

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.

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Photos taken by the authors or editor unless otherwise acknowledged.

PRINTER: Hansen Print, Smith Street, Naracoorte, South Australia 5271. Ph: (08) 623699

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FRONT COVER: Kubla Khan, Mole Creek, Tasmania. Photo: Ross Anderson

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Bottom - ACKMA members at the Vale of Belvoir, Tasmania. Photo: Deb Hunter

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FROM THE EDITORS

I was elected as the ACKMA Publications Officer taking over from Kent Henderson who published a magnificent 82 journals from ACKMA's inception. Kent had commenced preparing this journal No. 83 and I appreciate the copy he provided. I hope to maintain the high standard that has been set and will be surveying members prior to the next journal on how you wish to receive your copy, either hard copy or electronically.

ACKMA has some challenges to keep producing a high quality printed journal as our Treasurer, Grant Gartrell, highlighted in his report to the Ulverstone AGM. I will be exploring new ways of printing to ensure we maintain the standard. Rauleigh has redirected the publications@ackma.org email address to me - I look forward to receiving your contribution.

Conference delegates will remember Moira Lipyeat's account of the Christchurch earthquake and the damage to Moa Cave.

Members will be well aware of the devastating earthquake in Christchurch last February. Aside from the tragic death and destruction of the quake, access to a significant cave was also, effectively, destroyed. Attending ACKMA members inspected the Moa Cave (in suburban Redcliffs) during the pre-conference study tour held prior to the 16th ACKMA Conference, at Westport, in 2005. This old basalt sea cave is an important Maori site, and was formerly the site of significant archaeological/sub-fossil digs. It was also where noted ACKMA member, Moira Lipyeat, launched her 'Caving History of New Zealand' book *Delving Deeper*, in 2003.

The cave was actually closed to the public in November 2004 after a geologist's report found the cave's roof and



The Launch of "Delving Deeper" in Moa Cave

VALE - VAL SPEEDIE

It is with very deep regret that I advise members of the death of ACKMA luminary Val Speedie, in October last year. Val was, for many years, a guide at Undara and she was a key member of the Organising Committee of the 15th ACKMA Conference at Chillagoe & Undara in 2003.

Val was a very great lady as all who met her would readily agree. Perhaps the following Eulogy (many thanks to Lana Little for forwarding it), which appeared in the local *E-Newsletter* of the Gulf Country, best sums up the life of Val - who made such a valuable contribution to her local community, not to mention the management and interpretation of Undara.

REST IN PEACE, DEAR VAL

On Sunday 17th October our dear Val Speedie lost her battle with cancer, she was one of the 'rays of sunshine' in the Gulf region and everyone who knew her enjoyed her warmth. She was a big part of why our organisation is so successful and she will be missed by all our staff and members. Our love and prayers go out to her husband Tony and family and we'd like them to know that we'll never forget her and her contribution to the people and the environment of the Gulf region. Things will never be quite the same. Love from all the crew from the Northern Gulf Resource Management Group.

Personally, I'm am sad that I am writing this column for the newsletter Val helped design, edit and distribute to so many readers in the Gulf and across Australia. She did such a wonderful job and I enjoyed every issue. She was one of the first people I met when I moved to the region and she always made me feel welcome, always had some great advice, always listened and always fixed my grammatical errors! (who will do that for me now?) I miss you Val, Love Sarah XO.



Val Speedie
- 15th ACKMA Conference 2003



Moa Cave damage

face were ‘potentially unstable’... Thereafter, management of the site appears to have been close to zero... However, the problem of ‘the cave entrance as a local eyesore’ (to quote a more recent press article) was ‘solved’ by the earthquake – very sadly. Indeed, the owner of the cave (who operates the adjacent *Moa Cave Guest House and Motel*) had just completed the paperwork with the local council to use it commercially – for weddings, parties etc. The quake caused tons of rock to fall down over the cave entrance area, blocking it off. One would image, given the myriad of other reconstruction priorities in Christchurch, the cave entrance is unlikely to be cleared in any sort of a hurry, if ever.

Unfortunately International Show Caves Association (ISCA) President David Summers (pictured below), was unable to attend the conference due to business commitments, however new ISCA Director Dan Cove from Jenolan Caves read a message on his behalf. David has provided the following update for ACKMA.



During the Sixth Congress of the International Show Caves Association (ISCA) in Liptovsky Mikulas, Slovakia, the membership implemented a bold new strategy to ensure that it fully embraced the world.

In 2006, the General Assembly of ISCA adopted a new constitution. This new constitution made provision for the Board of Directors to comprise a

President, two Vice

Presidents, a Secretary, a Treasurer and five Directors. One person could hold the offices of Secretary and Treasurer.

With the exception of the Secretary / Treasurer, each Officer and Director had to be from a different country. While this seemed ideal in 2006, the rapid growth of the member countries left the Board of ISCA in a position that it offered an extremely thin representation around the world.

During Congress 2010, the membership responded very enthusiastically to the call to “embrace the world” and changed the Constitution to allow for up to ten Directors, in addition to the President, two Vice Presidents, a Secretary, and a Treasurer.

In addition to the enlargement of the number of Directors, a further change to the ISCA Constitution was adopted to permit up to two Associate Members of the Association to become Directors.

While there was a small degree of resistance expressed by some of the voting Full Members to the concept of Associate Members (individuals) being permitted to become Directors, the rallying call to “embrace the world” won the day, by a very substantial majority. The election of the ten Directors was very spirited and keenly contested. Again, the call to “embrace the world” was followed by the membership with the result that five continents are now represented in the ISCA Board of Directors.

The two new continents represented are Australasia and Asia. Australia’s Dan Cove was elected from Australasia and Zhang Shouyue of China was elected from Asia.

Africa is represented by Hein Gerstner of Cango Caves and South Africa and North America is represented by Second Vice President Brad Wuest of Natural Bridge Caverns in Texas, USA.

The ISCA President failed miserably with his suggestion that Bermuda be recognized as another continent. As a result, he will continue in the state of being all at sea!

The following countries have a member on the ISCA Board of Directors:-

- | | | | |
|-----------|--------------|---------|---------|
| Australia | Bermuda | China | England |
| France | Germany | Hungary | Italy |
| Slovakia | South Africa | Spain | Sweden |
| U.S.A | | | |

A new day dawns for ISCA following this election, or to be correct a new quadrennium has dawned for ISCA. The new Board of Directors is approaching this with a great degree of optimism, as well as enthusiasm, and is looking forward to applying this broader view to the world of show caves.

PRESIDENT'S MESSAGE

Peter Chandler

Last month many of us met at the Ulverstone, Tasmania 'Wilderness Karst' ACKMA conference, despite personally not taking part in pre or post caving trips it was still a great week and thanks again go to the Tasmanian organising committee and their many helpers. The programme was really well prepared, being officially opened by The Governor of Tasmania who took the time to have a personally guided tour of Gunns Plains with Geoff Deer afterwards.

Highlights for me included meeting Professor Arrigo Cigna who attended and shared a small portion of his expertise gained over his lifetime. Second, by chance touring King Solomons cave for the first time and being with Neil Kell who re-lit the cave not so many years ago, and third, having first learned about Dismal Swamp at the 1999 Mt Gambier conference, and again at Ulverstone before visiting the site with its perhaps controversial development by Forestry Tasmania. I could go on.

I write this while sitting out a rainy day in Collingwood, Northwest of Nelson, waiting to bike the Heaphy Track. Access to this track is for a three year wintertime trial, having been closed since the gazetting of the Kahurangi National Park around 15 years ago. Access to wilderness areas is certainly an issue karst managers also have to deal with.

A key to our ACKMA organisation functioning, with a year between official gatherings is without doubt communication, email being an essential tool on a daily/ weekly basis. Published quarterly, the Journal certainly provides a permanent record of the organisation, here I would like to acknowledge the huge contribution since 1987 of Kent Henderson, as Publications Officer, the journal evolved from an occasional and modest newsletter to what we can be proud of to date - Thanks Kent!

With a new Publications Officer elected at the Ulverstone AGM, we look forward to Steve Bourne, our immediate past President putting his personal touch to our Journal - please support our Journal editor!

I would like to take this opportunity to thank those who elected me to this position, though I did fill in as president on the passing of Peter Dimond, in 2003. It is noteworthy that Andy Spate remains an Office bearer as our International Relations Officer having been President over 20 years ago- we are all fortunate for Andy's continued involvement at this level.

And throughout my presidency I welcome contacts from any members with any cave and karst issues, which I am sure someone in our organisation is well qualified to deal with.



The new ACKMA committee. From front left clockwise; Dan Cove, Dave Smith, Cath Sellars, Peter Chandler, Libby Chandler, Geoff Deer, Andy Spate, Steve Bourne, Kirsty Dixon and Sasa Kennedy

Photo: Ross Anderson

IMPACTS of DRYING CLIMATE on AQUATIC CAVE FAUNA in JEWEL CAVE and OTHER CAVES in SOUTHWEST WESTERN AUSTRALIA

Dr Stefan Eberhard BSc, MSc, PhD (Director, Subterranean Ecology Pty Ltd), and Sarah Davies (Augusta Margaret River Tourism Association)

INTRODUCTION

Groundwater plays an important role in many surface ecosystems, such as wetlands and phreatophytic vegetation, but for subterranean aquatic animals (stygo fauna) it forms the critical habitat. The caves within the Leeuwin-Naturaliste Ridge have experienced reduced groundwater levels and stream flow in recent years. Tree roots penetrate the limestone to tap groundwater in cave pools and streams where they grow in the form of dense mats. These aquatic root mat habitats have been found to contain diverse stygo fauna communities (Jasinska et al. 1996; Jasinska 1997; Jasinska and Knott 2000; Eberhard 2004; Eberhard et al. 2005). The submerged tree rootlets and associated microflora provide the primary food source and the food web is completed by interactions between root mat grazers, decomposers and predators (Jasinska 1996; Eberhard 2004).

The stygo fauna communities in the Leeuwin-Naturaliste Ridge Caves are threatened by loss of aquatic habitat resulting from declining groundwater levels and reduced stream flows experienced during the previous 15 years, and particularly during the past five years. The main cause of the water decline is reduced rainfall experienced in southwest Western Australia since the mid 1970s, although other anthropogenic stressors, for example blue-gum plantations, may be involved in some specific catchments. Climate modelling attributes part of this change to atmospheric greenhouse gases, and predicts the drying trend will increase over coming decades. By 2030, annual rainfall across most of Western Australia is projected to decrease by 2 to 5% relative to the climate from 1990 (<http://www.climatechangeinAustralia.gov.au>).



Figure 1 Stygobitic amphipod, *Uroctena n. sp.* from Aquatic Root Mat Community 1 (Easter and Jewel Caves). Note the absence of eyes and pigment, with elongated body and appendages. This specialized subterranean species is endemic to the Jewel Cave Karst System and critically endangered by declining groundwater levels. Photo: S. Eberhard.



Figure 2. Stygophilic amphipod, *Perthia sp.* (cf. *acutitelson*). Note the presence of eyes and pigment, with robust body and appendages. Populations of this species in Easter and Jewel Caves are genetically distinct and isolated from populations in other caves and surface waters. Photo: S. Eberhard.

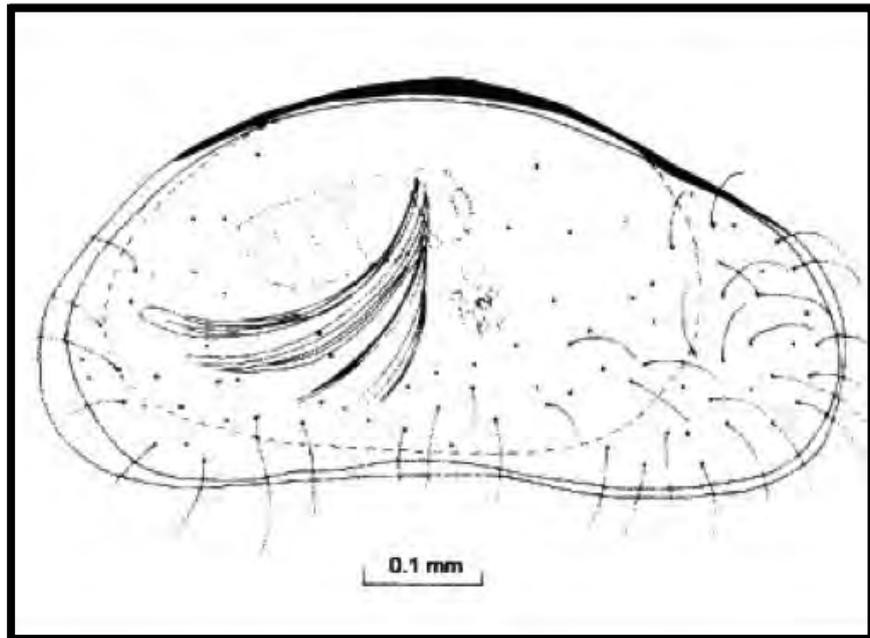


Figure 3. Critically endangered stygobitic ostracod, *Areacandona admiratio*, locally endemic to Jewel-Easter Caves. Taxonomic drawing reproduced from Karanovic 2003.

Following the PhD study of Jasinska(1997) four stygofauna communities in the Leeuwin-Naturaliste Ridge Caves were recognized as Threatened Ecological Communities (TECs) and listed as Critically Endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth):

1. Aquatic Root Mat Community 1 (Jewel & Easter Caves)
2. Aquatic Root Mat Community 2 (Strong's Cave)
3. Aquatic Root Mat Community 3 (Kudjal Yolgah & Budjur Mar Caves)
4. Aquatic Root Mat Community 4 (Calgardup Cave).

Each of the four listed cave communities is recognised as distinct due to their differing composition of aquatic subterranean species (stygofauna) (Jasinska 1997; DEC 2008). A subsequent PhD study determined that Community No. 1 is limited in distribution to a small karst aquifer (area < 2 km²) comprising Jewel Cave, Easter Cave and Labyrinth Cave, located in the southern portion of the Leeuwin Naturaliste Ridge (Eberhard 2004). Community No. 1 comprises at least 15 species, including seven crustaceans (amphipods, ostracods, copepods) and eight species of oligochaete. At least two crustacean species are obligate subterranean forms (stygobites) and are locally endemic to this karst aquifer—the amphipod, *Uroctena* n. sp. (Figure 1), and the ostracod, *Areacandona admiratio* (Figure 2) (Eberhard 2004; Karanovic 2003). In addition the aquifer supports genetically isolated populations of a second species of amphipod, *Perthia* sp. (Figure 3) (Eberhard et al. 2005).

The Department of Environment and Conservation (DEC) in Western Australia is the State government authority responsible for managing and conserving the Leeuwin-Naturaliste Ridge TECs. A series of Interim Recovery Plans (IRP) has been prepared by the DEC (2003; 2008) for the four listed TECs, however, few of the Interim Recovery Plans (IRPs) recovery actions have been successfully implemented. Most known occurrences of aquatic root mat communities in the caves of the Leeuwin-Naturaliste Ridge have disappeared in the last few years, including from Jewel and Easter Caves.

The Augusta Margaret River Tourism Association (AMRTA) manages Jewel Cave, a prominent tourism attraction in the southwest region. The AMRTA also manages a significant portion of Easter Cave including this cave's only entrance situated within AMRTA's Jewel Cave Precinct. The AMRTA has an Environmental Management Plan for its Jewel Cave Precinct. This plan makes a commitment to conserving natural values within the Precinct including monitoring of subterranean fauna and habitats (AMRTA 2006). As part of this commitment, AMRTA commissioned Subterranean Ecology in July 2010 to survey and assess the condition of Community No. 1 in Jewel Cave and Easter Cave. This was supported through grant funding awarded to AMRTA from the Government of Western Australia's Natural Resource Management Grant Scheme.

