# Programme,

# Abstracts of Papers, Posters, Seminars and Workshops

# Participants Contact List


**Downunder at Dover**

## The 25th Biennial Conference of the

## Australian Speleological Federation

## Dover District High School

## and Far South Wilderness Backpackers

## Tasmania 7117

## 2nd-9th January 2005

**Compiled by Albert Goede, Arthur Clarke and Stephen Bunton**

## Programme Omission

**An Introduction to the History of Cave Tourism in Tasmania** by Nic Haygarth and Arthur Clarke was omitted from the programme but is scheduled **10.30 Friday** but is in the abstracts p.10.

## CaveMania Programme

### Sunday 2nd January 2005

| | | |
|---|---|---|
| from 2 pm. | **Registration.** | Far South Wilderness. Narrows Rd |
| 5.30 pm | **Welcoming BBQ.** | Far South Wilderness. Narrows Rd |
| 7.30 pm | **ASF Executive Meeting.** | Far South Wilderness. Narrows Rd |

### Monday 3rd January 2005

| | | |
|---|---|---|
| (Before 10 am) | **Final Registration.** | Dover District High School Auditorium |
| 10.00 am | **A Welcome to Country** by Rodney Dillon Member of the Tasmanian Aboriginal Community | Dover District High School Auditorium |
| 10.05 am | **Official Opening** by the Governor of Tasmania William Cox. | Dover District High School Auditorium |
| 10:15 am | **Keynote Speaker Alan Warild,** Australia's foremost Sporting Caver. | Dover District High School Auditorium |
| 11.00 am | Morning Tea | Dover District High School |
| 11.20 am | **Welcome and Introduction.** Stephen Bunton Convenor | |
| 11.20 am | **Session 1 Presentation of Papers & Posters. Tasmania's Caves** (Stephen Bunton to Chair) | Dover District High School |
| 11.30 am | **Tasmanian Caves and Karst** - looking forward, looking back. Ian Houshold | |
| 12.00 noon | **Tasmania's Cold Caves** - An island of alpine karst. Kevin Kiernan | |
| 12.30 pm | Lunch (Own arrangements or provided at Dover District High School for those participants staying at Far South.) | |
| 2 pm to 4 pm. | **Session 2 Presentation of Papers & Posters. Australian Caves and Karst 1** (Arthur Clarke to Chair) | Dover District High School |
| 2.00 pm | **The Bullita Cave System Austalia's Longest Cave** - A historical perspective of surveying the cave Bob Kershaw | |
| 2.30 pm | **Karst in the West Kimberley**: an overview and update. Ross & Jay Anderson | |

3.00 pm **Karst Development at Naracoorte SA**: When, Why and How? Susan White and John Webb

3.30 pm **Kartscare** - Cavers looking after Caves and Karst. David Wools-Cobb

4.00 pm **Thermokarst at Marine Plain, East Antarctica** (Poster) Kevin Kiernan, A McConnell and E Colhoun.

4.10 pm **Bullita Cave Aerial Photo** (Poster) Robert Kershaw

4.30 pm Opening of the **4th International Speleological Art Exhibition** by Adrienne Eberhard (speaking at 5.00 pm) Dover Art Gallery (Next to the Dover Online Access Centre).

6.30 pm Dinner Far South
(For those people not staying at the Far South, there will be an optional availability of having shared pizza and salads at the licensed Dover Wood Fired Pizza place at 6 pm)

7.30 pm Small Meeting Time John Dunkley to Convene Far South

## Tuesday 4th January 2005

9.00 am **Session 3 Presentation of Papers. International Caves and Karst 1** (Dave Wools-Cobb to Chair) Dover District High School.

9.00 am **Exploration in Lechuguilla Cave 2002-4.** J & T Whitby

9.30 am **Karstic Phenomenon in the Namakabroud Area of Northern Iran.** Hakimi Asiabar.

10.00 am **Lava Caves of the Big Island of Hawaii.** Jenny and Gary Whitby

10.30 am **The Tsingy de Bemaraha Pinnacle Karst, Western Madagascar.** Arthur Clarke

11.00 am Morning Tea Dover District High School.

11.30 am **Session 4 Presentation of Papers. Australian Caves and Karst 2** (Cathy Plowman to Chair) Dover District High School.

11.30 am **Methods or Problems associated with surveying the Bullita Cave System** Bob Kershaw

12.00 noon **Karst and Subterranean Wetlands**: opportunities for recognition of these environments. Jay Anderson

12.30 pm Lunch (Own arrangements or provide at Dover District High School for those participants staying at Far South.)

| | | |
|---|---|---|
| 1.30 - 3.30 pm | **ASF Council Meeting**. | Dover District High School |
| 3.30 pm | Afternoon Tea | Dover District High School |
| 4-00 - 5.30 pm | **ASF Council Meeting (cont'd)**. | Dover District High School |
| 6.00 pm | Dinner for Far South participants | Far South. |
| 7.30 pm | Small Meeting Time John Dunkley to Convene | Far South |

## Wednesday 5th January 2005

**All Day Field Trips**

**Newdegate (Hastings) Tourist Cave** by own arrangements. Show your CaveMania nametag to the booking desk at the kiosk to be included on a tour free of charge.

**Pre-paid Mystery Creek Cave or King George V** with The Hastings Experience Adventure Cave Tours. See participant Lists for Departure times and Transport Arrangements.

**Other trips** see Participant Lists for Departure Times, Transport Arrangements, Leader Details and Gear Lists. These trip incur an administration cost of $10 per person.

| | | |
|---|---|---|
| 6:00 pm onwards | **BBQ at Hastings Thermal Pool**. | |
| 9.30 pm | Bus returns to Far South. | |

## Thursday 6th 2005 January 2005

| | | |
|---|---|---|
| 9.00 am | Workshop 1 (2 hours) **Digital Imaging for Cave Photography** - Basic Techniques Phil Maynard | Computer Room Dover High |
| | OR **Session 5 Presentation of Papers - Biospeleology** (Jay Anderson to Chair) | Dover District High School Auditorium. |
| 9.00 am | **Tasmanian Cave Fauna**. Arthur Clarke | |
| 9.30 am | **Factors Affecting Light Output from Glow-worms** Dave Merritt | |
| 10.00 am | **Arthropod Seasonality and Succession** - How important is fresh guano? Tim Moulds | |

| | | |
|---|---|---|
| 10.30 am | **Biology for Biology Teachers** Stephen Bunton | |
| 11.00 am | Morning Tea | Dover District High School. |
| 11.30 am | **Session 6 Presentation of Paper and Posters** (Stephen Bunton to Chair) | Dover District High School. |
| 11.30 am | **Digital Photography Limitations and Solutions** (Seminar) Angus McCoun | |
| 12.00 am | **Synthesising Stalactite Morphology** (Poster) Damian Merrick and Julia James | |
| 12.10 am | **"Very Interesting, Very Beautiful... and Full of Curiosities!** "Some Historical Material Relating to Caves at Mole Creek (Poster) Rolan Eberhard | |
| 12.20 am | **Electronic Maps of the Mole Creek Karst** (Poster) Rolan Eberhard | |
| 12.30 pm | Lunch | Dover District High School. |
| 2.00 pm | **Session 7 Presentation of Paper and Posters** (Arthur Clarke to Chair) | Dover District High School. |
| 2.00 pm | **Karst Management in WA** - An overview of the current situation. Jay Anderson. | |
| 2.30 pm | **Nullabor Karst** (Poster) Ken Boland | |
| 2.40 pm | **Bullita. Is it a Cave and How long is it?** – an interactive workshop John Dunkley | |
| 3.30 pm | Afternoon Tea | Dover District High School |
| 3.50 pm | **The Destruction of Harman Valley Victoria** Ken Grimes and Reto Zollinger | |
| 4.00 pm | **Viewing Map and Photographic Print Competition Entries** | Dover District High School |
| 4.30 pm | **Madagascar Mystery** (Film) by Nicolas Gabriel. | Dover District High School |
| 6.00 pm | Dinner | Far South for Far South participants. |
| 7.30 pm | **Slide and Digital Image Entries for the Photo Competition** | Dover District High School |

## Friday 7th 2005

| | | |
|---|---|---|
| 9.00 am | Workshop 2 (2 hours) **Digital Imaging for Cave Photography** - Advanced Techniques Phil Maynard | Computer Room |
| | OR **Session 8 Presentation of Papers** (Steve Phipps to Chair) | Dover District High School. |
| 9.00 am | **Lechuguilla** - A Tasmanian Perspective Dave Wools-Cobb | |
| 9.30 am | **Early maps of Tuglow Caves: the Bracewell Collection** John Dunkley | |
| 10.00 am | **Fine Tuning Your SRT Rig** (Workshop) Alan Warild | |
| 11.00 am | Morning Tea | |
| 11.30 am | **Session 9 Presentation of Papers. ASF Management Issues** (Stephen Bunton to Chair) | Dover District High School. |
| 11.30 am | **ASF Karst Index Database** Mike Lake | Dover District High School. |
| 12.00 noon | **Helictite** (Meeting) Susan White | Dover District High School. |
| 12.30 | Lunch | Dover District High School or own arrangements. |
| 2.00 pm | **Speleosports.** | Dover District High School. |
| 4.00 pm | Afternoon Tea | Dover District High School. |

7.00 for 7.30 pm **Cavemaniacs' Dinner and Prize Presentation**. Dover RSL Club, Chapman Avenue.
PLEASE NOTE Licensing Laws and RSL Club policy forbid dinner attendees bringing their own alcohol into the club for consumption on the premises.

## Saturday 8th 2005

9.00 am All Day. **Final ASF Council Meeting** Dover District High School

**Fieldtrips** for those not involved in the ASF Council Meeting.
See Participant Lists for details of Departure Times, Leaders, Transport Arrangements and Gear Lists.
These trips incur an administration cost of $10 per person per trip.

6.30 pm Dinner for Far South participants Far South.

