CAVES IN WESTERN AUSTRALIA

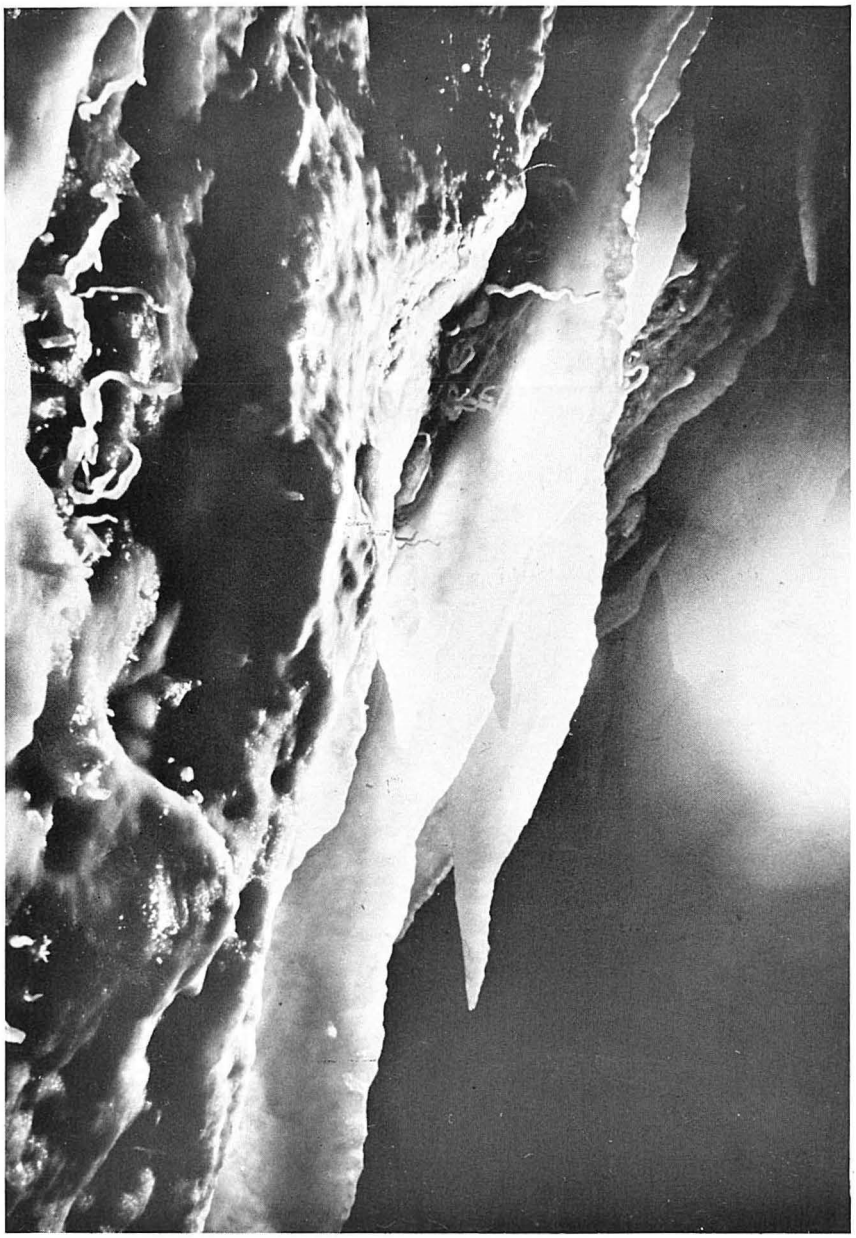

PHOTO: N. POULTER

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CAVES IN WESTERN AUSTRALIA

1. Introduction

Caves have always held a strange fascination for man. Even today when we understand how caves are formed there is still a certain "fear of the unknown" for most people when they enter this strange, dark environment.

In Western Australia the protection of caves and their delicate formations has had a chequered history. Fortunately, the importance of most of our cave systems was recognised early enough to ensure reservation in various public reserves and National Parks.