STUDY AREA

The Leeuwin-Naturaliste Ridge is a narrow band of coastal dune limestone (Tamala Limestone) situated within seven kilometres of the coastline between Cape Naturaliste and Cape Leeuwin in the southwest of Western Australia. This survey was undertaken in Jewel and Easter Caves, both of which are located within the

southern part of the Leeuwin Naturaliste Ridge (Figure 4) and form the greater part of the Jewel Cave Karst System which comprises four watertable maze caves (Jewel, Easter, Moondyne, Labyrinth) that are hydraulically connected (Eberhard 2004).

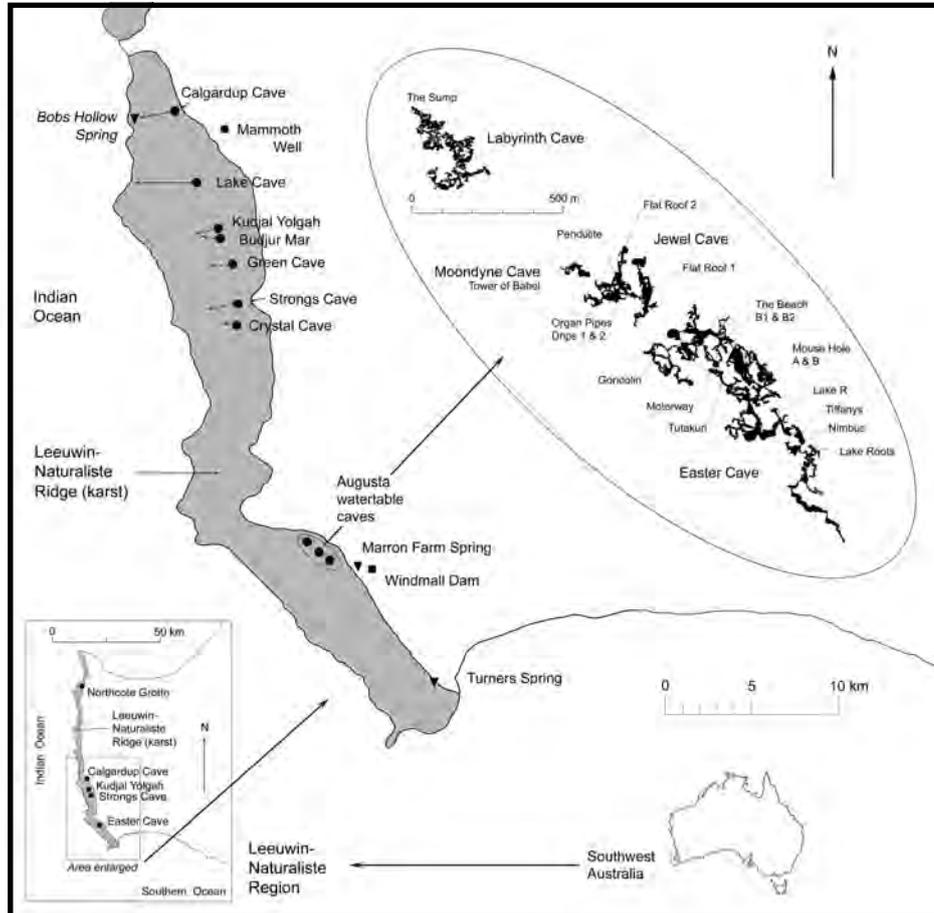


Figure 4. Jewel-Easter-Labyrinth Caves and other caves in the southern part of the Leeuwin Naturaliste limestone ridge (shaded grey). The Jewel-Easter-Labyrinth system is a watertable maze cave on the inland flank margin of the ridge – drainage direction in this system is eastwards. The other caves shown are all linear stream caves which drain westwards to springs on the coast.

MONITORING SITES AND METHODS

Previous studies have demonstrated that groundwater levels throughout the karst aquifer are concordant, so a single site in Jewel Cave (Flat Roof 1), which has been levelled to the Australian Height Datum (AHD), is representative of the watertable elevation throughout the karst aquifer (Eberhard 2004). At all monitoring sites throughout the caves, estimates of pool surface area and depth were made, and photographs taken. Root mat community condition was assessed by eye and photo monitoring. The attributes assessed were the condition of root mat growth (submerged/emerged/growing/decaying) and presence/absence of stygofaunal amphipods. Amphipods were used as an indicator for the

presence of the Aquatic Root Mat Community No. 1 since they are the only member of the TEC visible to the naked eye. Stygofauna were not collected during this survey as it was considered that this posed an additional risk towards extinction of the community. At all easily accessible sites, the pool edges and sediment were searched for amphipods and amphipod tracks in the mud, which indicate amphipod presence and activity. The field survey was undertaken 2nd July 2010 (Jewel Cave) and 3rd July 2010 (Easter Cave) by Stefan Eberhard, Giulia Perina (Subterranean Ecology) and Sarah Davies (AMRTA).

RESULTS (Abridged from full report)**EASTER CAVE**

Tiffany's Lake is the main monitoring site and the original "type locality" for the Aquatic Root Mat Community No. 1 (Easter Cave) of the Leeuwin-Naturaliste Ridge Caves (Jasinska 1996). Between 2000 and 2003 the lake had an area of 50m² (Figure 5a), which by 2006 had been reduced to a residual pool approximately 1m². This pool had decreased slightly in 2010 (Figure 5c). The depth of the monitoring site (Tiffany's A) had been reduced from almost one metre in 2000 to less than 0.5m in 2006 and less than 0.2m in 2010. In 2006, most of the root mat habitat lay subaerially exposed, while in 2010, there were no submerged roots in the residual pool. The roots appeared to be living although root degeneration was evident. The root mat within the residual pool appears to have decreased in biomass since 2006.

Both subsidiary pools and Tiffany's A were searched for stygofauna, with amphipod tracks and two amphipods sighted only in Tiffany's D. On previous monitoring visits to this site, amphipods were relatively abundant and included *Uroctena* n. sp. and *Perthia* sp. In 2006, only one individual amphipod was sighted (*Uroctena* n. sp.). The two amphipods observed in 2010 were juvenile *Perthia* sp. This is promising, suggesting that this species at least is still breeding, however no other fauna were observed including the locally endemic species, *Uroctena* n. sp. Tiffany's D was the only site at Tiffany's Lake with evidence of new root growth, although these roots lay subaerially exposed beside the pool. This pool contains a deeper hole (water depth 0.6m) which, at current rates of water level decline may provide the only refuge for water dependent organisms within one to three years (Figure 6).



Figure 6. Tiffany's D monitoring site (July 2010), one of three remnant pools of Tiffany's Subsidiary Lake which had a surface area of > 100m² in 2000 which has shrunk to approximately 1.5 m² in 2010. This is the only site where two individuals of *Perthia* sp. were observed in 2010. Photo: G. Perina, Subterranean Ecology.



a)



b)



c)

Figure 5. Tiffany's Lake water level monitoring site (Tiffany's A), (a) 1999 with submerged root mat, (b) November 2006, and (c) July 2010, showing residual pool, subaerially exposed root mat and ruler indicating approximate water level circa 2000-2003. Photos: S. Eberhard.

JEWEL CAVE

The root mat community in Jewel Cave, although previously extensive in 2000 was almost completely dry when inspected in 2004, and almost certainly dry by 2006; this was confirmed in 2010 (Figure 7). Representatives of the Aquatic Root Mat Community No. 1 were collected from this site in 2000 (Eberhard 2004), however this occurrence has now completely dried up. One last remaining tiny remnant pool is all that remains of a previously much more extensive series of large and connected lakes in Jewel Cave. This remnant pool does not contain root mats or stygofauna, although previously in the 2000-2004 monitoring period when the lake was more extensive, the endemic amphipod *Uroctena n. sp.* was collected from this lake.



a)

Figure 7. Jewel Cave, Flat Roof 2 monitoring site; (a) August 2000 and (b) August 2010. Note the depth of water in (a) is approximately 0.2 m. The loss of water at this site represents the loss of known occurrence of Aquatic Root Mat Community No. 1 in Jewel Cave.

Photos: S. Eberhard (a) & S. Davies (b)



b)

DISCUSSION

Groundwater Levels and Condition of Stygofauna Habitat

The watertable in the Jewel Cave Karst System is currently at the lowest level ever recorded, 22.6 m AHD, being 2.5 m below the maximum level recorded since historical measurement commenced in 1958, and 0.6m below the lowest palaeo (Pleistocene) level for which there exists any dated stratigraphic evidence (Eberhard 2004) (Figure 8). Since 2000, the ground water level has declined by more than one metre, or on average 101mm per year. The degeneration of tree roots at Tiffany's A suggests that the watertable is now critically low, and dropping at a rate too fast for tree roots to grow downwards with the descending watertable. At least 95 to 98% of all known areas of potential habitat for Community No. 1 have been lost. Most of the known habitat, which is characterised by watertable pools with submerged tree roots, has dried out. The available habitat is now restricted to a few small pools, of which only one (Tiffany's D) provided evidence of amphipods being present. Only small numbers of living rootlets, if any, are present in these pools.

Should water levels decrease by a further 200 mm, all but the deepest pools (present maximum depth <0.600m) within Easter Cave will be dry. Figure 8 indicates that at the current rate of water level decline, the aquifer will be desaturated by 2013 if not before.

Annual rainfall over the past 10 years at Cape Leeuwin has been consistently below the long term annual average (973.1mm). This has been reflected in the decline of the water table over this period. If this trend continues, Tiffany's Lake (pool D) will provide the only known potential habitat for amphipods and other groundwater dependant organisms within one to three years, however, this very small pool does not contain dense root mat habitat and is therefore unlikely to contain, or be capable of supporting, all species in Community No. 1.

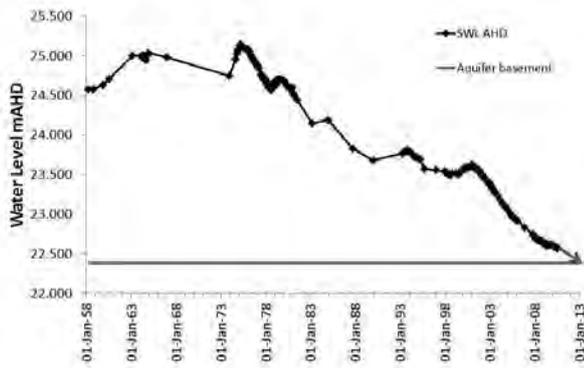


Figure 8. Jewel Cave hydrograph 1958 to 2010 showing groundwater level (SWL AHD) and aquifer basement as measured in Flat Roof 1.

Key Point 1. At the current rate of water decline, all known habitat for Community No. 1 will be lost within 2 to 5 years.

Condition of Community No. 1 (Jewel & Easter Caves)

All habitat and occurrences of Community No. 1 in Labyrinth Cave, Jewel Cave and The Beach (Easter Cave) have completely dried up and therefore local populations of stygofauna are no longer present. Root mats are exhibiting signs of stress, and stygofauna decreased abundance or apparent absence. The small number of amphipods observed in 2006 (one individual of *Uroctena* n. sp.) and 2010 (two individuals of *Perthia* sp.) is in contrast to the relative abundance of both of these species on previous monitoring visits when water levels were higher.

Key Point 2. At the current rate of water decline, loss of all known occurrences of Community No. 1 is predicted within 2 to 5 years.

Conservation Status of endemic species in Community No. 1

At least two specialized stygobitic species are locally endemic to the Jewel-Easter karst aquifer, the amphipod *Uroctena* n. sp. and the ostracod *Areacandona admiratio*. Extensive sampling in other caves of the Leeuwin-Naturaliste Ridge has not collected these species at any other sites (Jasinska 1996; Eberhard 2004). The Jewel-Easter karst aquifer also contains a genetically isolated population of the amphipod, *Perthia* cf. *acutitelson* (Eberhard et al. 2005).

Key Point 3. Likely loss of two endemic stygobitic species: *Uroctena* n. sp. and *Areacandona admiratio*.

Climate Change Projections

A range of independent climate models consistently predicts reduced rainfall for southwest Western Australia. By 2030, annual rainfall across most of

Western Australia is projected to decrease by 2 to 5 % relative to the climate around 1990. By 2070 a decrease of 5-10 % is most likely under a low greenhouse gas emission scenario, or a 10-20% decrease under a high-emission scenario. Winter and spring rainfall is likely to decrease. By 2030, annual average temperatures over Western Australia are projected to increase by up to 1 degree C in southern coastal parts of the state. By 2070 this increase is around 1.5 to 2.5 degrees C under a low-emission scenario, or around 3 to 4 degrees under a high-emission scenario. The combination of projected warming and less rainfall has serious implications for groundwater recharge and storage. Most models predict that potential evapotranspiration will increase over Western Australia.

(<http://www.climatechangeinAustralia.gov.au>)

(<http://www.ipcc.ch>)

(<http://www.ioci.org.au>)

Conservation Measures and Recovery Plan

The Department of Environment and Conservation (DEC) in Western Australia is the State government authority responsible for managing and conserving the Leeuwin Naturaliste Ridge TECs. An Interim Recovery Plan has been prepared by the DEC (2008), however, few of the IRPs recovery actions have been successfully implemented. Most known occurrences of aquatic root mat communities in the caves of the Leeuwin Naturaliste Ridge have disappeared or become severely reduced in the last five years, including Community 1 (Jewel & Easter Caves), Community 2 (Strongs Cave) and Community 3 (Kudjal Yolgah & Budjur Mar Caves). A recent increase in water levels in Community 4 (Calgardup Cave), and Crystal Cave, has been recorded, although the overall trend in most caves in the Leeuwin-Naturaliste Ridge is groundwater decline.

Prior to the 2010 survey in Jewel and Easter Caves, an inspection was undertaken in 2006 with a condition assessment report provided to AMRTA and DEC (Subterranean Ecology 2006). This report warned of the continuing serious decline in water levels since the previous survey (2000-2004). The report recommended prompt action or risk losing the community in the near future. About this time a hydrological modelling study by Dr Steve Appleyard (Senior Hydrogeologist, DEC) concluded that harvesting of rainfall at Jewel Cave was a feasible option to consider for ameliorating the groundwater decline in the karst aquifer for the purpose of conserving Community No. 1.

Despite the obvious significant decline in habitat and condition of Community No. 1, the most recent Interim Recovery Plan No. 281 (DEC 2008) recommended against intervention on the assumptions that:

1. lower water levels likely occurred in the past, and;
2. deeper refugial habitats exist.

The DEC Plan conceded that as yet there has been no physical evidence to support either of these two assumptions, a significant limitation with which the authors agree.

In relation to the assumption of lower water levels in the past, it is well documented that southwest Western Australia experienced cool and dry climate conditions during the late Pleistocene, however, the current climate regime is warm and dry, so caution is required in using palaeo-climate conditions as a proxy for the Present. Mean temperatures now may be higher than at any time during the Holocene and possibly well into the Pleistocene, so evaporation rates are likely to be higher now than at any time during the same period. Lower rainfall in the past may not have produced the same level of aridity as an equivalent average rainfall would now. A detailed chrono-stratigraphic study of palaeo water level changes in the Jewel karst aquifer spanning the Early Pleistocene to present supports this interpretation. The palaeo-hydrograph showed that the watertable fluctuated considerably but appeared to be generally elevated (between 24.5 and 29.5 m AHD) through the Late Pleistocene (Eberhard 2004; <http://www.lib.murdoch.edu.au/adt/browse/view/adt-MU20051010.141551>).

