

Journal of the

Australasian Cave and Karst Management Association



The ACKMA Journal

Official Publication of the Australasian Cave and Karst Management Association Incorporated.

Published quarterly in March, June, September and December.

The opinions expressed in the ACKMA Journal are those of the individual authors and not necessarily those of ACKMA Inc or its officers.

EDITOR: Tim Moore

SUB EDITORS: Tony Culberg, Andy Spate

Photos taken by the authors or editor unless otherwise acknowledged.

PRINTER: Hansen Print, Smith Street, Naracoorte, South Australia 5271.

Ph: +61 8 8762 3699

ACKMA Inc is cross-affiliated or otherwise associated with:

Australian Speleological Federation, New Zealand Speleological Society, Australasian Bat Society, The WCPA Working Group on Cave and Karst Protection, Guiding Organisations Australia, Bat Conservation International, American Cave Conservation Association, International Show Caves Association, Cave Diving Association of Australia, The Malaysian Karst Society, The Jenolan Caves Historical & Preservation Society and the USA National Speleological Society Cave Conservation and Management Section

LIFE MEMBERS of ACKMA Inc

Steve Bourne*, Michael Chalker*, Peter Chandler*, Brian Clark*, Alan Costigan, Grant Gartrell*, Kent Henderson*, Ernst Holland*, Greg Martin*, Dave Smith*, Andy Spate*, Dianne Vavryn*, Rauleigh Webb*, Kevan Wilde*, David Williams*

(*previously elected as Fellows)

FELLOWS of ACKMA Inc

John Ash, Peter Bell, John Brush, Dale Calnin, Deborah Carden, Arthur Clarke, Ken Grimes, Ian Houshold, Julia James, Neil Kell, Kevin Kiernan, Lana Little, Robyn McBeath, Cathie Plowman, Dennis Rebbechi, Barry Richard, John Watson, Nicholas White, Anne Wood, Phil Wood

ACKMA PRESIDENTS

Ernst Holland 1987-91, Andy Spate 1991-95, Michael Chalker 1995-97, Greg Martin 1997-99, Brian Clark 1999-2001, Peter Dimond 2001-02, Peter Chandler 2002-03, Robyn McBeath 2003-05, Steve Bourne 2005-11, Peter Chandler 2011-13, Dan Cove 2013-16, Dale Calnin 2016-2018, Andy Spate 2018-

FRONT COVER: New lighting in Lake Cave, Margaret River (Mark Delane) (see page 19)

ACKMA Inc OFFICE BEARERS 2019-2020

President

Andy Spate AM Email: president@ackma.org

New Zealand Vice President

Peter Chandler Email: nz.vice.president@ackma.org

Australian Vice President

Scott Melton Email: aus.vice.president@ackma.org

Executive Officer

Kent Henderson Email: executive.officer@ackma.org

Treasurer

Dave Gillieson Email: treasurer@ackma.org

Publications Officer

Tim Moore Email: publications@ackma.org

Committee Member

Jodie Anderson Email: committee@ackma.org

Committee Member

Cathie Plowman Email: committee@ackma.org

Webmaster

Rauleigh Webb Email: webmaster@ackma.org

International Affairs Officer

Andy Spate Email: international.affairs@ackma.org

Secretary

Steve Bourne Email: public.officer@ackma.org

Committee Member

Jordan Wheeler

Email: membership.officer@ackma.org

IN THIS ISSUE

Editorial	Page 3
President's report	Page 4
Cave and Karst World Heritage	Page 5
"Around the show caves"	Page 14
Lake Cave lighting upgrade	Page 19
Offerings by Australian show caves.....	Page 22
ANDYSEZ 58	Page 23
Notes on the 2019 Guides' School	Page 27
Cleaning graffiti at Timor	Page 28
Book review—"Underworld"	Page 29
Ken Grimes Award.....	Page 30
Back issue availability	Page 31
Notes from a proofreader	Page 31
The 2020 ACKMA Conference	Back cover

Editorial

One of my (what my friends would describe as many) eccentricities was that, as Minister for the Environment in New South Wales in the late 1980s and early 1990s, I rejected the traditional formal office boardroom photograph for the ministerial foreword, in the various annual reports for the National Parks and Wildlife Service during my period as its Minister. Instead, I arranged to have, for each of those reports during my tenure, an informal photograph to be taken at an appropriate site in the National Park system that reflected the values I held dear. One of those photographs was taken underground in Eagles Nest Cave at Yarrangobilly. The image was taken under the supervision of my now long-time friend, Andy Spate.

As consequence, it is with great pleasure that this edition contains three elements linking to that aspect of my past. The first of them is to be able to record that Andy has now been invested as a Member of the Order of Australia by her Excellency the Governor of Tasmania. His award not only recognises the importance of the contribution that Andy has made to cave management and karst protection on both a national and international basis, but also adds lustre to our Association by the implicit recognition of the values of the landforms and ecosystems that we all hold dear.

Second, I have the pleasure of publishing not one but two articles about Yarrangobilly in the "Around the show caves" section of this edition. I confess, when I received and read the piece about Yarrangobilly's electric vehicle charging station, it reminded me of the various occasions when I stayed at Yarrangobilly in my ministerial days when the facilities were far less modern than now available to visitors to that comparatively remote location in Kosciuszko National Park.

This edition contains quite an eclectic range of material. This is headlined by the piece from Prof Dave Gillieson about present (and possible future) World Heritage protection for cave and karst locations. It is complemented by an article from our president that catalogues the activities available at the various show cave locations in Australia. Although prepared for publication in the newsletter of the US National Show Caves Association, Andy's piece is nonetheless a useful reference compendium for all of us interested in cave management in this country.

Although there are no accounts, in this edition, of international cave wanderings (and their attendant spectacular photographs) that I have been able to bring you in past editions, I have been promised a piece from Steve Bourne for December in which he will recount his recent trip to Mulu in Sarawak. I also have the expectation that the March 2020 edition will contain an article concerning visits to the Neolithic cave sites in France at Lascaux Cave near Montignac and at Chauvet Cave near Vallon-Pont-d'Arc. Although the caves themselves are closed for protective reasons, their

museum re-creations look to be spectacular. I also anticipate a bonus report on a site visit to the troglodytic fortress at La Roque Saint-Christophe, a location some 18 kilometres downstream from Lascaux on the Vézère River.

I now turn to other matters for the future.

First, Scott Melton provides us with initial information concerning the Association's 2020 Conference, the first of our conferences to be held at Jenolan Caves in the great state of New South Wales. More complete information concerning the conference will be published in the December Journal (including registration documents). Although the call for papers and posters will be circulated separately by email before the December Journal is published, the call will be repeated in that Journal. However, this is a preliminary call to ask our readers to start thinking what they might contribute to the conference's proceedings or which colleagues they might stimulate to contemplate doing so.

The conference in May next year at Jenolan will also occasion a change of the guard at the helm of our Association as Andy has indicated he will pass the baton to a successor at the AGM to be conducted in conjunction with the conference. Importantly for me (and, more particularly, for this Journal), I indicated, when I took on this role from the Margaret River AGM in 2018, that my tenure as your editor would be for a maximum of two years. Those two years will expire at the Jenolan AGM. It remains my intention to relinquish the editorship on that occasion. I encourage readers of the Journal, particularly those of a younger generation than Andy and me, to contemplate raising a hand to volunteer to assume my role. I promise full cooperation in a transition process for the preparation of the June 2020 Journal.

Finally, on matters Jenolan, there is also a short note in this edition concerning the availability of financial assistance toward attendance at the Jenolan conference via the vehicle of the Ken Grimes Award, an award administered by a committee drawn from the life members of the Association.

As a further matter concerning this Journal itself, I note that, when I attended the AGM weekend in Naracoorte in South Australia in May this year, I received from Steve Bourne all of the back copies he held of the Journal. In this edition, I publish a table that sets out a list of the editions that I hold and how many copies I have of each of them. As can be seen, the list is fairly complete from the June 2011 edition (with varying numbers of copies of the following editions of the Journal). If any reader wishes to receive any (or many) of these back copies, please send my Associate, Ms Peta Dixon, an email at peta.dixon@courts.nsw.gov.au; let her know what ones you want; and we will post you the requested copies (assuming that, for those in limited supply, they have not already been taken following requests from fellow readers).

President's Report

Things have been relatively quiet since the successful Guides' School and the AGM – apart from Committee discussions about concerns expressed by Rauleigh Webb about the ventilation of Jewel Cave at Margaret River. I have responded, on behalf of ACKMA, in a letter to Margaret River Busselton Tourism Association expressing our concerns and, more importantly perhaps, offering assistance from ACKMA members' expertise.

The Committee has experimented with an audiovisual communication linkup (Zoom) to try and reduce the number of inter-Committee e-mails. This has not worked well, given the time stretch from New Zealand to Western Australia – plus the many busy involvements of all the Committee players.

Jodie's group, convened to develop a strategic plan for ACKMA, will have met on line by the time the September Journal is published. We await the group's deliberations with interest. I have seen Jodie's Jenolan strategic plan and was very impressed. But plans require implementation ...

For my (many) sins, I have been shanghaied into organising the papers for our next conference at Jenolan in May next year. In the December Journal, I will be calling for papers and posters for the conference – so please start thinking about what you might present.

ACKMA, ASF, Nicholas White, John Watson, other ACKMA members and I made submissions to the South Australian Nullarbor Parks Draft Management Plan.

These seem to have been largely ignored, as we have come to expect across Australia. The final plan has been released – it is a total travesty. No discussion of what happens in Western Australia – in this 'one nation'. The previous Nullarbor National Park, reduced to a narrow rectangle 10-12 kilometres wide and ~140 kilometres long, a total travesty of the IUCN definition (to which Australia has agreed) of what constitutes a 'national park', and errors of facts. The document says 50,000 people a year cross the Nullarbor. This is about 135 vehicles per day – 65 each way.

The Western Australia annual average daily traffic (AADT) volumes suggest the number of vehicles is between 430–760 per day. That's up to about 250,000 vehicles – many with at least a passenger. The Eucla Police Sergeant suggested about 400 vehicles a day in a recent phone conversation, citing discussions with highway people. What else have they got wrong?

However, the finest part of the "plan" recognises the role and input of the Mirning indigenous people who have used and managed the Nullarbor landscape for many



Photo—Maureen Oates OAM

millennia. They are, properly, involved in the management of the Nullarbor - a place that has been demonstrated to be of World Heritage significance but our (silly) Federal/State setup means that World Heritage status will be almost impossible to achieve. Very, very unfortunate.

Elsewhere in this Journal you will see mention of the Ken Grimes Award for support to attend the 2019 Conference at Jenolan in May next year. Please promulgate this information to all your contacts. Let's get some new, interesting people in our great ACKMA!

I again thank all those who congratulated me on my recent Honour.

POSITION VACANT—May 2020

Journal Editor (unpaid)

As noted in my editorial and foreshadowed in earlier Journals, I will not be seeking to continue as Editor beyond the May 2020 AGM.

