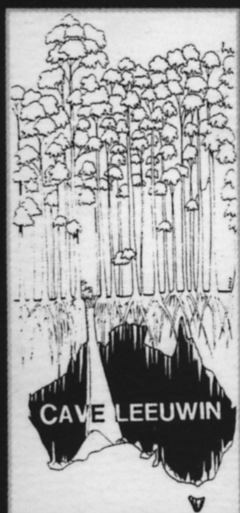


CAVE LEEUWIN



	Sunday 30 Dec	Monday 31 Dec	Tuesday 1 Jan	Wednesday 2 Jan	Thursday 3 Jan	Friday 4 Jan	Saturday 5 Jan
Time							
9am	R E R G E R	ASF Committee Meeting	Welcome/ Opening D.Smith	Wayne TYSON (1) Lex BASTIAN	Rolan EBERHARD Patrick LARKIN	Brenton KNOTT Wayne TYSON (2)	ASF Committee Meeting (if required)
10am	I G E S I G		Z. Xue Wen (1)				
10.30	T S I R T S	Tea Break	Tea Break	Tea Break	Tea Break	Tea Break	
11am	A R T T A R I T A		Neil TAYLOR Slides CI	ZHU (2) Xue Wen Slides Mexico	Russell BRIDGE Cave Management Workshop	Neville MICHIE Norman POULTER	
12	O I T						
12.30	N O I N O N	Lunch	Lunch	Lunch	Lunch	Lunch	
1pm				S		Roger HOWLETT	
1.30		ASF Committee Meeting	Julia James	P	John WEBB	Mark BONWICK	
2pm	R E R G E R		Rauleigh WEBB (2)	E L			
3pm	I G E S I G T S I R T S		Cave Management Prelim.	E O S P O	Bill HUMPHRIES	Slides Australia All Over Slides Lechiguilla	
3.30	A R T I T A	Afternoon Tea	Afternoon Tea	R	A1 Warild	BCI Bat Slides	
4pm	O I T N O I N O N		Keir VAUGHN- TAYLOR	S	Afternoon Tea Rauleigh WEBB (1)		
5pm		ASF Committee Meeting					
6pm	Ice Breaker BBQ		BCI Bat Slides				
7pm		New Years Eve Bash		Slide Competition Showing	Dinner (7:30)		
8pm							
8.30							

CAVE LEEUWIN PAPERS

Biology

POULTER Norman – Cave Rights for Trogllobites
HUMPHRIES Bill – Biological Research into the Cape Range Karst area.
KNOTT Brenton – The Importance of Caves at Yanchep, Western Australia

Karst and Cave Geomorphology

WEBB Rauleigh James – Stegamites – a "New" Speleothem (2)
MICHIE Neville – Phenomenal Cave Climates
WEBB John – How old are Australia's caves ?
Evidence from Buchan, eastern Victoria,
and Chillagoe, north Queensland
BASTIAN Lex – The Hydrogeology and Speleogenesis of Yanchep
James Julia – The Role of Sulphuric Acid in Speleogenesis
XUE WEN ZHU – China Karst Types (1)
Fenglin Karst (Tower and Cone karst) in China (2)
EBERHARD Rolan & KIERNAN Kevin – Little Trimmer Project, Mole Creek,
Tasmania

Cave Surveying

BONWICK Mark – RDF in the Jenolan Caves Survey
BRIDGE Russell – Total Stations for Cave Surveying
WARILD Al – A New Topofil

Cave Management

WEBB Rauleigh – People Counters in Caves (1)
TAYLOR Neil – WA Cave Permit System
LARKIN Patrick – Central Queensland SS Inc. vs CQC Pty Ltd – "The Bats Case"
VAUGHN-TAYLOR Keir – What Happened at Yessabah

Expeditions

TYSON Wayne – Caving in Java (1), Plane Caving on the Nullarbor (2)