The lowest documented palaeo-water level in the Jewel-Easter-Labyrinth karst aquifer was 23.2 m AHD between 13,000 to 11,000 years ago, established by radiometric dating of a stalagmite near Tiffany's Lake (Eberhard 2004). Groundwater levels in the karst aquifer are presently at 22.6 m, which is 0.6 m below this minimum verified palaeo-level, and the base of the cave passages containing watertable pools (and stygofauna habitat) lies at approximately 22.4 m AHD (Figure 8).

In relation to the assumption that deeper refugial habitats exist, these do not exist in the Jewel-Easter aquifer because development of this "watertable maze" type cave system is confined to a narrow belt on the inland margin of the limestone dune where the hydraulic gradient is towards the east. This hydrogeologic pattern contrasts with all other "linear stream" type caves of the Leeuwin-Naturaliste Ridge which drain westwards to the coast (Figure 4). The linear stream caves may contain deeper saturated refugia in the inaccessible downstream sections of their drainage conduits nearer the coast, however the rapid conduit through-flow and seasonal discharge regime of springs such as Bobs Hollow Spring and Contos Spring indicates limited groundwater storage in these systems also. The Jewel-Easter system is a small perched aquifer resting on relatively impermeable granite-gneiss basement rocks. Permeability and groundwater circulation will be much more limited in the underlying granite-gneiss basement rocks, and is unlikely to provide a favourable habitat for stygofauna. The base of the cave passages containing watertable pools (and stygofauna habitat) is composed of clay sediments derived from weathering of the basement rocks. The clay sediments become anoxic a few centimetres below the surface and therefore cannot

support stygofauna. Any fractures in the underlying granite-gneiss basement rocks are likely to be filled with clay and anoxic, and therefore unsuitable habitat for stygofauna.

The Interim Recovery Plan (DEC 2008, pp. 21-23) lists a number of "recovery actions" that have been completed, are ongoing, or proposed to be undertaken, however recovery actions have not contributed to amelioration of the key threat (declining water levels) or to improvement in condition of any of the listed TECs. The IRP (pp. 24-30) proposes eighteen (18) future recovery actions to be completed in the five year term of the plan from 2008 to 2013. Now at the mid-term point of the plan (November 2010) the majority of the proposed recovery actions have not been initiated. The criterion for failure of the Interim Recovery Plan (DEC 2008 p21) is the "*proved total destruction of one or more occurrences of the threatened ecological communities and/or proved extinction of one or more listed species within them*".

Key Point 4. Failure of the Interim Recovery Plan prepared by the Department of Environment & Conservation (DEC 2008) is likely in the near future.

A major limitation of the Interim Recovery Plan is its necessary restriction to the four TECs listed under the EPBC Act. Subsequent to the earlier studies by Jasinska (1996) which resulted in the four listed TECs, multiple other aquatic root mat and stygofauna communities have been identified in the Leeuwin-Naturaliste Ridge caves (Eberhard (2004)). These communities are equally threatened by drying climate and declining groundwater levels. One example is Lake Cave which when surveyed in (2000-2004) held the highest richness of stygofauna species (23 species) recorded in the region, but when the cave was sampled in July 2010 it recorded a 74% decline in species richness (Subterranean Ecology & AMRTA 2010). The root mat habitat in Lake Cave had dried up and 14 species with root mat associations were not collected. The Lake Cave stygofauna community was recently nominated for listing as a Threatened Ecological Community under the EPBC Act. Lake Cave is currently the subject of a groundwater recharge trial and hydrological studies supported through grant funding awarded to AMRTA from the Government of Western Australia's Natural Resource Management Grant Scheme.

CONCLUDING REMARKS

To manage the risk of extinction of Aquatic Root Community No. 1 and endemic species in Jewel and Easter Caves, immediate action is required to ameliorate groundwater decline. Previous investigations indicate that recovery of groundwater levels in the Jewel-Easter karst aquifer may be feasible by harvesting local rainfall runoff and delivering this into the caves.

ACKNOWLEDGEMENTS

Jayne Hatcher (AMRTA Attractions Manager) and Lindsay Hatcher (AMRTA Natural Environment & Projects Manager) instigated this project and provided pivotal support along the way. This research was supported through grant funding to AMRTA from the Government of Western Australia's Natural Resource Management Grant Scheme. The expert guidance and support on hydrological aspects provided by Dr Steve Appleyard, Dr Ryan Vogwill and Margaret Smith from the Department of Environment and Conservation (WA) is gratefully acknowledged.

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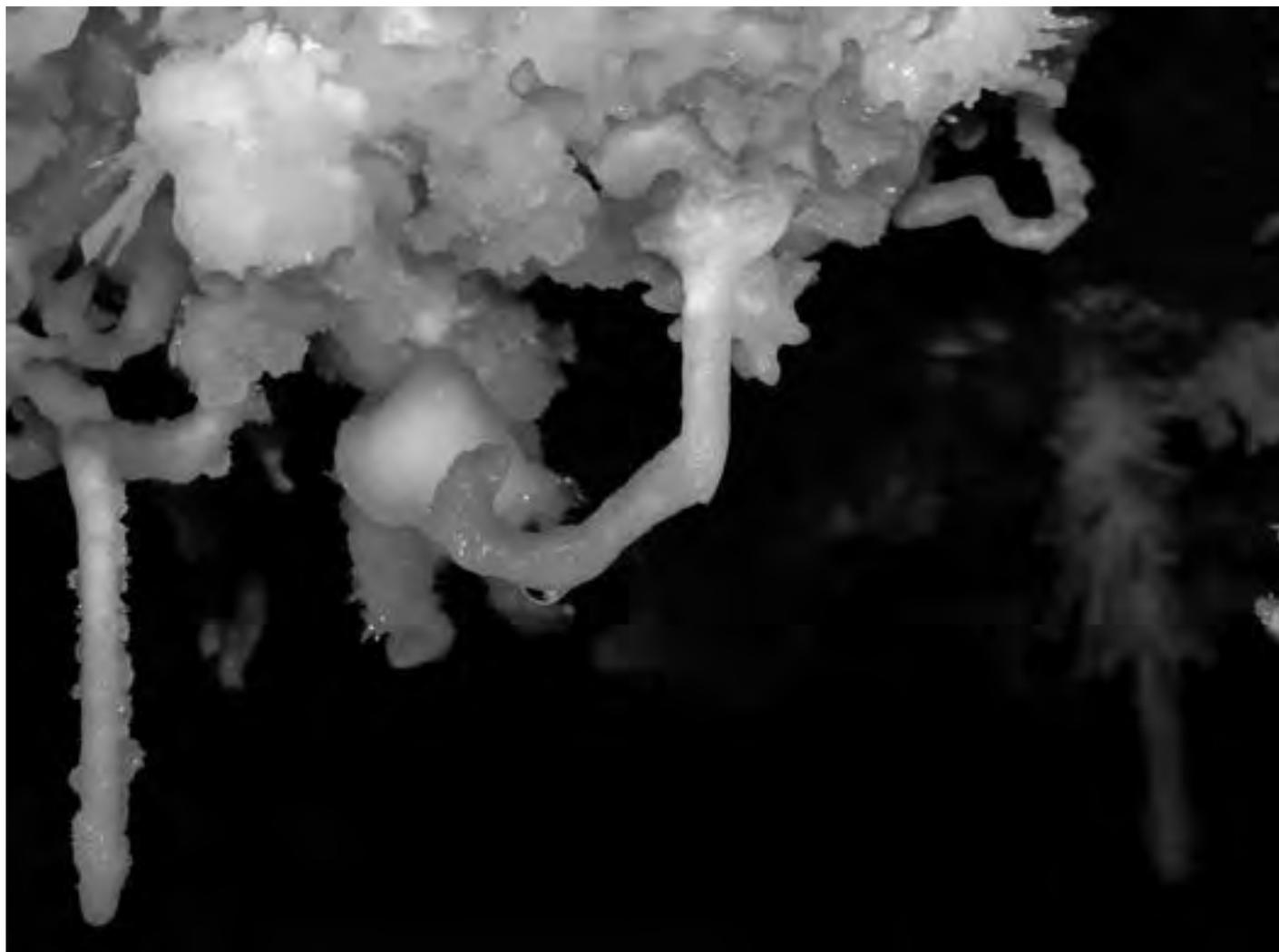
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Cave formations in Jewel Cave Photo: Steven Bourne

TAILENDER CAVE: MANAGEMENT by CAVERS

David Wools-Cobb



Tailender helictites

ABSTRACT: Tailender Cave has suffered considerable visitor damage since its discovery. Karstcare undertook to clean up much of this damage and install some infrastructure to mitigate further visitor damage. This was a long-term project over 10 years.

Tailender Cave (MC64) is in the Mersey Valley, near Mole Creek, Tasmania. It is on Forestry Department controlled land under a joint management plan between Parks & Wildlife Service and Forestry Tasmania. The cave is so called because it is on the very edge of the limestone bed in the Mersey Valley: the "tail end" of it.

The cave was discovered in the late 1960s with some dispute over who actually found it, and how much of it was explored. Tailender has, in effect, two distinct sections; about 600m of old stream way/collapse through to a sump, and above this, another totally

different section after an eight metre climb, which after passing through a large chamber of breakdown rockfall becomes truly beautiful, with a spectacular variety of speleothems.

Karstcare, an environmental group of cavers looking after caves, was formed in early 2001 under the Wildcare banner: volunteers assisting the Parks & Wildlife Service in reserves. Our focus has been mainly the caves and karst areas of Mole Creek Karst National Park although considerable work has been conducted in other karst areas.

Tailender became our first formal project with a site visit together with karst officer Rolan Eberhard on April 29 2001. Most of the cave was visited with various sections examined with regard to cleaning, and determining what areas needed to be track marked and string-lined off.



Stringline and message

Local cavers considered that the difficult eight metre climb would dissuade most casual visitors and so the more decorated section would be considerably protected. Regretfully this was not the case, particularly after the gating of a more popular cave downstream (Lynds Cave) seemed to result in a renewed interest in Tailender Cave.

In 2001 on my first visit to Tailender after many years I was shocked by the damage that had occurred, particularly muddying of speleothems. It appeared that many members of the “non-caver” community have been visiting this cave; people had been pushing through highly decorated areas with dirty clothes and leaving muddy residues, plus considerable mud tracking had occurred on the floor in previously clean areas. We felt that much of this damage would unlikely to be from “legitimate cavers” as clearly there were alternate routes and options to avoid such damage. Discussion ensued as to the possibility of gating to gain some control and this occurred in about 2003, with access at the discretion of the local PWS office.

We determined that although much of the mud in this cave occurs naturally, only certain sections could be targeted for cleaning, with installation of some boot washing stations to protect these areas once cleaned.

Our next visit a few months later involved one group doing a line survey to determine the development of the cave compared to two others in the same valley. This proved to be virtually identical (NNE from memory) to both Lynds Cave and Croesus Cave. Some of the group not surveying commenced cleaning some of the worst muddied speleothems: the “Sharks Teeth” plus one other area. These cleaned up quite well, however it was noted that orange clay seems to have penetrated well into microgours and some calcification had occurred over the top.

Photos were taken of pre and post cleaning efforts. We marked off three delicate areas to hopefully limit how far visitors penetrate, whilst still giving a view of what we were attempting to protect. We also placed two advisory signs- one on a lead that was a dead-end but needs removal of boots if visiting, and another towards the back of the main lead suggesting that continued traffic

was causing massive erosion on the mud banks beyond, hoping to dissuade future visitation. We also replaced the tape at the top of the eight metre pitch and left an improved ascent system (cordelette) in order to greatly increase the safety of this climb.

At this stage we felt that we had certainly left the cave in a better condition for our visit, however considerable expense would be involved in providing boot washing stations and matting. It was a few years later when funds became available to enable us to achieve more.

In 2008 a group of volunteers transported five metres of plastic matting, one backpack sprayer, and one boot washing bin in to the upper section. We encountered one nasty restriction getting the washing bin through. A lesson was learned regarding determining the dimensions of any infrastructure vs. the restrictions of access!

Much of the access to the working area involves about 400m of crawling; this was difficult with heavy rolls of matting, backpack sprayers and a boot wash bin. I found most volunteers fairly exhausted by the time they got to the place they were required to commence work.



Paul Darby at a wash station

Our cordelette system to climb the pitch was always viewed as temporary; on this trip we installed two P-hangers with a fixed rope, appropriately labelled. This made the access much safer and quicker. The P-Hangers were tested a few hours later and passed the appropriate stress test. All tape and maillons were removed and we installed a new boot wash station at the beginning of a beautiful pool area, to reduce future mud tracking. We also string-lined a route to limit further traffic in this area.

The traditional approach to cleaning is to use 20 litre backpack sprayers, however this would have involved considerable climbing, and the possibility of some damage to the cave. It was decided that trowels, a water pump and plastic piping would allow much easier cleaning in the future.

The matting was cut into 300mm wide sections and placed over the cleaned flow stone. We had discovered that aluminium pegs corrode considerably in the cave environment, so all pegs were replaced with stainless steel, and signage also replaced with a better-laminated type. A number of string-lines were placed to limit cavers to a main track.

On our next working bee we carted in 15m of matting, cut in 300mm wide strips, plus a boot washing station, 40m of plastic piping, a pump and fittings. We set up the pump and 20m of piping and commenced at a high level of the route, working back to the lower areas. We formed teams of two to clean various sections: one sprays while the other scrubs.

It was found that a 12v pump and 12mm black piping terminating with a fire fighting sprayer worked extremely well, with water on site and able to be pumped with force to lift and wash away the mud.

After cleaning off a section of the track, tube matting was laid to keep muddy boots above the cleaned flowstone. A new boot washing station was located at the end of the higher muddy section, for boot & glove cleaning for returning groups, and a further new boot wash station at the top of the rock fall.



On our next visit to Tailender Cave we had quite heavy packs - each with a roll of matting. We were trying a new type of matting - thinner & black, which seems to slip less on a slope. Unfortunately it also shows up the slightest bit of mud, but should still be effective in preventing mud tracking.



Matting was placed over sensitive areas

At one stage we had commenced cleaning on a considerable slope and it was decided that a better type of matting would be required to reduce the slipperiness of this area, whilst keep boots high above the (not cleanable) mud underneath.

After further cleaning, matting was placed in all the appropriate areas to keep boots above the mud. More matting was also placed around the two upper two boot wash stations and across the floor of the pool area. Fortunately where the matting was on a slope we managed to locate some natural tie points, negating the possibility of requiring "dynabolts".

Our final working bee in May 2010 we found the crawl was considerably easier without the huge load of gear that we had to transport into the cave in the past. This time we carted in a fourth boot wash bin, signage for each bin and pumps and batteries. This trip completed cleaning all areas planned and we photo-documented the project and some of the more beautiful parts of the cave. Laminated signage was installed to explain the intended use of each boot wash station, encouraging cavers to keep these stations filled.

We noted that the far boot wash station, being the first encountered returning from the muddy sections of the cave already contained a considerable amount of mud

since installed. This station will require regular 'servicing' to remove accumulated mud.