## Sunday 9th 2005

Before 10 am **Check-out and Departure**

**Post-Conference Fieldtrips commence.**

**Ida Bay Fielldtrips.** See Participant Lists for details of Departure Times, Leaders, Transport Arrangements and Gear Lists.
These trips incur an administration cost of $10 per person per trip.
Accommodation is arranged at Southport Community Hall for $10 per night.

**Mole Creek Fielltrips** by arrangement with Dave Wools-Cobb.
Accommodation by own arrangements.

## Saturday 15th 2005

Pre-paid **Gordon Dam Abseil** Fieldtrip.

## Sunday 16th 2005

**Junee-Florentine Fieldtrips commence.**
See Participant Lists for details of Departure Times, Leaders, Transport Arrangements and Gear Lists.
These trips incur an administration cost of $10 per person per trip.
Accommodation by own arrangements.

# CAVEMANIA ABSTRACTS

**Abstracts have been arranged in alphabetical order by name of senior author.**

## Index by Themes

**The following themes are represented in the Abstracts:**

**(D) Exploration**



**(E) General Interest**



**(F) Historical**

**(G) Techniques**

**Category: Paper**

## KARST IN THE WEST KIMBERLEY – AN OVERVIEW AND UPDATE 2.30 pm Monday

Ross and Jay Anderson

The Kimberley region in WA contains several significant karst systems. These areas have been the focus of several intensive speleological expeditions. Since the mid 1900's several Australian Speleological Groups have undertaken trips to this area. The expeditions have generally had the goal of documenting and recording the karst values of the area. The WA Speleological Group (WASG) is one such group that has undertaken speleological studies in the Kimberley.

The authors see that it is important, not only that speleological research is documented, but that information is kept in a central area. It is also seen as important that the Speleological Groups in WA are aware of trips occurring to the region, and of outcomes. This will assist in the co-ordination of information and ensure that valuable volunteer time is not wasted. This paper is a documentation and summary of trips undertaken in the Kimberley region. It is important that information about karst values, karst features, biology and other aspects of speleology are thoroughly documented. This information can then be utilized in site-specific management of protection of a karst system or parts of a karst system that may be threatened in the future.

This paper will outline the main speleological expeditions/trips that are known to have occurred to this area. There will be further discussion on what is currently known about the karst in the Kimberley. Some recent discoveries and useful techniques of recording information will be outlined. Further discussion around future visits and documentation of karst in the Kimberley will be explored. The paper will be presented in a pictorial format, which has a specific focus on the karst in the West Kimberley Region.

**Category: Paper**

## KARST AND SUBTERRANEAN WETLANDS – OPPORTUNITIES FOR RECOGNITION OF THESE ENVIRONMENTS IN AUSTRALIA 12 noon Tuesday

Jay Anderson

The protection and conservation of the environment is an issue that has received a large amount of attention in recent years. As speleologists, we would consider that the karst environment also needs acknowledgement, recognition and protection. Some opportunities for recognition and environmental protection are found within a number of areas. The level of protection afforded by different international treaties and conventions varies. Likewise, the management of sites can allow for recognition under Australian legislation and policy. Each treaty or convention provides a different focus and a range of management tools.

There are a number of relevant international treaties and conventions. Of particular value is the Ramsar convention and World Heritage sites. There are also Australian National Heritage Lists. For example, there are new amendments to the *Environment Protection and Biodiversity Conservation Act 1999.* These will be briefly discussed, particularly in relation to how karst areas, or subterranean wetlands may fit into these categories.

There is often a lack of information and resources to obtain the data required. In some cases nominations, and land management, are made with minimal information. There is a need for more open communication between managers/planners and groups that have local knowledge. It is suggested that speleological organisations are in a position to provide useful input. Thus, Government collaboration with speleological groups is an important part of the nomination and management process.
This paper is a pictorial format that outlines the primary methods that can be utilized to recognize and protect unique environments such as karst systems. It is suggested that Speleological Groups and individuals with speleological knowledge and expertise consider the karst systems that they are familiar with. It would be excellent if a profile of significant karst systems and unique subterranean wetlands was developed. This could provide land managers and the Australian Government with a source of priority sites for listing and protection under international conventions or Australian methods.

**Category: Paper**

## KARST MANAGEMENT IN WA – AN OVERVIEW OF THE CURRENT SITUATION

2.00 pm Thursday

Jay Anderson

There are a range of environmental management techniques, laws and policies that have been directed towards protecting and conserving some aspect of the environment. The conservation and protection of karst systems is an important issue that needs greater consideration and attention. The development of management plans and policy can play a significant role in the protection and conservation of karst systems. The state of W.A. has many karst systems, with differing land tenure. As such, these areas also have a wide variety of karst management. The areas within Western Australia which are karstic include: the Nullarbor, the Kimberley Region, the Cape Range, and the south-west coastal calcarenites – including the Wanneroo cave belt near Perth, and the Leeuwin-Naturaliste Ridge.

This paper will briefly examine the range of instruments that are available in relation to protection and conservation of all aspects of karst systems. The paper will outline the policy instruments relating specifically to karst systems that exist in Western Australia. The focus of the paper will be on wholistic karst management and management techniques currently being utilised, on a regional basis. The final Section of this paper will examine the effectiveness of current management techniques and policy and make some recommendations for future direction.

There is an opportunity for the Commonwealth and State Governments to set some clear policy regarding karst systems. It would be excellent if the agencies and organisations could work together in the management of karst. It is encouraging to see the progress that has been made, however there are opportunities for the development of further important policies in an integrated manner regarding this significant environmental issue. There is also further opportunity for both the public and the Government to be involved in protecting and conserving karst systems. It is the authors' view that Karst Management in WA, could benefit from increased collaboration and consultation. There is also a need for more education and interpretation of karst areas.

**Category: Poster**

## NULLARBOR KARST UPDATE

2.30 pm Thursday

Ken Boland, St Francis Church, Lonsdale St Melbourne 3000

A detailed description was given at the last Conference of exploration up to and including the collecting of megafauna bones from three caves in May 2002. The W.A. Museum continues to work on these. Two post-Easter trips in 2003 and 2004 have yielded a further 194 and 603 features respectively. Many features located from the air remain to be documented on the ground. Those visited so far include several respectable caves, one of which is a smaller version of Thampanna doline and entrance named 'Whispering Cavern'. Features are seen to be somewhat clustered, and other areas are all but devoid of any. The significance of the data remains to be understood. The documentation process is outlined. Exploration is ongoing, typically some 1500 sq.km per year. The focus continues to be on all karst related features rather than just caves.

**Category: Presentation**

## CAVE BIOLOGY FOR BIOLOGY TEACHERS

10.30am Thu

Stephen Bunton, The Friends' School, North Hobart 7000

A closer look at cave biology can illustrate a number of important biological principles studied by pre-tertiary students. This presentation was given to the 2003 BIOTA Conference for the Tasmanian Biological Teachers Association. It introduces teachers to some of the specific terms and some of the interesting cave invertebrates found in Tasmanian caves, thanks to some lovely photographs by Stefan Eberhard. The main concept explored is that of geographical isolation, its affect on evolution and the resultant adaptations of cave invertebrates.

**Category: Paper**

## THE TSINGY DE BEMARAHA PINNACLE KARST OF WESTERN MADAGASCAR

10.30 am Tuesday

Arthur Clarke, School of Zoology, University of Tasmania, Private Bag 05, Hobart, Tasmania 7001

Originally part of the African mainland and super continent of Gondwanaland, Madagascar is now an island country - the fourth largest island of the world - located 400km east of Mozambique (in Africa) and around 400km west of the small islands of Mauritius and Reunion. Known for its amazing biology, particularly the diverse mix of arid and wet zone flora with many unique animals (50 species of chameleons and 22 species of lemurs), Madagascar also has some world renown areas of unique limestone pinnacle karst.

Pinnacle karst is a form of tropical or equatorial karst characterised by near vertical rock blades, fretted and sharped by dissolution. Principally dissolved by rainwater there are three described forms or varieties of pinnacle karst: shilin (in China), the arete karst in Mulu (Sarawak) and the New Guinea Highlands and the most acute form: the tsingi karst of Madagascar.

The Tsingy de Bemaraha Parc Nationale is one of two large areas of extensively eroded pinnacle karst located in the arid parts of Madagascar; Bemaraha is in the west and Ankarana in northern Madagascar. The 152,000 hectare Tsingy de Bemaraha Parc contains two separate areas of limestone: the low relief "Petits Tsingy" adjacent to the Manambolo River and the more extensive higher relief "Grands Tsingy" further north where the limestone pinnacles are in excess of 100m high. Formed as a plateau, this pinnacle karst area features bare reticulated saw-topped ridges with almost vertical slopes rising above forest-covered depressions, fault graben canyons and solution joint corridors.

The surface vegetation in the tsingy itself is quite unique with many endemic xerophytic and/ or water storage plants. Although the tsingy receives torrential downpours in the wet season, very little water remains on the surface and in dry season, the only moisture for 6-7 months is the nightly dew, so it is essentially an arid environment.

The limestone has been structurally altered over time, as evidenced by faulted sections (uplifted massifs of limestone and down-faulted grabens) and strong jointing, giving rise to the presence of maze structures with many narrow fissures. There are three types of caves and correspondingly different cave ecosystems: diaclase maze canyon rifts (essentially "roofless caves") with many tree roots and a predominance of epigean species; caves with intermittent streams containing occasional tree roots and a mix of hypogean and epipgean species and the more extensive caves with speleothem deposits, white walled maze passages and large chambers, sometimes containing thousands of bats and a predominance of hypogean species including guanophiles.

