

*Journal of the*

# Australasian Cave and Karst Management Association



# The ACKMA Journal

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**FRONT COVER: Postcard of Caves House and the Jenolan Valley from the late 19th or early 20th Century — supplied by Ian Eddison**

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# POSITION VACANT

## Volunteer wanted

**Starting no later than May 2021!!**

## Journal Editor (unpaid)

### EDITORIAL

Undoubtedly these remain challenging times for us in both Australia and New Zealand. The scale of commercial activities in show caves necessarily remains constrained (if possible, at all) as a consequence of the Covid-19 pandemic. Moreover, for some of our colleagues, personal lives and cave operations remain impacted by the disastrous Australian bushfires at the beginning of 2020.

However, information emerging from the data logger project, as discussed in an article from Andy Baker, Andy Spate and Dave Gillieson later in this edition, shows that at least some potentially interesting science can emerge from what otherwise would be broader mists of gloom.

This edition includes electronic posters for two important forthcoming events in the life of the Association. The first, announcing the inauguration of the Ann Augusteyn Award for Guiding Excellence provides an opportunity to give recognition to those, whether members of the Association or employees of organisational members, who make an exemplary contribution to the richness of the experience of paying visitors to show caves in Australia or New Zealand.

The second poster is for the 2021 Guides' School and the immediately following ACKMA Annual General Meeting and seminar. These are to be held at Wellington Caves in central western New South Wales in May next year. By then, although we will undoubtedly remain in some Covid induced "new normal", it is to be hoped that the new pattern of human existence will still permit a socially and intellectually rewarding experience for those who attend.

This Journal (and, probably, several future editions) is slimmer than might otherwise be expected – with this

likely being as a consequence of our general collective inability to travel. Perhaps readers might contemplate writing an article of a more historical and reflective nature such as that which has been contributed by Ian Edison concerning the Historic Gardens of Jenolan. Any contributions to future editions will be gratefully received!

There is little other news to impart. However, I am delighted to advise that I have not needed to recycle large numbers of back issues of this Journal. A few requests were made seeking to fill gaps in individual collections while Regina Roach volunteered to take bulk back issues to distribute amongst the guides at Yarrangobilly and, for the copies that were left over after that, to offer them to patrons who might be interested in reading about caves in a broader fashion.

I must conclude this editorial by making reference to the banner which appears above this editorial and which, for this edition, is in a larger font than has appeared previously. Come the 2021 Annual General Meeting, I will definitely cease to be the editor of this Journal. As I have previously noted, I reluctantly agreed to continue for an additional year because of the absence of a willing volunteer to take over from me some four months ago. It is, however, as our immediate past president indicated before the 2020 Annual General Meeting, time to pass the baton to a younger generation.

I am happy to assist in effecting a smooth transition – but a transition there must be!

**Tim Moore**

# President's Report September 2020

## Ian Eddison

The ACKMA committee has met via Zoom a couple of times since the AGM. Although many show caves around the country are closed, there has been a lot of communications within the ACKMA committee by phone, email, SMS, Facebook chats and Zoom. For your benefit our collective work is summarised. I have played a small part in most of these subjects, I acknowledge the hard work by many different people who have done the heavy lifting on these communications and projects. It is wonderful to have so many passionate people among us helping on different issues. Thank you so very much.

Communications in recent times are summarised for your knowledge:

### **Quarry proposal Meander-Tasmania**

No action based on careful consideration of the Natural Values Protection Plan required of Sibelco to enable the extension of the life of this existing quarry.

### **Rio Tinto's destruction of caves at Juukan Gorge-WA**

Expressed our grave concern of such destruction to federal ministers, the WA premier and ICOMOS in Australia and France.

### **Re-Imagining Tourism on Kangaroo Island-SA**

Supporting the planned development of tourism areas on Kangaroo Island, bringing to the forefront of consideration caves and karst such as Kelly Hill tourist cave.

### **West Kangaroo Island Management Plan-SA**

A submission was provided to contribute to the planning of the park areas on the Western end of Kangaroo Island with strong reference to caves and karst.

### **Extinct Species Trade Regulations-NZ**

Supporting the development of regulations surrounding the trade of bones, feathers and other natural and cultural items. This is in order to protect them from unscrupulous unmonitored trade.

### **Abattoir proposal at Mole Creek-Tasmania**

We did not support the proposal and asked for it to be rejected based on a lack of referencing of previous research and the lack of environmental safeguards.

### **Koonalda Cave-SA**

In abeyance but the indication is that it is tentatively supported for tours in this significant cave with indigenous art and artefacts, subject to further discussions and carrying out our due diligence. Our decision and communication with relevant authorities will happen in due course.

### **Short term contracts for cave guides-Australasia**

Our recommendation is being developed for dissemination to HR team leaders and other interested leaders

throughout Australasia. This is being prepared with great empathy for those staff at show cave sites in casual employment and those part time and permanent staff on short term contracts without job security .

### **Interaction with ASF**

Exchange of communications between ACKMA and ASF Presidents, in support of building our relationship due to our mutual goals in the management and protection of caves and karst.

### **Ongoing projects**

The Australian Cave Animal of the Year is well planned out for the immediate future.

The International Year of Caves and Karst requires thought by each of our tourist cave operators and managers of other caves and karst natural areas as well as the science work being conducted. We need to consider how we present this to the international community. Wellington Caves NSW is listed as the site of an event in May next year although it is difficult to expect many can travel far to join us. We have to consider how we can present internationally on the key subjects.

The Ann Augusteyn Award is being launched for recognition of excellence in cave guiding (see posters later in this edition). The committee is very supportive of this quality award in honour of Ann.

The ACKMA Strategic Plan continues to be developed and is creating positive comment from the committee.

Modernising communications is an objective I set myself after listening to several people within ACKMA. By now you would have received at least one video by email. This is a beginning of that attempt to communicate in a more engaging way in addition to the ACKMA journal. Another —“The Guides' Grotto”— will be aimed at and for cave guides to develop and share skills.

In these difficult times consistently adapting to the risks of COVID-19 is a challenge. Some of our show caves are open, many are closed. This will change as opportunities and challenges come and go. Be careful, stay safe, apply your COVID-19 plan in everything you do. Most importantly keep planning for the future.

I look forward to talking with you more about next year's Guides' School and at presentations on 'Post Bush Fires' and 'Effects of COVID-19' on our industry during our meeting and AGM at Wellington NSW next May. Please now consider your presentation.

**I also remind you that at the 2021 AGM our Treasurer and Editor positions will become vacant so please consider which of those roles you may be prepared to take on.**



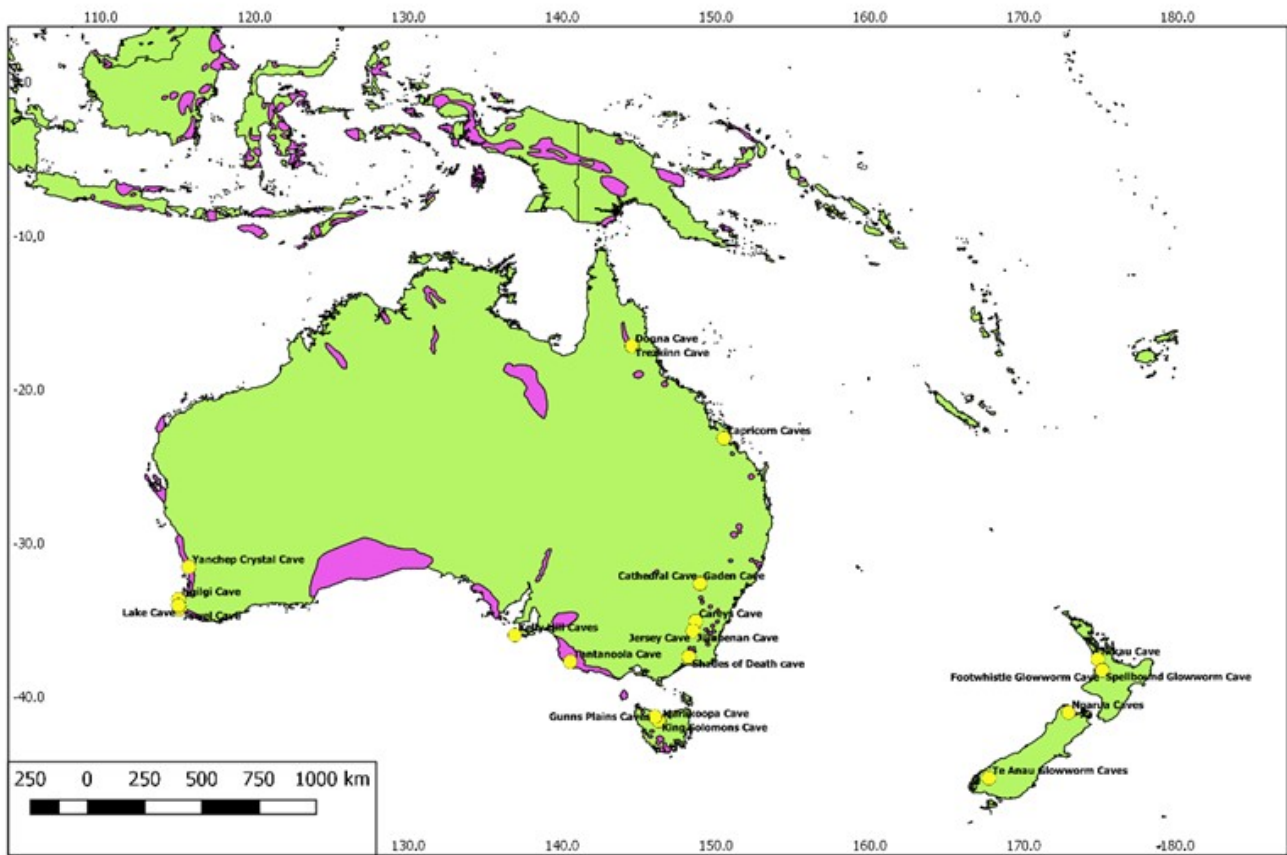
# ACKMA Cave Climate Project – An Update

