CAVES AUSTRALIA

The Journal of the Australian Speleological Federation

Beautiful Bungonia

Exitravaganza 2012 • Thylacine Cave

Paul Devine • Peter Berrill

Protecting Caves From People III

No. 189 • JUNE 2012

COMING EVENTS

This list covers events of interest to anyone seriously interested in caves and karst. The list is just that: if you want further information the contact details for each event are included in the list for you to contact directly. A more extensive list was published in ESpeleo *earlier this year. The relevant websites and details of other international and regional events may be listed on the IUS website http:///www.uis-speleo.org/ or on the ASF website http://www.caves.org.au. For international events, the Chair of International Commission (Nicholas White, nicholaswhite@netspace.net.au) may have extra information. This list only covers events in 2012 and the first half of 2013.*

However, 2013 looks very busy with the next ASF Conference, TAGalong, in January at Galong NSW, the ACKMA Conference in May at Waitomo Caves, New Zealand and the international IUS congress in July at Brno, Czech Republic.

We'll keep you posted on these events in future Caves Australia *issues*

2012

August 5-10

International Geological Congress, Brisbane. This is a large and general conference but does have a karst section. For details see http://www.34igc.org/

September 13-15

International Congress on Scientific Research in Show Caves, Skocjan Caves Park, Slovenia. The Congress will focus on scientific research in show caves. For details of the venue, program and costs check the Park Škocjanske jame website http://www.park-skocjanske-jame.si or e-mail: psj@psj.gov.si for details.

September 16 -21

39th International Hydrogeology (IAH) Congress, Niagara Falls, Canada. The 2012 Congress will allow the presentation of a wide variety of new and evolving hydrogeological issues and opportunities that includes a major session on Karst Hydrogeology. For details see: http://www.iah2012.org/index.php

2013

January 6-11

Trogalong: 29th Biennial ASF Conference, Galong. NSW. Australia. Hosted by the New South Wales Speleological Council. Further details in this *Caves Australia* with the first circular.

May

ACKMA Conference, Waitomo Caves NZ. 20th Cave Management conference Dates to be confirmed. For details contact the conference convener, Libby Chandler: conference.convenor@ackma.org

July 21-28

16th International Congress of Speleology, Brno, Czech Republic. For details see the website http://www.speleo2013.com and the 2nd Circular is available for download at http://www.speleo2013.com/page/ show/circulars and contains a lot of important details about the ICS, including its accommodations, venues, and many fantastic trips to choose from. Registration begins on 1 August 2012. This event happens only once every four years and offers the best and newest discoveries in cave and karst exploration, science, education, management, and art, presented by the leading experts from around the world.

ASF Publications

The following ASF publications are currently available from the Publications Commission via the ASF website:

JENOLAN CAVES: GUIDES, GUESTS AND GROTTOES

by John R. Dunkley

This 73-page book was written in association with Jenolan Caves Historical and Preservation Society in 2007. Its fascinating content includes many historical photos and information about Jenolan Caves from its earliest days. Paperback, B5 landscape format, black and white photos, $19.95 plus postage and handling.

DOWN UNDER ALL OVER: 50 YEARS OF AUSTRALIAN SPELEOLOGY

Edited by Chris Bradley, Cathy Brown, Jeannette Dunkley, John Dunkley and Susan White

Published for the January 2007 26th ASF Conference at Mount Gambier to celebrate 50 years of ASF. An eclectic selection of writings and graphics from the first *ASF Newsletter* in 1957 with an overview of the history of ASF by John Dunkley. A4 portrait format, black and white maps and illustrations, $9.00 plus postage and handling.

WEE JASPER CAVES

by J. Dunkley, A. Spate and B. Welch.

The new Wee Jasper Caves book is a major new rewrite of the text. It remains a sought-after reference for the caves of the area, especially for the cave maps. 64 pages of broader scope of information, better layout of maps, new text, expanded sections and fantastic colour photos. B5 landscape format, $15.00 plus postage and handling.

NSW KARST ATLAS

by Peter Dykes

This new publication presents a framework for cave and karst documentation in NSW with cave and karst regions and cave areas based on catchment boundaries. It also has a very valuable appendix of the limestone areas used by Lishmund et al. (1986) correlated with the cave areas. A4 portrait format, colour cover, black and white maps, CD with basic GIS layers, $26.00 plus postage and handling.

These publications can be ordered using the purchase order form provided on the ASF website **www.caves.org.au/publications.htm** *Follow the instructions on the form for purchasing items.*
The Publication Sales Officer is D. Rueda Roca who can be contacted via email: drueda@navantia.es

For general enquiries about ASF Publications, contact **publications@caves.org.au**

CAVES AUSTRALIA

Caves Australia is the Journal of the Australian Speleological Federation and is published quarterly.

Editor:
Ian Curtis
Email: iancurtis10@hotmail.com

Production and Advertising Manager:
Alan Jackson
Email: alan.jackson@lmrs.com.au

Proofreading:
Susan White
Greg Middleton
Joe Sydney
Jodie Rutledge

ASF: asfinfo@caves.org.au
For all ASF publications:
publications@caves.org.au
Editorial contributions are welcome!
For contributor guidelines, contact the Production Manager.

Advertising
Contact the Production Manager for commercial, caving community and classified rates. Rates range from $5 to $400 for full page mono back cover. Discounts apply for placements of 4 adverts and an up-front payment.

Issue Dates
March, June, September and December

Magazine Subscription
Journals are included within ASF membership fees. Subscription to the magazine is also available to non-ASF members at $40.00 including postage within Australia for one year (four quarterly issues).

Change of address
Notify us immediately of any address changes to ensure delivery of your *Caves Australia.*

Layout and Production by Summerleas Print, Kingston, Tasmania

Caves Australia

No.189 June 2012
Australian Speleological Federation
PO Box 388 • Broadway • NSW 2007 • www.caves.org.au
ABN 15 169 919 964
ISSN 1449-2601 • Registered Publication NBQ0005116

ASF

Contents

Accoustic Pot, Bungonia NSW. Photo by Olaf Theden

ASF Executive

EDITORIAL

IT IS exciting to be editor of this magazine and read through the many articles that illustrate the breadth of speleological work that is currently being undertaken and the passion that cavers have for caves. The depth of that work, too, comes through in the articles submitted for publication.

❖

OUR LAST issue, *Caves Australia* 188, contained a fascinating exploration of the Pearse Resurgence in New Zealand. Today, (June 28th), quite by chance, I was reading the Sydney Morning Herald on iPad when the same story, complete with video footage, appeared under the title 'Cave Divers Find New Species. Photos, interviews, the wonder and challenge of discovery.' It was satisfying to have the acknowledgement that our special interest is of interest to the wider community.

❖

THERE WAS a certain sadness in the last issue when we learned of the passing of respected and well-liked cavers. This issue explains in greater depth why we will miss them: Peter Berrill for, amongst other attributes, his courage, vision and leadership; Paul Devine for his selflessness, tenacity and love of adventure. Paul Hosie tells how 'Paul D' pored over Google maps of the Nullarbor and selflessly issued to expeditionary groups lists of features that he felt (accurately, as it turned out) could be identified. Roger Howlett, too, writes on the Nullarbor, telling of his most recent Thylacine discovery: 'All of the discoveries in the area are wholly attributable to the incredible research work done by Paul Devine.'

❖

THIS patient and painstaking work reminds me that VSA and CEGSA are also working and documenting on the Nullarbor. VSA has annually, for the past decade or so, used a light aircraft to locate features north of the Eyre Highway. Hundreds have been located and visited. The empty map of the Nullarbor is slowly but surely being filled in.

❖

WHEN reading of the hard work of groups of cavers in so many different fields, and the passion we have for our caves (check out Joe Sydney's love of Bungonia!), it feels good to be a caver.

President's Report

GREETINGS to you all, wherever you are, and whatever you are doing.

Today I am not complaining about the weather or about my ageing body or even giving you a weird philosophical insight into the cosmos.

No, today I am just sitting here in the wee hours mixing a bit of detective work with a dash of creativity and filling in a shopping list of supplies for my next caving trip.

Just as the medical fraternity recommend we get as much sunlight as possible during the cooler months to keep our vitamin D replenished, I know I need a dose of total darkness, as can only be found when one is immersed in the remotest reaches of a brand new cave.

What systemic neurotransmitters or hormones will be released in that environment are yet to be described but they are potent and addictive nonetheless. (Speleomedicine is so new it's not yet in Google!).

It is good to see people are deep underground and pushing the limits. This edition of Caves Australia has some highlights of what has happened in the past. It is up to me and you to make something newsworthy happen in the next month or so.

I was records keeper once for CEGSA and I found myself on occasions engrossed in reading old trip reports, revelling in stories of cave exploration and the scientific description of things living in caves.

It kept me hooked, and I found that there was always a growing list of things to do, such as filling in the gaps of an area map and revisiting caves with 'possible extensions' and question marks. Then there were the ones lost in the bush, 'position doubtful' shown for their location. For everything known and recorded there seemed to be ten times as much waiting to be found and reported.

And if you asked me what are the greatest and most exciting things happening in Speleology in Australia right now, I couldn't answer, except to say "that you are part of it". I would also say that there are positions vacant in clubs all around the country for suitable and keen trip leaders, jobs for storytellers, openings for people to dare to enter, and research projects that need dreamers to ponder and undertake.

Read from the past and be inspired. Pass on the warmth and knowledge and get out and under again.

Let's get our families involved and introduce a friend to our world of subterranean thinking.

Club memberships are slowly growing and we should be encouraged by this, but as we know, with so many fun things to do nowadays, there is also a high attrition rate among novice cavers and a slowing down amongst the most senior of our members. Let us boost the ranks of Australian cavers so we have the numbers, not to fill the fill the gaps of jobs and duties in our clubs, but instead, to be the ones along with us to find the gaps and spaces we are so passionate to crawl or swim through.

Let us get out there and talk to people. The interesting thing is that many caves have already been found by land managers but never reported because they often only represent a hazard for stock or a place to dump things. Talking to the right people finds caves for us to explore.

Let us get down and dirty and get a dose of darkness into us.

In Caving
Stan Flavel

Beautiful Bungonia

Joe Sydney
HCG

BUNGONIA National Park, with its 200 caves, its wet canyons, its abseiling and rock climbing areas, its old gold and copper mining villages, its wilderness areas for bushwalking, offers some of the best activities that any Australian National Park can offer.

Located approximately 175 km southwest of Sydney and 35 km east of Goulburn, it makes an ideal area for a day trip, weekend or longer stay. No matter how long you stay, Bungonia Park guarantees the adventurer loads of fun and thrills. Not only is Bungonia ideal for the serious outdoor enthusiast, it is also ideal for families. It is one of the few caving areas left in NSW not to require a permit, though it is wise to contact the Ranger before coming as it can get very busy.

The Park has excellent camping facilities. It can cater for large groups of up to 100, families, clubs or individuals who just want to get away.