**Category: Paper**

## AN OVERVIEW OF CAVE AREAS AND THE INVERTEBRATE CAVE FAUNA IN TASMANIA

9.00 am Thursday

Arthur Clarke, School of Zoology, University of Tasmania, Private Bag 05, Hobart, Tasmania 7001

There are 141 recorded cave areas included in the ASF Karst Index for Tasmania. Forty-one (41) of these are non-karst cave areas: principally in quartzite, sandstone, mudstone, metamorphic rocks, granite, dolerite or basalt; the remaining one hundred (100) are karst cave areas in limestone, dolomite or magnesite. Although there are estimates suggesting 4,000 known caves in Tasmania, presently (at November 2004), there are 2,770 documented caves in Tasmania: 150 non-karst caves and 2,620 karst caves. In addition there are another 161 documented karst features including poljes, blind valleys, swallets, springs and at least one possible "cenote". The major karst areas are: Junee-Florentine: 625 caves; Mole Creek: 509 caves; Ida Bay: 274 caves; Mount Cripps: 231 caves; and Gunns Plains: 151 caves. Invertebrates have been recorded from about 20% of the known karst and non-karst caves in Tasmania. Approximately 950 species of fauna from these caves are listed in a student (MSc) database that currently includes around 6,400 occurrence records based on collections and observations from 540 caves and another 12 efflux spring or mound spring sites in Tasmania. Just over 20% of

the known invertebrates are aquatic species. The greatest diversity amongst the aquatic species are the hydrobiid snails, amphipods, syncarid shrimps, phreatoicids and aquatic isopods. As may be expected in cool temperate cave areas, the major terrestrial species are the spiders, harvestmen, mites, pseudoscorpions, beetles, cave crickets, springtails, isopods, millipedes, oligochaete worms and land snails. Many species remain undetermined or undescribed. The karst bio-space in Tasmania is complex with variable development of aquatic and terrestrial habitats. Analysis of the karst bio-space in Tasmania (in November 2004) reveals several areas of high species diversity reflecting the intensity of study in those karsts: Ida Bay: 286 spp., Mole Creek: 189 spp., Bubs Hill: 183 species, Hastings: 176 spp., Junee-Florentine: 174 spp., Gunns Plains: 134 spp., Loongana: 111 spp., with 109 species from both Franklin River and Precipitous Bluff.

**Category: Paper**

## EARLY MAPS OF TUGLOW CAVES: THE BRACEWELL COLLECTION

9.30 am Friday

John Dunkley

The first half of the twentieth century is generally regarded as a time of few visitors and little progress in the exploration , recording and management of our cave resources. However, bushwalkers often gravitated to caving, indeed that is the origin of several speleological societies, but at the time there were no such societies. Although some individuals made only a few trips, and there are few reports extant, a few did produce reports and maps which are of value if only because of their rarity. They fill in the social history of caving in Australia.

The SUSS Tuglow book (Cooper et al., 1998) revealed a lot of unreported history of the cave, but omits the maps prepared in 1939 and 1940, on a trip led by Ronald Bracewell, and earlier ones dating back to 1934. I tracked down Bracewell in retirement in California. He says of his previously unreported expedition that others present were his father Cecil Charles Bracewell, Horace A. Salmon, Hilary Jackson (Vice-President of the Trampers Club), George Loder (Trampers Club) and an Argentinian whose name he has forgotten. They built a rope ladder about 100 feet long using rungs cut on the spot. They saw Bouchier's name in pencil and an 1800s date. Salmon tried taking photographs using magnesium powder but his shutter jammed at the bottom. The maps were produced some months later.

Bracewell says that this was the only caving trip he ever undertook. However he held on to the maps and some other minor papers for sixty years, donating them during a visit to Australia in 2000. On the other hand, Harper and Salmon had been actively caving for some years and the collection includes maps dating back to 1934.

Bracewell, Giovanelli and Harper all joined CSIRO after graduation and remained lifelong friends. Ron Bracewell, BSc, BE, ME (Sydney), PhD (Cambridge), designed microwave radar in World War 2, joined the faculty at Stanford University in 1955 and went on to become Professor Emeritus of Electrical Engineering. Ron Giovanni DSc (1915-1984) had earlier been one of the authors of the well-known map of Colong Caves dated 1945 but originating in the 1930s. He became Chief of the Division of Physics in CSIRO and later coordinated the changeover from imperial to metric units on various dates over 30 years ago. Arthur Harper AO led the Heat and Temperature Measurement Division of Physics for over 30 years and was Executive Member of the Metric Conversion Board, for example changing road signs overnight to a predetermined schedule. He died in 1991 aged 78. Described as the driving force behind the trip, Horace Salmon was a drapery salesman, founder and President of the Trampers Club and a bushwalking friend of Paddy Pallin.
Despite the fact that made only that one trip, Bracewell's collection and recollections provide useful additional insight into the beginnings of organised recreational caving in this country.

Acknowledgement: I thank Emeritus Professor Ronald Bracewell for permission to publish these data.

**The Original Maps**

Tuglow Caves: sketch of 60 ft level, drawn from memory by H. A. Salmon on 20/11/39. Scale 1" = 20 ft.

Gangerang Range: hand drawn map signed by Ron Bracewel on 15th March, 1941 *(not reproduced).*

Tuglow Caves: Drawn from data collected in the Horse Gully Caves on 25-27 December 1939 and Tuglow Caves on 24-28 December 1939 and 28 January 1940 by R N Bracewell (5 sheets) *(not reproduced here, this is a cover sheet prefacing the next five maps).*

Tuglow Caves: Three sheets, two signed by A F A Harper and H A Salmon. Sheet 1: "Plan of 135' floor", Sheet 2: "Cross-section of Drop 135' ... 200' approx. (looking south), Sheet 3: "Plan of 200" floor". Dated 1934.

Tuglow Caves: Two sheets "Section looking West" and "Section looking South" with "Phantom Plan of System", signed by A F A Harper and H A Salmon on 22/9/1934.

**References**

Cooper, I., Scott, M. and Vaughan-Taylor, K. 1998: *Tuglow Caves,* Sydney University Speleological Society, 65 pp.

Bracewell, R. N. 1939-1940: A ms. Collection of maps of Tuglow Caves produced or collected by Ron Bracewell when exploring these caves near Oberon, NSW. Manuscript Collection, State Library of NSW.

**Category: Poster and Interactive Workshop**

## IS IT A CAVE AND HOW LONG IS IT?

2.40 pm Thursday

John Dunkley

This paper will take the form of part-poster and part-workshop. The audience will be asked to participate actively, so everyone should read the poster display before the session begins, preferably a day or two in advance.

From time to time debate arises about just how to define what a cave is, and in turn how to measure the length of a cave. While of little significance to cave scientists, such exercises present other cavers with incentives and challenges that encourage further exploration and discovery. However, rather than attempt immutable definitions of caves and cave length, this presentation will provide several examples, drawn primarily from actual cave maps, illustrating conceptual issues to be taken into account in addressing the question. The audience will be invited to apply their own experience, perceptions and instinctive feelings to the question. Topics to discuss include differences between caves in temperate and tropical environments, segmentation of cave passages, roof holes and collapses, large chambers, dolines and shafts, drip lines etc. The questions may not be answered fully, and arguments may not be resolved, but there will be plenty to think about.

**Category: Poster**

## "VERY INTERESTING, VERY BEAUTIFUL... AND FULL OF CURIOSITIES" SOME HISTORICAL MATERIAL RELATING TO CAVES AT MOLE CREEK

12.10 pm Thursday

Rolan Eberhard,
Nature Conservation Branch Department of Primary Industries Water & Environment GPO Box 44 Hobart 7001

Historical documents recently come to light add considerably to our knowledge of the history of caves at Mole Creek since settlement. In 1879 surveyor Charles Smith wrote to the Minister of Lands and Works describing a richly decorated cave shown to him near Sassafras Creek. Smith contrasted the pristine state of the new cave with the degradation that had occurred at other Mole Creek caves, recommending that the land should be set aside as a cave reserve. This evidently provided the stimulus for one of three cave reserves created at Mole Creek in the 19th century, encompassing a total of 426 acres. However, by the mid 20th century, the largest of the cave reserves (300 acres) had been sold off, except for about 5 acres surrounding the most downstream entrance to Sassafras Cave, leaving most of the cave under private land. In 1901 the Crown Lands Bailiff reported on the condition of the caves, indicating that some of the caves at Sassafras Creek had been secured by gates and were in good condition. Those at Caveside (eg. Wet Cave) were unsecured and showed considerable damage. Despite early recognition of the need to protect the caves at Mole Creek, some caves suffered much damage within the

first few decades of their discovery by Europeans. Where the colonial government did act to create cave reserves, the reserve boundaries rarely encompassed the underground extent of the caves, creating the situation that currently exists at Mole Creek whereby some of the most important caves are located partly in reserves and partly in private land or State forest.

**Category: Poster**

## A NEW HYDROGEOLOGICAL MAP OF THE MOLE CREEK KARST SYSTEM

12.20 pm Thursday

Rolan Eberhard, et al.
Nature Conservation Branch Department of Primary Industries Water & Environment GPO Box 44 Hobart 7001

A cave mapping and water tracing program has been used to elucidate the landforms and subsurface drainage of the Mole Creek karst system in central northern Tasmania. This work contributes to a spatial database that will assist land management planning in this intensively utilised karst area.

**Category: Documentary Film**

## MADAGASCAR MYSTERY: A DOCUMENTARY FILM FEATURING THE TSINGY DE BEMARAHA KARST OF WESTERN MADAGASCAR 4.30pm Thursday

Nicolas Gabriel

As principal cinematographer and director, Nicolas Gabriel explores the relationship between the surface and the subterranean ecosystems in this arid area of limestone pinnacle karst of western Madagascar. Acutely "eroded" by dissolution through the action of torrential downpours and strong winds during the very brief annual wet season, the karst landscape of the Tsingy de Bemaraha has a striking relief. Nicolas uses a mix of cleverly designed animated graphics to demonstrate the geological and geomorphic processes involved in the evolution of the karst landscape. Many new species of plants and animals are still being found on the surface and in the caves. Some of these new finds are shown in this film. In order to demonstrate the attributes of the Tsingy karst, Nicolas has engaged a team of international consultants: sound chaser and composer (Christian Holl), speleologist and guide (Jean-Claude Dobrilla), ethno-archaeologist (Monsieur Ramilisonina), botanist (Jean-Jacques Delavaux), herpetologist (Jasmin Randrianirina), entomologist and mammalian consultant (Andre Peyrieras) and cave biologist/ karst consultant (Arthur Clarke). The film has been sponsored by National Geographic who added the English commentary in this version produced for television audiences, including blanks for inserting commercial breaks.