All previously installed signage was checked; only one showing slight moisture damage. All matting seemed secure, and although showing some mud on the surface, appears to be adequate to ensure mud is not picked up from underneath. The cleaned track seems to be remaining as such, with non cleaned areas to the sides sometimes in stark contrast.

We also took particular note of the condition of our boots after returning through the rock fall: the matting and cleaned track had dramatically reduced the accumulation of mud, even after the muddier sections of the rock fall. After determining that all sections of the upper part of the cave that could be practically cleaned had indeed been done, we removed all polypipe and cleaning equipment.



There were a number of lessons learnt from this project.

1. Natural rock is usually easier to clean than flowstone
2. Broad, long-term planning is required: it's disheartening to see more needing to be done at each visit.
3. A 12v pump and 12mm polypipe is an excellent method of transporting water: minimal impact on the cave and less physical effort for cavers.
4. With polypipe joined to a fire-fighting sprayer, good pressure can achieve lots of cleaning.
5. Each 10Ahr battery lasted about one hour of pumping; this could be extended with a caver switching the pump on/off as needed.
6. Choice of matting is important: it's expensive, heavy and can be slippery. We cut all matting into 300mm strips: just wide enough to walk.
7. Location of boot washing stations is critical for long-term management. These require periodic servicing and may need refilling with water by casual visitors.
8. All signage needs to cater for groups going in/out respectively; advising on when to clean boots and carry water to recharge the washing station.
9. Long-term solutions like P-hangers & replaceable rope optimise safety on a regularly climbed pitch.
10. Volunteers need a variety of jobs/cave to work in: my greatest fear was that they'd be burnt out by Tailender before completion of the job.
11. I noted quite an unexpected lack of recharging of the main water pool in the cave over some years: I feel our own impact this pool to be negligible, however even after some winters minimal recharging had occurred. Of late this pool is the lowest I've seen, perhaps a result of climatic change? (We've just experienced an extremely wet summer, which is unusual: the results on this pool may be interesting to see now).

CONCLUSION

A total of 237.5 manhours work has been contributed to this cave. (Not including travelling and administration). The cleaning has left the cave in a much better condition than pre-2001, with infrastructure in place to limit further mud-tracking well into the future. Periodic maintenance of the boot washing stations will be required and perhaps some re-cleaning over ensuring years.

Advisory signage cannot stop visitors from progressing, however most cavers would accept the reasons stated on this signage and limit further impact. Installation of infrastructure such as boot wash stations and matting should ensure that future visitors understand that someone cares greatly about this cave, hopefully that will impact on their own attitudes as well.

ACKNOWLEDGMENTS

Finance (essential for this project to proceed) Grants from Shane Hill Electrical, Devonport, Wildcare Inc and Forestry Tasmania. Special thanks to the 26 different volunteers: some making more than one tortuous trip!

CAVE of the WINDS

John Brush



Cave of the Winds Canyon

Cave of the Winds is a well known show cave near Manitou Springs in Colorado. Perched high in Williams Canyon on the eastern side of the Rocky Mountains, it attracts some 400,000 visitors a year and in 2011, it celebrates its 130th anniversary as a show cave.

An opportunity to visit the cave arose in February this year while Marjorie and I were in Colorado for a skiing holiday. Faced with the prospect of daunting long weekend queues on the slopes, we decided a 200 km detour to visit the cave was a more inviting option.

We had previously visited Cave of the Winds back in 1995. On that occasion we were fortunate to have been invited by local cavers to visit the spectacular Silent Splendor section of the cave. This is an upper level passage off the show cave route and beyond a tricky vertical muddy squeeze. It was discovered in 1986 and has very restricted access to protect its delicate helictite, anthodite and crystal displays.

When we thought back about our 1995 visit, we realised that although we had entered through the normal show cave entrance and walked on some of the tourist paths, we had seen almost nothing of the show cave. This year, we were determined to fix that omission.

But had we picked the right day? It was a sunny Saturday on a long weekend and, judging by the number of vehicles in the car park, it was apparent that not everyone in Colorado was hitting the ski resort slopes that day. What were all those visitors coming to see?

Inside the huge visitor centre (i.e. gift supermarket and tour sales counter), there were dozens of people milling around, shopping or queuing for tickets. Hmmm! More doubts about trying to see the cave today. On eventually reaching the front of the queue, we were offered a choice of tours; the standard Discovery Tour (45 minutes for \$18) or the Lantern Tour (90 minutes for \$22).



Yes, there were limits on party size and yes, there were lots of people ahead of us and we would have to wait our turn. However, the wait would be only 30 minutes. And yes, provided the first tour returned on time, we would be able to make the last lantern tour of the day with 5 minutes to spare. So, we handed over our money and signed up for both tours.

As we admired the T shirts, coffee mugs, jewellery, fossils and hunting knives in the gift shop, we noticed tour groups were heading into the cave every five minutes. Very efficient and the operation was running like a well-oiled machine. All too soon, "Group 17, with blue cards" was called. It was our turn - and before we had even finished inspecting all the merchandise on offer.

Access to the cave is via a short suspended walkway from the rear of the visitor centre and through a short tunnel excavated in 1895. Once inside the real cave, our guide explained we had to bunch together in family groups or with friends to have our photos taken. Sensing we were all thinking this was just a ploy to extract more money, the guide quickly added that although our photos would be ready to inspect as we left the cave (but with no obligation to buy), the most important reason for the photos was for our safety. If anybody got lost, management would know what they looked like. This seemed like spin to us, but we later came to realise it was a plausible story. Our guide took only a minute or two to photograph everyone using a camera bolted to a hand rail and a flash affixed to the cave wall that was aimed at a small carpeted alcove where we were directed to stand.

As we left the photo area, someone from the office retrieved the memory card from the camera and inserted another one ready for the next party, due in two minutes time.

The cave is a joint-controlled phreatic maze with many narrow fissure-like passages along its 3km length. The show cave route is not overly endowed with decoration, due in part to vandalism in the 19th Century.

Our path through the cave took us along many passages and around several loops. We encountered several other tour groups in our travels and at times we had to wait as another group squeezed by.



During two of these encounters we nearly picked up some extras, so perhaps the guide was right about the group photos being a safety measure. Our party was a bit slow, or at least slower than the guide expected, because an elderly woman had brought her mother who had recently suffered a stroke and was, understandably, having some difficulty negotiating the steep and narrow steps and ladders. "They never told us there were any steps", the daughter kept saying. Bringing up the rear of the party, we helped them along. Of course, this had nothing to do with our desire to get back on time to make that second tour.





Souvenir photo

protection for the naked flame and a degree of fire safety for visitors. The light output was feeble, but at least it was possible to see the outline of the low passage immediately in front of us. Soon however, the passage dimensions increased and once our eyes became accustomed to the dim glow of the 20 assembled lanterns, it was possible to see something of the cave. The lanterns certainly added a historic air to the tour. Our guide added to the historic theme by outlining the early commercial, property and legal disputes associated with Cave of the Winds and the rival Manitou Grand Cavern in which we were standing at that moment.

Amazingly, we returned to the entrance almost right on time. As we stepped into the afternoon sunshine, the guide handed out the photos mounted in attractive souvenir folders, with a cheery “keep it if you like and pay \$10 at the shop, or hand it back to me before you leave”. Oh well, it’s only \$10.

Before long, it was time for our lantern tour. This was to take us into an unpaved, unlit part of the cave and we were to be issued with candle lanterns, or at least their modern equivalent. But first we had to pass through a cut-out of a cave passage. As our young guide explained, if we couldn’t bend down and get through this, we wouldn’t make it through the cave. Fair enough. Back into the cave for another ‘safety photo’ and then it was a quick trip along the same tourist route as before, but this time there was no stopping, except at the traffic congestion points.

At the end of the concrete path, we stepped onto earth floor and climbed a set of wooden stairs. At the top, there was a gate and a rack holding rows of metal buckets. The buckets, as we were soon to discover, were our lanterns. Each had a hole punched in the side and into this was inserted a small wick lamp - a glass bottle filled with a kerosene and wick protruding through the lid. A wire running from the lip to the bottom of the bucket formed a handle, so that the bucket was carried on its side with the inside of the base acting as a reflector and the sides providing a degree of wind



The lantern rack

Cave of the Winds was discovered in 1869, but it was not opened to the public until 1881 when George Snider and Charles Rinehart formed a partnership to open the cave. However, the partnership soon soured with, amongst other things, claims by Snider that Rinehart was more interested in collecting (and pocketing) the admission fees than in developing the cave for visitors. In 1884, Snider saw an opportunity to develop another cave he had found in the area and soon traded his half share in Cave of the Winds for forty acres of land near his new cave. Now wary of partnerships, he opened his new cave, Manitou Grand Cavern, to the public in 1885. Before long, there were commercial rivalries between the two operations.



The Tulip- Silent Splendor

The majority of visitors (and revenue) apparently gravitated towards the more spacious and better decorated Grand Cavern, which before long, also advertised an Indian skeleton as an additional viewing attraction. Then there were ownership disputes - under whose property did the caves lie? Both sides scored victories in the courts. However, the legal claims and counter claims that started in 1886 were not fully resolved until 1916 when Snider sold up and moved to California. This followed the final court battle brought by Rinehart's daughter, Emma, which resulted in the Grand Cavern operation being handed over to Cave of the Winds. Under common management, Grand Cavern soon fell into decline and in 1921 the entrance collapsed after heavy rain. In 1929, an underground connection was discovered between the two caves, but it was not until 1973 that the public was again able to visit the Grand Cavern passages on an adventure caving trip. The adventure tours were phased out in 1996 in favour of the lantern tours.

The lantern tour was a relaxed affair and with a captive audience for 90 minutes, the guide had ample time to talk about the fascinating history of the cave and to point out relicts dating from the early 20th Century tours. However, as with our earlier tour we were not overly burdened with information about speleogenesis or morphology of the cave.

Upon returning to the entrance, we eagerly pounced on the souvenir photos. Oh well, it's only another \$10. Interestingly, most people appeared to purchase their photo, so the arrangement seems to be a real money spinner for the operation.

Despite the disappointing spiel on the first cave tour and the general paucity of scientific information about the cave, we came away with a positive impression of our Cave of the Winds experience. Being there on such a busy day certainly demonstrated the management team was able to efficiently handle large numbers of people and, apart from the occasional need to briefly queue in the cave, the numbers did little to diminish our experience. The idea of taking photos of all visitors is something that some local cave operators might give some thought to.



The French Tickler -Silent Splendor



Silent Splendor

CAVE of the WINDS-PART 2

Peter Buzzacott

The Cave of the Winds is a major draw card for nearby Manitou Springs, about 120kms from Denver, Colorado. The passages are filled with stalactites, walls are covered in flowstone and they are open 364 days of the year. They sell season passes, arrange individual tours for groups of 15 or more and each year a number of weddings are performed in the main cave.

My wife and I wound our way from the highway upwards towards the Cave of the Winds car-park, following ample signage. The car-park is about the size of a cricket pitch and the attractive walkway to the main building is lined with raised stone flowerbeds and yet large enough to accommodate a queue of coaches dropping off and turning. There is no entry fee: anyone can walk in and buy souvenirs, junk-food, soft-drinks, and they are welcome to do so from 10am till 7pm daily, even 9am till 9pm on public holidays.

On first impression this confused me. We just walked in and no-one asked us for money. We walked around the balcony, took photos of the wonderful cliffs on the opposite side of the gorge, took turns on the coin-operated binoculars, then we even walked over to the glassed display of cave history. The limestone was

deposited during the Paleozoic era, some 500 million years ago, the seas that covered Colorado receded around 70 million years ago, the area was lifted and is now classed as high altitude, and the rooms and decorations formed some 4-7 million years ago. Learning this didn't take long as the glassed displays occupy a small corridor, tucked out of the way of the fast-food and souvenir shops.

We wandered into the gift shop and found ourselves in retail paradise. Wall to wall, floor to ceiling souvenirs: mugs, stuffed toys, games, magnetic rocks, books, table mats, tea-towels, you name it, they sell it. There were two checkout areas, at either end of the store, and both had customers queuing. We wandered around and then joined a queue to purchase tickets for the next tour of the cave. A variety of themed tours were on offer such as the "Lantern Tour" which, as the name implies, is conducted with lanterns. We chose the regular tourist tour and spent the next forty minutes browsing through the souvenirs or watching people pan for gold outside. A working sluice keeps the water flowing, pans are supplied, all you need do is buy a bag of "ore". While we were waiting, two other tour groups formed and entered the cave, then it was our turn while about another 50 people milled around behind us, awaiting their tours, shopping or panning for gold. This cave hosts many thousands of visitors per year.

We entered the cave and immediately everyone was required to pose for a photo in front of a green screen, the antithesis of nature-based tourism. We politely refused but clearly we were mistaken and needed the process explained to us in simpler terms. Disapproving frowns at our individualism over, our tour guide could have worked in Disney, pattering off her scripted safety



Pay binoculars and opposing cliffs



*The walk from the carpark to the entrance
Photo: Cheryl Buzzacott*

brief and politically correct joke, all of it simple enough for children to grasp. The footpaths are well maintained, there are 200 or so stairs but the pace is slow enough for herds of tourists to puff their way along. Today the chatty guide delivered the usual spiel about rainwater dissolving the limestone above and we listened to how stalactites hang down and stalagmites grow up and they're both grown by depositing calcium and so on. The lighting was static but restrained, (I didn't spot any algal growth), and the decorations ranged from massive frozen flows to delicate helictites. In one of the blander passages someone had thoughtfully written on the wall (in stone) "DREAMS OF MOUNTAIN AS IN THEIR SLEEP THEY BROOD ON THINGS ETERNAL", which gave everyone something to think about. Mainly I wondered where the pieces were that people had snapped off.

We found ourselves back at the gift shop just as another group entered the cave to have their photos taken in front of the green screen. Their tour guide gave the same safety brief, made the same politically correct joke and they wandered off down the passage. A few of us purchased digitally-enhanced fake photos, all of them now printed and hanging in rows, but most ended up in an overflowing bin destined for landfill.

The Cave of the Winds is professionally managed and one of the most popular show caves in the USA, even more so since Al Gore announced this is where the "man-bear-pig" lives in an episode of South Park. Aside from the well-trodden paths, there are wild sections closed to the public, hidden bat colonies and rare crystalline speleothems housed in controlled humidity. But, from a show cave management perspective, the Cave of the Winds is also worth a visit to see how efficiently people can part with their money. No-one does this as well as our American colleagues so the next time you're passing call in – it's free to go in and look around...



Above Some of the more than 200 steps

Below left Silent Splendor Photo: John Brush

Below right Wide paths and ample lighting



A RETURN VISIT TO WAITOMO

Miles Pierce



The new visitor centre at Waitomo Glow worm Cave

In November of 2010, in the course of a two-week car tour in the North Island of New Zealand, Rhonwen and I spent two days at Waitomo, renewing acquaintances with local ACKMA members and seeing some of the significant cave tourism developments and changes. We were last at Waitomo for the 12th ACKMA Conference that was held there in 1997.

The most striking change of course is the recently completed new visitors centre at the famous Waitomo Glowworm Cave. As reported by Greg Martin in ACKMA Journal No 81, the new visitors centre was officially opened on 21 October 2010 – only days before our visit – and replaced the previous centre that was burnt down in 2005.

As Greg outlined, the new centre is characterized by its evocative roof, fashioned to be reminiscent of the Maori woven hinaki or eel catcher. The lightweight ribs of the roof structure support a double layer of transparent plastic fabric with a sustained static air space between the inner and outer parts to afford convective heat insulation. It had already been dubbed ‘the bubble-wrap roof’ by some wags.