Andy Baker<sup>1</sup>, Andy Spate<sup>2</sup> and Dave Gillieson<sup>3</sup>

1. University of New South Wales, Sydney
2. Optimal Karst Management
3. University of Melbourne

## Introduction

Since our last article on this project, published in the ACKMA Journal 119 in June, there has been significant progress with a large number of show cave sites set up and recording data. Most individual sites have been downloading data every month and sending them through to Andy Baker, who has produced graphs and some preliminary interpretations. A number of sites have successfully recorded cave climate data with no visitors, which provides a very useful baseline from which to understand the natural fluctuations in temperature and humidity. Several sites have now re-opened to visitors under COVID-19 restrictions, so we are starting to see evidence of the minor fluctuations due to people being in the cave.



Distribution of participating show cave sites in Australia and New Zealand. The Congo Caves site in South Africa has also been supplying data from existing monitoring but has not yet received data loggers due to air freight restrictions.

### Currently involved in the project are:

#### Australian sites

**New South Wales:** Careys Cave, Wee Jasper, Wellington, Yarrangobilly

**Queensland:** Capricorn Caverns, Chillagoe

**South Australia:** Kelly Hill, Tantanoola

**Tasmania:** Gunns Plains, Mole Creek

**Victoria:** Buchan, Shades of Death Cave

**Western Australia:** Calgardup Cave, Jewel Cave, Ngilgi and Lake Caves, Margaret River, Yanchep

#### New Zealand sites

Footwhistle, NgaRua, Nikau, Spellbound and Te Anau caves.

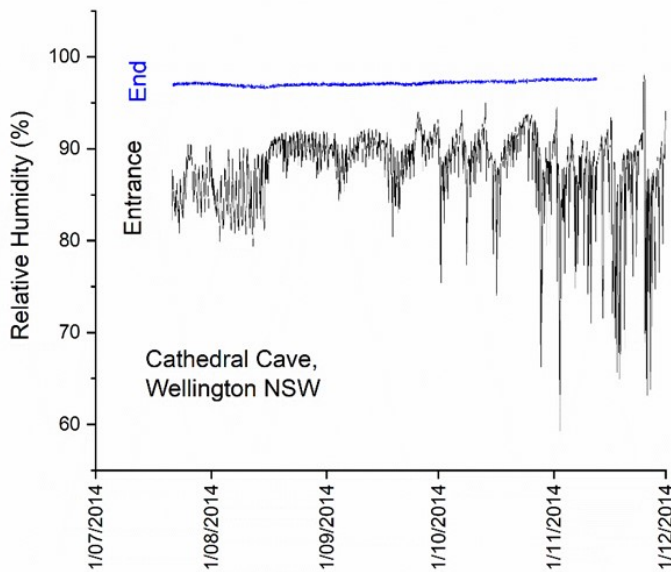
#### South African site

Congo Caves.

### Caves and cave relative humidity

First, some science. The humidity in a cave primarily depends on the water vapour content of the air, and the cave air temperature. The same amount of water vapour in cool air will have higher humidity than in warm air.

Data loggers provided in the ACKMA baseline cave climate monitoring initiative record temperature and relative humidity, and also calculate the dew point. We previously wrote about how cave air temperatures might vary through the year. What do we expect to see for relative humidity in caves? Something like the following examples.

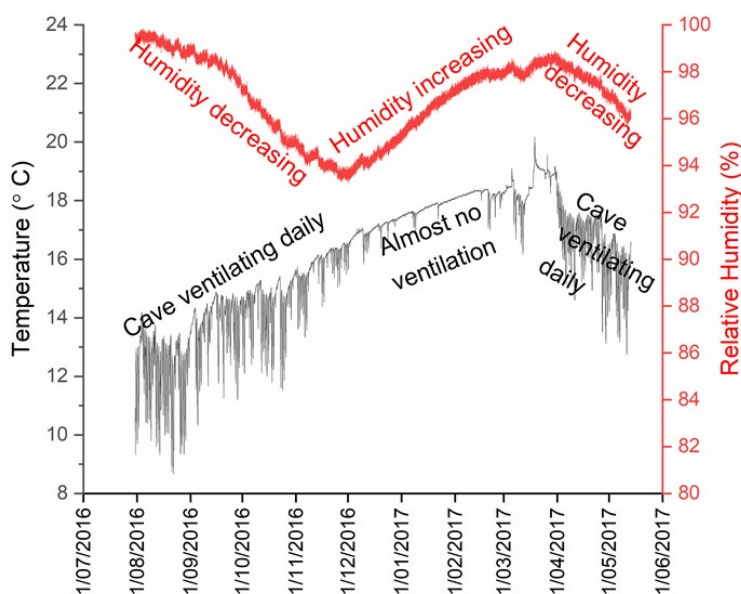


### **Wellington, NSW**

The data, from Cathedral Cave, shows the differences between the cave entrance and the end of the cave. It is some old data from a research project. The relative humidity near the tourist entrance is the black line. The relative humidity varies between 60 and 95%. Warm and buoyant air leaves the cave every night, drawing in external air with lower relative humidity, as shown by the daily wiggles in the black line.

The blue line is at the end of the cave. Here, relative humidity is constant and high - over 95%. There is groundwater present at the end of the cave, providing a near continuous source of water vapour.

The high and constant relative humidity tells us that this part of the cave does not ventilate very much and condensation on the walls is likely.



### **Daylight Cave, Sebastopol, NSW**

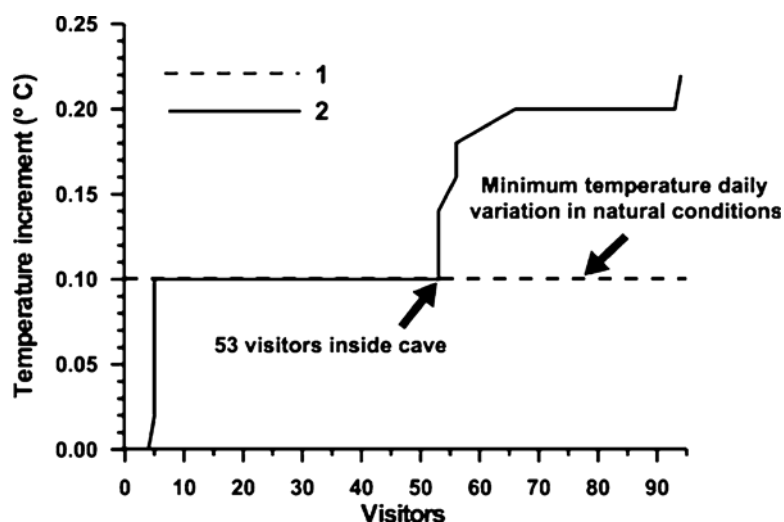
The second example is from the Kempsey Speleological Society Cave Studies Team. It is an example of how cave temperature and humidity are related. In this cave, you can see from the temperature data (black line) that the cave ventilates in winter (lots of daily wiggles as relatively warm and buoyant air leaves the cave at night), but not in summer. In winter and spring, the daily ventilation of air leaving the cave must be replaced by air drawn in from the outside and this external air has a lower relative humidity than the cave air. The relative humidity slowly decreases. Once that ventilation stops, the humidity increases slowly through summer. And in autumn, with daily air exchange occurring again, the humidity starts to decrease.