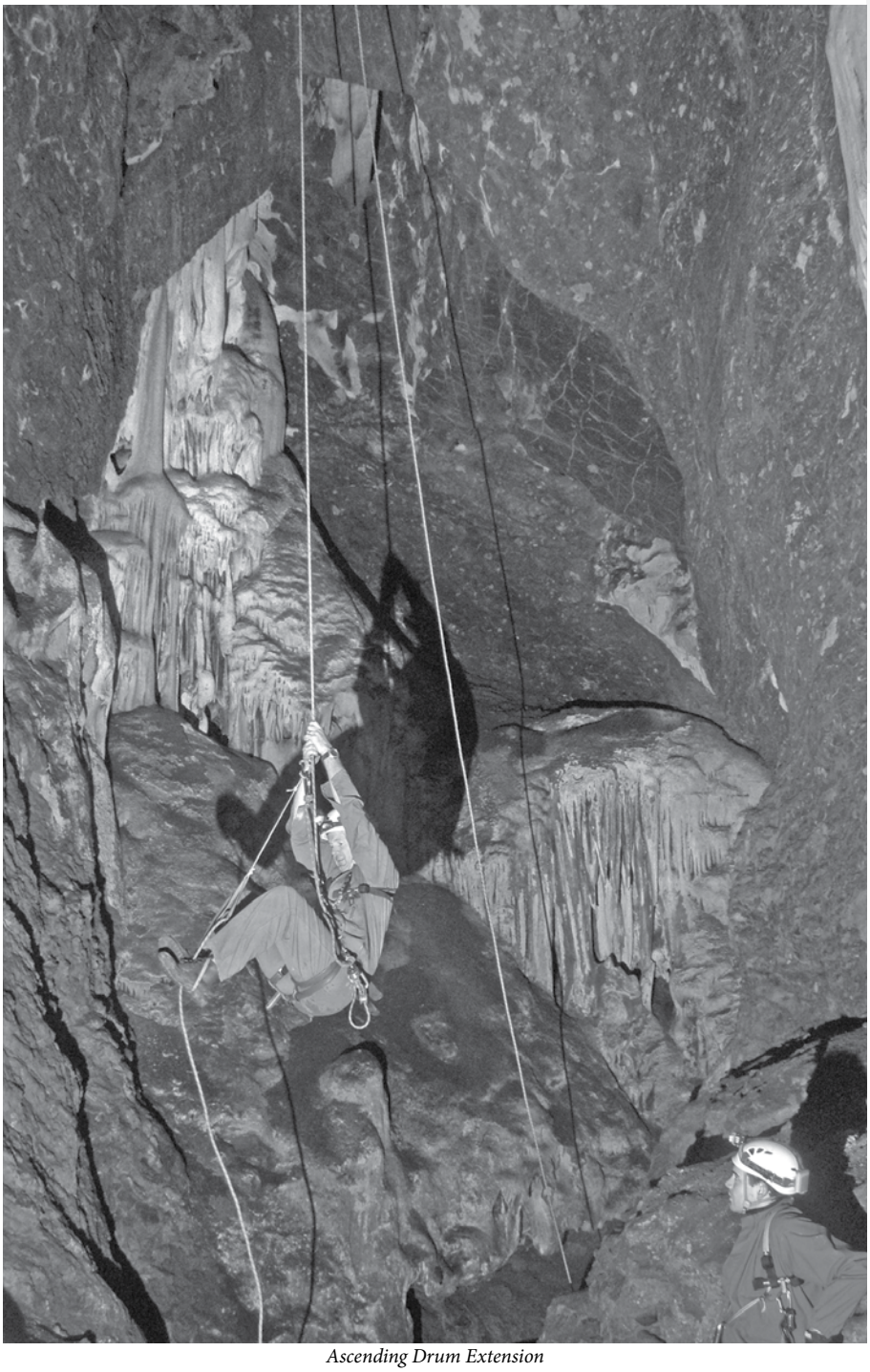
Flat tent sites are available with parking close by. Those with a caravan or motor home can also enjoy the comforts in the flat parking bays. Camping fees apply, with much of the proceeds going back to the Park to help with its upgrade and maintenance of facilities.

A free communal kitchen offers gas cooktops, kitchen sinks with hot and cold running water and a fireplace for those cold winter evenings where you just want to sit, socialize and enjoy a meal in warm comfort. Gas barbeques are located outside near the kitchen, at key campsites and now in larger car park picnic areas.

Recently added filtered-water stations are located around the campsite. These now ensure clean and safe drinking water to fill your water bottle or larger container.

The toilet and shower block boast ample space with lots of toilets and hot showers - great after a hard day's activity.

The book *Under Bungonia* is the bible of Bungonia National Park and its caves.



ANDREW BAKER

Ascending Drum Extension

Written by Julie and Peter Bauer, it contains all that there is to know about the Park - its geology, flora and fauna, history and caves. A must for every caver's or club's library!

A first must is a visit to The Lookdown and platform. The ramp extends 8 m over the cliff line with magnificent views into Bungonia Creek gorge and valley. Across the valley is Marulan, which saw a fierce conservation battle in the 70s by conservationists and cavers. A compromise between groups saw the mine getting the northern karst (with few caves) whilst the conservationists got the southern side (with caves).

After The Lookdown, take the time to visit Jerrara Lookout with spectacular in-season views of waterfalls and canyons.

Now — the fun activities. However, a word of caution. Bungonia Caves contain carbon dioxide (CO_2) which can be higher and more concentrated during summer. The usual precautions must be taken. Consult the ASF website for more details about carbon dioxide, its effects and how to avoid it. If an emergency occurs, Telstra 3G mobile coverage can be found throughout the Park. Ring 000. The NSW Cave Rescue Squad number is 0428 158 777 (0428 1KVRSQ).

THE CAVES

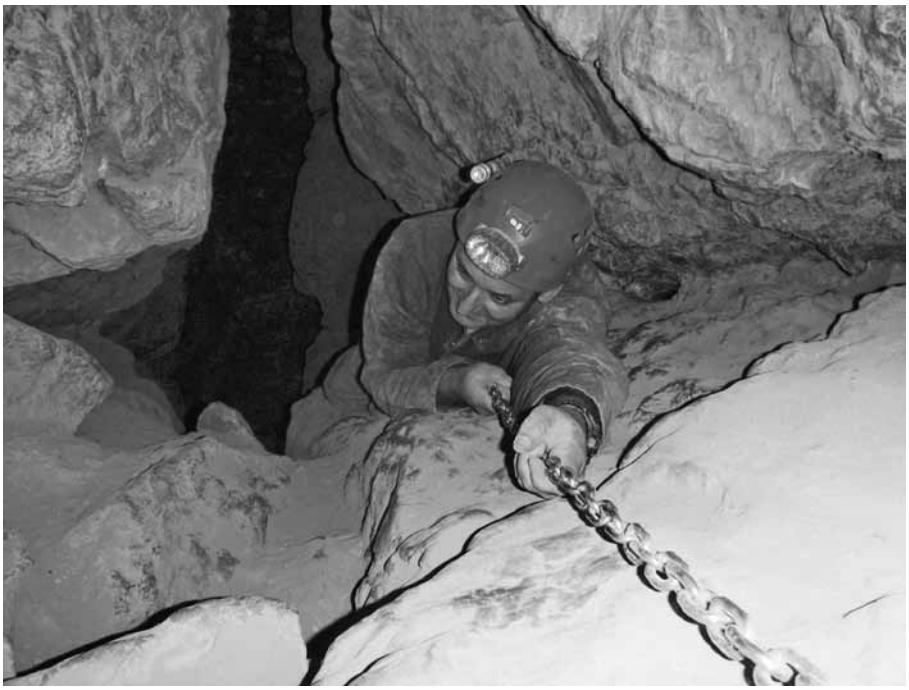
Though there are over 200 caves, only a handful are suitable for caving. Here is a précis of the top caves and activities.

B44 Grill Cave

A large, yet challenging, single entrance cave with tourist-style steel ladders. It's ideal for the novice caver and families. At one time in its history Grill Cave was used as a tourist cave but it is sporty enough for the experienced caver and is recommended for anyone who is relatively fit. Abseiling can be done not far into the cave close to one of the steel ladders. No ropes or ladders are required but a hand line or belay line for novices and children may come in handy.

B5 Hogans Hole to B4 Fossil Cave

Because of its complexities this is a through-cave for fit and cave-skilled adventurers. Although compact, B4/5 offers everything a cave can offer: climbs, drops (abseiling/laddering/SRT), crawls and the 'Hairy Traverse', an inclined ledge high in the cave wall overlooking a 15 metre drop. Too difficult? Not to worry, as a newly installed chain hand line is now in place. This ideal sporting cave can be entered through either entrance. Ropes or ladders are required. A popular abseil spot is the top of B5 cave with its 20 m cliff and pre-set ring bolts



DIRK STOFFELS

Joe Sydney on Hairy Traverse

B16 Blowfly Cave/B51

Another through-trip cave, popular with vertically-skilled cavers as both entrances require roping from pre-set ring bolts. This cave can be done from either direction but my preference is from B16 as you need to squeeze downhill through the 'Dragons Teeth' — for the male caver, quite challenging to one's manhood. If you're up for it, why not also drop into 'The Adytum', a 47 metre pitch and a prusiking challenge. A must-do cave!

B33 Argyle Cave

Argyle Cave is a very sporty multi-pitch cave that diverts to two sumps. In winter, both sumps can be reached easily: however, in summer, you may hit carbon dioxide. The top section through the 'Flattener' squeeeeze and down the Cork Screw to the top of the first pitch can be done without vertical gear. A hand line through the Flattener may be of use.

B13 Drum Cave

With its 55-metre entrance pitch Drum Cave is the sportiest cave Bungonia can offer. It also has three other large pitches that lead to a sump and an upper extension with incredible fossil walls and formations not seen elsewhere at Bungonia. Drum is a 'must do' cave for experienced cavers only. The cave is not open all year. It is closed annually from 1 November to 1 April in order to provide a safe environment for the bats during their breeding season.

B7 Canberra Hole/B14 Steampipe Cave

An ideal cave if you want to abseil 15 metres into B7, walk across to B14 and then prusik or ladder out. Great for novice (ladder) and vertically experienced cavers.

B22 Acoustic Pot

Another small yet sporty cave is Acous-

Bungonia Gorge and Quarry. Photo by Joe Sydney

tic Pot. With a sloping entrance passage, it eventually pops into a large cavern to the top of a 30 metre pitch. A popular, short, sporting, vertical cave.

There are many more caves that can be done, so consult *Under Bungonia* for more details.

THE CANYONS!

Bungonia offers two great canyons: Bungonia Creek and Jerrara. Sadly, Spring Creek canyon is currently closed.

Bungonia Creek Canyon

A lovely canyon with spectacular scenery. A full day is required to do this canyon as it has multiple long pitches and short swims.

Jerrara Canyon

This short, wet canyon can be done in either a half or full day. It has three long abseils (50 m) and a 40 m swim.

GORGE WALK

Bungonia Park boasts one of the most magnificent gorge walks in Australia. The walk to the gorge can be exciting as it passes the foot of Marulan limestone quarry. From The Lookdown you can see the valley floor, strewn with boulders that have dropped from the quarry edges. The walk is rough and is recommended for fit adventurers. With its high limestone walls, it gives an eerie acoustic echo whilst walking through. The gorge also offers rock climbers a series of pre-set climbs varying in grades. The gorge is a must-do whilst staying at Bungonia.

SHOALHAVEN RIVER AND TOLWONG MINE

Why not pop down to the river for a swim? If you walk upstream and visit Tolwong Mine you will find the remains of a retort and two chimneys, serving as reminders of the failed early 20th century copper mine. A great day trip for the fit.

A SWIM, ANYONE?

Behind the campground is a swimming hole and when Bungonia Creek has sufficient water, it's a great place to cool off at the end of a long, hot day.

FUEL AND SERVICES

The city of Goulburn is 45 minutes' drive from Bungonia and offers fuel, food, hospital and everything else you need.

There are lots of other things to see and do in the area as well as visit Bungonia National Park. It's one of my favorite karst locations because it not only offers cushy camping, it is also one of the great challenging and sporty areas in NSW. I hope, when you go, that you enjoy Bungonia as much as I do.