Since being produced late last year, the film has won six awards at international film festivals:

- Sunny Side, France: Prix Voyage Découverte (Travel and Discovery prize);

- Festival International d'Autrans du film Montagne Aventure, France: Prix du Film Nature et Environnement (Nature and Environment prize);

- Festival du Film de Val d'Isère Grandeur Nature (Environment Film Festival), France: Grand prix du Jury Grand prix du public;

- Festival International du Film Alpin et de l'Environnement les Diablerets (Swizerland): Prix Spécial du Jury;

- Festival International du Film d'Aventure de Montréal (Quebec): Mention du Jury;

- Festival Vertical du Film de Moscou (Russia): Primé.

**Category: Poster**

## THE DESTRUCTION OF THE HARMAN VALLEY, VICTORIA 3.50 pm Thursday

Ken Grimes and Reto Zollinger

A significant lava flow on the slopes of Mt Napier has been degraded by the actions of the landowner in bulldozing the basalt, crushing the rocks and altering the nature of the landscape. This is a serious conservation issue and this poster outlines the implications and raises some legal and management issues.

**Category: Paper**

## KARSTIC PHENOMENA IN THE NAMAKABROUD AREA OF NORTHERN IRAN

9.30am Tuesday

Hakimi Asiabar, S., Lahijan Branch, Azad University
Khakzad, A., Faculty of Earth Sciences, Shahid Beheshti University
Bahar Firoozi, Kh., Geological Survey and Mine Exploration of Iran
Tabatabaie, H., Exploration Branch, National Iran Oil Company

The town of Namakabroud (36°40' N, 51°17' E) is found in Mazadaran Province and is located 12 km to the west of the city of Chalus which is on the southern shore of the Caspian Sea.

The geomorphology of the area is dominated by landslides and karst development. The most important factors influencing the evolution of karstic landforms are lithology, structural patterns of joints and faults and dolomitization. The main outcrops in the Madoubans Mountains consist of members of the Lars Formation (Upper Jurassic) and are characterized by their creamy, white and buff colours. The Lars Formation is divided into five members distinguished on the basis of variations in cementation, dolomitization, recrystallization and porosity.

Many springs are found in the northern foothills of the Madoubans Mountains and indicate that the area has an active groundwater system with subterranean flow to the N and NW. The size and frequency of sinkholes and dolines is greater in the western parts of the crests of the Madoubans Mountains and the most important features are Zang-e-Tool Cave, Sisara Cave and the Dive-Hammam doline. The two caves are the most extensive and the Dive-Hamman doline is the largest collapse doline found in the area.

To investigate the development of solution cavities and to identify the presence of underground percolation zones, topographical and geological maps were prepared . Geological mapping, geomorphological and structural analysis were used in conjunction with resistivity measurements (Schlumberger method) based on an electrode spacing of 1000 metres. Geophysical and structural cross-sections were drawn for different parts of the Madouban Mountains. This enabled us to describe the patterns and directions of underground water movement.

**Category: Paper**

## AN INTRODUCTION TO THE HISTORY OF CAVE TOURISM IN TASMANIA

10.30 am Friday

Nic Haygarth and Arthur Clarke

Karst was one of Tasmania's earliest tourist attractions. Caves in the Mole Creek region drew visitors by 1840, and in the early 1850s the proprietor of the Chudleigh Inn marketed the nearby Western, Westward, Oakden, Chudleigh or Wet Caves to tourists. In the early 1860s, two more caves were discovered: one at Sassafras Creek, near South Mole Creek and one at Flowery Gully, south of Beaconsfield: both caves attracted many visitors. In the late 19th century more caves were found near Sassafras Creek and at Ida Bay, Gunns Plains and the Bird River near Macquarie Harbour: all being mooted as tourist sites.

Individual entrepreneurship was a factor in deciding which became show caves. Cave tourism in the Mole Creek region was advanced by the Mole Creek railway, opened in 1890, which enabled the working class of Launceston to make day trips. It became clear during the heyday of private cave tourism at Mole Creek - the first two decades of the 20th century when the motor car took over from horse and buggy - that effective development of show caves could only be afforded by the government, which operates Tasmania's four tourist caves today. A comparatively small tourist revenue still hampered their development, and it was not until the official opening of Newdegate Cave at Hastings in 1939 that Tasmania finally consigned acetylene lighting in caves to history and fully embraced electricity.

The Tasmanian Caverneering Club, the first caving club in Australia, began in Hobart in 1946. Cavers were engaged to explore and map the major tourist caves and report on their potential for expansion and further development of our karst tourist industry. In this same process, cavers discovered many other new caves, some of which were recommended as preferred tourist sites.

**Category: Paper**

## TASMANIAN CAVES AND KARST – LOOKING FORWARD, LOOKING BACK

11.30 am Monday

Ian Houshold, Karst Geomorphologist, Deparment of Primary Industries, Water and Environment, GPO Box 44 Hobart, Tasmania 7001

Since the last Tasmanian ASF conference in 1993 we have greatly expanded the known boundaries of Tasmanian caves and karst in space, time and in our knowledge of how karst systems operate. Rather than focussing especially on caves, mapping of karst hydrological systems has greatly expanded the relevance of karst processes to land management in areas where few accessible caves are found.

Over 300 areas of potentially karstic carbonate rocks have now been mapped, some within the last ten years. Perhaps half of these contain significant cave systems. Weathering caves in sandstone and other sedimentary rocks, sea caves, seasonal snow caves and boulder caves in hillslope deposits are widespread. Perhaps the most intriguing of these non-karst systems are found in extensive dolerite talus deposits where large closed depressions, underground stream systems, boulder caves and major springs comprise rare examples of well developed pseudokarst in non-carbonate rocks.

The diversity of Tasmanian cave biota has long been recognised, with many rare species now listed on State threatened species legislation. New species and communities are being constantly identified and described. However Tasmanian karst workers are keen for this recognition of biodiversity to be complemented by an equally strong commitment to proper management of karst geodiversity – the full range of abiotic processes and features found in karst. Reserve categories declared under the *Nature Conservation Act 2002* all contain reference to the State's commitment to the protection of geodiversity along with biodiversity.. However legislation specific to geodiversity across all tenures, and similar to that used to protect rare and threatened biological communities and species, is still not currently under consideration. Protection of geodiversity is only possible on land reserved under the *Nature Conservation Act.* Yet, as can be plainly seen in caves and karst, many of the most fragile and non renewable elements of karst systems are abiotic and found within a variety of land tenures.

Research is constantly expanding the boundaries of our understanding of the development of karst ecosystems. Much can be applied to landscapes surrounding karst. Recent PhD's addressing climatic and environmental history (using high resolution mass spectrometry to date and analyse environmental isotopes in speleothems) have relevance far beyond the boundaries of karst systems themselves. Subjects as wide ranging as temperature and bushfire histories interpreted through analysis of straw stalactites, to interpretation of changing climatic patterns since the last glacial stage from flowstone cores have all been studied over recent years, using Tasmanian cave deposits. Original research into the nature of microbiotic processes in Tasmanian caves has recently been completed by local microbiologists.

Tasmanian cavers and karst scientists are beginning to work with the Aboriginal community to try and slowly unravel the cultural and environmental history of the island. The Southwest is a patchwork of landscapes whose vegetation distributions have been essentially controlled by fire. Much of the Southwest, particularly the buttongrass sedgelands and the major river valleys which formed communication routes, is largely cultural landscapes which were likely to have been maintained by Aboriginal fires. On the other hand, areas such as the

New River basin, where fire has been excluded for many hundreds of years at least, form invaluable reference points for essentially natural systems. Karst systems are found throughout these areas and the knowledge contained within them will be invaluable in developing a new perspective on Tasmanian landscape history, integrating science with traditional practices.

Many Tasmanian karst areas form the basis of a complex mix of rural industries. Intensive agriculture, forestry. limestone mining, tourism and urban uses are carried out in the context of the vagaries of karst processes. Managing these highly productive lands in a way which conserves the integrity of the natural processes which underpin them will rely on developing an excellent knowledge base along with careful discussion and negotiation between all of those with an interest in using and caring for karst.

The Australian Speleological Federation will continue to play an important role in providing advice in all of these areas, and in the active collection and documentation of factual information on which wise management will be based.

**Category: Paper**

## THE BULLITA CAVE SYSTEM, AUSTRALIA'S LONGEST CAVE – A HISTORICAL PERSPECTIVE OF THE SURVEYING OF THE CAVE

2.00 pm Monday

Bob Kershaw, Illawarra Speleological Society

There have been snippets of geological and other information regarding Australia's longest cave published in the ASF's journal Australian Caver, minor presentations made at overseas and ASF conferences over the last few years and an article in CEGSA News in 2003. Of late there has been an article published in The Australian newspaper as well as numerous postings on the email group –ozcavers.

The aim of this presentation, with NT Parks and Wildlife permission, is to provide a perspective of the historical development of the surveying of the Bullita Cave system from the numerous expeditions and their successes over the past 15 years. From the initial work by rangers Keith Claymore and Keith Oliver, and the Operation Raleigh Expedition of Smith and Storm from the UK to the TESS surveying and the subsequent work by Australian cavers coordinated by Top End Speleological Society (TESS) and Canberra Speleological Society (CSS), the Bullita Cave system is close to 100km in length.

**Category: Paper**

## METHODS OR PROBLEMS ASSOCIATED WITH SURVEYING THE BULLITA CAVE SYSTEM

11.30 am Tuesday

Bob Kershaw, Illawarra Speleological Society

This presentation deals with the problems of surveying the Bullita Cave System over the last 15 years to encourage discussion with other surveyors and to improve the management of surveying large caves in Australia. With changing expedition members, improvements in technology and computer programs becoming more prevalent and user friendly the annual project has in fact required a great deal of planning and preparation.