However, with increasing visitor and tourist pressure positive steps are now urgently required to properly conserve and manage the State's caves and other natural attractions, so as to ensure enjoyment by future generations.

In this booklet the caves of Western Australia are briefly described. Comments are made on their geological formation, some of their major values and attractions, the kinds of special management problems which need to be considered, and some of the steps which are being taken towards their future conservation.

2. Location of Caves in Western Australia

There are several regions of Western Australia which contain extensive cave systems (see Figure 1). The "oldest" caves are developed in the Devonian Reef Limestones (approximately 350 million years old) of the Kimberley Region. Those documented to date are mainly located in the Napier and Oscar Ranges. Caves in Tertiary Limestones (14– 45 million years old) occur in the Cape Range National Park, near the North West Cape, and also on the extensive Nullarbor Plain in the Eucla Basin. The Nullarbor caves range from small sinkholes (known locally as "blowholes") through to huge underground tunnels with lakes and submerged passages.

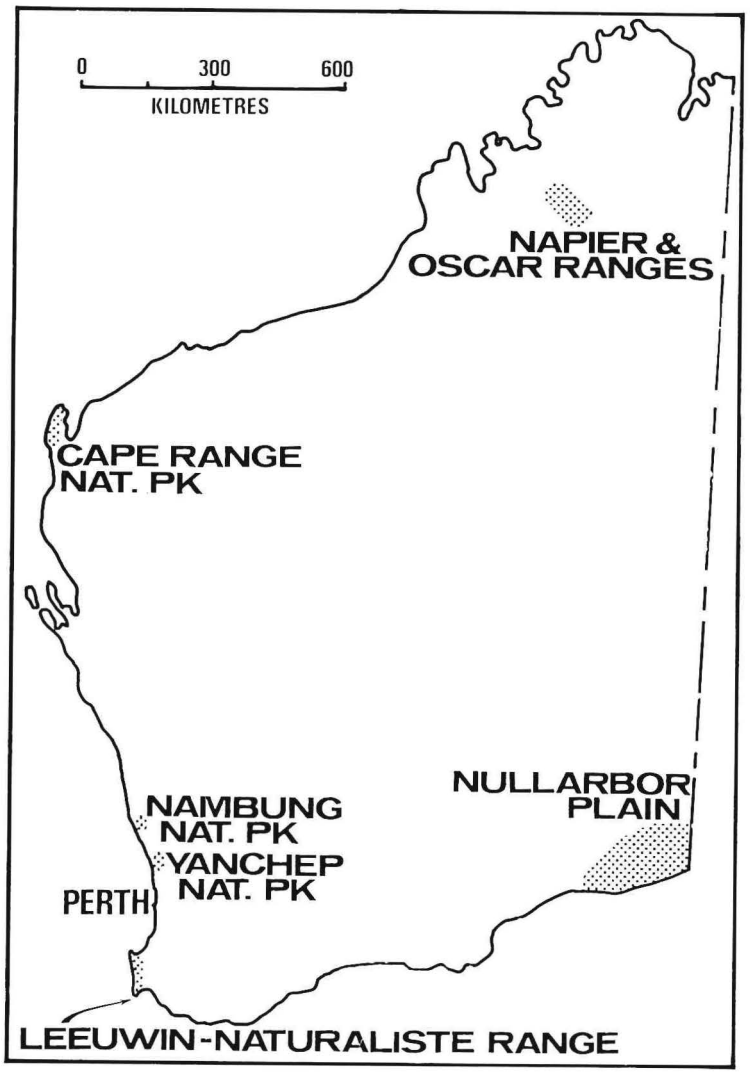


FIGURE 1: Major cave areas of Western Australia

The most impressive "speleothems" (cave formations) are found in the "youngest" caves which have developed in the Aeolian Limestones (approximately 10,000 years old) fringing the coast in the South West corner of the State. The greatest concentrations of caves are in the Nambung National Park, around Yanchep and in the Leeuwin-Naturaliste Ridge.