### **What can relative humidity data tell us?**

- It can explain when and where condensation might occur on the cave walls and surfaces.
- It can explain when and where mists might form in the cave atmosphere.
- A constant relative humidity and temperature can suggest limited ventilation and could help identify parts of a cave that might also experience high concentrations of gases such as carbon dioxide.
- Unexpected variations in relative humidity could indicate the presence of an unknown entrance, or how air is moving between entrances.
- Unexpectedly high relative humidity can indicate the presence of a nearby water body.

- Caves with streams or dripping water and which also have a low relative humidity can behave like natural evaporative coolers, with the cave water cooling as it evaporates.
- The main effect of any reduction in humidity is drying and flaking of flowstone surfaces. So, any major and protracted change in humidity can have very harmful effects. This has been seen in caves on several continents where cave ventilation has been altered, for example by opening new entrances or changing door opening protocols.

As we saw in the previous article in this series, large numbers of visitors in a cave can significantly raise the air temperature. A single person releases heat energy at 80–120 Watts, about the same as a single incandescent light bulb. Thus a party of 50 or 60 people on a cave tour can locally raise temperatures by 1–2°C. The passage of tourists through Altamira Cave, Spain, raised air temperature by 2°C, CO<sub>2</sub> concentration from 400 to 1200 ppm and decreased relative humidity from 90% to 75% (De Freitas and Littlejohn 1987). This degree of change in humidity, if allowed to persist, would lead to deterioration of speleothem surfaces. According to Cigna (1993), management needs to ensure that these fluctuations lie within the range of natural variation for the cave, and that they return to normal levels within a short period of time. Calaforra et al. (2003) provide a good example of determining visitor thresholds in such cases.



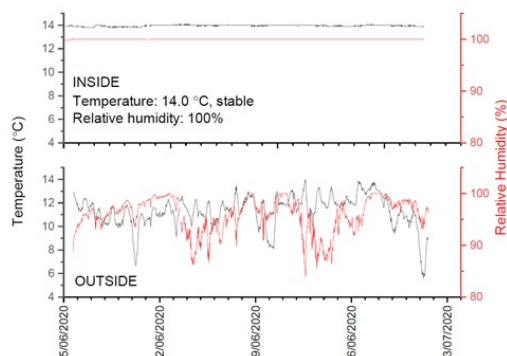
Number of visitors producing an increase in temperature of more than 0.1°C in the Cueva del Agua de Iznalloz, Spain (Calaforra et al. 2003). Key: 1 maximum mean daily variation of temperature under natural conditions; 2 mean variation caused by visitors

Finally, something on how hard it is to make precise and accurate relative humidity measurements. Almost all measurement methods, including loggers, fail to work well in the very high humidity of many cave environments. Once condensation has occurred on the logger, they will just continuously read 100% relative humidity. Putting the loggers in a dry part of the cave will help, but if the humidity is high, it will not be enough to defeat condensation.

The loggers provided in the ACKMA baseline cave climate monitoring initiative have a specified accuracy of ±3.5% for humidity between 60-80% and ±5.0% for humidity over 80%. Our calibration of all the loggers suggested they are precise to ±0.5%. That is, repeated measures are very close to each other, while calibration against more expensive instruments has shown them to be quite accurate. We expect them to provide useful data for relatively dry caves found on the Australian mainland, but they will probably struggle to overcome condensation in wetter caves found elsewhere.

How do you reliably record relative humidity in caves? You need a weather station grade device, such as the Vaisala HMP155, which is used in the examples given here. It has a probe heater option which removes condensation. The probe, datalogger and battery could cost several thousand dollars.

### Some preliminary results



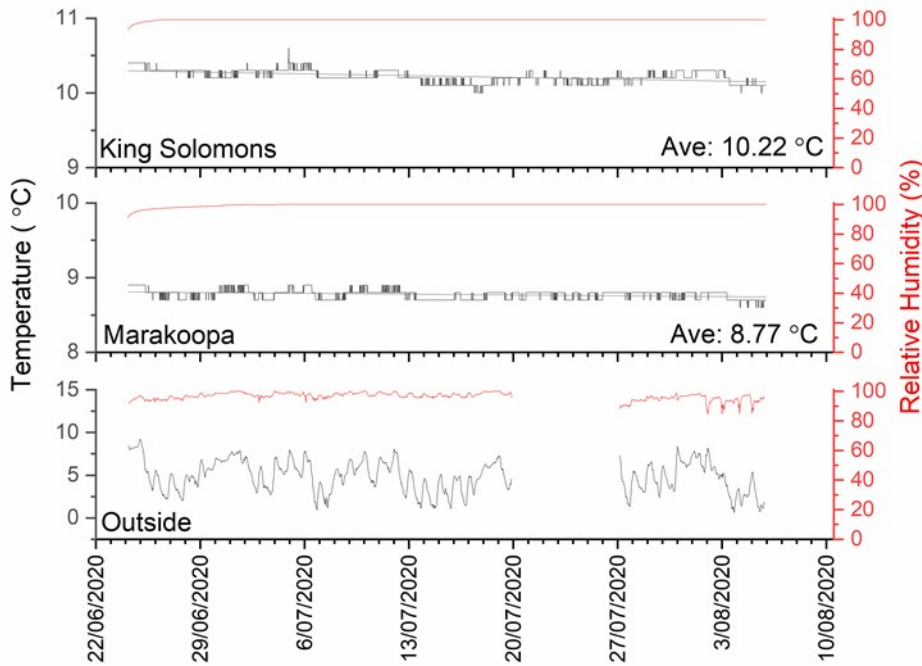
#### *Nikau Cave, New Zealand*

This is a very stable cave climate regime, with minimal daily fluctuations and no discernible trend over the period of observation. In contrast, the outside datalogger shows substantial daily fluctuations and drops in temperature with some severe low pressure cells coming through from the Tasman.



**Mole Creek, Tasmania**

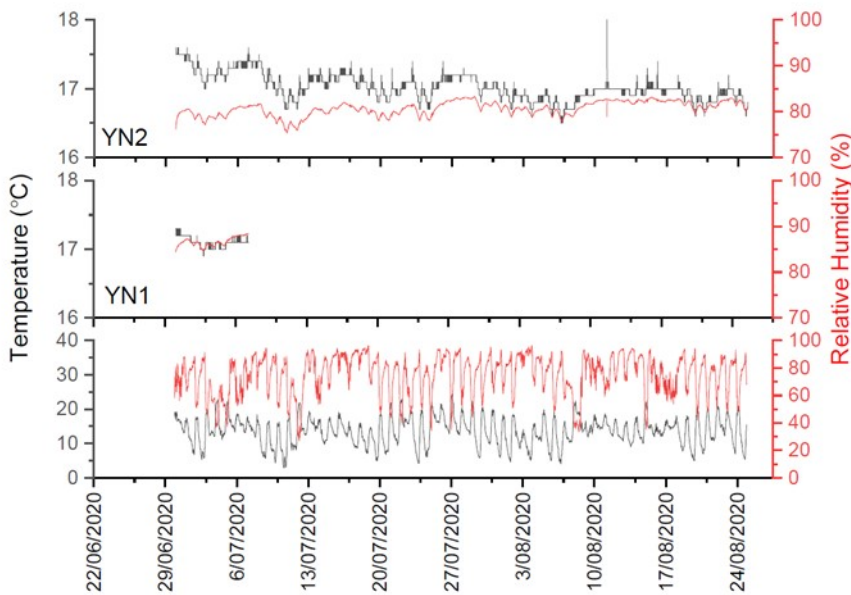
This dataset shows the cooling effects of the cave stream on temperature in Marakoopa and effects of entrance size. King Solomons is starting to show a decline in temperature at the start of winter in this poorly ventilated cave. This shows the importance of cooling at the surface and conduction of this cooling through the bedrock. This results in the winter minimum cave temperature would be expected to be later than the external air temperature. Another month or two of data from all the participating caves will help show this effect.



Relative humidity is constantly high in both caves. The outside datalogger shows daily fluctuations, most marked in temperature, and passage of some winter cold fronts.