When you come to Trogalong in January, Bungonia National Park is well worth a visit.

JUSTIN WILKINSO

Drum Main Pitch

LYNDA APAIU

Bungonia Creek

JULLIE BURTON

Jarrara Creek Touchstone jump — no helmet!

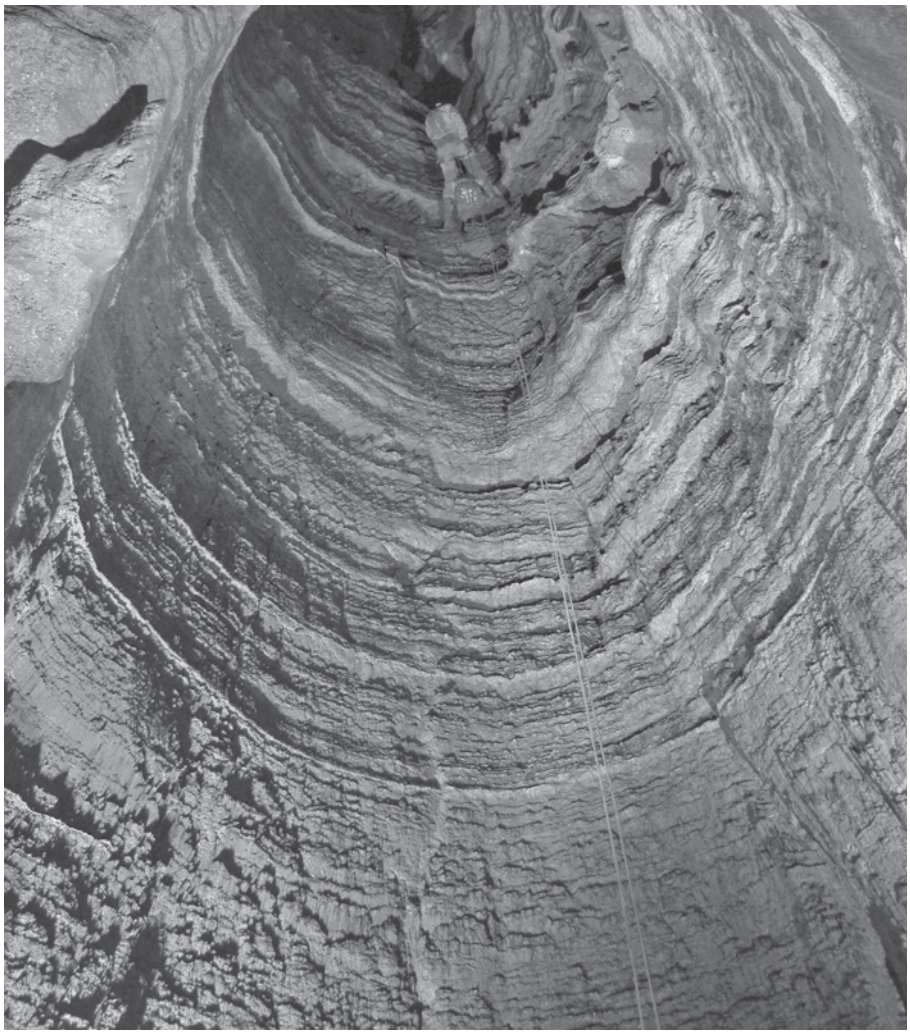
Exitravaganza 2012

Tony Veness
Southern Underground Cave and Karst Equipment Resourcer — STC

IN FEBRUARY 2012, 15 northern and southern Tasmanian, mainland and overseas cavers participated in Exitravaganza 2012 (E2012). The week-long cave survey expedition explored and mapped some of the further reaches of the known Exit Cave system, located at Ida Bay in southern Tasmania.

E2012 followed on from the previous year's Exitravaganza and numerous day and weekend survey trips since 2009.

This article briefly describes the achievements of E2012, and outlines Southern Tasmanian Caverneers' (STC) ongoing Exit Cave survey program. For brevity, the long and colourful history of Exit Cave within the Tasmanian caving scene, and indeed within the ASF's and Australia's caving history, is not discussed here. Needless to say, if you want to know more, pack your gumboots and thermals and come and give us a hand.



ANDREW BAKER

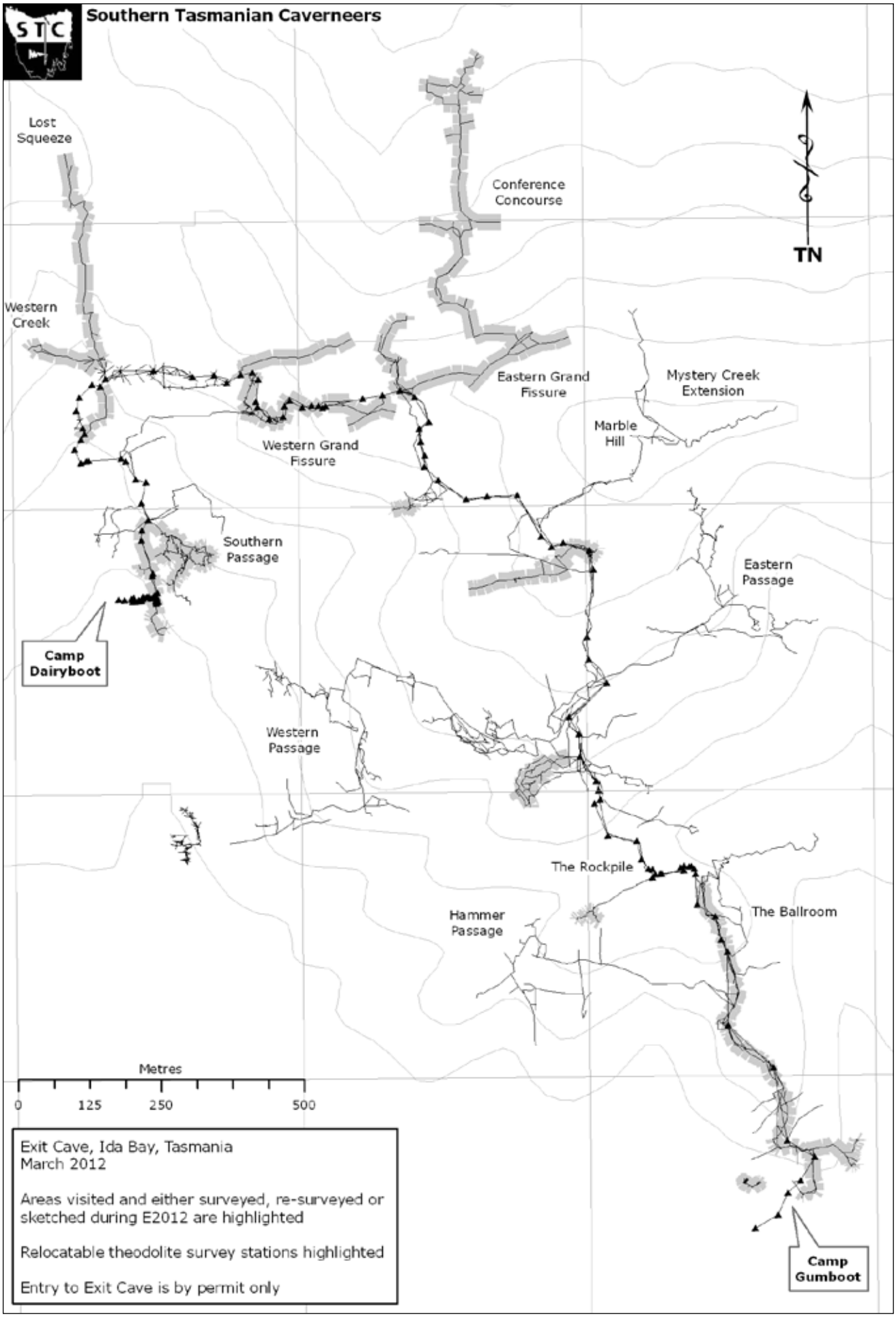
Midnight Hole pitch, Mystery Creek Cave, Ida Bay.

BACKGROUND

In 2009, STC approached the Tasmanian Government Department of Primary Industries, Parks, Water and Environment (DPIPWE) to discuss obtaining access permits which would allow a concentrated cave survey to be undertaken within Exit Cave. The desire to complete an accurate map of the known cave system was shared by both karst managers and STC cavers alike. With the delivery of a Scoping Study report to DPIPWE, the expectations and the methodology of the survey program were established. Collaboration with DPIPWE was facilitated through Karstcare, a group underthe auspices of Wildcare Inc, an umbrella organisation for volunteer activities on reserved land in Tasmania.

Importantly, there was a desire to undertake the cave survey (re-survey in some parts of the cave) using contemporary cave survey techniques. The availability of robust cave survey software, affordable Electronic Distance Measurement (EDM) devices and reliable LED headlamps made exploration and surveying a more pleasant experience than it would have been with the equipment of 30 years ago. The skills and experience of current STC members meant a robust but flexible survey technique was adopted, which has worked well for 79 trips over four years.

STC is undertaking an ASF Grade 53 / 54 survey, tying into existing permanent survey stations placed during a theodolite and EDM traverse of the main route through the cave (ASF Grade 8) undertaken over three years in the mid 1990s. All in-cave sketch and shot data are recorded on pre-printed, waterproof logsheets which are electronically scanned and archived post trip. There are currently 381 scanned data sheets from 79 individual surveys held in the program's electronic archive. A naming scheme ensures every sketch sheet and shot log-sheet created and every station placed during a survey, is uniquely named and tied together via a trip report.



Line traverse of the known Exit Cave system. Areas highlighted were surveyed or resurveyed during E2012

The trip report is completed by the party leader as soon as practicable after the survey, generally on the way home from the cave via some hot food.

Compass software is used for cave survey data reduction and on-screen viewing. ESRI's ArcMap is used for to-scale printing of up-to-date shot diagrams and annotated mudmaps for use within the cave. Ancillary data such as surface features, topography and determined or inferred water flow are stored as separate data layers, and are overlaid as required for mapping.

STC is currently developing routines for drawing Exit Cave maps electronically, using the Scalable Vector Graphic (SVG) tools within Compass and the open-source graphic editing package InkScape. Scanned sketch sheets are imported into InkScape and draped over shot data exported from Compass. Standardised International Union of Speleology and ASF symbols are used to electronically trace passage and wall detail from the in-cave hand sketch.

The desire to electronically produce a multi-page map of the 20+ km long cave system has been kept in mind since the start of the survey program in 2009. It is only recently that the development and easy interfacing of the very affordable Compass software suite and the open-source InkScape graphic editor program make this a reachable goal.

The current survey also pulls together many years of above and below ground historic survey data held in the STC electronic archive. The survey project currently underway builds on the survey data collected during many long days undertaken at Ida Bay over the last forty or so years.

E2012 OVERVIEW

STC advertised the dates of E2012 in *Caves Australia* 186 (September 2011). Interest in the expedition was less than astounding initially. After a few directed emails to mainland clubs and after some spruiking for hardy Northern Tasmanian cavers, STC had enough interest to justify establishing campsites and starting sherpa trips prior to the 18th February 2012 kick-off date.

After a two month long stream of emails between intended participants and expedition organisers, equipment, transport, food and other provisions were organised. Expedition funds partly covered the cost of evening meals for E2012 and 120+ evening meals and cooking gas were purchased and carried in prior to the survey expedition.

Two camp sites were established adjacent to separate cave entrances, during four, day or weekend trips to Ida Bay from Hobart. The main camp (Camp Gumboot) was adjacent to the IB-14 resurgence, 90+ minutes walk from road access through typical southern Tasmanian rainforest. The satellite camp (Camp Dairyboot) was established adjacent to IB-120 (Valley Entrance), a further 60 minutes walk through the rainforest.

