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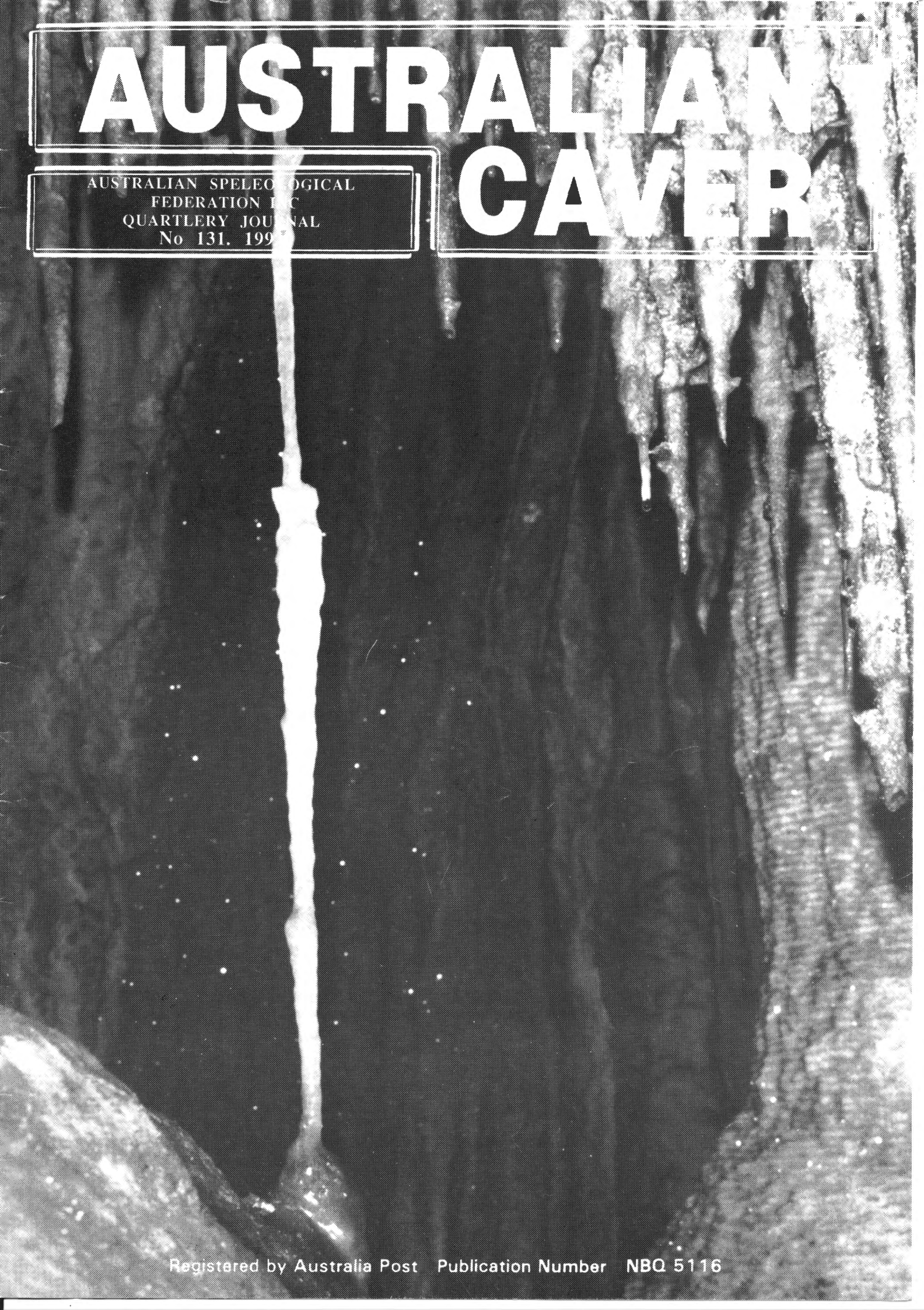

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C O N T E N T S

FRONT COVER PHOTO: Casteret Cave, Jenolan.
Photo by Marcus Macoun.

EDITOR'S BITS

This issue contains a compilation of four of the papers presented at the Caver Impacts Forum in Sydney in June of last year. I hope that you find them worthwhile and that some debate is generated as the organisers would like some feed back to help plan the follow up Forum that is to occur later this year.

The dead line for the next issue, No 132 is the 10th of September. As usual the in tray is looking very empty. I have awarded the prize for a black and white photograph for the front cover to Marcus Macoun whose effort appears on the front cover of this issue. He is $60.00 richer.

The last issue for this year, No 133, is to be a special edition on Cave and Karst Management. Its aim is to address issues that cavers and cave managers have in common and also to look at those that are not so, how can management can be improved and how cavers can play a part in that management process. That is, how can we resolve conflicts of interests whilst conserving what we have. I hope to have imput from the managers of caves in all states as well as farmers upon whose good will we so often rely for our recreation and work.
Clare Buswell.

WHAT'S ON:
TAS TROG 1993. Launceston Tasmania 4 - 8 Jan 1993. See this issue of Australian Caver for details.

August 23 - 30th 1992 RESCON 1992. International Cave Rescue Congress, Contact A.R. Wood, 1-10 Powell St, Pen-y-Cae Swansea, SA9 IGQ, UK.

Jan 25 - 27 1993. 4th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, Panama City Florida. Contact: Barry Beck, Flordia Sinkholes Res. Inst., Univ of Central Florida, Orlando. Fl 328116.

SEND REPORTS OF ALL CAVING ACCIDENTS AND INCIDENTS TO MIKE LAKE, CONVENOR ASF COMMISSION ON CAVE SAFETY
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WHAT'S IN A CODE 0F ETHICS ?

Canberra Speleological Society

The publication of the ASF Code of Ethics in the Australian Caver No 130 1992 set me to pondering just what is a code of ethics and what is it for? I had some vague moralistic sense of a code of ethics being adopted out of social, or in ASF's case, environmental responsibility. A code which defined the limits of acceptable human behaviour after weighing up its impact on others, or on the planet on which, for a comparatively short time we live. This was fine, but how did it affect only behaviour and how could a code of ethics influence the behaviour of others? Could a behaviour that I view as responsible today still be responsible tomorrow, or next year, or many years in the future?

I turned to my Oxford Dictionary for some definitions to help my understanding, but my search was less than successful. It defined ethics as the "science of, or treatise on morals; moral principles". This was pretty heavy going for your average caver who is simply intent on immersing himself, or herself, in mother earth at weekends. Nevertheless! there was a message here. Moreover, all were concerned with right or wrong and concerned with good or righteous character. If I subscribed to a code of ethics, Icould congratulate myself on adopting the high moral ground, that defensible position of justifying my actions in terms of avoiding those activities which I, and others about me, knew to be less than responsible or even harmful to society or to the environment in which we live.

After a little soul searching, it dawned on me that there was a relationship between a code of ethics and the evolution of knowledge of the consequences of your own actions. By illustration, it had once been fashionable to burn witches, but of late this has been frowned upon. A more back to earth analogy was that it was once acceptable to record your visit to a cave upon the walls. To primitive humankind this was accepted practice as evidenced by the beautiful frescos of Lascaux and, more recently, by the pencilled signatures on many Australian cave walls dating from earlier this century. We frown upon such practice today, but what has changed. The cave walls are still there, that primitive desire to record one's presence is still there, you only have to look at the graffiti on railway sidings, it is just that we now view graffiti as unacceptable, a lasting testimony to an individual's indiscretion and lack of responsible behaviour.

So it seems that our perception of acceptable behaviour evolves over time and as our knowledge of the consequences of our actions increases, so our recognition of what constitutes acceptable behaviour becomes more comprehensive. In short, our personal code of ethics becomes more comprehensive as we become better informed.

As you trace the evolution of codes of behaviour within societies, the general trend is one of greater sophistication built on expanding knowledge. When we seek to change a particular code of ethics therefore, we usually seek an improvement in coverage, a better yardstick upon which to judge our behaviour.

So it is with caving. There was a time when we did many things which no longer are acceptable. Even if you have not experienced the change yourself seeing is believing and most of us have seen those stars of early epic caving films stop for a well earned cigarette during their expedition underground. Water tracing using now unacceptable dyes, was an accepted means to an end aimed at furthering our knowledge of cave systems. Cave safety has also undergone something of a revolution, based I might add on bitter and hard won experience. A stringent code of ethics, therefore, has been instrumental in maintaining our caves in a relatively good state of preservation.

For cavers then, it seems that our code of ethics should be becoming more sophisticated. Our behaviour should increasingly be the model upon which the occasional underground adventurer refers to as a benchmark for his or her speleological activities. Each amendment to our code of ethics should build upon an earlier version nothing less than perfection should be our ambitious aim. Yet recent changes to the ASF Code of Ethics and Conservation seem to contradict this aim.

Take for example the issue of camping in caves. There was a time when not a second thought was given to the implications of camping underground. Over time ASF developed the view that camping in caves was unacceptable behaviour primarily because of the adverse effect on a cave system and, secondly, because there were very few examples where there was any justification for camping underground. It is worth noting that camping in caves within United States national parks is still stnctly prohibited. The huge cave systems of Mammoth and Flint Ridge have been explored thoroughly without the need to resort to camping in the caves since the 1950s.

Despite the wide acceptance of the adverse affects of camping in caves, changes to the ASF Code of Ethics adopted earlier this year have relaxed previously adopted behaviour by saying that "camping will not occur in a cave, unless absolutely necessary to achieve a specific speleological or conservation objective". The nature of such objectives may have been discussed at the time of adopting this code of behaviour, but unfortunately the record of such a discussion is not referred to in the Code of Ethics. The fact that a distinction is made between a speleological and a conservation objective gives rise to further concern. Afterall, should not a basis of conservation underlie our speleological objectives when it comes to camping in caves.

A further and possibly more fundamental area of concern with the newly adopted Code of Ethics is the use of

Cont'd page 4

LETTERS

Dear Editor,
When I met the ASF Code of Ethics many years ago, it was with a sense of delight in a positive and encouraging little document, so different from the traditional and restraining authoritarian legislation of that other very large organisaton to which I nevertherless choose to belong.

I believe the ASF code worked because it was a cavers' covenant or agreement, and though it has cost me some unpleasant remarks on the odd occasion when I have been unwilling to bypass a prefectly bypassable gate, I have generally managed to live quite comfortably with it.

However, I have recently found myself discussing my willingness to possibly bypass gates and authorities. I am also reluctant to publish information from a recent trip, lest it contribute to an area being nominated and possibly "closed".

I find this a most distrubing change in myself.

Moreover, I see the worst elements of my other very large organisation being reborn in speleology, particulary in the form of non-negotiable lockups.

I do hope that the lessons from much older organisations may prevent a repeat of ill conceived crusades by knights in speleological armoured chairs, for when men or women dare to claim the right of dictatorial administration and legislation, then the vitality of an agreed code will be lost, and an army of caring and trained speleologists replaced by laws with less potential for the protection of caves than the eunuchs of the Queen Candace.

Yours Faithfully,
Ken Boland.

What's in a Code of Ethics
Con't from p.3

explosives in caves. There was a time when the use of explosives, unilaterally, was acceptable behaviour simply because not enough people had thought of the consequences. We've given it more thought now. Is it sufficient justification to use explosives in a cave simply to satisfy our curiosity or to improve accessibility? What of the consequences? In opening up what is potentially a delicately balanced system by improving access and thus leading to increased visitation and possible degradation. Then there is the mechanical effects of actual primary damage to the cave and the possible impact of exhaust gases on the cave microclimate, to say nothing of the potential danger for the cavers involved or subsequent visitors to the cave.

Unfortunately, our newly adopted Code of Ethics lets us down badly here mostly due to the phraseology used and not, let us hope, through intent. It now seems that blasting in caves is discouraged "unless absolutely necessary, and then only with the permission of the landowner and/or management authority and the society committee, and only after an assessment of environmental impact." This may sound adequate enough until you realise that anyone may use explosives in a cave providing the landowner approves and the cavers have done their own assessment of environmental impact. This is hardly a formula for responsible cave management.

It is easy for us all to overlook the significance of our code of ethics. It is just a manifestation of what we regard that we already do. After all we are responsible cavers. If we look at a code of ethics at all, we see what we want to see and interpret the words as a reflection of our own behaviour which we believe is based on an informed knowledge of the subject. The truth is that if we do not take our code of ethics seriously, it quite easily become a listing of common practice, rather than of ideal practice.
Canberra Speleological Society

Dear Alan,
Herewith a reply to your letter in Australian Caver No. 130, concerning the ASF and ACKMA.

ACKMA had its origins in the ASF Commission on Cave Tourism and Management. This Commission held a number of conferences which were predominantly attended by managers rather than cavers. The sixth conference of the Commission was held in New Zealand and it was at this conference that ACKMA emerged as a separate organisation.

ACKMA was set up to meet the specific needs of cave managers and their staff, ie guides and associated park, conservation or reserves personnel. It was not set up to be a rival organisation of speleologists. The intention was and still is to my knowledge, that the two organisations would work together to improve the management of caves and karst in Australia. Both organisations make submissions to draft management plans and both organisations are involved in the collection and publication of data related to specific interests.

ACKMA still runs the conferences dealing with cave management and the ASF continues to run its Commission on Caveand Karst Management.

I do not know the cross membership figures of ASF/ACKMA. The ASF has a mailing list of around 800 individuals and clubs and ACKMA's is approximately 150.

Problems concerning the relationship between cavers and cave managers have always been present both before the setting up of ACKMA and after its inception. Both the ASF and ACKMA continue to work together to solve disputes that come under their juristiction.
Clare Buswell

CAVE RESCUE IN TASMANIA

Stuart Nicholas

Introduction

Up until a couple of years ago, practiced cave rescue capability in Tasmania was fairly minimal. A couple of members of the Tasmania Police search and rescue squad (in southern Tasmania) had some SRT capability, but only a little cave time. A few cavers had done some Sunday afternoon practice sessions on various local cliffs, rigging up Z-pulley haul systems and attempting to break their SRT rigs while removing some poor practice victim from a rope. A couple of real haul rescue jobs had been carried out within the club - in one instance the instructions for setting up haul systems were read and digested while driving to the incident site in the middle of the night!

