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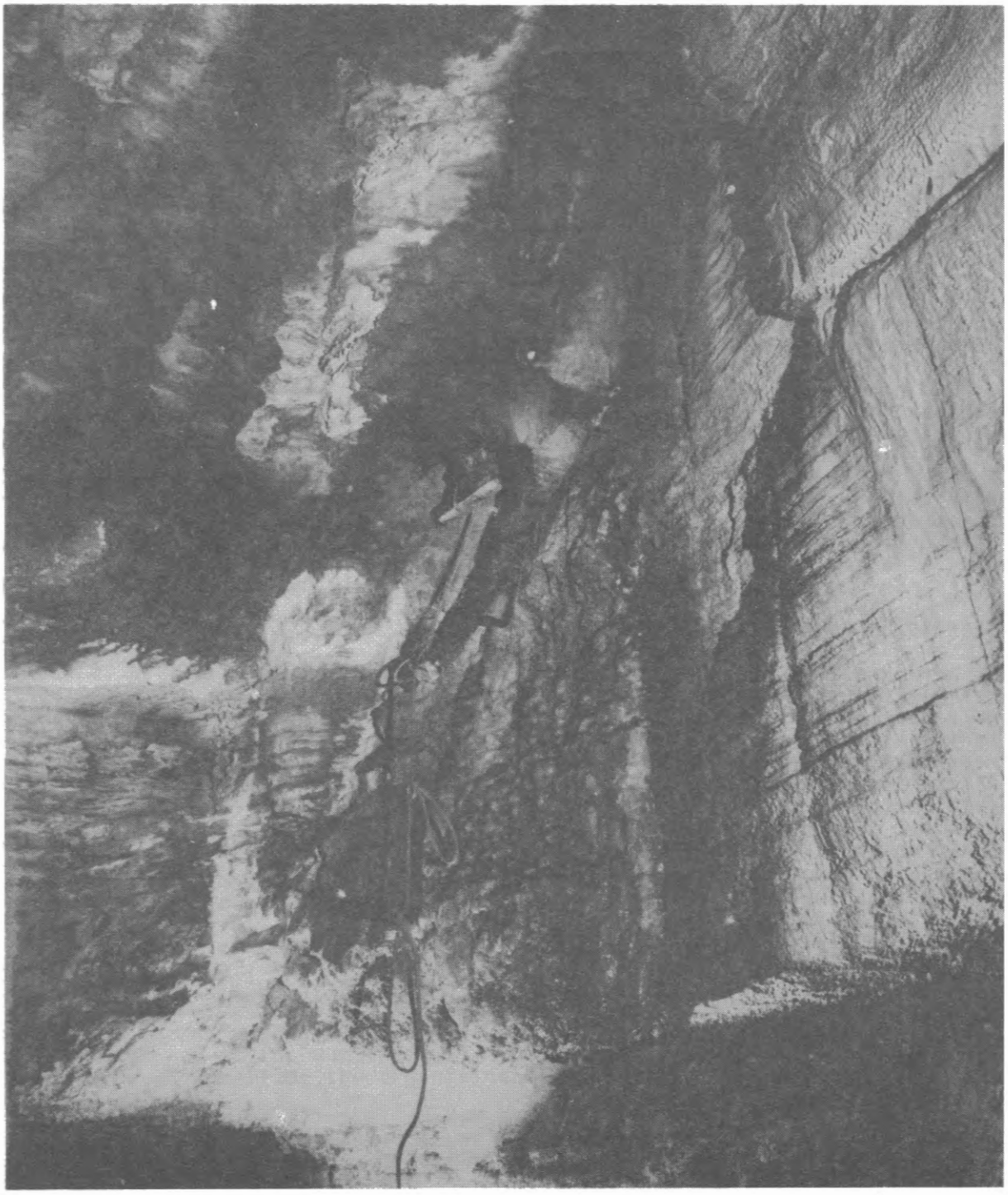

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DEADLINES FOR FUTURE ISSUES:

No. 128: end June 1991 No. 129: end August 1991

All articles, reports, photos and reviews are welcome for publication and should be sent to Clare Buswell c/- Politics Dept Flinders University, Bedford Park South Australia.

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Cover Photograph: Downclimb from Valley Entrance into Exit Cave Tasmania by P. Ackroyd

EDITORIAL by I.Mann

Well this is the last Australian Caver I will be editing, or attempting to edit. As of number 128 the editing will be done by Clare Buswell and as of the end of 1991 the editing and distribution will be handled by Clare.

Clare's address appears at the top of this page and anyone with articles should now send them direct to her. All articles received and as yet not printed will also be sent to her.

I would like to take this opportunity to thank those regular writers of articles who have supported me during my association with the newsletter over the past 10 years. I would hope that you continue to send your articles to Clare in order that the Australian Caver may continue to be produced at the standard (or better) that has been established, while still keeping it at a realistic price. I remember 10 years ago when I became involved in the Newsletter we were given virtually no articles to continue with and absolutely no address list.

I think we have improved over the years and with the help of you, the members of ASF, will continue to do so.

DOWN UNDER ALL OVER

SRGWA-February 1991
Robert and Norman Poulter spent 4 weeks touring parts of Thailand during Nov.-Dec. visiting areas not seen during their first trip of 1988. A lot of limestone was seen during a journey along the Thai-Laotian border between Chian Khan and Nong Khai so this is an area that could be investigated for caves. Numerous insects including some strange horned spiders were collected for study.

Paul Drew participated in the CALM funded surface restoration weekend of Brides Cave. Although the work has yet to be finished, the abseiling and ladder bollards were cemented into place and the old track has been covered with brush to allow rejuvenation and encourage people onto the new track. In conjunction with WASG, work will commence in late Feb. restoring some of the underground .

Plans are proceeding for SRG's trip into the SA side of the Nullabor in July with Dr Mike Gray of the Australian Museum. During the trip it is hoped to start placing reflective number tags on some of the caves.

Letters to Editor:

Dear Editor,

It was with interest that I read Peter Ackroyd's account of the flooding incident in Growling Swallet [jf-36]. The incident shows again that caving is a thought sport. That is, with preparation and carefully considered actions, potentially life threatening situations can be avoided.

Undoubtedly they made the right decision about not attempting to force the flooded route, but instead retiring to a safe area to wait out the flood. With a little more preparation and knowledge their actions could have been much more effective in conserving body heat and extending their endurance, not to mention making things much more comfortable.