P SMEJKAL (FULL NAME?

Eastern Grand Fissure

At Camp Gumboot, endless drinking water was available from the nearby IB-14 resurgence. The convenience of two pit toilets and large tents and tarpaulins for cooking and gearing up, served the 13 to 21 cavers staying at Camp Gumboot each night during the expedition.

Camp Dairyboot was less salubrious, with BYO drinking water and DYO toilets required. Camp Dairyboot was provisioned with food and camping equipment for a maximum of four to five cavers each night. Importantly, Camp Dairyboot provided access to the furthest known reaches of the Exit Cave system, via a 45 minute scramble and ladder down through Valley Entrance. This access saved cavers a full underground traverse of the cave system, which can take up to four hours return, providing you know the way. This approach was taken from both a minimal impact point of view and to shorten the time underground for tired cavers at the end of many days underground.

E2012 METHODOLOGY

The first day of the expedition was set aside for driving from Hobart to Ida Bay and carrying in a week's worth of caving equipment, breakfasts, lunches and sleeping gear for the initial 16 cavers. The afternoon was spent exploring Exit between the IB-14 entrance and the Rockpile, as well as completing the establishment of the main camp.

This initial two- to three-hour period in Exit, adjacent to a walk-in entrance, was an opportunity for visiting cavers to check whether they were adequately equipped for a week of 9°C air temperatures, and that everyone's gear had made it to the cave entrance after various flights, ferry trips and repacks over the previous days.

Alongside the three 'core' STC members — who both a) knew the cave system reasonably well and b) were staying the full period of the expedition — there were cavers with a variety of experience, some of whom had not previously been to Exit Cave, or Ida Bay or indeed Tasmania. This constraint made it important for the core cavers to plan each survey day at least the night before, to maximise the efficiency of each survey party and to ensure that records were kept up to date.

For each day of the expedition, three to four survey parties (of three to four cavers each) were organised and allocated survey equipment, pre-printed logsheets and an area to explore and survey. Records of each survey party's intentions were kept at Camp Gumboot for Search and Rescue purposes. After the initial night at Camp Gumboot, a survey party of four cavers relocated to Camp Dairyboot for one night, to undertake survey work at the Valley Entrance end of the cave. The survey party then returned, either overland or through the cave, to Camp Gumboot. This process was repeated three times throughout the expedition by different teams of cavers.

With reference to the overview map, the

areas furthest away from the two campsites were the focus for E2012. Camping close to a cave entrance each night saved two - four hours of travel time each day by not returning to vehicles and driving either to Francistown (Dover) or further north. Historically, the areas furthest from IB-14 have been typically the least well surveyed to a modern standard. Therefore, given the effort required to mount E2012, there was a desire during the planning of E2012 to focus as much time in the more distant areas of the cave system as practicable.

The use of STC-constructed LED flashers during E2012 was extensive, as it has been throughout the whole Exit cave survey program. A survey team of four cavers where two cavers act as scouts, laying and re-laying LED flashers on temporary survey station positions is advantageous in cold conditions.

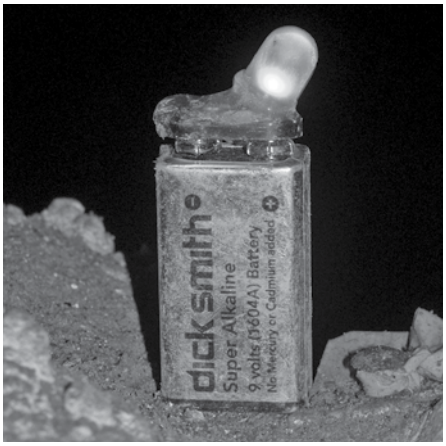
The book and instrument persons follow the two scouts, efficiently surveying from flasher to flasher, collecting LRUDs and temporarily labelling the positions of new survey stations with annotated flagging tape. LED flashers allow one or two scouts to operate independently from the book and instrument person, selecting suitable survey station sites. Of note, the 9VDC battery powering the LED flasher is magnetic and care must be taken not to affect the bearing measurement.

NOTABLE E2012 ACHIEVEMENTS

- 467 caver-hours underground, by 24 cavers
- 23 trips over six days (survey teams in separate parts of the cave are considered to be on separate trips for record-keeping purposes)
- Installation of a boot wash station in Conference Concourse
- Installation of limited track marking in Western Grand Fissure
- Partial resurvey of Conference Concourse to support on-going side passage and upper level exploration and future electronic sketching
- Re-location and documentation of Northwest Creek, Lost Squeeze and sundry smaller areas which have featured historically in a variety of published small scale maps of Exit Cave. These areas have been tied into the main theodolite traverse running through the cave.
- Discovery of a large partially water-filled fissure north and parallel to Western Grand Fissure
- Linking of a handful of vertical entrances to the main theodolite traverse

RECOMMENDATIONS

E2012 was the largest caving expedition held in Tasmania for many years. It was the first time cavers had camped en masse within the Ida Bay karst region for exploration and survey purposes in almost ten years.



ANDREW BAKER

STC constructed LED flashers

It is very easy to achieve little during a large caving expedition. Whilst many factors such as the weather and genuine accidents cannot be planned for, to justify the considerable cost in time and effort in organising an event such as E2012, little should be left to chance. Some generic and Exit-specific recommendations are:

- Have a flexible plan. Whilst opinions are welcome during expeditions and robust discussion over an evening glass of port or beer is good fun, participants need to appreciate what the overall plan is and where they fit into the 'survey machine'.
- Communicate. It was invaluable organising survey gear, survey areas and survey teams the evening before each survey day. This gave everyone the opportunity to have input and be clear about where they were going the next day and what was expected of them. Better to go to sleep with a plan and organised gear than to wake up to a tent vestibule full of yesterday's squashed lunch and filthy thermals and no idea what time you're going underground and with whom.
- Days off. It's not feasible for most cavers to cave six days straight and accurately survey, especially in a cold and wet cave such as Exit. A couple of half days off during a week-long expedition to dry thermals, clean survey gear or do some photography at your own pace is generally appreciated by all.

ANDREW BAKER

Western Grand Fissure track marking and the typical late afternoon pose of a tired surveyor

- Paperwork and more paperwork. For a multi-year cave survey such as E2012, attracting participants from the other side of Bass Strait and the other side of the globe, it's important to ensure documentation is complete before the end of the expedition. It was anticipated that non STC cavers would not have the time or energy to complete sketches and reports after E2012 was over, and so a somewhat ruthless approach to evening paperwork sessions was implemented. This meant some long nights for expedition organisers but such was life. Brief trip reports tying new survey station names, sketch and survey data logsheets together were completed every night whilst the day was fresh in surveyors' memories. Tedious but necessary and not so bad over a glass of port.
- Environmental best practice. Following discussion with DPIPWE, a variety of measures were adopted to reduce E2012's environmental footprint, especially in terms of minimising caving impacts and protocol for camping in a wilderness setting. Practices established during this expedition provide a model for consideration in planning future caving expeditions.

CONCLUSION

The weather was great, the company was fantastic and we achieved a lot. I don't think any more could have been asked of expedition participants and the various pre- and post-expedition Sherpas. STC thanks everyone who participated in E2102.

ACKNOWLEDGMENTS

STC wishes to acknowledge financial or logistical support of the ongoing Exit Cave Survey program provided by:

- Department of Primary Industries, Parks, Water and Environment, Tasmanian State Government (ongoing)
- Parks and Wildlife Service Tasmania, Tasmanian State Government (ongoing)
- ASF Grants Commission. Conservation and Environmental Grant (2011) $2450
- WILDCARE Inc. Karstcare program grant (2011) $1774
- Department of Sport and Recreation's Minor Grants Program, Tasmanian State Government (2012) $500
- As previously stated, very special thanks are owed to the many Tasmanian and mainland cavers who have contributed to the exploration and mapping of the Exit Cave system over the last 50 or so years. The current survey program would not be possible without the data collected during many long, cold and wet days at Ida Bay.

Hungarian Cave Exam Part 2

CAVES AUSTRALIA **continues its Hungarian Caving Exam quiz series. Our last issue looked at 'Technical Knowledge'. This issue deals with 'Knowledge of Safety Techniques'. The final section on 'Scientific Knowledge' will be in the next issue.**

N.B. The questions in italics are for advanced students.

VI. KNOWLEDGE OF SAFETY TECHNIQUES

Safety Technique

1. What is a safety technique and what is belaying?
2. What types of belaying do you know?
3. What is the aim of defensive belaying? What are its drawbacks?
4. When is defensive belaying needed?
5. When is self-belaying needed?
6. Which descenders do we have to use when self-belaying?
7. Why can't we use self-belaying with a Stop descender?
8. What equipment can we use for self-belaying?
9. Why is the usage of a (Poignee) ascender by itself not recommended for belaying on a horizontal rope bridge?
10. What is the difference between static and dynamic belaying?
11. With what equipment can we belay one another from below and from above?
12. *In what cases can we belay with static ropes?*
13. Why is a static rope improper for belaying in general?
14. *What is a belay point? When is it needed?*
15. What factors determine the impact force in a rope when falling? Which factor has the most outstanding role? Why?
16. What is the Fall Factor? Describe its significance.
17. Draw an example for Fall Factor 2.
18. What are the possible numbers for the Fall Factor?
19. *How can the Fall Factor be higher than 2?*

VII. KNOWLEDGE OF SAFETY TECHNIQUES

Sources of Danger and Resources in Caves

1. What do we call 'objective' and 'subjective' sources of danger?
2. Which are the main groups of objective dangers?
3. *Describe the dangers which are connected with climatic factors.*
4. What does 'bound return' mean?
5. List the subjective sources of danger.
6. Is it more dangerous to visit caves at night? Why?
7. *Describe the role of chance occurrence among subjective dangers.*
8. Which are the main groups of resources?
9. Outline the significance of information and time as resources.
10. List the human resources.
11. *Describe the theory of resources.*

VIII. KNOWLEDGE OF SAFETY TECHNIQUES

Accidents in Caves, Rescue

1. How can we define a 'cave accident'?
2. List accidents of personal injury.
3. List accidents of hindrance of progress.
4. What is the highest danger in accidents to the injured person? How can we prevent it?
5. How can we define rescue in a cave?
6. List the sections of rescue.
7. What do we call 'rescue of partners'?
8. What are the characteristics of rescuing partners?
9. What is the significance of rescuing partners?
10. What is the telephone number of the Cave Rescue Service (BMSZ)?
11. What pieces of information do we have to tell to the BMSZ?
12. *According to which viewpoints can we decide whether the injured can be taken out by partner-rescue or the Cave Rescue Service has to be called?*
13. *Why is it practical to call the Cave Rescue Service through the alert duty of the Capitol Police Headquarters?*

IX. KNOWLEDGE OF SAFETY TECHNIQUES

First Aid

1. What is the main danger in losing consciousness? How can we prevent it?
2. What needs to be done with an unconscious injured person?
3. Which are the contra-indications for stable side positioning?
4. *What is the definition of shock?*
5. *How can shock be created?*
6. *How can we prevent shock and how can we decrease its worsening?*
7. When can spine-fracture be suspected?
8. How can we determine spine-fracture?
9. What are the signs of concussion?
10. *What dangers are present in concussion?*
11. How can we make a distinction between arterial and venous bleeding?
12. How do we dress arterial and venous bleeding?
13. What endangers the injured person in an accident in caves? How can this be prevented?
14. How can we decrease the danger of cooling?
15. What do we give the injured to eat and drink till the doctor arrives?
16. When suspecting spine-fracture, how can the injured be moved?
17. Describe the dressing of limb-fractures.