Global distribution of Cave and Karst World Heritage Properties - a Review

Professor David Gillieson, School of Geography, University of Melbourne

Email: david.gillieson@unimelb.edu.au

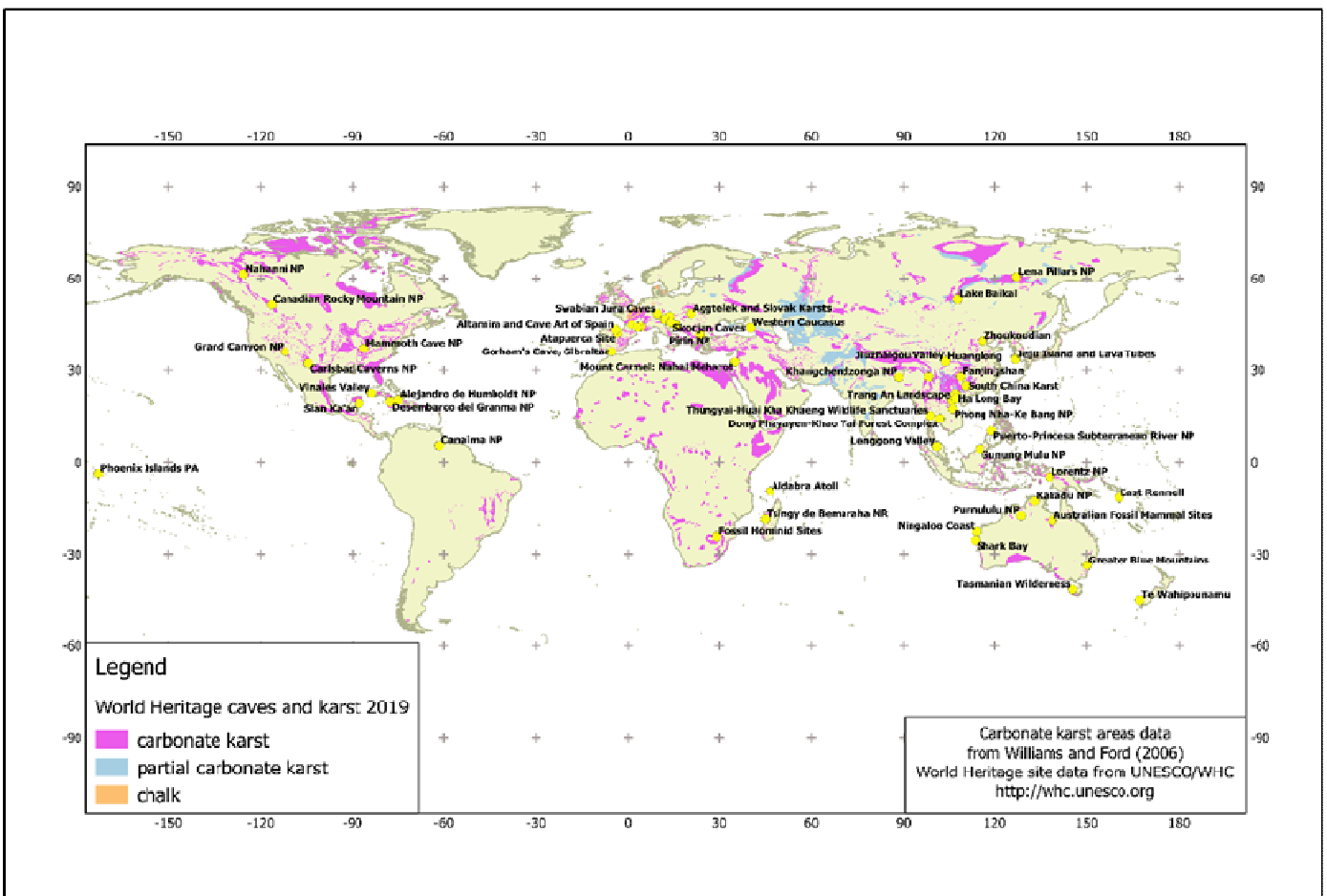
Introduction

Back in 2008, Professor Paul Williams, an ACKMA member from New Zealand, was commissioned by the International Union for the Conservation of Nature (IUCN) to review the status of World Heritage cave and karst properties (Williams, 2008). This excellent report is freely available from IUCN and should be on the reading list for anyone interested in subterranean heritage. At the time, the World Heritage Committee of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), whose task is to decide which nominated properties or sites will be inscribed on the World Heritage List, indicated that there were probably enough cave and karst properties already listed. Any future nominations would have to fill real gaps in the global coverage of the “best of the best” subterranean heritage.

I have been privileged to assess a number of World Heritage nominations for IUCN over the last twenty years, with properties located in Vietnam (2), Malaysia, Indonesia, Philippines, China (2), Argentina, France (3), Switzerland, the Slovak Republic and Turkey. In this article, I take a look at the geographical spread of the existing cave and karst World Heritage properties; the criteria that are used to list them; then consider the sites on the tentative cave and karst World Heritage List; and also review some current developments in World Heritage management.

Existing World Heritage cave and karst sites

As of August 2019, there are a total of 1,121 World Heritage sites. Of these sites, 869 are cultural, 213 are natural and 39 are mixed properties. The list is available at <http://whc.unesco.org/en/list/>. Table 1 provides a list of the current World Heritage cave and karst properties (59 sites). The List dates from 1978 to August 2019. It includes natural, cultural and mixed cave and karst properties. It should be noted that an individual site may contain karst and caves, but that heritage may not have been the reason for its inscription on the World Heritage List. For example, the Lorentz National Park in West Papua contains significant alpine and subalpine karst around Mount Jaya (Carstenz Pyramid), but was inscribed on the List for its outstanding biodiversity and intact primary rainforests.



Distribution of cave and karst World Heritage properties in 2019

Table 1: Existing Cave and Karst World Heritage Properties 2019. Source: UNESCO World Heritage

Name	Date inscribed	Category	State Party
Nahanni National Park	1978	Natural	Canada
Plitvice Lakes National Park	1979	Natural	Croatia
Prehistoric Properties and Decorated Caves of the Vézère Valley	1979	Cultural	France
Grand Canyon National Park	1979	Natural	United States of America
Kakadu National Park	1981	Mixed	Australia
Mammoth Cave National Park	1981	Natural	United States of America
Tasmanian Wilderness	1982	Mixed	Australia
Aldabra Atoll	1982	Natural	Seychelles
Pirin National Park	1983	Natural	Bulgaria
Canadian Rocky Mountain Parks	1984	Natural	Canada
Cave of Altamira and Paleolithic Cave Art of Northern Spain	1985	Cultural	Spain
Škocjan Caves	1986	Natural	Slovenia
Peking Man Properties at Zhoukoudian	1987	Cultural	China
Sian Ka'an	1987	Natural	Mexico
Tsingy de Bemaraha Strict Nature Reserve	1990	Natural	Madagascar
Te Wahipounamu - South West New Zealand	1990	Natural	New Zealand
Shark Bay, Western Australia	1991	Natural	Australia
Thungyai-Huai Kha Khaeng Wildlife Sanctuaries	1991	Natural	Thailand
Jiuzhaigou Valley Scenic and Historic Interest Area	1992	Natural	China
Huanglong Scenic and Historic Interest Area	1992	Natural	China
Australian Fossil Mammal Properties (Riversleigh/Naracoorte)	1994	Natural	Australia
Canaima National Park	1994	Natural	Venezuela
Ha Long Bay	1994	Natural	Viet Nam
Caves of Aggtelek Karst and Slovak Karst	1995	Natural	Hungary, Slovakia
Carlsbad Caverns National Park	1995	Natural	United States of America
Lake Baikal	1996	Natural	Russian Federation
Hallstatt-Dachstein/Salzkammergut Cultural Landscape	1997	Cultural	Austria
East Rennell	1998	Natural	Solomon Islands
Desembarco del Granma National Park	1999	Natural	Cuba
Viñales Valley	1999	Cultural	Cuba
Lorentz National Park	1999	Natural	Indonesia
Puerto-Princesa Subterranean River National Park	1999	Natural	Philippines
Western Caucasus	1999	Natural	Russian Federation
Fossil Hominid Properties of South Africa	1999	Cultural	South Africa
Greater Blue Mountains Area	2000	Natural	Australia
Gunung Mulu National Park	2000	Natural	Malaysia
Archaeological Properties of Atapuerca	2000	Cultural	Spain
Alejandro de Humboldt National Park	2001	Natural	Cuba
Purnululu National Park	2003	Natural	Australia
Three Parallel Rivers of Yunnan Protected Areas	2003	Natural	China

Phong Nha-Ke Bang National Park	2003	Natural	Viet Nam
Dong Phrayayen-Khao Yai Forest Complex	2005	Natural	Thailand
South China Karst	2007	Natural	China
Jeju Volcanic Island and Lava Tubes	2007	Natural	Republic of Korea
The Dolomites	2009	Natural	Italy
Phoenix Islands Protected Area	2010	Natural	Kiribati
Ningaloo Coast	2011	Natural	Australia
The Causses and the Cévennes	2011	Cultural	France
Propertyess of Human Evolution at Mount Carmel: The Nahal Me'arot/Wadi el-Mughara Caves	2012	Cultural	Israel
Archaeological Heritage of the Lenggong Valley	2012	Cultural	Malaysia
Lena Pillars Nature Park	2012	Natural	Russian Federation
Decorated Cave of Pont d'Arc, known as Grotte Chauvet-Pont d'Arc, Ardèche	2014	Cultural	France
Trang An Landscape Complex	2014	Mixed	Viet Nam
Zuojiang Huashan Rock Art Cultural Landscape	2016	Cultural	China
Gorham's Cave Complex	2016	Cultural	Gibraltar, United Kingdom
Khangchendzonga National Park	2016	Mixed	India
Caves and Ice Age Art in the Swabian Jura	2017	Cultural	Germany
Fanjingshan range, Guizhou Province	2018	Natural	China

An individual site must have Outstanding Universal Values (OUV) for inscription on the World Heritage List. The State Party (the national government) must provide a detailed justification for listing in terms of the OUV criteria.

The cultural values in the OUV criteria are:

- i) to represent a masterpiece of human creative genius;
- ii) ...
- iii) to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;
- iv) ...
- v) to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of

irreversible change;

vi) to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance.

Expert advice on nominations citing cultural values is provided by the International Council on Monuments and Sites (ICOMOS), based in Paris.

The Prehistoric Sites and Decorated Caves of the Vézère Valley in France were inscribed in 1979 under cultural criteria (i) and (iii). The extensive art in the limestone caves dates back at least 24,000 years and testifies to the high level of skill shown by the artists who depicted the bison, mammoths and ibex that they hunted. The use of natural pigments, perspective and the clever use of the cave wall topography combine to provide masterpieces of art in which the animals appear almost to move - especially by a flickering light.



Left: Limestone cliffs near Font de Gaume cave in the Vézère valley

Right: Mammoth painting in Grotte de Bernifal, approximately 24,000 years old



For natural values, the OUV criteria are:

- (vii) to contain *superlative natural phenomena* or areas of exceptional natural beauty and aesthetic importance;
- (viii) to be outstanding examples representing *major stages of earth's history*, including the record of life, significant on-going geological processes in the development of landforms, or *significant geomorphic or physiographic features*;
- (ix) to be outstanding examples representing *significant on-going ecological and biological processes* in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;
- (x) to contain the *most important and significant natural habitats* for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

Expert advice on nominations citing natural values is provided by the IUCN, based in Gland, Switzerland.

The caves and karst of Gunung Mulu National Park, Sarawak were inscribed, in 2000, under natural criteria (vii), (viii), (ix) and (x). This is exceptional and testifies to the landscape integrity, outstanding caves and karst and rich biodiversity thriving in pristine rainforest environments.



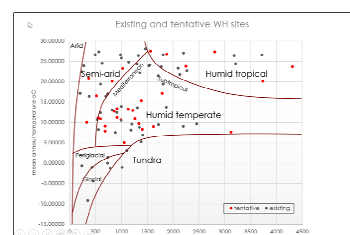
Hidden Valley in Gunung Mulu National Park. This overlies Clearwater Cave



Looking towards the entrance of Deer Cave, Gunung Mulu National Park

There are some notable gaps in the representation of karst regions and cave sites in the existing list of World Heritage properties. There are a number of reasons this might be so. First, we would expect that the distribution of potential sites will be constrained by the area of outcrop of karstic rocks (in the broadest sense). Second, the prevailing climate in an area of karstic rocks may inhibit the formation of karst and caves. For example, we would not expect extensive karst in Arctic Canada, despite the large area of limestone there. However, a recent expedition to Greenland has discovered significant ancient caves relating to a Tertiary wetter climate (<http://northeastgreenlandcavesproject.com/2019-expedition-to-northeast-greenland/>). Third, some countries lack capacity to develop World Heritage nominations and management plans, despite the fact that World Heritage status is an important, widely respected and marketable brand for international tourism.

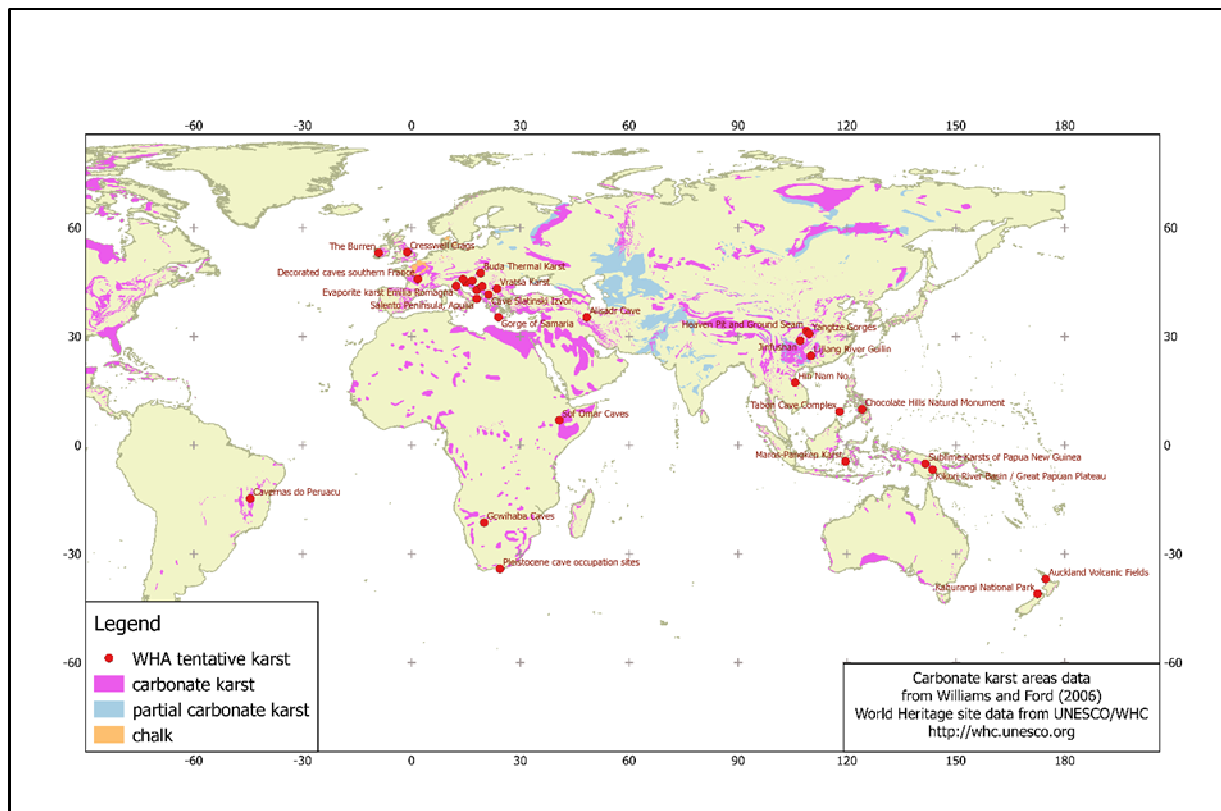
There are relatively few World Heritage karst sites in the southern hemisphere, particularly in South America, Africa, Australasia, and the South Pacific. There are also few sites in Eurasia and the Middle East, despite extensive areas of carbonate rocks. There are very few sites in the Russian Federation, despite large areas of karst. In terms of broad climatic zones, karst World Heritage properties are poorly represented in arid and semi-arid, tundra, glacial and periglacial environments. There are many World Heritage properties in humid-temperate and humid-tropical regions. These include iconic sites such as the huge caves of Vietnam and Sarawak, important art and fossil sites in Europe and Asia, and important wild karst lands in Tasmania, China and Canada. It would be hard to justify new nominations from these areas, as the caves and karst are well-represented. However, the nomination process is essentially a political one and, in recent years, the World Heritage Committee has chosen to disregard the expert advice provided to it by IUCN and ICOMOS.