The most disturbing part of the account of the incident was the comment that as the night wore on, they kept a careful watch for any signs of hypothermia developing among the group. If the group's heat management was as described in the article, then I think they would have found it very difficult to stabilise any of the party who may have become hypothermic. This is because their heat conservation measures were apparently ineffective. When stranded in a cold, wet and drafty place, body heat is too precious to be allowed to leak away unchecked.

It would be valuable to outline the principles involved in heat loss from the body and offer some practical suggestions in managing heat loss. There are four heat loss processes that must be understood by people who are exposed to cold. These are radiation, conduction, convection and evaporative cooling. The effect of each one of these processes must be reduced. The ideal situation is where the heat lost does not exceed the heat generated by the body. The way to do this is to know the rates at which different parts of the body lose heat and how to stop body heat escaping to the environment.

Compared with its size, the head is the zone of highest heat loss. Hands and feet can lose proportionally as much heat as the head under normal circulation, but the body will reduce blood flow to these extremities to conserve heat. The brain must be kept at close to 37 celsius to function normally and requires large quantities of oxygen and nutrients. So under cold stress, the body will attempt to maintain normal blood flow to the head. Therefore as much care needs to be given to providing adequate cold protection for the head as to the hands and feet.

Radiative heat loss is the process by which a body loses energy by emitting electromagnetic radiation. For the human body, this is infra-red radiation or radiant heat. Fortunately radiant heat is reflected by shiny metallic surfaces. Therefore a reflective space blanket is essential equipment in the cold. Arguably the reflective layer is most effective next to the skin, (as used in hospitals), but the large heat loss that would be caused by removing all clothing to place the reflective foil next to the skin is unacceptable in a cold cave. So in practice the space blanket should be worn on top of other clothing.

Conduction is heat lost through physical contact. Therefore direct contact with cold materials must be minimised. Reduce the area of contact with the cold walls and floor of the cave. Cold water has the ability to remove vast quantities of heat so keeping out of water is essential. Of the substances normally encountered in caves, air is the poorest conductor of heat. It is readily warmed, requiring less than one hundredth the energy needed to warm an equal weight of water. Wool and synthetic, thermal, fibres trap the air next to the skin producing an insulating layer. So adequate and preferably dry clothing is essential to minimise heat loss. Scavenging other people's lost heat through conduction and radiation is very effective. In practice this means that the group huddles close together. This reduces the effective heat loss from each person by reducing the body area exposed to the cold environment.

Convection is heat lost due to a warmed fluid moving, (usually vertically) by its buoyancy, to be replaced by colder fluid. The air next to the skin must be prevented from moving. The same clothing that insulates is also effective at preventing convective heat loss. Although such clothing may prevent the gentle convective air flow that body heat would produce, extra protection from drafts and strong air currents may be needed. A space blanket is also good wind protection.

Evaporative cooling occurs whenever a substance changes from a liquid to a gas. Water evaporating from clothes or off skin will remove large quantities of heat. The rate of evaporation depends on the dryness of the air; the drier the air, the more rapid the heat loss by evaporation. Evaporative heat loss can be reduced in two ways. Either by not having any water to evaporate, that is by getting into dry clothes and staying dry, or by increasing the water vapour content of the air to near 100%. At 100% relative humidity, no evaporative heat loss occurs. If mist or fog forms around you then the air is saturated with water vapour so evaporative heat loss is virtually nil.

Using the information outlined, the group's strategy should have been something like the following.

A. Put on gloves and balaclavas and adopt the foetal position to conserve body heat, but not on their backs. They should have rested on toes, knees and elbows, with pads made from packs and ropes to further reduce heat loss and ease the pressure.

B. Next thing should have been scavenging of leaking heat by the party huddling together. This reduces the exposed surface area of each member, therefore reducing heat loss. Social inhibitions associated with members of the same sex having close physical contact have no place when survival is at stake.

C. A reflective space blanket drawn over the group would have further reduced radiative and convective heat losses. It would have also produced a still zone of air that, when warmed by body heat, would have provided a temperate micro-climate. Evaporative losses would be reduced too, as the local relative humidity would have increased to nearer 100%, hence reducing evaporative heat loss.

D. Exercise is an effective way of generating body heat, but the problem with callisthenics is that you can lose a lot of warmth by moving about in chilled air. A better way is to use the stress/relaxation method, where you tense up your muscles for about five seconds then relax for about the same time. Three or four cycles of this is enough to warm one. Five or six can often start one sweating.

E. Artificial heat is effective too. A small candle, preferably in a candle holder, (or a carbide lantern), placed among the group huddled under the space blanket, will produce prodigious quantities of useful heat. The candle would be used for intermittent periods to top up the group's heat store if the stress/relaxation method was not producing sufficient warmth.

F. To be able to survive for long periods, the body's fuel must be maintained. Each caver ought to carry a minimum of 24 hours supply of concentrated high energy foods. Hungry cavers get chilled easier than well fed ones.

The above six strategies would have kept the group much warmer than they were. Not only warmer, but they would have maintained good physical condition for several days if they had sufficient food. With the addition of lightweight space blankets and several candle stubs or commercial candle lanterns, the group would have suffered much less from the cold.

I was surprised that Stuart Nicholas did not take a spare supply of insulin with him as a matter of course. This would not take up much room in his kit and it would mean he would be able to function normally for longer, if trapped for many days.

Finally a large vote of thanks should go to this group for being so frank. They provided an opportunity for everyone to benefit by their experiences in preventing an inconvenient situation turning into a tragedy.

Alex Kariko.
Safety & Training Officer
Victorian Speleological Association Inc.

SPELEO SYNOPSIS
August 1990 - February 1991

by Peter Ackroyd

NEW ZEALAND

NZS Bulletin 8 (152) (Dec 1989) Surveying is the hot topic in this Bulletin with an excellent article by Jonathan Ravens. Isewhere, Camelot, a cave in the Waitomo area, and a successful connection dig are described by Kieran McKay.

EUROPE

Descent 95 (Aug-Sep 1990) Damaged bolts are in the news at the moment. European cavers use bolts extensively and British cavers are starting to find that the conventional 'spit' anchor seems to strip threads rapidly under heavy use. In other news, a sixteen year old Derbyshire lad had mysteriously gone missing for 12 months. Foul play was suspected until his body was discovered, without any lights, 100 metres inside Ivy Green Cave close to his village. The cave is well known but because he'd not told anyone he was going caving, the rescue was a year too late. A reasonably priced underwater camera is reviewed by Rob Palmer who also details the recent discoveries in Cheddar's Gough's Cave.