Some large "state wide" but low tech. exercises had been held in the Mole Creek area (northern Tasmania) in previous years. Typically these involved stretcher carrying, some small hauling exercises and cave familiarity trips for the non-cavers. Some cave diving was also done on these weekends, together with stretcher floating in Wet Cave with the then popular Stokes Litter (basket litter) supported by tyre inner tubes!

Structural changes within Tasmania Police in recent years enabled some of the operatives in search and rescue to begin a quest for excellence in the S&R squad - not just in caving, but all their fields of endeavour (including all weather bush and mountain search and rescue, cliff rescue and helicopter usage).

A few Police practice days were spent on local cliffs with a couple of cavers, setting up SRT rigs and teaching them the gentle art of underground SRT. Much frustration and experimentation later, half a dozen or so Police had been allocated their own SRT and caving gear and had been underground a few times. Usually the easily accessed but very vertical Tassy Pot in the Florentine Valley was used as the practice site for the budding caving rescue squad members. While it was accessible, Ida Bay also received more than the occasional visit from the Police....!

Two members of the rescue squad did a number of cave trips, both with and without local cavers, to assess caves for further training of the squad members and possible full "exercises". Much experimentation with hauling systems was done, in conjunction with cavers, on local cliffs and in the Police S&R store - a building with a suitably high roof and plenty of steel work to tie ropes to.

1991 - The First Big Exercise

All this frenetic activity culminated in an exercise early in 1991 in Big Tree Pot at Ida Bay in which a patient in a sit harness was easily and rapidly hauled up the bottom (90m) pitch and the next couple of pitches (in a stretcher) before damage to the stretcher stopped the exercise. The stretcher was an American SKED sheet stretcher, but suffered from an eyelet popping problem, something that is not unknown for these units... Otherwise it worked reasonably satisfactorily. The major difficulty found was the lack of suitably strong tie-on points for other than simple vertical lifts. A short back-board would be most desirable (essential!) for horizontal lifts (ie the stretcher horizontal during a vertical lift). A counter weight hauling system was used with good results.

A mine communication system operating at 150kHz (VLF) was tested as well as VHF radios using a "leaky feeder" wire, plus the ubiquitous field telephone system. Only the telephone proved to be viable as a communications system. Further testing a few weeks later, in a different cave, of the mine communications system and the leaky feeder VHF system confirmed that they were not viable options for underground communications.

The exercise, together with all the training trips and experimentation was one as a combined effort between the Police and the cavers. All outdoor groups in Tasmania have excellent relations with Police search and rescue - each depends on the other when a real operation occurs and total co-operation and mutual respect for each other's abilities is the order of the day.

During 1991 a number of caving practice days were held, together with more experimentation and practice with various rope skills, hauling systems and so on. A major exercise was planned for early 1992.

THE 1992 CAVE RESCUE EXERCISE

The venue was tentatively chosen as Khazad-dum (JF4,5,14) in the Junee area near Maydena north west of Hobart. A preliminary "check-out" trip was carried out with two Police S&R members and three cavers. The cave was deemed to be ideal - a popular cave often visited by local and interstate cavers, relatively solid and safe, no risk of flooding in the top half, reasonable access and bolted with large Loxin eyebolts.

And so it came to pass - the weekend after Easter 1992 was chosen. Cavers (from northern and southern clubs), Police and bushwalkers (for sherpa support/gear carrying) were notified and the alarm clock set for 0500.

Personnel Exchange

The control protocol used was initially tested on the Big Tree Pot exercise a year ago. This involves partial and continuous exchange of people for the duration of the operation. Rather than working complete "shifts", say two people are exchanged after some few hours, then another two and so on. The people exchanged are nominated by the underground controller. There is a potential problem here in that some personnel are underground much longer than others. However, with short initial change-over times and taking into account the work that specific individuals are doing, none of the available personnel becomes overly tired. As a result, a second complete cycle (maybe even a third) can be done with the same personnel. From observation, it

CAVE RESCUE IN TASMANIA

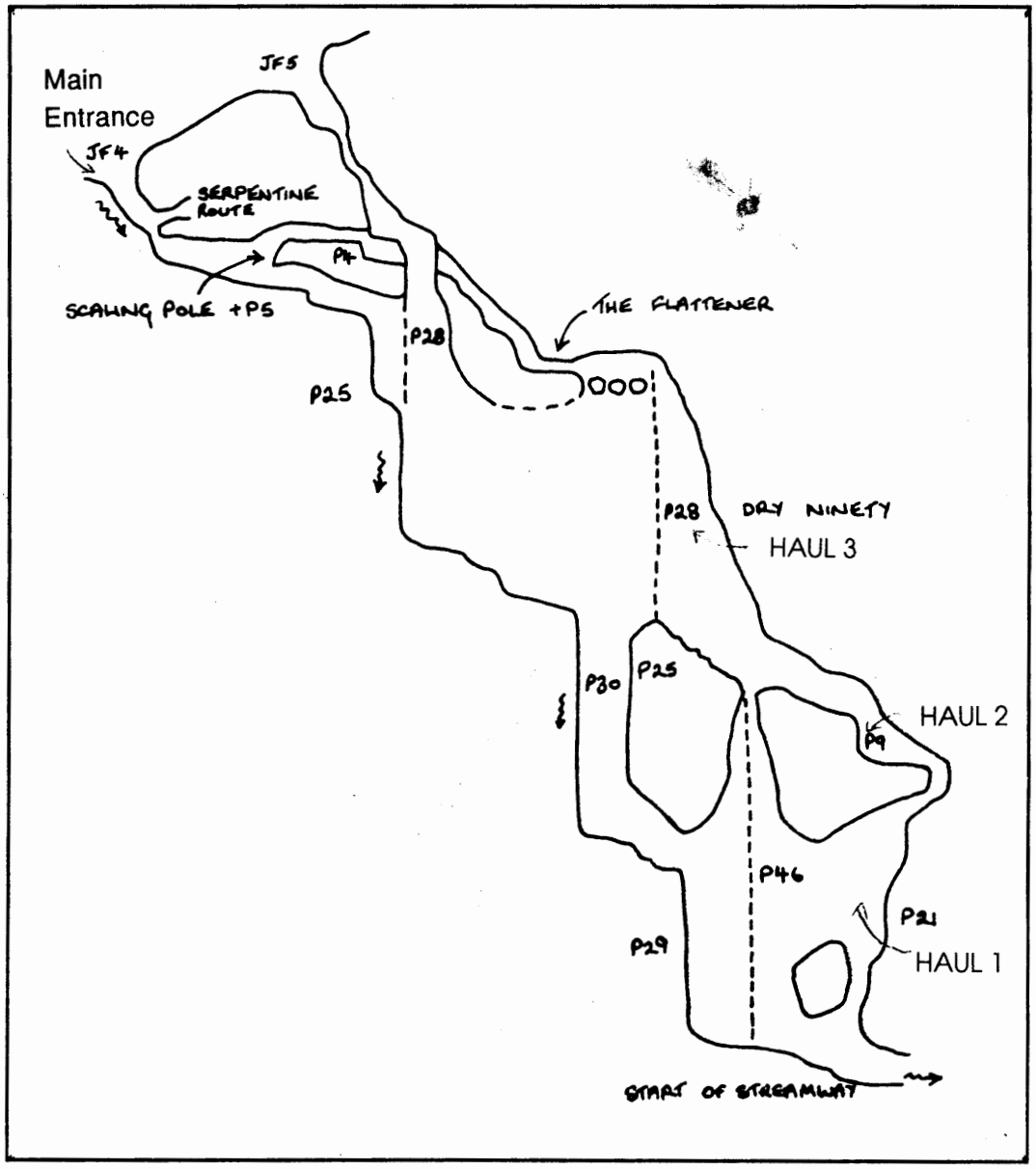
appears that a real operation could be continued over a period of 24 to 36 hours or more without anyone suffering great exhaustion andwithout input of fresh personnel. No doubt a major real operation would continue for much longer, but would be considerably safer using this method of personnel control rather than working a long shift and then exchanging the team complete. Good underground to surface communications is vital for control of this system.

Equipment and Set Up

The stretcher used in the KD Exercise was a Paraguard MkII rescue stretcher, made in England by RFD-GQ Ltd - the same company that manufactures life rafts and other marine safety equipment. For those not familiar with this device, it is basically a modern commercial version of the tried and true Neill-Robertson stretcher. A description of the stretcher follows at the end of the article.

The 1992 KD Exercise involved moving the patient/stretcher package (hereafter referred to as "the package") up three dry pitches over a total vertical range of about 125 metres and through some 170 metres of cave passage. The underground part of the exercise ran for about 10 hours. The patient, stretcher, bolting kit and other vertical tackle - ropes, spare ascenders, pulleys and so on were transported in during the initial couple of hours, sequenced to minimise delays.

A telephone line was laid during this set-up period. The line extended from the base outside the entrance to a point at the top of the innermost of the three pitches involved in the exercise. Six hundred metres of two conductor military



Khazad-Dum section: JF4 and JF5 entrances to start of streamway.
Diagrammatic sketch only, not to scale.

CAVE RESCUE IN TASMANIA

phone line was prepacked in a gear sack such that it could be pulled out without tangles. A pocket on the front of the pack holds the field telephone which is connected to the line to enable use at any time during line laying. (Another pack held at the Police store contains 1000 metres of the same line - plenty more is available.) Two people laid the line - one carrying the bag and paying out the line, the other following and tucking the line out of harm's way as much as possible. This proved to be a very efficient method with little time wasted. On pitches, the wire was hung a metre or two away from the rope.

The Exercise

Bolting of the first haul pitch took a little time, but a good set-up was achieved. To quieten the yelps coming from the green corner, the extra bolt placements are such that they will be of considerable benefit to future "normal" users of the cave (and of course, any future rescues!). The pitch is 21 metres high and is rigged such that it drops from the end of a 1 metre wide "floor-less" rift. No problems were encountered with the counter-weight haul system. Some difficulty was had getting the package from the top of the haul into a horizontal position and away from the pitch head - no surprises there!

The next haul pitch is only 9 metres, but poor rock did not allow good (ie high) bolt placements. A "temporary" haul system (using natural anchors!) was set up behind the pitch top to drag the package into the cave passage. Getting the package from this point to the base of the next and final pitch posed something of a dilemma. A short drop followed by a steep and awkward rock pile had to be negotiated. However, undaunted, the lateral thinkers came to the fore and a flying fox was set-up between the two points! The package was slung horizontally by the two end haul slings from a relatively taut rope, pulled by a haul rope and pushed by people positioned on the rock pile. What could have been hard work became almost easy!

THE SKED STRETCHER.

The top pitch hangs free and is 28 metres high. Again, the only difficulty was getting the patient package off the top of the haul. Brute strength is a wonderful thing in such circumstances! All that remained now was the negotiation of the entrance series. This section of KD is only short but, with a stretcher, fairly tortuous - less than 100 metres distance, but over 40 metres rise and containing rock-pile, short awkward climbs, streamway and a low flattener just for fun!

More people were summoned from the surface for this last grunt. Various "armstrong" model haul systems were set up, used and moved to the next point. A couple of hours later the "package" was on the surface above the entrance of Khazad-dum! The finale to a brilliantly successful cave rescue exercise.

THE STRETCHERS

The SKED stretcher

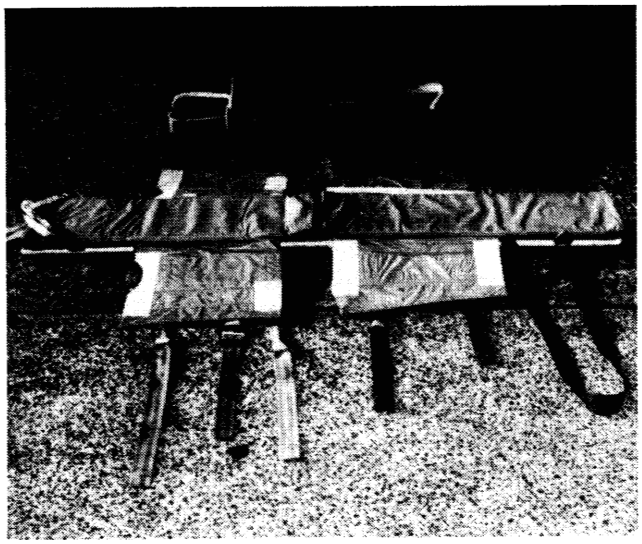
The SKED is a simple oversized "body/coffin shaped" piece of flexiblepolyethylene about 5mm thick. It is manufactured by Skedco, Inc. in the USA. Basically it is an improved commercial version of a drag sheet. The patient is restrained by rolling the ends over the feet and top of the head. The sheet is sufficiently wide to enable the sides to be rolled right over the patient, ie overlapped, and straps used for positive restraint. Eyelets exist at frequent intervals around the edge, but as noted above, they tend to pop out under load. Vertical hauls are facilitated by the provision of haul spider straps and suitable attachment points on the stretcher. Horizontal lifts are not easily achieved owing to its flexibility and the eyelet popping problem. The material itself is immensely strong and does not seem to tear. No patient padding is provided with the SKED. As a result, "cold spots" are very noticeable and considerable padding and insulation is needed for cave use. For transport, the unit rolls up and is stuffed into a (tight-fitting) cylindrical bag. Appropriate carrying straps and so on are attached to the bag.

The PARAGUARD MKII Stretcher

It comprises two parallel aluminium tubes about 250 mm apart, separated by padded frame members on which the patient lies. Attached to the sides are thin semi-rigid segmented panels and heavy synthetic material that wrap around the patient. Four body straps - two for the legs and two for the upper body - and a foot strap system are incorporated to restrain the patient. The original buckles have been replaced by D-rings on the unit used for this exercise. A head restraint strap system is also present. The aluminium frame tubes are each in two pieces with a sliding lockable sleeve to join them - this can be removed (with some difficulty) to enable the stretcher/patient package to be bent in the middle if needs be. Substantial lifting straps and eyes exist at each end of the unit and a sling system is provided to enable horizontal lifts to be done. Two rope handles on either side are provided for carrying the package. Unlike the SKED, the patient's arms may be inside or

CAVE RESCUE IN TASMANIA

outside the restraint panels when the patient is strapped in.