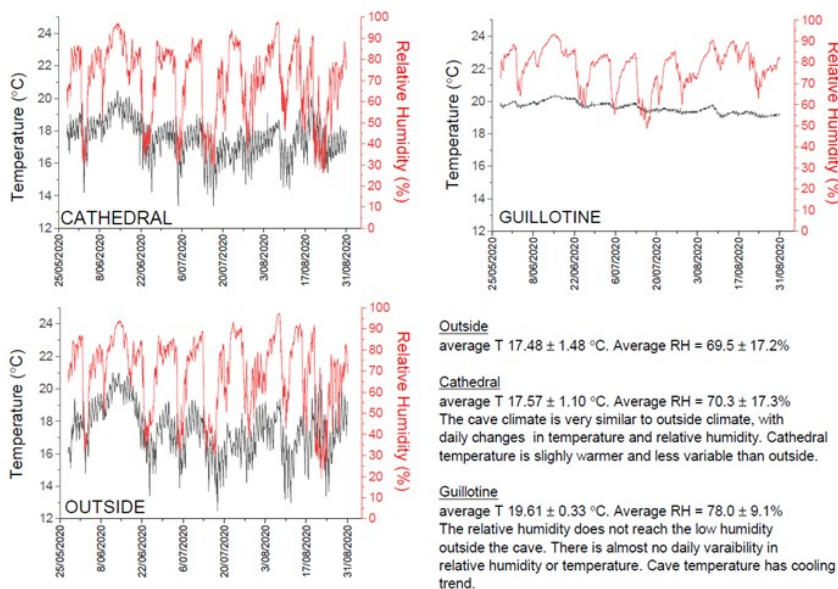
**Yanchep, Western Australia**

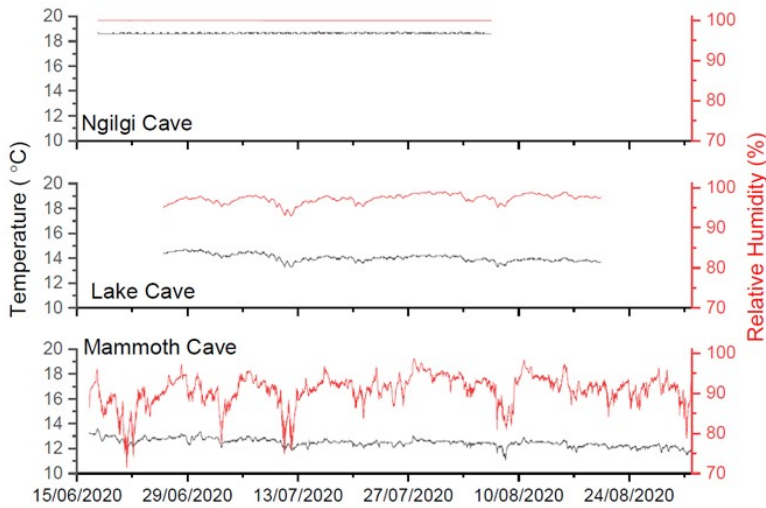
Data from YN2 (Yonderup Cave) shows that this cave has some diurnal fluctuations in both temperature and humidity. The spikes in temperature maybe an effect of visitors entering the cave. The winter cooling trend is also visible at this cave. The outside datalogger shows significant daily variation and the passage of cold fronts due to Southern Annular Mode fluctuations.



**Capricorn Caverns, Queensland**

These datasets show the effects of cave geometry and multiple entrances. The outside datalogger shows typical winter subtropical weather with cool, drier westerlies blowing from stationary high pressure cells. This is reflected in the Cathedral chamber logger with numerous daylight holes, giving a highly correlated record of temperature and humidity. In contrast, the Guillotine chamber is past a constriction which limits air flow, resulting in reduced temperature fluctuations over the same period. The winter cooling trend is apparent in this chamber. However, humidity shows greater fluctuations which may be due to cooler drier air coming in from another entrance.





### Margaret River, WA

In south-west Western Australia, we have several caves participating. Of these three caves, Ngilgi is very poorly ventilated so stability in both temperature and humidity is to be expected. Lake Cave is possibly influenced by air flow from fissures in the large collapse doline, although the actual cave entrance is quite small and would restrict airflow. Mammoth is a multi-entrance cave so variable humidity is to be expected. Again, these caves show the decline in temperature to the cave climate winter minimum temperature, due in the next month or two. Also of interest is the very different average cave temperature for three caves within a few tens of km from each other.

### Further reading:

Delving deep into caves can teach us about climate past and present by Gabriel Rau and colleagues: <https://theconversation.com/delving-deep-into-caves-can-teach-us-about-climate-past-and-present-50122>

**Calaforra JM, Fernandez-Cortez A, Sanchez-Martos F et al** (2003) Environmental control for determining human impact and permanent visitor capacity in a potential show cave before tourist use. *Environmental Conservation* 30:160–167. Copy available from the authors at:

[https://www.researchgate.net/publication/231875886\\_Environmental\\_control\\_for\\_determining\\_human\\_impact\\_and\\_permanent\\_visitor\\_capacity\\_in\\_a\\_potential\\_show\\_cave\\_before\\_tourist\\_use](https://www.researchgate.net/publication/231875886_Environmental_control_for_determining_human_impact_and_permanent_visitor_capacity_in_a_potential_show_cave_before_tourist_use)

**Cigna AA** (1993) Environmental management of tourist caves. *Environmental Geology* 21:173–180. Copy available from the authors at:

[https://www.researchgate.net/publication/227018875\\_Environmental\\_management\\_of\\_tourist\\_caves](https://www.researchgate.net/publication/227018875_Environmental_management_of_tourist_caves)

**De Freitas CR, Littlejohn RN** (1987) Cave climate: assessment of heat and moisture exchange. *Journal of Climatology* 7:553–69

**Rau, G., Cuthbert, M.O., Andersen, M.S. et al.** (2015) Controls on cave drip water temperature and implications for speleothem-based paleoclimate reconstructions. *Quaternary Science Reviews*, 127, 19-36. Copy available from the authors at [www.bakerlabgroup.org](http://www.bakerlabgroup.org)

**Credit:** Part of this text is based on that previously published by Andy Baker as ‘Caves and climate’ in the 60<sup>th</sup> Anniversary Edition of the Kempsey Speleological Society TROG Vol 54 No. 5 (Nov 2018).

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# Ann Augusteyn Award

The **Ann Augusteyn Award** recognises the excellence and outstanding contribution of an individual to cave and karst guiding and interpretation. Nominations for the award will be open biennially, and the award announced at the subsequent cave guides training event that is held in conjunction with the ACKMA AGM.

The inaugural Ann Augusteyn Award will be awarded at Wellington, New South Wales in 2021.

**Nominations will open on 15 January 2021 and close on 15 March 2021.**



Amy Vass, Zara Lane Photography

## A celebration of Ann Augusteyn

Ann and Ken Augusteyn bought the then Olsens Caves in 1988 and embarked on a journey to further develop and promote the caves which were renamed Capricorn Caves. Ann and Ken, assisted by their family of John, Robert and Helen, worked to modernise the show cave experiences, develop accommodation facilities, provide for greater community connections with the caves and support science research.

After Ken's passing in 2008, Ann continued their vision with a special focus on guide-development and assisting guides to develop engaging cave visitor experiences. Ann was supporter of ongoing training and development and exposing guides to new and practical ideas to enhance their guiding.

Ann died suddenly in 2018 and ACKMA determined that her efforts to promote vision, excellence and new approaches in cave guiding and presenting should be celebrated and progressed.



### Prize

Associate Professor Julia James has donated a shield which will rotate from one award winner to the next, with the award winner's name engraved on it.

The award winner will also receive:

- 1) The honour of being recognised by their peers.
- 2) A certificate.
- 3) A year's membership of ACKMA.
- 4) A book prize relevant to caves and karst.

### Award criteria

Anyone can nominate an individual for this award. For an individual to be eligible they need meet the award criteria:

- Be a member of ACKMA or work for an organisation that is a corporate member.
- Show commitment to cave and karst guiding and interpretation.
- Demonstrate leadership in developing new and engaging ways to interpret caves and karst to the community.
- Share with and assist others to further develop the profession of cave and karst guiding and presentation.
- Adapt cave and karst presentation so that it is relevant to varying audiences.

### To make a nomination

To nominate an individual please provide the following information:

#### YOUR DETAILS

Your name, full contact details and professional relationship (if any) with the person being nominated.

#### PERSON BEING NOMINATED

For the person being nominated please include:

- Their **name, workplace and workplace address**.
- A description of their **cave and karst presentation work** (maximum 250 words).
- **Why you believe they deserve this award**. Please refer to award criteria (maximum 250 words).
- **Supporting documentation** such as video, photos and other documentation (maximum of five documents).
- Names and full contact details of **three professional referees**, including each referee's relationship to the nominee and how they know of the nominee's work as a cave guide, interpreter or presenter. Please think broadly here as a referee does not need to be a speleological expert or have been a cave guide to appreciate excellence in cave and karst guiding and presenting. Referees with a variety of backgrounds relevant to cave and karst presentation are encouraged.

#### KEEP YOUR NOMINATION SECRET

Please note that the award committee would like to keep nominations 'a surprise' until the public announcement and encourage people making a nomination to support this.