Caves and Caving 48 (Summer 1990) The lead article is a summary of the '89 Mulu (Sarawak) Expedition - Clearwater Cave is now 75 km long with the connection with Black Rock Cave yet to be found. Andy Ive reports on a flying trip to Romania while Geoff Newton tells of a new caving area in Norway. An article translated from Spelunca 33 tells of the first through trip of the 1150 m deep Fuente de Escuain Cave (Nth Spain) and the issue wraps up with a lot of international news, including the latest list of longest and deepest caves in the world.

Cave Science 17(1) (Apr 1990) Speleogenesis within a limestone outcrop near a coal field (South Wales); geomorphic evolution of the Ingleborough Karst (Yorkshire); caves of San Salvador (Bahamas); Tertiary caves in Norway; caves of eastern Irian Jaya.

Stalactite 1-2/88 (Journal of the Swiss Speleological Society) Contained in this issue are articles describing a dive to -117 m in a cave in Northern Italy, an overview of the Sieben Hengste-Hohgant-Schrattenfluh karst system, the significant changes wrought in the lower sections of Reseau des Siebenhengste by a 1987 flood and a look at the history of exploration of some well known Swiss caves.

Stalactite 1/89 This issue contains more history with early Swiss caving cartoons and the early exploration of La Tanna l'Oura (Veytaux). There is also a summary of the development of the Swiss Rescue Group between 1981 and 1988. The issue also contains an index for Swiss caving literature published in 1988.

Stalactite 2/89 Urs Widmer has been to Lechuguilla Cave in the US and the front cover shows it - great photo. Other items include preliminary results on studies of bats in alpine caves, fauna in Holloch, a study of cave systems in Schrattenfluh and a look at the caves of the Diablerets Massif.

Descent 96 (Oct-Nov 1990) In the news section we learn that the long awaited 'Aggy/Daren' link is now a lot closer with the discovery of 'Dweebland' in Daren Cilau (South Wales). It consists of two hundred metres of passage with many leads towards Agen Allwedd yet to be pushed. Also in Daren Cilau, a foldable fixed ladder has been installed to handle the heavy traffic into the cave. The ladder is made up of a repeating series of linked rings bent up from 10 mm stainless steel rod. A brief summary of the entrapment by floodwater of a school group in Ibbeth Peril Cave (Cumbria County) is given here - this group exhibited common sense by sitting out the flood till the levels dropped. Kev Senior writes about the 1989 British expedition to Irian Jaya during which thick jungle near the Baliem River was penetrated in an attempt to find big caves. The issue winds up with the final of the four part series "The Leakey Tapes" (in which well known hard caver, Bob Leakey, recounts his exploits in the 1940s and 1950s), and a discussion on how long to keep SRT ropes before retiring them.

Caves and Caving 49 (Autumn 1990) Many reports from expeditions in this issue including caving in Belize, a summary of the exploration to date in this central American country; a Cambridge University trip to the Loser Plateau (Austria); a

Sheffield University trip to the Lake Beyshir region of Turkey; a small group's expedition to the Tymphe region of NW Greece; a York University trip to the Picos de Europa mountains in North Spain; and the 19th Matienzo expedition to Cantabria, North Spain. This last expedition discovered Cueva Valline which at almost 9 km long, was their most significant find for many years. Unfortunately the group went outside its allotted area to find it, resulting in the Spanish authorities refusing their application for the 20th Matienzo trip.

Descent 97 (Dec 1990 - Jan 1991) Amongst the news in this issue is the discovery, by Geoff Yeadon, of the East Kingsdale inlet which eventually resurges at Keld Head. The inlet is about 1 km upstream and so far over 100 m of dive line has been laid in massive passage beyond a tight underwater squeeze. A summary of the 1990 BCRA conference is followed by an amazing tale of a through trip in Mexico - a combination of high water and lack of experience almost landed the combined British/Mexican team in trouble. Other articles include a new cave in Devon - Skullcap - and a cave diving expedition to Mallorca, Spain.

Caves and Caving 50 (Winter 1990/91) An Asian flavour for this issue with articles describing karst in Honshu (main island of Japan), Guangxi Province (China) and Turkmenia (just on the USSR side of Afghanistan). Other overseas trips included two trips to Cuba in 1989. Local news and a discussion on the best replacement for the now out of favour (finally) 8 mm self drilling anchor - British cavers are starting to understand that stainless is best.

Cave Science 17(2) (Aug 1990) This entire issue is taken up by various dissertations on the caves of Guangxi, China.

Descent 98 (Feb-Mar 1991) This issue relates how an explorer in a disused mine, Coniston Copper Mines (Cumbria), tumbled a total of 43 metres down two levels and lived! He was wearing a good quality helmet, which was almost destroyed in the fall, but still suffered one skull fracture and a badly broken arm. It is unclear how he fell, but it would appear that he clipped into the wrong side of a pull down abseil rope. Other items include a trip to the Jura region of France, a trip to the gypsum caves of the Ukraine (USSR), exciting new diving in Kingsdale Master Cave and two new caves found after extended digging trips in South Wales, Blaen Onnen Quarry Pot and Twll Dychrynllyd.

USA

NSS Bulletin 51(1) (Jun 1989) An issue devoted to speleobiology - bugs, beetles and bats. One item on histoplasmosis suggests that cavers intending to explore tropical caves should 'acclimatise' by exposing themselves to tropical bat caves gradually.

NSS News 48(7) (Jul 1990) Jewel Cave, that two dimensional maze in South Dakota, is growing again - an article by Mike Wiles records the last decade of exploration during which the cave's length passed the 75 mile (120 km) mark. A short article on show caves suggests that show cave owners and present day cavers are working together better than in the past.

NSS News 48(8) (Aug 1990) A brief article on directional Aragonite in Lechuguilla Cave and a summary of the 1990 NSS Convention is pretty much all this issue contains.

NSS News 48(9) (Sep 1990) The guest editorial in this issue asks "Why survey?". It then provides plenty of cogent reasons for doing so. Endangered cave fauna in Austin County, Texas, is described further on in the issue followed by an article on relapsing fever passed onto cavers by ticks in the warmer states of the US. On the cave safety side, a detailed analysis of a death by drowning in My Cave (West Virginia) is provided.