THE PARAGUARD MK11 STRETCHER

For transport to the accident site, the stretcher is packed in a fairly compact carry bag, complete with shoulder straps, but, in the original, lacking haul loops. The bag will be modified shortly.

The Paraguard stretcher survived the 1992 exercise without damage. The SKED stretcher used in the 1991 exercise did sustain some damage (eyelet popping, deep scratches), despite the cave having little in the way of horizontal grovely bits. Certainly, the Paraguard is the best unit used so far in an underground exercise. Minor modifications are needed. In particular, some modification of the exposed tube ends to reduce snagging during hauling, vertical and otherwise, is needed. Carry straps/handles on the ends (as well as the existing haul straps) would be convenient for handling in narrow passage where access to the side handles is restricted. As noted above, the patient strap buckles have already been changed to more functional D-rings.

Safety

At all times, safety was paramount - all pitches and hauls had the package and the counterweight person belayed separately. One person at the patient site acted as safety officer and had the authority to stop or modify the exercise should it have been necessary for safety reasons. The patient was continually monitored.

Hauling

All the vertical hauls were carried out with a counterweight haul system, using a pulley on the anchor bolt krab and an inverted ascender as safety blocking device. The counterweight person prusiked a short distance on the rope from the package via the pulley, then pulled up on the package rope to lower themselves and raise the patient package. This is a relatively easy method of raising a patient. During hauling, another person prusiked beside the patient on a separate rope. That person was responsible for upkeep of patient morale, steering the stretcher package and controlling the haul.

The counterweight system requires minimal extra gear or knowledge to set up and can be simply done with only one person needed. A heavy patient and light counterweight person may pose a problem, but additional help from someone at the bottom of the pitch makes it easy. Surface experimentation has enabled us to get a patient past a rebelay with this system, only requiring the patient to unclip one krab.

Normally, for maximum safety, at least four ropes are needed per pitch - one haul rope, two belay ropes and one prusik rope, plus rigging gear and so on. The belay on the person prusiking beside the package could be deleted without much compromise of safety. This would leave three ropes per pitch. A separate rigging team would normally be directed to set up the pitches in advance of the patient package and haul team arriving. The quantity of gear actually needed for a real operation would not be that great as a lot of it could be passed up through the patient site to the rigging team above. Tight control and record keeping would facilitate that process.

THE PARAGUARD STRETCHER WITH PATIENT STRAPPED IN.

Personnel Control

At no time were more than eight rescue people at the patient site. Interchange of personnel, as noted earlier, was carried out during slack periods. Given that we now have a good handle on times needed for various operations, the personnel interchange could be carried out without interuption to the operation or causing traffic jams on pitches and so on. People were not allowed to congregate at the cave entrance - the road base camp (with unlimited cups of tea and other luxuries) was only twenty minutes or so walk from the entrance.

A log sheet was kept at the cave entrance to keep tabs on

CAVE RESCUE IN TASMANIA

underground times for all personnel involved. Communications were maintained by phone from the patient site to the cave entrance, from the cave entrance to the road base camp by Police VHF hand held radios and, if needed, from the road to Hobart Police HQ by radio.

Three control points were in operation - one at the road where "spare" personnel were stationed, one at the cave entrance (a caver who knew most of the cavers involved) and one at the patient site. In most above ground rescue operations only two control posts are established in the field - one at the base camp/road and one at the search site or field search camp.

Patient notes

The ever patient patient had few complaints - the only real problem was aching knees owing to his legs being pushed straight by the stretcher patient restraints. Some heavy foam or other padding behind the knees would solve that problem - injuries allowing, of course. For the exercise, the patient's arms were outside the stretcher and this proved to be worthwhile - the patient was able to steer himself to some extent and it made him feel far less helpless.

The Paraguard stretcher is probably warmer than the SKED owing to its softer construction and hence fewer hard pressure points and heat sinks. The narrow base width of the Paraguard made it less stable than others when carrying and when sitting on the floor, but a "patient supervisor" would minimise rollover problems. The head/helmet restraint worked very well, too well in fact! During the first haul, the patient slipped a little (unavoidable as he is only restrained vertically by a figure-eight strap around his boots). Our patient indicated that there was some risk of asphyxiation by the helmet strap as the helmet was held by the head restraint system!

Very necessary is a face shield to stop dirt and stones from burying themselves in the patient's face and eyes - even a face cloth and industrial goggles would be sufficient. Goggles for any haul controller at the bottom of the pitch are also necessary so that she/he can look up with less risk of a visit to her/his ophthalmologist.

Concluding Remarks

Practice sessions (evenings, practice days and so on) continue, involving both cavers and Police. We hope to never need the expertise gained from these sessions.
For further information on hauling, command and control, cave rescue techniques and so on, see the (incomplete) reference list following this article.

I would like to thank all the twenty two or so people involved in this latest exercise - Police and cavers - and everyone involved in the past practice sessions for their enthusiasm, perseverance and patience. Exercises do not have the excitement or drama of a real operation and can be a real bore. However, this one was totally successful owing to the input and energy of all those who lost sleep, gave up their Saturday and Saturday night and apparently enjoyed themselves!

Stuart Nicholas
TCC, Inc. - S&R Coordinator

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CONSERVATION ISSUES AT MOLE CREEK

D. Hunter

The Mole Creek Caving Club was an inevitable development in one of the country's premier caving areas. The number of local cavers has grown in recent years leading to a need to get organised in our own right. Besides regular meetings and caving days, the group is working on conservation issues and is becoming involved in Police Search and Rescue to develop a locally based cave rescue team.

Four years ago, a group of the local cavers discovered in the Dog's Head "hum" (Kiernam, 1984) a rare form of calcified mosses now identified as phototropic phytospeleothems (Lichon, 1992). Other discoveries have been made. For an area of such high know density of caverns, it may seen hard to believe discoveries are still occuring.

A higher profile is needed for the karst values of the area. There are serious problems with land management (agricultural and forestry). The Council runs a Municipal tip in a series of sinkholes and the advent of a chlorine bleach pulp mill in northern Tasmania would double the demand for industrial lime and threaten the forested catchments of the karst, the Great Western Tiers. The Tiers dominate the skyline of much of northern Tasmania, their escarpments looming nearly 1,000m above the Mole Creek valley floor.

Campaigns for better forest management practices and reserve proposals on the Great Western Tiers began in 1972 and now, as then, the campaign for the conservation of the Tiers's forests is very much locally based, although supported by other organisations such as The Wilderness Society.

The Mole Creek Caving Club is represented in the Great Western Tiers National Park Campaign. Of all the pressing conservation issues facing the Mole Creek karst, forestry for wood chips is the biggest. Karst values are a major thrust of the Campaign.

The National Park Proposal was released in January 1990, (The Western Tiers Interest Group et. al, 1990) and was developed in the absence of Government action on reserve proposals including those of Kevin Kiernan (Kiernan 1984, 1989) and calls for better forestry management practices. The crosscut saws, horses, and bullocks which extracted high grade sawlogs have been replaced by clearfell techniques and cable logging on steep slopes.

The proposal addresses the vulnerability of the karst and its fauna, speleothems, hydrology, recreational and scientific values.

Material produced by the Campaign out of the Deloraine Environment Centre includes, a widely travelled slide show to expert commentary, containing a significant proportion of Mole Creek cave shots, a VHS video rendition on the slide show and a series of 4 postcards including a cave card. The campaing is reviewing the Proposal and action plans in the light of a new Liberal Government. The issue will be present at TAS TROG'93.

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Are you or your club working a project of any sort?
Collecting water or soil samples, surveying the catchment area of Little Big Cave, fencing around a cave to keep the rabbits out, or just trying to get data published?

The ASF is compiling a list of speleological projects and who is undertaking them. The list is to form the basis of funding applications so that the ASF can help your club get a project up and running or completed. The information required is as follows:

Detailed description of the project:
How long has the project been going and the expected date of completion:
Who is organising it and how many people are involved:
What institutions, such as Universties, Gov't departments, are involved with it.
Has the project received any funding and if so from what sources, e.g., NPWS, Australian Research Council Grants?
Please send the above information to
Clare Buswell, C/- Politics Dep't, Flinders University. S.A. 5042
Ph: (08) 388 6685.

INTRODUCTION

The caver Impacts Forum started under the working title of "Human Impacts", but we were not about to deal with such niceties, for example as the impact of mining on caves. Whilst mining impacts, such as at Mt Etna, can be spectacular, we realized that the greatest damage to caves is by cavers themselves.

The Forum started with a one day event organized jointly by the NSW Speleological Council (NSWSC) and the Australasian Cave and Karst Management Association (ACKMA), and was staged at Sydney University on Saturday, 22 June 1991.

Four speakers gave papers which were intended to give participants food for thought for when they took part in the workshops later in the day. The Forum was not intended to end there. Nor does publication of these papers complete the work of the Forum.

Only a few representatives from each of the many clubs attended the Forum. The ideas was for them to take these ideas back to their clubs as the basis for the clubs to organize their own field workshops and general discussion amongst club members. That beginning has lost some of its impetus, so the publication of these papers is perhaps timely. It is intended to stimulate continuation of the Forum to deal with all aspects of the impacts our caving activities produce. A further speech by our Guest Speaker, the Hon. Tim Moore, NSW Minister of the Environment, was given on the day. This speech concerned the Minister's proposed legislation, (since enacted) to facilitate Karst Conservation Reserves and Karst Wilderness Areas. What is unusual about this legislation is that it facilitates the creation of an underground reserve without the absolute need for the government to purchase all of the surface land above.

When you read these papers, we suggest you take a pen and paper and make a few notes as you go. We want your responses, some of which we envisage can be published in "Australian Caver". We need your feed back to help plan the future direction of the Forum.

Please give us your thoughts, no matter how brief, on any aspect of caving and its impacts on caves, karst and karst areas. In particular, we're looking for suggestions on how to monitor, manage repair, reduce or eliminate the damage due to caving activities. Please forward your comments to: Terry Coleborn, 3 Lavender Place, Wagga Wagga. NSW. 2650

Caves are there for all to enjoy, so this Caver Impacts Forum is an open forum and not restricted to members of the speleo fraternity only.

Looking forward to hearing from you.

Chris Dunne and Terry Coleborn

CAVER IMPACTS FORUM

DO CAVERS HAVE AN IMPACT?

Andy Spate and Elery Hamilton-Smith

Introduction

We have long held the view that caves, their contents and values are more a threat from cavers and their activities than they are from the activities of quarry operators and other users, or abusers, of karst areas (Hamilton-Smith 1962, Spate 1973). Of course, when there are impacts from non-caver users, then they may well be more extreme, as in, for example, the dumping of sheep in both Three Sisters Cave and Earls Cave in the Mount Gambier region, logging in Junee-Florentine and the appalling destruction at Mount Etna, amongst other examples, but these each affected only a limited number of caves rather than the thousands damaged by cavers.

The activities of cavers have produced widespread impacts from Tasmania to the Kimberleys and from south-western Western Australia to Chillagoe. Unfortunately these impacts are not well documented - and it is not easy to quantify and subsequently document them. It is easy to say that the responsible and properly organised cavers, that is, those who belong to speleological societies or caving clubs, have minimal impacts and that the problems we see arise from other users. But, this is simply not true. Probably more importantly, it is usually the dissemination of information about caves from these organisations or their members which leads to wider public interest in caves. This quickening of interest of the wider community may not be deliberate but it does occur in spite of the stated conservative policies of caving clubs.

We consider here the activities of all cave visitors - researchers with universities and government departments, cave area managers and other staff, speleological societies and their members, scout and other youth groups, and casual cavers such as family groups, and other cave visitors who cannot easily be classified. Although the last are often considered by organised speleologists to be a 'yobbo' element, our experience suggests many of them have a better attitude to cave conservation than many of the more identifiable users.

The one group we exclude are those visiting conventional tourist caves; this is because these caves have been hardened against visitor impacts; in other words, management impacts replace visitor impacts and that is a different question - even if the impacts have been severe. Even this definition causes problems by truncating the spectrum of cave users and the dividing lines between conventional tourism, adventure caving and 'wild' caving are fuzzy indeed.

There is a truism (from Tom Aley's famous 1975 paper "Caves, Cows and Carrying Capacity") that has been increasingly re-iterated by Australasian cave managers in recent years - 'caves have a zero carrying capacity'. Whilst this is not entirely true, for most practical purposes it is so and the re-working of the ASF motto by SRGWA into "What we have now is less than we had yesterday" (Poulter 1991) is entirely apposite.

IMPACTS OF CAVE USE

As we have noted above we are confining our attention here to the end of the user spectrum away from cave tourism and formal adventure caving. It is very surprising (considering the various ethical codes, do and don'ts lists and the acceptance by many, if not all cavers, that caving does affect the cave) that there has not been more objective discussion, measurement or monitoring of what these supposed impacts might be. We have surveyed a great deal of the Australian, United States and British cave literature as well as some of that from other countries and found very little other than the 'motherhood' type of statement above.

Authors such as Robert Stitt (1977) in the United States have produced tabulations of internally and externally derived inputs on caves; Tom Aley (cited in Everson et al 1987) has systematically surveyed some Missouri caves to elucidate recreational impacts; Frances Gamble (1981) discusses caver impact in South Africa and Raymond Tercafs (1988) describes impacts of cave use on subterranean faunas across Belgium. Reider (1976) discusses caver impacts and carrying capacity, and Kiernan (1988) provides some Australian perspective in his excellent small book of karst management issues.

Interestingly the papers by Gamble and Tercafs are in 'proper' international scientific journals, subject to refereeing and with wide circulation. Stitt's paper claims that Max Nicholson (1970) "was the first outside the caving community to delineate the effects of sport caving". Whether this is so or not is probably open to debate.

A Unique Environment

Before turning to our consideration of impacts it is probably worthwhile to consider what it is that makes up a cave environment and what makes it different from above-ground situations. Firstly, we have no short wave-length radiation - no visible light nor infra-red. Therefore energy sources to support life must be derived from material washed or carried in from outside or from very low energy chemical reactions such as the oxidation of iron and similar chemical species. The absence of light of course means no photosynthesis and ecosystems must therefore be based on a narrower base than we are used to on the surface.

