessed by a number of people – the stone I hurled at the rabbit brought about its immediate demise! How unlucky was that rabbit!!

Other groups took the Kepler Track or Hollyford Track and Ann Augusteyn and Regina Roach have provided a description of these.

### Kepler Track

"Just a wee stroll" and 12 kilometres later! I would not have missed it for the world. The track through the magical beech forest loaded with lichens, mosses and ferns was perfect; the gradient was such that conversations could flow freely!! Our hosts Thomas and Heath were amazing; they regaled us with fascinating stories of the Fiordland bush; demonstrated the predator controls and even eventually discovered Moturau Hut on beautiful Lake Manapouri where lunch awaited us! The *Kids Restore Kepler Birdsong Project* supported by the local community and funded by Air New Zealand CTOS and Distinction Hotels in partnership with DOC is most impressive. It is so refreshing to discover a "good news" story. I loved every moment.

Ann Augusteyn Capricorn Caves



Julia James with Ann Augusteyn on the shore of Lake Te Anau  
Photo: Ann Augusteyn

### Hollyford Track

A 'Walk in the Park' was the theme of the Guides' Workshop on Thursday. There were three options. Kepler Track, Key Summit on the Routeburn Track and the Hollyford Valley Track.

Question. Why choose the Hollyford Valley option?

Answer. "Because it has everything." A bus ride viewing textbook glaciation features - U shaped valleys, terraces, hanging valleys, roches moutonnees, kettles, neve fields etc. Great photography - except for the Mirror Lakes. It was misty rain so their mirror image reflections were not on display but the boardwalk and bird life made for a short pleasant stroll.

Knobs Camp, an old public works camp now utilized as tourist accommodation, was a quick stop before we climbed up out of the valley, and off loaded the Key Summit walkers at the beginning of the Routeburn Track. This group thought one has to ascend and descend steep hills to take outstanding photos. If they had been smarter they would have stayed on the bus with the Hollyford group and their guide Brad Crawford.

We drove slowly through Gunn's Camp at the head of the Hollyford Valley, named after Davey Gunn, a cattleman who lived there ninety years ago. The settlement later became a road camp and now has a shop, museum and accommodation.

Our walk commenced with a swing bridge crossing. Only a maximum of two people at a time are allowed on the bridge except if you do not read the sign. Luckily there were no issues for the group of people who waltzed across the bridge in one group without first reading the sign.

Located beside the swing bridge was a boat ramp for the launch of jet power boats. It is used by fisherman and many people completing the eight day circular DOC Hollyford Track walk. The "walkers" walk the easy sections and find alternate methods (jet power boats and helicopters) to avoid the hard sections!

We sauntered about 4 km along the mostly level track, sometimes alongside the river where one could spot the trout cruising among the rounded river stones. The trails and traps of the stoat contractors were obvious. Being heavy boxes many were located close to the track where they could easily be transported in, set up and monitored.

Brad showed us how to identify landslips by the vegetation. We learnt about the different types of beech trees and ferns, foods the Maoris ate and bird calls. Included was a lesson in Kiwi bush craft if ever one needed emergency food or shelter. It was an excellent interpretative example in the use of alliteration to communicate a message.

If you are hungry then search for the big ferns whose fronds feel "hard and hairy" they will feed you – remember the saying "hard, hairy and hungry". The ferns which feel "soft and silky" will provide you with shelter, and the saying is "soft, silky and sleepy".

On the return stroll to the bus whilst walking alone I reflected about my setting. High above, the U shaped valley was walled in by Darren Mountains. The sun glistened on the snow patches against a bright blue sky background, thirty metres above me the beech formed a broken canopy of dark coloured leaves, and the dappled light danced upon the different coloured tree trunks and moss covered trees. Surrounding me was vegetation in endless shades of green.

The Hollyford Track option was an outstanding example of a 'Walk in the Park.'

Regina Roach, Yarrangobilly Caves

On day two, we travelled a bit over an hour to Clifden Caves, via the historic Clifden suspension bridge. Clifden Cave is immediately adjacent to the road and clearly signposted, available for anyone to visit. As we all know, the issue with open access to caves is the inevitable damage and vandalism. Maybe not though! Read on for the Luxmore Cave description! Clifden Cave is a stream cave, easily accessible with mostly walking passage. There are a couple of pools that can be skirted around the wall (ably assisted by Thomas) or the direct option through up to knee-deep water could be taken. All who wished to stay dry did.

Neil had asked John Brush to lead a graffiti cleaning workshop in the cave, given John's experience in this work. David Woolls-Cobb was in my group and like John, has cleaned many a cave surface. We experimented with a few techniques; spraying water, wire brushes (with stainless steel bristles to avoid rust if they drop out), nylon brushes and a drill with a nylon bristled



Two methods of negotiating the pool in Clifden Cave. Above. Thomas Lundman watches Daniel Carrauthers skirt the pond.

Photo: John Brush

Below. Thomas assists Charlotte Riley through the water with Keagan Morris in the foreground.

Photo: Steve Bourne



Graffiti in Clifden Cave. Different inks and paints used require different methods of removal. This would be an excellent topic for a future journal for members to share their success or otherwise with graffiti removal

Photo: John Brush

brush. As John and David highlighted, each situation needs a different technique, and I hope to have an article for a future journal on this topic. There was some particularly offensive coloured blue paint in Clifden Cave, reading 'Vlad from Russia' (Putin??) part of which was successfully removed through the use of the above four techniques. Graffiti in caves stimulates interesting discussions. What is the cut-off date for something to be considered historic? What if it is a person of note? Two examples jump to mind; a date of 1213 in Postojna cave, Slovenia and Brett Whiteley's (an Australian artist), signature as child visitor to Jenolan Caves, New South Wales.

On this day, we also visited the Totara Forest Walk. This was a nice short walk to visit the majestic trees and capped off a great day, prior to our hour long drive home.



The Capricorn Caves crew at Clifden Cave. Standing. Jordan Wheeler, Christian Bom, Ann Augusteyn, Charlotte Riley, Kimberley Wheeler. Seated. Judy Christensen, Keagan Morris.

Photo: Ann Augusteyn



Peter Chandler using the drill with nylon bristled brush to remove the blue paint of "Vlad".

Photo: John Brush



*How many ACKMA members to circle a giant Totara tree?  
Eleven!!  
Photo: Ann Augusteyn*

**Te Anau Glow Worm Cave**

Te Anau Cave is accessed via a 25 minute boat trip across Lake Te Anau to the Murchison Mountains, where the Takahe, a flightless bird, once thought to be extinct, was rediscovered in 1948. This bird looks like an over sized Australian swamphen and is of the same genus. We were able to see these close up in a park on Sunday but no one was lucky enough to see a wild bird.



*Lucy Collinson introducing Te Anau Glow Worm Caves to ACKMA members.  
Photo: Ann Augusteyn*

Lucy Collinson introduced ACKMA members to Te Anau Cave in the visitor centre. I was immediately struck by the enthusiasm of the Real Journeys guides which was a highlight of our entire visit to the site. Te Anau Cave is accessed through a low entrance, some bending required. The first section of the cave has a fast flowing stream and waterfall, and it was above this that Neil had his fall just prior to the ACKMA AGM event. He was lucky not to head over the waterfall. Above the waterfall, a dam has been constructed and boats take visitors further upstream to view the glow worms. As an ACKMA member and well travelled caver, I have been lucky to view quite a few glow worm caves. Te Anau Cave has a moderate showing of glow worms, and I have certainly seen caves with larger more spectacular shows than this. This does not detract from the cave experience though, which starts from the moment you

board the boat at Te Anau. The package of boat trip across the lake, tour through a very active stream cave, viewing of glow works by boat inside the cave and walk through the forest accompanied by knowledgeable and friendly guides make this an excellent and very worthwhile experience. On a cave tour it is normal to be subjected to a few facts, most of which we fail to retain. Fortunately, I have had several trips to Waitomo and my knowledge of glow worms and their life cycle is reasonably good. One other fact I managed to retain was the age of Te Anau Cave, just 12,000 years! I found this incredible and it was confirmed the following day by Prof Paul Williams in our trip to Aurora Cave.

On Saturday evening, Paul Williams provided an after dinner talk on the Aurora Cave system and geology of the broader Fiordland landscape. See Paul's article elsewhere in this journal (page 13).



*Paul Williams receives a man-hug following his excellent dinner address.  
Photo: Ann Augusteyn*

**Aurora Cave**

Aurora Cave is the master system of which Te Anau Cave is a small section where the stream exits the mountain into Lake Te Anau. We enjoyed another boat trip to reach this and a nice walk up the mountain to reach the cave entrance. We had quite a leisurely look through some sections of the cave, with the highlight being Paul William's on site interpretation. One of Capricorn Cave's young guides provides his thoughts on the Aurora Cave experience.