Distribution of existing and tentative World Heritage properties in relation to broad climatic zones

Tentative World Heritage cave and karst properties

In addition to properties already inscribed on the World Heritage List, there are also 33 properties on the Tentative List which have significant karst values. Some of these have been on the Tentative List since the early 1990s, reflecting the lack of capacity or willingness of the relevant country to produce a nomination. For example, huge areas of karst occur in the Middle East, but are not included in nominations because the State Parties there have focused entirely on cultural sites; in Jamaica, the well-known Cockpit Country karst deserves a nomination but this is not a priority for that government. Tentative List properties can be seen on the World Heritage Centre website <http://whc.unesco.org/en/tentativelists/>



Tentative World Heritage cave and karst properties 2019

Table 2: Tentative Cave and Karst World Heritage properties 2019. Source: UNESCO World Heritage Unit

Name	Date first proposed	Category	State Party
Buda Thermal Karst	1993	Mixed	Hungary
Caves of the Buda Thermal Karst	1993	Natural	Hungary
Lijiang River Guilin	1996	Natural	China
Cavernas do Peruacu	1998	Mixed	Brazil
Decorated caves of southern France	2000	Natural	France
Heaven Pit and Ground Seam	2001	Natural	China
Jinfushan	2001	Mixed	China
Yangtze Gorges	2001	Mixed	China
Tara National Park	2002	Natural	Serbia
Cave Slatinski Izvor	2004	Natural	North Macedonia
Vjetrenica cave	2004	Natural	Bosnia and Herzegovina
Lonjsko Polje	2005	Mixed	Croatia
Velebit Mountain	2005	Natural	Croatia
Chocolate Hills Natural Monument	2006	Natural	Philippines
Kikori River Basin/Great Papuan Plateau	2006	Mixed	Papua New Guinea

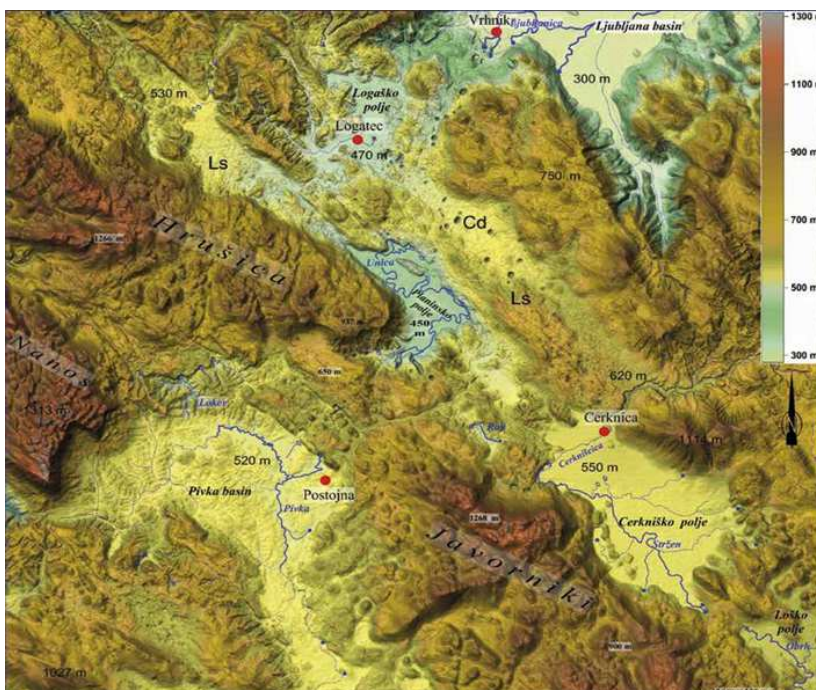
Salento peninsula, Apulia	2006	Cultural	Italy
Sublime Karsts of Papua New Guinea	2006	Natural	Papua New Guinea
Tabon Cave Complex	2006	Cultural	Philippines
Alisadr Cave	2007	Natural	Iran
Auckland Volcanic Fields	2007	Mixed	New Zealand
Kahurangi National Park and Canaan karst	2007	Natural	New Zealand
Maros-Pangkep Karst	2009	Mixed	Indonesia
Gcwihaba Caves	2010	Natural	Botswana
The Burren	2010	Mixed	Ireland
Sof Omar Caves	2011	Mixed	Ethiopia
Vratsa Karst	2011	Natural	Bulgaria
Cresswell Crags	2012	Cultural	United Kingdom
Gorge of Samaria, Crete	2014	Natural	Greece
Classical Karst	2015	Mixed	Slovenia
Pleistocene cave occupation sites	2015	Cultural	South Africa
Hin Nam No National Park	2016	Natural	Laos
Evaporite karst and caves, Emilia Romagna	2018	Natural	Italy

While limestone areas are well represented on the existing World Heritage List, evaporite karst is not represented at all. The inclusion of the important evaporite karst of Emilia Romagna in Italy is a good addition to the Tentative List. It would be good if the long gypsum cave, Optimistychna (214 kilometres) in Ukraine, with a well-developed landscape of doline karst, could be added to the Tentative List. Similarly, there are no nominations for halite karst, though splendid examples exist in Israel and Iran; the latter having salt glaciers and domes as well as well-developed caves. There are some outstanding karstic landscapes developed in quartzites or quartz sandstones already on the World Heritage List. These include Purnululu (Australia), Wulingyuan (China), Meteora (Greece), and Canaima (Venezuela). Sandstone landscapes with ruiniform relief, canyons and deep joint

corridors are represented in Kakadu and other parts of Arnhem Land, as well as Danxia in China (Wray, 1997).

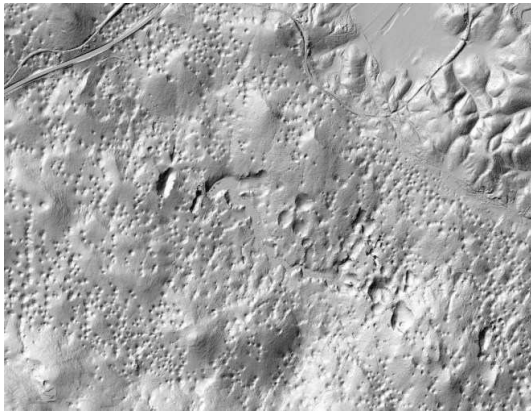
In 2019, the following cave and karst nominations are under review:

- Classical Karst, Slovenia: Surprisingly the large region from which karst takes its name has very limited representation on the World Heritage List. There are only three small sites: Plitvice Lakes (Croatia), Durmitor National Park (Montenegro), and Škocjanske jama (Slovenia). The Plitvice Lakes were on the World Heritage in Danger list due to bombing damage. The Slovenian karst is developed on limestone and dolomite and covers 8800 square kilometres or about 45% of the country.

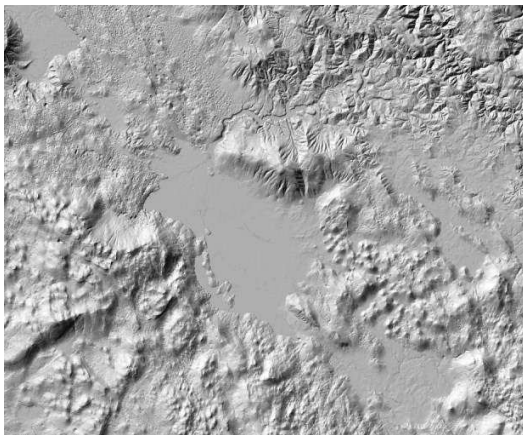


The classical karst area being nominated for World Heritage listing. Drainage from the Pivka basin flows through the Postojnska jama to the Planinsko polje, emerging at Planina jama. The Cerklje ob Gori polje is part of a large drainage system that floods seasonally. From Mihevc et al., 2016.

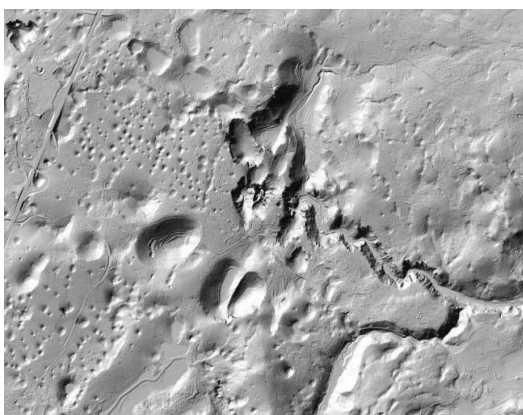
The karst consists of structural plateaux and large flat floored valleys (poljes) with extensive underground drainage, thousands of dolines and many caves. A World Heritage nomination currently under review covers some iconic features of the Classical Karst, namely the Postojnska jama, the Rakov Skocjan caves and karst, Cerknisko polje and the Pivka lakes basin. This core area of 83,800 hectares includes forested mountains as well as the type examples of poljes and their underground drainage. The Pivka river flows across the basin on flysch rocks, which is a drained polje. It sinks into the 20 kilometres long Postojnska jama. The Postojnska jama has been a show cave since the early nineteenth century and currently receives about 800,000 visitors each year. The underground river from Postojnska jama reappears after 2.5 kilometres in the 8.5 kilometres long Planinska jama on the edge of the Planinsko polje. The largest polje, Cerknisko, covers an area of 3,800 hectares and its floor is cultivated seasonally. The polje is flooded to a depth of several metres in winter. The Rakov Skocjan area contains several natural bridges and stream caves which drain into Planinsko polje. The proposed area also includes a buffer zone to help maintain the integrity of the karst drainage, which feeds northwest to the Ljubljana springs and river.



Rakov Skocjan caves



Cerknisko polje



Škocjanske jame



- Sof Omar Caves, Ethiopia: Sof Omar is the longest cave in Ethiopia at 15 kilometres. It is located in the Bale National Park and the cave takes the entire drainage of the Web River. The cave floods to the roof seasonally and is notable for its phreatic features including pendants, spongework and flutings. A Sheikh Sof Omar Ahmed took refuge here in the 11th Century and local Muslims make a pilgrimage to the cave each November.

In 2021 the following tentative nominations are due to be assessed by the World Heritage Committee:

- Auckland Volcanic Fields, New Zealand
- Cat Ba Archipelago (extension) to Ha Long Bay, Vietnam
- Dinosaurs and Caves of Koytendag, Turkmenistan
- Pleistocene Occupation Sites: Emergence of Modern Humans, South Africa

In Australia, there has been recent activity in new World Heritage nominations after a long period of inactivity. The successful 2019 nomination of the serial site, Budj Bim Cultural Landscape in western Victoria, sets a useful precedent for the incorporation of Indigenous heritage in Australian World Heritage properties. The Commonwealth government insists that any future World Heritage nominations must first be nominated and inscribed on the National Heritage List. This is a complex process and subject to a great deal of delay, especially where there is perceived conflict with mining interests.

There is now growing support for the nomination of the South Australian part of the Nullarbor Plain as World Heritage. This would most likely be as a mixed serial site, incorporating both natural and cultural values of a number of key locations across the arid karst. Steps have already been taken to have sites placed on the National Heritage List, although Koonalda Cave is already on the List. Natural values would include the largest arid karst area in the world (filling a gap in global coverage), spectacular caves with saline lakes, very well-preserved marsupial bone deposits and speleothems yielding long environmental histories back to at least the Pliocene. Cultural values include ice-age flint quarries and parietal art, ancient songlines and sacred sites as well as a long-established association with country for the Mirning people. It will be absolutely critical to gain active Indigenous involvement in any nomination process, while State and Commonwealth support is also critical. It is to be hoped that the Heritage Section of the Department of Environment and Energy will have learnt from earlier efforts to develop a World Heritage nomination for Cape York, which foundered due to a lack of meaningful dialogue with, and involvement of, the traditional owners.

Management of World Heritage sites

The management of World Heritage properties is subject to the World Heritage Operational Guidelines, last revised in 2017. Protection and management of World Heritage properties should ensure that the OUV, integrity and/or authenticity are maintained or preferably enhanced in the future. Increasingly, the effective management of the nominated site is a very important consideration for the World Heritage Committee. There have been several cases where a nomination was sent back to the State Party for substantial improvement to the management regime before the site would be considered again (France, Turkey, Vietnam).