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CAVE LEEUWINGUIDEBOOK to CAVES of SOUTH-WESTERN WESTERN AUSTRALIA

published by

WESTERN AUSTRALIAN SPELEOLOGICAL GROUP

DECEMBER 1980

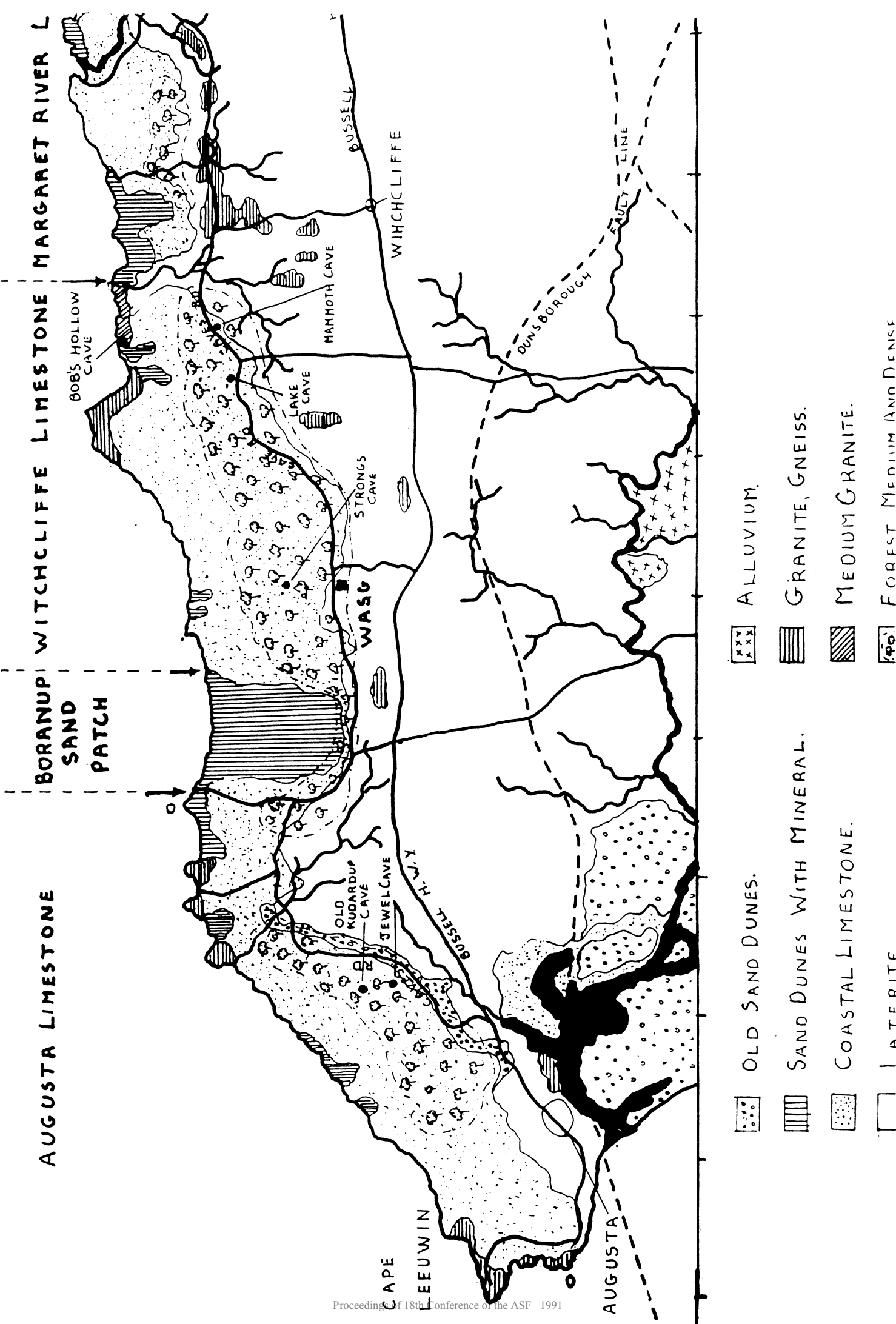
INTRODUCTION

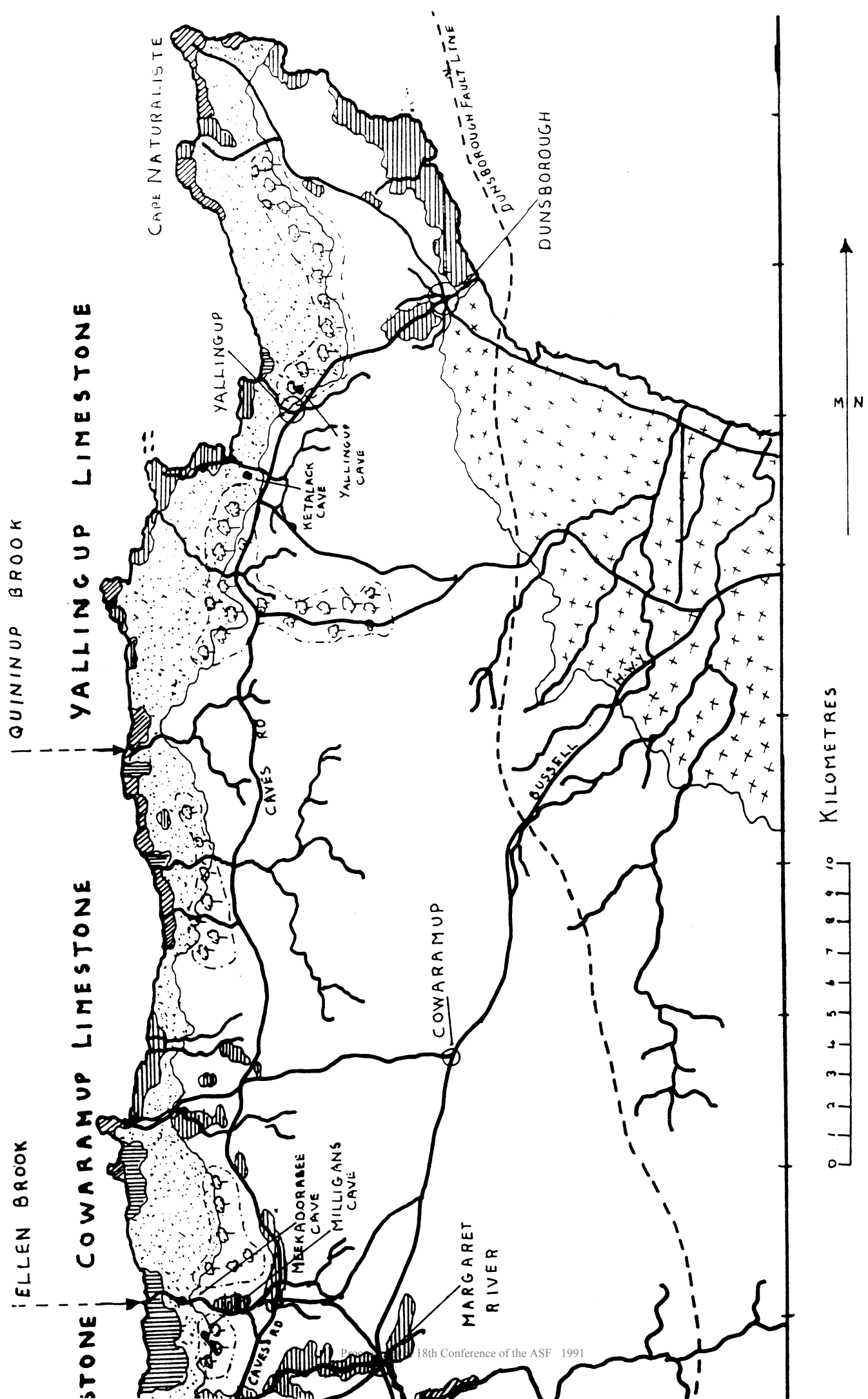
This publication is an adaptation of the 1978 Guidebook and is intended to provide information and background to people interested in the caves of the south-west of Western Australia. Participants at CAVE LEEUWIN, the 18th Biennial Conference of the Australian Speleological Federation, 1991, in Margaret River, W.A., will find it of value in various areas for field trips.