One of many of the incredible experiences from ACKMA 2017 at Te Anau was the Aurora Caves, not only the caves themselves but also the walk to and from. What significantly added to this experience was the overview of the geology and formation of the caves and of the Te Anau area. Understanding why everything looked like it did gave me an insight to the recent past of this beautiful place. The walk to the caves was full of Beech trees, and a micro world full of mosses, every time I looked closer at the mosses, I would discover that the many species are all living symbiotically with each other. Then was the caves themselves, from the entrance that could fit a 747 plane, to the gushing

waterfalls. I struggled to say a single word while inside that cave because I was so blown away by what I was seeing in front of me. I am very thankful to all those who put this experience together and thankful to those who attended, I am looking forward to seeing you all in the future.

Christian Bom, Capricorn Caves



Marjorie Coggan and Dave Smith in Luxmore Cave  
Photo: John Brush



Nicola Beckett under the "Rock of Death", a slab of rock identified as unstable and could possibly fall. I did like the risk strategy, only one person to move under the rock at any one time. Seems perfectly reasonable to me.

Photo: John Brush

On Monday, the majority of the group took a helicopter flight to the Mount Luxmore Hut, from where we would visit Luxmore and Luxless Caves. The Capricorn Caves crew visited Aurora Cave on this day, after walking to Mount Luxmore the previous day, a fair day's exercise of 28 km *plus* caving. Understandably, they were a little weary after that effort, particularly the very petite Charlotte Riley who must have run most of the day to keep up.

I commented about graffiti in open access caves when describing Clifden Cave. The Mount Luxmore Caves are open access and I only saw one piece of graffiti. There may have been more but it wasn't obvious. One can draw two conclusions as to why there is a lack of graffiti in these caves; the people who walk the track are conservation minded and respect the



Anne Musser examining moa bones in Luxmore Cave  
Photo: John Brush



The wounded warrior Neil Collinson.  
Photo: Ann Augusteyn

environment they are accessing, or people do not carry spray paint cans and other writing implements with them while hiking. I hope it's the former but suspect there is an element of not having writing tools available to leave their mark.

On Monday night, the final night of the extended ACKMA AGM weekend, a dinner was held at the Distinction Motel. The usual final dinner thank yous were perhaps a little more personal than usual. Neil Collinson reflected on the achievements of his team, including Laura Dawson, daughter Lucy, guide Thomas Lundman and wife Paula, providing gifts of alcohol and flowers. While Neil was able to attend the meeting and greet ACKMA members on occasions, his team largely filled the organisational breach. Laura, Lucy, Tom and Paula worked long hours to deliver a great week of activities and I am sure the experience will raise them to a new level. Neil reflected that his accident and his absence from much of the event was a good thing. I don't think there is anything good about what Neil was and is going through, but the growth of his team is an outcome he is proud of. The AGM attracted 60 members, who were treated to a great week of activities - *sweet as!!*

All good things come to an end and Tuesday it was time to say goodbye and make our way home, while some members stayed on and enjoyed a holiday in New Zealand. I am sure that Te Anau is now on the list for most if not all of us to visit again.

# AURORA CAVE and TE ANAU VALLEY, FIORDLAND, NEW ZEALAND

Paul Williams  
University of Auckland

Te Anau Valley in Fiordland was once occupied by one of New Zealand's largest Pleistocene glaciers. It now contains Lake Te Anau, the largest lake in the South Island and the source of the Waiau River, the largest river draining eastern Fiordland. The lake is situated in a fault-aligned depression striking NNE-SSW and receives drainage from a mountainous catchment of 2998 km<sup>2</sup> that rises to 1500-2000 m above sea level. It is composed mainly of Paleozoic igneous and metasedimentary rocks (Turnbull et al. 2010). The lake has an area of 348 km<sup>2</sup> and has an average depth of 132 m. Its surface is at 203 m above sea level, but has a maximum depth of 417 m, so its floor descends well below sea level. It has been over-deepened by glacial scour, but is also slightly impounded by a moraine dam.

At the height of the global Last Glacial Maximum (LGM), the Te Anau Glacier above Aurora Cave was more than 20 km wide and, as it flowed south, was joined from the east by large glaciers from South Fiord and from the Lake Manapouri basin; their combined ice spreading across lowlands to the east and southeast as a piedmont lobe. The ice abutted against Mt Prospect (970 m) and neighbouring Danby Hill (724 m) to the southeast and against the Cheviot Hills, foothills of the Takatimu Mountains, to the south. Meltwaters escaped down the Waiau River valley.

The western side of the Te Anau glacial trough between two western arms of the lake (known as Middle Fiord and South Fiord) is covered by a series of lateral moraine benches that ascend the valley side to 975 m, almost to the tree-line at 1100 m. The lower part of this slope is underlain by Oligocene limestones of the Tunnel Burn Formation (Turnbull 1985), which is the host rock for Aurora - Te Ana-au Cave that lies beneath the slope and extends from near lake level to 469 m. The modern stream flowing through the cave comes from a hanging tributary of the main trough known as the Takahe



ACKMA members at Aurora Cave entrance.  
Photo: John Brush

valley (Fig. 1), and re-emerges at 204 m beside Lake Te Anau. The lowest part of the cave near the lake is a tourist cave, known as Te Ana-au Cave, and upstream part beyond a sump is a larger upstream section known as Aurora Cave (Fig. 2). The lake is the baselevel for the stream that flows through the system. High abandoned passages in the Aurora section of the cave are the equivalent of subterranean river terraces. These are 30-40 m above the modern stream passage and contain speleothems dating to 273 ka; so a maximum rate of stream incision of ~0.15 m/ka is implied.

A staircase of lateral moraines left by retreating glaciers runs up the valley side (Fig. 1), and these provide the opportunity to date glacial events in the valley by using cosmogenic exposure age dating of glacial erratics left of the surface of the moraines. By contrast, in the cave beneath the same slope, calcite deposition in the cave provides the opportunity to date mild unglaciated intervals, when speleothems accumulated, by using uranium series dating of calcite. The two independent

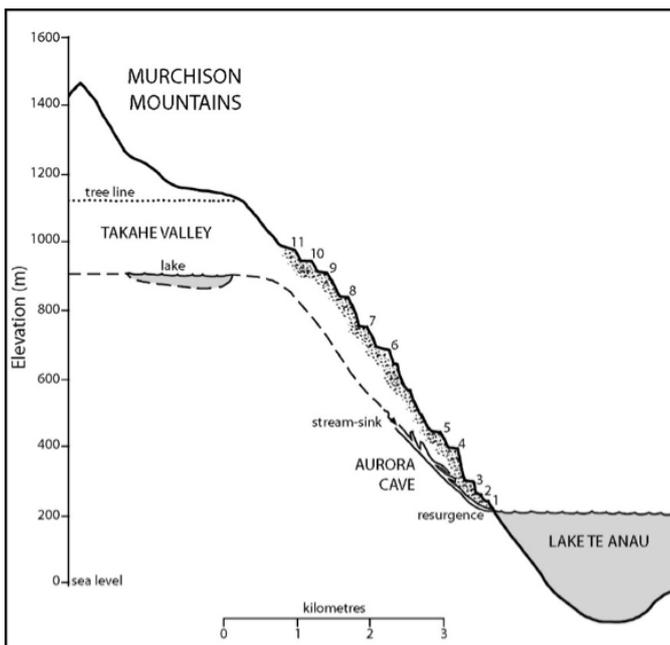


Fig. 1 Schematic profile of the slope above Aurora Cave. Numbers refer to lateral moraines.