The roof soars above and is largely separate from the excellent functional building spaces beneath it. These include a front-of-house ticket purchase foyer, an interpretation theatre, an exhibition area, a café and a restaurant, plus a well-stocked gift and souvenir shop.

At the time of our visit, the exhibition area had an informative series of panels explaining the architectural concepts embodied in the new visitors centre and its link to indigenous cultural heritage, as well as pictures of the construction phase.

We enjoyed a lunch in the spacious restaurant area beneath the cavernous roof. It was a bright sunny day and the solar radiation transmitted through the essentially clear roof fabric made itself felt, not withstanding that the high roof is open at each end to allow a through draft. This comfort issue may have since been addressed.

The longevity of the unusual roofing fabric will be something to watch, however, there is no doubting that it is visually impressive as well as making an important cultural connection with Waitomo’s past.

Our first entry into the local 'underworld' was with Van Watson, in company with Pete and Libby Chandler, to see the then recent upgrading works in Aranui Cave under Van's able planning and management.

In particular, many new sections of walkway have been installed along the main passage using steel framing, galvanized after fabrication and typically supported off and fixed into the adjacent cave walls. In much of this cave the deep sediments on the passage floors precludes getting a sound footing for support piers. New decking material comprised around 20mm thick, black plastic grid-mesh tread spanning up to 900mm. This same material had also been used for the treads on new and old concrete stairs, with spacers inserted to facilitate occasional hosing out of accumulated dirt.

The walkway upgrading works within the cave had been accomplished between regular cave tours and at night, such that there had only been one three-day interruption to normal tour operations. A very commendable achievement. Aranui is essentially an old 'fossil cave' with a typically high and narrow ascending main passage with some fine sculptured passage shaping and sections of good speleothems.

Much of the floor is covered by deep sediment, and although generally dry, a small flow occurs in wet weather. The cave lighting was also upgraded as a part of the redevelopment works to enhance the visitor experience and safety.



*Suspended walkway in Raukuri Cave.
Photo: Rhonwen Pierce.*

Returning to the visitor centre, we were given the opportunity to join a regular guided tour of Ruakuri Cave and duly joined a minibus for the 3km trip out to the Ruakuri carpark. The upper parts of Ruakuri Cave that had been used for cave tours for many years in the early days were closed in 1988 due to complex land ownership issues and 'bureaucratic hurdles'. Subsequently, cultural sensitivities arising from recognition that the main upper level entrance had once been used as a Maori burial site and its inclusion in a special reserve precluded its reuse as a show cave entry point. After eventually reaching agreement with the various ownership parties, Tourism Holdings Limited (THL) embarked on an ambitious and costly project to construct a new artificial entrance.

After much careful planning and design, the new artificial entrance took form as a 10m by 15m deep reinforced concrete shaft with a wheelchair friendly helical ramp around the internal periphery. Softly lit with LED track lights only, it is indeed an unexpected and visually impressive entrance - particularly to an engineer like me. The entrance is worth a visit in its own right! Van Watson acted as THL's on site, hands-on development person with John Ash assisting in a consulting and advisory capacity.

At the bottom of the entrance shaft, a 22m long diameter concrete pipe tunnel with airtight doors at each end gives access to the upper passageways of this extensive active stream cave. Ruakuri Cave was reopened for regular cave tours in 2005 and as well as its innovative new artificial entrance it has extensive sections of walkway bracketed off the cave passage walls and/or suspended by stainless steel cables from bolt fixings into the roof.

In places, the walkways are suspended above the perennially active streamway. Like the recent upgrading in Aranui Cave, the new elevated walkways utilise post-fabrication galvanized steel frames and plastic grid-mesh tread. Elsewhere, concrete paving maintains a smooth flat or gently graded path for the approximately one kilometre loop.

Understated low-voltage lighting is employed throughout and the guided tour has the rare distinction of being fully wheelchair friendly despite its significant length and the many challenges that were presented by the passage shapes and sections that traverse above the active streamway well below. In all, it is a great achievement and a credit to all who were involved in its conception and successful implementation.

More information on the redevelopment of Ruakuri Cave is contained in articles in ACKMA Journals Nos. 57 and 60, and particularly in the paper on the subject presented at the 16th ACKMA Conference by Greg Martin and John Ash. Recourse has been had to these sources for some of the details mentioned above.

The lower streamway part of Ruakuri Cave has continued to be used for the ever popular 'Blackwater Rafting' adventure caving operation, originally set up by John Ash and Pete Chandler, and now operated by THL.

Finally, Rhonwen and I were treated by our Waitomo hosts, Pete and Libby Chandler to a personally guided look at their 'Spellbound' experience. This operation utilises two caves that at the time of the 1997 Conference were operated in a relaxed low-key way by Derek Mason on his farm property.

Pete and Libby have continued this style but enhanced the operation with their own imaginative and practical improvements. The tours are limited to a maximum of twelve participants and include a minibus ride through the picturesque Waitomo countryside and the impressive dissected karst landscapes when nearing the site.

On alighting the minibus, participants have the opportunity of observing and feeding tame eels lurking in the surface stream before donning light equipped helmets and walking the short distance to the swallet entrance of the Mangawhitikau glowworm cave.

After traversing the delightfully sculptured entrance series, including crossing the stream on a bridge – with another opportunity to spot eels – the visitors board an inflatable dinghy, turn off their lights, and for the next half hour or so can take in the prolific glowworm display whilst their guide propels the craft using a guide rope. There is an opportunity to disembark just prior to the removable dam which makes the streamway navigable, and observe the latter end of the cave near where it sumps.

A leisurely return is then made in the dinghy, giving a second opportunity to appreciate the bio-chemical illumination produced by the prolific glowworm population, with the visitors eyes by now fully dark-adapted.

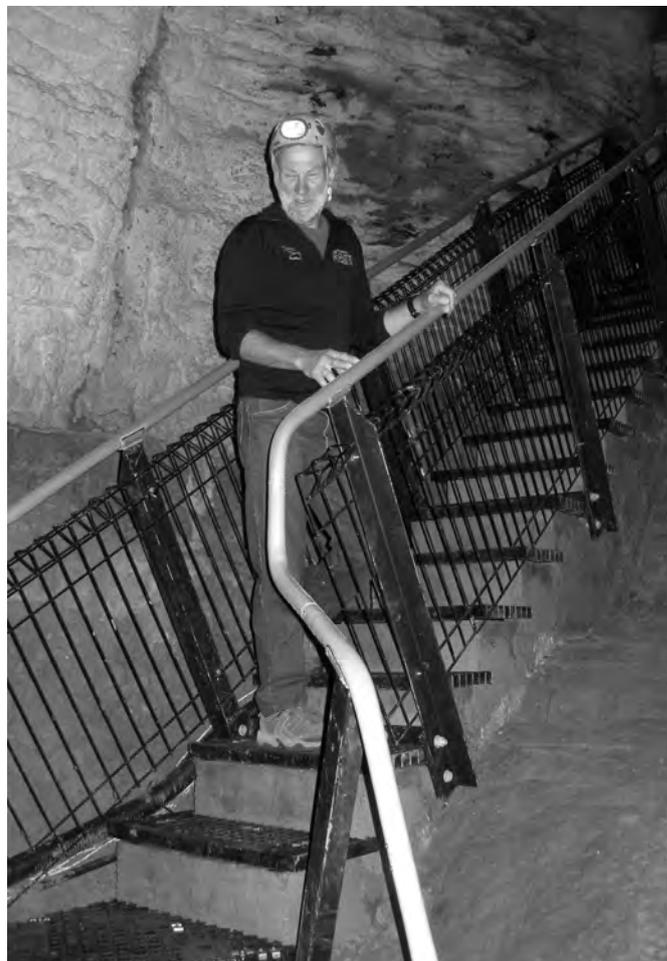
After exiting the glowworm cave, a short excursion in the karst gorge takes visitors to Te Ana o Te Atua or 'Cave of the Spirit', a spacious horizontal former stream passage. Pete and Libby and their team have completed placing concrete paving and sections of marginally elevated walkway, plus installed low-voltage track lighting powered from a small engine-generator in a shed outside.



Pete and Libby Chandler in Mangawhitikau Cave.

The cave is a very easy walk-in and return the same way, with interesting passage shapes, bedding plane exposures and patches of nice speleothems, plus a cache of animal bones. Two roof windows – tomos – that admit dappled outside light, also add to the interest of this cave. *(Issue 57 of the ACKMA Journal referred to above also has information on the development – then at an earlier stage – of the Spellbound experience).*

In all, Spellbound offers 3+ hours of diverse karst experience in a relaxed and friendly style for small parties. For 'free independent travelers' and others who have the time, Spellbound provides a different and more intimate way to observe glowworms compared to the Glowworm Cave in Waitomo itself which caters for large groups with frequent tours to meet the needs of the many package tours that include Waitomo on their itinerary, in addition to other casual visitors.



Van Watson on refurbished stairway in Aranui Cave.

Waitomo truly has something for everyone. Its world renowned Glow Worm Cave, now replete with its new and distinctive visitor centre, the associated show cave options of Ruakuri Cave and Aranui Cave, a range of adventure caving options including the well known Black Water Rafting and other challenging privately run operations.

Then, for those not wanting to don a wet suit or otherwise indulge in strenuous guided wild caving, Spellbound offers a non physically demanding opportunity to spend three hours learning about and appreciating the local karst, two delightful caves and a different glowworm observing experience.

Rhonwen and I would particularly like to record our sincere thanks to Robert Tahurangi and Van Watson of THL and to Pete and Libby Chandler for making our return visit to Waitomo after thirteen years so rewarding and enjoyable.

JUNGLE FAIRIES

Steve Bourne



Henry and Syria with some Australian friends

When ACKMA visits a cave location, it likes to make a mark. One way has been raising funds for an appropriate local cause. Last year when ACKMA visited Mulu, Cathie Plowman again led the charge to raise funds, this time for training for Mulu staff. A significant sum was raised, probably influenced by Mulu Manager and ACKMA Life Member Brian Clark's promise to match the sum raised. Sorry Brian, I cost you a bit!!

Brian considered bringing some staff to the ACKMA conference in Tasmania but the cost was high and a week of conference would give staff little opportunity to learn from local staff. Typically, Brian went all the way to the top and sent an email to Department of Environment and Natural Resources (DENR) Chief Executive Allan Holmes seeking DENR to support a visit from two Mulu staff, and if Allan was supportive, he would speak to "Bournie" to make it happen. As always, Brian's timing and planning were impeccable. Allan visited Mulu at the end on 2010 and he had clearly fallen in love with the place and Allan directed

"Bournie" to make it work. Being a good public servant I followed instructions.

Brian brought Syria and Henry to Australia in early March. Both have impressed me in my two visits to Mulu with their knowledge and passion, and also with their desire to learn. The first evening I arranged a barbeque for Brian and Sue to meet with friends, some they had not seen since departing for Mulu 10 years ago. It was a great evening and an opportunity for Naracoorte staff to meet or reacquaint themselves with Henry and Syria. Henry stole the show explaining he was raised in the jungle and did not see a "long nose" (white person) until he was six years old, and that his education was all outside what we see as the regular means to gain an education. Although his formal schooling may be lacking, I have never met a more observant person, nor one more able to interpret the environment he was looking at. Somewhere during this evening the term "jungle fairies" came to mind to describe our guests, which somehow stuck and was a name they loved.



Henry and Syria in Starburst Chamber, Victoria Fossil Cave, Naracoorte

Syria and Henry had variety of experiences at Naracoorte. Naracoorte staff took them on a number of adventure tours, they learnt and led show cave tours and visited a number of sites away from Naracoorte. They spent a day visiting Tantanoola Cave, Piccaninnie Ponds, Mount Schank and the Blue Lake with Andrew Hansford and Deb Carden took them to the coast; the first time Henry had seen the ocean. I wish I had been there to see his reaction, Deb was worried he might not stop when he ran into the water! I also took Brian and Sue to Bool Lagoon. This ephemeral wetland had been mostly dry since Brian left, after Brian drained it to allow vegetation to regenerate. It has been a standing joke that Clarkie was to blame for Bool Lagoon being dry for 10 years so it was fabulous to be able to show him with record March levels in it. At least I had filled it up again!!

They had 9 days at Naracoorte which passed all too quickly. On their penultimate day, I drove them to Adelaide to meet up with Brian and Sue at Cleland Wildlife Park, where our department showcases local and other wildlife, most famously the koala. The park provides excellent opportunities to get up close and personal with Australian wildlife. The obligatory photos were taken with koalas, kangaroos and emus plus a few other Australian friends.



Syria and Henry took full advantage of the opportunity, observed their surroundings, made their own assessments of the Naracoorte business and planned what they would take back to other Mulu staff. I feel the funds ACKMA left at Mulu to support training have been really well utilised and ACKMA has made a significant improvement in the interpretation at Mulu.

The following email was forwarded by Brian on behalf of the “jungle fairies” and it is worth including to show how much they gained from the experience.

Dear ACKMA Members and Naracoorte Caves Management (and also Brian).

We would like to express our deep and sincere thanks to everybody at Naracoorte Caves. We found the programme very interesting, comfortable accommodation providing good service and food. We would like especially to thank everyone who sponsored our trip because without the assistance from you guys our dream could not come true. We feel very grateful to be able to further our knowledge. Our trip was wonderful and we thank you for making it so. We feel we were really able to enjoy the main sights and get a feel of the land and we were such a short time in Naracoorte but those trips showed us some fascinating highlights. The friendliness and hospitality of Naracoorte will stay in our hearts.

This memorable experience will definitely enhance ourselves to bring a better guiding system in the future to Mulu.

Yours sincerely,

Syria and Henry.



Fox Cave, Naracoorte. Henry “wrote” NCTE, an abbreviation for Naracoorte with his headlight.

THE 19TH CONFERENCE on CAVE and KARST MANAGEMENT ULVERSTONE, TASMANIA

Steve Bourne



The 19th Conference was held in Ulverstone Tasmania from 8 May to 13 May 2011. Approximately 60 delegates gathered from around Australia and New Zealand, plus overseas guests Prof Arrigo Cigna from Italy and Peter Gazik, accompanied by wife Zuzanna and daughter Katarina, from Slovakia. Some pre conference caving was enjoyed by a few including Prof Cigna who managed a trip into Genghis Khan, his first wild cave for over 10 years.

An evening welcome was held at the conference venue with special guest Paul O'Halloran MHA, a Greens Member for Braddon. Paul addressed delegates and made himself accessible for a chat during the evening. He had a good knowledge of the environment and issues in the local area and his comments were warmly received.

The conference was opened by His Excellency Peter Underwood, The Governor of Tasmania. Cathie Plowman had written to Government House inviting him to do so, and he accepted. While quite a formal affair, he was relaxed and certainly helped us do the same. I was honoured to do the introductions and spoke of various

Governors' cave visits which His Excellency expanded upon. After the opening he enjoyed his first ever cave visit to Gunns Plains with Geoff and Trish Deer. I am not sure Geoff followed all of the usual protocols of a Vice Regal visit. While researching vice regal visits to Australian caves I was amazed at how often this has happened, perhaps an opportunity for a historian to prepare a paper addressing this topic?