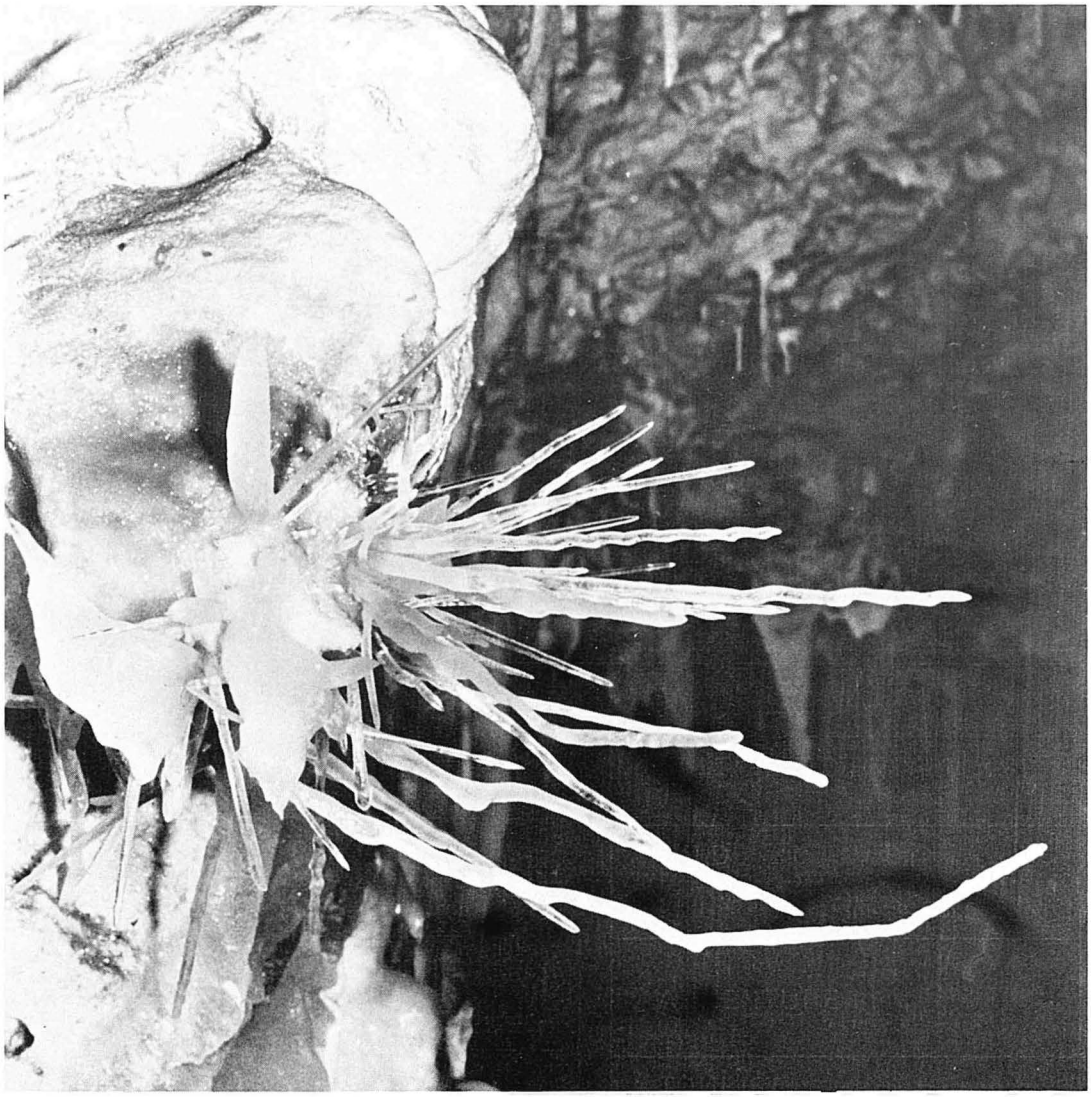
3. Development of Caves and Cave Formations

Limestone caves and associated surface "karst" features (such as gorges and collapse "dolines") have been formed mainly from the action of water. Rain absorbs carbon dioxide from the air to form a very weak acid solution and further acids are added as the water seeps through decaying vegetation in the soil surface. This weakly acid solution is then able to dissolve the limestone, especially along cracks and other lines of weakness such as faults or old tree root channels.