Many people have contributed to the production of this booklet and its 1978 predecessor. Barry and Fran Loveday have been responsible for an incredible amount of research to produce the information on the Leeuwin-Naturaliste Ridge, except for the Augusta area. Barry compiled the area map. Peter Bell wrote the Augusta information and produced the maps of Jewel and Old Kudardup Cave. A big thank-you to Peter for his excellent design of the front cover. **The photograph was taken by Peter in Jewel Cave.** Rauleigh Webb wrote the Eneabba information and produced the maps of Green and Kudjal Dar Caves. Perry Raison and Rauleigh Webb wrote the Jurien information. Kerry Williamson wrote the geological notes and the information for all other areas not previously accounted for. Perry Raison was responsible for updates to the 1978 information and was assisted by Lex Bastian and Rauleigh Webb. Printing and editing of this publication, except for the front cover, was by Perry Raison.

I hope you find this publication of use and interest and that it enhances your enjoyment of the caves in S.W. Western Australia.

Ed.





GEOLOGY AND GEOMORPHOLOGY

South-west of Western Australia

Coastal Limestone

The coastal limestone is believed to have formed 100,000 to 500,000 years ago. At that time, extensive glaciations caused the lowering of the sea level as much as 60 metres below present levels. The south-west of W.A. is one of the windiest sections of temperate coastline in the world. The high wind and wave energy results in a fast flux of sand-sized particles from the sea to the beaches to the active dune belts beyond. These particles are mainly calcareous and of biological origin, viz. mainly mollusc shell fragments of the calcareous red algae, and the microscopic skeletons of Foraminifera. Other particles are derived from the erosion of the basement rocks and the reworking of soils. These are mainly quartz in the Leeuwin Naturaliste Ridge, with some feldspars, garnets and heavy minerals.

This sand, over several incursions inland, blew into large dunes up to 200 metres above sea level. These dunes became stabilised by vegetation and the contemporaneous processes of soil formation, lithification and karstification began to occur. The lithification or solidification of the dunes is caused by rainwater, during the wet season, dissolving out part of the carbonate of lime which is then carried downwards to the watertable or the gneiss basement. During the dry season, reprecipitation of this carbonate of lime produced a very hard cap rock near the surface, with less well-cemented limestone below, and a leached quartz sand above. With time, the quartz sand developed into mature soils ranging from humic loams to terra rosas with ferricrete. These processes continue to the present.

One factor important to the development of caves in this area is the ease with which the northward-migrating dune belts helped by prevailing winds threw barriers of dune sand over the courses and valleys of small streams which lacked the flow of water in summer necessary to resist the encroaching sand. More perennial streams such as **Turner Brook** modified the dunes to form gorges of construction (Jennings, 1968).

North of Perth, even very large rivers (for example, the 160 km long Arrowsmith River) are very seasonal in their flow and could be blocked by the encroaching dunes. This has resulted in some very large streams sinking and forming large cave systems, for example, the river entering the **Stockyard Gully system** has been measured at 40 cusecs.

The streams whose downstream courses had been crossed by the dune belts would continue to flow through the porous dunes along their old courses, though some ponding would produce swamps. These vegetation-choked swamps would, with time play an important role in contributing to the aggressiveness of the stream waters.