NSS News 48(10) (Oct 1990) The feature article describes the exploration history of Tecumseh (Horseshoe Bay) Cave - which at 900 m is Wisconsin's longest cave. The 1990 expedition to Costa Rica (Central America) is also described in this issue along with the news that America's hottest find of the decade, Lechuguilla Cave (New Mexico) is now 83 km long and 477 m deep - the USA's deepest cave.

NSS News 48(11) (Nov 1990) The main article in this issue discusses the transmission of rabies from bats to humans via aerosols within caves. The suggestion is that it probably does occur but at a low frequency. There is also the index to Volume 47 (1989) and couple of semi-fictional pieces.

Speleonics 15 (Oct 1990) This issue contains some historical items such as the French electric mining lamp developed in 1869, ten years before Edison developed his incandescent light bulb. Other items detail the use of a sophisticated 2 KHz RDF system developed for use in caves in 1960.

NSS News 48(12) (Dec 1990) A nostalgic issue, recalling the formation of the first "Grotto" (caving group within NSS) in 1940 - the New England Spelunkers Grotto. A large lava cave system The Freudian Complex, recently found in California, is described followed by an article on ropes and rigging which indicates that Americans are starting to catch up with the rest of the world as far as lighter ropes and safer rigging are concerned.

Compass and Tape 8(1) (Summer 1990) Fred Wefer continues his series of articles on computer produced and displayed cave maps, this time discussing special options such as map rotations in slow motion, cutaway views and the like. A program for compiling and computing cave data stored in different media and formats has been developed by a member of Mammoth Cave's Cave Research Foundation. Being flexible and user friendly, it is able to absorb data stored by many surveyors and computers spanning the decades that this cave survey has been carried out, and integrate it into a single, homogeneous data set which it then uses to compute Cartesian coordinates. This issue finishes up with a good tip on cleaning Suuntos and a listing of the 1990 map drawing competition entries and winners.

Compass and Tape 8(2) (Fall 1990) This issue deals solely with computer applications in cave mapping - digitised storage and retrieval of data, conversion programs from SMAPS to Macintosh and new laser printable plastic sheets.

35th ASF COUNCIL MEETING MARGARET RIVER, WA - Dec 1990/Jan 1991

by Chris Dunne - ASF Secretary

Margaret River, in WA's beautiful Southwest, was the scene for the two sessions (31 Dec and 5 Jan) of the ASF Council meeting, held as part of ASF's 18th Biennial Conference, 'Cave Leeuwin', organised by our two WA Member clubs, WASG and SRGWA.

The Conference consisted of the presentation of a number of papers, poster and slide competitions, Cavers Dinner and an excellent Speleosports - a real grovel up the creek. Field trips were mainly south from Margaret River and to the Nullarbor - both before and after the Conference.

Mid-week, in addition to the other presentations of the Conference, there was a well attended workshop on cave management, and a couple of informal meetings to discuss the Newsletter and the Karst Database. The NSW Speleo Council held a brief meeting, primarily to discuss the Yessabah Caves conservation issue. Also discussed was that Council's proposed 'Human Impacts Conference' [now termed the 'Caver Impacts Forum'].

Most Member clubs (19 out of 22 financial Members) were represented at the ASF Council meeting, although, possibly on account of the distance from the eastern seaboard, several clubs were represented only by proxy.

Only four Associate clubs: CCC, CWCG, SSS and TCKRG, were represented, as well as Top End Speleo Society (TESS) which was voted in as an Associate. Also accepted were CAVEX Inc. from SA, and Savage River Caving Group (SRCG) from northern Tasmania. Although not represented, former Members TCC and SCS rejoined as Associates early in 1990. Also in 1990, ISS resigned as a Member to become an Associate.

Reports from the Executive, most of our 12 Commissions and several of the ad hoc Committees were received and discussed, as was the Draft ASF Constitution (1991), which was later endorsed by those clubs present. Once ratified by the ACT Corporate Affairs Commission, this Constitution can come into effect during 1991.

The battle over the legality of the mining operation at Yessabah is somewhat akin to that at Mt Etna. Yessabah was the subject of a couple of the Conference papers, and a strongly worded resolution. Various areas in Tasmania are also of concern: King River - a dam proposal; Benders Quarry near Exit Cave - the quarry should go; and Exit Cave itself - a licence to run Adventure Tours has been granted prior to any Management Plan for the cave.

On the positive side, a Plan of Management is in preparation for Kubla Khan Cave, Mole Creek - there was considerable consultation with clubs during late 1990.

In the west, whilst WASG and SRGWA are involved in the Cave Management Committee, there is concern at the non appearance (after more than a year) of the final Plan of Management for the South Coast Region, which includes the WA Nullarbor - we had raised a number of issues. Also on the Nullarbor, we support a moratorium on trips to the Dome in Mullamullang.

Finally, ASF is to co-ordinate its responses on karst related conservation issues with recognised, high public profile conservation organisations such as the Australian Conservation Foundation (ACF), the Wilderness Society, Greenpeace, and Friends of the Earth.

There were a few changes: Ann McLaren and Ian Lutherborrow are stepping aside as Safety Officers - the Executive is to appoint a replacement. Julia James is now co-convenor with John Dunkley of the International Relations Commission - they are to investigate the feasibility of ASF hosting the 2001 IUS Congress.

Cathy Brown, in Canberra, was appointed as Librarian and has already catalogued the present collection which only dates from about 1985, following our disastrous affair with the Australian National Library. John Dunkley and Ken Grimes have offered significant portions of their private collections to the Library on long-term loan.

With less than half of the 1000 plus copies of the Australian Karst Index sold to date, the Documentation Commission was directed to drastically reduce its price [for private purchases]. The Commission was also given a number of far-reaching directives aimed at preserving the national integrity of the Australian Karst Database - there was the risk of its being abandoned by some states. The Geodesy Karst committee was terminated - Keir Vaughan-Taylor completed his thesis project, but had experienced difficulty in obtaining his copy of the Karst Database.

In anticipation of Ian Mann stepping aside later in 1991, there were some directives on the future of the Newsletter - FUSS is to take over full production, with Clare Buswell as Editor, and WASG to manage the address list. Ian has been able to keep costs down, which enabled retention of the $6 discount on Capitation Fees for 1991. With discount, fees are $7.50 for club members, $11.50 for Individual Members, for fees paid by 30 June. Associate clubs pay $35.