Answers to Part 1

ANSWERS to the Hungarian Exam themes for the first grade course in caving (theoretical knowledge).

The answers to this quiz/exam are not easy to give in an Australian context as it is clear that we do not use particular equipment e.g. carbide lamps, and have not done so for over 25 years. Also the equipment available here when we did do so was not as extensive as that in Europe. The answers are therefore given in a general sense rather than specific for each question. If you know some of the answers here that are not specifically answered please let the editor know and we can publish updated information in later editions of *Caves Australia* or in *ESpeleo*. Some of this information will vary according to particular trips and particular areas of Australia.

TECHNICAL KNOWLEDGE

Main Personal Equipment

Questions 1-10 are to do with lighting. It is clear from the questions that the main source of lighting in this Hungarian club is carbide lamps that are now rarely used in Australia, and have not been used as main sources of light for over 25 years. It is very difficult to obtain carbide and many landowners and land managers do not permit its use. There are significant issues relating to disposal of spent carbide and the potential for fire (it cannot be used in areas where fire restrictions are in place). Nevertheless it was used in remote areas e.g. Nullarbor expeditions until better and cheaper battery powered lights and charging systems became available.

The main types of carbide lamps used here were the small cap lamps and the larger hand held type. The more complex type (Petzl) with a head-mounted lamp and a waist-mounted production cylinder with a connecting tube were less common here.

Carbide lights have the advantage of being a diffuse light and for many years were a very cheap form of lighting. However they have significant disadvantages: potential danger of explosion and fire (burnt overalls!), blow out in any significant draught, don't work reliably if flooded, need the jets cleaned regularly and the disposal of the spent carbide needs to be done carefully and properly (spent carbide dumped in caves is dangerous to cave life). Electric lights are now cheaper and since the introduction of LED bulbs, give a diffuse light, which the old rechargeable Pb-acid miners lights did not. Nevertheless dumped spent batteries still cause significant damage to cave fauna as well as being unsightly rubbish.

How the different systems (open, pressure equalising, water injection) work can be found at www.acethylene.com Also, some specialist collectors of carbide lamps exist in the caving community so if you are interested ask around for details.

The primary light source should be a reliable, independent light, usually mounted on the helmet. This should have sufficient energy (or extra batteries) for the length of the trip plus half of the planned trip length. Extra batteries should be carried for one refill. A minimum of two secondary lights should be carried and may be handheld. These need to be sufficiently powerful to give adequate light. The main problem with secondary lights is that they are insufficiently powerful or robust. As electric lights are used predominantly, extra batteries and globes should be carried. The secondary lights should both be able to be used for the length of the trip plus a half.

Contact zone

A UIAA approved climbing helmet (ie not a construction site helmet with an elastic chinstrap) is the preferred helmet for caving use. The UIAA standards are found at www.theuiaa.org Helmets protect from falling rocks, from head injury from falling over and from bumping your head against the ceiling.

A first aid kit should include a collection of things that would be of use for alleviating any problems. This list is basic and other items may be important. This will depend on the type of trip and terrain. Included should be: 2 snake bandages, bandaids, elastoplast tape, butterfly closures, personal drugs e.g. asthma inhalers, triangular bandage, antiseptic, barley sugar, safety pins, small scissors, needle, "Stingose", salt, Panadol painkillers, alcohol swabs, disposable gloves. Please note that this list is no more than indicative.

Everyone should carry a first aid kit. The leader (or designated person) may carry some extra items. However, the kit may vary between trips depending on the nature of the trip, its severity and the remoteness of the area. It is important for everyone to carry a basic kit so that assistance can be given by anyone in the party. Insulating foil is used to combat hypothermia i.e. keeping someone warm. Interestingly, this section does not have anything about the minimum amount of water needed in hot arid areas; the minimum in many parts of Australia, even in winter, is 2 litres per person per day. This may explain the issues that we have explaining this to many northern European cavers visiting Australia.

TECHNICAL KNOWLEDGE

Personal Supplementary and Collective Equipment

This section is predominantly equipment for vertical trips. Rather than just summarising existing information, we refer you to the latest edition of Al Warild's book *Vertical* for a good summary of practices used in Australia. Other books may also have similar information.

TECHNICAL KNOWLEDGE

Caving Trips

Caving trips are generally identified for difficulty according to easy, medium, hard but also according to vertical ie single short vertical pitch, multiple pitches, multiple pitches with re-belays, etc. The difficulty relates to degree of vertical, how "tight" and long squeezes are, amount of water present and temperature of caves. Some caves in Tasmania are difficult because they are in cold water but others in the NT are dif-

ficult because of the high temperature and humidity.

A caving trip is any trip underground in a wild cave. The number of cavers present on any particular trip relates to the conditions of the trip but large numbers are discouraged.

Where larger numbers are present the party should split into small groups of four to six people. The size of the party for each cave is dependent on the type of trip. In general, four is regarded as a minimum size for a party but there are conditions where this is inappropriate e.g. multiple pitch vertical trips.

The personal requirements for a caving trip are: sufficient personal fitness and skill to undertake the activity, adequate and appropriate equipment and adherence to the ASF Codes of Conduct. For a trip to be undertaken within an ASF club, adherence to the relevant club "regulations" is also required. These will have some variation between clubs.

In addition to actually leading the group, the leader has a range of responsibilities for the duration of the activity including:

- Organising the overall trip, including transport, timing, meeting and accommodation arrangements. This includes making sure the trip is listed according to the relevant club protocol and an emergency contact system organised.
- Taking reasonable steps to ensure that the level of knowledge, ability, skill and equipment of each participant is adequate for the level of difficulty and complexity of the activity; ensure group equipment is secured and stored correctly at all times; check first aid kit and communication equipment prior to activity
- Ensuring that a process has been undertaken to research and plan for likely hazards, and that the leader is familiar with the measures required
- Introducing themselves as leader and introducing any other key people
- Ensuring that the minimal impact caving message is conveyed and adhered to and manage and minimise the impact to the environment that may be caused by the activity
- Where considered necessary, nominating an assistant leader (or assistant leaders) with known skills and experience relevant to the activity and willing to perform defined duties; delegating responsibility to other group members as necessary
- Ensuring a briefing is conducted and understood by all participants
- Undertaking a head count before, during and immediately following the activity
- Maintaining awareness of the physical and psychological condition of the group; control the pace of the group
- Managing the group to avoid or minimise the effects of hazards, notifying relevant people of safe completion of the activity and ensuring that any incidents are managed, reported and recorded
- Ensuring that the land manager's requirements are followed
- Ensuring to the best of their ability that group members do not get into situations beyond their capabilities; frequently checking weather forecasts prior to the activity and, if possible and relevant, during the activity
- Ensuring that all documentation has been completed and collated

Individual tasks may be delegated but the responsibility remains with the activity leader.

Participants are responsible for their own actions both in relation to obvious risks that may be encountered and also in following the directions and instructions of the leader on any activity.

TECHNICAL KNOWLEDGE

Cave Bivouacs

A cave bivouac is where a major rest stop is undertaken. It is not a full campsite but a short stop to sleep and eat.

Equipment may include a bivouac bag, a light sleeping bag, sleeping mat, small stove and fuel, food and water, waste disposal containers and anchoring devices if necessary.

Sleeping bags stuffed with cotton/kapok are heavy, not very warm and do not hold warmth when wet.

The main points when choosing a bivouac site are safety, sufficient area for all participants and cooking, separate area to store waste (including human waste) away from the main site if possible. The site should be flat if possible. The location should be optimised with respect to the length of the trip and the actual exploration of the cave.

TECHNICAL KNOWLEDGE

How to overcome Shafts and Clefts

The details of this are best obtained from Al Warild's book *Vertical* or from discussion with experienced vertical cavers.

Sunrise over the Roe Plains. Photo by Chris Holman.

Tribute to a Brilliant Cave Explorer: Paul Devine

Paul Hosie
CEGWA

OCCASIONALLY our lives cross paths with truly remarkable individuals and I am lucky enough to claim such through my association with Paul Devine, whose life pulled up short in April 2012.

TRAGIC LOSS

It's an unfortunate fact that articles like this are rarely written about living souls. I guess the old adage applies, "You don't appreciate what you've got until it's too late." The key messages I want to impart to you are the reasons why the caving and cave diving community lost a highly gifted, generous and truly remarkable individual when Paul Devine died in April this year. He was only 40 years old but I suggest to you that the contributions he made to cave exploration in his too-short life will be seen to dwarf many of those of his predecessors, contemporaries and probably his successors too.

BRILLIANT

The first interaction I had with Paul D as I came to know him was when he emailed me a Google Earth screen capture of Kija Blue sinkhole in the Kimberley. Nothing remarkable about that you might say, but I assure you, that was an exceptional feat, particularly from someone who had never been to the place or even had much of a clue as to where it was located (apart from our one hint — "somewhere near Kununurra!").

Kija Blue is an amazing place, very remote, accessible only by helicopter, and it took a team of keen dry cavers and cave

divers many years to re-discover it. When we finally found it in 2005 and dived the site, we were blown away by the grandeur of the place and the fantastic cave diving potential it offered. On our return to civilisation, Ken Smith, Paul Boler and I communicated our discovery to the caving and cave diving community but, on advice from our local members, agreed to remain tight lipped about its location. Only one person ever located the site solely from his own efforts, Paul Devine— and it only took him a matter of days to achieve what it had taken the rest of us, pretending to be Sherlock Holmes, years.

His trick, of course, was an amazing ability to scan large areas of the ground using high resolution aerial photography and identify potential karst features from them. In no other place was this more evident that the work he did on the Nullarbor. If you want to gain some appreciation of the scale of this task, use Google Earth or Google Maps and zoom right down to an area of the Nullarbor Plain near your favourite cave until the ground features are still clear to see. Now pan the screen left, right, up, down and see how much ground you can cover, identifying and marking possible karst features as you go. Get the idea of how much time this takes?

METICULOUS

Shortly after our initial introduction, Paul D sent me some data for a couple of hundred aerial photo marks he had generated for the Roe Plains. Paul D knew we were spending a lot of time on the Roe Plains in the new cave diving sites and I told him we were keen to do some bushwalking to find new sites.

Alan Polini and I spent many days walking lots of kilometres through the thick bush and located many new caves and karst features from the data Paul D provided. We would give him the feedback and he would refine his identification techniques — telling a burnt patch or dark shadow on an aerial photo from a small depression isn't as easy as it sounds!

Paul D was very excited about some of our findings and he was the first to identify the relationship between the trending treelines on the Roe Plains and the underwater cave systems. It was his encouragement along these lines that eventually led us to the discovery of the largest cave diving system discovered on the Roe Plains so far, which occurred as recently as late last year.

In January 2007, Paul D presented his paper, "The Karst features of the SW Nullarbor — Mardabilla Plain & adjacent localities" at the ASF Conference at Mount Gambier. This was a game changer for me. It was at this point that I began to fully appreciate the magnitude of his efforts in identifying karst features on the Nullarbor

from aerial photos. When we got back from the conference, I learnt from Paul D that he had personally purchased an entire groundset of high resolution stereo aerial photos for virtually the entire Nullarbor. He had then, over many years, spent thousands of hours meticulously scrutinising them to identify potential karst features to be ground truthed and documented by visiting cavers.