When the dune belt solidified into limestone, a cavity could form above the stream. This cavity was widened and undercut by the stream until it became too wide for the roof to support the weight of limestone above. At this stage a collapse occurred producing a collapse dome or in some cases the collapse followed lines of weakness such as dune bedding or soil horizons. The weakness of the coastal limestone results in a preponderance of collapse forms, both doline and cave passage, often of considerable size. While the dune was solidifying, tree roots going deep within the

sand would act as conduits for the flow of percolation water. Sand around these roots would not lithify, leaving a tube of loose sand through the solid rock. If a collapsing cave intersected such a tube, the sand plus some surface soil would fall into the cave producing a soil cone and a shaft or solution pipe. Many caves are entered by such pipes.

As the coastal limestone consists of sand grains cemented together, water can move downwards between the grains whereas with impermeable crystalline limestones this percolation is restricted to the joints. Thus, straws, stalactites, etc., can occur over the whole roof of a cave, and the preponderance of small pores favours the formation of helictites. The minimal role played by joints (if any) in downward percolation of water disfavours the formation of rimstones, as concentrated flows of such waters are rare. The sloping roofs reflecting dune bedding favour the formation of shawls of which there are many fine examples.

North of Perth stalagmites are more common and obvious. A suggestion (Dick Van der Roest, pers. comm.) is that a temperature gradient between roof and floor may be responsible in these shallow caves below a sparsely vegetated hot surface.

The common occurrence of sand grains in the caves, derived from soils and stream dissolution of calcarenite, favours the formation of oolites. The complete life history of an oolite nest from initiation to final cementation has been observed over a 20 year span in the Easter Cave dig.

Asphodelites, a peculiar flower-like splatter formation formed on cave floors by very saturated drip waters, have been described from Calgardup, Blackboy Hollow and Deepdene Caves by Bridge (1972).

Halite exudation which plays a very important role in the Nullarbor caves is of less importance in the south-west but forms undercuts in seaward facing gorges and peels the 'skin' off stalagmites in Quinninup Lake Cave.

Extensive moonmilk forms are common around entrances in coastal limestone caves. This is the combined result of the multiplicity of percolation pores and the seasonal wetting and drying of this area of the cave. In the north where the climate is more seasonal, the zone of wetting and drying is more extensive.

The rocks underlying the limestone affect drainage patterns and hence the mode of formation of caves. The Leeuwin Naturaliste limestones are underlain by Granite - gneisses and Granulites at least 660 million years old. Streams are swiftly flowing and confined more or less to their gneissic river valleys. In contrast, the limestones of the Swan Coastal Plain overlie softer Tertiary sediments and in most cases this contact is below local watertable levels. Streams are thus not confined to valleys, complicated hydrological systems past and present result from collapse diversion of cave streams.

Surface karst forms are rare, being precluded by soil cover and lithology. Linear karren are rare in poorly cemented calcarenites, but in some indurated cap rocks, small sections of rillen-karren occur, for example, Yallingup Cave entrance. Splash and rain-pitted karren are common on exposures, especially near the sea. At the slope of the younger Augusta limestone onto the older, and on remnants of similar limestone in northern Witchcliffe, areas of karst pavement with local runoff pipes occur. Extensive karst pavements occur in the Eneabba area.

Geology and Geomorphology of the Leeuwin-Naturaliste

The Leeuwin Naturaliste Ridge coastal limestones stretch for 80 kms atop a ridge of Granite-Gneiss and Granulites which show considerable local variations in relief for W.A. The cave areas in this ridge, from south to north, are Augusta, Witchcliffe, Margaret River, Cowaramup and Yallingup.

The Witchcliffe area and the three areas north of it are typified by stream cave systems whereas the Augusta area is typified by shallow nothe-phreatic maze caves. Recent extensive mapping, some geomorphological and geological interpretation and the beginnings of a hydrological investigation have given rise to a fairly complex (but tenable) hypothesis for the formation of the Augusta caves which further work shall put to the test.

Witchcliffe cave streams drain swamps. Further north, the basement has a greater relief and catchments and streams are smaller. Hence active streams are rarer and inclined fissure caves are more common.