**For enquiries and to submit a nomination please email:**

**[AnnAugusteynAward@ackma.org](mailto:AnnAugusteynAward@ackma.org)**

# Ode to the Covid Cave

## Text & illustration—Kirsty Dixon

While sitting and pondering the current state of the world and how nature is coming back in surprising ways in surprising places, it occurred to me that perhaps Mother Nature needed some social distancing as well – from us.

A chance to take a few deep breaths and reset to rhythm of the earth – for all of us.

In combination with the opportunity for the ACKMA Cave Climate Project to do some collecting of baseline temperature and humidity data from show caves during this downtime through the project being coordinated by Andy Baker, Andy Spate and Dave Gillieson, it inspired me to consider how caves in particular were being affected by the Covid lockdowns and the lessons and benefits that could come from this.

In a surge of socially distanced creativity I have prepared some musing on this topic for your pondering and enjoyment. The artwork is a snapshot of the Covid Cave, with all its infrastructure, having a chance to just be – without

The first thing Andy S said when I showed it to him was that the stairs and railings were not up to Australian standards – oh well, chalk that up to artistic licence! You may also note that there are two data loggers recording temperature and humidity shown – can you find them?



### Ode to the Covid Cave

Forming over eons,  
The slow drip, drip, drip  
of dissolution and deposition.  
Forming and reforming,  
labyrinths of crystal magnificence  
in the dark, waiting...

Ancient humans found them and thought them to be  
places of wonder and reverence,  
Realms of the ancestors and portals to the underworld.  
Shelter and security in the bosom of earth mother.

As humankind discovered how to make better and brighter light,  
Slowly the wonders of the caverns were revealed,  
and while some of the reverence diminished, the magic  
never disappeared.

Yet slowly we began to take them for granted,  
A place for a lovely day's outing,  
scaring the kids,  
pretending we were once again brave warriors facing the  
unknown,  
conquering the darkness.

For some a way to make a quick buck,  
For others a way to illuminate their own fantasy crea-  
tions, with garish lights and fanciful names...  
Natural amusement parks.  
The toll of visitation is leaving its mark.  
The ever-increasing demand of tourism for better, bigger,

longer, higher -  
and the ever-increasing numbers.  
How are these marvels of creation to cope with such de-  
mands?

And then came Covid.  
Everything in shutdown and lockdown,  
A brutal awakening to a world that would never be the  
same.

And yet there is hope.  
This chance for everyone to remember their connection  
with the natural world,  
To reawaken the wonder, reverence and appreciation for  
things we have for too long taken for granted.  
To give Nature a chance to take a few deep breaths and  
reset back to a more natural rhythm.

There have always been those who still carry a vision of  
wonder and awe,  
And wish to help others revive and appreciate the ancient  
wonders we have been gifted with.

As we get ready to welcome revisitation,  
let us take this wonderful opportunity to highlight the  
specialness of the places we have guardianship over,  
and reawaken the sense of wonder, awe and reverence for  
these marvels of the earth.



CELEBRATE THE  
INTERNATIONAL YEAR OF CAVES & KARST

2021

ACKMA  
MEETING

Wellington Caves NSW

**3-5 May 2021** - Caves Guide School 'Eco Guide'  
Certification conducted by Savannah Guides

**6-7 May 2021** - Post-Bushfire Workshop, operational  
adaptation to COVID-19 and AGM

This event will be different to any other ACKMA event as we adapt to social distancing guidelines. Regardless of the changing restrictions and border closures, you can participate. In order to forward plan and cost all aspects of this event, including online facilitation, please consider your options and complete the expression of interest form.

**P: (02) 6840 6480 E: [enquiries@wellingtoncaves.com.au](mailto:enquiries@wellingtoncaves.com.au)**





## 2021 ACKMA Meeting Expression of Interest

If you can join us physically or would like to participate online, please register your expression of interest.

Registration fees will vary based on your participation and fees will be included on the final registration form.

If you would like to present during the Post-Bushfire Workshop or COVID-19 response, please prepare your abstract and forward through to ***president@ackma.org*** for consideration.

*Please note presentations are limited to 20 minutes.*

## Accommodation

The Wellington Caves Caravan Park has a number of options available including suites, powered and non-powered campsites.

Please visit our website ***www.wellingtoncaves.com.au*** for further information on each accommodation type. If you would like to make a booking please contact our office on 02 6840 6481 (Monday – Friday) and mention you are attending the ACKMA event.

## Expression of Interest Form

*Please note a formal Registration Form will be required closer to the date.*

***Please return to enquiries@wellingtoncaves.com.au***

Please complete and tick your response		
Name		
Phone		
Email		
Organisation		
	In person	Online
Guide School 'Eco Guide' Certification 3-5 May 2021		
ACKMA Meeting 6-7 May 2021		
20 minute presentation		

# Around the show caves

## Introduction

In this edition, we have three contributions—two from local sites and one, a series of three interesting photographs of lava tubes, from South Korea.

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**From Mark Delane—Margaret River (WA)**

### The unexpected side effects of COVID-19 in our caves

With the world spinning and then coming to a full stop in a hurry ... all from a partly cooked bat, aliens, or some other conspiracy ... like everyone, we stopped operations and closed our sites thanks to COVID-19.

With a great deal of uncertainty, worry and a focus on social distancing, cleaning and stockpiling toilet paper, consideration for the caves was more about the concept of their having a break - a chance to breathe and relax.

Well, little did we realise that, while the caves may have embraced the lack of visitors, our cave infrastructure did not. It sounds strange, I know, but with a complete lack of visitation some of our infrastructure dramatically showed signs of need for people - in two key areas.

The first was the handrails. Many of them started to show signs of surface rust within a couple of weeks, which then rapidly increased over the following weeks. Without the constant movement of hands up and down the handrails (moving and dispersing any moisture that condenses on them), the moisture could sit and cause damage. The impact was astonishing; the vertical and angled sections rusted at a rapid rate. It was as if gremlins were working on them around the clock. These sections became inaccessible, unsafe and a hazard within four to six weeks. The horizontal sections, however, seemed to be spared.

the cave they eliminate or drastically reduce this risk by dispersing and moving the moisture and not allowing it to penetrate the steel.

So, with no one moving through the cave - wiping off the moisture - for the period of closure, we have inadvertently allowed the handrails to rust. In preparation to reopen the sites as the restrictions eased, we were shocked to discover the extent of rust that had occurred. With lots of head scratching and with mouths open, we had to start replacing large sections of handrails quickly in some of our caves.

So, over a couple of weeks, we spent hours removing affected sections of handrails and replacing them with new rails. In total, we ended up replacing over 300 metres of handrails - all bent and custom-shaped to suit each cave.

The second surprise to our caves was the visible presence of mycelium growth on sections of the Jarrah timber boardwalks. Again, with no visitors walking through the caves and suppressing any chance of growth, the mycelium took the opportunity and started to colonise sections with some spectacular results. Some of these boards have been in place within the caves for up to 15 years. Thankfully, there was no need to replace any boards.



**Mycelium photos:  
Tim Brown**



**Photo: Trish MacShane**

The thinking is that, as people used the handrails to go up and down the stairs, they slowly affected the handrails by reducing the galvanized zinc coating and thus increased the exposure of the steel to moisture penetration and therefore the likelihood of rust. As people move through

Both events were purely the result of having no visitors within the caves for a number of weeks - completely unexpected outcomes! Certainly, some lessons learnt; some long hours of replacing infrastructure; and a true sense of renewed amazement about how caves are truly stunning and constantly surprising!





## From Ian Eddison—Wellington Caves Discovery Lab

The Wellington Caves Discovery Lab is located within the new Visitor Experience Centre. It provides “hands on” interactive science sessions for all ages. This is a multifunctional area and is suited to public tours and school excursion sessions. With the closure of the Fossil and Phosphate Mine and Gaden Cave, due to the current social distancing restrictions, we were forced to think nimbly and determine what other products we could offer to increase visitor dwell time.

While we had not officially begun activities in the Discovery Lab, we had run short visits as tests in the previous holidays. Based on the popularity of these events, introducing a new Discovery Lab tour was the obvious choice.

We have put together a 45-minute activity. This enables visitors to learn about the different sciences that are studied on site, in particular palaeontology. Guests are given an overview of geology, hydrology and chemistry before undertaking their own fossil dig through 800,000 year-old sediment excavated from the Fossil and Phosphate Mine. Some of the exciting discoveries found include reptile vertebrae, a possum jaw and a range of carnivore teeth.

These “Fossil Finding” sessions have been very successful. We have run them during both peak and off-peak periods.