Alex Kariko, in Melbourne, has been working steadily on the Beginners Handbook. He tabled the results of a survey he conducted amongst clubs during 1990. Evalt Crabb tabled a draft Code of Ethics which incorporates significant conservation elements, which are absent from the present Code - please forward any comments to Evalt.

Concurrently with the acceptance of the draft ASF Constitution, By-Laws for 'Membership Fees and Councillors' and 'Election of the Executive' were also accepted - 1 Councillor per 15 members, up to a maximum of 6 Councillors.

There is further review work to be done - to ensure the smooth introduction of the new structure; to reconsider our Membership and Associates policies; to develop a Library policy - the Library was explicitly referred to in the old Constitution.

Lloyd Robinson, Lloyd Mill and Peter Berrill were returned as President and Vice-Presidents respectively. The meeting also elected Nick White as a Fellow of ASF, for services rendered to the Federation and Australian speleology over many years.

The January 1992 Council meeting is to be in Jindabyne, followed in January 1993 by the next Biennial Conference in Launceston, Tasmania.

SURVEY DATA REDUCTION SOFTWARE

A REVIEW OF SMAPS 4 & the SMAPS/Graphics Option

By S.Nicholas

This article consists of three parts: the Introduction and brief history of cave survey data reduction as carried out in Hobart; an overview of SMAPS 4 and in particular a review of SMAPS 4.3, followed by a review of the separate SMAPS/Graphics Option, version 1.1. Many of the functions and features of the Graphics Option overlap and in part supplant those of the basic SMAPS 4.3 software. Hence there may appear to be some contradiction and/or repetition in the discussion and conflict in actual use of the software. However, in practise, this does not represent a problem as the two packages are used sequentially and not simultaneously, with the SMAPS/Graphics Option being an output facility called from SMAPS 4.3 and hence an adjunct to the data preparation and manipulation work of SMAPS 4.3.

INTRODUCTION

Reduction of raw (field) cave survey data has always been a somewhat tedious and error prone penultimate phase of mapping caves. Twenty years ago, a set of trig. tables, a pencil or two and several free nights comprised about the only option for the "amateur" caver to convert the field instrument readings from polar form (one or two angles and a distance) to rectangular form (two or three coordinates in a rectangular coordinate system). Station locations could then be plotted on paper in a scaled grid system before final drafting of the passage details to produce a map.

A few years later, scientific calculators of varying degrees of sophistication (many having considerable programming capabilities) became available and up until the last few years, these devices were, and still are used extensively by cavers all over the world for survey data reduction. Personal computers have, however, now become common both in the work place and at home. The power and speed of these machines is continually increasing and cavers, being fairly innovative individuals, have taken advantage of this fact to ease the post-weekend cave survey data reduction chore to something that is almost enjoyable! Many programs have been written and more particularly, partly written, to achieve this result and a lot more besides.

Many readers of this journal will no doubt concur with the above history and evolution of cave survey data reduction. During the mid-80's we were blessed with the local (Tasmanian) appearance of a copy of SMAPS 3.3, an American software package dedicated to this slightly esoteric application. ("SMAPS" is another of those dreaded computing acronyms, in this case derived from Survey Manipulation, Analysis and Plotting System.) Subsequently, much of the local (Tasmanian) cave survey data (both new and old) has been reduced to rectangular coordinate format and traverse line plots made with the aid of that software.

During the latter part of 1988 a major redesign/rewrite of the software became available in the form of SMAPS 4. Written for use only on IBM or compatible DOS machines (DOS is the operating system - or "house-keeping" software - most commonly used by IBM brand and IBM-compatible personal computers using 808x or 80x86 series microprocessors), it embodies many of the "wants" arising from use of the previous version on both IBM and CP/M machines (CP/M is a now almost obsolete personal computer operating system), as well as having a few kinks of its own.

The software has been written in a "modular" form, in accordance with modern programming language constraints and recommended program structures. This will enable additions and modifications to be made by the authors much more easily than previously. Early last year (1990), the first major add-on module, the SMAPS/Graphics Option version 1.1, became available to give advanced screen graphics of cave survey traverses, a facility many (older...) cavers have been clamouring for! Various other modules and upgrades are noted in the manual as being planned and/or worked on for forthcoming updates, based mainly around advanced graphics facilities including solid representations, topographic overlays (contour and surface) and arbitrary viewing angles with perspective (as yet there is no mention of an optional armchair...). Other current work includes a SMAPS programming language for ease of data manipulation and report generation as well as a postscript driver for advanced laser printer output. (Postscript is a sophisticated control language / system for laser printers.) A

non-postscript laser driver is available now for HP Laserjet II series printers and emulations thereof.

SMAPS 4 software

The initial release of SMAPS 4 was version 4.1 which, in common with new software from most sources, did contain bugs (ie. problems or faults) - most however were fairly innocuous, being little more than a nuisance and easily worked around. A few months later, SMAPS really came of age with the release of version 4.2. Most of the known bugs (in particular, some problems plotting maps with wide carriage printers and some minor file management problems) were remedied with this release, as well as there being a few functional changes and improvements added.

Subsequently, version 4.3 appeared early in 1990 in conjunction with the release of the SMAPS/Graphics Option. The basic (data entry and data processing) SMAPS software is now available and must be purchased separately from the Graphics Option. SMAPS 4.3 on its own has no screen graphics facility without the SMAPS/Graphics Option but does retain the hardcopy printing/plotting functions of SMAPS 4.2. It incorporates some bug fixes as well as some significant (mainly unseen / transparent) enhancements to accommodate the Graphics Option.

Most of the other major features / changes for the basic SMAPS software are given below:

* SMAPS has separate data printer and map plotter software drivers with associated appropriate output ports selectable. (A driver is a software module to "translate" data into a form that can be understood by a printer / plotter or other hardware device.) This enables two different output devices to be used (if your machine has two output ports) without the need to swap cables and change driver names. Drivers are now available for X-Y pen plotters as well as the usual dot matrix printer/plotters, plus HP lasers as noted above. Many common printers and plotters are supported. There is also an option for having your own driver written if you own a backwoods "Brand X" hardcopy device... Plot output can also be made to a file or the screen and calculated data to a file only, if no hardcopy is needed.