Secondly, the cave and speleothem development processes rely upon a flow of water and carbon dioxide from the atmosphere, through the soil and rock and thence to the cave. Maintenance of an adequate soil and vegetative cover is needed to maintain the cycle of water and carbon dioxide through the system. The atmosphere contains about 0.03%

* Andy Spate - NSW National Parks & Wildlife Service, PO Box 733, Queanbeyan, NSW 2620; Vice-President, Australasian Cave & Karst Management Association; Elery Hamilton-Smith - Dept of Leisure Studies, Phillip Institute of Technology, Bundoora, VIC 3083; Executive Officer, ACKMA.

DO CAVERS HAVE AN IMPACT?

carbon dioxide, soils up to about 10% (for the very best soils in the very best climates!) but more usually around 1-3%. Cave atmospheres - at least the ones humans get into - tend toward equilibrium with the outside atmosphere but their confined nature and the constant degassing of dripping and flowing waters means that their carbon dioxide content is commonly greater than atmospheric and up to around 0.5% - although of course much more highly enriched caves are well known in New South Wales.

Thirdly, the cave climates tend to be isolated from the outside world - although again there are many exceptions and the range of degrees of isolation produce a wide array of specific environments. Caves tend to be at the mean annual temperature of the rock mass that encloses them (remember the volume of rock is usually much, much greater than the volume of cave). This temperature is usually close to the mean annual temperature of the area in which the caves lie and in most of our caves the temperature range will only be a degree or less once away from the entrance - the range is often less than the accuracy of our thermometers! There is normally a plenitude of water vapour in the air and the relative humidity will tend toward 100% - saturation. Again the accuracy of water vapour measurement required exceeds the specifications of our instruments.

The physical characteristics of cave contents - speleothems, sediments, fossils and so on as well as archaeological materials and cave biota (simple plants and more complex animals) living in caves will have been produced by, and in equilibrium with, these various relatively unchanging environmental characteristics. Lack of variation means that systems are not well able to cope with greater change than they are 'used to'.

Often it is the very unchanging or at least buffered cave environment which permits the preservation of sediments, fossils, bones and speleothems. We could liken caves to a refrigerator - things won't keep forever inside but they do keep a hell of a lot better if we don't leave the door open or modify the system environment be turning the power off.

Fourthly, the conditions under which many cave sediments are emplaced are often 'quieter' than surface environments and their densities may be low or they may be delicately stratified so that disturbances such as trampling may markedly damage the characteristics of the site. This is particularly so of airborne deposits and bones in owl roosts.

One way of looking at this is to recognise that they typical cave is essentially an extremely low energy environment - it is for all essential purposes over the short term a homeostatic one with little energy input. So, even the entry of one person with their own body temperature, movement and usually at least one source of light constitutes a major change in the energy regime. This will have little or no impact upon the bedrock, but a major impact upon micro-climate and hence a potentially major one on various of the cave contents.

Direct and Indirect Physical Impacts

We can consider user impacts on caves and their contents in two ways. Direct physical impacts such as compaction, breakage, sampling and disturbance to bats are widespread and usually comparatively obvious. The indirect effects of environmental modification may not be so obvious and may have very far-reaching effects. The essentially non-renewable nature of most cave resources means that few impacts are reversible through the application of time or technology. Some impacts may be reversible - for example we could block up a dig - but the results of that original modification may have led to irretrievable damage if, say, a colony of bats had left the cave because of climate change and had been unable to find an alternative site.

Stitt (1977) points out that increasing the numbers of people using caves may combine in three ways. Cumulative effects are those where the impacts simply add together; synergistic effects are those where two or more effects combine and produce an effect greater than would be expected if the two had occurred independently. Where an impact has no influence on the effects of other actions it is said to be independent. All three of these types will be occurring throughout a cave visit. We tend to forget that synergistic effects (ie. multipliers, snow-balling, positive feedbacks) do occur in non-mechanistic systems. This is especially true of compaction and liquefaction and other types of sediment disturbance and probably of much else. Stitt then argues that the 'impact of a party of ten is more than twice that of a party of five' - we cannot help but agree.

As many natural materials possess some 'elasticity' of some of their properties smaller parties are better than large even if the total numbers of passes is as high or higher. Whether this is evenly partly true of cave ecosystems is a matter for conjecture although it can be demonstrated for relatively simple agricultural systems and for sand dune communities. Casual observation, but by many observers, seems to indicate that the earliest visits to new caves will rapidly reduce the abundance and diversity of cave invertebrates. That is, there appears to be a threshold of disturbance which is soon reached - and then the community collapses.

Dave Gillieson (pers comm) cites the Russenden Cave at Texas, Queensland, as an example. This cave when first discovered had a flat, silt floor rich in organic material 10-15 cm deep. The first trip numbered five, the second 12 and after about six trips the total visitor numbers had reached about 100. Elery Hamilton-Smith collected a rich invertebrate fauna. By the sixth trip the fauna was demonstrably impoverished, water flow had been channelised and the low density silt had been compacted over large areas. This sort of story seems common over large areas with Byaduk Caves, in the lavas of Western Victoria being another 'good' example.

DO CAVERS HAVE AN IMPACT?

Direct impacts of use

These impacts are produced by direct physical processes and may affect physical, archaeological and biological attributes of the cave environment.

Although most cavers have respected the integrity of speleothem decoration, there are the exceptions. We are all familiar with caves which have been almost totally stripped of decoration. Scotts Cave and Baldocks Caves at Mole Creek, Honeycomb Cave at Murrindal, and Cotter Cave near Canberra are good examples. The first two of these were formerly show caves and are the worst Australian examples of the phenomenon, also noted in the United States (Russell Gurnee, pers comm), that the worst vandalised caves are abandoned show caves.

It is quite remarkable to look at the photographs of these caves taken at the turn of the century by Stephen Spurling III and recognise the former aesthetic qualities of these caves, including probably some of the finest examples of conulites (Hill and Forti 1986:30-31) seen in Australia. Another example of the destruction of conulites in Australia is at Dalleys Cave, Murrindal, where although less spectacular, the occurrence there was one of the largest and most complex yet known - now trampled into total extinction.

Honeycomb Cave is also an interesting example, in that it was first discovered and its value recognised in 1907 (Hamilton-Smith 1991a). It was concealed from view at that time and only rediscovered by the current generation of cavers in 1960. Sadly, its beauty then lasted less than a year.

Pool crystals were deliberately removed from Punchbowl Cave, Wee Jasper, in the late fifties or early sixties for placement in a museum so that at least some of the material would survive trampling (Jennings 1964). Whether the removal triggered less respect for the site is unknown - but this is possible.

The 'rock-hound' type caver is a particular problem. Examples which come to mind in Australia include those apprehended by a landholder after taking a sackfull of speleothems from a cave at East Buchan; those responsible for extensive quarrying of pool crystal (which later appeared on the retail minerals circuit) from Federal Cave at Buchan and the individual who tried to market fossils from Victoria Fossil Cave, Naracoorte (but was blocked simply because one of us looked in the window of a mineral shop and recognised the material). But think of all of us cavers who have one or more pieces hidden away or sitting on their mantleshelf.

The very acts of movement on feet, hands, knees or prone bodies crawling can markedly change calcite or other mineral speleothems on cave floors, walls and ceilings. Examples of the destruction of micro-gours can be seen throughout NSW. More commonly, and frequently of less apparent concern to users, are clastic (clay, sand and silt deposits, ie. 'mud') deposits. These may be compacted, liquefied, eroded after disturbance or transported to other places. Often quite beautiful and delicate structures - notwithstanding any scientific values in addition to their aesthetics - may be destroyed. Transport and compaction may lead to the dimpled, 'brain-surface' pathways common in many heavily used areas.

Sometimes transport from elsewhere in the cave can lead to the development of a compacted pathway on which the surface actually builds up. One such pathway, in Signature Cave, Wee Jasper, has built up by about two centimetres in the last four years by this process.

The impact of feet and bodies are not necessarily confined to unconsolidated sediments. Many a weta or other invertebrate has perished underfoot. The changed physical state of the substrate may also preclude its use by burrowing species. A good example of the latter has occurred at Mount Widderin Cave, Skipton. Hamilton-Smith (1968) recorded an important invertebrate community living on the loosely consolidated floors of this cave. This community provided a virtually unique opportunity for long-term research. However, the landholder concerned has encouraged (for a small fee) indiscriminate and unmanaged wild caving at this site. When last visited by one of us, the floor was trampled to a virtually polished surface; no fauna at all was seen.

Mud transfer from sediment areas to clean surfaces and to stalactites and stalagmites is an on-going problem and together with speleothem breakage is the most obvious and intractable sign of degradation. It is, of course, a difficult issue as caves are alternately clean and 'dirty', and the changing of overalls every five minutes is never going to be popular! However, simple precautions like using the back of one's hand for balance if it is needed can markedly remove the problem. Speleothem breakage can be accidental or deliberate but today's cavers probably break very little deliberately. However on popular routes and in confined spaces damage can be on-going.

Anemone Cave at Wee Jasper provides an example of almost wanton destruction of a beautiful speleothem by mud transfer and stalactite breakage. There are two routes through this tiny cave. One lies through the 'Anemone' itself - a perfectly round hole fringed with white calcite stalactites - the other by an unexciting low ramp. The Anemone is all but destroyed and is caked with brown mud.

In most heavily used caves as well as many highly protected and little used caves one can find evidence of highly inappropriate behaviour - that of mud fights. This as a cave damaging pastime appears to have persisted where other forms of vandalism such as littering have markedly declined. Is it something primeval in being dirty and having a plentiful supply of ammunition ready to hand?

DO CAVERS HAVE AN IMPACT?

Erosion of unconsolidated materials and polishing of limestone by moving bodies can be seen in many cave areas. At Bungonia and Wee Jasper, for example, polishing has become so pronounced that in caves such as the Grill and Punchbowl slopes that could once be easily climbed are now difficult - if not dangerous. In Dog Leg Cave erosion and reworking of the stream bed has very markedly changed the course of the creek. This, coupled with the positive delight many visitors get out of wallowing in the pools, does not appear to have unduly inconvenienced the invertebrates found in this cave in spite of Andy Spate's concerns of 15 years ago. These unique Gondwanaland species must be remarkably resilient to have survived the impacts of probably thousands of visitors.

Here we have the ambiguity of a population, which one would expect to be particularly vulnerable, surviving considerable disturbance. However, one cannot generalise from this. In the first place, the cave has an active, if non-perennial stream - it is a much higher energy environment than most caves to begin with. Secondly, the changes which result from disturbance are probably within the range of the normal variation on the stream environment - changes in temperature, sediment load and nutritive content. One could only fear the result of other changes which might have occurred had a cigarette butt or a spill of battery acid polluted the pool - both of these will produce changes considerably outside the normal parameters.

Erosion of surface soils around entrances and entrance facies themselves is particularly marked in many areas. Large volumes of material moved into caves not formerly receiving such slugs of sediment is undesirable.

Changes in vegetation over caves consequent upon recreational activities are not known to have produced underground changes in Australia although cavers have been implicated in unnecessary vegetation destruction in some areas (see, for example, Anon 1987). Other examples include gathering wood for campfires in the aridity of the Flinders Ranges, the chopping down of a rainforest remnant species at Murrindal simply for greater ease of access, and the degradation of the doline at Corra-lynn Cave, Curramulka over the 1954-60 period. Destruction of vegetation around entrances may have led to accelerated erosion on those sites. However, the formalisation of camping and access at Bungonia, for example, has allowed remarkable recovery of the understory in that area which has certainly improved the aesthetics of the area if nothing else.

Digging has had a direct effect on many Australian caves and it would be interesting to catalogue the various efforts to see how much new cave has been revealed. At Yarrangobilly and Bungonia stratified sediments containing sub-fossil bones have been destroyed. Elsewhere digs have produced indirect effects - these will be discussed below.

Direct disturbance of bat populations by cavers (and bat researchers) has lead to dramatic changes in their distributions and reductions in their populations. We must plead 'mea culpa' and state that we conducted research into bent-winged and horseshoe bats in eastern Victoria in the 1960s and may have contributed to the species decline in the latter species. On noticing that decline we changed our practices and there now seems to have been an upsurge in the species numbers and a re-occupation of abandoned roost sites (Hamilton-Smith 1970).

Mohr (1975) asks the question "...Does caving disturb bats?". He goes on to point out a number of ways in which cavers interfere with roosting bats and quotes rates at which disturbed bats loss their fat reserves through the winter months.

Sluiter and Van Heerdt (1957, 1964) record their long-term observations of bat populations in the southern Netherlands, and demonstrate how a continuing decline in population was reversed by cessation of population disturbance.

Cave bat numbers seem to be increasing again in eastern Australia but they are still very vulnerable to direct interference (Hamilton-Smith 1991b). In the past our major concerns were for the sanctity of the maternity sites so important to the populations in the summer months. The overwintering sites such as Thermocline Cave at Marble Arch are also critically important for the life cycle of these, and other, species and should be avoided if possible (Hall 1982).

The actions of managers, be they well-intentioned cavers or the paid kind, often exert direct impacts on cave environments in an effort to improve some deleterious situation. Very many gates have been installed over the years with very little thought on how they might limit bat movements and nutrient flows and completely change cave environments. Webb (1984) presents a particularly good account of how a cave was much modified by the heavy hand of management.

During the work that Andy Spate carried out with others in 1991 on the resources of Kubla Khan in Tasmania it became obvious that a gate, with a low sill, installed by cavers had halted the flow of leaf litter and other material to the waiting jaws of the invertebrates below. How significant this effect is we do not know. It may be that the balance is a least partly redressed in this instance by the material actually carried into the cave on boots, clothing and SRT gear.

Williams (1975) first drew attention to the role of an artificial barrier across the streamway at Waitomo Caves, New Zealand, in causing a massive decline in the famous glow-worm population. This has since been dealt with, but continued monitoring has periodically revealed damaging impacts of other minor well-intentioned actions.