History of the Leeuwin-Naturaliste

Between Cape Naturaliste and Cape Leeuwin lies a belt of dune limestone some 80 kms long and 7 kms wide at the maximum, intersected only in places by various streams, rivers and certain geological features such as the Boranup Sand Patch. In this area can be found more than 300 speleological features and caves.

Over a period of more than 100 years, this area has been explored and surveyed by numerous groups of early settlers and surveyors and later, in the last 30 years, by members of the Western Australian Speleological and Speleological Research Groups.

The earliest reports on exploration of caves were mentioned in a report in the newspaper *The Inquirer* dated 1848 by a Mr Turner of Augusta, giving a detailed description of some caves explored in the area near Augusta. One such cave could possibly be the Old Kudardup Cave which has an excellent display of historical cave graffiti on it's formation. During the 1880's and 1890's more major caves were discovered when the forest was cleared by the M.C. Davies Timber Co. and also by the Bussells who were early settlers in the district. Caves in these areas have also been found to contain the names of early settlers written on the formation.

The turn of the century saw the establishment of the Caves Board by J.W. Hackett for the purpose of managing the caves for tourism. Between 1901 and 1914 more than 14 caves were developed for tourism and recreation and several other caves were partly developed but were never opened. The first caves in the south-west to be developed with electric lighting were Yallingup cave in 1903 and later Northcote Grotto in 1905, while the caves in the Margaret River area were still being lit with magnesium lamps.

The government commissioned Marmaduke Terry in 1900 to survey all speleological features above ground between Yallingup and Augusta. This above ground survey is the basis for the W.A.S.G. Cave Lists in the south-west today. Later in 1902, Yallingup Cave was also surveyed by Terry and a proposal for a shaft to a cave in Yallingup Gorge was put forward but later this plan was abandoned.

During the years 1907 to 1909 the Caves Board promoted an extensive advertising campaign with lectures and slides and printed pamphlets of a descriptive nature. These were sent to tourist centres throughout the world advertising the caves of the south-west.

In 1910 the Caves Board was partly abolished and in 1914 it was fully integrated into the Licence and Liquor Board which was in control of the state's hotels. Many of the tourist caves became neglected and although the caretaker of the caves, Tim Connolly, appealed for money for repairs, it was denied.

For two decades from 1920 onwards, many of the installations in the tourist caves were neglected and slowly disintegrated or were damaged by vandals or bush fires.

Two events were important in this period. Lake Cave flooded in 1924. This required the contracting of mining engineers to construct a shaft to drain off the flood water so that the cave could again be opened for tourism.

In 1928 visits to the caves had reached over 2000 people per year. In 1936 a huge bushfire swept through the caves reserve, burning and destroying most of the entrance ladders to Bride's Cave forcing the closure of this cave to possible use by the public.

From the early 1930's to 1950, much caving and exploring was done by Ruddock, including the entering of the downstream section of Strong's Cave in 1938. By the 1950's only five caves were open to the public, of which three are still open today.

Cavers exploring in the Augusta area in the late 1950's discovered the majestic Jewel Cave system which has over 3 kms of passageways. This cave was developed for tourism and opened to the public in 1959 by Sir David Brand, thus closing Moondyne Cave nearby.

Around this time, the same small group of cavers, discovered major extensions in nearby Easter Cave. This small group were to form the nucleus of W.A.S.G. the formation of which, these discoveries helped promote. In 1960 members of W.A.S.G. discovered and explored Labyrinth Cave. This gave rise to increasing activity by cavers and W.A.S.G. went from strength to strength, with the discovery of Strong's Cave in 1960 and the Christmas Star extension in Crystal Cave in 1968.

In the next decade, major finds included Terry Cave, Winjans, Boya Booka, Beenup and many more. Major extensions were found in Easter Cave, including the CEGSA extension found in 1976 during the survey of this extensive system. Easter Cave now totals more than 8 kms of phreatic passageway.

