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CONTENTS

MISCELLANEOUS NOTES	1
SAFETY NOTES	1
ASSIGNING A GRADING TO CAVE SURVEYS	2
CONSERVATION ACTION	5
ABSTRACTS AND REVIEWS	6

C O V E R : Unfortunately, in many cases, it seems that the only way to prevent damage to our caves is to keep as many people as possible out of them. Several New South Wales societies combined in a conservation trip to Yarrangobilly this year. They successfully restored some damaged sections of Restoration Cave to something like their original appearance, and to ensure that they remain that way a gate has been fitted to the cave. The cover picture for this issue shows the gate being locked by the leader of the trip. E. G.

Incidentally, the cover page and particularly the illustration used in this year's issues of the Newsletter must be considered to have been experimental. This being the case, perhaps subscribers and member societies would like to express their opinions as to whether we should continue with this type of cover, improve it, or do away with a cover page.

Material for publication in the ASF Newsletter should be forwarded to the Publications Officer, at least one month in advance of the month of publication.

Because of automatic addressing, subscribers are asked to notify any change of address without delay.

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MISCELLANEOUS NOTES

- ★ Apparently the Glass Cave at Wombeyan, N.S.W. is under threat of demolition if a request to extend a mining lease in the area is granted. The New South Wales Tourist Department have sort the support of SUSS in an attempt to have the application rejected. SUSS, in turn, have requested the support of ASF and various individuals who have some interest in the preservation of the Wombeyan Caves. It is understood that to be successful the opposition will have to be quite strong and fast action will be necessary. More precise details of this matter could be obtained from the ASF President or SUSS Secretary.

- ★ Subscribers must have noticed that very little news from member societies has reached the appropriate column of this year's newsletters. In fact the only news which was available was gleaned from some borrowed society newsletters, WASG being the only member society to forward a copy of their newsletter to the ASF Publications Officer this year. Really it is not too difficult to find material for the newsletter, so if member societies don't bother to keep the Publications Officer informed of their activities he is just not going to chase after them. It is a great

pity that this type of notice has to be continually inserted in these pages.

SAFETY NOTES

A recent television newsreel item reported that the Adelaide St. John's Ambulance Brigade were testing a new type of splint for use in cases of injury to limbs. It consists of an inflatable, heavy plastic sheath which completely encloses --and is fastened around--the limb. Unlike the conventional type of splint it effectively cushions the injury and provides overall protection. Its light weight and small size when folded would appear to make it particularly useful for first-aid in caves. The only obvious disadvantage is its susceptibility to damage, particularly when inflated for use.

Perhaps member societies in each State could investigate this matter further and present their findings to ASF for the benefit of all.

Word has filtered through that the four Sydney societies have managed to get together to discuss co-ordination of regional Search and Rescue arrangements. Thus the various S&R bodies are now interconnected and ready for action at short notice.

THE AUSTRALIAN SPELEOLOGICAL FEDERATION
EXTENDS THE COMPLIMENTS OF THE SEASON
TO ALL ITS SUBSCRIBERS

ASSIGNING A GRADING TO CAVE SURVEYS

B. M. Ellis

Bridgewater, Great Britain

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Cave Research Group
of Great Britain
from the
C.R.G. Newsletter
Number 88, September 1963

It is the opinion of the author that the system of accuracy gradings for cave surveys, published by the Cave Research Group¹ is not as concise as it might be, because it is written for specific combinations of instruments. This article suggests a scheme to enable cave surveyors to arrive at an appropriate survey grading when using combinations of instruments other than those given in the table of gradings published by the C.R.G.

A completely accurate system of grading cave surveys would, presumably, be based on the known accuracy of the survey. However, this is rarely known and therefore a system of "expected" accuracy must be used. A very convenient manner in which this can be done is to base the grading on the instruments used, and assume that the accuracy will be the same irrespective of the surveyor and the conditions under which the survey is made. This is the system used by A. L. Butcher and recommended by the Cave Research

Group. Although this does not give the accuracy of the survey, it does give a useful indication of the accuracy to be expected.