Jodie Anderson at the Twin Falls, Aurora Cave.  
Photo: John Brush

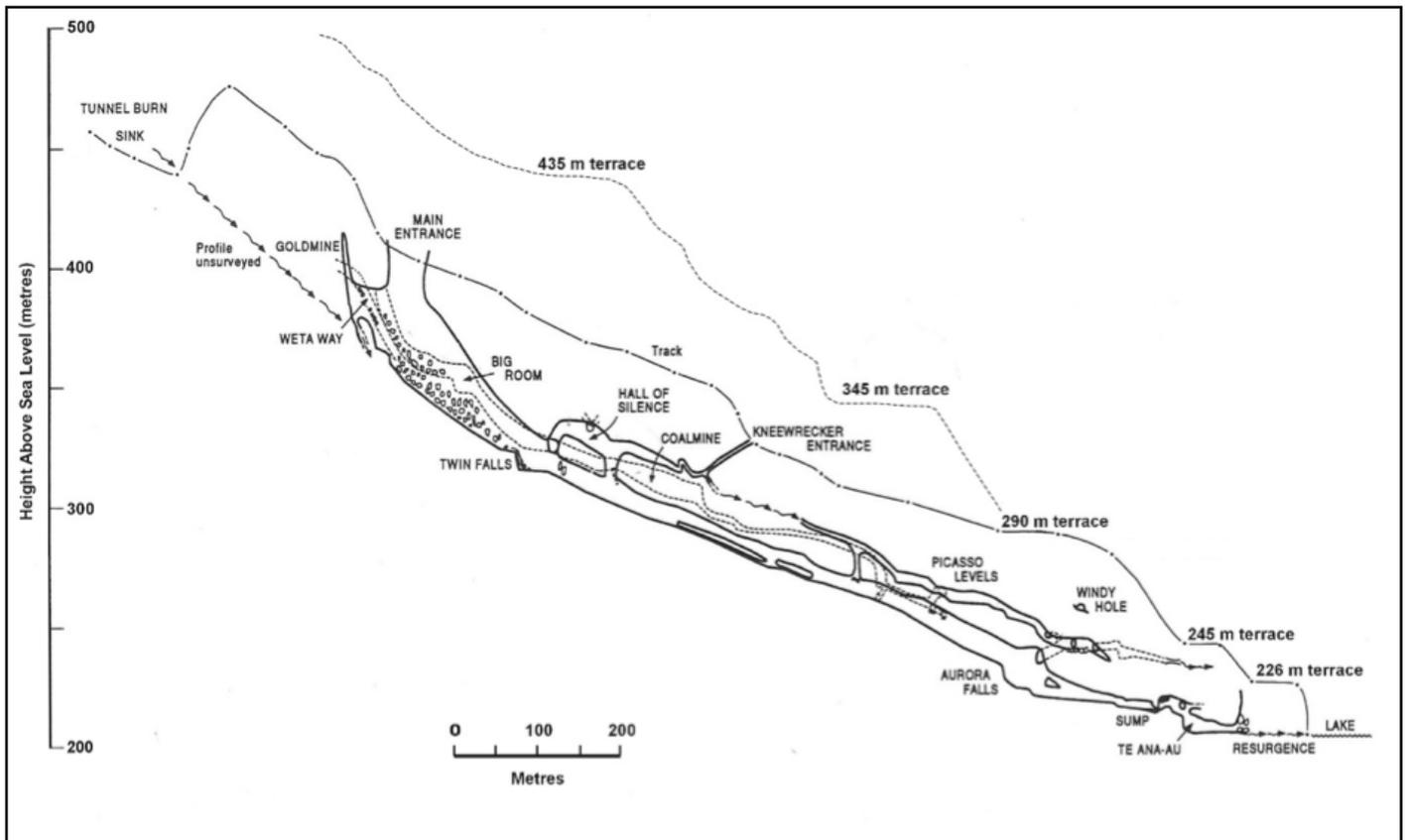


Fig. 2 Projected long profile of Aurora-Te Ana-au Cave showing moraine terrace levels overlying the cave. The Hall of Silence is illustrated in Fig. 3.



Paul Williams interpreting features of Aurora Cave.  
Photo: Steve Bourne

and complementary sources of dates offer a rare opportunity to learn much more about the Late Quaternary climatic history of the valley, specifically the timing of cold events (represented by moraines) and intervening warm intervals (represented by speleothems).

The cave acted as a sediment trap during glacial events (refer to Williams 1996 for more detail), but during mild intervals between glacial advances the cave stream re-excavated these

sediments and, elsewhere, percolating water deposited speleothems on them. Stratigraphic sections in the cave reveal calcite speleothems interbedded with sands and gravels laid down by glacial meltwaters (glacifluvial deposits), and these provide the main source of dateable evidence within Aurora Cave. Thus speleothems provide evidence of when mild interstadial and interglacial conditions prevailed, and their ages yield bounding dates for glacifluvial events. Fig. 3 illustrates the dates on speleothem samples from the Hall of Silence. The main Te Anau valley glacier was the source of most meltwater and sediment in the cave, but the Takaha glacier, located in a hanging tributary that is the catchment of the modern cave stream (Fig. 1), would also have contributed glacifluvial sediments.

The ages of lateral moraines provide a chronology of glacial activity. Cosmogenic ages of erratic boulders on moraine surfaces provide minimum estimates of how long the boulders have been exposed. Samples from six lateral moraine terraces provided useable results, and showed terrace ages to become progressively younger as they descended in elevation towards the lake. The exposure ages indicated that an early Last Glaciation advance reached high up the valley-side above Aurora Cave and that the next lowest terrace at 830 m was deposited at the start of the global Last Glacial Maximum around 32,000 years ago (see Fink *et al* 2006 for details). At that time, the ice above Aurora Cave reached 627 m above modern lake level, and the glacier was about 1 km deep, but was not as large as the MIS 4 glacier (61-66 ka) that had preceded it. Lateral moraine terraces at 735 m, 435 m, 290 m and 226 m clearly define the level and date of the declining ice surface of the Te Anau Glacier through the LGM between about 30 ka and 18.5 ka.

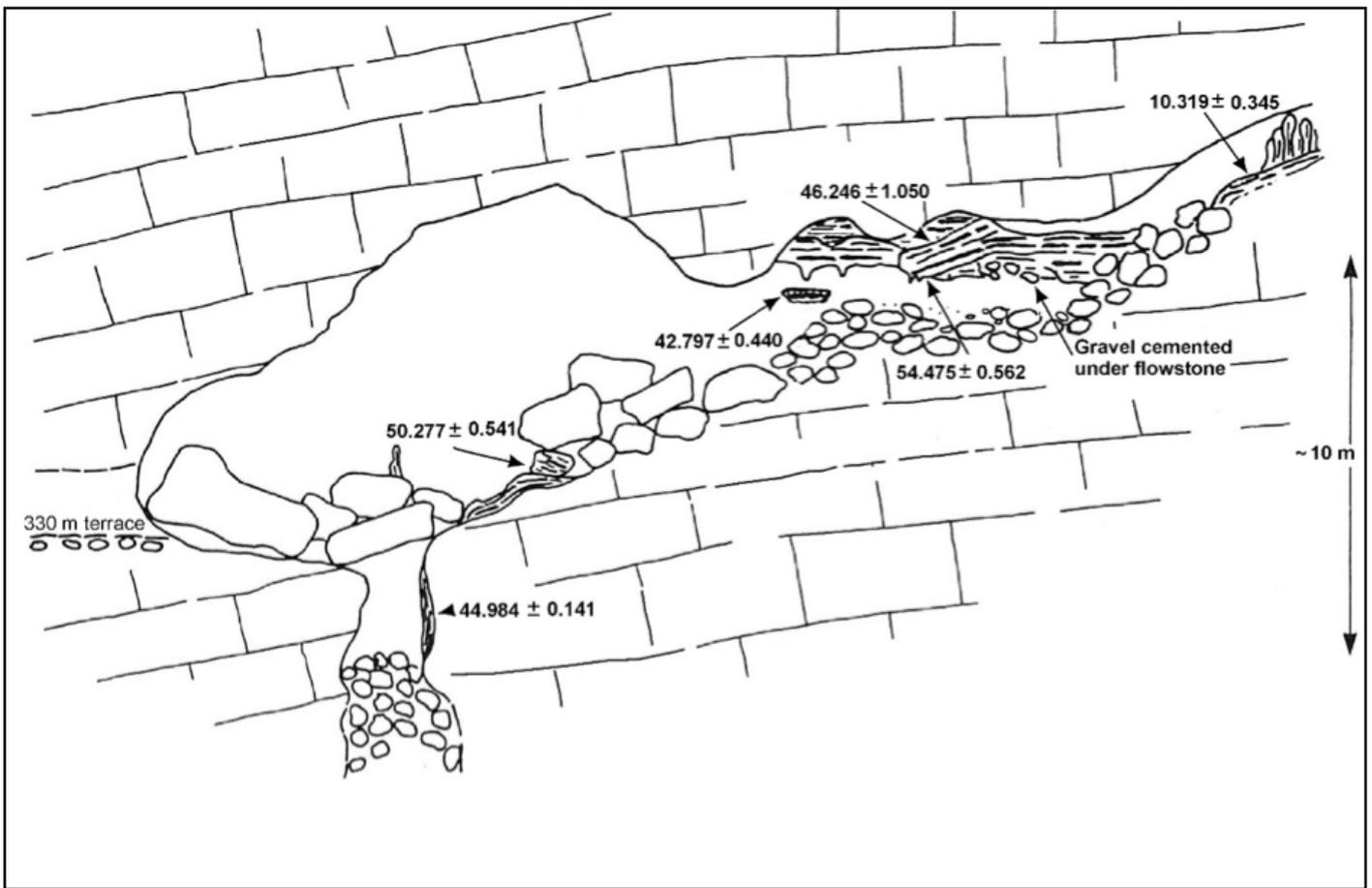


Fig. 3 Schematic cross-section through the Hall of Silence, with U/Th ages of dated speleothems. Access is via the passage with the 330 m terrace at left.