However, there are other factors that have inhibited surveying this cave such as climate and remoteness.

**Category: Poster**

## BULLITA CAVE SYSTEM AERIAL PHOTO

4.10 am Monday

Bob Kershaw, Illawarra Speleological Society

An aerial photo showing the approximate location of the Bullita Cave system in relation to the surrounding landscape.

**Category: Paper**

## TASMANIA'S COLD CAVES: AN ISLAND OF ALPINE KARST 12 noon Monday

Kevin Kiernan, School of Geography UTAS Private Bag 78 Hobart 7001, Tasmania

Speleologists visiting Tasmania are commonly warned that they will encounter wetter and colder conditions than those to which they may be accustomed. But although conditions may be bracing today they have been far more so in the past. This paper will provide an overview of Tasmania's karst areas in the context of the significantly colder climatic conditions that have prevailed at various times during their evolution.

Unlike most of the karsts of mainland Australia, much of Tasmania's karst is essentially alpine in character, with some Tasmanian karsts variously effected by glaciers and/or other non-glacial, cold-climate (periglacial) processes. During the most extensive of several glaciations an ice cap of over 7000 km2 extended over Tasmania's Central Highlands at which time many of Tasmania's major rivers such as the Derwent and Mersey originated from karst-like cave systems in the snouts of major glaciers. In some cases streams flowing through caves at the base of glaciers have left a legacy of channels eroded into the present landscape. While the glacier melt-karst has now vanished, a legacy of the glaciers remains in some conventional karst areas where glacial effects variously included the removal of surface karst by glacial erosion, the clogging of pre-existing caves by glacial sediment and/or the generation of new cave passages by glacial meltwater.

Away from the glaciers, other non-glacial cold climate (periglacial) effects included the destabilisation of hill-slopes when conditions were too cold to permit colonisation by the forests that now bind the slopes together; the swamping of karst surfaces by landslide and other mass movement deposits, sometimes blocking streamsinks and causing a reversion to surface drainage; interruptions to the formation of speleothems caused by changes to vegetation and/or water flow; the shattering of rock in cave entrance zones by the freezing and expansion of moisture in crevices even at very low altitudes; and an increase in the volume and size of sediment delivered into rivers. By the latter means the effects of cold climate were felt in many karsts even those well-removed from the mountains.

Karsts close to the coast were also influenced by a fall of global sea levels by up to 130 m that resulted from water being locked up in global ice-sheets and glaciers, which had the effect of steepening the hydraulic gradient through coastal karsts until sea level rose again as the climate warmed and the great ice sheets melted. This legacy of climate change in Tasmania's karsts influences the character of some of Tasmania's most celebrated sporting caves and is of great scientific interest, with the little-studied alpine karsts being of particular importance.

While alpine karst is relatively common worldwide, it typically occurs in areas of active mountain-building where a rapid pace of development and destruction limits the potential for survival of ancient alpine karst. For example, in New Zealand's Southern Alps there has been over 18 000 m of uplift during the last 3 million years, sufficient to raise Mt Cook to twice the height of Everest had not erosion outpaced the rate of uplift. In contrast, the relative stability of Tasmania's mountains allows the survival of very ancient alpine karst. This highlights the potential for Tasmanian caves to provide evidence of global significance concerning patterns of natural climate change over a very long time scale.

**Category: Poster**

## THERMOKARST AT MARINE PLAIN, EAST ANTARCTICA 4.00 pm Monday

Kevin Kiernan, Anne McConnell & Eric Colhoun

Thermokarst, a cold-climate form of pseudokarst, comprises irregular, hummocky terrain with closed depressions that appear similar to sinkholes but which are formed in very cold (periglacial) environments by the melting of permafrost ice in the ground and settlement of the sediments in which the ice occurs, rather than by dissolution of soluble rock as in true karst. It is well developed in high northern latitudes but is rare in the southern hemisphere The largest occurrence of periglacial thermokarst that has been recorded in East Antarctica occurs at Marine Plain (67°37'S, 78°09'E ), a small basin of 4 km2 that is filled with Pliocene marine diatomite sediments c. 9 m thick which are overlain by thin glacial sediments. Summer thawing of the ground at Marine

Plain is confined to the upper c. 1 metre with the ground below this depth remaining permanently frozen. The diatomite includes some very minor limestone lenses but dissolution of these does not appear to have contributed significantly to development of the pseudokarst landforms. These landforms include thaw pits, thaw lakes, ground ice slumps, linear closed depressions and very small-scale beaded drainage features. Strong thermal conductivity adjacent to bedrock hills on the margin of the plain is an important process that has promoted progressive degradation of the subsurface permafrost by formation and back-wearing of low scarps, causing formation of the principal thermokarst landforms. The existence of only small thaw pits away from the bedrock margins of the plain suggests the permafrost is probably closely in equilibrium with the present day climate and is undergoing only very slow degradation over a long time. Human disturbance of the ground surface has locally thinned the seasonally-thawed surface sediments that form an insulating blanket over the deeper permafrost, and this has caused some accelerated melting and slumping. Marine Plain was designated as a Site of Special Scientific Significance in 1987, primarily in response to the discovery of Pliocene dolphin and mollusc fossils. Its significance as a thermokarst was not recognised at that time. It has recently been re-designated as Antarctic Specially Protected Area No 143 and a new management plan now recognises the significance of the thermokarst.

**Category: Paper**

## THE ASF'S NATIONAL KARST INDEX DATABASE – AN OVERVIEW OF THE UPDATING FEATURES

11.30 am Friday

Mike Lake

The ASF's National Karst Index Database has been running since January 2001 and it accounts for the majority of the visits to the ASF's web site.

Until now that database has been read-only. The reason for this was that the database is quite complex and when initial coding was started in 2000 we decided to "walk before we ran". In hindsight that turned out to be a good idea.

Over the last year the code underlying the database has been extended to provide updating functionality. The codebase now runs to 100,000 lines of code. We have data updating, auditing, attribution and automatic PDF generation of cave summary forms.

The KID is also a working implementation of the UISIC standard for Cave & Karst databases. As the code is released under the GPL, other countries can adopt our system, although for some languages considerable work in internationalisation would be required.

This talk will present an overview of the new functionality and encourage clubs and other organisations to contribute to updating Australia's national karst index database.

**Category: Seminar Paper**

## DIGITAL PHOTOGRAPHY AND ITS LIMITATIONS AND WAYS AROUND THEM IN THE CAVE ENVIRONMENT

11.30 am Thursday

Angus R. Macoun

Digital cameras are becoming popular and many people are hardly using their film cameras anymore. This is due to the perceived main benefits of digital technology which are that more pictures can be taken and stored or deleted, that payment for film processing is not necessary and pictures can easily be emailed to other people. There are numerous other technological advances as well. However, this does not mean that a digital camera will give a better picture quality than a film camera. This is especially so in a dark environment. Digital photography has a number of drawbacks when compared with film and it has its own costs. Photographing with a digital camera requires a different approach to obtain good results. This seminar will give some simple approaches and some more complicated solutions both in photographic and computer techniques to the challenge that the digital world gives us in making great cave photographs.

**Category: Poster**

## SYNTHESISING STALACTITE MORPHOLOGY

12 noon Thursday

Damian P. Marrick, IMAGEN Program, Level 2 South Pod, National ICT Australia, Bay 15, Locomotive Workshop, Australian Technology Park, Eveleigh, NSW 1430, Australia

Julia M.James, Heavy Metals Research Centre, Chemistry, F11, The University of Sydney, NSW 2006, Australia

A topic of major interest in speleology is the morphology of speleothems. However, the chemical and physical processes that occur to form speleothems in nature are quite complex. Speleothem growth can be modeled computationally with the input of various parameters, one could easily explore the vast variety of potential shapes that may arise from different conditions in a cave.
Our research aims toward the goal of computationally modeling the morphology of speleothems. We have investigated two models for generating stalactite geometries, and rendered these geometries as realistic images.

The first of these is a rigorous model based on the thermodynamic and kinetic theory of calcite deposition. It first generates the shape of a calcite straw, based on a linear approximation of the rate of deposition. It then blocks the straw and builds up the sides and tip of the stalactite.

The second model is a stochastic particle-based approach from computer graphics. This model starts off with a cylinder, representing the straw speleothem, which is made up of calcite particles joined together by edges in the geometry. Water particles are generated at the top of the straw and allowed to flow along edges between calcite particles. Deposition occurs on every calcite particle visited by a water particle, according to the length of time the water particle is present there. The water particles accelerate down the sides of the stalactite until they reach the tip, where they are removed, causing new water particles to be created back at the top of the stalactite.

Stalactites generated by both models were rendered as images with realistic texturing and lighting in a ray-tracer. Although the first model provided a more chemically accurate approach to generating geometry for a stalactite, the images produced by the second model appeared much more realistic. We aim towards a hybrid of these two approaches that may result in more realistic images.

**Category: Workshop**

## WORKSHOP 1-DIGITAL IMAGING FOR CAVE PHOTOGRAPHY: BASIC TECHNIQUES

9.00am Thursday

Phil Maynard

Digital cameras are rapidly gaining acceptance in photography. There are a host of new technologies and techniques associated with digital imaging. These include techniques that parallel traditional darkroom practices as well as completely novel techniques made possible by computerised storage.

This workshop covers the process of capturing an image, transferring it to a computer and performing basic enhancement techniques. Techniques relevant to cave photography will be the focus of this workshop. Topics covered include camera selection, camera resolution and storage, transfer of a digital image to a laptop, scanning film and slide images, file formats and image quality, image resolution on screen and in print, colour depth, colour saturation, colour balance, cropping/resizing/rotating images, and the use of levels and curves to correct images.

**Category: Workshop**

## WORKSHOP 2-DIGITAL IMAGING FOR CAVE PHOTOGRAPHY: ADVANCED TECHNIQUES

9.00am Friday

Phil Maynard

This workshop will cover more advanced image enhancement techniques for digital photography. Topics covered include layers and masks, selections, layer blending, use of the clone tool - techniques and ethics, blur filters, sharpening filters, novelty filters, and output options. Once again, the focus of this workshop will be techniques that are important for cave photography.