The problem that has confronted surveyors ever since the scheme was published is: what grading should be given to a survey if different instruments were used from those listed, or--if the instruments were the same--they were used in a different combination? It is assumed that other surveyors have done as the author has in these circumstances: guessed at which of the combinations given would produce a survey of the same accuracy, and taken this as the appropriate grading. This is reasonably satisfactory for most circumstances but gives rise to difficulties when, for example, a clinometer has been used on what would otherwise be a low grade survey. The use of a clinometer is necessary if sections are required and, at the same time, can greatly increase the accuracy of the plan. For example, if a slope of 8° is ignored, a 1% error is immediately introduced into the plan; and as the angle of slope increases the percentage error increases at a greater rate--a 25° slope ignored introduces a 10% error. How is this increase in expected accuracy to be shown in a grading for a survey made using a hand compass and a cloth tape?

To reduce the guesswork required in designating an appropriate grading to a cave survey the following suggestion is made. The table of survey gradings already published should be replaced by Table 1 of this article. It will be seen that the instruments, and other means, most likely to be used in cave surveying, are listed in vertical columns and that alongside each is given a number. To derive a survey grading it is only necessary to add together the numbers alongside the instruments used in making the sur-

¹ BUTCHER, A. L. 1953 : Cave Survey
Pub. No. 3, C.R.G. of Gt. Britain.

CULLINGFORD, C. H. D. (Editor)
1953 : British Caving. Chapter XVII
"Cave Surveying" by A. L. Butcher;
Routledge & Kegan Paul, London.

Table 1

DETERMINATION OF GRADINGS

METHOD USED TO MAKE MEASUREMENTS			RATING NUMBER
DISTANCE	DIRECTION	INCLINATION (AND RESULTS USED IN PLAN)	
		Estimated outside the cave	$\frac{1}{4}$
Estimated outside the cave	Estimated outside the cave	Estimated and noted inside the cave	$\frac{1}{2}$
Estimated and noted in the cave	Estimated and noted in the cave	Hand-held clino., readings $\pm 2^0$	1
Pacing or count- ing body lengths		Hand-held clino., readings $\pm 1^0$	$1\frac{1}{4}$
Marked string or cord	Hand-held compass readings $\pm 5^0$		$1\frac{1}{2}$
Cloth tape	Hand-held prisma- tic readings $\pm 1^0$		$1\frac{3}{4}$
Metal tape or chain			2
Tacheometer or similar			$2\frac{1}{2}$
	Calibrated prismatic compass and clin- ometer, tripod mounted, readings $\pm \frac{1}{2}^0$		4
	Theodolite, astrocompass or similar, tripod mounted, readings $\pm \frac{1}{4}^0$		$4\frac{1}{2}$
NOTES			
1. If "leap-frog" method of surveying is employed when hand-held inst- ruments are used to measure direction and inclination, increase the total rating number by $\frac{1}{2}$.			
2. The surveyor may alter the derived grading by a factor of $\pm \frac{1}{2}$ to take into account conditions at the time of the survey, known clos- ure errors, etc.			
3. The survey grading is to be given to a half or whole grade between 1 and 7.			

Editor's Note: In granting per-
mission to reprint this article,
the Cave Research Group's Editor
has pointed out that the theories
expressed therein are those of the
author and are not necessarily the
official opinions of the Group.

For further discussion on this

problem, I would direct the reader's
attention to three articles in
C.R.G. Newsletter No. 90/91, by A.
L. Butcher, B. M. Ellis and--for
an Australian point of view--J. N.
Jennings. Abstracts of these are
included elsewhere in this issue
of the Newsletter.