A passage formed by paragenesis in Aurora Cave. Paragenesis is when cave passage development is upwards due to the presence of sediment which prevents the erosion of the cave floor. Some of this sediment and large rocks are visible adhering to the wall partway up the right side of the cave passage.

Photo: Steve Bourne

The Main Entrance of Aurora Cave at 406 m would have been exposed by glacial retreat during the mid-LGM interstadial around 22.5 ka. At that time the meltwater stream from the Takahe valley would have reinvaded the cave, and so would have recommenced the sluicing out some of the glacial fill.

During the Late Glacial after 18 ka, it is probable that a glacier floated on the lake and calved icebergs as the ice margin retreated. By that date, the exit of the hanging Takahe valley at 890 m was ice-free, although a cirque glacier would have still remained further up-valley. The first recorded Late Glacial speleothems in Aurora Cave were growing around 16.5 ka in Weta Way Passage at 385 m and, thereafter, mild conditions sufficient for speleothem growth continued near lake level into the Holocene.

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# ELEVATION of DAVE SMITH to a LIFE MEMBER of ACKMA

## Andy Spate and John Brush

It was my very great pleasure, on behalf of the ACKMA Life Members, to move that Dave Smith join the family of our Life Members. This was seconded by John Brush and carried unanimously by acclamation by the members present at the AGM at Te Anau.

Dave has made a great contribution to ACKMA – usually understated and unrecognised – as is evidenced by the following:

- 1997-2004 ACKMA Committee Member
- 2003 Elected Fellow of ACKM
- 2005-2011 Executive Officer
- 2011-2013 NZ Vice President
- 2013-2016 Executive Officer

Dave has been involved in cave-related work across:

- 1990-91 & 1993-94 Conservation Officer, NZ Speleological Society
- 1998-2003 Research Officer, NZ Speleological Society
- 1992-2017 Secretary, Waitomo Catchment Trust Board

And of course, he has his professional role in the Department of Conservation. In 1995 he wrote a regional karst management strategy under contract. After 1997 he has been managing karst programs around the Waitomo area as a ranger, program manager and ultimately district manager. Since 1997 managing karst programmes around the Waitomo area as a ranger, programme manager then district manager. His main role has been managing biodiversity staff and operations across the board.

His contribution to ACKMA has been considerable. As well as being a cheerful and friendly fellow his work on the ACKMA Rules over the past few years has been exceptional.

Dave's background includes guiding and outdoor instruction with various companies in the early 1990s, including Black Water Rafting. He has been involved in cave related work across NZ, Alaska, Tonga and Philippines; and recreational caving across Australia, and in New Mexico and Samoa. He is a recreational caver through Hamilton Tomo Group since about 1986. Lots of exploration, especially in Bulmer Caverns, Mt Owen, and long involvement in Cave Search and Rescue (SAR).



*Dave receiving his award from Dale Calnin, Te Anau 2017  
Photo: Steve Bourne*

We commend Dave Smith to the membership of ACKMA.



*Dave in Hollow Hill Cave, Waitomo, New Zealand 2013.  
Photo: Steve Bourne*



*Clockwise from top left.  
In Victoria Fossil Cave, Naracoorte 2015.  
Photo: John Brush  
In Beekeepers Cave, Naracoorte, 2015  
With Steve Bourne at Westport, New Zealand, 2005.  
In Johansens Cave Rockhampton, Queensland 2016  
At Mole Creek, Tasmania 2004  
In Aurora Cave, Te Anau 2017  
Photos: Steve Bourne*



# RELIGHTING FEDERAL CAVE, BUCHAN, VICTORIA, USING the SUN'S RAYS

Miles Pierce and Peter Robertson

## Background

In March 1915, the then superintendent of the Buchan Caves Reserve, F J Wilson, in company with an employee, W H Bonwick, discovered a 'new cave' by following the low level ongoing stream passage from Royal Cave and then climbing upwards from near where the stream passage drops into a tight and normally closed sump (later linked to Dukes Cave). Wilson, in a letter to the Secretary for Lands, dated 27/3/1915, described it as 'a nice open passage with a few grottoes', 'extending about 400 yards back into the hill' and noting that it had a 'very fine chamber of rich formation near the end'. Wilson further opined that 'if an entrance could be got at the northern end it (the cave) would be very easy to improve'.



*LED track lights mounted on existing wrought iron stanchions with LED feature light at base of left stanchion. Concrete steps illuminated by LED strip lights secured to guard wire below hand railing.*

*Photo: Daryl Carr*

During the following month, Wilson surveyed the interconnection to 'fix the position' of the northern end of the new discovery. In a further letter to the Secretary of Lands, 8 June, Wilson advises that work on opening the new tunnel had started and asked that the explosives already applied for be sent as soon as possible. A tunnel was driven by day labour and with funding constraints imposed by the Lands Department, took until May 1916 to break through to the northern end of the new cave. In Wilson's 2 May letter to the Secretary, he advised that the tunnel was 230 links (46 m) long and that 'it struck the cave exactly where I intended'.

Duly named 'Federal Cave', the new cave was soon added to the guided caves menu for visitors to the Buchan Caves Reserve. Fixed electric lighting was installed in Federal Cave, together with Fairy and Royal Caves, c1920. Electricity supply was from an internal combustion engine driven, DC generating plant. The underground wiring was lead sheathed, rubber insulated, cotton braided, two-core cable. Light fittings were simple reflectors, sometimes of the jeweller's shop silvered glass variety, with general service incandescent lamps in porcelain base Edison screw holders.



*Solar panels installed 2012 near cave entrance.  
Photo: Daryl Carr*

Federal Cave lacked the extensive speleothem 'decoration' of the Fairy and Royal show caves, with its main attraction in that respect being the 'King Solomon's Temple' formation that marked the end of the electrically lit extent. It also required visitors to retrace their steps in order to leave the cave when both Fairy and Royal caves had one-way 'through tours' by virtue of separate entrance and exit tunnels. As a consequence, its use as a show cave declined. By the late 1960s when its sister show caves were rewired for operation from the SECV mains electricity supply - using enclosed transformers in the caves to supply 32 V light fittings - the lighting in Federal Cave was not upgraded and was then no longer operational.



*Control Box No. 10 with 12V sealed battery and supply from solar PV panel teed off from the 'bus' cable.  
Photo: Daryl Carr*



*LED feature light and 'Techno' cable tee-off fitting.  
Photo: Daryl Carr*

During the 1970s the then Caves Reserve manager encased the metal gate on the Federal Cave tunnel entrance with concrete to thwart occasional break-ins. This was removed in the late 1980s with a new steel door being fitted and the cave then used for occasional guided 'adventure tours' with participants fitted out with helmets and lights. These tours were commonly offered during the busy school holiday periods and gave a different experience of the 'standard' tours in the lit Fairy and Royal Caves.

By 1983 management of the Buchan Caves Reserve had passed from the Lands Dept to various newly formed departments and ultimately to Parks Victoria. Graham Parkes, as Parks Victoria's first Buchan Caves Ranger-in-Charge instigated the establishment in 1991 of the Friends of Buchan Caves (FOBC) as volunteer group to assist Parks Victoria in maintaining the caves and karst under its management at Buchan. This was one of the early Parks Victoria 'Friends Groups' and has over the succeeding years undertaken many useful projects ranging from surface track marking, tree planting and arranging interpretative signage to cleanup work in the show caves.

#### **A proposed solar cell based lighting system**

In 2001, FOBC member, Peter Robertson, proposed a project to relight Federal Cave based on distributed sealed secondary batteries maintained by a photovoltaic panel. It was contended that such a system would be well suited to the occasional guided tours conducted in the cave. After obtaining Parks Victoria's in-principle agreement, via Dale Calnin, the then Buchan Caves Ranger in Charge, the first part of the Federal Cave main passage was fitted with LED (light emitting diode) track lights powered from sealed 12 V lead-acid batteries placed at strategic intervals. The batteries were charged from a common 'bus' cable that was initially supplied from a 24 V DC transformer – rectifier located at the Caves Reserve administration offices. With the assistance of a grant successfully applied for by the FOBC, a 170 watt 24V DC photovoltaic panel was purchased in 2005 to takeover from the mains-operated transformer rectifier. The solar panel was mounted on a pole above the tunnel entrance to the cave and was commissioned in July 2005. Although the artificial lighting was then limited to only part of Federal Cave it is believed to have been the first solely solar cell powered cave lighting installation in Australia. Light emitting diodes (LEDs) – single and in small cluster assemblies – were also still evolving as commercial products and their use for cave lighting was novel.