Participants with their own laptops are encouraged to bring them and practice the techniques introduced in this workshop.

**Category: Paper**

## BIOLUMINESCENT GLOW-WORMS: IS THERE A DIFFERENCE BETWEEN CAVE AND RAINFOREST POPULATIONS?

9.30 amThursday

David J. Merritt, Niu Changying, Claire H. Baker and Glenn Graham
The University 0f Queensland, Brisbane, Queensland

Glow-worms have very specific habitat requirements, needing moist, protected conditions. Wet caves provide an ideal environment because the atmosphere is humid and the glow-worms are protected from weather extremes. On the other hand, rainforest populations are periodically exposed to stresses such as drought, wind and occasionally, fire. Exactly how different are long-term cave and rainforest populations? A study of *Arachnocampa luminosa* in New Zealand has shown that cave and rainforest populations are polymorphic and highly heterozygous indicating that significant gene flow occurs between them (Broadley, 1998). Our recent study using mitochondrial DNA sequences has also indicated that cave and rainforest glow-worms from the same region are one and the same species: for example, glow-worms *(Arachnocampus tasmaniensis)* from a rainforest gully at Francistown near Dover south of Hobart are genetically closely related to those from Mystery Creek Cave, and could not be considered a discrete species. We outline a genetic study using microsatellite markers that is underway to help assess the differences between cave and rainforest populations.

The different environments of cave and rainforest glow-worms are also reflected in the glow-worms' physiology. Rainforest glow-worms show an innate rhythm in light output, even when placed in constant darkness, whereas cave glow-worms appear to glow continuously. Further, cave glow-worms are exposed to relatively constant temperatures whereas rainforest glow-worms are exposed to daily fluctuations. Here we describe the physiological reactions of rainforest glow-worms to experimentally manipulated dark/light conditions and temperature fluctuations.

**Category: Paper**

## ARTHROPOD SEASONALITY AND SUCCESSION IN CAVE GUANO – HOW IMPORTANT IS FRESH GUANO?

10.00 am Thursday

Timothy Moulds, The University of Adelaide, Department of Environmental Biology,
North Terrace, Adelaide, South Australia 5005

Australia's most diverse guanophilic arthropod community from Bat Cave, Naracoorte consists of over 30 species of insects, arachnids and crustaceans. Highest species abundances occur during summer when the maternity chamber is occupied by some 35,000 southern bent-wing bats (*Miniopterus schreibersii bassanii*) that use the domed chamber for birthing. During summer deposition of fresh guano and urine is greatest in the chamber's centre, under the main bat roost, resulting in dramatic increases in pH, while remaining areas exhibit

lower pH. During winter bats vacate the cave to enter torpor in cooler caves in the region, resulting in a cessation of guano deposition and consequently lower, often acidic conditions (pH <5.0).
Community succession is observed in bat guano, with maximum species richness occurring early in the deposition cycle and diminishing with time as the guano ages and becomes increasingly acidic. The strongly seasonal guano deposition within Bat Cave results in distinct arthropod community assemblages in fresh and old guano. Species richness is significantly higher at tops of piles than at bases. Increasing species richness correlates positively with increasing pH at bases of guano piles. Seasonal fresh guano deposition into this chamber is vital for the long term survival of this unique guanophilic community. This highly specialised ecosystem provides an invaluable study site for subterranean ecology and cave biogeography in southern Australia.

**Category: Poster**

## ARTHROPOD ECOLOGY IN A BAT MATERNITY CAVE

12.20 pm Thursday

Timothy Moulds, Environmental Biology, The University of Adelaide, South Australia, 5005

Bat Cave, Naracoorte, South Australia, is the largest of only two maternal sites for the large bent-wing bat (*Miniopterus schreibersii bassanii*). Guano dropped by these bats in the maternity chamber provides a habitat for an extremely diverse arthropod community. Despite a comprehensive species inventory from previous invertebrate surveys, the ecology of arthropod species in the cave remains completely unknown. This study seeks to elucidate and explain temporal and spatial patterns of arthropod diversity and abundance in the maternal chamber. Pitfall traps, open for 48 hours, bimonthly, have been positioned in 18 guano piles throughout the maternal chamber. The traps have been placed in pairs at the top and bottom of piles to ascertain the importance of fresh guano to the arthropod populations. A range of environmental factors including pH, moisture content, and guano deposition rates are being examined to evaluate their micro- and meso-scale affects on arthropod populations.

Preliminary data indicate that guano is usually slightly acidic, with the tops of guano piles strongly basic (8.0-9.0). The abundance of species of Acarina, Coleoptera (Carabidae, Histeridae and Anobiidae), Diptera (Phoridae), and Pseudoscorpionida (*Protochelifer naracoortensis*), has been found to be higher on the tops of piles where guano deposition and moisture content are higher. Arthropod abundance and diversity are postulated to be strongly linked to seasonal guano deposition, peaking over summer months. Further studies, beyond the scope of this project, should include research on fungal and microbial diversity which, apart from guano, form the basis of the maternal chamber food web. Detailed ecological information on species endemic to the maternity chamber would also greatly enhance management and conservation practices for this fragile environment.

**Category: Workshop**

## FINE TUNING YOUR SRT RIG

10.00 am Friday

Alan Warild

A workshop designed to improve the efficiency of your abseil and prusik system.

**Category: Paper**

## EXPLORATION AND SURVEYING IN LECHUGUILLA CAVE: 2002 - 2004

9.00 am Tuesday

Jenny & Gary Whitby

Spanning three expeditions over the last 26 months, two Aussies have participated in project trips into Lechuguilla Cave, New Mexico, USA spending a total of 23 days in the cave.

This cave is different to most as it was carved by highly corrosive sulfuric acid, created when hydrogen sulfide gas rose from deep underground pools of oil to mix with surface water leeching downward. The unique conditions of Lechuguilla have been ideal for the growth of extraordinarily large and well developed speleothems. The result is one of the most aesthetically beautiful, mineralogically diverse, and geologically and exploration challenging cave systems in the world. The known length of this cave today (Nov 2004) is now over 184km, and at a depth of 489metres, it is the deepest cave in mainland USA, and is the 5th longest cave in the world.

The expeditions this presentation is based on were are all to the Western branch of Lechuguilla Cave. Results of these trips have discovered 3.1km of new passage which was surveyed and inventoried, and 2.0km of resurvey. There are still many leads left for future expeditions. This presentation gives an insight into experiences and sights of exploration in Lechuguilla.

**Category: Paper**

## LAVA CAVES OF THE BIG ISLAND, HAWAII

10.00 am Tuesday

Jenny & Gary Whitby

The Big Island of Hawaii, is home to the longest lava caves in the world. In 2003, a roup of ASF cavers had the opportunity to participate in survey and exploration of several systems on the island.

This presentation takes you to visit some of the caves in the north west, south west, and eastern parts of the island including the two longest lava tubes in the world being Kazamura Cave, at over 65.5km and Kipuka Kanohina (Kula Kai Caverns) at 22km.

Virtually the whole island of Hawaii is in a hazard zone as judged by the United States Geological Survey (USGS). The USGS scale for the island runs from 1-9, with higher number designations given to areas lying further from active eruption zones. The lava caves we visited were in a "zone 2" hazard area.

Hawaiian lava caves are difficult to survey in, as they contain magnetite and hematite in large enough concentrations to affect compass readings. The caves are braided and maze-like with multiple levels and confusing passages, and contain unusual lava formations and secondary deposits. Evidence of ancient habitation and Hawaiian artifacts have also been found in these caves. This presentation is a slide show of the ten days caving and surveying in these unusual and sometimes surprisingly colourful lava caves.

**Category: Paper**

## KARST DEVELOPMENT AT NARACOORTE, SOUTH AUSTRALIA: WHEN? WHY? & HOW?

3.00 pm Monday

Susan White and John Webb, Dept of Earth Sciences, Latrobe University, Bundoora, VIC., 3086

The Lower Southeast of South Australia and a substantial part of southwestern Victoria comprise a limestone karst province, which has extensive areas where cave and karst development is limited interspersed with areas of atypical intensive karst development such as at Naracoorte.

At Naracoorte dolines, uvalas and blind valleys characterise the surface karst. The caves range from simple single passages to complex mazes, and passages trend predominantly northwest/southeast. Cave walls retain evidence of solutional features. The caves contain a range of fossiliferous clastic sediments and dated speleothems. The fossils accumulated through pitfall entrances in several episodes during the Middle Pleistocene (100,000 - 400,000 years ago).

The development of the Naracoorte karst is constrained by the age of the enclosing Gambier Limestone (Oligocene-Miocene), and probably is later than the maximum sea-level transgression at ~7 Ma. The following Pliocene-Pleistocene regression deposited a series of sub-parallel beach dune ridges, becoming progressively younger seaward.

Cave formation probably occurred in a relatively narrow window of time between uplift along the Kanawinka Fault in the late Pliocene, and draining of the caves by the sea level fall at ~800 ka, during deposition of the West Naracoorte Range. The main period of cave development probably began during deposition of the East Naracoorte Range at ~1.1 Ma, as prior to this the cave area was flooded by the sea, and no cave formation could occur. The caves may have initially formed along the freshwater/seawater interface extending inland from the East Naracoorte Range, and were subsequently enlarged by groundwater flow as sealevel fell between 1.1 Ma and 800 ka. Because the water table was not stable for a substantial period of time, there was no preferential development of passages at a particular elevation. The incision of Mosquito Creek postdates uplift along the fault and occurred during the 1.1 Ma to 800 ka sealevel fall. As the water table dropped due to sea level fall and creek incision, the caves first partially, then completely drained. Most of the collapse that characterises many of the Naracoorte caves probably occurred progressively as the water drained from the passages; at least some collapse entrances could have formed at this time.