Table 2
COMPARISON OF GRADINGS

INSTRUMENTS USED TO MAKE SURVEY	SURVEY GRADING	
	C.R.G.	NEW SCHEME
Sketch plan from memory, not to scale	1	1
Sketch plan roughly to scale. No instruments used; direction and distances estimated	2	$1\frac{1}{2} - 2$
Simple compass ($\pm 5^\circ$) and marked string	3	3
Prismatic compass ($\pm 1^\circ$) and cloth tape or marked string	4	$3 - 3\frac{1}{2}$
Calibrated prismatic compass ($\pm \frac{1}{2}^\circ$), metal tape and clinometer	5	$4\frac{1}{2} - 5$
Tripod-mounted, prismatic compass ($\pm \frac{1}{2}^\circ$) and clinometer ($\pm \frac{1}{2}^\circ$) and metal tape	6	6
Theodolite, tacheometer and metal tape	7	$6\frac{1}{2} - 7$

vey. This scheme includes four new features.

1. The surveyor is allowed latitude to alter the "derived" grading by plus or minus half a grade to take into account factors which cannot be written down as hard and fast rules--such things as known closure errors, conditions under which the survey was made, the care that was taken over making the readings and plotting the survey, etc.

2. If the "leap-frog" method of surveying is used with hand-held instruments then the grading is increased by half a grade. In this method the surveyor starts at station 2, takes readings to 1 and 3, then moves to station 4. From here he takes readings to stations 3 and 5, and so on. This procedure minimizes the errors introduced on changing stations when using the normal method of taking readings from station 1 to 2, then from 2 to station 3, etcetera.

3. Normally surveys should not be made using a combination of instruments that occupies more than two adjacent horizontal lines in Table 1. If a wider range than this is used then one of the instruments, or methods, will be unnecessarily more (or less) accurate than the others. (Such a combination can give rise to a false grading on this scheme).

4. As the instruments are listed in order of increasing accuracy, if an instrument is used that is not listed, it is easy to derive a suitable figure to be used to obtain a grading.

Two examples should remove any doubts about the working of this system. Thus, a survey is made using a metal tape, and clinometer and calibrated prismatic compass both mounted on a tripod and the readings being accurate to $\pm \frac{1}{2}^\circ$, then the "numbers" are $2 + 4 = 6$ and a grading of $5\frac{1}{2}$ to $6\frac{1}{2}$ could be

claimed. As another example, if to make a survey, a cloth tape, a hand-held prismatic compass and a hand-held clinometer (the readings of both being accurate to $\pm 1^0$) were used, then the grading would be $1\frac{3}{4} + 1\frac{3}{4} + 1\frac{1}{4}$ which gives a total of $4\frac{3}{4}$. As it is intended, by the author, that survey gradings should be given only as a whole or half grade then the surveyor would claim either $4\frac{1}{2}$ or 5 depending on whether or not he thought the survey was as accurate as possible with the instruments used.

It will be found that, in most cases, the gradings obtained by this scheme agree closely with those given against the examples listed in the C.R.G. publications. These are shown in Table 2. The main variations occur around the original C.R.G. Grade 4. In the author's opinion this is not surprising because there is a wide difference in gradings at this point; not only does one have to use a calibrated compass to increase the grading from 4 to 5, but a clinometer must also be used. If the idea of "half-gradings" is not liked then results could just as easily be given to the nearest whole number.

The only originality in this scheme is an attempt to minimize the guesswork that cave surveyors have had to make ever since the Cave Research Group first published their survey gradings--denoting on a cave survey the appropriate grading when their method of survey was not identical with one of the examples given. The variations between the gradings given by this system and those originally described (with one exception where it is thought there is an improvement) are very small. If this system were adopted there would be no need to

alter any previous gradings. It is felt that the system is only very little, if at all more complicated than the original but is definitely more consistent and more comprehensive.