Photo from the Discovery lab (left) by Michelle Tonkins

Photo of Anticline Cave (right) by Anton Veugen



## Anticline/Water Cave

This small but very interesting cave is located in the middle of the Caves Caravan Park. It is inaccessible to visitors but is a unique feature of our Park. It is geologically and hydrologically significant – showing the karst process from the laying down of the rock; significant folding and uplift; the dissolving process (including speleothem development); right through to explaining the water table.

Anticline has an interesting history. After being “lost” for many years and rediscovered in 1988, it was cleared of rubbish, landscaped and fenced. An interpretative A4 sign was added. We are working on a project potentially to open this cave to guests in the future.

In the short term, however, we have developed a simple but effective strategy to enhance visitor engagement. We have designed a webpage accessible by a QR code delving into the history of Anticline, its rediscovery and a range of images to showcase the spectacular folds and uplifts. This is an effective way to allow visitors to experience Anticline Cave without physical access.

Wellington Caves has taken our interpretation of this significant karst landscape feature (an estavelle) to a much more modern level for our caravan park guests.



## Manjanggul Lava tube photographs

**Dr Kim Lyoun—Director,  
Korean Research Institute**

These spectacular photos were sent to us by one of our South Korean correspondents

**Wikipedia give the following brief information:**

*The Manjanggul Lava Tube is located in Gimnyeong-ri, Gujwaeup, Jeju City. At up to 23m wide, 30m high and 8.928km long, it is the 12th-longest lava tube in the world and the second longest on Jeju island. It is regarded as having significant scientific and heritage value, owing to its excellent condition of preservation despite its age of formation (about 300,000 to 200,000 years ago).*





# Historic Gardens of Jenolan Caves

This paper was originally prepared for presentation at the (cancelled) 2020 ACKMA Conference by **Ian Eddison**. Ian is a former guide at Jenolan and is currently the Caves Engagement Officer, Wellington Caves, NSW. For reasons of image density and file management, not all of the photographs that would have been projected during Ian's presentation are able to be included.

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## Abstract

### Historic Gardens of Jenolan Caves

First prepared in 2010, this paper justifies the expenditure to maintain the gardens and study the flora of the Jenolan Reserve.

#### *19th Century - turning the first sod*

The discovery of Jenolan focuses on the capture of absconded convict James McKeown. McKeown was in a hidden valley in an established camp site with a garden. James McKeown's convict records show his trade as "Kitchen Gardener".

The establishment of landscaped gardens began when Jeremiah and Lucinda Wilson began hospitality services in the valley in the early 1880s. Joseph Rowe was residing in McKeown's Valley and had a significant vegetable garden, most likely growing produce for where he was a cook - in Wilson's Accommodation House.

In 1888, formal gardens were developed and, in 1898, Mr Maiden, the Curator of the Botanic Gardens, laid out new plantations around Caves House. Mr Blakely was gazetted as gardener in 1899.

One significant Walnut tree, planted in 1892, became a feature in a children's book - "The Wizard of Jenolan". The timber of this tree was subsequently made into the reception desk for Caves House.

#### *20th Century - significant botanical interest*

In 1900, the gardens were handed over to the lessee of Caves House. In the Department of Mines Annual Report, it was said, "Irrespective of the attractions found in the Caves, the picturesque little valley in which the Caves House is situated is now one of the most beautiful spots in Australia."

In the Agricultural Gazette of NSW in 1901, there is a list of plants collected in the vicinity of the Jenolan Caves by Blakely and Wiburd. These specimens still form the basis of our flora list today.

In 1905, one hundred ornamental trees were planted on the slopes and, in 1906, more were planted along the road between Caves House and the Grand Arch.

In 1954, the Binoomea Cut was officially opened and the announcements included references to the gardens and surrounding "nature trails". It was said that "the tracks

at Jenolan will be among the first of their kind in Australia."

In June 1997, an ivy-covered limestone wall in the main visitor precinct was revealed during garden maintenance.

#### *21st Century - botanical interest continues*

As recent as 2010, significant plants have been located in the region - *Geranium graniticola*, *Ozothamnus adnatus* and *Myoporum floribundum*, to name a few.

I obtained botanical specimens for DNA analysis by the University of Tasmania as part of a study on the relationships of Blue Gum species in Australia. This study's results demonstrate that the latest botanical science findings that the flora of Jenolan Caves make it a fascinating and important site botanically.

The late Prof Elery Hamilton-Smith had been very passionate for the maintaining of the historic gardens of Jenolan Caves and wrote "The Maiden Gardens - a case for restoration" in 2010.

The current Director of Jenolan Caves, Jodie Strickland, is well aware, and supportive, of the historic gardens of Jenolan Caves. Among many present projects, the gardens around the Blue Lake are planned for revitalisation.

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## Introduction

Gardens at Jenolan Caves have evolved since the 1880s. The gardens have been a feature for visitors to enjoy. Permanent gardeners have not been employed on site for decades and introduced plants have become bushland weeds.

At the time the original version of this document was produced in 2010, the gardens were tended sparingly. In 2020, more planning is occurring and more tinkering in the gardens does take place. Regardless of the causes for the demise of the garden areas at Jenolan, the main reason that hinders the reinvigoration of the historic gardens is the need to cultivate continually and tend the gardens for their living and seasonal beauty. This requires continued financial investment. Formal gardens require professional horticultural care - trained and qualified horticulturalists and gardeners need to be employed.

This article, "Historic Gardens of Jenolan Caves", is the gathering of historical references and contributions by many people - demonstrating their desire to see the famous Jenolan Gardens restored.

I firmly believe that it is the combined knowledge and skills of a New South Wales Government multi-agency approach that is required to reinvigorate the, "Historic Gardens of Jenolan Caves". It is most likely success will come through such combined interest. With appropriate planning and funding, to enable restoration and ongoing garden maintenance, this will be achievable.

I trust you find the information within this article grounds for further effort to assist the cause to reinvigorate the "Historic Gardens of Jenolan Caves".



## Discovery of the Jenolan Caves valley

### Jenolan's First Gardener

#### Dr Dan Catchpoole, Member of Jenolan Caves Historical and Preservation Society (JCHAPS)

History tells us that the first European to visit New South Wales famed and world renowned Jenolan Caves was a gardener. The story of the discovery of Jenolan focuses on two brothers, James and Charles Whalan, and follows their attempt to hunt down the "notorious bushranger" James McKeown in 1836.

James Whalan, eldest son of Charles Whalan Sr, sergeant-to-arms for Lachlan Macquarie was one of the pioneers to settle in the greater western slopes following the crossing of the Blue Mountains, establishing a farm at Ginkin, west of the Jenolan valley. It is reported that the absconded convict, James McKeown was seen stealing Whalan's horse. With the assistance of his servant, Jeremiah Beale, and of a trooper, James Whalan tracked and followed McKeown into a hidden valley eventually finding him in a relatively well-established camp site.

The eventual capture of McKeown led in turn to the observation of the limestone outcrops which house the now famous cave system - which was later explored by Charles Whalan Jr who brought them to public prominence.

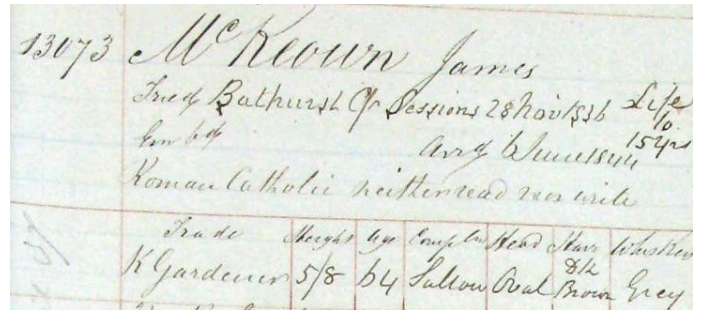
Being a convict, James McKeown did not receive the recognition of being the first European in the caves' vicinity. However, given the reports of an established campsite and a possible garden, likely growing corn/maize, McKeown undoubtedly had been there some time prior to this.

Indeed, reports indicate that McKeown had stolen a set of bullock bows with the intention to plough some land. Perhaps the horse was acquired to assist with this task. These bullock bows were apparently discovered by Jeremiah Wilson, the first "keeper of the caves" (or his brother Fred) in a small cave near the creek named "Bow Cave" as a consequence.

Until recently, little has been known about McKeown - much of the documented information being based on hearsay but not substantiated. Recent careful research has identified that James McKeown arrived in Sydney aboard the Asia4 on 21 February 1825, being assigned to Robert Smith of South Creek. Smith was building up land stocks south of Bathurst and presumably McKeown found himself crossing the Blue Mountains to help build this part of New South Wales. McKeown had a history of absconding, being sent to Morton Bay (Queensland) for a brief period in 1827-1828. Following his capture at Jenolan, McKeown was sentenced to transportation to Norfolk Island for seven years, only to survive this most notorious penal colony to return to Tasmania in 1844 for a period of probation. His whereabouts following this time is not known.