Solution pipe entrances have formed since the main cave development, intersecting the older main cave passages and enabling sediment accumulation. Cyclical wet and dry conditions occurred over the last 500ka as landscape modification occurred throughout the Pleistocene to the present.

The overall landscape history of the Naracoorte area during the Pliocene/ Pleistocene shows that speleogenesis was controlled by oscillating sealevels, coastal deposition and tectonic movements on the Kanawinka Fault.

**Category: Paper**

## KARSTCARE – CAVERS LOOKING AFTER CAVES AND KARST 3.30 pm Monday

David Wools-Cobb

KARSTCARE is a group of cavers who regularly contribute to care and maintenance of caves in the Mole Creek National Park. Over the past four years they have achieved about 500 hours of "hands-on" work on a variety of projects.

The author will outline many of their achievements and explain how partnerships with cave managers can be mutually beneficial. He will also give basic details of the post-conference project planned for Kubla Khan Cave.

**Category: Paper**

## LECHUGUILLA – A TASMANIAN PERSPECTIVE 9.00am Friday

David Wools-Cobb

David was invited to join a private expedition into Lechuguilla Cave, New Mexico in October/November 2004. This involved camping in the cave for 8 days.

The cave is considered by many cavers to be one of the most spectacular in the world. The known cave is over 184km long and 489m deep in limestone that has been eroded by sulphuric acid welling up from underneath. It has some spectacular and somewhat unique secondary deposits.

Lechuguilla Cave lies underneath a desert mountain range- the Guadalupes and, is vastly different from any caves in Tasmania.

In his presentation the author will outline the preparations required for such an undertaking and show a few slides of the cave. He will also outline some of the lessons learned from the "controlled" way that Lechuguilla has been explored and surveyed.

## CaveMania Participants List

| | | | | | |
|---|---|---|---|---|---|
| Jay | Anderson | rossjay@iinet.net.au | PO Box 443 Cloverdale WA 6153 | (08) 9387 6127 (h)<br>(08) 9387 6127 (fax) | 0407 473 539 |
| Ross | Anderson | rossjay@iinet.net.au | as above | | |
| Hakimi | Asiabar | | Lahijan Branch, Azad University Iran | | |
| Andrew | Baker | andrew.c.baker@uts.edu.au | 8 Barry Pl Cherrybrook NSW 2126 | (02) 9680 1442 (h) | |
| Craig | Barnes | craigb@mail.usyd.edu.au | 4/57-59 Eton St Sutherland NSW 2232 | (02) 9521 6320 (h)<br>(02) 9351 3644 (fax) | (02) 9351 2972 (w) |
| Michael | Bates | mbates@maths.unsw.edu.au | 2/503 King St Newtown NSW 2042 | (02) 9565 5548 (h) | |
| Serena | Benjamin | serenab@utas.edu.au | 33 Coolamon Rd Taroona TAS 7053 | (03) 6227 8338 (h) | |
| Anna | Binnie | anna.binnie@uts.edu.au | 8 Berripa Close East Ryde 2113 | (02) 9887 2371 (h) | |
| Ian | Binnie | ian_binnie@optusnet.com.au | 8 Berripa Close East Ryde 2113 | (02) 9887 2371 (h) | |
| Stephen | Blanden | | 1395 Main Rd Gunns Plains TAS 7315 | (03) 6429 1192 (h) | |
| Ken | Boland | kboland@blessedsacrament.com.au | St Francis Church 326 Lonsdale St Melbourne VIC 3000 | (03) 9631 5027 (h+w) | (03) 9663 2817 (fax) |
| Chris | Bradley | chris.bradley@abs.gov.au | 22 Mirning Cres Aranda ACT | (02) 6161 0108 (h) | (02) 6252 7232 (w) |
| Adam | Branford | beaker@slmember.on.net | PO Box 2511 Mt Gambier SA 5290 | (08) 8723 4007 (h) | (08) 8725 5883 (w) |
| Vicki | Bresnan | | 28 Kathleen St Cottesloe WA 6011 | (08) 9384 1824 (h) | (08) 9383 1194 (fax) |
| Paul | Brooker | paul@pitchblack.com.au | 19 Franklin St Morwell VIC 3840 | (03) 5135 3961 (h) | 0418 384 245 |
| Darren | Brooks | dbrooks @westnet.com.au | 14 Fyfe St Exmouth WA 6707 | (08) 9949 1274 (h) | (08) 9949 3235 (w) |
| Laurie | Brown | lcbrown@optushome.com.au | 39 Esdale St Blackburn VIC 3130 | (03) 9878 4847 (h)<br>(03) 9893 4895 (fax) | 0413 388 927 (w) |
| Grace | Bunton | | 1 Raymont Tce Mt Stuart TAS 7000 | (03) 6278 2398 (h) | |
| Kathryn | Bunton | kbunton@friends.tas.edu.au | PO Box 198 North Hobart 7002 | (03) 6210 2200 (w) | |
| Stephen | Bunton | sbunton@friends.tas.edu.au | as above | (03) 6210 2200 (w) | |
| David | Butler | David.Butler@dpiwe.tas.gov.au | 637 Deviot Rd Deviot TAS 7275 | (03) 6394 7686 (h) | |
| Alan | Caton | al.caton@bigpond.com | 643 HenryLawsonDrive East Hills NSW 2213 | (02) 9792 1231 (h) | (02) 9691 6989 (w) |
| Arthur | Clarke | arthurc@southcom.com.au | 17 Darling Pde Mt Stuart 7000 | (03) 6228 2099 (h) | |
| Robyn | Claire | | PO Box 245 North Hobart 7002 | (03) 6226 2631 (w) | |
| Marie | Choi | battymariec@picknowl.com.au | 17 Darling Pde Mt Stuart 7000 | (03) 6228 2099 (h) | |
| Jason | Cockayne | | 75 Capella Drive Hallet Cove SA 5158 | (06) 8322 0895 (h) | (06) 8326 1777 (w) |
| Ian | Collette | franian@upnaway.com | 23 Barry Ave Mortdale NSW 2223 | (02) 9570 3420 (h)<br>0411 744 715 | (02) 9534 6999 (w) |
| Evalt | Crabb | evalt@shoal.net.au | 132 Northstead St Scarborough WA 6019 | (08) 9341 7505 (h) | 0428 135 526 |
| Joan | Crabb | joanc@shoal.net.au | 24 Walsh Cres North Nowra 2541 | (02) 4422 4446 (h) | |
| Matt | Cracknell | crowdang@yahoo.co.uk | 24 Walsh Cres North Nowra 2541 | (02) 4422 4446 (h) | |
| | | | Cairns Rd Sturges Bay TAS 7116 | 0409 438 924 | |

| | | | | | |
|---|---|---|---|---|---|
| John | Cugley | ekcaver@westnet.com.au | PO Box 14 Geeveston TAS 7116 | (03) 6298 3209 (w) | |
| Ian | Curtis | iancurtis@hotmail.com | PO Box 1845 Kununura WA 6743 | (08) 9169 1465 (h) | |
| | | | "Thin Gums" Clergate NSW 2800 | (02) 6365 8246 (h) | (02) 6362 3444 (w) |
| | | | | (02) 6361 3616 (fax) | |
| Paul | Darby | | 90 Purtons Rd North Motton TAS 7315 | | |
| | | | PO Box 364 Ulverstone TAS 7315 | (03) 6425 4395 (h) | |
| Melissa | Dolman | m.dolman@bom.gov.au | 6 Brently Close Warre Warren Nth VIC 3804 | (03) 9796 8883 (h) | (03) 9669 4597(w) |
| Jeanette | Dunkley | jdunkley@effect.net.au | 5 Coleman St pearce ACT 2607 | (02) 6286 1783 (h) | |
| John | Dunkley | john.dunkley@effect.net.au | 5 Coleman St pearce ACT 2607 | (02) 6286 1783 (h) | |
| Rolan | Eberhard | Rolan.Eberhard@dpiwe.tas.gov.au | Dept Primary Industries Water & Environment GPO Box 44 Hobart 7001 | | |
| | | | | (03) 6233 6455 (w) | |
| Brian | Evans | evansrb@snowy.net.au | PO Box 1069 Cooma NSW 2630 | (02) 6452 6126 (h) | |
| | | | 95 Mulach St Cooma NSW 2630 | 0409 443 415 | |
| Dane | Evans | Dane6002@yahoo.com.au | as above | | |
| Rhys | Evans | | as above | | |
| Ruth | Evans | evansrb@snowy.net.au | as above | | |
| Joe | Farrell | | | | |
| Albert | Goede | goede@tassie.net.au | 69 Esplanade Rose Bay TAS 7015 | (03) 6243 7319 (h) | |
| Glenn | Graham | zzggrah1@uqconnect.net | University of Queensland St Lucia QLD 4072 | (07) 3365 3478(w) | |
| Lyndsay | Gray | | PO Box 364 Ulverstone TAS 7315 | (03) 6425 4395 (h) | |
| Ronnie | Harrison | rharr1642@hotmail.com | PO Box 959 Baytown Texas 77522-0959 US | (281) 960-0631 (h) | (281) 837-8425 (w) |
| Nic | Haygarth | | | | |
| Fran | Head | franian@upnaway.com | 132 Northstead St Scarborough WA 6019 | (08) 9341 7505 (h) | (08) 9246 8469 (w) |
| | | | | (08) 9447 3062 (fax) | |
| Lance | Hoey | | 16 Tarana Rd Hope Valley SA 5090 | (08) 8265 1907 (h) | |
| Ken | Hosking | hosking@netspace.net.au | 11 Marine Tce Battery Point TAS 7004 | (03) 6223 8031 (h) | |
| | | | PO Box 558 Sandy Bay TAS 7006 | (03) 6231 2434 (w) | (03) 6231 2419 (fax) |
| Ian | Houshold | Ian.Houshold@dpiwe.tas.gov.au | Dept Primary Industries Water & Environment GPO Box 44 Hobart 7001 | | |
| | | | | (03) 6233 3868 (w) | |
| Debbie | Hunter | debhunter@tassie.net.au | 165 Fern-lea Rd Caveside TAS 7304 | (03) 6367 8142 (h) | 0403 293 549 |
| Yvonne | Ingeme | Yvonne.Ingeme@dse.vic.gov.au | 33 Fostyer St Hamilton VIC 3300 | (03) 5571 2544 (h) | (03) 5573 0734 (w) |
| | | | | (03) 5573 0706 (fax) | |
| Julia | James | jmj@chem.usyd.edu.au | 41 Northwood St Newtown NSW 2042 | (02) 9519 1415 (h) | (02) 9351 2743 (w) |
| | | | | (02) 9351 3329 (fax) | |
| Bob | Kershaw | rkershaw@ozemail.com.au | 15-56 Duke St Woonona NSW 2517 | (02) 4283 3767 (h) | |
| Kevin | Kiernan | kevin.kiernan@utas.edu.au | School of Geography UTAS Private Bag 78 Hobart 7001 | | (03) 6239 1494 (h) |
| | | | | (03) 6226 2461 (w) | (03) 6226 2989 (fax) |
| Michael | Lake | mikel@speleonics.com.au | 2 Derringbong Pl Thornleigh NSW 2120 | (02) 9481 0949 (h) | (02) 9514 1725 (w) |
| Brigid | Larkin | beaker@slmember.on.net | PO Box 3600 Mt Gambier SA 5290 | (08) 8723 4160 (h) | |