Other factors relevant to ongoing management

The Criterion of Integrity is described in the Operational Guidelines as “a measure of the wholeness and intactness of the natural and/or cultural heritage and its attributes”. For this, we need to assess if the site:

- includes all the elements necessary to express its OUV. In some cases, this may mean that the proposed World Heritage boundary extends beyond individual protected areas and thus nomination and ongoing management may involve several jurisdictions and land tenure types.
- is of adequate size to ensure the complete representation of the features and processes which convey the site’s significance. In most cases this will also involve the creation of a buffer zone around the World Heritage area to minimise off-properties impacts.
- suffers from adverse effects of development and/or neglect.

Since 1979 all World Heritage properties have a State of Conservation Report which is repeated every six years (ideally) and identifies both good management condition and threats to the integrity of the properties. A total of 3,793 reports have now been completed on 574 World Heritage properties. In recent years, some 53 properties have been declared “World Heritage in Danger” due to ongoing threats. In most cases, these properties are located in areas of conflict, resource extraction or rapid urbanisation. In extreme cases, a site may be taken off the World Heritage List. This would be a source of great shame for any government responsible for that World Heritage site. For example, the Manas Wildlife Sanctuary in the foothills of the Assam Himalaya, India was declared World Heritage in Danger in 1992 due to the effects of encroachment, forest-clearing and poaching. Substantial changes in the management regime and development of a cross-boundary agreement with Bhutan have led to the site being reinstated on the World Heritage list in 2011.



The Ha Long Bay WHA in Vietnam may be a candidate for World Heritage in Danger, due to marine pollution and overcrowding

Increasingly, the Involvement of Indigenous Peoples in World Heritage management is a priority. Since 2005, the Operational Guidelines have promoted a “partnership approach to nomination, management and monitoring”, as stated in paragraph 40. This was last revised and expanded in 2017, and the active involvement of Indigenous peoples in World Heritage management is seen as essential and leading to best practice management. In 2015, the World Heritage Committee established an International Indigenous Peoples Forum on World Heritage. This forum’s aim is to elevate the role of Indigenous communities in the “identification, conservation and management of World Heritage properties” and is held every year coinciding with the World Heritage Committee meeting. In 2018, UNESCO endorsed its Policy on Engaging with Indigenous Peoples 201EX/6. This important document includes the role of indigenous peoples in the conservation of natural and cultural heritage, and applies to all activities supported by UNESCO - not just World Heritage. Management planning should also take account of traditional or local governance systems used by Indigenous peoples. There may be existing land title under customary law which has persisted for centuries. This may not be formally recognised, or even desired, by the national government, but there is still an obligation to manage with this clearly in mind.

Further Reading:

- Bosak P, Bruthans J, Filippi M et al (1999) Karst and caves in salt diapirs, SE Zagros Mountains, Iran. *Acta Carsologica* 28(2):41-75
- Gillieson, D. & Clark, B (2010) Mulu: The World’s Most Spectacular Tropical Karst. In Migon, P. (ed.) *Geomorphological Landscapes of the World*, Springer, pp 311-320. (This book is really a bucket list of the best sites on the planet - <https://www.springer.com/gp/book/9789048130542>)
- Mihevc, A., Gabrovšek, F., Knez, M., Kozel, P., Mulec, J., Otoničar, B., Petrič, M., Pipan, T., Prelovšek, M., Slabe, T., Šebela, S. and Zupan Hajna, N., 2016. Karst in Slovenia. *Boletín Geológico y Minero*, 127 (1): 79-97
- Waltham T (2007) Karst and caves within the salt domes of Iran. *Cave Karst Sci* 43(2):91-96
- Watson J, Hamilton-Smith E, Gillieson D et al (eds.) (1997) *Guidelines for cave and karst protection*. International Union for the Conservation of Nature and Natural Resources, Gland
- Williams PW (2008) *World heritage caves and karst: a thematic study*, World Heritage Studies. IUCN, Gland, Switzerland. <https://www.iucn.org/content/world-heritage-caves-and-karst-a-thematic-study>

“Around the show caves”

Te Anau Glowworm Caves, New Zealand

Neil Collison

Work is progressing to replace the last 80 metres of original walkways in the cave. This is the final piece in a walkway replacement program that has been ongoing over a number of years. The priority, this time, has been to remove foundations from sitting on ledges that have been subject to time-related erosion from the streamway in the cave.

Some will recall that, about the time of the 2017 ACKMA AGM, I took a tumble when a ledge let go. This required a focus to design the new structures without reliance on ledges for walkway supports. This original section of walkway, now being replaced, was built in the early 1950s. The new walkway along the streamway needs to be very robust, despite being 1.5 metres above the normal water flow, because, at times, the narrow canyon section of cave will be totally submerged under the rushing water.



The design needed to include all our path junctions

The new walkway has been prefabricated using measurements that were obtained from 3D-scanning the section - with reference to the contour of the walls at the new walkway level. The parts are all pre-drilled, pre-cut, pre-painted and have fitted better than anyone could have hoped for. Stairs have replaced inclined ramps in two locations.

Despite the scale of the job, the cave has remained open throughout the works, with engineers positioning the new sections - to check for fit; slotting them in between the old handrails and slightly above the level of the original walkway - outside the tour timetable.

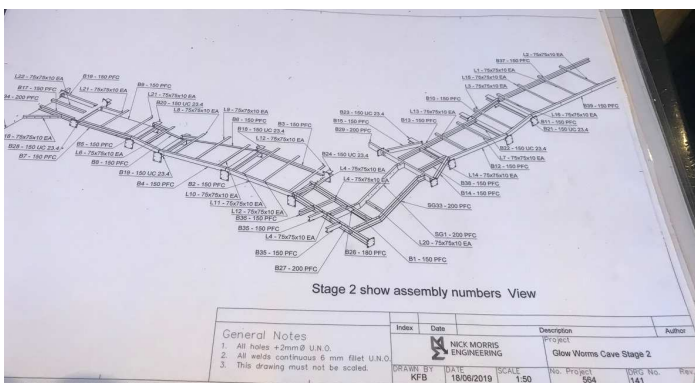
Once the mounting plates were bolted to the walls, the cross-members were removed until time for final positioning. A team would follow the engineers to grout behind the plates. In places, the new walkway surface spans the cave's passage from wall-to-wall. A new lighting loom is also to be installed as part of the present works, with an upgrade to slightly newer technology. New data cabling will also enable improved data collection and communication to the surface.

There has also been an upgrade of the real-time rock monitoring system installed in the caves. New sensors have been fitted and the whole system linked to a web portal and text alert system advising of any movements of key features along the tour route. Once the new data cables are in place, this system will be upgraded further to include cave climate data and water flow sensors.



Above: Fitting the frame

Below: An example of a layout plan



The team at work

Two from Yarrangobilly Caves, New South Wales

1. Greenpower at Yarrangobilly

Teagan Symons (story + photos)

Well here is a story about Yarrangobilly's little electric-charging bay.



It is not a big, modern, Tesla charger but it does do the job and has its own unique attributes. This charging bay was installed at least three years ago by Yarrangobilly's previous manager, George Bradford. The charging bay became necessary as Yarrangobilly had invested in an electric all-terrain vehicle (ATV). Our electric ATV is used for general duties throughout the precinct, on a daily basis, by cave guides and all the staff at Yarrangobilly.



ACKMA Journal No. 116 September 2019

Running an electric vehicle at Yarrangobilly is made even more environmental and "green" when you consider where the electricity itself comes from.

Yarrangobilly is completely disconnected from the National Electricity Market. We do not receive any electricity - we generate all our power on site. We are completely "off the grid", as they say. In the powerhouse, we have a hydro pelton wheel and that is our preferred method to generate electricity. This amazing little generator was installed in 1936 and uses the water from Rules Creek to generate most of Yarrangobilly's electricity. It was recently serviced by our NPWS mechanic and he commented that it only requires a very basic service to keep it operating nicely. Generally, he only checks the lubricant and gives it a basic clean and she is "good to go" for another year. He also informed us that the pelton wheel itself is completely made of brass, which was another surprising attribute.

So generally, when we are recharging our electric vehicle at Yarrangobilly, we are using electricity that has been generated renewably, making Yarrangobilly more environmental and modern than ever before! This was proved, in particular, on one recent weekend. We had guests staying in Caves House and they were charging their Tesla vehicle one morning when another Tesla vehicle arrived and lined up waiting to use the charging station. We had never had a line up before.

The situation became even more entertaining when we spoke to the Tesla drivers. One of the Teslas had the number plate GRN PWR.



It turns out this is a commercial vehicle that is used to take guests on renewable-themed tours around the Blue Mountains of New South Wales. I am sure this business, and all of its Teslas, will become a regular recharger at the new Jenolan charging facility. The Tesla drivers loved the renewable source of electricity offered at Yarrangobilly. The GRN PWR driver even agreed to have his number plate in the ACKMA journal as it was all just a little too ironic!

In this modern world we live in, it is always nice to be reminded of the past. As cave enthusiasts, our fascination with the past becomes stronger each time we step inside our earth. It is humbling to know that Rules Creek is still flowing through the Yarrangobilly limestone and it has done so for millions of years. Having an electric vehicle that is charged with hydro-electricity is one way that Yarrangobilly is helping to honour the past and use it to better both our own and our earth's future.

2. Changing Yarrangobilly

Regina Roach (Canberra Speleological Society) and Gary Bilton (Yarrangobilly Caves Old Boy)

Yarrangobilly is ever-changing. A new Caves Supervisor, Bernadette Zanet, arrived in February 2019. Bernadette joined Yarrangobilly from Bonegilla Migrant Experience at Albury. Since starting work, Bernadette has joined the Canberra Speleos on a caving trip and attended the Guides' School at Naracoorte.

On arrival at the Yarrangobilly Visitors' Centre, a returning visitor notices many changes. Gone are the museum pieces of the past - the assorted bottles, signs, tins and the early rolls of pre-1980s' cave tickets. Surviving on the wall is the 1926 map of the New South Wales railway tracks. The Railway Department once managed Yarrangobilly. On the mantelpiece, there is a magnesium ribbon lantern originating from the days before electricity.

Rest assured, you can feel safe at Yarrangobilly now. Security cameras have been installed. The Visitors' Centre is a cosy, warm environment with its new heaters so you can peruse the wide selection of goods in comfort, and visitors of today are able to now utilise the wifi.

Previous visitors will notice a difference around the Thermal Pool and the Lyrebird Cottage. Recent hazard-reduction burns and asset-protection measures have removed many large fallen trees, and burnt and cleared away the undergrowth.

Scientific research is continuing in Harrie Wood Cave monitoring the effects of climate change.

Visitors booking accommodation at Caves House will notice a change to a dynamic pricing system. When there are many rooms available for booking, the price of the room is lower, so availability affects the price of the room. One single-storey bathroom has been renovated and it is envisaged the other bathrooms will follow. Caves House is now accessible by wheelchair from the Visitors Centre along a new paved pathway.

An expanded range of tours is available - with some tours available using an online booking system. Child-focused tours, including "Little Caves, Little Kids" and "Bake and Bushcraft", are based on the nature-play approach. The "High Plains, Huts, and Heritage" tour transports people in Yarrangobilly's four-wheel-drive bus to a variety of destinations. The Castle Cave, which has never been electrically lit, is now toured more frequently. Adventure caving through Mill Creek Cave or Diversion and River Caves is another option.

The stair access from the track to the Thermal Pool has been reconstructed with more, smaller steps, a retaining wall and pavers.

Just like the Yarrangobilly of old, it is an ever-changing place.

Two from Wellington Caves, New South Wales

Both stories from Ian Eddison

1. Threatened Species Day

On Threatened Species Day on 7 September 2019, Wellington Caves had environmentally based tours available for guests, in addition to the regular tour program. These themed tours were:

- Twitching On The Reserve
- Woodland Wander
- What's A Troglobite?

Unlike many karst reserves around the country, the caves at Wellington are fenced near the visitor arrival area as there are vertical caves close by. As a result, many of our visitors don't see a lot of our reserve unless we run events such as these on Threatened Species Day.

This relatively small karst reserve has Grassy Box Woodland, which is an Endangered Ecological Community. It has typical legacies of the past, such as agricultural and ornamental weeds as well as feral animals. It still, however, has enough diversity of original flora species to support a considerable number of fauna species. Several macropod species, many reptiles and birds are common here.

Our Threatened Species Day started with a cold, windy morning, with a little drizzle, so the 8.00 am "Twitching On The Reserve" was looking to be uncomfortable and unrewarding. However, our walk included the Osawano Japanese Gardens, with lots of cover and an extensive water feature for birds, as well as our open Grassy Box Woodland. We walked through old and restored woodland and a very diverse floristic area on limestone that has had little impact over the years.



**Brown treecreeper
(Tim Bergen)**



Diamond Firetail (Tim Bergen)



Hooded Robin (Tim Bergen)

Our small group of three guests, with Janice Hosking of Dubbo Field Naturalists and me, were rewarded with 32 species sighted (and two of these were threatened ones). We observed small groups of Brown Treecreepers and Hooded Robins. The elusive Diamond Firetail was not seen on the day but previously noted and was seen during the following week - so we have at least three threatened bird species on our small karst reserve alone, emphasising the importance of keeping and caring for our flora for birds.

At 1.00 pm, our “Woodland Wander” had eight guests, with Gay Bennison of Burrendong Arboretum and me. The cool breeze had eased, but we still had to be mindful of the risk of falling limbs, so the route was carefully negotiated, taking in old woodland and a restored area some 10 years old, as well as our diverse floristic area on limestone. We certainly had the opportunities to see the diversity and discuss the unique aspects of certain plant species. We also got to get to see some of our local history as we walked over the old phosphate mine site. This gave a further insight to our guests about uses of the landscape and flora in the past.