In some caves the formation of passages and chambers has been by gradual solution attributed to lakes. In other cases formation has progressed through the erosive action of streams and rivers. Occasionally there is evidence for mainly physical processes, for example, caves which have been formed by the action of waves along the coastline.

Caves developed in the Aeolian Limestones of the South West also show deposition of dissolved calcium carbonate as impressive speleothems. These are mainly found along the walls and floors of the caves and they may vary greatly in form from minute helictites only a few millimetres long up to huge pillars and flowstones weighing several tonnes. Some of the commonly known speleothems which occur in most caves are stalactites, stalagmites, shawls, columns and straws.

In addition to the speleothems or "pretties" there are many other interesting features to be seen in caves including evidence of old stream levels, miniature collapses and faults, and variations in rock type.



Helictites are a group of speleothems that seem to defy gravity and extend in strange and unpredictable directions. Growth is controlled by water surface tension resulting in random orientation or development along the major crystal axes of calcite already deposited.

PHOTO: J. WEBB

4. The Values of Caves

Caves have three main values:

* as habitats for certain species of wildlife
* as sites of archaeological and scientific importance
* as attractions to tourists and recreational cavers

The relatively constant temperature and humidity in caves makes them ideal environments for some forms of wildlife. In addition to their commonly known attractions to bat colonies they also support many specially adapted insects and water dwellers in their streams and lakes.

Caves are scientifically important on several counts. First, they provide natural "laboratories" for study of the present day wildlife. Second, they hold the secrets of past populations of wildlife by way of bone deposits which may have been preserved in the cave for thousands of years.

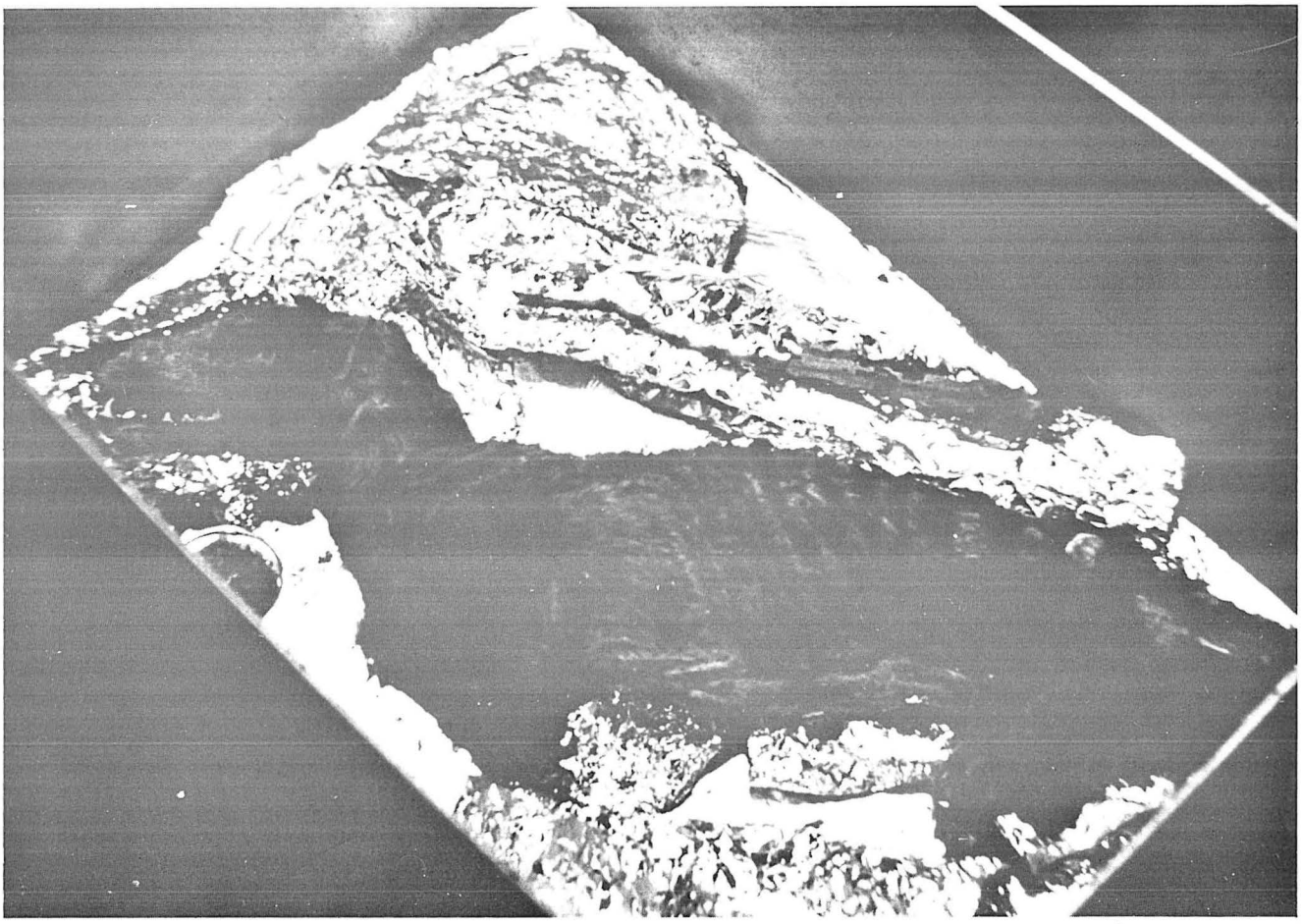
Finally, they enable speleologists and geologists to build up a picture of the various processes involved in cave formation by "viewing from within" so to speak. The archaeological significance of caves is due to their use or habitation through the ages by man. Some caves contain Aboriginal wall paintings and other artifacts giving valuable clues into the prehistory of Western Australia.