DO CAVERS HAVE AN IMPACT?

Removal of gates and walls at Jenolan has permitted bats to return to previously abandoned roosts in the north-side tourist caves (Ernst Holland, pers comm). Similarly modification of the gate on Cotter Cave, near Canberra, has allowed bats to return to their former home. [It is will known that bats exhibit considerable philopatry ('love of home') - do they constantly explore their environment or is there some 'racial memory' drawing them back to their former homes?]

Indirect impacts of use

As indirect impacts are frequently subtle and of long duration the effects may be correspondingly subtle and long-term. Often systems, particularly biological systems, show threshold effects when perturbed. That is, the disturbance can continue for some time before the system shows signs that it is in trouble. Often the system collapses catastrophically and irretrievably.

Some indirect impacts may be deliberate, for example changing water or airflows through digging. The use of explosives, which has been all too common in Australian caving practice, normally leaves a residue of oxides of nitrogen - the impact of these upon invertebrate populations could be disastrous. Indirect impacts may also be accidental as in the introduction of nutrient sources such as chocolate flakes from Mars Bars!

The impact of underground camping or other massive assaults on the energy system is even more extreme (Poulson 1977). Cigarette butts or ash and spent carbide or dry cells are all magnificent sources of insecticides - quite apart from the aesthetic impacts of bad caving practice.

Having brought up the subject of food we will continue in this sphere. Cave ecosystems, by their very evolution, are stable but fragile, given that the various organisms are adapted to a fairly unchanging set of conditions. Ecosystems with low biomass and species diversity are particularly sensitive to perturbation and additions to the naturally occurring food source can have very large effects on the system (McReynolds 1975). Although we say cave ecosystems are relatively stable, McReynolds points out that they are in "....a tenuous balance that teeters on the brink of doom".

Poulson and Kane (1990) have demonstrated how the introduction of a new food type (horse manure!) changed a deep cave community quite dramatically. Local specialist species were repelled, new species were attracted into the site and previously rare species became dominant at the expense of others. As a result, a whole new community developed. Glenn Campbell, in his PhD work at Sydney University, discovered that many food scraps were being utilised by cave animals.

May (1971) collected nine species of fungi from North Island, New Zealand, caves. Two of these were growing 'on remains of bread mixed with mud'. [Kiwi cavers obviously don't eat Mars Bars!] During the Kubla Khan work referred to above three of us sat on the sand bank above where the River Alph sinks and consumed our lunch - three battered Mars Bars. Although we were not aware of having dropped any fragments at all, within a few days it became apparent that we has done so. Tiny pieces of the chocolate 'skins' had fallen onto the siltbank - fungi grew upon the chocolate and various species came to feast on the fungi and each other. Whether this had a long term effect in this environment is unlikely but the 'Paradox of Enrichment' is a very real peril for the stability of cave animal communities.

Cavers are a potential effective force for the introduction of plants and animals from one cave or area to another. How many of us launder our overalls and clean our boots between trips much less than between caves. It is clear that we may be transporting only highly cryptic species but nonetheless it is probably occurring. Derek Ford suggested to Andy Spate that the bacteria which may or may not be involved in 'mondmilch' (moonmilk) production are prime candidates for transport and infection of another cave. He went so far as to suggest that this may have happened to Jillabenan Cave at Yarrangobilly.

From time to time one hears suggestions that we could transplant animals or re-populate depauperate caves. Vandel (1965) warns against such propositions and a moment's reflection will suggest some of the dangers that may arise. He cites some examples of taxonomic confusion brought about by transplants, but Australian cavers would probably be more convinced by the example of the rabbit, the cane toad and prickly pear.

Changes to the hydrologic regime, both as to quality and quantity, induced by cavers are quite common. These may range from water tracing activities to major diversions such as propounded at the Tenth ASF Conference in Brisbane in 1974. Such activities deserve especial care as we very rarely have any real understanding of cave waters and their biota. Poulson (1975) argues that aquatic cave ecosystems are even more vulnerable than terrestrial cave communities. In a dry continent such as Australia we should be especially careful.

The coal-tar derivative dyes such as fluorescein and rhodamime WT are relatively environmentally inoffensive especially in low concentrations. However, the optical brighteners such as leucophor may be less so. It should be noted here that soaps and detergents - cavers have been known to wash in caves - as well as being pollutants in their own right may act as transport agents for bacteria, viruses and other biological entities for greater distances than would usually occur (McReynolds 1975).

Enlarging or creating entrances, or linking caves at depth may well produce changes in cave microclimate to the detriment of speleothems and other sediments as well as biological systems. Most of our examples of the damage to

DO CAVERS HAVE AN IMPACT?

caves produced by changing cave microclimates come to use from tourist cave areas but there are undoubtedly instances of changed cave environments arising from wild cave digs.

Various examples are recorded in the literature, but the most spectacular from our personal experience is at Dalleys Cave, Murrindal, (Hamilton-Smith 1970). When this cave was first entered, the walls of the lower passages were coated with wet mud which in turn supported a great population of invertebrates. Within a couple of weeks, the walls were dry (and have remained so ever since) while most of the fauna has disappeared. In this case, the cave had obviously always had considerable air circulation, and the digging to gain entry was relatively minor in relation to the cave as a whole; yet the cave climate was changed to a remarkable extent.

Another long-standing example of the impact of digging, together with other impacts, is afforded by Alexandra Cave at Naracoorte, South Australia (admittedly a show cave). This cave was totally sealed and entry was obtained by digging out a depression where water had been seen to soak into the ground. Over many years, the speleothems dried out, became brittle and developed a dry, unattractive surface. Replacing the cave gate of widely spaced wooden slats with an airtight door quickly restored the surface quality of the decoration. However, it was then found that the entry of people had introduced algae, which led to an explosive growth of lampenflora, some of which has proved difficult to deal with as it had developed on moonmilk (probably also the result of introduced organisms, as it does not appear on the original photographs).

DISCUSSION - DO CAVERS HAVE AN IMPACT?

Our short answer has to be yes. We have given a number of examples above - there are many other stories that we could cite involving ourselves, managers, researchers and other cave users. How we might address and reduce our collective impacts is addressed in our more extensive paper (Spate and Hamilton-Smith 1991). However, it seems to us that there is an urgent need for cavers, be they ASF cavers or others, to develop and adopt a 'minimal impact code' for caving practice. We need to reduce the impacts of visitors.

Essentially, this means changing the behaviour of visitors. Let us firstly be positive, noting that a great deal has already been done. Cavers not uncommonly remove their boots and muddy overalls in well decorated areas; survey markers are much more unobtrusive; cavers rarely smoke in caves; underground camping has almost disappeared; graffiti is now a rarity; littering has generally disappeared (remember flash bulbs and cubes?); trails are often marked and even if they are not, cavers are more likely to stick with existing tracks; carbide lighting is almost dead.

All of this may well occur amongst the organised, including both ASF member societies and Scouts. But it is also commonly seen amongst some of the 'casual, disorganised' cavers, many of whom, as we noted in our introduction, are remarkably environmentally responsible.

At least two other issues are worth considering here. One is the issue of repeated visits. Intuitively, one caver visiting the same cave 200 times has much the same impact as 200 cavers each visiting once. This is not the case as repetitive use in short time frames (ie. many at once) often has a greater direct affect on soil/sediment stability and transport and on animal communities than does a large number of individual impacts. Many persons in a short time are usually multiplicative; smaller numbers over a longer times seem to produce additive impacts. Ethical questions arise here also.

The extreme example is probably the Tasmanian caver who actually brags of the number of times he or she has visited Kubla Khan! Part of any low-impact ethic would surely be that we will refrain from re-visiting any cave unless there is good reason for doing so. Certainly, there often is good justification for repeated visits to continue exploration, or carry out some other research and study activity - but just going back to the same cave for the pleasure of doing so has to be considered in relation to the level of impacts which result.

The other is the practice in some caves, for example, Scrubby Creek at Buchan, and Yarrangobilly and many other places, of providing in-cave notices which instruct visitors on-site in appropriate minimal impact behaviour. Many well-known examples of destruction, for example, Chevalier at Jenolan and Honeycomb at Murrindal, might have been avoided or at least lessened if this had been done - many destructive impacts result from ignorance or stupidity rather than any willful and deliberate action.

So, as a practical outcome of this, perhaps the Federation should, as a matter of urgency, draw up a Low Impact Caving Ethic and make this widely available through member societies, equipment shops, land managers, etc. We use the word 'ethic' deliberately and advisedly. It is not just a matter of a code of behaviour, but rather our 'total position' in relation to our land resources. Such an ethic would draw upon various of the past statements of the Federation and others, integrating these into a single statement with a focus on minimising impacts.

Although we in Australia have an enviable, world-wide reputation for good cave management, it is often instructive to look overseas for a broader perspective. Britton (1975), in a comparison of British and American cave conservation and management practices, states that in Great Britain:
"In the entire country, no cave now exists which has a man-sized entrance and undisturbed biology or sediments, and the bitter fruit of the early gatings ensures that the preservation of caves which remain to be discovered will be difficult or impossible...."

DO CAVERS HAVE AN IMPACT?

He goes on to say:
"There is little discernible difference between American and British cavers and they will probably react similarly in similar situations. Thus it seems reasonable to expect that, over a period of time, the great bulk of American caves will be gutted of everything fragile by sport caving but that the period of time may be markedly extended if leadership of stature is available.... Much remains undamaged as yet but unless America finds the solutions which eluded the British it will not stay that way."

Australia has a long and positive record of cave conservation and management and one would hope that Britton's gloomy, hopefully overstated, outlook is not to be a model for this country. However, without doubt there is a need for us to build on our record and leave some of Australia's caves and their contents in a relatively untouched condition.

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CAVE MANAGEMENT IN VICTORIA

Nicholas White

Abstract

The paper gives a historical perspective of exploration and management of Victoria's caves. It discusses the inter-relationships of cavers and managers and what impact these have had and are having on Victoria's caves. These impacts are no different from what is occurring in NSW. The main distinctions are a smaller number of speleological clubs and more recently a single government agency with control over publicly owned caves.

Introduction

The main karst areas with caves in Victoria are the Buchan Area, Limestone Creek, Portland, Warnambool and Lower Glenelg. Victoria's Western District has a number of Volcanic caves.

Most of these limestone areas were settled by Europeans very soon after the 1840's. Caves feature in early writings and both tourist interest and Government interest in the caves was well established by 1900. Cave reserves at Buchan were established in the 1900's and Fairy Cave was opened as a show cave in 1907.

There was much early interest in the caves from amateur naturalists interested in both the beauty and contents such as bones. Cave exploration and speleology did not really start until after the Second World War. It is not my intention to detail this early history which is given in Figure 1, but to use it as the basis for what followed from the caving perspective and from the Government in terms of new reservations for caves and the management of caves and karst.

Caving Clubs in Victoria

The Victorian Cave Exploration Society and the Sub Aqua Speleological Society both formed in the late 1950's. These clubs systematically explored and documented most areas with caves in Victoria. The clubs had a combined membership of about 50 in any year although various other outdoor groups from various organizations or institutions did spasmodic caving. The two clubs amalgamated in 1967 to form the Victorian Speleological Association (VSA). The VSA since this time has had a membership of 70 to 100 individual members at any time and close association with nearly all other recreational groups going caving through Associate Member status.

Cave visitor numbers are very hard to obtain. As part of the battle to have the Potholes Area at Murrindal protected I estimated that yearly visits to wild caves in the Buchan-Murrindal Area amounted to 6000 person days in 1979. This estimate was obtained from Rimstone Cooperative and VSA statistics and from visitor books placed in a number of caves.

In monitoring cave visitor usage the Department of Conservation and Environment in 1990 estimate that there were 3,600 cavers in 500 groups who recorded visits either at Homeleigh or in cave located visitor books. There has been some changes in the caves which are heavily visited due to changes in access over this period but a few caves take the majority of traffic, 8 of the caves taking 75% or 2700 visitors in about 400 groups of 7 people. I will examine the effects of this level of visiting and the management response in the rest of this paper.

Wild Cave Visitor Damage

In referring to the damage cave visitors do to caves I do not wish to question the ethical basis of caving itself. I accept that cavers do damage caves. This can be termed selfish but

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CAVE MANAGEMENT IN VICTORIA

Figure 1.
Victorian Cave History

1840's to 1900	Early Cave Discoveries by Settlers, Farmers & Geological Survey
1890's to 1910	Early Cave Tourism at Buchan & Limestone Creek Government interest
1907	Buchan Cave Reserves Proclaimed Discovery and Opening of Fairy Cave, Buchan
1907 to 1939	Various Tourist Caves and Associated Developments
1937	Discovery and Development of Princess Margaret Rose Cave
1946 to 1956	Modern Cave Exploration Begins
1958	Victorian Cave Exploration Society Formed
1959	Sub Aqua Speleological Society Formed
1968	Victorian Speleological Association Formed By Amalgamation of VCES and SASS
1968 to Present	Consolidation of Speleological Knowledge
1971 to Present	Reviews of Public Land by LCC Resulted in Many Cave Areas Being Reserved
1983	Victorian Cave Classification Committee Constituted Later Reformed as Caves Advisory Committee
1986	Davey & White Report 'Victorian Caves and Karst Strategies for Management and Catalogue'
1989	Potholes Area Purchased by Government
1990 - 1991	Various Management Plans Incorporating Cave Classification
1991	Draft Strategy for the Management of Caves and Karst in Victoria

I believe that cave recreation and speleology are legitimate expressions of our inquisitive make-up. I subscribe to a 'minimum impact' philosophy and to this end work both within caving circles and with those responsible for cave management in government to achieve this.

Visible damage occurs each time a caving group goes into a cave. How visible this is depends on the nature of the cave. On the whole it is very visible in most Victorian and New South Wales caves. This is because the caves presently are mainly dry with episodic wet events. The floors are either dry or moist breakdown soils and clays which when trampled are compressed or transferred to other surfaces such as clean flowstone. Such compression of floor materials and transfer of these materials is progressive and dependent on the numbers of visitors. The end result is inevitable, a lowering of the aesthetic quality but also other less visible damage such as interference with mineralogical processes, killing of invertebrates or depletion of their habitat. The visible damage may be much less in very wet caves but my experience of these in the UK is that damage is still visible from wear and tear on surfaces and speleothem breakage.