ACKMA Journal No. 116 September 2019

“What is a Troglomite?” - you may well know, but our guests often don't, so I amended our usual 3.30 pm Cathedral Cave tour to have an emphasis on life in caves. Our top entry level has great examples of an ecosystem, organic matter from moss in the twilight zone, leaf litter, Welcome Swallows depositing the odd dropping, and spider webs cleverly showing off the links between them. Further down to the Cathedral Chamber - a totally dark zone except for our visitation - we found more spiders and, eventually, at the furthestmost part of our tour of what is a fairly dry cave, we come to a warm, humid environment in Thunder Cave and behold the troglomites to the surprise of our guests. Children that were “Can we see some more now?” had transformed into Bug Busters and we literally had to drag them away to get out on time.

Overall, our Threatened Species Day events were quite rewarding - not in a huge increase in visitation, but in creating more in-depth and memorable experiences for our guests.

Threatened Species Day is on 7 September each year. It is the anniversary of the date the last known Thylacine died in Hobart Zoo in 1936. For me, it has become special due to our friends at Flinders University providing the opportunity for me to participate in their dig in our Cathedral Cave a few years ago. I had unearthed the ankle of a Thylacine that afternoon, along with a Tasmanian Devil incisor among many bones of small mammals. My guests on the Cathedral Cave tour this afternoon were fascinated with my recounting of that previous experience.

Left: On the Woodland Wander (Ian Eddison)

Wild Wellington

Each of our karst areas has its unique features and challenges when accessing wild caves. At Wellington Caves, New South Wales, we can have a CO₂ issue from time to time. One of our show caves, Gaden Cave, is checked for its atmospheric conditions on a daily basis. This hazard is one of the reasons why staff here do not get to go adventure caving in our wild places very often. Recently, however, some of our learned friends, Andy Baker of UNSW and Andreas Hartmann of Freiberg University of Germany, along with David Head of Weidmüller Lighting, inspected our Anticline/Water Cave.

David Head was demonstrating some of the lighting available through Weidmüller, and Andy and Andreas were checking on some instrumentation set up at Wellington Caves for hydrological study. It was only natural that Anticline/Water Cave was of interest to us all. Our water table is low because of the drought and



Anticline/Water cave (Ian Eddison)

this provided an opportunity for Andy to retrieve some equipment that was now exposed because of the lowering water table. David's lighting really showed off this cave for us all to enjoy. The folding of thinly bedded limestone is very well displayed here and there is also, of course, the water table. In addition, there are features such as the stalagmite in the floor seen in the photo, which is often covered by water. The water and rafting crystal can be seen in the back of the chamber in the photo taken on this recent trip.

A group of our staff were given access to several of our wild caves and one of our closed but previously developed caves. This was an introduction to caving for many of them. In fact, only Katie Bower (who attended ACKMA in Margaret River) had done some caving previously.

So it was an honour to provide an introduction to adventure caving (with training) and introduce them to Anticline/Water Cave, Triplet Cave and Gaspip Cave one afternoon.



Katie Boyer in a solution tube squeeze (Ian Eddison)

A squeeze in a surface solution tube began the training fun, with techniques and emergency response being discussed before entering each of these caves. The team had a learning and fun afternoon getting a hands-on experience. Although I was the trip leader, even I had not been in Triplet Cave before. This added to the excitement of the adventure for everyone. We found a safe access route and all the pre-planning of maps and advice of others paid off.

These caves are quite small compared to what many of our ACKMA members would be used to. However, doing them together, as an afternoon event, made for a real adventure, with some challenges to overcome and enough to tempt them to do more when the opportunity occurs.



The team from the training afternoon (Ian Eddison)

2018 lighting upgrade at Lake Cave, Margaret River, Western Australia

Mark Delane

The need to upgrade the lighting in Lake Cave was identified by Peter Bell in 2016 (when we were still lucky enough to have him working with us). The existing lighting was nearing the end of its fifteenth year; there were a few elements that had started to diminish; and the hardware was becoming harder to source. We needed to improve the lighting, not because the existing design and program were inadequate - no! - in fact, they were excellent and well-suited to the cave and the tour ... but the technology had progressed. Halogen lights were both harder to get and too energy hungry, not to mention the lifespan and maintenance costs when compared to the new LEDs.

So where to start? That was the first question, followed closely by 'what do we want?' After some thinking, research and discussions, Peter was clear that the best option was to redo the entire lighting. This would give us a clean start and the chance to give the cave a fresh look. To do this we needed to go fully LED. Having looked at options, other examples and talking to David Head at Weidmuller, we had started to focus on Weidmuller's lighting as our best option.

Could we dim the lights to match the programming? That was the big unknown for us. We knew the "Rock-Stars" could not dim and that was fine, but could the "Enviros" - for our plan to work they needed to do so! Peter spent many hours thinking, e-mailing, and thinking some more about the options. We were optimistic that they could do what we wanted.

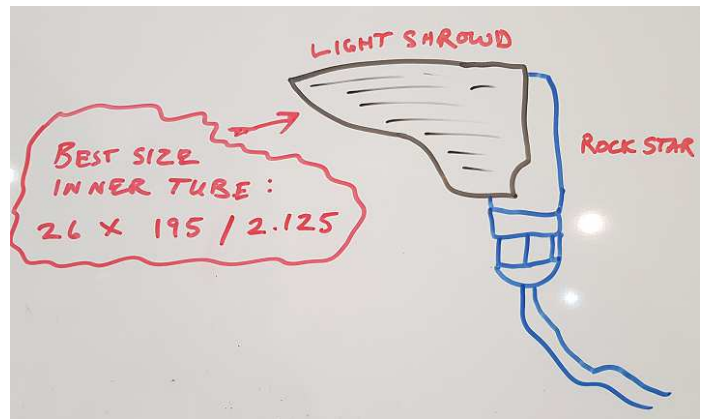
So what better way to find out than to go on a road trip to Jenolan to meet with David Head and Dave Rowling and see the lights in the field - by field, I mean cave of course! So after a day well-spent with Dave and David, we were happy to see the lights in action and being dimmed (ramped up and down, being the more technical term I have been told). Peter was happy, and so was I as this was all still very new to me but I was learning fast and loving it.

Once we arrived back in Western Australia, the pace quickened and we were set! We knew that the lights could do and what we wanted. We had received a sample from David; and, after Peter built a little test kit/model, we were sold on this being the best option for the cave and for us.

Next came the design, so the team was in and out of the cave, measuring this-and-that, double-checking, and then measuring again. Luckily, Lake Cave is not that big - you can easily measure from one end to the other!

With the measurements done and confirmation that the lights could meet our needs, then the next step was to work out how much of everything we needed, how many Rock-Stars, how many Enviros, how much cable and how many brackets etc.

Then came the Distribution Boards (DB) - how big, what they would control etc. From all this information, we had our budget for materials, extras, electricians etc. This was then submitted for approval and we were given the go ahead!



Doing the planning (Mark Delane)

Thankfully, for me, Peter knew exactly what he was doing! He had it all worked out in his head and, like Santa, he had a list and was checking it twice! He drew the electrical plans out in CAD and then had them checked and signed off by an electrical engineer. They were all good and ticked off on the list.

Next was the design and layout of the DBs - again Mr Bell! These were a piece of art - everything in order and in a system that was easy to follow. This was great for me as the first-timer trying to learn and provide some value in the process. Alex Lyovin and David at Weidmuller were both helpful. With a few minor tweaks and suggestions, the DBs were perfect, and they too were marked off on our list.

So we took the leap of faith, so to speak, and placed the orders, one for the construction and delivery of the DBs, and the other for the lights, cable, brackets etc, plus some contingencies for each. Next, we waited - there was not much we could do until the items arrived.

Then came the day they arrived. It was like Christmas, except during this time Peter had retired to greener pastures in Tassie ... so this meant a long-distance relationship ... they say they never work! Well, thankfully, ours did ... otherwise who knows what would have happened!

So it had all arrived, what next! We were going to install the new system ourselves! But, would we do this during operations, or outside of hours? Would we close the cave to do the works or not? So many questions! And what better way to answer these questions than by doing nothing ... well not quite. I needed some time to work out the logistics and the program for us to build the new system and then install it, while still operating and still using the old system. We needed to get it right and we needed to walk ourselves through each of the elements as a group, discussing options and ideas for how to do the installation. This was an invaluable process - the whole team was involved. In the end it paid dividends.

The production line

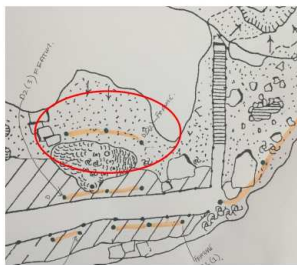
After several cave walk-throughs and some round table discussions, we had a plan. This was mapped out and documented so that we could progress from day-to-day in an order ensuring that the next person, or people, could transition seamlessly from those on the previous day. After a few YouTube videos and some soldering practice, we got started. We had a great system for measuring the cable runs: checking them twice; then cutting; then terminating and soldering the lights; testing them at each and every stage, one cable run at a time. Each was stored safely in its own crate or cardboard box, complete with its allocation of brackets, stands or clamps and an info sheet for each one. We had daily task records and run sheets which provided invaluable handover notes to the team - as every day seemed to have a different combination of staff on.

Lake Cave Lighting Upgrade 2018	
Light Run # 6 (old D11-2)	
Run Number: Six (06) - Feature 04	DB: DB-2 - Front of Cave
Dimmer: UA11	Channel: 3
No. of Lights: 3	Type: Environmin's
Access/Run: Right side of entry stairs	Stands: 3 Recycled plastic stands with silver brackets, all BaseOnly
<input type="checkbox"/> Tested	<input type="checkbox"/> Plug added
<input type="checkbox"/> Labeled for install	<input type="checkbox"/> Installed
<input type="checkbox"/> Completed	
Comments: Feature lights run 04 enters Cave down left-hand side of entry stairs (looking from the bottom) then buried across to the rocks on the top side of the right-hand side of the cave, three lights them in a daisy chain.	

An example of a detailed planning sheet (Mark Delane)

After each cable run was created and the stands, clamps or brackets were created and put into their own crate or box, the team moved on to create the next one, fine-tuning their soldering and heat-wrap skills.

After a couple of weeks, we had created, tested and completed all the



individual cable runs, along with their stands, brackets and fixings. Then came the joyful task of carrying each section down to the cave - down the 280-odd steps to the brick platform just outside the cave entrance where we made a staging post. From here, we then started to work out the order and process to install each run, whilst still having the cave operational and still using the existing system.

The day of our first install came - we took a deep breath and started. We started with the track lights, run No 1. After some final discussion about the pathway of the cable; the process to fix the lights to the handrail; and the exit plan for the soon-to-be-redundant lighting, we were off. First run in, a perfect outcome - smooth install - no unforeseen problems - and it went like a dream! A true testament to the team ... their workmanship, collaborative approach and open discussions meant it all went without a hitch.

With one under our belt, we proceeded with the next, and then the next, and then, finally, at the end of our second day of installing around tours, we had all the track lighting in; we had connected them up to the new DBs we had also installed and they worked a treat! It was like turning on the Christmas lights on the tree ... a great

sense of joy and, more so, the chance to see, first-hand, the powerful impact these new lights had on the cave and, for the handrails, the improvement for the visitors.

Without delay (and on the back of the success from the track lights), we then started at the back of the cave running out all the off-track feature lights. This presented some opportunities and challenges, but mostly opportunities. We could tweak and adjust the new features to show off the cave best and truly highlight features with such crisp and constant light that these Enviros now provided us.

Over the next week, we ran out all the feature lighting; positioned and tested each - again in between tours and without any dramas. Luck was on our side for sure, but the prep work of the staff and their focus on sticking to the process was certainly paying dividends.

The most difficult section was still ahead of us - running the new cable and feature lights along the boardwalk alongside the existing lights, then to place the new lights to pick up the key areas to highlight. This was more challenging. Again, after some more discussion within the team, a solution was found that allowed us to run the new cable separated from the existing cable, and in a much neater, cleaner and accessible manner than the system being replaced.

The option was a simple one, to use "downie" fittings attached to our handrails and create a loom that stood off the handrails, out of the water and still accessible to the staff if any maintenance was to be carried out. The benefits were twofold! A clean, neat and appropriate new install and with no impact on the old. This meant the old could be removed without impact on the new when the time came.

So, with new plan in hand, we set about to install the final runs; connect and test them all. Again, within a matter of a few days, this was all done. We were all in, no issues, no hurdles or setbacks, no interference to trade and no silly long hours! All done in-house with a team that added to their skill set and delivered a fantastic job to date.

The next stage was to test the programming and tweak the scenes and logic in the software and then to adjust and set the lights, trialling different gels, shrouds, angles etc. At this point, Peter felt like a holiday so we flew him over to lead the charge in the commissioning of the new system. Over two days pre- and post the day's tours, we were in and out of the cave, up and down the stairs like a yo-yo fine-tuning the PICED programming ... another crash course in fast learning! The results though ... WOW! It was like a new cave, being able to have the lights back in step with the tour guide, to be able to set the scene, create a reveal and then to complement the tour guides in their job was the outcome. The cave looks crisper; the lighting is amazing and consistent; the fixtures are so well-highlighted; and the lighting is again such a pivotal part of the experience visitors enjoy on their tour.