* As mentioned above, the software is only available for the "industry standard" IBM/DOS PC/XT/AT/x86 machines or clones thereof. It is recommended, and is almost mandatory, that 640k of memory and a hard disk be used. Greatly improved performance can be had if a maths co-processor (a second microprocessor IC in the computer dedicated to [floating point] math. calculations) is installed - the software has automatic detection of such a device. Use of a ramdisk / virtual disk (a part of the computer memory allocated to look like a disk) for work files also helps if your machine has sufficient spare memory. The software is relatively disk intensive in operation, as is most data base / data manipulative software (ie. it frequently / continually accesses the disk), but this does not appear to be a problem with modern fast access drives and the average cave survey or area survey - after all as a dedicated cave surveyor, one does need an occasional cup of tea to avoid the dreaded RSI blues...

* In common with most menu driven software these days, many functions and commands are displayed in pop-up menus or windows on the screen with the addition of "expert selection" mode via a single letter command selection rather than having to move the cursor and hit <RETURN>. Other functions are selected using the ten standard function keys, with or without the ALT key, as found on IBM/DOS machines. The software has a very useful context sensitive "help" window for those moments of SMAPS amnesia! In fact, after initial familiarisation, further reference to the manual is almost unnecessary.

* Survey station names up to eight characters long instead of the six for SMAPS 3.3 can be used. Also, an automatic station number sequencing and incrementing facility exists, even when non-numeric prefixes or suffixes to the number are used (a great feature). Existing station names can be changed in a block by adding or deleting a suffix or prefix to or from the selected block of data; shot type may also be changed in a block of data. "Shot type" typically defines the status of the shot data with regard to inclusion in the reduction and or subsequent plotting and survey statistical data accumulation. It is also used by the Graphics Option as a handle on displayed and plotted line types. Station name searches and search-and-replace operations can be done.

* The date format problem of the old SMAPS 3.3 (month and day interchanged) has been solved by using the format set up in the DOS operating system "country code" of the machine (this is set up at initial configuring of the machine operating system to suit the local date convention).

* Block cut-and-paste and copy functions are available to shift data. Directory subtrees and surveys can be moved at will and the map file system reorganised. Blocks of data can be inverted and reversed, with consequent reversal of the 'to' and 'from' station names and angles, when the data does not follow in a forward chronological order.

* Comments can be put between lines of raw survey data - a most useful facility!! One information page can be utilised for each survey to record text / freeform notes. This has been extended to a full screen in size and more instrument details, including any fixed instrument errors and measurement error range, can also be recorded and tied to particular surveys.

* Wall, ceiling and floor distances from each survey station can be entered and the points plotted for ease of later map drafting. SMAPS 3.3 had a facility to enter the passage data but "for information only".

* Thread measuring devices (eg Topofil) are supported for leg length inputs. As well, depth gauge readings can be entered for vertical measurements when surveying underwater (or very deep 'dry' caves....!).

* Various messages, prompts and status indicators appear on the screen to indicate progress of a procedure, errors, space available in various buffers and so on. The screen driver, by default, uses colour attributes for a CGA or VGA screen (the standard IBM / clone colour screens), although this can be overcome with the use of the DOS 'set monitor=mono' command in the system autoexec.bat file (an optional file of programs and system functions that is examined by the operating system when the machine starts or is re-booted) for mono monitors. The error trapping is quite extensive and specific if you can stand the bleeps from your machine - no (?) more of those mysterious system crashes sometimes encountered with SMAPS 3.3.

* During conversion of data to rectangular coordinates, no calculated data appears on the screen. Instead, a progress screen is displayed which continually updates various conversion statistics. Figures such as number of shots, printer pages used, total length, maximum extensions of traverse and so on are displayed - quite spectacular to see the numbers clicking over at some speed when converting a big survey!

* The SMAPS 4 loop closure / adjustment procedure is improved over that in SMAPS 3.3 in that one can specify up to a maximum of 500 constrained stations, ie stations that must be constrained at the original calculated location during loop adjustment. This allows small loops within a system to be adjusted without the entire survey being adjusted and distorted. The closure technique is as per SMAPS 3.3, ie method of least squares. A progress screen similar to that described above is displayed during the closure routine. Version 4.2 has had a minor bug fixed in this procedure.

* Map plotting appears to be faster, ie plot file generation is faster. Maps are plotted in graphics mode sideways on the paper of dot matrix printers with the usual selection of scale, station names and so on available via a pop-up window. No comment can be made as to the effectiveness or functionality of the X-Y digital plotter driver routines as the author of this article does not have access to such a device at this time.

* Survey linking is now possible. Complex systems (eg Growling Swallet in the Florentine Valley, Tasmania) can have the data analysed (reduced) as a number of individual surveys (ie. as entered in the first place) and then be linked together for plotting and so on. This avoids the need to analyse the "data tree" of the entire system. Linking is faster than analysis and doesn't produce such a large resultant disk file. As before, a progress screen is displayed during this procedure.

* Maps may now be clipped / limited in extent very simply (unlike SMAPS 3.3!), ie limits specified to define a smaller section of a larger map for plotting in both plan and profile. As yet no plotting facility for developed or extended sections exists - possibly a fairly significant weakness for Australian use anyway. Only projected sections ("profiles") can be plotted with the viewing

angle, scale and so on being selected by the user; horizontal datum lines may be optionally plotted on profiles and as well, an exaggeration factor may be included to vertically expand plots lacking vertical range in relation to the horizontal extension of the plot / cave.

* The internal file structure seems to change with each revision of the software, but a conversion routine is always supplied to crank the data into the required structure, so no rekeying is required. These work very rapidly, simply and without any hitches whatever - fairly unusual for such conversion routines...

* Data can be dumped to an ASCII (text) file for use by other software and also can be taken up from appropriately structured ASCII files created by other programs (a minor bug existed in this routine in version 4.1 but was fixed in version 4.2). ASCII is a standard alphanumeric and control character coding system used extensively for data transfer between dissimilar programs and / or machines. A utility is also available for conversion of data from CMAP, another US cave survey program. The ASCII file structure for both raw and reduced data files is detailed in the manual.