AUGUSTA

The Augusta area boasts some of the most well decorated and longest caves in W.A. Covering an area over 16 km long from Cape Hamelin in the north to Cape Leeuwin in the south, the Augusta caving area, designated AU, contains a belt of coastal limestone consisting of Pleistocene deposits laid down during glaciation periods. Some characteristics of the aeolianite are sharp jagged limestone which has been greatly eroded by high rainfall, very heavy vegetation (*Karri Eucalyptus diversicolor*), heavy undergrowth and many speleological features and caves.

Climate. The climate here is Mediterranean, humid and receives a high annual rainfall followed by a short summer drought. Temperatures often rise to 35 degrees and warmer during the summer, so if you can't keep your cool in the caves every day, the local beaches offer a pleasant diversion for even the most dedicated caver.

Tourism. Tourism is an important industry of the Leeuwin Naturaliste Ridge, so if you can spare a day from caving, go touring as there is a lot to see. Within the Augusta area are:-

Cosy Corner: A great beach, sheltered and ideal for children. While you're there, check out the limestone outcrop on the beach to the south of the car park. It contains many blowholes spurting water up to six metres on rough days.

Leeuwin Lighthouse: Built in the 1890's by M.C. Davies and Co. entirely out of local limestone, it is the tallest lighthouse in W.A. Check at the lighthouse for inspection times.

Leeuwin Water Wheel: Built in the 1800's to supply water to the lighthouse and Augusta, the wheel is now completely covered in calcite from the spring which once flowed over it. No cave has been found for the Leeuwin Water Wheel Spring (AU 26) so if you have time take a look,.....

There are many more places to see both in the Augusta area and in other parts of the Leeuwin-Naturaliste Ridge, for example, Cape Naturaliste, Yallingup Beach, Canal Rocks, Sugarloaf Rock, Prevally Park and Boranup Beach. For more information see the Augusta-Margaret River Tourist Bureau in Margaret River.