The smiles, awe and renewed pride of the guides was also clearly on display. We had a few weeks of operating the new lights where we asked for feedback from the guides and made some slight adjustments to the programming as a result. The new lights were a success!

We left the old lighting system in parallel for six weeks to ensure that the new system was without any gremlins. We then removed all the old system in a matter of days, again around tours and with the help of some of the guides; carrying up is harder than carrying down! We salvaged all that could be used at the other sites or as spares, and recycled what we could also, meaning that not a lot was then thrown away.

The new system has not only provided such an amazing quality of light, it pays homage to the cave. It requires less maintenance; has a longer lifespan; and uses significantly less power. The old system, with all lights on, was 12.5 amps ... the new system, with all lights on, is 3.0 amps.

In the end, the months of planning, checking, thinking, measuring, research and consideration simply meant that the production and installation was almost seamless and fast. It was delivered in-house without any loss of tours and looks first class. Credit must go to Peter Bell for his efforts in developing the plan; creating the design; and inspiring us to deliver the project. Equally, to the

team that delivered the project - to Rusty Rouse, Alan Meyburgh, Gabriel Magyar, Tim Brown, Patricia MacShane and Alex Kingston - thank you and well done! A fantastic team effort in delivering such a first class, best practice result. To the guides that assisted in carrying items up and down, for your patience and input, thank you.

Now we move forward to the next cave's lighting system to upgrade!



**Some of what came out!
(Mark Delane)**

Editor's note: Rock-Star and Enviro are types of light fitting appropriate for use in cave environments and supplied by Weidmüller Interface GmbH & Co. Piced is a Lighting program for use with CBus lighting systems

What do Australian show caves offer to their visitors?

Andy Spate

I have developed the table below to provide background for an article in CaveTalk - the monthly newsletter of the National Caves Association (of the USA) which represents mainly the privately owned show caves in the USA.

When I first put the table together - based on my ideas of what was here in Australia - I submitted the table to a few show cave operators around Australia. And found out there was much going on about which I had no idea!

It seems that we are doing more than I would have thought! Please advise me of any corrections or additions/deletions to president@ackma.org

Site	State	Tenure	Guided	Self-guided	Adventure	Theme ¹
Abercrombie	New South Wales	Government	2	1		
Buchan	Victoria	Government	3			
Calgardup	Western Australia	Government		2		
Capricorn	Queensland	Private	2		2	2
Chillagoe	Queensland	Government	3		2	
Cutta Cutta	Northern Territory	Leased	1			
Englebrecht	South Australia	Leased	1			
Gunns Plains	Tasmania	Leased	1			
Hastings	Tasmania	Government	1			
Jenolan	New South Wales	Government	12	1	3	4
Kelly Hill	South Australia	Government	1			
Margaret River	Western Australia	Leased	3	1		
Mimbi	Western Australia	ALC ²	1			
Mole Creek	Tasmania	Government	2			
Naracoorte	South Australia	Government	3	1	3	
Princess Margaret Rose	South Australia	Leased	1			
Tantanoola	South Australia	Government	1			
Undara Lava Tubes ³	Queensland	Leased	8			
Wee Jasper ⁴	New South Wales	Leased	2			
Wellington	New South Wales	Leased	3			
Wombeyan	New South Wales	Government	4	2		
Yanchep ⁴	Western Australia	Government	1	2		1
Yarrangobilly	New South Wales	Government	3	1	3	7
Totals			59	11	13	14

Notes:

1. Themes such as history, science, flora and fauna, infrastructure.
2. Aboriginal Land Corporation.
3. Undara is complicated - tours are conducted in different parts of several lava tubes.
4. Two tours in one cave
5. The 'theme' cave here is the Silver Slipper Cabaret Cave established during WW2 to provide R&R to USA troops. Now used for functions including dining.

ANDYSEZ 58

Early accounts of karst features in Quaternary “soft” limestones in Western Australia Andy Spate

My late father, the distinguished geographer, O H K Spate (1911-2000) left me a slim book which I had not investigated until recently - much to my shame. The 95-page book's title page is:

“A Sketch of the Physical Structure of Australia, so Far as it is Presently Known”

by J. Beete Jukes, M.A., F.G.S.

late Naturalist of H.M.S. Fly, 1850.

This little book is packed with interesting observations - including such passages as:

Lapse of time would tend still further to modify these different assemblages [of plants and animals] by extinction of the old species and the introduction of new ones, until at last the more distant groups exhibited a specific contrast ... (page 94).

Think rabbits, cane toads or introduced weeds!

Jukes's map and text draws heavily on the work of many others (as one would expect). Part of the map, from Cooktown in Queensland to the Torres Strait, is based on surveys by the HMS Fly and HMS Bramble in 1842-1845, with additions from the “Charts of Captain King R.N.” I can discern no reference to the amount of time Jukes and the HMS Fly spent in Australia.

There are many references to limestone but nothing on caves and karst, other than the paragraphs discussed below.

However, given that the work and map was produced in the 1840s and 1850s, it seems remarkably accurate - for example, the Nullarbor, south-east South Australia and western Victoria and parts of the east Gippsland coast are shown as Tertiary.

But the Leeuwin-Naturaliste is mapped as granite and other metamorphics. The Kimberley, and parts of the Northern Territory, is mapped as “Age unknown, but supposed to be palaeozoic [sic].” We now know that it is much, much older than that.

The book is octavo in size and extremely fragile. The two maps are on an imaginably thin tissue paper! Goodness knows what it is worth - my father paid £2/15/- in 1951! It now looks like the original book in good condition would sell at about USD\$3,000. There are many facsimiles available online - and many other mid-19th Century Jukes's books - he seems to have been a very interesting man. If anyone would like to see a scan of the whole book and maps, please contact me. Or find an online book.

Both Jukes and Charles Darwin (1846) encountered Quaternary calcarenites on visits to Western Australia. These are the so-called syngenetic dune limestones (Jennings 1985) in which we find the caves at Margaret River, Yancheep and elsewhere in WA and in south-eastern Australia, as well as a range of other karst features such as the pinnacles of Nambung National Park and the “Petrified Forest” at Cape Bridgewater in Victoria.

These two visitors are almost undoubtedly the first scientists to have discussed, albeit briefly, the features of these limestones in at least Australia and maybe worldwide. Just two paragraphs ...

This ANDYSEZ looks at their two contributions and introduces what will become the next ANDYSEZ.

In Jukes's book, at pages 60-61, we find:

In traversing the plain from the sea, you first pass for about ten miles over a district of loose white sand, quite impassable for wheel carriages, but covered by the usual forest of the country, and producing fruits and vegetables in considerable quantities in the gardens of the colonists. It consists partly of grains of quartz and partly of calcareous grains, probably rolled fragments of shells and corals. In several places it passes into the state of a rather soft friable limestone, sufficiently firm to be used for building stone. In other places are seen rising from the sand what appear to be trunks of fossil trees, having not only the external form of trees, but much even that resembles their internal structure. These occur throughout the colony in places wherever this white sand is found, and they have been frequently described at King George's Sound, where Mr. Darwin believed them to be calcareous concretions formed in the hollows left by decayed trees. In a little cliff near Freemantle, however, near the entrance of the Swan, I saw some of these dendritic masses fully exposed, and from their peculiar structure and conformation I believed them to be nothing more than stalactites formed in the sand by the percolation of rain water dissolving and taking up the carbonate of lime found in the sand, and re-depositing it in fantastic forms wherever a predisposing cause happened to determine it. I believe the limestone in these sands likewise to be formed in the same way, as the bedding had frequently a rather highly inclined or contorted dip, evidently not due to movements of elevation, but the result of their original formation. In this case I suppose rain to have sank through the sand, dissolving the carbonate of lime in its passage, till it at length became saturated or could sink no farther, and that, as it evaporated, the carbonate of lime was deposited in a crystalline condition, binding up all the adjacent grains into a more or less solid stone.

He obviously didn't believe in paragraphs!

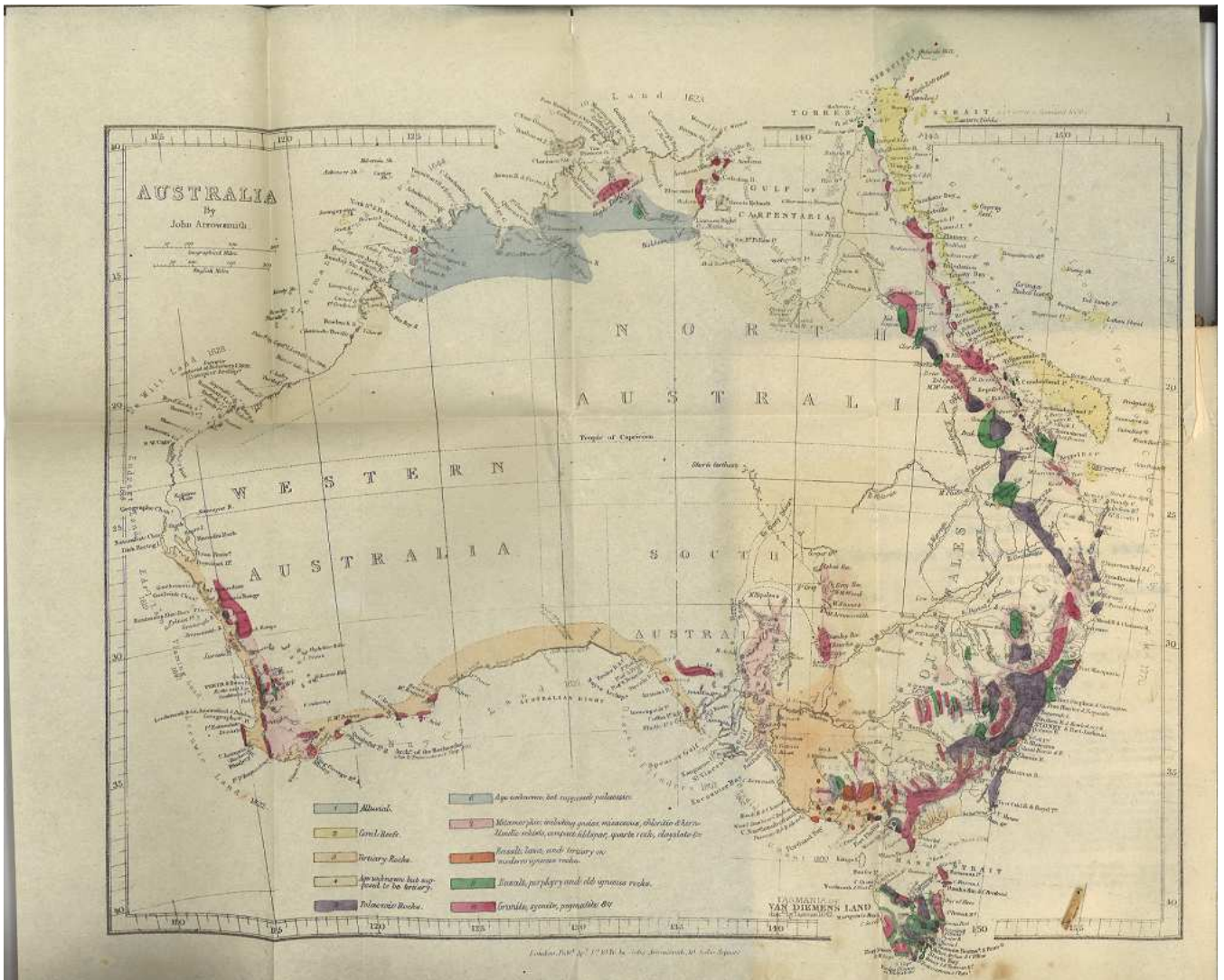


Figure 1 J Beete Jukes' pioneering geological map of Australia. Although the book was published in 1850, the near-unreadable text at the bottom says that the map was published in 1846 by Johnathan Arrowsmith, 40 Soho Square.

Darwin's book is considerably larger, with the second edition running to a "mere" 520 pages. Jukes may have only seen the first edition, as the years between Jukes's and Darwin's books seem too short when one considers the travel times between England and Australia in those days. The new Qantas 17-hour flights from Perth to England have nothing in comparison to the sailing voyages from England to Australia - four months!

Darwin's title page is:

JOURNAL OF RESEARCHES
 INTO THE
 NATURAL HISTORY AND GEOLOGY
 OF THE
 COUNTRIES VISITED DURING THE VOYAGE OF H.M.S. BEAGLE ROUND THE WORLD,
 UNDER THE
 Command of Capt. Fitz Roy, R.A.
 BY CHARLES DARWIN, M.A., F.R.S.
 SECOND EDITION, CORRECTED, WITH ADDITIONS.
 LONDON:
 JOHN MURRAY, ALBEMARLE STREET.
 1845

One day I accompanied Captain Fitz Roy [sic] to Bald Head; the place mentioned by so many navigators, where some imagined that they saw corals, and others that they saw petrified trees, standing in the position in which they had grown. According to our view, the beds have been formed by the wind having heaped up fine sand, composed of minute rounded particles of shells and corals, during which process branches and roots of trees, together with many land-shells, became enclosed. The whole then became consolidated by the percolation of calcareous matter; and the cylindrical cavities left by the decaying of the wood, were thus also filled up with a hard pseudo-stalactitical stone. The weather is now wearing away the softer parts, and in consequence the hard casts of the roots and branches of the trees project above the surface, and, in a singularly deceptive manner, resemble the stumps of a dead thicket. (P 450)

These quotes indicate that both gentlemen were groping to understand what was happening in the dune limestones - and their ideas are pretty good. Many other people have grappled with the karst geomorphological issues on the calcarenites since the mid-19th Century.