I will not try to elaborate on the kinds of damage nor to its magnitude although we have very real examples in Victoria such as Honeycomb Cave just as you do at Wee Jasper but will pass on to examining the institutional mechanisms of controlling and regulating the amount of damage which future generations will inherit as a result of our caving.

Cave Conservation and Management in Victoria

Firstly, as mentioned above most Victorian cavers have some level of alliance and contact with the VSA. By and large we all subscribe to the same set of ASF ethics which regulate our activities. The abuses which occur I believe result in part from large party sizes and perhaps at times from misconceived digging.

Most damage is inadvertent and not deliberate. Thus education and adherence to a Code of Ethics are important in minimizing damage. More importantly the number of caves visited tends to be restricted. Of the 1000 caves in Victoria something like100 of these would receive repeated visits in any one year. This is because of factors such as location, size, recreational possibilities, etc. These then are the caves which should receive both management and caver attention to protecting their integrity.

I do not wish to examine damage to caves from pollution, sedimentation, rubbish dumping and other such activities as the solutions to these problems are not directly related to this Forum.

The VSA has been instrumental in calling for more active protection of caves and in its own right has reached

CAVE MANAGEMENT IN VICTORIA

Figure 2.
Cave Classification Committee - Terms of Reference

1. The compilation of a catalogue of Victorian caves, whether on public or private land, which identifies caves according to their nature and significance.

2. The classification of Victorian caves, in accordance with the recognised Australian classification, based on cave nature and significance.

3. The development of strategies for the management and care of all caves in Victoria, including:

a) steps which should be taken to improve the protection and management of caves on public land,

b) ways of more effectively protecting caves on private land including any recommendations for acquisition of land,

c) any other matters relating to the protection of caves and/or their contents.

agreements with individual cave owners regarding access and visitor controls.

Government Protection and Management

Government protection started with a few early reserves. For about 80 years their only interest was in the tourist caves and this was restricted to the show caves. Little if any management was done for wild caves. Management rested with a number of Ministries. In 1971 the Land Conservation Council (LCC) was set up. This body recommended the way in which public lands should be managed and classified. Over the years this has resulted in most caves in the State which are in Public Ownership being placed under some form of formal protection such as in National Parks or Reserves.

At the Fifth Australasian Conference on Cave Tourism and

Figure 3.
Classification Scheme.

Category 1: Public Acess caves

- 1.1 Adventure Caves
- 1.2 Show caves

Category 2: Special purpose sites

- 2.1 Reference sites
- 2.2 Sites of special natural and/or cultural value
- 2.3 Dangerous sites

Category 3: Wild (& unclassified) sites

- 3.1 Caves classified as wild

Figure 4.
Cave Classification Breakdown of Victorian Caves

CATEGORY	NUMBER OF SITES	PERCENT OF TOTAL SITES
1.0 Public Access Caves		
1.1 Adventure Caves	22	2.3
1.2 Show Caves	7	0.7
2.0 Special Purpose Sites		
2.1 Reference Sites	0	0
2.2 Sites of Special Significance	46	4.9
3.0 Wild and Unclassified Sites	862	91
Total Sites	947	100

Management the then Minister for Lands and Forests, Mr Rod Mackenzie, made a commitment to set up a Cave Classification Committee. This Committee was subsequently set up with broad terms of reference (Figure 2). The Committee commissioned a study, conducted by Adrian Davey and Sue White, which recommended Management Strategies for Victoria's caves and provided a recommended classification and catalogue of the caves. The Committee was replaced by the Caves Advisory Committee which has been working through the recommendations and was instrumental in preparing a Strategy for the Management of Caves and Karst in Victoria. This Strategy is now open for Public comment.

Victoria's land management agencies have now been amalgamated under the one Ministry of Conservation and Environment for the last eight years. Management Plans are now being prepared for most of the important cave areas. These Plans are based on the Classification scheme (Figures 3 and 4). It should be said that the Classifications are for Management purposes and the Classification does not define access, nor is it a ranking of significance. This has been fully accepted in Eastern Victorian plans but only reluctantly in Western Victoria.

Conclusions

Victoria has the same problems as NSW with damage to wild caves. There is close interaction between cavers and the Department of Conservation and Environment which is directly responsible for publicly owned caves and indirectly for privately owned caves.

The Caves Advisory Committee provides the formal interaction and it has very broad terms of reference to provide advice to the Minister. This and a willingness of local managers to come to grips with very real questions of about what is happening to caves gives me confidence that many problems at the cave level will be addressed in a way which leads to lower rates of cave degradation.

Nicholas White.

WHY DO YOU GO CAVING?

Martin Scott

Abstract

It is suspected that recreational caving, exploration including surveying and mapping, diving, digging and blasting, and other scientific studies have minimal impact on caves. Natural and other human influences are suspected to have a greater relative impact. There is need to educate cavers to further minimise their impact on the caves. Speleologists who publish their findings contribute valuable information for cave management, and should be given freer access to karst areas.

Introduction

Why do you go caving? Your reasons for going caving determine the likely impact you will have on the caves, and they have implications for cave management. The suspected relative impacts on caves by cavers are compared with other influencing factors. The ideas presented are aimed to assist in the management of caves and influence the activities of cavers.

Impacts on caves

Numerous natural and human influences have an impact on caves. Natural influences on caves include variability in the weather, producing extremes of flooding, drought and fire. Human influences on caves, except by cavers, include forestry, farming, housing, tourism, quarrying and other industries.

All of these human influences have the potential to pollute karst waters. Forestry and farming change the vegetation cover, often leading to increased run-off within the karst catchment. Cave tourism development often partly alters the morphology of the caves, and introduces lighting, wiring, concrete, steel, etc. and large numbers of tourists. Limestone quarrying has a large scale impact on specific karsts, although other cavernous limestones may be threatened in the future as present supplies are exhausted.

I suspect these natural and human influences have the greatest impact on caves, much more than the impact by cavers.

Impacts on caves by cavers

The types, numbers, frequency of caving and activities of cavers are shown in Table 1. The impacts of the activities of cavers are discussed below.

Recreational caving is undertaken by all three types of cavers. Recreational caving causes accidental (and unfortunately also intentional) damage to decorations, smoothing of cave walls, transport of mud and the placement of bolts. Recreational caving leads to exploration and other scientific studies. The impact of recreational caving is minimal, although it is cumulative and its effects are most noticeable in caves visited by large numbers of cavers (eg. Bungonia Caves, NSW).

Exploration is a type of scientific study that is mostly carried out by speleological groups. Exploration provides the greatest amount of information on caves. Techniques used by cavers in exploration include surveying and mapping, diving, digging and blasting.

Surveying and mapping should have minimal impact on caves, as it is undertaken infrequently and at a slower pace than recreational caving. The cave maps produced are particularly important for understanding caves and karst, and are used extensively in further scientific study.

Diving is presently underutilized in the exploration of NSW caves, a situation which should be re-dressed as cave divers provide important basic information on karst hydrology. Cave diving involves the laying and following of (often temporary) guide lines in cave streams and pools. Diving muddies the waters in caves, but this impact is minimal when compared to flooding.

Table 1
The Types, Number, Frequency of caving and the activities of cavers.

Types of cavers	Numbers of cavers	Frequency of caving	Caving activities	Do they publish their findings?
Friends and outdoor groups (eg. scouting)	Large	Infrequent	Recreational	No
Speleological Groups	Moderate	Frequent	Recreational, and exploration	Yes/No, in unrefereed bulletins other scientific & speleological studies
Scientists	Few	Infrequent	Recreational Scintific	Hopefully, in scientific journals

WHY DO YOU GO CAVING?

Digging and blasting is the localised removal of material from constricted cave passages. The impacts of digging/blasting on caves are:

1. disturbance and transport of rock, sediment or formation to other parts of the cave;

2. possible loss of important geological, archaeological or biological information. This information is often better exposed or more easily studied in less-restricted localities of the cave. For example, sedimentary layers often extend laterally away from the digging/blasting site, although entrance facies deposits may have restricted distribution. Digging/blasting may also assist in exposing important geological, archaeological or biological localities;

3. the enlargement of the cave passage causes changes to air movement and humidity, although the enlargement is normally minimal, and only sufficient to allow the caver to pass through the constriction;

4. the temporary production of noxious gases and extreme noise levels by explosives, although some new types of 'explosives' no longer have these detrimental effects;

5. to allow access to more cave passage, giving more information on the cave and karst.

Digging and blasting can have a high impact in a localised area of the cave, but it is minimal compared to the whole cave. The impacts of digging are similar to those of natural influences such as floods and by burrowing animals. Before embarking on digging or blasting, the speleologist should assess if the possible gains of new cave passage are worth more than the possible scientific information that will be lost. By educating speleologists to recognise scientifically important localities in the cave, digging/blasting can minimise the loss of scientific information while extending our knowledge of the cave and karst.

Other cave and karst scientific study apart from exploration is undertaken by speleological groups and scientists. The impact of scientific study on caves should be minimal, although it is not examined herein. Hopefully they should increase our knowledge of the caves and karst.

Cave Management

Of particular concern in the management of caves is that cavers are educated to minimise their accidental and intentional damage to caves. This education needs to occur within the caves, at the caving areas, within the caving groups and amongst cave scientists.

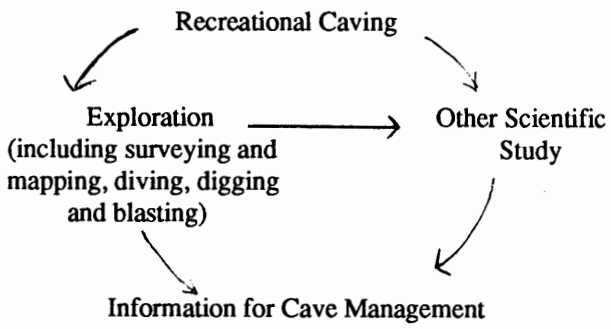
Exploration is the greatest source of information in speleology. Most basic information on karsts is gathered by speleologists exploring the caves, and this information should be further utilised by cave and karst managers. However, not all speleological groups regularly publish their findings, due to ethical or financial reasons. However, a lack of money is not an excuse for not publishing, as ASF is always looking for articles to publish in 'Australian Caver'.

Cave and karst managers have often got to decide who and how often cavers visit an area or cave. In managing a karst area they may wish to consider the following:

1. recreational caving by friends and outdoor groups in specific areas (such as Bungonia Caves), leads to some of these cavers furthering their interest in caves within speleological groups and as cave scientists. Stopping recreational caving at all areas, stops the flow-on of cavers to speleological groups and cave science (Figure 1);

2. remove the necessity for pseudo-scientific reasons for going caving, as all initial caving in NSW caving areas is purely recreational. Recreational caving leads to exploration by speleological groups and further scientific study (Figure 1);

Figure 1. How cavers provide information for cave management.



3. the easier it is for speleological groups to gain access to karst areas, the more time and effort they will devote to its exploration and documentation;

4. numerous speleological groups concurrently at a karst area, allows the exchange of ideas and information. This may not be feasible at all areas due to the limited number of caves in some karsts;

5. speleological groups which publish their findings contribute to the knowledge of the karst, and so assist in its management;

6. restricting access to speleological groups which publish their findings, limits exploration and other scientific study, and the amount of information on the karst area which can be used for management;

Cont'd p. 24

THE MANAGEMENT PERSPECTIVE

Ernst Holland *

Introduction

The intention of a manager is to control. Because managers of cave areas often felt that they had no control over those persons who entered the caves without paying or being employed by the management authority, it compromised this objective of control.

It could be argued that the first 'cavers' were the managers such as Moon of Buchan, Wilson of Jenolan. People such as Etheridge and Trickett could possibly come under either category, ie. managers and cavers. Today we see cavers who become managers and it has been interesting to note the change of perspective from these persons.

Historically it has been recognised that human entry to caves creates impacts. Jeremiah Wilson's referral to the use of fences and burning of Magnesium ribbon verifies this. Today it is recognised that everyone has impacts on caves, but because it is for the so called 'right' reasons (economic, safety, etc.), it is acceptable to some authorities, whereas to impact on a cave for fun is not seen as acceptable to those same authorities. However, it is seen by some cavers as being acceptable if it is to further their interests.

What managers were trying to protect were those features (basically the formations) that were seen to enhance the visitor experience from a tourism and education perspective (the visual experience). The caver wanted to experience the thrill of exploration (finding new caves), recreation (to enjoy themselves), and to gain scientific knowledge (even though this was seen as an excuse by many managers).

Sport versus Science

In British caving, conservation and access have involved the 'science-sport' conflict since Baker and Balch parted company earlier this century. Baker confessed that his priority was sport, and science the pretext. When the cause of science failed to get him access to Swildon's Hole he resorted, as he put it, to 'cave-burglary', and justified his act of piracy on the grounds of 'sportsmanship' (Mellors 1976).

There is no more mention of Balch for the comparison to be made; he apparently maintained the ethic of science over sport. But even the genuine caver was very rarely successful in conveying that message because their knowledge was not shared and often resulted in repetition of the same work or projects: how many times is that cave going to be mapped? This resulted in the inability to recognise the overall contribution that each party was trying to achieve.

Managers and Cavers

Over the years there have been conflicts between managers and cavers as to who creates the major impacts. The fences that are put in a cave by managers to protect the features are thought of by the cavers as having an impact. The helmets worn by cavers where viewed by the managers as a threat to the features of the caves. This was seen at Hollow Hill, New Zealand during a management conference.

Managers are there to manage the caves (their ability to do so is a separate question). As such, unrestricted access was seen by the manager as an unacceptable, unknown quantity and had to be avoided at any cost. Also, managers felt that the resource and their credibility was threatened by the activities and attitude of cavers who would often question their right to manage.

In reaction to this, cave entry by permit was introduced as a means of control. However this ended up in the hands of administrators (head office) who had never been in caves, thought impact was something to do with teeth, and were just doing a job anyway. This compromised the local managers control and was seen as giving the caver a free go. This was especially obvious when the club newsletter would

WHY DO YOU GO CAVING?