GENEROUS

When I told Paul D that we were interested in exploring and documenting karst features in the Mardabilla Plains area, he immediately provided many hundreds of waypoints for us to sink our teeth into. In order to reciprocate as far as possible, I made sure I gave Paul D full feedback after our trips. In early 2010 Craig Challen and I documented and explored over 130 karst features, including 14 new caves. Since then several CEGWA trips to the area have documented a further 273 features and explored 47 additional caves, all of which are wholly attributable to the incredible, painstaking work of Paul Devine.

Currently there are about 5,300 documented features in the Karst Index for the Nullarbor. Paul Devine's efforts identified an additional 7,500 potential karst features. From the work done by our group alone over the past couple of years, we have found that 90% of Paul D's marks are actual karst features and for every two features he spotted, we have found an additional one.

Paul D was amazingly generous with his data and I believe he knew reasonably early on that as far as the Nullarbor is concerned, there is more to do than can possibly be achieved by an individual or group alone. We exchanged a lot of information in the months before his death and when I commented to him my amazement at the work he had done and the volume of work required in future, his characteristically 'master of understatement' response was:

"Yeah, there is a bit much data ... but don't feel any pressure to attempt to visit all 7000!" — Paul D, 16 Feb 2012

LEGACY FOR A GENERATION

Unfortunately, Paul wasn't with us any more when we returned from our Easter 2012 Nullarbor trip in early April. We learned of his death while we were at Eucla on Good Friday where we spent Easter with some of his friends from Mundrabilla Station who were as upset and shocked at his death as we were.

The discovery of Thylacine Cave, Tartarus Cave and the many thousands yet to be explored and documented on the Nullarbor are the legacy that Paul Devine leaves the speleological community. We will certainly do our best to remember him and share our discoveries with the caving and cave diving community in his loving memory.

Over 7,500 locations on the Nullarbor idenifoed by Paul Devine

Paul Devine identified the relevance of the vegetation lines on the Roe Plains

A PERSONAL TRIBUTE

Unfortunately, I didn't know Paul Devine very well personally, but he was and continues to be an inspiration to me. His love of the Nullarbor Plain and its caves matched my own but his efforts to identify and explore new karst features there dwarfed all others.

He selflessly shared the information that he had so painstakingly generated so that others might share his love of that special part of our magnificent country. For that reason alone he has earned the undying gratitude and respect of all Australian speleologists, whether they knew him personally or not. The legacy that Paul Devine has left the caving community is one of such magnitude that it is unlikely to be matched by another individual in our lifetime, if ever. I am sorry he left us, but I pledge to keep his memory alive through the discoveries we have recently made on the Nullarbor as well as those in future which are entirely attributable to his regrettably short life's work.

RIP Paul D

Discovery and Exploration of Thylacine Cave, Nullarbor WA

Dr Roger M Howlett
CEGWA

I FIRST visited the Nullarbor and some of its caves in 1956 and it was with a great sense of excitement that I recently returned during Easter 2012 with my colleagues of the Cave Exploration Group Western Australia (CEGWA).

The expedition comprised ten CEGWA members lead by Paul Hosie and the aim was to document and explore karst features in the Mardabilla Plains area of the far Western Nullarbor. All of the discoveries in the area are wholly attributable to the incredible research work done by Paul Devine, who we learned had tragically passed away just before our trip. On this expedition alone, 153 new karst features were fully documented and of them, 21 were true caves.

PAUL HOSIE

Roger Howlett with a Thylacine jaw

DISCOVERY

It was mid-afternoon on the 11th April 2012 and we had already documented 15 karst features that day, three of which were caves. Most of the features are soil depressions, many of them having blowholes or solution pipes at the drain point. Many of the solution pipes are large enough to climb down, so our method was to take it in turns descending them to evaluate the prospects. The last hole I checked had been a dud, so my travel companion and caving buddy Wesley Lamont (Wez) suggested I check the next one also. This turned out to be a reasonable sized cave.

Within a few minutes I saw what I was sure was a Thylacine skull. Electrified by this discovery, my 'five minute' check of the cave had stretched out to over twenty minutes — enough for Paul to come down and check that I was OK. We agreed that the cave was significant enough that we would return early the following day to thoroughly explore, survey and document it.

DESCRIPTION OF THE CAVE

The following day we found that there were four Thylacine-like skulls and skeletons in the cave so we tentatively named it Thylacine Cave. The use of the name was later confirmed with Graham Pilkington as being acceptable for the Karst Index. The surface entrance to the solution pipe is about 1.2 m in diameter, 6 m deep and vertical. The flat and level ground surface around the pipe would seem to indicate that there was never an animal accessible walk-in entrance.

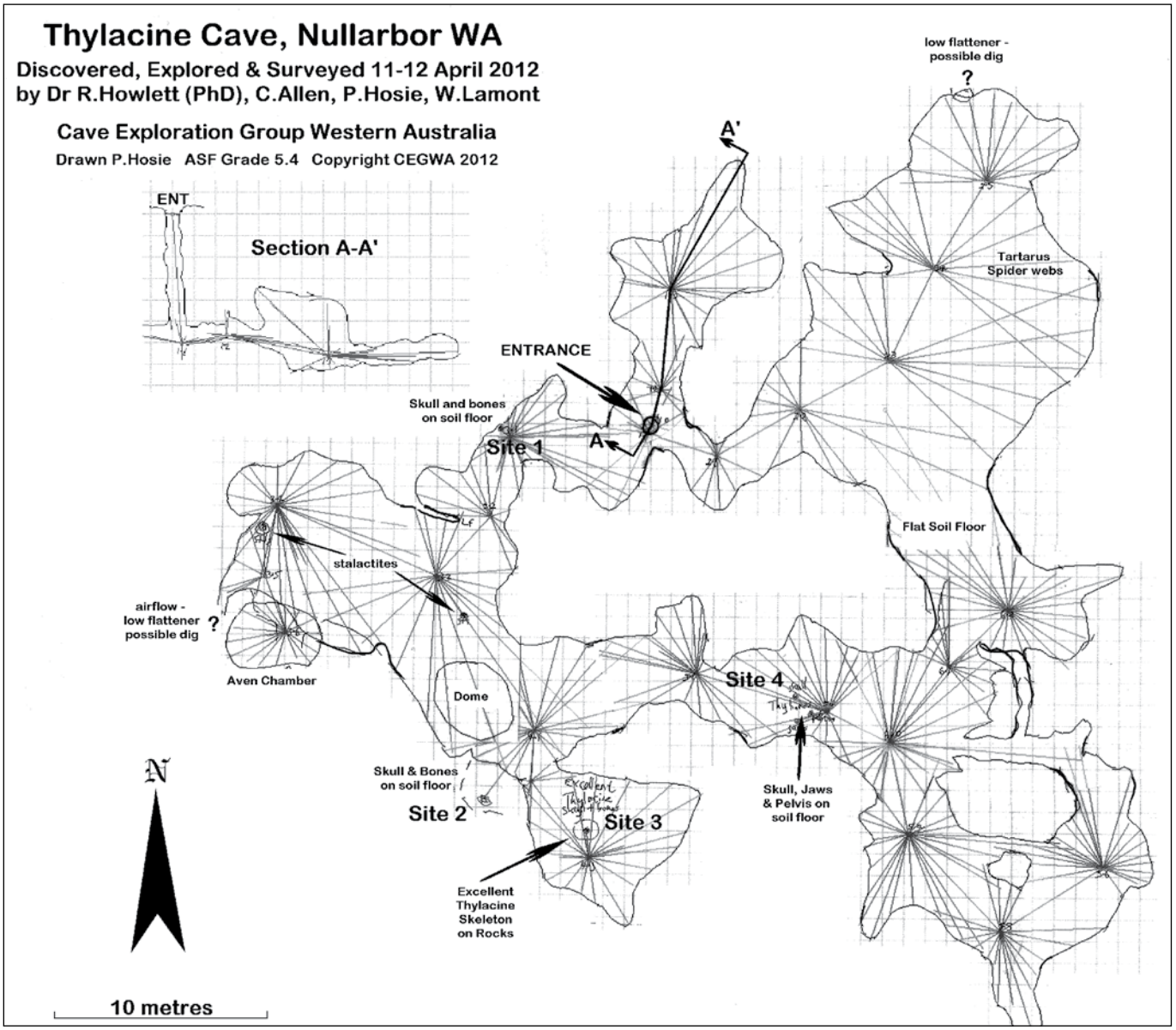
The cave was digitally surveyed by Christie Allen and Paul Hosie using Paul's Laser DistoX equipment. The map shows a sinuous V-shaped cave. The roughly level, mainly rocky floor and rubble inclines have a total length of approximately 140 m. There are some small calcite formations and troglobitic Tartarus spiders (we have observed the spiders in all of the caves we have explored in this area so far).

SKELETAL REMAINS

The floor of Thylacine Cave near the entrance showed a kangaroo skull, a few possum-sized skulls, jaws and other bones. Other vertical solution pipe entrance caves explored during this Easter trip showed numbers of kangaroo skeletons and other possum-sized remains, quite often including some with dried-out skin.

At locations marked Site 1 to Site 4 on the map were skulls that looked like dog/dingo or Thylacine. These sites were cordoned off with yellow flagging tape, photographed by Wez and nothing was removed. The WA Museum vertebrate palaeontologist Dr Alex Baynes hopes to be able to join us on our return to the cave and bring collecting material. Whether any funds can be found to conduct radiocarbon dating of the remains is a doubtful question as the WA Museum is appallingly under-funded.

The skull nearest the entrance (Site 1) was about 8 m from the base of the solution pipe. The approximate distances of the other sites from the entrance are: Site 2 = 28 m, Site 3 = 36 m and Site 4 = 45 m. Site 1 has an intermittently damp soil floor containing an average dog-sized skull, much weathered and fretted away. The left side of the skull, upper jaws and palate were mostly missing. No lower jaws or other bones were visible.



Due to the bones' fragility, a detailed examination was not possible. I could only say the skull is dog-like and certainly not that of a kangaroo. Site 2 is a dry, soil-floored alcove off the side of a large chamber which contains a single skull, ventral side up, clearly showing the two hindmost teeth in the right upper jaw. Fortunately, the two hindmost teeth are so clearly very different in a dog/dingo compared to a Thylacine that there is no doubt that this is a Thylacine skull.

Site 3 is the pearl in the cave's palaeontological inventory. It is in a six metre diameter chamber with a three metre high ceiling and an inclined boulder floor. Strewn on and amongst the boulders in the centre of this chamber are a skull and many other bones from a single animal. The skull had the teeth facing upwards, showing five of the full complement of eight molars. Their shape and alignment are indisputably those of a Thylacine. Both lower jaws were present, one adjacent to the skull and one upright amongst the rubble. Also next to the skull was the pelvis and other bones partially

Location	Thylacine (yBP*)	Dingo (yBP*)	Authors
Devon Downs Shelter, SA	2,980 (±90)		Smith, M (1982)
Venus Bay, SA	3,030 (±60)		Medlin, GC (1996)
Wombah, NSW		3,230 (±100)	Mulvaney, DJ (1975)
Murra-el-elevyn Cave Nullarbor WA	3,280 (±90)		Partridge, J (1967)
Madura Cave, WA		3,450 (±95)	Milham, P & Thompson, P (1976)
Fromm's Landing, SA	3,881 (±85)	3,170 (±94)	Macintosh, NWG & Mahoney, JA (1964)
New Guinea	4,000		Bulmer, S (1964)
Tunnel Creek Kimberley WA	4,100 (±67)		Gale, SJ (2009)
Thylacine Hole Nullarbor WA	4,650 (± 104)	2,200 (±96)	Lowry, JWJ & Merrilees, D (1969)
Horseshoe Cave Nullarbor WA	5,630 (±120)		Archer, M (1974)
New Guinea	10,000		Van Deusen, HM (1964)
Skull Cave, Augusta WA	**17,500 (± ??)**		**Howlett, RM (1960)**
Mammoth Cave Witchcliffe WA	37,000		Landelius, EL (1960) & Merrilees, D (1968)

* yBP = years Before Present (Note: For full reference list, please contact the author via secretary@cegwa.org.au)

buried in the rubble. The skeleton has obviously shifted from the animal's original position at death.