You might like to relook at ANDYSEZ 57 (Spate 2017) to refresh your minds about 'karren', although some of things that Darwin, Jukes and I will discuss are not mentioned there, as you will see.

Before we look at Darwin and Jukes, we need to look at some other things not mentioned in ANDYSEZ 57. These are rhizomorphs. To quote Ken Grimes (2017, p 517):

“Rhizomorphs (or rhizocretions [or rhizoliths]) are hard calcified root structures that are commonly associated with [solution] pipes. Rhizomorphs are common in calcareous dunes and have an obvious branching root structure. They form from carbonate that has been precipitated around the root, and thus are thus thicker than the original root - which may be identifiable as a thin hollow core if that has not been infilled by younger cement.”

Figures 2 and 3 display rhizomorphs. Note the solution tube in the centre of Figure 2. I also did not discuss pinnacles such as are found in Nambung National Park, WA, and at many other places across Australia and the world - we will come to them later - next ANDYSEZ. They are perhaps relevant to Darwin's and Jukes's observations.



Figure 2 (above) and Figure 3 (below)

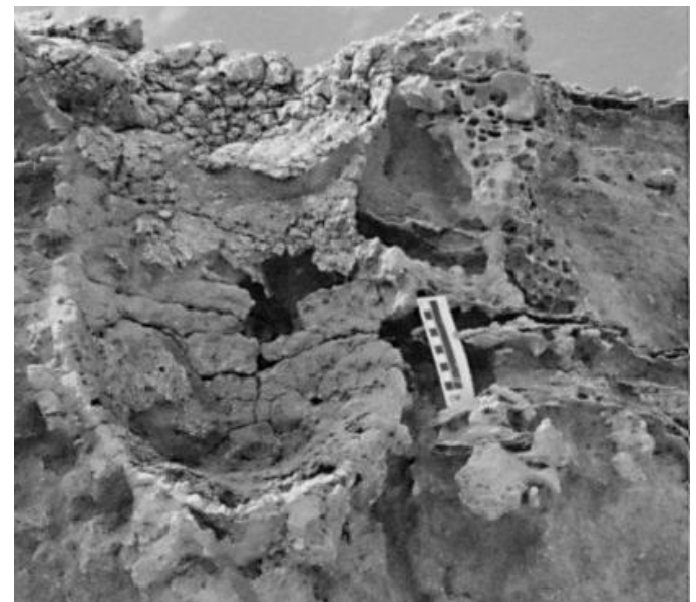


Being contrarian, but chronological, let's look at Darwin first. What did he see?

It seems that Darwin may have seen rhizomorphs, although that is not entirely clear but it appears likely. He mentions others seeing "corals". Note that he has mentioned bedding in the sands which we now know are calcareous dunes - solidified in most places. He certainly has seen solution tubes standing clear of the surface and interpreted them as "petrified trees" - many others have come to the same conclusion, including the Victorian national parks' people who persist in erecting interpretive signs about petrified forests despite being advised that such an origin is most unlikely (Grimes 2004). Ken pointed out that big trees do not grow at densities as shown in Figure 4. Nor is there evidence of tree roots, but the tubes have rounded bottoms as shown in Figure 5. Petrified forests seem to be on the outer - but more to come.



Figure 4 (above) and Figure 5 (below)



Now let's look at what Jukes had to say. He certainly seems to have observed rhizomorphs and solution tubes, again describing the latter as "petrified forests" - as many others have done since.

It seems that Jukes has observed much the same things that Darwin did - again interpreting remnant solution pipes as "petrified forests". He notes the dune bedding of the calcarenites and the mode in which they become limestone - very perspicacious.

I believe that he also observes rhizomorphs and correctly identifies the nature of the sands as shell and coral fragments [bryozoan algae skeletons are also present]. Both Darwin and Jukes misuse, in our modern thinking, the word "stalactites".

Both men have observed our aeolian calcarenites - of which we have more than anywhere else on Earth - early on in Australia's European history and deserve to be remembered as such.

And, on a lighter note, demonstrating that we are one nation, these calcarenites are known as:

- Tamala Limestone in Western Australia;
- Padthaway Formation in South Australia
- Bridgewater Formation in Victoria;
- Old Dunes on King Island, Tasmania; and
- Neds Beach Calcarenite in New South Wales.

Figure 6 shows a view of pinnacles at Nambung National Park, WA. Matej Lipar and many others have discussed these karst features here and elsewhere over many decades - they are much more complex than earlier discussions have made out.

Lipar and Webb (2015) provide the most definitive explanation of their origins. We will visit their findings in ANDYSEZ 59 in a future edition of the Journal.

CAPTIONS FOR FIGURES 2 to 5

Figure 2. Large rhizomorph mass with a solution tube in the centre (from the web but I lost the link).

Figure 3. Smaller rhizomorphs from Penguin Island, WA (from the web but I lost the link).

Figure 4. Solution tubes at Cape Bridgewater, Victoria (from Grimes 2004).

Figure 5. Solution tube bases at Cape Bridgewater, Victoria - no evidence of tree roots (from Grimes 2004).



Figure 6. The Pinnacles, Nambung National Park, WA (from Lipar and Webb 2015)

References

- Grimes KG, 2004, Solution Pipes or Petrified Forests? Drifting sands and drifting opinions! *The Victorian Naturalist*, 121(1):14-22
- Jennings JN, 1985, Syngenetic Karst in Australia. In Contributions to the Study of Karst, pp 41-110, PW Williams and JN Jennings, (eds) Australian National University, Department of Geography Publication G5(1968)
- Lipar M, 2009, Pinnacle syngenetic karst in Nambung National Park, Western Australia, *Acta Carsologica* 38(1):41-50
- Lipar M, Webb JA, White SQ and Grimes KG 2015, The genesis of solution pipes: Evidence from the Middle-Late Pleistocene Bridgewater Formation calcarenite, southeastern Australia, *Geomorphology* 246:90-103
- Lipar M and Webb JA, 2015, The formation of the pinnacle karst in Pleistocene aeolian calcarenites (Tamala Limestone) in southwestern Australia, *Earth Science Reviews*, 140:182-202
- Spate A, 2017, ANDYSEZ 57 Karren, *ACKMA Journal* 106: 20-29

2019 Cave Guides' Workshop survey summary

Cathie Plowman

Following the Cave Guides' Workshop at Naracoorte in May 2019, 30 of the participants responded to an online survey. Thanks to Chaka Chirozva from Naracoorte Caves who coordinated the survey and collated the survey responses. A quick summary of the responses is that:

- most participants had their expectations met;
- most presentations were "relevant" to "extremely relevant" to each respondent's work;
- all presenters were very effective and engaging in communicating their messages; and
- overall, nearly all respondents thought the workshop afforded them adequate networking opportunities to develop in their careers.

Some respondents did note a few challenges:

- too cold in Blanche Cave; and
- need to manage time between sessions, including allocating more time for more activities.

However, as the aim of the event was to provide additional knowledge and skills for cave guides to develop their careers, and only 12 of the 30 respondents were cave guides, the survey results need to be considered in this context when evaluating what cave guides gained from the workshop.

Thanks to everyone who attended the workshop and contributed to the event, especially coordinator, Nick McIntyre, the Naracoorte Caves staff for hosting the event and, especially, to the Naracoorte Caves Café team for their excellent catering.

**The *Jenolan Caves Reserve Trust* and the
ACKMA 2020 Organising Committee
invite you to attend the 23rd Conference of the
*Australasian Cave & Karst Management Association***



Jenolan Caves NSW

Sunday 3rd - Friday 8th May 2020

Graffiti Removal from Main Cave at Timor, New South Wales

Garry Smith, President - Newcastle and Hunter Valley Speleological Society (NHVSS) and ACKMA member (story and photos)

During 2018, NHVSS became aware that significant spray-paint graffiti elements (vandalism) had appeared on the walls of Main Cave at Timor in the Hunter Valley, New South Wales.

It was decided to do something about removing it during an NHVSS trip to the area in June 2019.

Upon entering the cave, our group was immediately confronted with the horrendous amount of black spray paint graffiti on large sections of wall. Thankfully, none was on speleothems, but there was some on eroded palaeokarst on one wall. The areas were assessed to identify any historic signatures which may be impacted if we cleaned them all. I can hear the thinkers questioning, "at what point in time does a signature change from being graffiti to an historic signature". There are many arguments to be considered here and there are numerous published in-depth articles about this subject. A good example is the paper by Reed and Bourne (2018) under the subheading, "The value of historical writing in caves". However, I am not going to tackle that subject in this short article.

To document our clean-up, we decided to photograph each area of graffiti vandalism prior to and after removal by rubbing it off with wire brushes.

Luckily, the majority of the walls now covered in graffiti were those which had been vandalised about 30 years earlier and had previously been cleaned at that time using the same method we were about to employ. Back then, I was a member of NHVSS and also heavily involved with Scouting as a Venturer Leader and a Regional Caving Instructor. So the Scouts, on one of my caving courses, were involved in the earlier cleaning of graffiti.

Upon close inspection, the majority of the cave walls were found still to be coated in a layer of soft calcite (not moonmilk) and the graffiti on the whole could be removed by rubbing vigorously with wire brushes. Provided there was still enough soft calcite on the walls, I expected that the same process would be viable again without sustaining any noticeable damage to the cave walls. Wire brushes were used on a small test area and proved to be very successful.

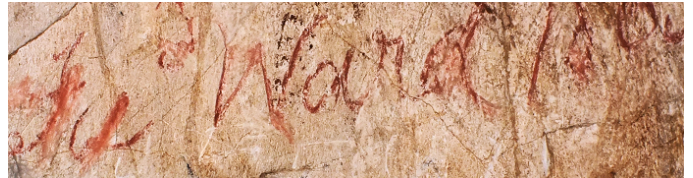


Ellie Brown and Trish Morrow continue the attack.

Our band of enthusiastic, wire brush-wielding graffiti removers then set to work. Even the young children in our group embraced the project with enthusiasm and achieved some outstanding results (in areas within the limits of their reach).

Overall, the clean-up took about two hours and achieved almost total removal of all the 2018 graffiti. The shame is that the caves on the reserve at Timor are freely open to the public to wander into at any time, and thus can be targeted, in the future, by graffiti vandals.

There are many caves outside the reserve and surrounding property owners are very protective of these caves on their land, so those caves have, on the whole, remained undamaged.



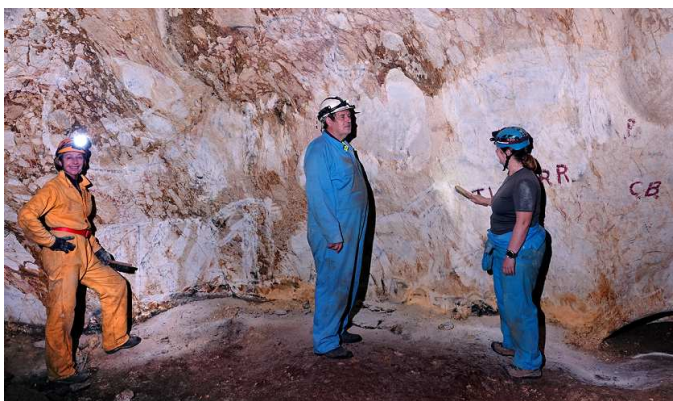
Thankfully, the historic signature of "Fred Ward 1865" - alias "Captain Thunderbolt", a notorious outlaw, has not been damaged in Main Cave. Fingers crossed, his signature survives into the future.

Further Reading

Reed E and Bourne S, (2018) 'New evidence confirms Thomas Hannay as the first photographer of Naracoorte Caves and emphasises the importance of historical writing in caves', *Helictite*, 44: 45-58.



**Above: The team and graffiti before the attack!
Below: The same location with Marcia Kaye, Brian Reeves and Trish Morrow after removal of most of the graffiti**



Book Review: Robert Macfarlane (2019), *Underland: A Deep Time Journey*, Hamish Hamilton (Penguin), 496pp, ISBN: 9780241143803, RRP: \$45.00, available as hardback and as e-book.

Reviewed by David Gillieson

In *Underland*, the author explores natural and artificial spaces deep within the Earth for what they have to tell us about the long history of the Earth, and for what these insights might mean for our future as a species. This is a book filled with great adventures, quite deep wisdom and a touching concern for humanity. Across many cultures, and over Deep Time, people have used underground spaces for “Shelter (memories, precious matter, messages, fragile lives). Yield (information, wealth, metaphors, minerals, visions). Dispose (waste, trauma, poison, secrets).” Deep Time provides a framework with which to consider how our species (and closely related species) have related to the Earth and modified it to suit its purposes.