7. open permits or improved access for speleological groups which publish their findings regularly;

8. restricting access to friends, outdoor and speleological groups which don't publish their findings;

9. no access to sections of caves or whole caves, should only be used when it has been scientifically proven that they need this protection. No access means that no further information will be gathered from this section of the cave;

10. education, signs, taping, track marking, gating and permit systems can effectively be utilised to minimise the impact of cavers on delicate caves.

Conclusions

Cavers have minimal impact on caves when compared to natural and other human influences. Cavers should be educated as to which features within caves need protection, so as to further minimise their impact on the caves. All initial caving in NSW is presently recreational, and the necessity for pseudo scientific reaasons for going caving should be removed. Recreational caving leads to exploration and further study. Exploration is normally undertyaken byu speleological groups and they provide a lot of basic information on caves and karst. Speleological groups should be given freer access to caves and karsts, as they provide essential information for cave management.

Martin Scott
Department of Geology and Geophysics. University of Sydney.

THE MANAGEMENT PERSPECTIVE

arrive and the report relating to a particular visit had no relationship to the permitted reason for the trip.

Many persons often try caving for the experience, then lose interest, get a fright, or take on other commitments. This results in a lot of short term cavers, only seen once by managers. For this reason some cavers were seen simply as non paying tourists.

A manager's view of cavers can often be influenced by: his or her background, specific management objectives, changing requirements beyond the control of the manager, and their own experiences.

This has resulted in the introduction of adventure tours with impacts that have become acceptable and with no limits being set. By the same token, cavers frequently see themselves as having no impact, or claim: 'it was the other group that did it'. What defines an illegal caver when the regulations for an area, which are the manager's responsibility to enforce, state that an illegal caver is any person that enters a cave unaccompanied by a guide. Is familiarisation a guided tour?.

The manager sees cavers emerging with mud all over their clothes as objectionable and not proper amongst the well dressed visitors. The visitors see it from the spectators point of view and a sense of adventure. The real impact: what was done to the caves or how that mud was transported, is often overlooked.

Through the permit system cavers were directed to those areas that did not contain an abundance of formations or were seen as unimportant. This often resulted in the cavers taking a lot less care, because these caves were then regarded by them as being of no consequence.

Managers did not like the cavers forming, by use, an obvious pathway to a cave entrance because it showed other cavers where a cave was situated. The real problem is erosion, but the caver solves the problem by using the management concept of gating, which in itself attracts by the suggestion that a gate is guarding something important. The caver-explorer wishes to know where the water ends up, and so adds a chemical substance to assist. The manager is worried about the waters appearance being unnatural. What do the aquatic fauna think of it?

The caver-scientist removes bones for further study and the manager bemoans the fact that they can not now be put on public display as an added attraction. The scientist in the future wonders what the big hole is for?

The cave with the biggest shawl is developed for commercial gain by the management authority. The deepest cave is rigged for the ego of the caver. Development may be seen as long-term and rigging as short-term, but the rigging can be more frequent and consequently have the greater impact.

Pathways are developed through show caves to keep visitors to a defined area. Pathways develop in non-show caves because it is the easiest position in the cave to walk along. The pathway in the show cave is so aligned that the user will not fall and break a leg or formation. The accidentally formed pathway has no such considerations: you see the muddy hand marks on walls that have been used for support.

Call them tunnels and they are for the convenience of the visitor and unnatural. When they are digs, it is so you can find new caves. Management authorities have frequently created artificial water levels to assist their operation of show caves, while cavers attempt to lower water tables to further exploration.

Minimising Impacts

Many conferences, seminars, etc. have caused an awareness of impacts and so managers are now looking for guidelines and tools to control and minimise those impacts. The failure to recognise who is the cause of some impacts creates some resistance to the implementation of such guidelines and tools. But there have been many positive moves, with the managers recognising what cavers are about, and the assistance by cavers in various projects has been very welcome.

Finally, mention must be made of the tiny minority who will prove to be the salt of the earth in caving. The only people of this century's cavers who will not be hated and condemned, but revered by future generations will be those few, the Show Cave owners. Caves are continuously being eroded away by cavers, albeit usually unintentionally; floors are damaged and formations smashed. It is only with the protection of a Show Cave and the element of access control that goes with it, that some of our caves are likely to be conserved for future generations. Thus, those who will achieve ultimate fame will be the Show Cave owners and/or operators (Leakey 1978).

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LEAKEY D. Robert, 1978, Caving Motivation, British Cave Research Association Bulletin., 20:20-23

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* Ernst Holland - Jenolan Caves Reserves Trust. NSW

The Three Gorges Dam, China.

Micheal Lichon, Mole Creek Caving Club.

The Chinese government plans to go ahead with construction of what would be the world's biggest dam, on the Changjiang (Yangtse) River. This hydro-electric engineering construction would be of a proportion second in the woirld only to the Great Wall of China. The latest estimates cost the project at US $12 billion and time the construction period at 15years. The 600km long reservoir would inundate three major karst area of world significance, (film footage of magnificent karst towers rising from plains) and displace 1.3 million people from their land. These residents have been subjected to propaganda, coercion and intimidation to ensure acceptance. There was considerable and heated debate (very much out of character under the present regime in the Chinese parliament over the issue. The government has stifled the raising of environmental concerns since the Tiannamen Square massacre.

The benfits of the 180 hihg dam are said to be clean enregy, flood control and improvements in navigation on the river. The above cost estimates have exploded since even 1988, which it was US$4 billion(2). One can only imagine what the final cost to the world bank will be. The source of the water is high glaciated country and deforested land, releasing 250 million tonnes of silt per year. Evidence suggests the storage volume of the dam will rapidly decrease due to the deposition of silt(3).

The 6380km length to the Yangtse River services 400 million Chinese. The Yangtse George is a great beauty spot and a famous tourist attraction.It attracts the foregin exchange of 10 000 tourists every year(4). The misty canyons, filled with historic and archaeological sites, are the basis of poems and legends (5). The dam and most of the impoundment are to be sited in Mesozic and Paleozoic karst, but details are scarce beyound the spectaculare mature of the karst topography.

The media has shown little interest in pursing the issue, the Chinese embassy has been reluctant to supply details.

Given that the ordinarily subservient parliament was reported to have been considerably apitated, I think that in this case some pressure form the international community may be of some effect. What can the caving comminity of Australia do? Is the rest of the world's caving community aware of this threat?

(1) SBS news 4/4/92.
(2) The Ecologist. Vol 18 No 2. 1988. 56-63.
(3) The New Scientist. 4.5.1991. 32-25.
(4) The New Scientist. 6.5.1989. 9.
(5) The Ecologist. Vol. 18. No 2. 1988. p.56-63.

HEAT AND HUMIDITY IN THE TOP END

K. Magraith and G. Bannink

This is the second of the series on articles dealing with caving safely in the Northern Territory. This article looks at heat related disorders and their treatment.

With temperatures in the high twenties to low thirties, and the humidity usually over 90%, caving in the Top End is a strenuous exercise. The risk of heat stress and dehydration is always present and must be borne in mind on all trips.

The three heat related disorders which may occur are heat exaustion, external heat injury and heat stroke. Heat stroke is the most serious of these, and is potentially fatal.

Risk factors for the occurrence of these problems include:
1) Temperatures over 35 degrees and humidity over 60%.

2) Increasing age.

3) Preexisting medical conditions, especially heart disease and diabetes.

4) The use of alcohol and certain drugs, including diuretics ('fluid tablets') and drugs used in mental disturbances.

5) Lack of acclimatisation to the tropical climate (this usually takes four to seven days).

Prevention
This is much easier than treatment.
1) Acclimatise to Top End heat before going caving.

2) Cave in the coolest part of the day.

3) Ensure adequate fluid intake, both before and during the trip. This must consist primarily of water.

4) Rest frequently and don't over-exert yourselves.

It is easy to underestimate water requirements. Unless you drink regularly regardless of thirst, dehydration can occur very rapidly. We estimate that the average person moving through a cave would lose 500 to 1000ml of fluid each hour.

This point was illustrated to us in an experiment conducted on a Top End Speleological Society (TESS) trip. A group of TESS members measured body weights before and after a four hour trip, during which we all drank as much water as we normally would. I had been drinking frequently, and consumed almost two litres. At the end of the trip I had lost two kilograms, or 3.3% of my body weight. If I had not been drinking it would have been 6%. One caver was 5% dehydrated and would have been almost 10% if she had not been drinking water. Dehydration of 5% or greater usually necessitates hospital treatment, and levels of more than 10% can be life threatening. This exercise made us aware of the short time in which dehydration and death could occur in the case of cavers being lost or injured, or running out of water.

Recognition
Early recognition that someone is suffering from a heat related disorder or dehydration (which are very closely linked) is crucial to successful treatment.

Symptoms include:

headache, weakness, dizziness, chills, nausea and vomiting, muscle cramps, confusion, incoherent speech, rapid, shallow breathing,

cool clammy skin, (heat exhaustion or exertional heat injury) or

hot dry skin (heat stroke), collapse and unconsciousness.

In the case of heat stroke, collapse may occur without any other preceding symptoms.

First Aid
The extent to which this needs to be taken depends on the severity of the symptoms.

1) Get the person to a cool place with good air circulation if possible.

2) Cool them down quickly as best you can. Wrap them in cold wet sheets. Cooling must be continued until the victim's temperature is 39 degrees or less. If there is no thermometer, keep cooling them until temperature can be measured, or they have fully recoverd.

3) Give them fluids. Make the victim drink as much water as possible. Do not give salt or concentrated drinks (eg. Cola).

4) Massage the victim's arms and legs to improve blood flow and thus heat loss through the skin.

Although the heat related disorders described above occur uncommonly, TESS is conscious of the need to prevent heat stress and dehydration. When we go caving, each person must carry their own water supply. All cavers are made aware of the fact that thirst is not a good enough indication of the body's need for fluid and that they must drink regularly regardless of thirst. The party only moves as fast as the slowest, hottest person.

We impress upon all cavers the need to prevent heat stress and dehydration, and ensure that cavers are aware of relevant basic first aid measures. These factors are all especially important in the event of a rescue.

Obituary

Farewell Ken Lynn.

Ken Lynn arrived in Melbourne during the later months of 1956, accustomed to getting on his bike and going out after work for an evening's caving. The distances of Australia came as a nasty shock - but he recovered very quickly buying a car and heading to Buchan at the first opportunity.

Then in December, he attended the inaugural conference of the Australian Speleological Federation and the subsequent field trip to Kangaroo Island. This marked the next key point in his life - he met wonderful June, (then Marlow) - they later married, and in the words of the old story, lived happily ever after until his untimely death in mid 1991.

Ken became President of the Victorian Cave Exploration Society when it was established in 1957, and participated actively in trips throughout Victoria and South Australia until he and June went to Britain. They then returned and settled in Sydney, where both have been highly successful in their chosen field of industrial engineering. Both served at different times as state and then federal president of their professional institute, which must be a most unusual record for any couple.

To return to his caving, Ken took a long time to recover from going caving after work. I still remember the Wednesday nights when we met up after work, drove to Warnambool (160miles), caved most of the night, then drove home for Thursday's work! And there was the 3-day weekend when we drove to Adelaide, then to Buckalowie (Flinders Ranges), spent a great deal of time underground, then drove back to Melbourne for work on the Tuesday morning. Strangely, we decided to take the day off!

Although his involvement in Australian caving was relatively brief, Ken was a great inspiration to all who met him. He was tireless, always cheerful and absolutely determined. One Naracoorte hole demanded a week of the most stringent dieting before it would admit him - but even that didn't deter him.

We were glad to know that although he had experienced some ill-health in recent years, the end came suddenly and peacefully. He died sitting in his garden, knowing that he had lived a successful, and thanks to June a wonderfully happy life. Although now alone after some 33 years of marriage, June is able to look back upon her life with thankfulness and a lot of happy memories. She has the sympathy and best wishers of all of us.

Elery Hamilton-Smith.

Obituary

Rolf Adams 1965-1992

On April 19, 1992, well-known Sydney University Speleological Society (SUSS) caver, Rolf Adams, tragically lost his life while he was enjoying a pleasure dive with a friend, James Smith, in a flooded cave system known as Hole in the Wall, Florida, USA. Although he had not yet formally completed his advanced cave diver course, Rolf had recently undertaken more than enough dives to qualify for that rating and was highly regarded by some of America's top cave divers.

Rolf encountered problems when one of his regulators suddenly began to free-flow some distance into the cave. After turning off the faulty air source, he appared to become very anxious and hurried for the exit, possibli over-breathing his regulator. As Rolf had earlier indicated that he had fixed the problem, James only became aware of the severity of the situation shortly afterwards, when Rolf frantically signalled that he was out of air.

As the divers struggled to share James' air supply they lost control of their buoyancy and hit the silty bottom: they then rose to the ceiling before descending rapidly to the floor again, and Rolf suddenly lost consciousness and subsequently drowned. James was fortunate to barely escape with his own life on the small amount of air which remained in his cylinders.

The following obituary, presented by prominent American cave diver Bill Stone at the Service for Rolf in Sydney, shows that Rolf was greatly respected by members of the American caving fraternity as well. ***Peter Horne.***

It has been said that the true measure of a person includes not only the sum of the accomplishments in life, but the friends made along the way, and the good will he or she has bestowed upon both them as well as strangers. Judging from the varied backgrounds of those present at this memorial service it is clear that Rolf Adams touched many lives in his own special way.

I was privileged to have known Rolf in the role he most enjoyed in life: that of a modern day explorer. I first met him in the mountains of southern Mexico in the spring of 1989 during the initial explorations of what many believe will one day be the world's deepest cavern. We were both drawn by the lure of that remote place where few common men could even dream of the challenges that lay afoot beneath the surface. Rolf's enthusiasm, wit, and technical prowess quickly earned him not only a place at the exploration front, but the admiration and friendship of all who met him and wondered just where this amazing "Aussie" had come from. During the next two years, Rolf was to become a key player in establishing Cueva Cheve as the world's 5th deepest known cavern. In one epic mission he inspired his teammates into a 40 hour marathon that marked a milestone in the history of Mexican cave exploration.