| | | | | | |
|---|---|---|---|---|---|
| Stephen | McCabe | smccabe1@bigpond.com.au | 69 Bardin Pde Holsworthy NSW 2173 | (02) 9825 3974 (h) | |
| | | | c/- Joe Sydney | (02 9577 3377 (fax) | |
| Amgus | McCoun | photo@artoflight.com.au | | | |
| Iain | McCulloch | iain@ems.anu.edu.au | 22 Pennefather St Higgins ACT 2615 | (02) 6278 6569 (h) | 0412 293 619 |
| Geoffery | McDonnell | g.mcdonnell@unsw.edu.au | 13 Adams Cres St Marys NSW 2760 | (02) 9862 1936 (h) | (02) 9383 2077 (w) |
| | | | | (02) 9385 1558 (fax) | |
| George | MacLucas | | 11 Gulfview Pde Valley View SA 5093 | (08) 8261 4180 (h) | |
| | | | | 0401 125 731 | |
| June | MacLucas | junemacl@senet.com.au | 11 Gulfview Pde Valley View SA 5093 | (08) 8261 4180 (h) | |
| Denis | Marsh | denis.marsh@electrolux.com.au | "Kirrang" Ophir Rd Orange NSW 2800 | (02) 6365 8330 (h) | (02) 6360 6668 (w) |
| Grace | Matts | | 176 William St Bankstown NSW 2200 | (02) 9790 0374 (h) | |
| Phil | Maynard | philip.maynard@uts.edu.au | 7/11 Milson Rd Cremorne NSW 2090 | (02) 9908 2272 (h) | |
| David | Merritt | dmerritt@zen.uq.edu.au | University of Queensland St Lucia QLD 4072 | (07) 3365 3478(w) | 04 22 009 387 |
| Timothy | Moulds | timothy.moulds@adelaide.edu.au | 4/14 Kapunda Tce Payneham SA 5070 | (08) 8363 4574 (h) | (08) 8303 8245 (w) |
| | | | | (08) 8303 4364 (fax) | |
| Eric | Munro | | 39 Esdale St Blackburn VIC 3130 | (03) 9878 4847 (h) | 0412 026 475 |
| Steve | Phipps | sjphipps@utas.edu.au | 133 Waterworks Rd Dynnyrne TAS | (03) 6223 3939 (h) | (03) 6226 2973 (w) |
| | | | | (03) 6226 2973 (fax) | |
| Miles | Pierce | milwen@ozemail.com.au | 42 Victoria Cres Mont Albert VIC 3127 | (03) 9890 8319 (h) | |
| Rhonwen | Pierce | milwen@ozemail.com.au | 42 Victoria Cres Mont Albert VIC 3127 | (03) 9890 8319 (h) | |
| Cathie | Plowman | Cathie.Plowman@parks.tas.gov.au | 637 Deviot Rd Deviot TAS 7275 | (03) 6394 6768 (h) | 0417 053 773 (w) |
| Tom | Porritt | tomp@aussiewide.com | 10 Morden Crt Nunawading VIC 3131 | (03) 9878 2539 (h) | (07) 4056 5921 (h) |
| Norm | Poulter | normal@iinet.net.au | PO Box 120 Nedlands WA 6909 | (08) 9276 2495 (h) | |
| Dorothy | Robinson | dotrob@ozemail.com.au | PO Box 175 Keiraville NSW 2500 | (02) 4229 6221 (h) | |
| Lloyd | Robinson | | as above | | |
| Christopher | Ross | | 15/66 North Steyne Manly NSW 2095 | (02) 9976 5442 (h) | (02) 9805 6334 (w) |
| | | | | (02) 9976 5442 (fax) | |
| David | Rothery | sydmecc@bigpond.com.au | 6 Ryan Cres Riverstone NSW 2765 | (02) 9627 4040 | |
| Jill | Rowling | rowling@ali.com.au | 2 Derringbong Pl Thornleigh NSW 2120 | (02) 9481 0949 (h) | (02) 9697 44849w) |
| Jodie | Rutledge | jodie@rutco.com.au | 39 Brooks St Cooks Hill NSW 2300 | (02) 4926 1959 (h) | |
| | | | 26/235 Darby St Cooks Hill NSW 2300 | (02) 4926 1889 (w) | (02) 4926 1772 (fax) |
| Michael | Rutledge | michael@rutco.com.au | as above | | |
| Henry | Shannon | hshannon@tassie.net.au | 319 Brisbane St W. Launceston TAS 7250 | (03) 6334 1885 (h) | |
| Chester | Shaw | trog1@dodo.com.au | PO Box 67 Mole Creek Tas 7304 | (03) 6363 1433 (h) | |
| Mara | Silins | silins@emmans.edu.au | 34 ChuringaAve Mitcham VIC 3195 | (03) 9874 5802 (h) | |
| Garry | Smith | gksmith@idl.com.au | 3 SpinnakerRidgeWay Belmont NSW 2280 | (02) 4947 0114 (h) | (02) 4979 2787 (w) |
| Joe | Sydney | jsydney@choice.com.au | 36 Carmen Cres Cherrybrooks NSW 2126 | (02) 9875 1887 (h) | |
| | | | | (02) 9577 3361 (w) | |
| John | Taylor | John_Taylor@rta.nsw.gov.au | 26 Corfe St Red Rock NSW 2456 | (02) 6649 2592 (h) | |
| | | | PO Box 31 Red Rock NSW 2456 | | |

| | | | | | |
|---|---|---|---|---|---|
| Greg | Thomas | thor@wanet.com.au | 2 Donna St Rossmoyne WA 6148 | (08) 9259 4469 (h)<br>(08) 9410 2839 (fax) | (08) 9410 2927 (w) |
| Matilda | Thomas | matilda.thomas@ga.gov.au | 58A David St Turner ACT 2612 | (02) 6257 1707 (h) | (02) 6249 9216 (w) |
| Bruce | Waddington | bruce.waddington@lands.nsw.gov.au | 251 Great North Rd Five Dock NSW 2046 | (02) 9713 1160 (h)<br>(02) 8236 7030 (fax) | (02) 8236 7027 (w) |
| Amy | Ware | amyware@yahoo.com | 8 Salisbury St Orbost VIC 3888 | (03) 5154 2056 (h)<br>0407 651 200 | (03) 5161 1346 (w) |
| Alan | Warild | ayayama@hotmail.com | 41 Northwood St Newtown NSW 2042 | (02) 9519 1415 | |
| Michael | Wasmund | wasmund@au1.ibm.com | 15/66 North Steyne Manly NSW 2095 | (02) 9976 5442 (h)<br>(02) 9976 5442 (fax) | (02) 9463 5388 (w) |
| Winfried | Weiss | wmweiss@bigpond.net.au | 57 Gallipoli St MaryboroughQLD 4650 | (07) 4122 3274 (h) | 0411 800 705 |
| Barbara | Weisner | director@sawriters.on.net | 2 Dean St Para Hills West SA 5096 | (08) 8258 8752???<br>(08) 8232 3994 (fax) | (08) 8223 7662 (w) |
| Jenny | Whitby | gary-whitby@hotmail.com | 48 Park St Charlestown NSW 2290 | (02) 4943 2265 (h)<br>(02) 4957 7286 (wfax) | (02) 4952 3096 (w) |
| Gary | Whitby | gary-whitby@hotmail.com | 48 Park St Charlestown NSW 2290 | (02) 4943 2265 (h) | 0408 546 024 |
| Nick | White | nicholaswhite@netspace.net.au | 123 Manningham St Parkville VIC 3052 | (03) 9328 4154 (h) | (03) 9328 4154 (fax) |
| Susan | White | s.white@latrobe.edu.au | as above | | |
| David | Wool-Cobb | wools@southcom.com.au | PO Box 20 Ulverstone TAS 7315 | (03) 5425 3950 (h)<br>(03) 6425 7709 (fax) | (03) 6425 1095 (w) |
| Jessica | Wools-Cobb | wools@southcom.com.au | PO Box 20 Ulverstone TAS 7315 | (03) 5425 3950 (h) | |
| Reto | Zollinger | | 33 Fostyer St Hamilton VIC 3300 | (03) 5571 2544 (h) | (03) 5573 0928 (w) |









**CaveMania would like to thank the following sponsors for their support;**

**Aardvark Adventures**
**Cascade Beverages**
**Lark Distillery**
**QANTAS**
**Anvers Confectionary**
**Events Tasmania**
**Mountain Designs**
**Snowgum**
**Cadbury Scwheppes**
**The Hastings Experience**
**Nick McKim MHA**
**Walch Optics**