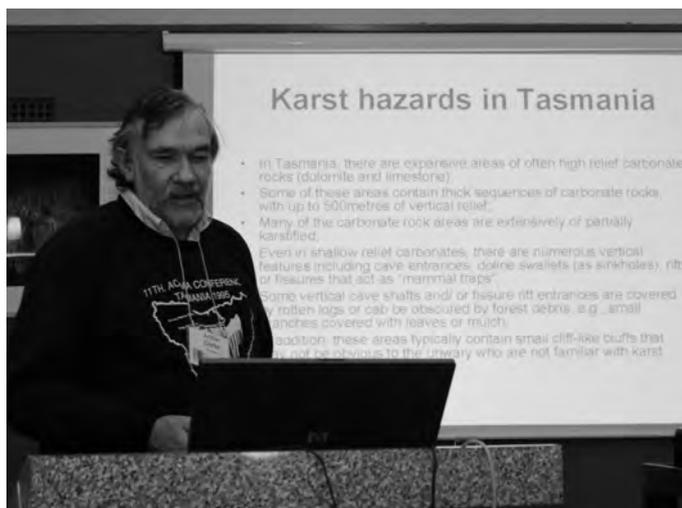
Prof Cigna delivered his keynote address *State of Show Cave Management in the World* and stimulated some discussion with the International Show Cave Association (ISCA) Show Cave Management Guidelines, which have previously been published in this journal.



L-R Cathie Plowman, Prof Arrigno Cigna, Tony Culberg, His Excellency The Governor and Councillor Jan Bonde and Steve Bourne at the microphone
Photo: Ross Anderson

Steve Bourne thanks Prof Cigna for his address
Photo: Ross Anderson

Chris Sharples followed this with *Tasmanian Wilderness for the Armchair Explorer*, a brilliant synopsis of karst within the Tasmanian World Heritage Area and the potential for more caves and even karst areas to be found. Andy Spate delivered the third keynote, *An Overview of the Mole Creek Karst* which had been expressly commissioned by the conference organisers. Andy's presentation showcased some of the superb Mole Creek caves and karst and discussed Mole Creek's significance. The photography of David Wools-Cobb was outstanding and certainly whetted the appetite for the Tuesday field trip.



Arthur Clarke delivering his paper
Photo: Ross Anderson

Arthur Clarke started proceedings after lunch with *Lost in Tasmania's wilderness karst*, a paper that dampened my enthusiasm for traipsing around Tasmania looking for caves after learning of a number of people who have never returned from doing just this. Dr Nic Haygarth's paper *Dan Pickett, Pioneer Cave Guide* explored the facts and myths surrounding one of early Tasmania's characters. *What turns glow worms on?* was Michael Driessen's contribution. Michael has been monitoring glow worms for a number of years and presented his findings. Arthur Clarke followed this with his paper asking the question, *Bioluminescence in glow worms: do tours have an effect?* Glow worms certainly attract a great deal of research interest as well as capturing the public's imagination.

Deborah Hunter presented *Landslides of January 2011 in part of the Mole Creek catchment*, yet another example of the extreme weather Australia has been subjected to in recent times. I was part of a group Deb led to Honeycomb Cave field trip the following day and was able to view first hand the damage. It is clear Parks Tasmania has an incredibly energetic and valuable volunteer who greatly assists with managing this area. Nicholas White concluded the first day's papers with *Karst in the Mid-Proterozoic dolomite, Pungalina Station, Northern Territory, Australia-its significance and management*. There is no doubt caving in this remote part of Australia is tough going.

On day three we journeyed to Mole Creek Karst Area, one of my favourite Australian cave and karst areas. In King Solomon's Cave, Neil Kell explained the rationale behind his lighting system installed in 2005. The linear nature of the cave makes it a lighting challenge but Neil has created a nice experience, although it was difficult to view as he intended with our large group moving through the cave. Some path lighting was quite low and Neil explained that the lights were now less effective than when first installed. The same lights are now more than twice as bright and only 60 % of the cost of six years ago. Such is the rate of advance in LED technology.



Deb Hunter speaks to a group at Honeycomb Cave, Mole Creek



Prof Cigna, Andy Spate, Derek and Deb Mason

The time allocated for Marakoopa Cave was greatly exceeded and put the schedule way behind. Marakoopa is rated by a number of people, including myself, as perhaps the best show cave in Australia. Other caves have more spectacular speleothems, more glow worms, bigger streams and a longer history, but for its all round interest and diversity this cave is right up there. On our visit to Circular Ponds, the farm of Glen Anderson, we were shown the changes that have occurred since the January 2011 floods. Dolines are growing in size and beginning to coalesce.



Dolines at Circular Ponds, Mole Creek

We split into groups to visit either the Trowunna Wildlife Park, a hit with our international guests, Alum Cliffs State Reserve or the Honeycomb Cave surface walk. Our guides for the day, Chris Sharples and Andy Spate, with contributions from Deb Hunter, David Butler, Nic Haygarth and others made for a rewarding and informative trip.

Three papers were presented in the Mole Creek Hotel late in the afternoon. Deborah Hunter presented *Tourism micro-business, Mole Creek, Tasmania*. She has played a significant role in introducing visitors to responsible caving and filling a niche in the tourism market. Stuart Brownlea, the Natural Resources Management Officer for the Meander Valley Council, presented an excellent piece of work in his paper *Planning in a Land Use Mosaic-Innovative Approaches on the Mole Creek Karst*. I look forward to seeing this paper written up and its possible application to other karst areas. Rod Pearse of the Tasmanian Land Conservancy presented *The Mole Creek Karst Forest Program*. This program was funded by the Australian Government and resulted in a further 376 hectares of karst being added to the reserve and 201 hectares being protected through conservation covenants on private land.



Zuzana and Katarina Gazikova in King Solomons Cave

My promise to our Slovak visitors was fulfilled when they spotted platypus in the creek behind the Mole Creek Hotel. After a pleasant meal it was time to return to Ulverstone.

Wednesday, day four, was a marathon day of papers kicked off by Anne Musser with *Palaeontology and Cave Tourism: Opportunities for Engagement*. Anne has commenced work as a guide at Jenolan Caves and is looking to use her training and experience in palaeontology to research and develop ideas for new products there. This paper was a fine introduction to the next, Sasa Kennedy's *Children's and youth activities at Jenolan - an evolutionary tale*. Sasa gave an overview of how these activities have been developed, but most importantly some really useful lessons learnt through trial and error, success and failure and the responses implemented. Dan Cove and Peter Austen completed the first all Jenolan session with a paper outlining Jenolan's approaches to marketing. As a follow up to this, they have offered to coordinate a project investigating improved marketing of Australian caves. I encourage all show cave operators to get involved with this important piece of work.



Marakoopa Cave

The second session moved away from Australian examples. After the Mulu meeting in 2010, Tim Moulds had visited Phong Nha-Ke Bang Karst area in Vietnam and provide a report with recommendations for improved management of the area to protect cave fauna. His paper *The Biodiversity and Management of the Phong Nha-Ke Bang Karst, Vietnam* outlined this work. The current management as Tim described requires significant improvement and it would be hoped that recommendations Tim, (and ACKMA Life Member Brian Clark in a separate report), have made will be implemented. Peter Gazik, whose role is Head of Cave Research and Cave Protection in the Slovakian Caves Administration gave an *Overview of Caves and Caving in Slovakia*. His presentation contained many excellent examples of cave protection through gating, some of the restoration works they have been undertaking and concluded with a series of brilliant images of the spectacular Slovak caves.



Ross Anderson took some exceptional photos on pre and post conference trips - this one in Croesus Cave, Mole Creek

Pat Culberg presented Arni B. Stefansson's paper *The Vatnshellir Project - a first for Iceland*, a remarkable tale of one man's determination to open Iceland's first show cave. This small lava cave remains unlit and is guided with visitors using helmets and headlamps. I found a number of websites with further information on this cave that are worth a look, including www.pbase.com which has a number of images of the installation of cave infrastructure.

Greg Martin gave us another excellent presentation that completed the story of the Waitomo Caves visitor centre. At previous meetings we had seen the fire that destroyed the centre and then plans for the replacement. This offering showed the finished product with *Waitomo Glowworm Cave Visitor Centre Rises from the Ashes*. It is a remarkable architectural design and Greg's paper discussed the trials and tribulations of the construction phase and how the centre is received by visitors. Unfortunately, visitation to the caves has taken a big hit with the Christchurch earthquake, which we heard more about in the next paper, by Moira Lipyeat, *The Impact of Earthquakes on New Zealand caves*. Moira is fitter now than I had seen for years and her presentation was a

remarkable tale of survival of the earthquake and the impact it had on the landscape around her house. Moira fell into a crack when the road suddenly opened beneath her feet, and later she told me a car had run over her while she was in there, but she was below the road surface and the car missed her!



*Peter Gazik presenting his work from Slovakia
Photo: Ross Anderson*

Ted Matthews' paper *Structural Control in Limestone Cave Formation* drew on many years' observations of Jenolan Caves and his interpretation of factors that influenced their development. Julia James' presentation, *The Enigma of Bellholes*, should have us all out looking for these features and attempting to understand their genesis. Andy Spate presented *Caves and Ruiniform features in Sandstones of Northern Australia*, a synopsis of the two and a half a month journey across the northern part of Australia preparing a report to the Australian Government on pseudokarst of Australia. Simon Ambrose, CEO of Augusta Margaret River Tourism Association was in Tasmania for other work and briefly attended the conference to report on the work being undertaken at Lake Cave, Margaret River in an attempt to save stygofauna at risk due to the drying of the cave. A paper summarising this work is presented in this journal. The final paper for a marathon day was Denna Kingdom's overview of the Vale of Belvoir, a significant purchase by the Tasmanian Land Conservancy.

Chandler was elected unopposed as President. An election was held for the ACKMA Publications Officer with Steve Bourne replacing Kent Henderson. Kent had held the position since the formation of ACKMA and has produced each of the 82 journals to date, bringing the publication from a 12 page newsletter to the publication we have today. Budget pressures will require some thinking to how we maintain the high standard Kent has set without exceeding our income. I congratulate Kent for his 24 years and 82 journals and look forward to building on his experience. All other positions were filled without election after Rauleigh Webb withdrew his nomination but later agreed to continue as a seconded ex officio committee member as ACKMA webmaster.

Dianne Vavryn was elected a Life Member of the association by acclamation and was truly moved by the honour. Rauleigh Webb delivered her citation which appears elsewhere in this journal.



Chris Sharples points to North Cave at Rocky Cape

The Annual General Meeting was held at the Ulverstone Surf Life Saving Club at the conclusion of the day's papers. The usual AGM business was transacted. Peter



North Cave at Rocky Cape

Thursday was another field trip, this time heading west with the first stop at Rocky Cape. Here Chris Sharples interpreted the geology of the coast and we viewed North Cave from a viewing platform. This cave is an important archaeological site and may be the first ever cave for which a map was drawn, with a plan of the cave drawn in 1827. From here we headed across the dolomite plains to Togari Hall for the presentation of three papers to set the scene for our Dismal Swamp visit.

Here we heard from Chris Sharples on *The Plains Karsts of the Smithton Basin*, Dr Nic Haygarth's historical perspective on the development of the area and Dean Tuscon on the Dismal Swamp development. Dean was kind enough to respond to some questions after the conference saying the development cost \$4.7 M and the visitation is around 17,000 visitors per year.

The visitor centre at Dismal Swamp, now marketed as Tarkine Forest Adventures, was excellent and certainly met the objectives of sitting discreetly in the landscape.



The toilets are a work of art, very few places have toilets placed with an amazing view across the top of a blackwood forest! The cafe serves excellent food and coffee and replenished the barely diminished reserves of delegates. ACKMA had previously visited the Dismal Swamp polje in 2004 at the AGM weekend meeting and I recall some concerns about the development. The 600 hectare Blackwood polje is one of a kind and it is of concern that 200 hectares is potentially still available for logging.

ACKMA members enthusiastically lined up for their turn to slide. It was fast and fun, although most people did not quite make it to the bottom due to condensation on the end of the slide and the very cold weather. Ross Anderson took Sam Webb's teddy bear Seymour for the ride of his life, showing the action packed video at the conference dinner. The maze on the polje floor is interesting and very well done, a nice blend of landscape interpretation and art with a surprise at virtually every turn. Being a fossil nut, I especially enjoyed the skeleton of *Zygomaturus trilobus*, an extinct cow-sized marsupial.

I thought the development was very well done, blended nicely with the landscape and that the slide did not detract from the overall presentation. I suspect though it



Zygomaturus trilobus

will always struggle financially, it is off the beaten track, away from the main tourist routes and requires significant staff input to operate. It has been moved from public operation to the private sector and I hope the concessionaires can make it work for them.

All too quickly the last day of the conference arrived. The last day of papers commenced with avid Wools-Cobb, with an overview of cavers' contributions at Gunns Plains, followed by Anne Wood with *Managing Access to Caves in the Digital Age* and Prof Cigna with the *Use of Chemical Methods for the Control of Lampenflora*. The last two papers stimulated significant discussion. The final paper was Rauleigh and Sam Webb's new template for producing the ACKMA Conference proceedings. Rauleigh demonstrated how the template works live by processing Ted Matthews' completed paper. It will greatly reduce the time required to compile the proceedings and Rauleigh is seeking all papers to be submitted soon to enable the compilation.

Geoff and Trish Deer hosted delegates at the Gunns Plains Caves. Geoff gave an overview of the struggles through the January floods which closed the cave for seven weeks. It was the first time that most had seen Neil Kell's lighting of the cave, which in Neil's usual creative style creates mystery, great scenes and allows the cave to keep a few secrets. Once again, the field trip was excellent although a little rain dampened the end of the day. Many thanks to Geoff and Trish for their hospitality.

The conference dinner had a Friday the 13th theme and delegates responded with an amazing array of costumes. ACKMA newcomer Celina Yapp from Waitomo Caves deserves a special mention for her red outfit, purchased at the last minute! Joy Wools-Cobb had done an outstanding job in preparing the venue, highlighted by a supersized inflatable black cat. Cathie Plowman had asked me in Mulu to be the dinner speaker and I prepared a presentation of six years as ACKMA president, reflecting on the highlights, conferences and people who have contributed during my time. During this, Andy Spate presented Prof Arriga Cigna with the ACKMA *Outstanding Contribution to Cave and Karst Management*, as agreed at the AGM.

Arrigo was given a framed David Wools-Cobb photograph with his image superimposed into one corner. New president Peter Chandler presented Peter Gazik with a framed Cradle Mountain image. Both Arrigo and Peter responded with kind words and deep appreciation for everyone who made their attendance possible.

A number of post conference caving trips were held as well as an excursion of the Vale of Belvoir. I visited Croesus Cave with Paul Van Nanyntan, Phil McGuinn and Dan Huth. Croesus is quite a simple trip, except the wading in cold water, but you are rewarded with some of the best scenery in an Australian cave. Other trips visited Kubla Khan, Genghis Khan and Marakoopa. Tasmanian cavers were extremely generous with their



Prof Arrigo Cigna "in" Genghis Khan Cave

time taking ACKMA delegates to some of their special caves and I acknowledge and appreciate their generosity, which extended to Paul and his wife Jeannie hosting me and other cavers over two nights.

ACKMA conferences are always full of highlights. For this author, the quality of presentations was outstanding, from the key note addresses to those covering a wide range of topics from delivering activities for children through to thought provoking presentations on cave development and the genesis of bell holes. I also appreciated the high quality of presentations of local people who provided background to the sites we visited. Congratulations to all speakers and I look forward to the proceedings publication.