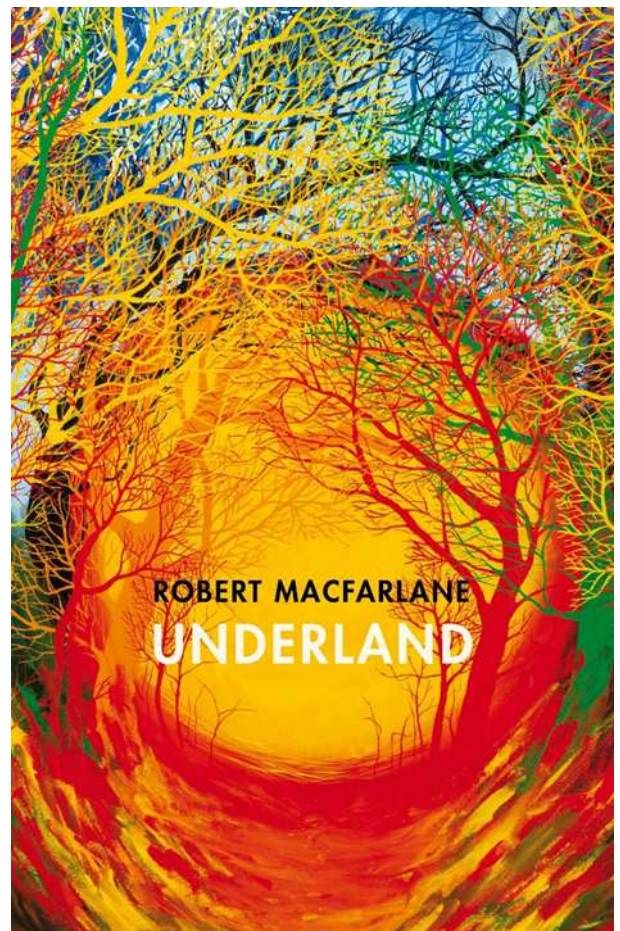
Macfarlane brings the full weight of his scholarship to the task. He quotes a dazzling range of poets, novelists and academic writers on geology, archaeology, mythology, morphology and glaciology, as well as on nuclear science, “dark matter” physics, and art history.

He moves smoothly from the ancient myths of Gilgamesh and Orpheus in the Underworld, to the latest ecological research on the fine network of fungal hyphae in the soil that transfer nutrients between trees and may even aid a form of communication between them, then considers the minds of the Neanderthal artists who created cave art in northern Spain 65,000 years ago.

In his first book, *Mountains Of The Mind*, Macfarlane was obsessed by the fear and fascination generated in the human psyche by climbing, and the addictive adrenaline rush termed “feeding the rat” by Al Alvarez. This theme is continued in *Underland*.

Under Paris, exploring the vast networks of catacombs with a group of anti-establishment punk cavers, he becomes stuck in a narrow vertical shaft as “the stone that encases me, the stone that is measuring me up like a coffin, starts to vibrate ... The thought of continuing is atrocious. The thought of reversing is even worse. Then the top of my head bumps against something soft ...” The select and secretive community of speleonauts under Paris is highly organised, with links to like-minded troglaphiles, in places as far away as Brisbane, creating a global network of invisible underground cities.

As he continues his explorations of the underground realm, we are taken to deep shafts descending the classical karst of Slovenia to the black sand banks of the underground Timavo River, emerging at springs near Trieste. Later, he explores limestone caves and tunnels excavated in the Julian Alps by partisans in World War II, and shafts used for the disposal of bodies by both sides. There is a claustrophobia-inducing account of negotiating loose boulder piles in Mendip



caves and of a solo winter expedition to caves with prehistoric art in the Lofoten Islands of Norway. Plus, a great chapter describing descents into glacial mills or moulin on the rapidly melting Greenland Ice Sheet.

One of the most harrowing chapters in the book describes his visit to an underground nuclear waste repository at Olkiluoto Island off Finland, where 6,500 tons of spent uranium will be buried until it becomes safe at the end of its half-life, millions of years from now. The various governments responsible for this vault have enlisted the aid of anthropologists, architects, graphic designers, ethicists and linguists to design symbols and messages which will communicate the danger of this place to whatever species may come here in the distant future. What might have been this book’s last sentence instead arrives on page 402: “This is the way the world ends, this is the way the world ends, this is the way the world ends — not with a bang but a visitors’ centre.”

In all of Macfarlane’s books, the adventures are really a point of departure for discussions of much deeper concerns: the relationship between people and landscape, the mutability of time and place, and the fragility of all that we are and all that we create. In his compelling prose, Macfarlane is effectively using the experience of the *Underland* to offer deeper and more shifting ideas about our world. “Time feels differently reckoned” after going underground, “further deepened, further folded”.

Continued next page

He is greatly concerned with the nature of the Anthropocene. In a geological sense, the artefacts of our civilisation will be the Lead-210 from nuclear fallout preserved in lake sediments; the bones of millions of intensively farmed pigs and steers; billions of crushed plastic bottles and other containers which will provide precisely dateable strata with reference to the product-design archives of multinationals.

In Hawaii, geologists have identified a new kind of rock which may define the start of this Age of Unintended Consequences. A sediment of recent history, the rock displays milky-blue flecks, small patches of dull green, and fibrous orange twists. It is known, because of its unique properties, as “plastiglomerate.” This forms where plastic marine debris is subjected to high heat and melts, wrapping together particulates such as shell grit or sand. It then solidifies as it cools. Campfires are one source of that high heat. Plastiglomerate may also emerge along the scorched trail of a bushfire, or it might be cauterised into the ground by flowing lava.

Macfarlane’s main contribution to an emerging body of popular ecological writing is to demonstrate clearly how the ground beneath our feet - the Underland - is profoundly affected by our activities on the surface.

Whether by:

- the rapacious gouging by multinational corporations; or
- by ongoing extraction or pollution of groundwater by industry and urbanisation,

human activity now extends deep into the earth.

Regional lowering of karst groundwater levels in Europe transcends national boundaries.

Falling water levels in a spring-fed river in the Czech Republic reveal engraved “hunger stones” placed there to commemorate the worst droughts and starvation of the distant past. One stone reads: “If you see me, weep.”

His messages are not all negative and he is adamant that we should not see the present environmental crises as a justification for apathy.

“We should resist such inertial thinking; indeed, we should urge its opposite – deep time as a radical perspective, provoking us to action not apathy. For to think in deep time can be a means not of escaping our troubled present, but rather of re-imagining it; countermanding its quick greeds and furies with older, slower stories of making and unmaking. At its best, a deep time awareness might help us see ourselves as part of a web of gift, inheritance and legacy stretching over millions of years past and millions to come, bringing us to consider what we are leaving behind for the epochs and beings that will follow us.”

This is both an entertaining and thought-provoking book which provides some good insights into why we go into caves, as well as providing long-term perspectives on ecology and reminding us that humans do not represent any point of culmination in the story of the planet.

Ken Grimes Award—ACKMA 2020 Conference

Grant funding is available to support attendance at the May 2020 Biennial ACKMA Conference in Jenolan.

The Honorary Life Members Fund will support one to two attendees with their conference costs. The fund is open to members and non-members. Students and researchers are welcome to apply, as well as others (such as leaders in guiding and interpretation) and attendees from neighbouring countries. There is no set format for application. Applicant must describe:

- **how attendance will benefit them (eg professional development),**
- **how their attendance will benefit ACKMA (eg a paper), and**
- **detail of the funding level sought.**

For more information, please contact Dave Smith (dave.smith.nz@gmail.com).

Applications will close 31 January 2020. Applications are to be sent to the above email address.

ACKMA members are asked to circulate this information to students and researchers working at their local cave or karst site.

The Journal management page

Journal back copies

Our President is presenting to the Savannah Guides' School near Cairns in November. He will be giving out some of our back copies of the Journal to tell those in the course about ACKMA.

However, if you would like to receive any (or many) of the back copies listed below, please send my Associate, Ms Peta Dixon, an email at peta.dixon@courts.nsw.gov.au; let her know what ones you want; and we will post you the requested copies if they are still available.

Requests will be met on what were known, in my youth, as "Boarding House Rules" - first in, best dressed!!

Issue	Month and Year	Copies
No. 83	Jun-11	4
No. 84	Sep-11	7
No. 85	Dec-11	Nil
No. 86	Mar-12	Nil
No. 87	Jun-12	6
No. 88	Sep-12	28
No. 89	Dec-12	9
No. 90	Mar-13	6
No. 91	Jun-13	Nil
No. 92	Sep-13	17
No. 93	Dec-13	1
No. 94	Mar-14	1
No. 95	Jun-14	4
No. 96	Sep-14	7
No. 97	Dec-14	51
No. 98	Mar-15	16
No. 99	Jun-15	7
No. 100	Sep-15	47
No. 101	Dec-15	19
No. 102	Mar-16	21
No. 103	Jun-16	11
No. 104	Sep-16	Nil
No. 105	Dec-16	41
No. 106	Mar-17	21
No. 108	Sep-17	1
No. 109	Dec-17	1
No. 110	Mar-18	1
No. 111	Jun-18	2
No. 112	Sep-18	7
No. 113	Dec-18	6
No. 114	Mar-19	2
No. 115	Jun-19	Nil

Notes from a frustrated proofreader

One of the problems I find while proofreading is expanding the various abbreviations used by writers.

It is a long time since I wrote any papers which were reviewed by anyone else, but my recollection is that there are some conventions used in academia and other places.

The primary one is to give the name of the organisation in full the first time it is used in an article. It is expected that the standard abbreviation will follow in brackets. So, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) would be set out like that. It is then permissible to use UNESCO in the rest of the article. That usually reduces any confusion. PSI has at least two expansions, "pounds per square inch" and "personal services income". "AU" can mean "Australia" or "astronomical units".

The second convention is to show clearly the jurisdiction in which the article is based. "DEH", I think, means Department of Environment and Heritage, but I have no idea whether this is in New Zealand, South Australia, Tasmania or a federal department. The first time an authority is named, its jurisdiction should also be carefully stated, eg South Australia's Department of Environment and Heritage, DEH(SA). "SA", itself, is ambiguous; it could also be South Africa or Soci t  Anonyme, so clarity is also needed here.

The ACKMA Journal goes to all states and overseas; not all readers will be totally familiar with the abbreviations in present use. And with the rate of change of the names of various government departments (almost every department changes name with each change of governing party, and often enough with just a reallocation of portfolios), it is critical to clearly identify what the organisation is.

A third convention is to either have at the beginning of the article, or at the end, a complete list of all abbreviations used and their expansions. This allows the reader to confirm the full name etc.

When citing a particular cave in an article, it would assist future researchers if the Australian Speleological Federation (ASF) reference for the cave were given. The reference is constructed, and consists of a numeral denoting the state, 2 for New South Wales, 3 for Victoria (just like postcodes and the name of AM radio stations), one or two letters to identify the area, so B for Bungonia, J for Jenolan, IB for Ida Bay, followed by a number. Each state has a system for issuing numbers; the task is often assigned to a club which is active in the area. My understanding is that New Zealand does not assign numbers to its caves.

And, also for future researchers, whether academic, family history or other, please give the full names of people mentioned in the article. Fred, Jo, Louise and John make sense to the author, but are not a lot of use in 20 or more years' time. Nicknames present a special problem.

If writing about a seldom-visited area, please give a little bit of guidance as to location. Tuglow Caves could be described as south of the Kowmung River, south of Jenolan Caves; Mount Cripps as south of Cradle Mountain Link Road and north of Lake McIntosh.

Tony Culberg
Proofreader



**Your invitation to attend the
Biennial Conference of the**

***Australasian Cave and
Karst Management Association***

**Jenolan Caves N.S.W. Australia
Sunday 3 to Friday 8 May 2020**

“2020” Vision for Cave & Karst Management

The organising committee would like to take this opportunity to invite all people interested in caves and karst to attend the Biennial Conference of the Australasian Cave and Karst Management Association. It will be held at Jenolan Caves from 3 to 8 May 2020. The conference theme is “2020” *Vision for Cave & Karst Management*—a play on the year of the conference but, importantly, a need to look forward with clear vision not only to the future of cave and karst management, but also cave/karst tourism in general. This is the first time that a full ACKMA Conference will be held at Jenolan Caves so we are expecting a high level of interest from delegates, not only from Australia and New Zealand but the wider cave and karst community around the world.

While a preliminary conference schedule has already been planned, more details will be published in the December ACKMA Journal, together with costings and a conference booking form. However, we can announce that Jenolan Caves House and Chisholm’s Grand Dining Room will be available for use during the conference week as the planned renovations will now not be starting until after our conference. We have reserved all accommodation options at Jenolan Caves so bookings are now open for accommodation and can be made by contacting our Caves House Group Bookings Manager, Trish Sanders, via groups@jenolancaves.org.au or (02) 6359 3900 or +(612) 6359 3900, if calling from outside Australia. Details of the various room types can be seen on the Jenolan Caves website, www.jenolancaves.org.au. However, we ask that you enquire and book directly with Trish to ensure that you receive the discounted room rate. The discounted rates are as follows and are on a per night/per room/cottage price. They only apply if you book for the six nights (Sunday-Friday nights inclusive):

Caves House Hotel

Other Accommodation

Grand Classic.....\$164.00	Gate House.....\$ 28.00
Classic.....\$118.40	Mountain Lodge..... \$106.40
Traditional..... \$72.80	Jenolan Cottages \$144.00
	Bellbird Cottage \$320.00
	Binoomea Cottage..... \$400.00

Further conference details will be provided in the December Journal. However, should you have any queries in the meantime, please contact the 2020 Conference Convenor, Scott Melton, via scott.melton@jenolancaves.org.au or (02) 6359 3926 or +(612) 6359 3926, if calling from outside Australia.

We look forward to seeing you all at Jenolan Caves in May 2020!