The 'key' to the distributed battery system was in the associated control boxes where a printed-circuit-board, designed and built by Peter Robertson, regulated charging of its sealed cell battery, switched 'on' track lights, and subsequently also feature lights, in response to a signal from motion detection devices. These responded to the movement of persons heading either inwards or outwards in each passage section, and switched 'on' track lights and any feature lights set up in that section for a preset time interval. Persons remaining in or coming back in range of a motion sensor would reset the time delay so that the lights in the section remained 'on'. The moulded plastic control boxes included silicon rubber cover seals and all cable entries were made via cable glands.

LED track lights were mounted inside downward facing black finished plastic housings and typically mounted on short PVC conduit posts or secured to existing hand railing stanchions. Most initial feature lights were 20 or 50 watt, 12V tungsten-halogen 'dichroic' lamps mounted in 'sealed' outdoor garden light fittings. The initial cabling consisted of flat 'figure-eight' 0.75 or 1 mm<sup>2</sup> plastic insulated cable.

With the first several sections of the cave lighting having 'proven the concept', the installation was progressively extended further into the cave. Many members of the Friends of Buchan Caves volunteer group assisted with the installation of the lighting system over successive working bees.

As time progressed the lighting system served its intended purpose, however, cable faults increased in frequency along with failure of some of the early LED track light assemblies. The adverse high humidity environment likewise took its toll on the 12 V incandescent lamps in the enclosed 'garden' fittings. Many lengths of the single insulated 'figure-eight' cable succumbed to the cave atmosphere with internal corrosion of the stranded copper conductors, indicating that the plastic insulation was not impervious. Inferior copper quality in these cables may also have been a factor in their deterioration. In singular contrast, the domestic type movement sensors – commonly used to switch 'on' outside home security lights – continued to function reliably.

#### **Upgrading the Installation**

With the solar powered distributed secondary battery based lighting system having been successfully proven in-principle and found useful in practice for irregular cave tours, a further FOBC proposal was put to Parks Victoria via Dale Calnin to upgrade the installation. This included replacing most of the cabling and, where needed, light fittings and lamps, with more durable products. Investigations into cabling canvassed tinned copper conductor cables as used for mining and marine applications. Sources of suitably sized cables of this description were not located and instead an elastomer insulated and sheathed cable with plain copper conductors commonly employed for connection to submersible motors on deep well pumps was chosen, having a wide temperature tolerance and resistant to water penetration to depths of 100 m.

In 2012 another grant for materials purchase was successfully applied for by FOBC through Dale Calnin and orders placed for the new cable along with moulded plastic 'Techno' (Italian) waterproof (IP65) tee-off connection fittings. A 6 mm<sup>2</sup> conductor cross-section was chosen for the trunk or 'bus' cable to run from the external solar photovoltaic panel through the cave from which tee-offs would service each successive control box and its associated rechargeable sealed battery. Two-core 1.0 mm<sup>2</sup> cable was ordered for wiring to LED track lights and two-core 1.5 mm<sup>2</sup> for display lights and sub-trunk cables from which the track lights would tee-off.

Another series of working bees attended by FOBC members during 2012 stripped out the earlier figure-eight cables, placed and where practicable, concealed the new black sheathed trunk cabling and installed replacement light fittings, etc., under the



Dale Calnin (Parks Victoria), Peter Robertson and Daryl Carr (Friends of Buchan Caves) marking the commissioning of the solar powered Federal Cave lighting system, July 2005. Post mounted PV panel behind.  
 Photo: Daryl Carr

favourable with comparatively few lamp failures and almost no cable or cable termination faults.

**Concluding Comments**

Federal Cave continues to operate with its totally solar cell powered lighting system comprising LED track lights and limited, separately circuited, multi-LED feature lights extending from its tunnel entrance through to the impressive flowstone and stalactite / stalagmite 'King Solomon's Temple' speleothem – the 'rich formation near the end' first observed by F W Wilson in 1915. The lighting is deliberately 'low key' to sustain the 'being in a cave feel' and recognising that for the most part, in contrast to the Fairy and Royal Caves, speleothem 'decoration' is not a dominant factor. Instead, the distinctive former stream passage evolution, prominent display of the dipping limestone strata and cross-sectional exposure of sediment beds in what is a predominately a simple straight passage offers a different kind of cave experience and opportunity for interpretation.

Since 2012, various other Australian 'show caves' have utilised solar cells in conjunction with battery banks to support mains backed-up cave lighting systems or have plans to do so. The now extensive range of proven LED lights, including high output multiple LED assemblies and their low power demand has greatly facilitated potential for solar powered cave lighting systems with mains supply being available as backup.

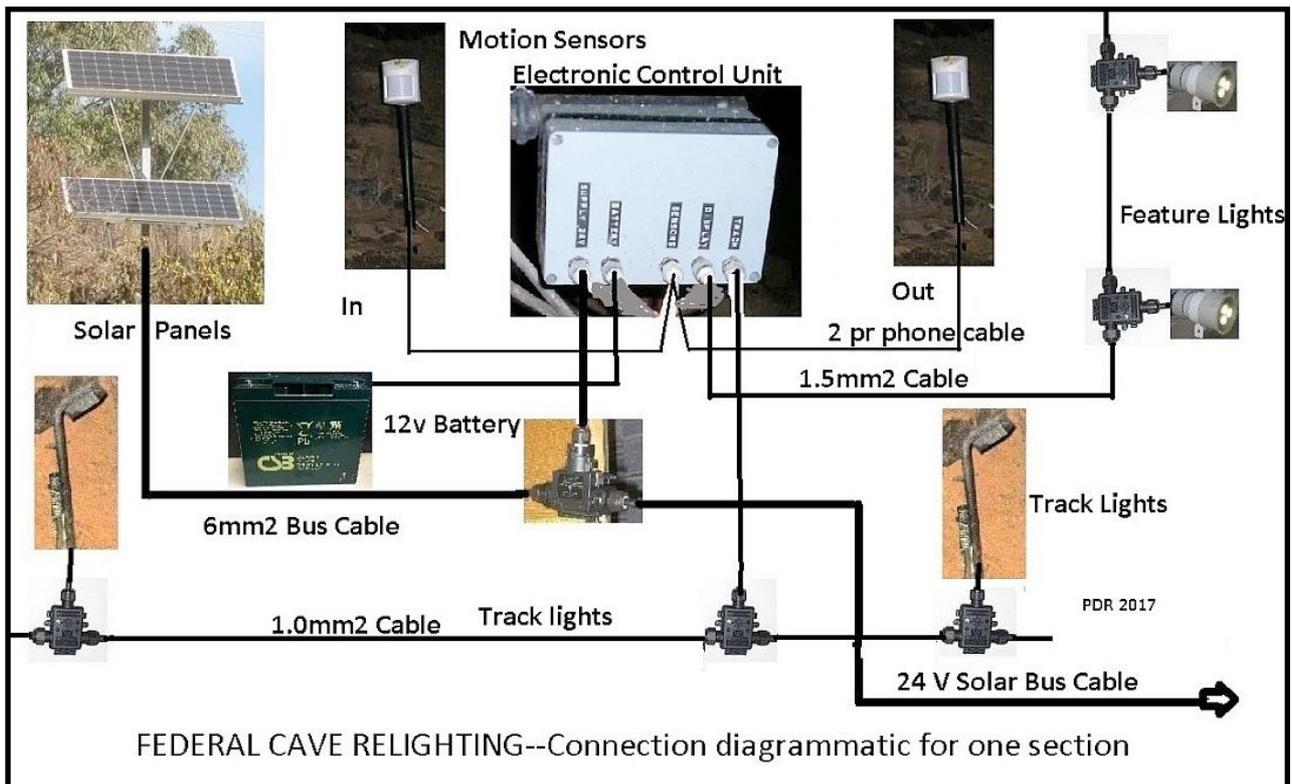
The distributed sealed battery system described above and totally reliant on locally generated solar energy has shown itself to be viable for intermittent and 'special' cave tours, as applies for Federal Cave at Buchan.

**Acknowledgements**

The authors acknowledge the work performed and other contributions made by many members of the Friends of Buchan Caves Group in the successive development of the Federal Cave relighting project, including in particular FOBC's long serving president, Daryl Carr. The co-operation and encouragement from Parks Victoria personnel, most notably, Dale Calnin, is also gratefully acknowledged.

supervision of Peter Robertson. FOBC and VSA member, Rudy Frank, devised a rig for pre-assembling and terminating pre-measured branch cables in the comfort of the Guides Room, and thereby reduced work that had to be performed within the cave. Peter experimented with homemade enclosures for 3 and 5 watt LED replacements of former 'dichroic' incandescent feature lights based on PVC plumbing fittings, coming up with a superior sealed fitting to the previously employed cast alloy 'garden light' fittings.