The conference team of Tony and Pat Culberg, Cathie Plowman and David Butler, Chris Sharples, Serena Benjamin and Greg Middleton quite simply got it right. A nice balance of papers and field trips to suit their location, excellent food and a high quality guide book produced by Chris Sharples. A number of delegates commented how relaxed the week was, a tribute to the organisers given the full nature of the program. On behalf of those who attended I extend my appreciation to the team and their efforts and advise everyone to watch for the proceedings CD ROM.

After the conference I sought some feedback from first timers.

Regina Roach Interpretative Officer Yarrangobilly Caves

I enjoyed immensely the ACKMA Conference held in Tasmania. The conference, caving trips and bushwalk,...well,...snow walk, were memorable and well organised. Having locals commentate on the bus trips, and lead the caving trips added an extra local dimension to the events. Interspersing the large variety of cave related topics presented in the session papers with relevant karst trips allowed me to appreciate fully the

Tasmanian landscape. Probably I was most impressed with the other attendees' friendliness and willingness to share their knowledge and expertise. I left Ulverstone thinking "Wow, Tassie has really great caves", "I learnt so much this week" "Why aren't we actively promoting this type of learning to all cave guides?"

Peter Gazik Slovakia

First I must mention our pre-congress trip in south-eastern Australia invented by Kent Henderson (our compliments). We started with meeting Julia James – our host in Sydney, then went with our friend Barry Richard to Jenolan, met there Dan Cove and Peter Austen who arranged many things for us, as well. Then the relay was taken over by Andy Spate – Wombeyan (thanks to Mick Chalker) , Wee Jasper (with excellent Geoff Kell) and Yarrangobilly Caves. Deborah Craven-Carden looked after us in Naracoorte, where we met also Steve Bourne. Then Kent Henderson took us to the Great Ocean Road, hitting some caves, history and wildlife on the road to Melbourne. A great thanks to all.

My first encounter with ACKMA was via paper and electronic form – newsletter and proceedings. That gave me a basic idea on what is it about. However, the real feeling can only be obtained by personal encounter. If I start from the beginning – the official opening ceremony looked very formal the day before – everybody was expected to come quite early, no cameras were allowed. And when I heard fanfares it made me feel very "official". But then, when listening to the "official" opening address by Steve Bourne, which made everybody laugh, followed by the Governor of Tasmania, who also added some spice to his speech, I realised that the matter is not so hot. The whole conference and stay in Tasmania showed up to have really very friendly and almost familial atmosphere. I must praise the very high level of papers presented in all fields – from scientific to interpretation one. We were allowed to have a look inside your "kitchen", which is quite rare. The organisation work was a first class one – thanks to all the team headed by Cathie Plowman and David Butler, including preparation of the excursion guide and abstract book, which helped a lot in general orientation.

And last but not least: the people, I and my family met there were just excellent – no matter where they came from: Australia, Tasmania, New Zealand. We felt open hearts, helpfulness and all surrounding sense of humour, which makes the life much easier. Thanks a lot, friends.



CONFERENCE AWARDS

Steve Bourne

ACKMA Journal President's Award 2011

The Presidents Award is given at each conference, recognising what the judges consider the most meritorious and informative papers presented in the previous two years journals.

It is never easy to choose among the number of excellent papers submitted to the Journal over any two-year cycle. Elery and I considered a number of excellent papers and decided to try and focus on the extent to which a paper would be of high practical value for members of the Association.

We decided to recognise John Brush as the most appropriate nominee for the award. He contributed two different papers in the same issue of the journal and both are valuable.

Track Marking – The Yarrangobilly Experience

This is a very thorough case study of the diverse approaches to track marking which have been used in un-guided (“wild”) caves and a critical analysis of the effectiveness of each method.

Cave Exploration in Timor Leste

Trip Reports are one of the most prevalent kinds of speleological publication, but John provides an example which might be utilised as a useful model for any trip report on an unfamiliar site. The description of the karst is based in a summary of the geographic and cultural context and also highlights the wide range of features worthy of scientific inquiry. John is also gently critical of the on-site management and points to issues which demand attention.

We would also like to highlight the quality of John Watson's paper titled “Simply being there”, which gives an alternative view to the need and desire we have to provide visitors with interpretation and key messages.

A New ACKMA Life Member

Dianne Vavryn was made a life member of ACKMA at the conference and her citation follows.

Dianne Vavryn has made a truly outstanding contribution to cave and karst management in Australasia in general, and to ACKMA in particular.

She has been running tours to Bat Cleft on Mt. Etna for 33 years, and is a walking expert on the caves – and particularly the flora and fauna of the central Queensland karst. She has been largely responsible for growing the native plants that have been used in re-vegetating Mt. Etna and the Mt. Etna Caves National Park. She was a guide at Capricorn Caves for some years also.

She played an extremely important part in fighting for both recognition of the values of Mt Etna, and even more importantly, the proper protection of the Mt Etna Caves. Her very persuasive negotiations with conflicting interests and the government agencies involved were a major factor in ultimately achieving success in the campaign to save Mt Etna.

She has been a massive contributor to ACKMA. She has attended the last ten ACKMA Conferences in succession and every intervening Annual General Meeting – a period of over twenty years. She was a key member of the Organizing Committee of the 10th ACKMA Conference in 1993.

She has presented papers at ACKMA Conferences, and been a not-infrequent contributor to the ACKMA Journal.

She has been the senior sub-editor of the ACKMA Journal since Issue 31 in June 1998 – 51 issues over the last thirteen years.

She was elected a Fellow of ACKMA in 2000, and we now propose, in 2011, that she be elected a Life Member of ACKMA.

Proposed: Professor Elery Hamilton-Smith
Seconded: Kent Henderson.



REFLECTIONS on the LIFE of ANDREW DAVID SKINNER: 8 JANUARY 1953-15 MAY 2011

Arthur Clarke



First child of Roy and Emily (Pem) Skinner, Andrew was born in Armadale (Melbourne) on the 8th of January 1953. Andrew came to Tasmania in 1954, when his father Roy was appointed Assistant Manager at the recently rebuilt Coles Bay Chateau (now Freycinet Lodge). Later that same year, Roy took up the position as Assistant Guide at Hastings Caves, using the Hastings Cave Chalet as residence.

From boyhood, Andrew assisted his father Roy maintaining a full meteorological station reporting temperature, humidity, rainfall and wind speeds. One of Andrew's earliest recollections of life at Hastings Caves, was the early morning ritual of doing the weather readings then spending up to two hours every day cleaning up the rubbish from the previous day.

Andrew relates that as a youngster, his learn-to-swim paddle-board used in the original thermal pool was made especially for him by family friend Olegas Truchanas, the well known Lithuanian-born Tasmanian conservationist and nature photographer. Olegas subsequently taught Andrew to swim properly and as Ros recalls, Andrew gained a reputation as a local swimming champion, proudly boasting that he could easily swim three lengths of Hastings pool, underwater with one breath!

Andrew inherited, or absorbed by osmosis, his father Roy's interest in caves and became a very keen caver. Andrew recollects early visits to *Mystery Creek Cave* with his father in 1960, when the Ida Bay Railway was still operating and together with caving club members they rode the empty limestone wagons into the old Blaneys Quarry on the northern side of Marble Hill. He recollects over-nighting with his father and other cavers in a dilapidated paling board quarry workers hut beside the Blaneys Quarry limestone railway terminus.

At one stage, Andrew was a member of four caving groups, joining the first, TCC (Tasmanian Caverneering Club) as a child member in 1962, at the age of nine and a junior member at age 13. Later during his teenage years, he became a member of SCS (Southern Caving Society), then at age 20 joined NC (Northern Caverneers) and from 1974 was a member of the Launceston Speleo Club. He remained a member of these groups till 1976 when he and wife Ros took up their post on Maria Island. In the early 1970s, Andrew had an association with a fifth caving group: the Claremont Caving Club, based in the northern suburbs of Hobart.

Together with his father, about 1965-1966, Andrew assisted TCC cavers in planning the route and constructing the second major access track to Exit Cave.

Lovingly referred to as the “Brooker Highway” (then later “the flat track”), it ran some seven miles from the old Catamaran Road along the *D’Entrecasteaux River* Plains to *Exit Cave*. Andrew’s first trip to *Exit Cave*, on the southern side of Marble Hill, was at the age of 13, in 1966; the cave was then only known up to the talus section, generally referred as “*The Rockfall*”.

Andrew lived with his family at the Chalet till 1968, until the larger dedicated restaurant with improved facilities and kitchen was built together with adjoining Cave Superintendent’s accommodation. At age 15, Andrew established a small museum of cave related exhibits in a corner of the dining room; it lasted from 1968 to 1970. His museum contained a mixture of geological items including fossils, rock samples, a few speleothems (but not many), old photographs, early newspaper cuttings about Hastings, pieces of old caving equipment, old cave lighting fixtures, a carbide-fuelled acetylene coach lantern and other items of interest borrowed from members of the outlying Hastings, Lune River and Southport community. There was also a small collection of philatelic items: postage stamps that featured caves, cave tourism or karst features. The museum also included some cave interpretation and historical information, some of which was used c. 1976 by Roy and Andrew to produce a booklet: *Hastings Caves State Reserve Tasmania – A Visitor’s Guide*.

Andrew went to University of Tasmania in Hobart in 1971, where he was majoring in Zoology, Geology and Geography. For those next two years, he lived in Parliament Street (Sandy Bay) sharing a house with other cavers including Kevin Kiernan. Andrew’s studies in Geography were the inspiration for Kevin to commence his own Uni studies and he still has Andrew’s First Year Geography lecture notes! Known as “Parliament House” their house hosted the monthly meetings of the Tasmanian Caverneering Club. While at Parliament Street, there was the one and only meeting of the Exit Cave Society attended by Roy Skinner, Jim Casey and Michael Hodgman, mustering support and finance for the development of *Exit Cave*.

Aside from caving, Andrew was a keen bushwalker. He became involved with the old *Lake Pedder* and took on the role of Secretary for the Lake Pedder Action Committee. In late 1972, Andrew and Ros made a trip to Precipitous Bluff (see photo), as a reconnaissance for the subsequent 1973 expedition by members of the Southern Caving Society. Andrew joined the United Tasmania Group – precursor to the Greens, to try to make a difference.

He transferred to the Mt. Nelson campus of the TCAE (Tasmanian College of Advanced Education) in 1973, enrolling in the final year of a landscape architecture diploma course. Inspired by his own exploration and other cavers’ adventures in *Exit Cave*, plus the international Churchill Fellowship studies of tourist cave developments undertaken by his father, for his final year major project, Andrew formulated a plan to show how *Exit Cave* could be developed as a major world class

tourist attraction. In that same year, Andrew conducted about 20 exploration trips into *Exit Cave*, producing an extremely detailed survey from the cave entrance to *The Rockfall*.

Despite being poor tertiary students with no car, Andrew was so passionate about caving that when he and Rosalind Bell married in 1973, he insisted that part of their honeymoon was spent caving. After completing his tertiary education, Andrew moved to Launceston and worked in town planning. It was an exciting time in the State of Tasmania. The National Parks and Wildlife Service (NPWS) had just been formed and later in 1974, Andrew gained a position as an investigations officer in the NPWS resources section, where he worked with Greg Middleton and others. This put Andrew in a position to influence the creation or enlargement of some parks and reserves. He was justifiably proud that he was able to influence extensions to the South West National Park, increase the area of Southport Lagoon State Reserve, enlarge the South Bruny Island National Park to include *Partridge Island* and supported the public submissions to have the Ida Bay State Reserve declared.

In 1975, Andrew was instrumental in setting up the Maydena Branch of TCC, which included Max Jeffries, Laurie Moody, Phil Voss, John Parker, Ann and Steve Annan among others. The first trip of the new club found *Beginners Luck Cave* (later re-named as *Tiata Kominya*), with its multiple entrances, wombat burrows, megafauna remains and evidence of Tasmanian Aboriginal occupation. Also that same year (1975), Andrew assisted his father and other local cavers in organising the second Australian cave management conference in Hobart.

According to Ros, when Andrew joined Parks he had really only wanted one job, the Ranger on Maria Island, even though it entailed less pay, isolation, sometimes dangerous hair raising boat rides, wild aeroplane landings, a house full of wildlife to evict, no power on occasions, and monotonous green paint on everything – inside and out. Andrew’s devotion allowed him to make a significant contribution to the preservation of Maria Island’s important cultural heritage in a meaningful and respectful way. Later, on reflection, Andrew said that their years spent on *Maria Island* were the happiest in his life – fishing, magical walks, and endless barbecues, plus a superb environment and work that gave great job satisfaction.

Late in 1978, Andrew had a promotion to Ranger-In-Charge at Hastings Caves. Andrew arrived there around Christmas 1978 with Ros, young Ailsa and their six month old infant daughter Annie. *Newdegate Cave* had just been rewired so Andrew’s focus was initially to upgrading the thermal pool area. In *Newdegate Cave*, Andrew re-positioned most of the cave lights, especially those that were aiming towards peoples’ faces. One of his first major achievements in *Newdegate Cave* was the final removal of the last lot of wooden bridges and stairs in the upper regions of *The Cathedral*, including the *Cathedral Stage* and the approach to *Titanias Palace*.

As Cave Superintendent from 1978-1984, he fought, cajoled and even embarrassed parliamentary ministers to get what was necessary for the Cave Reserve. A new water supply, sewage system and amenities that won awards were the result. He expanded the range of responsibilities for the Ranger-in-Charge to include surrounding reserves, scrounging paint, materials and labour to improve the Ida Bay Railway train depot, using his own tractor to mark tracks out to the George III shipwreck monument and the *Southport Lagoon*.

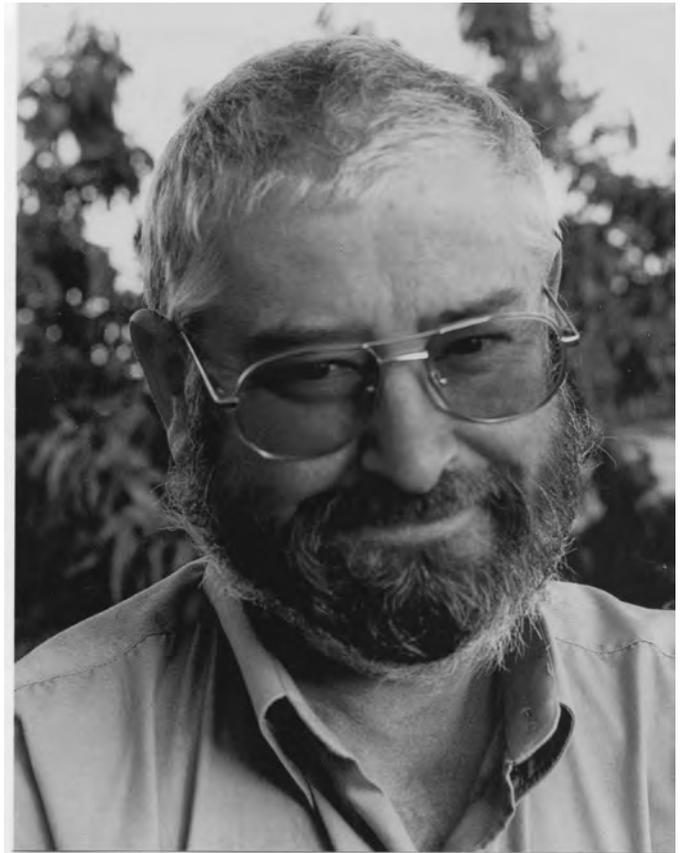
As head ranger at Hastings, Andrew also took it on his own initiative to alter the existing interpretation given for cave tours. He dismissed the former tradition of cave fantasy with named cave formations as “garbage”, introducing more appropriate description of the speleothem features in terms of their geomorphic origin. Cave guides were retrained, to ensure they delivered a more appropriate cave science related interpretation, so the cave could be presented as a natural scientific feature. On arrival at the entrance to *Newdegate Cave*, illustrated descriptions of karst processes now greeted patrons, together with a survey profile of the cave they were visiting. An alternate walking track to *Newdegate Cave* via *Fossil Creek Swallet* and a suspension bridge over *Hot Springs Creek* gave Tasmania its first karst interpretation walk.