Site 4 is in the floor of a low passage connecting two chambers. A skull top about 15 cm long lies partly submerged in a fluffy, dry earth floor. About one metre away from the skull lies an obviously carnivorous set of lower jaws and other bones. These were carefully and slightly moved to be photographed in the hope of enabling later identification, but we're still not sure as the photos were not conclusive.

THYLACINES ON THE MAINLAND

Thylacines survived until modern times in Tasmania until the death of the last one in a Tasmanian zoo in 1936. There is uncertainty over when the species became extinct on mainland Australia and New Guinea due to the paucity of radio-carbon dated specimens discovered. Some of the radio-carbon dating evidence collected to date from various locations are provided in the table on page 18.

These data suggest that the most modern Australian mainland Thylacines were living until approximately 3,000 years ago in South Australia. On the Nullarbor, the skeleton found on the cave floor of Murra-el-elevyn Cave had attached tissues and was dated to 3,280 (±90) yBP. This is currently the youngest Thylacine remains found on the Nullarbor. It is possible that Thylacines survived later than this, so any further remains found by cavers or palaeontologists are certainly precious.

EARLIER WORK

The last discovery I personally made of Thylacine remains was back in 1960. At 2.925 metres deep into a trench dug in the floor of Skull Cave, near Augusta in Western Australia, I recovered a maxillary (upper jaw) fragment. At the time, this was an excellent discovery that I was very pleased with, although having the bone dated was problematic and could only be estimated from work done much later on the soil strata. The WA Museum conducted an excellent palaeontological study by digging a trench in the floor of Skull Cave conducted by JK Porter in 1979 — just a few metres from my own. Charcoal samples from two different strata in the WA Museum trench were radio-carbon dated and these data were extrapolated to provide an approximate age for my Thylacine fragment of 17,500 years.

OTHER DISCOVERIES

Of the 21 new caves discovered and explored during our April 2012 expedition, we identified an additional two with obvious palaeontological significance. The first was Streamway Cave where we positively identified a Thylacine left mandible (lower jaw), fully populated with teeth. Several days later, Wez and I explored a large cave with numerous mummified animals including a stick-nest rat, bilby and bandicoots — all of which have been extinct from the Nullarbor region for a long time. We named this cave Crypt Cave and once again, the WA Museum is keen to visit the site and properly document the contents.

WESLEY LAMONT

Thylacine skull with matchbox for scale

ADVICE FOR CAVERS

Cavers finding dog-like skulls should mark their positions in the cave, photograph them and inform the state museum (of the state where the cave is located). If teeth in the skulls and jaws can be seen, close-up photos of these may allow a clear species identification to be made.

If you find remains with attached skin, hair or other tissues, you shouldn't assume they are recent and therefore unimportant. The Thylacine carcass discovered on the cave floor of Thylacine Hole (N63) in 1966 had the skin and hair largely intact on the body's exposed upper surfaces. The characteristic dark bars or 'tiger stripes' were clearly visible, even the tongue and one eyeball were still present and recognizable. This specimen was thought to be quite recent by the discoverers due to its remarkable preservation, but when radio-carbon dated, they were amazed to find it was in fact over 4,600 years old. Those of you interested in learning more about Thylacine morphology and how to tell the difference between a dog (wolf) and Thylacine skulls, I commend to you the excellent website: http://www.naturalworlds.org/thylacine This website also has the photos of the mummified Thylacine as described above.

NULLARBOR PIT-TRAPS

There were five Thylacine skulls found in Thylacine Hole (N63) in addition to the mummified carcass, some of which had fairly complete postcranial bones. They were located between 14 and 53 m from the cave entrance with the complete mummified carcass approximately 140 m from the entrance. Both Thylacine Hole and Thylacine Cave have vertical solution pipe entrances which are 11 m and 6 m deep respectively.

The cave structure and the surrounding geomorphology indicate that there never was access to the caves that an animal like a Thylacine or Kangaroo could readily climb or walk into. Sharp-clawed rodents and similar shaped marsupials could probably ascend the solution pipes, but certainly no larger animals.

Noting the considerable distances of the Thylacine remains from the cave entrances, it is obvious that the animals survived the drop into the caves and moved themselves to their final resting places. The question then arises: Did all these Thylacines accidentally fall down the entrance holes which are both about one metre in diameter? I suppose this is not impossible given the untold millennia of time these solution pipes were open to the surface.

Lowry & Lowry (1967) speculate that the smell of putrefying bodies already in the cave would have wafted out in the up-drafts and Thylacines were lured into these extremely hazardous descents.

I suspect nearly all vertical solution pipe entrance caves on the Nullarbor show animal skeletons on their floors and this applies even when the surface hole is relatively small, such as one metre in diameter. If such caves should have wash in earth floors of only a few metres depth, bones below the current cave floor could be extremely ancient. I would certainly like to find such a cave!

THE FUTURE

Given the vast number of unexplored karst features we are aware of on the Nullarbor, there is no doubt that we will be kept busy for many years (probably decades) exploring and documenting them.

I am particularly encouraged that some young people are taking an interest in learning about the palaeontological aspects of caving and I'm sure there will be many more remarkable discoveries to be made.

As far as the Nullarbor and the Mardabilla Plains sub-region is concerned, the CEGWA crew based in Perth, Margaret River and Esperance are well placed, equipped and motivated to document many of them over the coming years.

It will give me great pleasure to not only continue exploring caves and documenting their contents, but to transfer some of my knowledge of palaeontology on to the next generation of enthusiastic speleologists.

OBITUARY

Peter Berrill, The Caves, Queensland

Kerry Hamilton
Clive Kavanagh
Noel Sands
CQSS
John Dunkley
ASF

PETER BERRILL died on his 59th birthday on 27 February 2012 after several years battling cancer.

Peter will be forever synonymous with Mount Etna caves near Rockhampton. A member of Central Queensland Speleological Society for 36 years and its President for 30 years to his death, and living in the village of The Caves just 1 km from the mountain, Peter was the driving force behind a determined campaign mounted against the Mount Etna quarrying. Lasting from 1962 to 1999, this epic was the longest environmental campaign in Australian history.

UQSS and CQSS cavers themselves funded the initial purchase from a local farmer of 80 acres of Limestone Ridge karst, but Queensland Parks and Wildlife Service for many years resisted placing this in public ownership. Meanwhile there was no progress on Mount Etna. After 20 years of legal and other setbacks, and emboldened by the success of the Franklin River case and a personal visit by Bob Brown, in 1986 key CQSS members led by Peter decided that both the Government and the mining company were intransigent and direct action was the only way forward. It is impossible to do justice here to the role he played in the remarkable conclusion to the long saga, but there is great reading in a whole issue of *Australian Caver* 151 (2000), devoted to a lengthy chronicle of colourful reminiscences from those associated with the campaign.

In December 1987 cavers filled drill holes above Speaking Tube Cave to forestall blasting, "occupied" Speaking Tube and Illium Caves, announced a blockade, and called the bluff of the miners. Five members including Peter soon found themselves in court, injuncted against further entry to Mount Etna, the company destroyed the caves, and instead cavers sought to sue it for breaches of the Fauna Conservation Act (blasting killed some protected Ghost Bats). After the Supreme Court of Queensland held that CQSS lacked the necessary legal standing to do this, special leave was obtained to appeal to the High Court of Australia, which referred the matter back to Queensland. CQSS was unable to raise security for costs, was forced to discontinue the action, and the five members were left with an order for company costs estimated at $213,085.

In the hiatus that followed, Peter obtained funding to lead several highly successful expeditions to research ghost bats and caves in the almost unexplored Mitchell-Palmer karst north-west of Cairns. In 1997 he turned his attention to ASF affairs and for over five years was one of our longest-serving Presidents. He led a rejuvenation of ASF and on the advice of Brisbane solicitor Stephen Comino, who acted for the Mount Etna court cases, he set in motion changes which allowed ASF to become a registered Environmental Organisation with a tax-deductible Gift Fund, the objective being to ensure that future Mount Etnas would never be abandoned for want of a means of raising money. This enabled us to help fund the appeal against mining at Timor Caves a few years ago. This Karst Conservation Fund now stands as a lasting legacy of Peter's commitment to the preservation of caves and cave life.

And then the wheel turned and the world changed. The costs order remained hanging over the cavers' heads for 8 years but in 1998 new management in the company began to relent. Peter was tasked with negotiating a settlement of the matter with them, and in time a truly remarkable reconciliation was effected.

In 1999 the company agreed to release

the cavers from the costs order and to help purchase Cammoo Caves for addition to the National Park. In the early years of this century and with Peter as an adviser, the company gradually wound down its operations, removed the ugly infrastructure, negotiated with ASF for it to take over the Mount Etna freehold when the Parks Service initially rejected it, then began to rehabilitate the quarry faces. Eventually their leases were surrendered and in 2008 the land and caves were at last added to the National Park.

Rockhampton was a different world 40 years ago. Peter came from that era when few young country people finished high school, much less went to a university. Horizons were limited, development and employment opportunities prevailed at all costs, and environmental concerns were regarded as the pursuit of south-of-the-border greenies, lefties, loonies and dole-bludgers, not easy-going country folk. He ran a successful business but endured years of criticism from all sides of the debate and was often self-critical, based on what he perceived as his limited formal education, as though that were a bar to achieving one's life goals.

Politicians may prevaricate and academics may consult, but in the end it is vision, energy and enthusiasm coupled with doggedness and an uncompromising determination that brings about achievements like those at Mount Etna.

Peter never lost sight of that ultimate goal, which was to see all of Mount Etna and its caves in a National Park. He always said it was a team effort and it was, but someone had to lead the team.

In a recent book about Australia's 27 Prime Ministers, journalist Mungo MacCallum observed that our most significant leaders have been those who were "the most courageous, the ones who burst through the roadblocks not only in society but within their own parties". That was Peter. An accomplished bullshit detector and never slow to respond to criticism and challenges, he was remarkably persuasive and occasionally abrasive verbally. We now have that National Park and Australia needs more people like him. Cavers are cave managers just as much as those paid for the job, for without people like Peter there'd be many fewer caves left to manage.

It was Peter's great satisfaction in the last weeks of his life to see one of his initiatives, the ASF Karst Conservation Fund mounting a special appeal to fund research into his beloved Ghost Bats at Mount Etna and for the purchase by speleologists of Scrubby Creek Cave at Buchan. ASF has decided to commemorate him by prefacing its Award of Distinction for Cave Conservation with his name.

Peter is survived by his wife Diane and their sons Luke and Nathan and their families.

Protecting Caves from People III

Norman Poulter OAM
STC

PREAMBLE

At various times, working through the auspices of the Speleological Research Group Western Australia [SRGWA] and the Cave Management Advisory Committee of what is now known as the Department of Environment and Conservation [DEC], I developed a method of in-cave marking initially utilising recycled reflective road signs and unique PVC 'sticks' that were called TrackTags. Development began during the early 1980s and came to fruition during the early 1990s. An additional development several years later was the introduction of self-adhesive reflective markers. This paper is intended to introduce a new generation of cavers to the concept of in-cave marking — it has been adapted and updated from my initial paper 'Protecting Caves From People,' presented to the ASF TasTrog Conference in 1993.