Having tracked down a full series of records for James McKeown, we can now get a picture of who he was. Apart

from detailing what must have been a horrendous existence, yet one showing tremendous resilience to survive, we learn that McKeown had the trade of "plough and shears!" In further documents (see below) he is listed as "K Gardener" (kitchen gardener) further emphasizing his motivation for stealing a horse and some bullock bows - he wanted to survive and saw the potential within the Jenolan valley to establish a working garden.



McKeown's Convict record—supplied by Dr Dan Catchpoole

### 19th Century - Turning the first sod

Following James McKeown's attempt at a subsistence garden, the establishment of gardens at Jenolan Caves began, no doubt when Jeremiah and Lucinda Wilson began hospitality services in the valley. This was probably when the first residence was built in the early 1880's. Photographs of this period show formed culverts, fencing and livestock and there is no doubt that the growing of vegetables was a priority.



Photograph from Jenolan Archives provided by Ted Matthews

### The Mysterious Joseph Rowe

By the late Elery Hamilton-Smith

An Excerpt from *BINOOMEA*, The Newsletter of the Jenolan Caves Historical & Preservation Society. Issue 133, February 2008

Joseph Rowe is best known for his photographs of the Jenolan Caves. But there is more not known about him than is known.

The first references to him that I have found appeared in the 1880s. It seems that he was already resident in McKeown's Valley, but so far there is nothing that tells us

when he arrived at Jenolan nor where he came from. I once saw a suggestion that he had formerly operated a photographic studio in Sydney - but no photographic historian has found any hard evidence to support that. It seems he became a friend and helper to Jeremiah Wilson in the 1880s, both acting as cook in Wilson's Accommodation House and occasionally assisting with tours or other hospitality.

A press story (*Illustrated Sydney News*, 28 November 1889, p 21) tells of a free-ranging visitor who lowered himself into Frenchman's Cave on a knotted rope but then discovered that the rope was not long enough to escape from the cave. He managed to attract the notice of some walkers, who reported the problem. Rowe went to the cave immediately and alone, rescued him and took him back to the house and got on with cooking the dinner.

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**Ian Eddison recommences the story:**

No doubt, as a resident in the remote and rugged Jenolan Caves area, Joseph Rowe also grew his own subsistence garden. As a cook for guests in "Wilson's Accommodation House", it is likely he also provided produce from his own garden. Cavers have reported that on a late afternoon on



**Ruins of Rowe's Cottage in 2010 (Ian Eddison)**

Hennings Bluff, opposite the ruins of Rowe's Cottage, undulations in the valley can be seen as probable old rows of garden beds.

Charles Moore was the Director of the Royal Botanic Gardens, Sydney from 1848 - 1896 (Janelle Hatherly Royal Botanic, Gardens, Sydney—personal comment 2002). During Charles Moore's time as Director, the Department of Mines records (1888) show that formal gardens were developed:

"Great improvements have been carried out at these caves in the way of making the outside surroundings attractive to visitors. Plantations and walks have been tastefully laid out and suitable trees, shrubs, and flowers planted. Altogether, it is intended to make the cave surroundings as attractive and pleasing to the eye as possible in order

that visitors, when not engaged exploring the caves, will be able to pass their time pleasantly in viewing the scenery and vegetation around. The improvements at the bathing-hole have been greatly appreciated, and consequently taken advantage of, by the visitors."

A decade later, the Department of Mines records (1898) has two entries stating:

"Garden seats were placed in suitable places."

"In order to add to the beauty of the surroundings of the caves, Mr Maiden, Curator of the Botanic Gardens, has been authorised to lay out new plantations."

The Department of Mines records (1899) also state:

"Considerable progress has been made by Mr. Maiden, Director of the Botanic Gardens, in forming and planning the area surrounding the Caves House. In connection with this work, W. Blakely was gazetted as gardener on the 25th August, 1899. For the protection of the plantations, wire netting has been erected, and active steps have been taken to prevent the trespass of stock. Hose and hose reels have been supplied."

In 2002, Janelle Hatherly of the Royal Botanic Gardens, Sydney communicated, "I asked our historian, Ed Wilson, about Joseph Maiden's involvement with Jenolan Caves and he contacted Lionel Gilbert who wrote "The Little Giant" and who knows Maiden's life better than anyone."

Gilbert said that "Maiden had his fingers in so many pies like Rookwood Trust/Lord Howe Island Board etc. Maiden was good friends with Edgeworth David (the geologist) and both families went to the Blue Mountains for holidays. It is easy for him to imagine that Maiden went with David to the Caves."



The hard landscaping of walls, forged steel posts and stairs are the most resilient pieces of the Historic Gardens of Jenolan Caves.

**Photos by Ian Eddison**





One significant Walnut tree, planted in the late 1800s (presumably 1892), has become a feature in a children's book, "The Wizard of Jenolan". This tree went on to survive 90 years before being uprooted in a storm. Considerable efforts went into saving the tree but these failed. The significance of the tree was such that the timber was milled, dried and made into a unique Reception desk for Caves House. (Barry Richard—personal comment).



**Photograph of the Walnut Reception desk by Clay McLauchlan**

Visiting Jenolan in March 2020 to acquire some current images for this paper, I enjoyed half-a-dozen walnuts from another Walnut tree in the same garden mentioned above. This was a regular annual treat of mine while guiding at Jenolan Caves.

*20th Century - Significant botanical interest*

The Department of Mines records (1900) state:

"The plantations having been completed during September, under the supervision of the Director of the Botanic Gardens, they were handed over to the lessee of the Caves House in terms of his lease (M. 00/21,372). Irrespective of the attractions found in the Caves, the picturesque little valley in which the Caves House is situated is now one of the most beautiful spots in Australia."



**Provided by Dr Richard Medd  
Quoted from The Agricultural Gazette of NSW Vol XII 1901.  
Communicated by J. H. Maiden.**

*A List of Plants collected in the vicinity of the Jenolan Caves, by W. F. Blakely and J. C. Wiburud*

"The enclosed list of Phanerogams and Vascular Cryptogams (including a few introduced species)

collected by Messrs. Blakely and Wiburud is printed as it will prove a useful basis on which to compile a flora of this very interesting locality. Mr Blakely was formally gardener at the Caves, and Mr Wiburud has been guide there for many years; the plants have from time to time been sent to me for determination, and the collectors are to be commended for their zeal in collecting so many, and for the care with which the specimens have been prepared. The work was purely voluntary, and carried out in their spare time. The specimens have been deposited for permanent reference in the National Herbarium, Botanic Gardens, and are of value in connection with the Botanical Survey of this State which is now proceeding."

The list, referenced above, is not included in this document, but it is important to note that it still forms the basis of our flora reference list for Jenolan in 2020.

The Department of Mines records (1905) state:

"One hundred ornamental trees, supplied by the Director, Botanic Gardens, were planted by the guides on the slopes in the vicinity of the caves."

Could this be the planting of Sycamore which spread to over 50 hectares and is now the basis of a major multi-agency focus with volunteers? These efforts have significantly reduced this infestation – however, Sycamore remain and, as is usual in most bush regeneration projects, ongoing follow-up work is required.



**The bright green Sycamore infestation is now been significantly reduced through a concentrated bush regeneration effort and the recent late 2019 fire.  
Photo Chris Indyka**

The Department of Mines records (1906) state:

"A further supply of ornamental trees, supplied by the Director, Botanic Gardens, were planted along the road between Caves House and the Grand Arch."



**The Clarion Newspaper,  
Bathurst  
12 November 1954.  
Photo provided by David Hay**

## “NEW JENOLAN CAVES TUNNEL COMPLETED

The new man-made tunnel at Jenolan Caves (48 miles south east of Bathurst) will be officially opened by The Chief Secretary, the Hon C.A. Kelly, M. L. A. today at 3pm. (Originally planned by the former Government Surveyor, Oliver Trickett in 1917, the tunnel was commenced in March this year, and runs for 400 feet through solid limestone. Its Purpose to provide tourists with a smooth, gently graded path into the heart of the Orient and Temple of Baal Caves, which are probably the pick of the great underground caverns at Jenolan). Mr Kelly will also open the first of the new “nature trails” in the Jenolan bushland sanctuary. Described as “living museums”, nature trails are actually bush paths lined with attractive but unobtrusive labels pointing out the most interesting geological, botanical and zoological features. Although well developed in Europe and America, nature trails are still a novelty in the Southern Hemisphere, and the tracks at Jenolan will be among the first of their kind in Australia.”