In 1981-1982, Roy Skinner commenced planning of a new access route to *Exit Cave* from the saddle between Marble Hill and Lune Sugarloaf, behind Benders Quarry. Together with Hobart-based cavers Andrew assisted his father in the preparation and formation of this new more direct (walking) access track to *Exit Cave*. Formed as a level and contoured pathway across the surface karst at Ida Bay, it was constructed with the aid of various local cavers (particularly SCS members) and NPWS rangers. Subsequently known as the Skinner Track it is still today the only regularly used route for *Exit Cave* visitors. On occasional weekends, in between rostered duties at Hastings Caves, Andrew assisted his father running the Adventure Cave tours in *Exit Cave*.

Andrew planned a restoration project in *Newdegate Cave* to remove jettisoned waste, particularly the inorganic rubbish such as broken glass and discarded light globes. However, after spending funds to revamp the cave lighting, NPWS was reluctant to fund any restoration work.

Andrew later assisted Tony Culberg in running school based caving at *Exit Cave*, in the Junee-Florentine and at Mole Creek. Andrew made valuable contributions to the first set of guidelines for school based caving, being a member of the caving sub-committee of the Education Department’s Committee on Outdoor Educational Experiences (COOEE).

After leaving his position at Hastings Caves, Andrew bought land in Southport and later on in 1986 at the Hastings Caves Road site running a small farm where he, Ros and the three children raised cattle, living in a house beside the old Hastings Mill bakery. Andrew ran a rural contracting business, doing all kinds of odd jobs in the district running their small farm in between. He will



be remembered for the role of caretaker at the former National Fitness Council Esperance camp site at the mouth of the *Esperance River* east of Strathblane.

In his spare time Andrew spent three years as a Volunteer Ambulance Officer. He was treasurer for the local coast care group and was a driving force in the establishment of the new Southport Community Management Centre, of which he spent several years as chairperson. Andrew had ceased active caving by 1990, and applied himself to working with the Dover Fire Brigade and then later running the more local Southport Volunteer Fire Brigade, as well as taking an active interest in local politics.

Andrew was very humble and always felt that he should do more. When in 2001, in the year of the volunteer, it was announced that he was the Huon Valley Council Citizen of the year he was so shocked and honoured that he was left speechless. Andrew had words for every occasion but at this time, he was quite without words.

On a fine and sunny Saturday morning on 21st May 2011, the cortege into the Dover Lawn Cemetery was made up of members of the local Dover and Southport Volunteer Fire Brigades. Kookaburras in nearby trees cackled with perfect timing, as Ros cracked some jokes about Andrew while reading the eulogy. As his coffin was lowered into a grave, brigade members held his Collingwood Football Club flag above! Carn the Pies!

Andrew Skinner was held in high esteem within the Far South community. This was largest gathering at a funeral I have ever seen in Dover.

JEWEL CAVE DAZZLES AGAIN

Corey Gale *



Following an extensive redevelopment the stunning Jewel Cave, near Augusta in Western Australia, was officially re-opened on Wednesday 9th February, 2011, by the Honourable Brendon Grylls, Minister for Regional Development.

Over 170 people gathered for the grand opening of the Jewel Cave Preservation Centre, which is equipped with new interpretation panels, retail stands and full cafe facilities. The uniquely designed building has been crafted to incorporate the natural environment and overlooks lush forest, whilst offering a comfortable and engaging visitor experience.

Guests were invited to tour Jewel Cave and experience for themselves the dazzling beauty of its ancient adornments. As Western Australia's largest show cave, Jewel Cave is home to a stunning array of stalactites, straws and flow stones which entice visitors into this magical subterranean treasure trove.

The rejuvenation of Jewel Cave is a major step forward for the Augusta Margaret River Tourism Association (AMRTA) who have been developing the project for over eight years. The AMRTA worked with Willcox Architects on the project in order to develop an ecologically sensitive building which best complements the natural integrity and beauty of the site.

Chair of the AMRTA Board, Rachel House, acknowledged the input that different organisations had in the project. The \$3.1 million project has received funding from a variety of sources including Lotterywest, Royalties for Regions, TQUAL, South West Development Commission, RIFP and Envirofund.

Ms House commented that, "A great many people have dedicated a lot of time and hard work bringing this vision to life and to see it culminate in such a fantastic facility is testament to their determination."

Minister Grylls, who oversees the Royalties for Regions program, officially welcomed guests to the occasion and was delighted to experience the results of the funding for himself, "As well as the direct environmental benefits to the cave, the redevelopment creates a first rate experience for visitors," he said.

The project, which saw the cave close for four months during late 2010, included the removal of 50 year old infrastructure from the site to enable natural filtration of water and the protection of threatened ecological communities that live within the cave. Along with a new tunnel entrance, car parking and walkways have been constructed to tie into the Preservation Centre design. Revegetation of the site is about to commence after the driest summer on record in the south west of Australia. For more information about the limestone caves in the Margaret River region and information about visiting go to www.margaretriver.com.

* Acting Attractions Manager, AMRTA



New access way connecting the new visitor center to the cave.



L-R. Tony Tapper, Lloyd Robinson, Ron Spackman, Lex Bastion. The first Jewel Cave explorers – with Ron standing in for his father Cliff Spackman.



Anne Wood and Robyn MacBeath

Coming Events

2011: June 20-25	International Karstological School, Slovenia
2011: July 16-24	Asia-Pacific Geoparks Network Symposium, Vietnam
2011: July 20-27	INQUA Quaternary Sciences Congress, Bern, Switzerland
2011: August 15-18	Central American Congress of Karst and Speleology, Guatemala
2011: September 13-16	Parks Forum "Re-Discover Parks Conference," Perth, Western Australia
2011: Sept 23-25	Middle East Speleology Symposium, Lebanon
2011: Oct 25-26, Nov. 25-26	Centre for Gippsland Studies. Churchill, Victoria (Workshop and Conference)
2011: Oct 30-Nov 1	Global Geotourism Conference, Oman
. . . and Looking Ahead:	
2012: May	ACKMA Annual General Meeting, Wee Jasper, NSW
2012: Aug 5-10	International Geological Congress, Brisbane
2012: Sept 6-15	World Conservation Conference. Jeju Island, South Korea
2013: May	ACKMA 20th Conference, Waitomo Caves, NZ
2013: 21-28 July	International Congress of Speleology, Brno, Czech Republic

VISIONS OF MULU: 60 MILLION YEARS IN THE MAKING

Reviewed by Andy Spate



This is a spectacular book! One hundred and sixty one pages of images and text beautifully laid out and printed on excellent quality paper. A credit to Borsarmulu Park Management, the Sarawak Forestry Corporation and Natural History Publications (Borneo) - all of whose logos are found on the title page. The book starts with forewords from the Chief Minister of Sarawak and the Managing Director of Borsarmulu Park Management followed by a brief exposition of the World Heritage values of Gunung Mulu National Park, which concludes with the following paragraph:

It may be the most studied tropical karst in the World, but we've still a lot to learn: whilst this is not a text book to teach you about what we think we know, hopefully it will inspire you to think about just how much we still have to discover in this remarkable place called Mulu.

This book truly does inspire one! As stated, this is not a text book, but rather is a collection of splendid photographs with excellent informative captions. It has less than 60 pages with substantial text blocks which include some eight pages of geological and geographical background including discussion of karst processes and speleothem formation. This is nicely illustrated with maps and diagrams. The following 30 pages outlines the history of the exploration of the karst starting with the Royal Geographical Society's 1977-78 expedition including descriptions of the support provided by the local Penan and Berawan indigenous people. Much of this nicely sparse text includes quotations from the various expedition

reports. Most of the book's cave photographs are to be found in this section.

The remaining 150 or so pages are devoted to the fabulous flora and fauna of Gunung Mulu – the photographs are simply stunning in topic, colour, layout and captioning. For example, a photograph on pages 66-67 even makes a pile of bat guano a thing of beauty! Some 17 photographers provide the images with the bulk being taken by Ch'ien Lee. Brief biographies of some of the photographers are provided in the comprehensive acknowledgments at the end of the book. A small bibliography is also included. Scattered throughout the book are a number of apt aphorisms such as Aristotle's:

If one way be better than another, that you may be sure is Nature's way.

This is a magnificent 'coffee-table' book – without any hint of demeaning it by using that term. Anyone who has visited, or intends to visit Gunung Mulu will be delighted by this book. It retails for 160 Malaysian Ringgits – about \$A50 and \$NZ65. This is a very, very reasonable price for a hardcover book of this quality.

However, it weighs in at about 1.4 kg and thus postage from Malaysia will be about \$A25 (~\$NZ33). Brian and Sue will be bringing a box of 10 to Adelaide in July and will leave it with Steve on consignment – postage will still be of the order of \$11-16 in Australia and \$NZ35 across the Tasman ... so get in touch with Steve – or Brian at the Borsarmulu address above.

My one quibble with the book is that Brian and Sue do not get as much prominence as they clearly deserve.

Published by:

Natural History Publications(Borneo) Sdn. Bhd.
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PO Box 15566

88864 Kota Kinabalu, Sabah, Malaysia

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ISBN 978-983 812-131-6

First published July 2010

Copyright: 2010 Borsarmulu Park Management Sdn. Bhd.

Text by Brian Clark

Design and layout by Sue Clark

Graphic design by MASS Advertising Company

Printed in Malaysia

PROCEEDINGS OF THE 14TH INTERNATIONAL SYPOSIUM on VULCANOSPELEOLOGY, UNDARA, AUSTRALIA

Reviewed by Andy Spate

Kent asked me to review this DVD a few months ago for this edition of the ACKMA Journal.

Before moving onto the review I would like to pay tribute to the fantastic job that Kent has done for ACKMA in the evolution of the Journal – and of ACKMA itself. How often has he extended deadlines for me, made (sometimes trivial) changes to text at the last minute and treated my grumbles about symbols and layout cheerfully ...

The International Symposia on Vulcanospeleology are held under the auspices of the International Union of Speleology's Commission on Volcanic Caves under the chairmanship of Jan Paul Van Der Pas. The 14th Symposium was held at Undara in August 2010 with about 30 attendees.

The proceedings are contained on a DVD edited and produced by Greg Middleton and his group that organised the 14th International Symposium on Vulcanospeleology 2010. The DVD contains:

- a pdf document of the proceedings (216 pp.)
- separate pdf documents of 16 papers presented at the Symposium (I understand that at least 17 papers were submitted)
- a copy of the Proceedings in e-pub format (original layouts not preserved)
- 19 PowerPoint presentations used by presenters at the Symposium.

Inclusion of PowerPoint presentations **and** written papers is a useful approach to publishing conference proceedings that ACKMA might usefully adopt?

Surprisingly the table of contents is buried within the complete proceedings document following Peter Whitehead's scene-setting paper on the McBride Basalt Province and its vulcanospeleologic landforms.

I have not had the time to read all of the papers on the DVD but the variety and intellectual depth is obvious. These proceedings certainly add to our appreciation of lava field landforms in Australia and beyond.

Arni Stefansson's account of his community-based cave conservation and rehabilitation project is particularly well worth a look – what can be achieved with enthusiasm and hard work!

I had not previously heard of Kempe et al's use of the term 'pyroduct' for lava tubes so I did some googling and came up with the following:

LOCKWOOD, John P., Geohazards Consultants International, Inc, P.O. Box 479, Volcano, HI 96785, jplockwood@volcanologist.com and SANDERS, William, 555 Laurel Ave, San Mateo, CA 94401

THE PREACHER VS THE VOLCANOLOGIST - ORIGIN OF THE WORD "PYRODUCT"

Titus Coan (1801-1882) was an influential Congregational missionary who made major

contributions to the establishment of Christianity in Hawaii. He was also a gifted geological observer and was fascinated by the volcanic activity he witnessed after his 1835 arrival in Hawaii.

James D. Dana (1813-1895), who had already made major contributions to mineralogy, was appointed at age 25 to be the Geologist on the US Exploring Expedition ("Wilkes Expedition" – 1838-1842). He visited Hawaii for a month in 1840, where he met Coan. Dana later became Chairman of the Geology Department at Yale University and Editor of the influential Silliman Journal – forerunner to the American Journal of Science. He has been rightfully called "America's First Volcanologist". Coan's letters to Dana about Hawaiian volcanic activity, published in the AJS, are the principal records of Hawaiian volcanic activity between 1840 and 1880.

His detailed observations of the 1843 Mauna Loa eruption are the earliest field descriptions of any eruption of that great volcano. After an arduous four day journey through dense forest above Hilo, he came to the advancing lava flow, and on the fifth day hiked up to the source vents high on Mauna Loa's Northeast Rift Zone. Along the way, he witnessed openings into fiery subterranean "rivers of fire" that were supplying molten lava to flow fronts far below. He correctly noted the heat-insulating properties of these shallow underground tunnels, compared them to aqueducts, and wrote: "If I might be allowed to coin a word, this pyroduct – filled with mineral fusion, and flowing under our feet at the rate of twenty miles an hour, was truly startling".

Coan's pyroduct description was published in 1844 in an obscure journal, and re-published by Dana in 1850. In 1852, however, he rebutted Coan's conclusions and declared that what Coan had witnessed were actually the tops of deep fissures that were cutting the flanks of Mauna Loa "a linear fissure or series of fissures, and not a single tunnel-like opening". Dana continued to deny the existence of pyroducts.

I am not sure I like the term, but science evolves ...

John Brush and Marj Coggan have told me that the highlight of the presentations was Kirsty and Martin Mills which was a sound and light show on Fingal's Cave on Staffa Island in the Hebrides. The composer Felix Mendelssohn visited Staffa in 1829 and developed a musical sketch into an overture titled 'The Lonely Island'. He later rewrote the piece and renamed it 'The Hebrides Overture' (Fingal's Cave) as his Opus 26. It is worth noting that Martin and Kirsty have amassed a collection of more than 200 historic images of Fingal's Cave – 23 of these are included in their presentation to the symposium.

The 14th Vulcanospeleology Symposium DVD is well worth obtaining and reading. Copies can be obtained from Greg Middleton at ozspeleo@iinert.net.au.



Back Row: Nick White(Vic), Greg Middleton (Tas), Arni Stefansson (Iceland), Czaba Olah (Hungary), Stephan Kempe (Germany), Jan-Paul van der Pas (Netherlands), Harry Marinakis (USA), Gerry Collins (Undara), Greg Tunnock (NSW), Peter Whitehead (Qld), Phillip Holbertson (NSW), John Brush (ACT), Tony Culberg (Tas), Marjorie Coggan (ACT), Martin Mills (UK), Arthur Clarke (Tas).
Front Row: Kenneth Ingham (USA), Diana Northup (USA), Gunnhildur Stefansdottir (Iceland), Georg Szentes (Germany), Julia James (NSW), Anne Atkinson (Qld), Mick Godwin (Qld) Siobhan Carter (Tas), Pat Culberg (Tas), Sue White (Vic), Kirsty Mills (UK).