Bridgwater
November 1962

CONSERVATION ACTION

Earlier this year members of several N.S.W. societies joined in a conservation trip to Yarrangobilly organized for the A.S.F. N.S.W. Co-ordination Committee. Their purpose was to attempt to restore some damaged sections of the decoration in Restoration Cave and to take practical steps to guard against further damage--wanton or otherwise. The cleaning job was quite successful and PVC cable was installed to mark a preferred path through the cave. Also a locked iron gate has now been fitted near the entrance so that there can be some control over visitors to the cave.

Also earlier in the year, WASG reported that they were co-operating with the Augusta-Margaret River Tourist Bureau to install a protective grill and gate in Easter Cave to reduce the danger of vandalism.

Well founded objections to the gating of caves can be expounded, and the majority of speleologists must remember that their pursuit does not entitle them to any extraordinary rights with respect to visiting caves. Indeed, rather have they a duty to educate as many people as possible in the ways and benefits of cave conservation. However positive action, such as the examples above, must be taken if our Australian caves are to be preserved. And the sooner the better!

If you unwittingly mar a cave, surely your act is no less selfish than if it had been wantonly committed by the very worst vandal.

 ABSTRACTS AND REVIEWS

BUTCHER, A.L. 1964. Grading of Cave Surveys. Cave Research Group Gt. Britain Newsletter 90/91 : 17-18.

This is a brief comment on Ellis's "Assigning a Grading to Cave Surveys", C.R.G. N'letter 88, (See page 2) by the originator of the present C.R.G. grading. Butcher welcomes the new proposals and emphasizes the importance of their not rendering previous gradings invalid. On the divergence of the two schemes around Grade 4, he explains that when the present grades were originally drawn up it was recognized that "...the dividing line between the unpremeditated survey and the result obtained by a planned surveying party..." lay around Grade 4. He would resist lowering the present Grade 4 to $3\frac{1}{2}$ and suggests that in Ellis's scheme the difference between $1\frac{1}{2}$ points for a simple compass and $1\frac{3}{4}$ for a prismatic compass is too small in comparison with the 1 point given a hand-held clinometer. Butcher's comments are, of course, his own opinions and not official C.R.G. policy.

--EGA

JENNINGS, J.N. 1964. Cave Surveys and Their Grading. C.R.G. Gt. Britain Newsletter, 90/91 : 18-22.

While he recognizes the difficulties which prompted Ellis to propose a new cave survey grading scheme, Jennings--basing his remarks on Australian experience--challenges the value of elaborating and refining the present C.R.G. system. He reasons that if the more elaborate scheme is to be complete it must allow for all types of surveying instruments. For example, the "metallic" reinforced linen tapes and the light-weight miner's dials with an accuracy no better than one degree--both of which are

commonly used in Australia--are not listed in Ellis's table. Further, Jennings points out that although allowance has been made for "leap-frogging" the method of taking both backsights and foresights with prismatic compass and Abney level has been neglected.

Jennings' greatest doubts about the proposed new scheme are based on the fact that the grading only refers to the traverse and not the delineation of the shape and nature of the cave. In fact neither the present C.R.G. scheme nor the proposals of Ellis take account of the purpose of a survey.

After assigning cave surveys to one of three categories according to their purpose--that is, exploration, scientific, or engineering--Jennings suggests that the present grading scheme is adequate for exploration and engineering type surveys, but admits that the C.R.G. grades have failings when applied to scientific surveys. He then gives details of the various surveying methods usually employed in Australia.

In conclusion the author expresses his opinion that there is no great value in elaborating Butcher's grading system and points out that one could continue to add valid refinements to the present scheme without entirely eliminating its approximate nature.

--EGA

ELLIS, B.M. 1964. Mendip Cave Survey Colloquium. C.R.G. Gt. Britain Newsletter, 90/91 : 22-24.

This article is a summary of the proceedings at a meeting of eleven of Britain's experienced cave surveyors. The meeting discussed the purpose of cave surveys, their grading--particularly with respect to the outline detail--and standardization of scales, symbols, etc. Recommendations were prepared and presented to C.R.G. --EGA