The recreational attractions of caves are also varied and range from the feeling of awe experienced by tourists when visiting the well lit "developed" caves through to the challenges experienced by cavers as they squeeze through muddy cracks or wade chest deep in icy cold water.

5. Problems of Cave Conservation

There are potential conservation problems with all caves whether developed for tourism or used purely by cavers or casual visitors. The "threats" to caves include external factors such as changing land use and mining, and internal factors such as accidental damage and intentional vandalism of speleothems.

Fortunately, in Western Australia there has been very little conflict between cave conservation and mining interests. Although there is extensive quarrying for limestone along the Coastal Plain this has generally been well away from the more important caves.



Mummified carcase of a thylacine (Tasmanian tiger), several thousand years old. This was discovered in a cave on the Nullarbor Plain. Such carcases are rare but bones from animal skeletons are commonly found in most caves.

PHOTO: W.A. SPELEOLOGICAL GROUP

One of the many thousand Nullarbor blowholes. The effects of surface land use are well illustrated in this photograph. The original vegetation has been denuded by heavy grazing. In periods of heavy rainfall silt and animal wastes are washed into the cave system below.

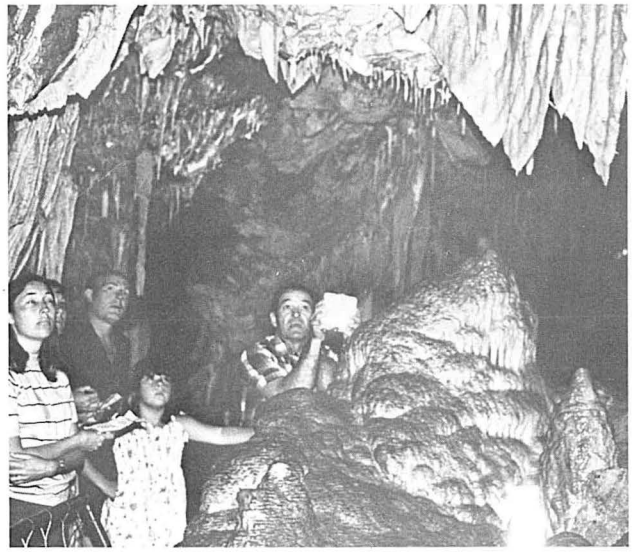
PHOTO: J. WATSON

Other land uses which have affected caves include residential development, road construction, forestry and agriculture. Changes from the original natural vegetation to cleared land or plantations can have marked effects on cave hydrology. It is not only the area immediately above the cave that is important, but also the entire catchment area of any streams or other drainage lines entering the cave. In some other parts of Australia, though fortunately not in W.A., there have been cases of direct pollution of underground streams through careless siting of septic toilets, runoff from animal manures and contamination by pesticides and fertilisers. Also, before vegetation becomes re-established after clearing there can be a risk of surface run off water carrying silt and clay into caves.

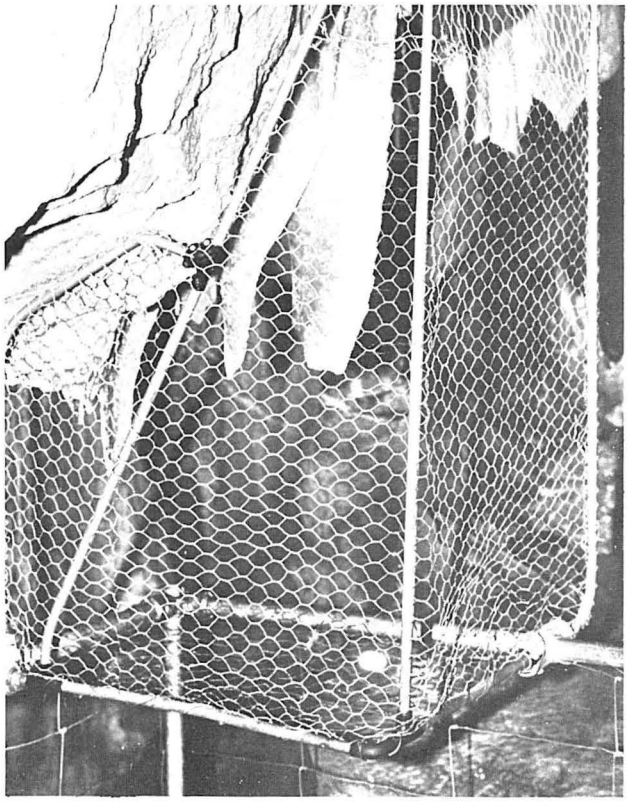
Changes in natural vegetation can produce more subtle, but nevertheless significant, effects on the cave environment. For example, the planting of dense stands of pine trees reduces the amount of rainwater seeping through the soil and into groundwater systems.

The effects of visitor pressure on the cave environment can also be subtle yet highly significant. In addition to litter brought in to tourist caves there is "unintentional" transport of dirt on visitors' shoes and fluff or dust from clothing which in time becomes deposited over speleothems eventually spoiling their appearance. Large numbers of visitors also lead to increases in the amount of carbon dioxide in the cave air. Quite apart from causing headaches and other discomforts, the high CO_2 levels also affect both the rate of formation of speleothems and the suitability of the cave environment for fauna.

Vandalism is the ultimate threat to cave conservation. In a few moments man can destroy what has taken literally thousands of years to form. Regrettably much damage has already been done and with a few exceptions all the well known caves in Australia have been vandalised, especially in the periods immediately following their discovery. It is ironical to note that if removed from the cave environment the beautiful calcite speleothems immediately begin to lose their "freshness" and eventually they fade completely.



Last year there were over 200,000 visits to the six tourist caves in Western Australia. The party seen here is in Yallingup cave. PHOTO: J. WATSON



The cage around these shawls at Yallingup Cave, whilst affording to them protection from vandalism also detracts considerably from their beauty. One of the biggest dilemmas for tourist cave managers, is how to compromise between physical protection on the one hand and aesthetic appeal on the other hand. PHOTO: N. POULTER

6. The Need for Management

In view of the various threats to caves and their "irreplaceability" it is clear that they must be adequately protected and managed to minimise the threats.