WHY?

Caves and their contents are finite resources, generally quite happy to stay the way they are, subject to modifications by Nature. People, being the inquisitive and sometimes thoughtless creatures they are, can alter environmental patterns or destroy features and faunal regimes. This occurs through sheer weight of numbers, although in caves, damage can occur from surprisingly low numbers of people in a short space of time.

Perusal of literature from the early part of last century suggests that cave visitation, with a few exceptions, was relatively benign during this and earlier periods. With the upsurge of recreational caving since the late 1950s, damage in some caves accelerated at an alarming rate. Long cherished features disappeared while others became degraded and troglobitic regimes were placed under severe stress or threatened with extinction.

Although visitor safety is a consideration, caves need protection from the visitor. However, it is not relevant just "to protect a cave". It is necessary to state what is being protected, examples being

- fauna,
- decoration,
- special features (e.g. mud pavement, sediments, soil cones, bone deposits),
- cave or section of cave maintenance — in as near as possible its original pristine condition,
- minimisation from further damage, by restricting damage caused by human activity to one clearly defined area.

I advocated the use of in-cave marking (in various forms) in conjunction with educational signs, practised with Minimal Impact Caving (MIC) in mind and the awareness that a "feature", initially considered insignificant, may subsequently be found to be of the utmost importance.

AN ABRIDGED HISTORY OF IN-CAVE MARKING

In-cave marking in the first instance was employed purely as a means of finding one's way into or out of a cave with little or no thought of protecting the cave. Early in-cave marking usually consisted of string, piles of rock or candle/carbide soot on cave walls. Such methods led to confusion as these marks could only be understood by those making them and this led to a proliferation (of marks) as different parties made their own marks, leading to further confusion, culminating in in-cave marking being associated with despoliation of caves (graffiti?) rather than protection of visitors.

During the late 1960s, attempts were made to protect some sections of cave, usually areas of high decorative value, the most notable being the Chevalier Extension in part of the Jenolan System (NSW) where I believe flagging tape, artificial carpet, carpet protector and other methods were trialled. Route marking, mainly in the form of survey tape was employed in Tasmania's Kubla Khan Cave during the early 1970s to mark a path through a muddy section, in order to keep visitors to one path and protect adjacent areas from despoliation. It didn't work very well due to the difficulty of seeing the tape in the prevailing low-light conditions.

In-cave marking seemed to be all but forgotten during the late 1970s to early 1980s and was not resurrected to any great extent until the Northern Caverneers began to restore and track mark parts of Kubla Khan in 1985 (Woolhouse 1985, 1988). This restoration work resulted in the first major appearance of my reflective discs manufactured from recycled road signs and led to my acquisition of more damaged signs from the WA Main Roads Authority, as I was planning to produce discs for sale throughout Australia while attempting to create a standardised approach (Poulter 1987). Other control methods being trialled in Australia included that of "stringlines" by Ian Houshold (Tasmania) and Peter Bell (WA).

TYPES OF IN-CAVE MARKING

Track marking is a fairly loose term that has been universally applied to many different forms of in-cave marking including:

Route Marking

This is a desired trail employed by managing authorities and exploration parties to protect areas of caves and visitors.

It can also denote easier routes that are less obvious to future visitors.

Initial markers can be quite "primitive" in appearance (rock cairns) as laid down by exploration parties, until more sophisticated and visible materials are available.

Track Marking

Track marking in its present context defines not only the alignment of a given route, but, more importantly, the width. While in most cases a track may be defined by some form of side markers, in other situations it may be defined by way of a laid or elevated "floor".

Barricades

Barricades are more substantial control measures designed to denote "No Go" areas and/or direction change while at the same time protecting features, including isolated ones such as skeletons/geologic features and defining protection zones such as entire chambers or extensions.

WHEN TO ROUTE MARK

Route marking commonly follows a survey line initially put down by exploration teams but can be modified by subsequent visitors or management decisions. A marked route simplifies complex passages or rockpiles while at the same time minimising visitor impact on untrampled areas.

Route marking can also be used to minimise visitor impact in regions known to be

hazardous or inhabited by fauna, or areas of delicate decoration.

Route marking simplifies visitation as well as potentially taking the least fragile route through a given area or cave.

WHEN TO TRACK MARK

The reasons for track marking are similar to those for route marking, except that not only is the position of the trail defined, but also the width. The track width may be as narrow as a single foot or as wide as a metre or so.

Humans are social animals and it has been noted that where passage width confines exploration to single file transit — that is what occurs. Where passage width is less confined — and unless track marking takes place at an early stage or all visitors are aware of their destructive potential and behave accordingly — people walk side-by-side, eventually disturbing the entire floor space (Max Meth, CEGSA, pers. comm. 1993). Therefore, where the passage is wide, track marking may be considered desirable merely to maintain some of the floor structure in its original condition.

In some instances it may be considered necessary to completely remove visitors from contacting the floor, for example by utilising sheet plastic or matting pathways across flowstone, or by constructing elevated walkways across sand, mud or fauna regions. This action may be necessary not only to protect the immediate area but also to avoid carrying contaminants (on clothing, boots, equipment) to other, more fragile sections of cave.

WHEN TO BARRICADE

Whereas route and track marking is generally as unobtrusive as possible, barricades are usually intended to be more intrusive in an effort to protect sensitive sites, areas, passages and fauna from human impact.

Barricades on the one hand can be a simple "low key" fence or stringline, rock containment wall or sign. At the other extreme, they can be in the form of a gate.

WHEN TO USE

With the steady introduction of the concept of Minimal Impact Caving (MIC) into national speleological fraternities and the increase in recreational caving by commercial operators, corporations, casual groups and individuals (even into formerly remote regions) all forms of cave protection need to be instated NOW.

HOW TO USE

There are no hard-and-fast rules as to what is to be done in a cave to protect it from (ill-informed) human interference or damage. What is done should be guided by common sense in addition to the desire to protect a cave environment as much as possible without destroying the "solitude or wilderness" effect. This "balancing act" may be difficult to achieve!

MATERIALS

In all instances, materials used in a cave should be non-deteriorating (or as near as possible to that state), neat and as unobtrusive as possible — less so in the case of barricades or signs. What material/s are deemed appropriate, neat and maintenance-free for track, route marking or barricades in one cave or section of cave may be considered totally inappropriate in another cave or section of cave, depending on what is being protected.

Non-deteriorating:

- Plastics — posts, chain, tape, sheet, carpet protector, 'price tags'/TrackTags, reflectors, pipe, fishing line, recycled planking/posts.
- Boulderous — native rock, colour-matched cement.
- Adhesives — silicon-based only.
- Steel — stainless steel (preferably 316).

Deteriorating:

- Metals — galvanised steels (which eventually rust/stain), mild steel (guaranteed to rust/stain).
- Aluminium — subject to electrolysis and attack by leaching salts.
- Fibrous — wood, paper.

WHY USE PLASTIC/STAINLESS STEEL?

Appropriate plastic (preferably PVC) or stainless steel (316) is basically unaffected by a cave's often hostile environment, an environment that is very aggressive to the two traditionally used materials, wood and mild steel (plain or galvanised). Conversely, PVC plastic and stainless steel appear to have no ill-effect on a cave's environment, thus making them very cost-effective materials. Recycled plastic planks and stainless steel framework, railings and tensioner wires are now frequently used in many tourist areas, including caves.

REFLECTIVE MARKERS

Reflective markers have only been used in caves on a sporadic, ad-hoc basis ever since their development, probably because of their lack of availability. Reflective material attached to thin brass foil nailed to rocks served as survey stations in Mullamullang Cave (6N-37) in the mid-1960s. Possibly due to the combined effect of electrolysis and salt action, by the late 1980s, most of the brass foil had decayed away. Aluminium-backed reflective material employed as track markers in Weelawadji Cave (6E-24) during the 1970s were, by 1993, severely corroded, most likely under the acidic action of massive guano deposits found throughout the cave. In both these cases, if the material backing the reflective layer could have been divorced from the damaging agent/s, the reflective materials could possibly have fulfilled their function indefinitely.

Following acquisition of grants in 1993 from various government and semi-government sources, SRGWA and I were able to establish facilities for the mass production of 30 mm diameter aluminium-backed reflective discs, TrackTags and 30 mm plain aluminium cave number tags. These facilities have now been relocated to my new home in Tasmania. A recent addition has been the introduction of 20 mm diameter self-adhesive reflective discs. The use of the colour coding listed in the "Sales Pitch" below has been endorsed at an ASF Conference.

STRINGLINES

Stringlines, used either as track marking or barricades, are relative latecomers to the cave protection armoury. The first examples I saw in operation were in Exit Cave (7IB-14) and Moondyne (adventure) Cave (6AU-11) in 1993.

Sections of Exit Cave had unobtrusive low-level stringlines using what appeared to be 2 mm green cord (sash cord) strung between zinc-plated steel tent pegs. Being less than 100 mm above ground level and of low contrast, the lines were difficult to see. Where stringlines had been trodden on with muddied boots, the lines blended into the surrounding terrain, making them even more difficult to see.

The stringlines of Moondyne Cave utilised heavy gauge nylon fishing line interspersed with self-adhesive reflective tape (cut into squares), randomly wrapped over the line. These stringlines, because of the reflective tape and being higher off the ground, were easy to see and less prone to foot damage.

My personal preference for stringline material is bright, heavy gauge fishing line as it does not absorb moisture, particulate matter or organisms. Although it looks very bright on the spool, as a single strand in a cave, the colour is much "softer".

SIGNS

Signs play an important role in everyday life — in that they provide information where it is needed all day, every day. There are numerous occasions where signs can play an important role in protecting caves,

sections of caves, their faunal inhabitants or other natural features — or warn of dangers.

In the past, signs have been written on whatever material has been available and, left unprotected, have rapidly deteriorated. Although such signs serve as an important first step they should be replaced at the earliest opportunity.

SIGN BARRICADES

Signs have been used as barricades in some caves, notably in Western Australia and Victoria. In some sensitive Victorian caves, once a passage has been explored and mapped, if it has been deemed undesirable by the VSA management committee (in the absence of land-owner expertise or presence) to allow further entry, a sign is placed across the passage informing visitors what is beyond and the reason for closure. Through SRGWA, I barricaded an entire passage system of Nurina Cave (6N-46) in 1988 with a single explanatory No Entry Please sign to protect the ecosystem beyond.

Professional signs are expensive and take time to produce. More expense is incurred if the sign needs to be replaced or altered due to changed circumstances, vandalism or theft. Depending on the materials used, they can also be susceptible to a cave's harsh environment. In this desktop computer age, coupled with printers and inexpensive laminators, high quality and informative signs can be manufactured "in-house" quickly and with minimum expense. Depending on the inks used in some printers, laminated signs appear impervious to a cave's humidity. It is best to lightly trim an A4 sheet prior to lamination in order to increase the lamination border.

TRACKTAGS

One of the biggest headaches with the use of reflective markers — or signs — in caves, is what to affix them to! One possible solution trialled by several people throughout Australia were plastic "price tags" but these were expensive, had limited application, but more importantly, were made from a brittle, inappropriate plastic.

With this in mind, I developed the multiple-use TrackTag system, made from PVC sheet, cut into 110 x 20 mm strips, "pointed & holed" each end in a separate operation using a custom-built press tool and power press purchased with grant monies.

Each end is pointed so it is easier to press into sediments or rock cracks and with three holes in the form of a triangle enabling it to be hung or dangled from stringlines.

The TrackTag can be cut in half with a hammer and chisel, thus making two shorter TrackTags. Aluminium-backed reflective discs and signs can be attached with silicon-based glues.

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