As a part of the upgrade, a second 170 watt photovoltaic panel was mounted beside the original panel to increase the battery charging capacity. The upgraded installation was practically complete by early 2013. The experience since then has been



# PHILIPPINE KARST ADVENTURES: PART 4 - LIBUTON CAVE

Kent Henderson



*Signage at the Visitor Centre office. We thought the offering of massage therapy after a 'strenuous' caving session to be quite enterprising!*

In mid May, I was in Mindanao, in the Province of Zamboanga Del Norte - largely to visit the family of my wife-to-be, Rasyd, in the city of Sindagan. About half way between it and the provincial capital, Dipolog, is the town of Manukan, and a few km to its east is the said Libuton Cave. It is possible to get there by local bus, but for very little, we merely rented a car and driver in Dipolog, whence we plied the 40 minute drive south to Manukan and the cave.

Similar to the adventure cave operations I described previously in Palawan, Libuton Cave is run by local villagers - about 30 of which are members of the Libuton Cave Guides Association (with tee shirts to prove it). All one has to do is turn up, pretty much 24/7. Upon arrival at the close-by village, guides will be miraculously allocated to you at no notice. You get two, for safety reasons.



*Libuton Cave information centre*

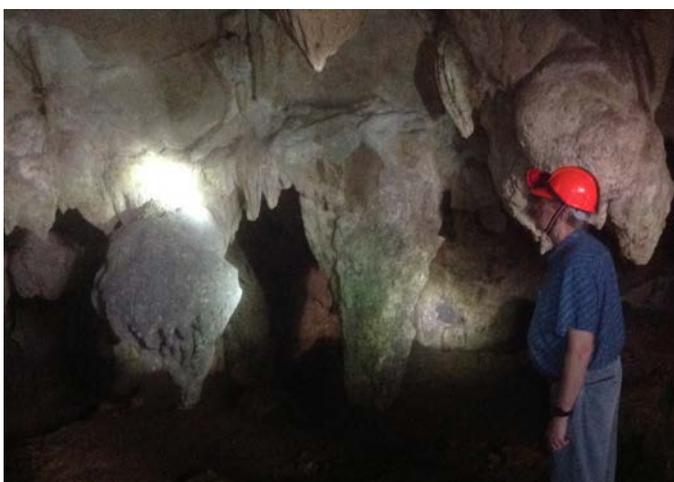


*At the entrance to Cave One*

There is 5 km of excellent concrete road from Manukan (past the Cave Information Centre) to the start of the track to the cave. The track itself is well constructed, with more than a few steps as necessary, along its approximately 600m traverse.

The cave itself is actually two, which are apparently unlinked, but relatively close to each other. They have been inspirationally named as Cave One and Cave Two! Both are through trips, with separate entrances and exits. The Cave One tour lasts about 40 minutes, while Cave Two takes about 90 minutes. The 'tour' consists of both caves. The cost is, per person, 40 pesos entry fee, plus 30 pesos helmet rental. Plus 'the group' (and there appears to be no size limit) pays 150 pesos per guide (ie: 300 in total). So all up, we paid 440 pesos...or the princely sum of circa \$Aus 12.00 (there are about 36 pesos to the dollar).

One tours Cave One first - the 'easier'. And it was, with little climbing and only one modest duck-under. The 'problem', however, is the cave is very muddy and wet...and the best footwear I had was a pair of flat soled sand shoes, with close to zero grip. Sigh... you would think after 30+ years' experience underground I would know better! In my own defence I will add that I had no caving plans on this trip; it just sort of popped up.



*Typical 'dry' speleothems - Libuton Cave*



*Active wet decoration - Libuton Cave*

Thus, at best, my trip through the cave was slippery... I did rather marvel at our two male guides, who both wore the standard Filipino footwear - thongs...also totally grip-less; although I suppose they have had 'years' of caving experience in them.

Cave One was studded with mostly dry decoration, with a few 'active' sections. It floods in the wet season, clearly to high levels on occasions, so the walls and attendant speleothems were largely mud covered.



*Whip scorpion - Libuton Cave*



*Exit - Libuton Cave One*

The flooding 'give away' was the significant number of washed-in 'blackened' coconuts that littered the floor and crevasses in various parts of the cave. In short, while far from unpleasant, the cave was unremarkable.

Having slipped and slid our way through Cave One, it was then time for Cave Two. I was advised that it was somewhat more energetic, with a number of crawls and the odd squeeze perhaps? So I graciously declined, citing my grossly unfortunate footwear. However, given that we would undoubtedly pass through Manukan in the future, I resolved to return for the delights on Cave Two then, with proper caving boots!

The management of the cave? Quite satisfactory as far it goes. Access is controlled by the local Cave Guide Association, and the two guides we had clearly had an adequate knowledge of the cave environment. They were careful we stayed on the route, as it were, as much as for safety as for cave conservation. Given it gets a watery pasting every wet season, it is fair to describe the cave as robust. We did tip the guides 200 pesos each at the end of the tour; given we were hardly overcharged for their services...

And yes, as I flagged in Part 3, I am definitely visiting the fabulous El Nido Karst in northern Palawan in early September...so you haven't heard the last of Karst in The Philippines just yet...



# JENOLAN CAVES, NEW SOUTH WALES - BUSY DAYS

Scott Melton

Acting Deputy Manager, Jenolan Caves



For those of you who know or have visited Jenolan Caves, you will recall that we are situated at the bottom of a 450 metre deep valley with two very narrow access roads, limited parking and very little flat ground. So you may wonder how we cope with visitor numbers which can approach 2700 daily cave visits (like Easter Saturday 2017) or approximately 8,500 visitors over the same four day Easter period in such a confined space. Jenolan Caves receives such high visitation because we are located a 3-4 hour drive from approximately six million people. This gives us an average annual visitation of approximately 230,000 cave visits.

At Jenolan, we have been keeping daily visitor statistics for quite a number of years so we have developed a very good record of our peaks and troughs of visitation. This has also enabled us to develop a set of staff/cave rosters that allows us to cater for these variations in visitation. In addition, on a busy day such as Easter Saturday or Sunday, we will employ up to three “helper” guides who are not initially assigned guiding duties unless a staff member calls in sick or we need to schedule extra tours.

I have worked at Jenolan Caves for 24 years and during that time I have seen a big shift, both in our visitation patterns/makeup as well as the way that we run the operations. Back in 1993, tickets were sold manually on a first come, first served basis and the length of the ticket office queues was legendary, often stretching up the road past Jenolan Caves House Reception. It was also not uncommon to take 100 visitors on a tour of the Lucas Cave at an interval of 15 minutes between tours on the really busy days. I have been reliably informed that back in the 1970s, the Lucas Cave did not even have a set number of visitors per tour and one guide with 200 visitors was not uncommon. Often, it was easier to station a guide at each viewing platform and just have the visitors walk through the Lucas Cave at their own pace. My own personal record group size in the Lucas Cave is 181 visitors set on a Good Friday when tours resumed after a blackout.

Jenolan moved to a computerised ticketing system in the mid 1990s but we still had long queues in the Ticket Office. Part of the problem was that we were allowing people to ring up and make an unpaid booking for the cave tours; they would then often not turn up meaning that tours were not running at maximum capacity and people in the ticket office line often had a three hour wait for the next available tour. To overcome this, we started getting people to make a credit card payment over the phone with us so that we would receive the revenue in advance and could more clearly see which tours were full. This allowed us to then schedule extra tours as needed to cater for those visitors who did not ring up and book in advance. Visitors would then collect their tickets from the Guides Office, allowing them to bypass the Ticket Office. As an aside, I added up the value of uncollected tickets after the first six months and it totalled just over \$4,000 of revenue.

We moved to our second computerized ticketing system prior to the Year 2000 Sydney Olympics but still allowed visitors to ring up and book tours in advance. As time progressed, we found that more and more people were booking in advance which effectively moved the ticket office queue into the Guides Office which started to suffer from crowding issues. We also saw an exponential increase in the number of phone calls being



*Jenolan Caves on a quiet day. Photo: Steve Bourne*

received as well. We started to think of an online booking system and approached the developers of our ticketing system to come up with a viable system but this proved to be very complicated and was eventually abandoned.