The first step is to draw up an inventory of all the known caves and then to classify them in terms of the various values already described. Then, and only then, is the responsible managing authority able to define the type of management and the degree of protection required for each cave.

Such a procedure is relatively easy for recently discovered caves and those where the impact of man has been minimal. Frequently, however, the damage has already been done and management can at best only hope to maintain the present status of the cave. In some cases it is not worth the management effort and a decision may be made to "let the cave go" and possibly even to encourage use by large groups of inexperienced or recreational cavers.

The existing tourist caves are also a special case where past history has dictated the degree of abuse on one hand, but, on the other hand, it has also dictated the degree of controlled access and management currently in operation.

Taking into consideration these factors an expert group of amateur speleologists in Western Australia has been able to develop a very simple cave classification system. This recognises different types of user groups and different management strategies for each cave. (Figure 2).

Until recently many of the major cave reserves, especially in the Leeuwin-Naturaliste Ridge, were "unvested." Consequently, in the absence of any active land managing authority having responsibility for the cave, amateur speleologists took it upon themselves to protect the more important sites by installing locked entry gates and by stringently controlling the numbers of speleologists visiting each cave per year. It is now anticipated that the various land managing authorities which control caves will follow this lead and develop appropriate management programmes in consultation with the speleologists.

7. Where to See Caves.

All caves are different. The person interested in seeing caves is therefore encouraged to visit as many of the W.A. tourist caves as possible. These are located at Yanchep and in the Leeuwin-Naturaliste Ridge (Figure 3).