### “CAVES FUNCTION

The longest man-made tourist access tunnel in Australia, the “Binooomea Cut” at Jenolan Caves, will be officially opened next Friday at 3 pm. Official invitations for the occasion have been issued by the New South Wales Department of Tourist Activities and Immigration, Mr Kelly, will perform the official function which will include the inauguration of the “Nature Trails” network of pathways in the Jenolan Caves bushland sanctuary.”

The nearby walking tracks have been significantly improved in recent years, some with interpretive signage. Other walking tracks lack modern interpretive signage and some tracks have been closed altogether. Perhaps this stage of “Nature Trails” being “among the first of their kind in Australia” in 1954, can now be viewed as justification for reopening closed tracks and the addition of more interpretive signage.

In June 1997, Guide Daniel Bailey and I began removing an Ivy covered limestone wall in the main visitor precinct under the direction of the late Senior Guide Nigel Scanlan. Some years later, maintenance staff member, Mark Simpson, built a new wall at the base of this area - to ensure a secure foundation would hold this area in place. No doubt many others have and will continue to tinker in the gardens. We need qualified landscaping and horticultural direction, year-in and year-out, to be successful.



**English Ivy and Blue Periwinkle continue to claim the limestone at Jenolan, covering 430 million-year-old marine fossils; sending roots into the cracks; and splitting the rock in the natural environment and in early European landscaping.**

### 21st Century Botanical Interest continues

The botanical list “collected in the vicinity of Jenolan Caves...” mentioned earlier may not be exclusive to the Jenolan Caves Reserve. Dr Richard Medd, a retired Agricultural Scientist, has spent recent times with me looking at the flora of the area. “As a community in an otherwise isolated area, travellers would have picked unusual plants which would have been of interest to the likes of Wiburd.” As recent as 2010, Richard and I found significant plants in the region - *Geranium graniticola*, *Ozothamnus adnatus* and *Myoporum floribundum*, to name just a few. This came about through my research and discussions with the late Keith Ingram, shared with Dr Medd, followed by field trips “in the vicinity of Jenolan Caves.”

One very reasonable concern about restoring the gardens is the possibility that more introduced plants become established as weeds in the bushland. The careful selection of plants and the continued maintenance of the gardens is essential in preventing this from occurring. This point was raised in an email by Dr Medd, when asked to contribute to this document.

### PLANT BIODIVERSITY THREATENED IN JENOLAN RIVER VALLEY.

Dr Richard W. Medd H.D.A.(Hons), B.Rur.Sc.(Hons), Ph.D. Principal Research Scientist (Plant Ecology)(Retired) September 2010

Over the past 18 months or so I have been privately documenting and photographing native plants of the Jenolan River Valley. Inspired by the rich diversity of its tablelands vegetation, which contrasts markedly to communities on the western watershed of the Great Diving Range, I became increasingly aware of, and alarmed at, the extent of degradation.

Extensive tracts of tableland and montane forests cover the ridges and steep slopes of the Jenolan River Valley, made exceptional by remnants of sub-alpine and rainforest plant communities embedded in its rugged terrain. In addition, specialised plant communities and species adapted to limestone substrates occur on the karst formations. This blend is regionally (perhaps even nationally) unusual, making the Valley a valuable floristic province.

Documentation of the Valley’s flora is quite poor and dated. An old list, published over a hundred years ago (which Ingram revised and expanded but didn’t publish), indicates approximately 440 taxa, including several undetermined species, occur in the vicinity of Jenolan Caves. A search of herbarium records revealed in excess of 110 other species recorded within a five-kilometre radius of Jenolan Caves. During several recent excursions to the valley, I have identified a further additional 150 species, bringing the known flora to an extraordinary 700 species (approx.).



I have no doubt there are more still to be found.

About 130 species are introduced plants, a discouraging number of which are major weeds ravaging the Valley: e.g. *Vinca major* (Greater Periwinkle) in the riparian system along the Jenolan River downstream of the Caves and bushland around cottages and buildings; *Hypericum androsaemum* (Tutsan) on many slopes adjoining the River; *Pinus radiata* (Radiata Pine, Monterey Pine) encroachment within and noticeably around the periphery of the headwaters and along the ridges, to mention just a few of the serious invasion problems. A hefty number of these weeds are garden escapes; a poor legacy of past horticultural enthusiasm and disregard for the natural environment.

It is my considered view that the Valley's plant biodiversity is at considerable risk because of the mostly unchecked weed invasions, with ongoing degradation compromising its resilience. Of great concern is the number of rare and threatened species recorded in the area; at least one of which is now considered provincially extinct and another as extinct state wide.

Jenolan Karst Conservation Reserve is an iconic estate entrusted to the relevant State Authorities. My strong recommendation is that a thorough audit of the flora of the Reserve is urgently needed, as a foundation to developing a strategic plan for the remediation, restoration and long term conservation management of the plant biodiversity and vegetation communities, for posterity.

Dr Rebecca Jones of School of Plant Science, University of Tasmania has been studying the relationships of Blue Gum species in Tasmania and mainland Australia as part of a PhD project. With assistance from me, additional botanical specimens have been obtained for DNA analysis. This demonstrates the latest in Botanical Science studies continues to find the flora of Jenolan Caves a fascinating and an important site botanically.

Jenolan Karst Conservation Reserve is part of the Greater Blue Mountains World Heritage Area, specifically due to the diversity of the Eucalypt woodland and the unique cave fauna present. (Dr J. James—personal comment).



*Eucalyptus bicostata* at Jenolan is an isolated population of 'Blue Gum'

English Ivy, Blue Periwinkle and Tutsan form dense mats and ground cover on slopes above what was originally garden and Sycamore has spread to around 50 hectares of the hillside. Volunteers have worked on the Sycamore invasion. The project has been coordinated by Lithgow Oberon Landcare Association (LOLA), National Parks and Wildlife Service (NPWS), Jenolan Caves Reserve Trust (JCRT), Hawkesbury Nepean Catchment Management Authority (HNCMA), Sydney Catchment Authority (SCA) and Local Land Services. Contracted bush regeneration teams have worked on kilometres of the Jenolan River - targeting woody weeds (especially a *Deutzia* infestation). Contract bush regeneration on Sycamore removal has taken place. Unfortunately these works have come to a standstill. The JCRT provided more than \$9,000 of "in kind" support for Sycamore volunteer events annually during the active years of work to reduce Sycamore.

I have collected seeds and had two nurseries propagate native plants to contribute to revegetate areas of Jenolan as part of the above weed management and landscape restoration. Personally, I have planted thousands of plants, often in my lunch break or after work in my own time.

Gardens and gardening have long been and continue to be of interest to people. In our region, the local town of Oberon holds an annual Daffodil Festival with private gardens open to the public, and a large, potentially world-standard, garden in "Mayfield" draws significant attention when open. The regional, cold climate Mt Tomah Botanic Garden is now the centrepiece for visitors to the Greater Blue Mountains World Heritage Area.

There is so much interest in gardens that they feature in most media such as radio, television, social media and magazines. Tourism of gardens is significant internationally. From a modern-day tourism perspective, could the Historic Gardens Jenolan Caves, New South Wales, be transformed so that the picturesque little valley (in which Caves House is situated) return to be once again "one of the most beautiful spots in Australia"?

## Conclusion

You are a "Stakeholder" in the Historic Gardens of Jenolan Caves, New South Wales .

I hope you will have read this document because of your interest in botany, history, caves or, specifically, Jenolan Caves.

There have been multi-agency efforts to conduct significant bush regeneration activities on the Sycamore invasion at Jenolan Caves. I was on the Steering Committee on behalf of Jenolan Caves. There have been volunteers, paid staff and contractors working on Sycamore removal before but never has there been such interest from so many organisations and individuals. A series of "Sycamore War" activities occurred resulting in significant reduction in the Sycamore infestation. The weed invasion at Jenolan Caves is not restricted to Sycamore. The weeds are escaped garden plants, a legacy of our history and of both flourishing times and hard times.

There is no doubt in my mind that, if our gardens were tended professionally and consistently, we not only would have a showpiece visitors would travel for, but we can also contain many of our weeds. This, along with appropriate bush regeneration techniques, can restore both the Historic Gardens and the World Heritage Listed Jenolan Caves Reserve's diverse Eucalypt dominant bushland.

What amount of qualified horticultural hours is needed to consistently tend the gardens? What resources are needed and where can we find the funds, year-in-year-out, to keep up the momentum?

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Both images of Jenolan are from postcards from the late 19th or early 20th Century with the earlier image above

Supplied by Ian Eddison





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