* Data report production is a little restrictive at present. Raw data can be listed at any time and the reduced/calculated data listed as it is calculated (or written to a file). The calculated data appears as a list of relative coordinates and absolute coordinates, together with the relevant station names. However, at present there is no facility within SMAPS to produce a listing of the raw data parallel to the calculated data. This can be done externally if one writes a routine to do it in a language of choice, but it does require both the raw and reduced data to be dumped to two ASCII files (as noted above) and then taken up by the external program / routine. This is not a great problem and the situation will be rectified when the SMAPS programming language facility becomes available.

* External programs are able to be run from within SMAPS 4.3 (an often useful facility for any software, especially for DOS [operating system] commands) via the use of a "Shell" facility. SMAPS 4.3 also enables the automatic loading at start-up of default survey info and software set-up parameters when surveys are created and processed. This facility was partially in place in version 4.1, but has been much improved in versions 4.2 and the current version 4.3.

* The manual is a 100 page production and is reasonably easy to work through, although I suspect its actual publication may have been a little hurried... Section 8 on plotting was omitted from the first edition but is supplied on disk with version 4.2.

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SMAPS/Graphics Option v1.1

Following entry and processing of the field data, one usually needs to see it in the form of a map - after all that is normally the ultimate goal of surveying a cave! If one does not have the SMAPS/Graphics Option, facility exists within SMAPS itself to produce hardcopy plots, as noted above. However, a far more sophisticated graphics module is now available in the form of the SMAPS/Graphics Option version 1.1. This is a separate package accessed from within the SMAPS plotting menu.

It is a total graphics system in that it enables both screen and hardcopy graphics to be produced, each in similar style to the other. The base information is derived from the analysed field data, but from that point, many display options are available. The line traverse may be viewed from any desired angle, with the centre of rotation set to be any desired station with in the survey, although not turned in a continuous animated fashion (as yet!). Station labels may be displayed in a number of forms such as station names, Z coordinate (depth), passage height and ceiling+floor distances.

Installation of the SMAPS/Graphics Option requires a small change to the DOS "environment" and selection of an appropriate display driver, in order that the software has sufficient "working space" and the display of graphics information on the screen can be done in the best (highest resolution) manner possible. All this is explained in the supplied 60 odd page manual. The low level graphics operations are at present carried out via a driver which may be installed as a

Terminate-and-Stay-Resident routine or only when required, both easily achieved via a batch file (supplied). This routine will not be used in future versions of SMAPS/Graphics (beyond version 4.3).

Perhaps the greatest step forward in the display of maps is the advent of "attributes" which may be attached to any shot or shots. (An attribute is [here] an invisible parameter to indicate how some feature is to be set or used by later processing - an indirect instruction attached to a survey shot to instruct the graphics and plotting software as to how the feature is to be displayed or plotted.) These may be set via (ie based on) the "shot type" parameter noted above, the survey creation or access date, plane, depth or position of the file in the directory tree. Whatever the base used, the result is a display or plot of the cave map with various line type and/or colours used to differentiate between different parts of the cave or system. This is of great advantage when cave systems of any complexity at all are displayed or plotted, eg Growling Swallet system in the Florentine Valley or the Bauhaus system at Precipitous Bluff, Tasmania. As an example of use, setting the shot type to "S" at data entry for surface surveys and then using the "shot type" attribute with "S" attached to a dotted line enables overland and underground survey traverses to be easily differentiated on screen or hardcopy. Various "fixed" attributes may also be set to control the appearance of map elements other than survey shots themselves, eg map border, datum intervals and so on.

The final operation in mapping a cave is of course to produce a drawing of the cave in form of a "hardcopy" map. Plotting follows basically the same procedure as screen display of maps, with a few additions such as position of the title block, inclusion or not of a border and so on. A "palette" of plotter attributes can be edited to mix and match the attributes set up for screen display to those available on the hard copy device (typically, dot matrix printer / plotters do not have any or many colours available, for example, so more reliance is placed on plotted line types / dot patterns which must be linked to the screen display line types already set). The screen display of the map has data across the top of it indicating full scale dimensions in your chosen units (metres here in Australia). These values may be used to set "clipping planes" in order to limit the plotted map to particular areas of interest, as well as set the scale of the map plot. Various options are available for setting the clipping parameters applying to a particular map.

Passage wall/floor/ceiling locations may be displayed or plotted as single dots either side of the station or as rectangles around the station if all four passage dimension parameters (left / right wall distances and up / down ceiling and floor heights from the station) were entered originally. This almost simulates a 3D isometric framework projection of the cave - a precursor of such a feature promised for a future version of the software.

Title blocks can be positioned where most convenient on the plot, square grid tick marks selected with any desired interval and depth scales plotted if desired on profile maps.

Statistical information can also be derived in the form of data pertaining to one station, orthogonal and direct distances and angles between two stations or the planer relationship between three stations. A rose diagram (a circular version of a bar graph) can also be displayed showing various passage and shot parameters in graphical form.

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Problems / BUGS (known to the author of this article)

* There seems to be a problem with the implementation of the high resolution screen drivers - displays can be had in CGA or EGA but not VGA at present. In part this is apparently due to lack of a standard for the interface to Hi-Res VGA and difficulties with the existing (version 4.3) graphics driver.

* As noted above, plots of extended vertical sections cannot yet be done.

* Setting hardcopy plot attributes can be a little confusing.

* A new version of SMAPS is due out shortly - before mid 1991 - and presumably many of the few existing shortcomings will have been fixed and new features added, in the usual software evolution process (it may even be out before this article goes to print).

* Generation of reports is simplistic. Anything other than simple lists of raw or processed data requires the data to be dumped to separate (for raw and processed data) ASCII files and taking it up with a custom written report generation application. This will be fixed with the advent of the SMAPS programming language in a future version.

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Not much more to be said really. For the meagre price of $70 AUS, the package is an absolute bargain, being most professionally written and free of most of the bugs and problems often encountered with software, even that written by some of the world's biggest software companies! The software is available from the USA and can be supplied in any of most of the current IBM / DOS disk formats. In Australia, Ken Grimes can supply information and order forms. Before digging out your bank draft, phone or write Ken or Doug Dotson (USA) for details on printer and plotter driver availability as only two routines are supplied with the package - if you need more drivers, the number on the end of your cheque needs to be a little bigger.

Addresses:

Ken Grimes
PO Box 362
Hamilton
Victoria 3300
Ph 055 748225

SpeleoTechnologies, Inc.
PO Box 293
Frostburg
Maryland 21532-0293
USA
Ph 0011 1 301 689 3423

Technical support is available via a computer bulletin board system and an EMAIL network in the USA. Doug Dotson (the software author) is most helpful and responsive if you write to him at the above address (SpeleoTechnologies, Inc.).