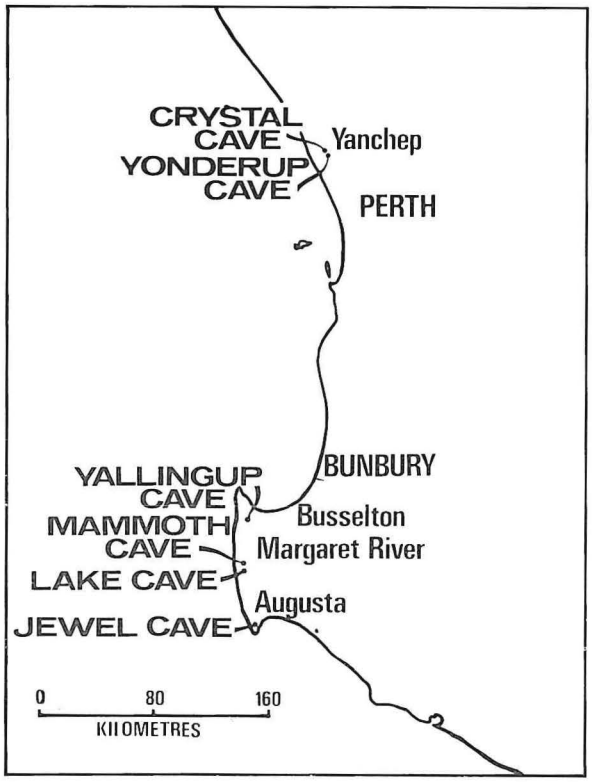
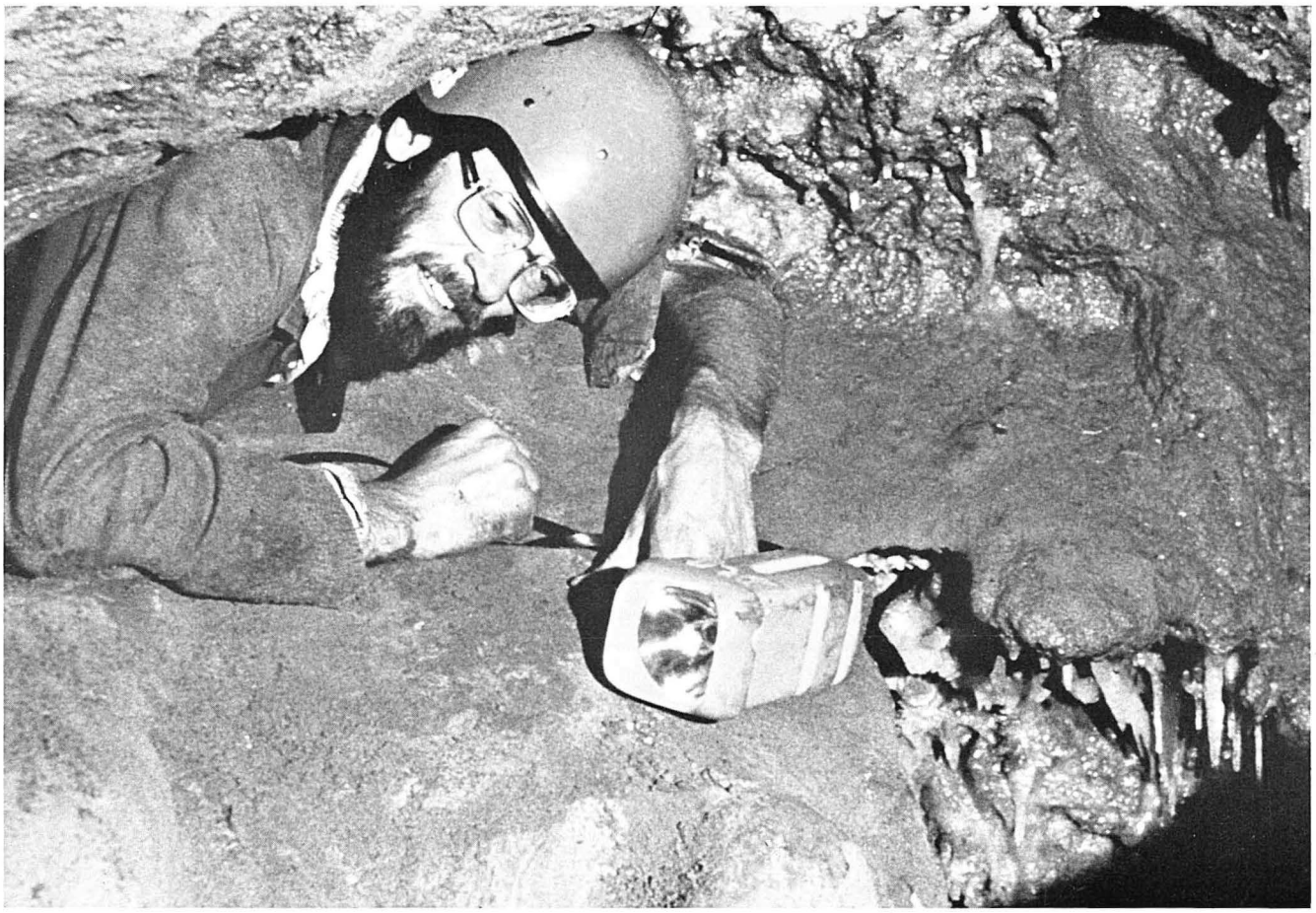


FIGURE 3: Tourist caves of Western Australia

CLASSIFICATION	USER GROUPS	RECOMMENDED MANAGEMENT
RESTRICTED ENTRY	Responsible speleologists, Scientists	Maximum protection – Locked gate
WILD	Speleologists, Other cavers	General protection, Recreation – not locked but access route to cave entrance should not be obvious
ADVENTURE	General public who discover the cave	
TOURIST	General Public	Tourist use, Educational value – Clearly signposted

FIGURE 2: Cave classification, user groups and recommended management



Cave exploration involves awkward "squeezes" sometimes through water and mud. Here an officer of the Department of Conservation and Environment is undertaking an inspection in a cave near Augusta.

PHOTO: B. LOVEDAY

There are two main caving groups in Western Australia which belong to the highly respected Australian Speleological Federation. Both clubs operate under the guidelines and rules of the Federation and both are prepared to accept newcomers. The clubs are actively involved in various research projects and in new exploration throughout Western Australia.

Further information on caves is available from the above clubs and also in numerous books some of which are available for consultation at the Department of Conservation and Environment.

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Perth

Acknowledgements

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