As a result, after much investigation, we moved to our third computerized ticketing system along with an online booking platform in early 2017. As we were new to online bookings, initially we only allowed people to book up to 48 hours before the start of a tour until we were certain that the system was operating to our satisfaction. We have subsequently reduced the lead time to 24 hours, 8 hours and now 4 hours. We will not reduce the lead time any further as we feel that four hours will give visitors enough time to drive from Sydney to make their tour start time. What have we seen with the introduction of the online booking system with a four hour lead time:-

- A big reduction in ticket office queues (which means we can often use one of the ticket sellers for tour duties);
- Fewer visitors coming into the guides' office to collect tickets (we still take phone bookings however);
- A dramatic decrease in the number of phone calls; and
- A change in customers' booking preferences as we now target our more expensive cave tours to appear first on our online booking system, which leaves the higher capacity caves available for our walk-in visitors.



*This is what they come to see, spectacular cave. Orient Cave, Jenolan Caves. Photo: Steve Bourne*

*So what is involved on a typical busy day at Jenolan Caves such as Easter Saturday 15th April 2017?*

The Easter Long Weekend fell in the middle of our school holiday period this year and was our first major test of the online booking system and ticketing system so we were all interested to see how it would go!

Our staff and tour rosters can be prepared up to two months in advance. This gives staff plenty of time to let us know of leave requests and for our casual staff; they can give us their availability surrounding other lifestyle activities. Based on our statistics, a suitable programme is prepared to cater for the anticipated number of visitors that we are expecting. For Easter Saturday, we prepared a roster/programme that saw us schedule an initial 67 tours which took into account the general public and inbound tour operator needs. We subsequently added an extra two tours to our schedule during the day. This programme then catered for just under 3,000 cave visits.

The Manager or Deputy Manager of the Cave Operations Department commences work at 8.30am and opens up the office for the day's trading. Generally, any sick staff will ring in by about 9.00am and suitable adjustments are made to the roster. Occasionally, we may need to cancel a scheduled tour (if no one has booked on it yet) but we don't like doing this as the tours are advertised on our website.

We are able to cater for large daily numbers because our two biggest caves, Lucas and Chifley, can cater for 60 and 40 visitors respectively and at a pinch can take a few more. In addition, due to the circular nature of the tour route in both caves, we can schedule tours 15 minutes apart. As the Chifley Cave tour is only one hour, it is often the easiest tour to schedule at short notice for extra capacity. We currently have an issue with groups exiting the Lucas Cave as we cannot use the exit stairs due to rock fall issues so groups must return back to the Grand Arch; this means some congestion on the entry stairs but our staff have adapted their tours to this change and it is not a problem. To help with this congestion, some River Cave tours are directed to exit via the Temple of Baal Cave providing

there is not a tour in there, helping to alleviate congestion in the Lucas Cave entry passage way.

Two of our biggest concerns on really busy days are car parking spaces and people arriving late for their tours, either due to slow traffic leaving Sydney and the Blue Mountains or a preponderance of people to rely upon GPS devices to estimate how long it will take to drive to Jenolan Caves. Normally, on most days, our car parks are self regulating but on the busy days, our maintenance staff will supervise car parking. We will fill car park number one first and then direct cars to our number two car park. Once this fills, we can park cars on the old tennis court area. Once this area fills, we direct people to "Burma Road" which can accommodate about eighty vehicles. At this time we will shuttle visitors to and from the main visitor area with the "Bat Bus". By now, we generally start to see places opening up in the main car park as the earlier visitors leave the valley. One change that we have noticed since the introduction of online bookings is that our visitors are arriving at more staggered times in line with their booking times. Visitors used to turn up "en-masse" which would create strain on our parking resources but this has changed; it will be interesting to see how this pans out over the next year.

On the busy days, people can show up late for their tours due to slow traffic or incorrect GPS time estimations. If it is only a few minutes past the tour time and we have a spare staff member available, we will catch them up to their tour. Failing this, we will reschedule them where possible to the same tour at a later time or another tour. It helps when visitors ring us and advise they are going to be late as we can offer more solutions for them. If the visitors decide they do not want to come on the day, we can transfer the value of their tickets to a voucher with one year validity so they can return at a later date.

Overall, we have about ten really busy days a year. Thanks to good rostering, well trained and multi-skilled staff and by drawing on past experience, we are normally able to cope with these high peaks in visitation without too many issues arising. We are also fortunate to have a variety of tours to suit our visitor requirements. So while we can accommodate up to about 3,000 cave visits on a really busy day, a busy day generally runs just like any other day!

# NARACOORTE, WHERE HALF a MILLION YEARS of BIODIVERSITY and CLIMATE HISTORY are TRAPPED in CAVES

Dr Liz Reed<sup>1</sup> and Dr Lee Arnold<sup>2</sup>

<sup>1</sup>Research Fellow, University of Adelaide

<sup>2</sup>ARC Research Fellow, University of Adelaide

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## THE CONVERSATION



*Enormous sand cones in Sand Cave, Naracoorte. Two people in overalls show the scale of the area.*

*Photo: Steve Bourne*

In 1857, guided by the flickering light of a candle deep in a cave at Naracoorte in South Australia, the Reverend Julian Tenison-Woods stumbled across thousands of tiny bones of rodents and small marsupials buried at the base of crystal columns.

Without knowing it, Woods had found a time machine of sorts – a record of biodiversity and environment spanning more than half a million years.

Now Naracoorte Caves are known as one of the world's best fossil sites, a place where marsupial lions, enormous kangaroos and giant monitor lizards met their deaths and were preserved by layers of sand.

But the caves captured more than just giants. Clues to Naracoorte's past environment are also preserved in plant fossils, sediments and calcite formations.

### **Big marsupials with bite: Australia's megafauna**

Global scientific attention first focused on Naracoorte after 1969, when cave explorers entered relatively inaccessible limestone chambers. After squeezing their way through an impossibly tight gap in Victoria Cave, they discovered the palaeontological equivalent of King Tutankhamen's tomb.



*Pitfall megafauna fossil assemblage in the Upper Ossuary, Victoria Fossil Cave, Naracoorte.  
Photo: Steve Bourne*

Scattered across the red sediment floor of a vast chamber were countless skulls and jaws of Australia's lost giants, the megafauna.

The find created a buzz worldwide and set the stage for a scientific journey of discovery that has unfolded over the past four decades.

Preserved within the deposits are fossils from a suite of megafauna species including heavyweight plant eaters such as *Zygomaturus trilobus*, short-faced leaf-eating kangaroos such as *Procoptodon goliath* and the five-metre snake *Wonambi naracoortensis*. The most famous of these is the marsupial lion *Thylacoleo carnifex*. The most spectacular fossils from this king of the Pleistocene forests have come from Naracoorte.

The reign of these amazing animals came to an end around 45,000 years ago, with the precise cause for their extinction still a hot topic for debate.



*Fossilised skull from Thylacoleo - a carnivorous marsupial that lived in Australia around 50,000 - 1.5 million years ago.  
Photo: Steve Bourne*

## How the underground archives formed

The Naracoorte Caves formed around one million years ago within the Gambier Limestone, itself dated to around 37 million to 12 million years old and formed during the late Eocene or Miocene epochs.

Overlying the limestone, a series of ancient sand dunes preserve records of the changing coastline over the past few million years.

Over time, holes opened up in the limestone, connecting the caves to the land surface. Sand and soil was transported into these cave entrances by water and wind, forming deep layered deposits spanning at least the last 500,000 years of the Quaternary period (2.6 million years to present).

At the same time as the sediments were deposited, many types of animals lived in the landscape surrounding the caves. The remains of these animals accumulated in the caves and became buried and preserved in the sediment layers.

Some species, such as bats and possums, lived and died in the caves. Predators used the caves as roosts and dens, leaving behind the bones of their prey. Owls accumulated vast deposits of small vertebrates, such as the ones discovered by Woods in 1857.

Larger species fell victim to concealed cave entrances that acted as pitfall traps for the unwary. Kangaroos were particularly susceptible to entrapment, being fast-moving and active at



*Deep, layered fossil deposits in Blanche Cave, Naracoorte. Each layer represents a window in time.  
The tags mark individual layers.  
Photo: Steve Bourne*



*It's a little bit squeezey in here. A film crew working with researchers at Naracoorte Caves.  
Photo: Steve Bourne*

night, dusk or dawn. Even the gigantic megafauna species succumbed to these traps.

With all of these ways for animals to accumulate, it is unsurprising that the caves preserve many deposits and tens of thousands of individual animals.

#### **Why are these deposits so significant?**

The fossil deposits preserve diverse vertebrate species, including more than 135 different examples of amphibians, reptiles, birds and mammals.

Nearly 20 species of megafauna are preserved, including nine species of extinct kangaroos. The preservation of the fossils is exceptional, with the finest details retained.