PROPOSED EXPEDITION

Fellow cavers are invited to take part in an expedition to Old Homestead Cave on the Nullarbor. The Expedition is being run by CEGSA during the three week period Saturday 21 September to Sunday 13 October 1991. These dates include travelling times to and from the cave. So far, approximately 15km of passage have been explored and 12km mapped. A large number of leads are outstanding and the cave is likely to become the longest known in Australia. The objectives of this expedition are to:

* Continue the survey and exploration of the cave.
* Produce a detailed surface map to show topography, drainage patterns, and vegetative cover in order to relate these to the cave development.
* Produce a photographic record of the cave.
* Carry out track marking to prevent track spreading.
* Guide around sensitive areas.
* Conduct specialised research.

In addition we will produce a report of all the activity in Old Homestead Cave up to and including this expedition. A set of photographs will be produced for all expedition members. People who wish to propose their own programme of specialised research, eg., studying the biology, geomorphology, etc. of the cave are most welcome to do so and such proposals will be strongly supported.

Any experienced caver who is willing to spend at least a week with the expedition and is willing to contribute substantially to the objectives is welcome to apply. Exploration will be done on a survey-as-you-explore basis and would-be members should be prepared to spend at least half their time underground on surveying trips. The number is limited, on a first-come first-served basis. You can book a place with a non-refundable deposit of $20 payable to "The Braidendrite Expedition", enabling you to receive all expedition correspodence. A further $80 deposit is required by the end of May to confirm your place. Final cost is anticipated at about $300 each including travel from Adelaide/Perth as well as the report and photographs. If you want to know more about our plans to have a 30km long cave on the Nullarbor by October, please contact one of the following people on behalf of the organising committee:

Mark Sefton	08 277 9086 (home)
Graham Pilkington	08 396 3044 (home)
Steve Milner	08 370 2231 (home)

AUSTRALIAN SPELEOLOGICAL FEDERATION INC.

MEMBER SOCIETIES

ACT
Canberra Speleological Society Inc., 18 Arabana St, ARANDA, 2614
Capital Territory Caving Group, PO Box 638, WODEN, 2606
National University Caving Club, c/- Sports Union, GPO Box 4, CANBERRA, 2601

NSW
Baptist Caving Association, 90 Parkes St, HELENSBURG, 2508
Blue Mountains Speleological Club, PO Box 37, GLENBROOK, 2773
Endeavour Caving & Recreational Club Inc., PO Box 63, MIRANDA, 2228
Highland Caving Group, PO Box 154, LIVERPOOL, 2170
Hills Speleology Club Ltd., PO Box 750, CASTLE HILL, 2154
Kempsey Speleological Society, 27 River St, KEMPSEY, 2440
Macquarie University Caving Group, c/- Sports Assoc., MACQUARIE UNIVERSITY, 2109
Metropolitan Speleological Society Inc., PO Box 2376, NORTH PARRAMATTA, 2151
Newcastle & Hunter Valley Speleological Society, PO Box 15, BROADMEADOW, 2292
Orange Speleological Society, PO Box 752, ORANGE, 2800
RAN Caving Association, c/- 30 Douglas Ave, NORTH EPPING, 2121
Sydney University Speleological Society,
Box 35, The Union, SYDNEY UNIVERSITY, 2006
University of NSW Speleological Society,
Box 17, The Union, University of NSW, KENSINGTON, 2033
University of Technology Sydney Speleological Society,
c/- The Union, PO Box 123, BROADWAY, 2007

QUEENSLAND
Central Queensland Speleological Society Inc., PO Box 538, ROCKHAMPTON, 4700

SOUTH AUSTRALIA
Cave Exploration Group South Australia Inc.,
PO Box 144, Rundle Mall, ADELAIDE, 5001
Flinders University Speleological Society,
c/- Clubs & Societies Assn. Flinders Uni., BEDFORD PARK, 5042

TASMANIA
Northern Caverneers Inc., PO Box 315, LAUNCESTON, 7250

VICTORIA
Victorian Speleological Association Inc., GPO Box 5425 CC, MELBOURNE, 3001

WESTERN AUSTRALIA
Speleological Research Group Western Australia, PO Box 120, NEDLANDS, 6009
Western Australia Speleological Group, PO Box 67, NEDLANDS, 6009

ASSOCIATE ORGANISATIONS
Australasian Cave & Karst Management Association, PO Box 36, CARLTON SOUTH, 3053
Avondale Speleological Society, c/- 20 Avondale Rd, CORRANBONG, 2265
Campbelltown Caving & Outdoor Group, PO Box 50, GLENFIELD, 2167
CAVEX Inc., c/- 15 Sandery Ave, SEACOMBE GARDENS, 5047
Central West Caving Group, c/- PO Box 428, OBERON, 2787
Chillagoe Caving Club Inc., PO Box 92, CAIRNS, 4870
Illawarra Speleological Society, PO Box 94, UNANDERRA, 2526
NSW Cave Rescue Squad Inc., PO Box 122, BANKSTOWN, 2200
North Queensland Speleological Association, 1 Boden St, EDGE HILL, 4870
OTC Caving & Canyoning Club, c/- PO Box 1996, NORTH SYDNEY, 2059
PNG Cave Exploration Group, c/- G. Francis, PO Box 1824, Port Moresby, PNG
Rover Speleological Society of NSW, c/- 2 Ray Pl, WOODPARK, 2164
Savage River Caving Group, PO Box 299, ULVERSTONE, 7315
Scout Association of Australia (NSW Branch), PO Box 115, HABERFIELD, 2045
Scout Caving Group (South Australia), c/- 44 Fullarton Rd, NORWOOD, 5067
Snowy Mountains Speleological Society, c/- Wolumla Public School, WOLUMLA, 2550
Southern Caving Society, PO Box 121, MOONAH, 7009
Sydney Speleological Society, PO Box 198, BROADWAY, 2007
Tasmanian Cave & Karst Research Group, PO Box 338, SANDY BAY, 7005
Tasmanian Caverneering Club, PO Box 416, SANDY BAY, 7005
Top End Speleological Society,
c/- Guy Bannink, Royal Darwin Hospital, PO Box 41326, CASUARINA, 0811
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