Con't p. 29

Obituary

Rolf Adams

Cont'd

But Rolf was much more. He was a Yosemite class rock climber, a kayaker, a long distance runner, and a scholar. He earned his Masters degree in Applied Mathematics from the University of California at Berkeley ... and, I might add, with an off handed intellectual power that left him plenty of time for expeditions. None doubted, as Rolf had confided to us in February of this year, that after the next expedition he would go on to obtain his PhD. And we all added silently, "in record time".

This past spring Rolf came to the U.S. to join a number of the world's leading deep cave explorers on a two month training exercise for the San Agustin Expedition to Mexico's Huautla Plateau in the spring of 1993. During the course of those two months Rolf performed in top form. He acquired the highest level of cave diving certification and then went on to learn about experimental rebreathers. He amazed everyone with his ability to grasp complex new tasks and then to put them into practice. By the time the training exercises were over Rolf had reached a level of ability in which he could confidently carry out a four hour mission in a subterranean river, swimming a total distance of nearly four kilometers in the process. And he could do that every day or, as he often did, to simply serve as the safety diver for another member of the team using traditional Scuba. He was equally at ease underwater with whatever apparatus suited the need. That Rolf should be taken from us while on a tourist dive following this complex work seems terribly unfair. It is much like the special forces unit that returns from its most dangerous mission without a scratch, only to lose one of their best members to a traffic accident while on holiday in the big city.

Theodore Roosevelt, one of America's most charismatic presidents, once said, "Far better to dare mighty things than to take rank with those who live in the grey twilight that knows not victory nor defeat." Rolf embodied that credo and in his brief time on our planet, he lived a richer life than all but a very few shall ever know. And he left our world, and all he touched, a great deal richer.

If there were to be an epitaph for Rolf it would read: "he was a quick Sludy, a jack of all trades and good at every one of them. He was the penultimate modern explorer: bright, athletic, a team player you could count on when the chips were down. He was never at a loss for a smile or a good joke and he always carried more than his fair share." We, your fellow explorers, salute you. Godspeed, Rolf Adams.

Bill Stone.

ASF EXECUTIVE MEETING NOTES

The recent ASF executive meeting in Melbourne at the end of May saw all but Peter Berrill from QLD and Steve Brooks from W. A. attend. Issues which the meeting covered items from conservation to finance to caver accreditation.

Conservation issues ranged from unresolved problems with the closure of Benders Quarry, in particular the possible transferral of the quarry operations to the as yet really unexplored Maydena area. It is known that the area is cavernous but the significance of the karst is unkown.

In NSW no mining leases have been renewed since the Yessabah case, leaving a back log of claims. There is also the possibility of the re-application for a lease at Yessabah.

The Cave Diving Association of Australia (CDAA), asked for and was given Associate status at the meeting. Further discussion will occur on the code of diving and access to cave diving areas.

Caver Accreditation. At Jindabyne, the ASF Council agreed to proceed with a national accreditation system and set up a working party to get the process up and running. The Tasmanian Dept of Sport and Recreation is also developing a "National Outdoor Recreation Leadership Strategy". Stuart Nicholas from Tasi has been involved in the latter, as have a number of ASF people across the country. The Dep't of Sport and Recreation has invited ASF representatives from all states to attend a meeting in Tasmania in July to discuss NORLS. This will also provide an opportunity for discussions to occur on the ASF's Caver Accreditation System.

The executive met informally with Elery Hamilton-Smith and Nick White from ACKMA on the Sunday. The discussions were wide ranging and both organisations will continue informal meetings when possible.

The Executive is due to meet in Adelaide on the second weekend in September. If you have any issues that you or your club wants to bring to the attention of that meeting then please phone or write to the executive.

Clare Buswell and Karen Magraith.

CLUB SECRETARIES.

Still got those disks that were handed out at the ASF Council meeting in January and still recieving complaints over not getting Australian Caver from your club members?

Then please send the disks with updated club membership lists to Steve Brooks
6 Kidbroke Pl, Westfield. W.A. 6112
ph: (09) 3909259

THE DARKNESS BECKONS

A Review

When I avidly read the first edition of `The Darkness Beckons' in the early 1980s, two things struck me: it was a darned good yarn, chronicling the development of cave diving in the UK from the earliest 'home made' attempts to the then current state of the art methods, and it instilled in the reader a deep understanding and respect for the knife edge upon which one was putting one's life if cave diving was chosen as a means of furthering cave exploration.

Sadly these two elements have been diluted with this second edition, published eleven years after the first. To be sure there is compensation in the greatly enlarged international cave diving section - virtually a second half of the book, and in the extraordinary quality of the 243 photos (53 in full colour) and the 64 maps and diagrams. Moreover the kernel of the "darned good yarn" is still there, in chapters 3 to 8 inclusive. But what has been lost is the deeply etched lesson that one gained from the first edition, that if you were thinking of taking up cave diving, you had better first learn your lessons, or suffer the consequences that befall all amateurs eventually. Farr stresses this in his words often enough, but the impact is seriously weakened by the accompanying text which, probably inadvertently, emphasises the technical aspects at the expense of hiding the fundamental tenet of all extreme activities - that all the high tech equipment in the world cannot compensate for an inadequately trained and panicky cave diver.

These quibbles aside, the book is an extremely valuable historical document, publishing for the first time many early photographs and anecdotes from the early days of cave diving and also bringing to light just a few of the German super diver, Jochen Hasenmayer's, amazing exploits.

Being written by a Briton, naturally English speaking countries are to the fore in the second half of the book entitled 'International Cave Diving'. The superb efforts of the French and Swiss cave divers gain rather less space than they may feel is their due, but I'm sure they are quite capable of describing their role in the development of this most extreme of exploration techniques in their own publications in their own inimitable fashion.

Australian divers get a guernsey in the international section with their record breaking exploration of Cocklebiddy Cave and the exciting events of Pannikin Plains Cave dominating (Chapter 11), and the Americans' enviable records for long penetrations and diving at extreme depths are covered in some detail.

The brief South African section covers Adam Duffin's discovery of the world's largest underground lake (2 hectares) in Dragon Breath Hole (note that Adam's name is misspelt on page 264 and in the index) and the distressingly unnecessary death by slow starvation of a cave diver in Sterkfontein when the authorities refused to allow recognised cavers to assist with a rescue operation.

The book is well bound and has good quality typesetting in a clear style. The information it contains and the images it conjures up, as well as the photos and maps, makes it a good buy at the price. I'm sure that every cave diver in Australia will want to have a copy or at least want to read the club's copy, and I recommend that all club librarians add the book to their shelves.

Peter Ackroyd

The Darkness Beckons, 2nd ed. The History and Development of Cave Diving, Martyn Farr.
Forword by Dr Bill Stone. Diadem Books, London. 280 pp.
240 x 200 mm. Price: 22 pounds sterling.
Distributed by Hodder & Stoughton Ltd. Kent. UK.

AUSTRALIAN KARST INDEX.

Huge discounts off previous prices.

All ASF clubs and Associates are now able to supply copies of the Karst Index to their members for a total price of around $15.00 or less including P&P - less than 1/2 the old price! The Karst Index is of course the cave list describing virtually all registered caves in Australia (over 6600), together with map, reference and cave name lists, and more a total of almost 500 pages.

Clubs should have copies available at meetings for perusal and immediate sale. All ASF members are urged to take advantage of the substantial discounts available to them through bulk ordering by their clubs of this invaluable caver's reference book. If your club does not have any stock of the Karst Index on hand you might like to find out why.

However, if your club does not want to order bulk copies of the Karst Index, you can still get a good price direct from the Documentation Commission at $20.00 per copy, including P&P, (down from the old $33.00).

The price to non-members, including government agencies, researchers, etc, remains at $35.00 plus P&P in Australia, a total of $44.00. Foreign orders AUD 35 plus P&P of $14.00 surface mail, $25.00 economy air or $37.00 airmail.

All enquires or orders (with cheque payable to "ASF HANDBOOK") to:

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Peter Matthews.

TAS TROG 1993

The 19th Biennial Conference of the AUSTRALIAN SPELEOLOGICAL FEDERATION,

hosted by the NORTHERN CAVERNEERS Inc
To be held in Launceston, Tasmania.
Monday 4th to Friday 8th January 1993.

"TASTROG '93" will be held at "GLENARA", Youngtown, situated 4.5km from Launceston City and the Airport.

ACCOMMODATION

There is accommodation for 50 delegates at Glenara in 16 HOSTEL-STYLE rooms, with 3 or 4 single beds per room. Fully serviced, all linen supplied, and shared bathroom facilities. We will endeavour to allocate you your preferred room-mate, if you indicate their name/s on the registration form. Also at Glenara will be a camping area, with portable showers and toilets on site. Due to fire restrictions, no personal cooking will be permitted by campers.

For more up-market accommodation 1 km away, we have booked into both the nearby "ABEL TASMAN MOTOR INN" and the "PARKLANE MOTEL" .Each motel offers double or twin rooms and family suites. Again, we will allocate you your preferred room-mate if possible. The "Park Lane Motel" has agreed to be sponsor of "TASTROG '93" and will negotiate a good tariff for delegates wishing to stay here before and after the Conference too. They also have some larger rooms and self-contained units, suitable for group share. A shuttle-bus service will run between both motels and "GLENARA".

To streamline Conference bookings and make "TASTROG '93" as easy as possible to attend, we are offering you a selection of "PACKAGE DEALS", which consist of:

* Conference registration, handbook, papers and satchel;
* 4 nights accommodation;
* 4 breakfasts, 3 lunches, 3 morning & 3 afternoon teas;
* A "Welcome" Bar-B-Que, the Do You Know Tasmania slide/tape show (D.Y.K.T. presented by the Launceston Walking Club);
* FREE childcare at conference, and
* transport arranged where necessary for transfers, field trips and social events.

PACKAGE DEAL "A" $220
Includes the six package deal items above with motel accommodation at the Abel Tasman Motor Inn or Park Lane Motel

PACKAGE DEAL "B" $180
Includes the six package deal items above with accommodation in Glenara Hostel.

PACKAGE DEAL "C" $160
Includes the six package deal items above with camp site accommodation at Glenara. (Please note that the price on the registration form is incorrect, it should read $160 not $180.)

OPTION "D" $85
for those organising their own bed and breakfast accommodation. All other "PACKAGE DEAL" items are included.

For PARTNERS, not participating in the conference, we offer bed and breakfast for 4 nights, welcome Bar-B-Que and D.Y.K.T. show:
"A" (Abel Tasman Motor Inn or Park Lane Motel) = $140. **"B"** (Glenara Hostel) = $100. **"C"** (Shared camp site) = $65.

For CHILDREN there is bed and breakfast for 4 nights, welcome Bar-B-Que, D.Y.K.T. show and FREE childcare.
"A" = under 4 years free. 4 to 14 years = $40 **"B"** (Glenara Hostel - all ages) = $100 **"C"** = under 4 years free. 4 to 14 years = $24

DAY TICKETS are available too. Also morning tea, lunch and afternoon tea at $12 per day may be pre-booked for partner and children if required. Conference registration fee $20 per day.

SOCIAL EVENTS

As Tassie caves are longer, harder, deeper and prettier, there are of course, the Caving Field Trips to look forward to. Running both pre and post conference (29th Dec '92 to 3rd Jan '93 and 8th to 16th Jan) we are organising Guided Trips into the Ida Bay, Mole Creek, Junee Florentine and Mt Cripps areas, with camping nearby.

To welcome you to the Conference will be a free BAR-B-QUE at Glenara on Monday 4th January, from 6pm. Registration will take place here from 2pm. Later this night will be the screening of the Do You Know Tasmania slide and tape presentation. This is an expertly produced introduction to Tasmania, and will include a segment on "caving in Tassie".
At 7pm on Thursday 7th, will be the infamous "CAVERS DINNER ($25). The venue for this is the "OLDE TUDOR MOTOR INN", Bass Highway, Launceston. There, "HENRY'S BANQUET CENTRE" will be transformed into a speleologists delight. The photographic competition will also be shown at the dinner.

PHOTOGRAPHIC COMPETITION

Now is the time to think about entering the "TASTROG '93" Photographic Competition. No entry fee is charged and it is not necessary to attend the conference, just forward your slides or prints to us by 4th January '93. Trophies will be awarded and the categories are:- Surface, Entrances, Passages/Chambers, Squeezes, Action/Technical, Decoration, Scientific, Dirt, and Novelty.

TRANSPORT

We will arrange transport, for those needing it, for field trips and social events.

If bringing your own car, you may wish to take advantage of the limited number of car and passenger spaces we have booked on both ferries.

"SEACAT TASMANIA" departs Port Welshpool in Victoria on Sundays 27th Dec '92 and 3rd January '93. Returns Sundays 10th and 17th Jan. A 4 1/2 hour catamaran trip.

T.T. LINE "ABEL TASMAN" departs Melbourne Sunday 27th Dec '92 and Saturday 2nd Jan '93, arriving Devonport the following morning. Returns Saturday 9th and Sunday 17th Jan, arriving the following day.

Let us know A.S.A.P. if you require a booking reserved for you on any of these dates. A small discount may be offered.

ANSETT AUSTRALIA is our official carrier and their sponsorship has enabled us to print the registration brochure. To show support, we urge participants to fly to Tasmania with ANSETT AUSTRALIA and to quote our Conference Booking Code MC09277 to your travel agent. Book early to ensure the best possible fares.

PAPERS

Expressions of interest in presenting a paper, conducting a workshop, or wishing to contribute in any way, to be sent to us A.S.A.P. We are requesting that papers be typewritten and/or on a floppy disc in IBM/DOS format, between 3 and 12 pages in length for A4 sized paper, and received by us before 25th November '92.

To encourage "Early Bird" Conference registration, those received before 25th September '92 will be entered into a draw for a mystery prize, donated by our sponsor "Wildsports"!

Registration forms available on request from:

"TASTROG '93"
P.O. Box 315
Launceston
Tasmania 7250

TAS TROG 1993

BE THERE FOR THE FUN