Naracoorte's record is relatively young geologically (around 500,000 years to less than 1,000 years before now), making it representative of modern ecosystems. This is why it offers value in addressing questions relevant to present and future conservation such as extinctions and adaptation to climate change and human impacts.

Unlike most localities where single sites are preserved, the Naracoorte Caves have multiple sites in many adjacent caves. This provides a unique opportunity to compare and correlate observations across related sites over a long, continuous time span.

Recent research has revealed that the deposits contain much more than bones, with fossil plant material, pollen, fossilised

algae and even DNA. This allows scientists to build a comprehensive picture of the environment during this time period. It is this incredible wealth of preserved materials that makes Naracoorte stand out.

Associated calcite formations (such as stalagmites) have preserved critical information on past climate. For example, past rainfall can be determined by studying the fine growth layers within the formations.

#### **World heritage significance**

International recognition came to Naracoorte in December 1994, when the caves were World Heritage listed as part of the Australian Fossil Mammal Sites (along with Riversleigh in northwestern Queensland).

The fossil records of Naracoorte and Riversleigh reveal the evolutionary history of Australia's unique mammals over much of the past 25 million years. The Naracoorte deposits encompass the latter part of this record, covering important events such as megafauna extinction and the arrival of humans in Australia.

The caves are managed by the South Australian government, which oversees tourism, conservation and research. The park is an established visitor attraction, and vital to the economy and culture of the Naracoorte district. The caves add to the wealth of other geological attractions in the Limestone Coast region, including volcanoes and some of the world's largest sinkholes.

Moving forwards, new funding has just been announced on a project to establish benchmark data on past ecological and environmental change that is trapped in the structures at



*Alexandra Cave, Naracoorte Caves National Park.  
Photo: Steve Bourne*



Naracoorte Caves. Working with colleagues at University of Adelaide and other Australian universities, museums, government and industry partners, we expect our next phase of research will have applications for biodiversity conservation, climate change, and building capacity for regional communities to share the stories of their unique heritage.

*Large roof window entrance in the spectacular Blanche Cave, Naracoorte. It is in this cave that the first fossil bones were discovered by Woods in 1857.  
Photo: Steve Bourne*

# 17<sup>th</sup> INTERNATIONAL CONGRESS of SPELEOLOGY MANAGEMENT of WHITE NOSE SYNDROME



The Australian Speleological Federation has developed protocols and information for delegates attending the 17<sup>th</sup> International Congress of Speleology in Australia in July. The following information has been provided to field excursion leaders and is reproduced here for the benefit of all ACKMA members. It provides some useful information for consideration with cave hygiene beyond the specific purpose for which they have been developed.

## Incorporating Safe Operating Procedures for Use of the Isopropyl Alcohol Wipes and Hydrogen Peroxide

### Isopropyl alcohol (also called isopropanol or dimethyl carbinol).

- The product we are being supplied with is: Isowipe Mini Cannister with 150 x wipes 21 x 14.3 cm in size.
- Equipment to be disinfected with Isowipes
  - Helmets
  - Lights
  - Cameras
  - Camera accessories
  - Other equipment glasses, compass, GPS etc
  - Karabiners, prusik devices, ascenders, stops etc
- For skin protection, wear washing-up type gloves when using the wipes. The product should be kept away from eyes.
- The Isopropyl wipes are not designed for fabric items such as seat harnesses. These items should have been washed before being brought to Australia.
- The helmet harness should be spray-treated with hydrogen peroxide (as below).
- Used wipes should be disposed of with ordinary rubbish and certainly not flushed in toilet systems.
- Leaders should ask participants about the cleanliness of their gear and how they have treated it before bringing it to Australia and New Zealand. Participants have been advised to 'expect to be asked'.

- Treat leather boots and other footwear with the hydrogen peroxide liberally inside-and-out. We estimate to allow 100 mls per participant.
- Empty excess fluid after 30 minutes and allow boots to dry.
- Hydrogen peroxide leaves no residual nasty chemicals and boots do not need rinsing after treatment.
- There are no residual clean-up problems with hydrogen peroxide. Unused hydrogen peroxide should be diluted and discarded as waste-water.

### Materials needed for WNS fungus disinfection protocol

- Kitchen wash-up gloves
- Wear protective eyewear and kitchen-gloves for hydrogen peroxide handling.
- Hydrogen peroxide, obtain via pharmacy in 200 ml bottles at 3% or 6% solution at about \$6.00 per 200 ml bottle. 6% preferred. (Alternate suppliers include supermarkets and hardware stores.) If larger quantity or higher percentage product obtained, dilute with water paying attention to risk management as above.

### Hydrogen Peroxide

- Hydrogen peroxide at 3% and 6% is recommended and is available at pharmacies. It is available at much higher concentrations from some chemical suppliers for industrial uses etc.
- To reduce the risk of safety issues, we recommend against using stronger concentrations. However, should anyone source a higher concentration of hydrogen peroxide then pay attention to handling (gloves and eye protection with observer present with a hose available for flooding the operator or area should splashes or a spill occur) and dilute portions to 6% or 3% with water.
- Hydrogen peroxide is a potentially dangerous chemical. Eye protection and gloves should be worn when using it.
- We are leaving field excursion leaders to source the hydrogen peroxide as it is unstable and needs to be used when fresh (unopened bottle) as it deteriorates after opening.
- The hydrogen peroxide 3% or 6% solution is best put in a cleaned spray dispenser, obtainable new from supermarket.



*A healthy Naracoorte Caves' Southern Bentwinged Bat (left) and a US bat infected with White Nose Fungus*

Any further information or questions: Nicholas White [biosecurity@speleo2017.com](mailto:biosecurity@speleo2017.com)

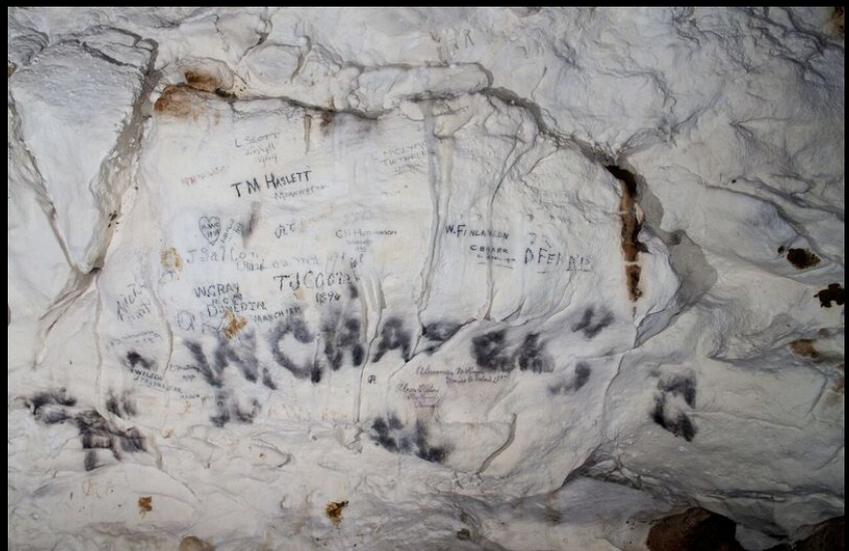


Above. Luxless Cave entrance  
 Left. John Brush and David Wools-Cobb removing graffiti in Clifden Cave.



Photos: Steve Bourne  
 Below. Graffiti in Clifden Cave

Photo: John Brush



Back Cover. ACKMA AGM 2017, Te Anau, New Zealand.

Front row. Jennifer, Kimberley Lea, Deborah Craven-Carden, Lana Little, Ann Augusteyn, Christian Bom, Zara Crawford, Kimberley Wheeler, Keagan Morris, Ian Eddison, Haley Brooks, Phin Adams, Leon, Jordan Wheeler, Thomas Lundman, Lucy Collinson.

Back row. Moira Lipyeat, Andy Spate, Paul Williams, Nick Heath, Robyn Richard, Mark Gibbons, Barry Richard, Scott Adams, Peter Bell, Scott Melton, George Bradford, David Wools-Cobb, Nicola Beckett, Anne Musser, Teagan Symonds, Aaron Strickland, Jodie Anderson, Mira Schwill, Mark Delane, John Brush, Phil McGuinn, Dale Calnin, Anita Edison, Peter Chandler, John Ash, Mary Traves, Greg Middleton, Arthur Clark, Dave Smith, Libby Chandler, Regina Roach, Greg Martin, Julia James, Janne Woodward, Dirk Stoeffels, Charlotte Riley, Matt Cooper, Lily Petrovic, Judy Christensen, Phil Woodward, Marjorie Coggan, Steve Bourne, Pat Culberg, Tony Culberg.

Insets. Neil Collinson, Laura Dawson