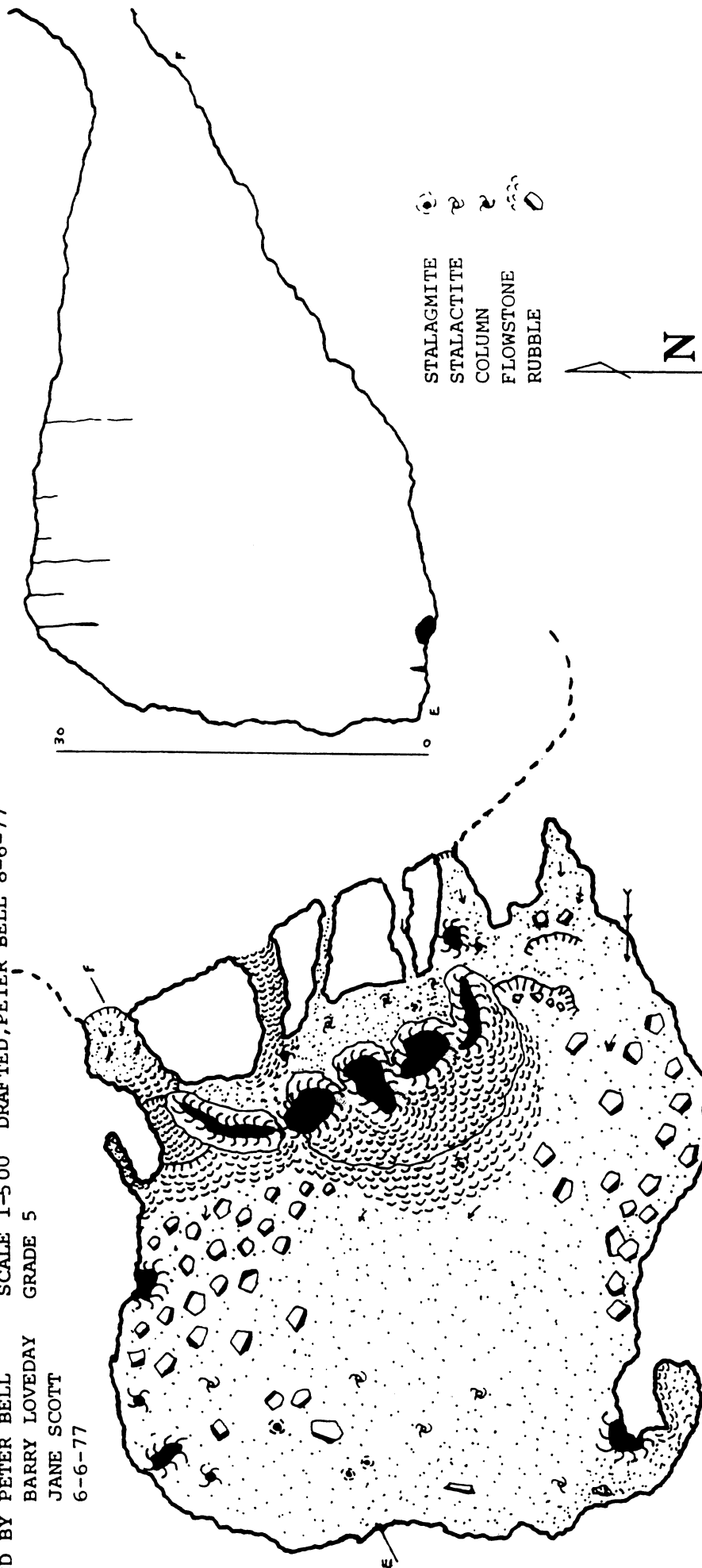
The caves. There are 29 known speleological features and caves in the Augusta area. The possibility of finding more is certain, the only limiting factor being the dense forest around them and the generally small entrances to the caves. Most of the caves have solution pipe entrances, and a few have large collapse entrances. The caves are nothepheatic and can be divided into two categories:

1. Caves reaching the water table: These caves are complex in their layout. There are three caves in this category, namely Easter, Jewel, and Labyrinth. If one looks at the walls, ceiling and formations of these caves, it can be seen that the rise and fall of the water table has been considerably responsible for their formation. The depth of these caves is approximately 44 metres at water level. They are all heavily decorated, predominantly with straws. They have many complex interconnecting passages. They all show a vague north-east trend due to the underlying Pre-Cambrian gneiss. One common feature of these caves is that they are multi-level, having as many as four different levels. It is these levels that explain the presence of caves not reaching the water table.

2. Caves not reaching the water table: These caves are generally much smaller and are usually vertically developed, for example, Harley's Cave and Bat Cave. These caves are surely consolidated for extension into bigger systems as they are probably remnants of higher water levels. As cave development would still have occurred while the water level fell, it is possible that there are small tunnels, now blocked by soil, which lead to lower levels. Evidence supporting this is the discovery of Easter Cave. Originally a small sand floored chamber, digging at the lowest point broke into a system over 7 kms in length at a lower level.

SURVEYED BY PETER BELL
 BARRY LOVEDAY
 JANE SCOTT
 6-6-77

SCALE 1-500
 DRAFTED, PETER BELL 8-6-77
 GRADE 5



KUDARDUP CAVE AU9

Formations in the caves. Straws and helictites are the most common type of formation to be found in the caves of Augusta. In such caves as Easter Labyrinth and Jewel, there are literally thousands showering from the ceilings, some reaching up to four metres in length. Some are completely transparent and almost all are active. They present a challenging task to photographers.

Helictites in amazing forms are to be found in Easter Cave where some grow horizontally out from the wall for more than 60 cm. Excellent displays of columns and stalactites can be seen in most of the Augusta Caves. Old Kudardup possibly has the best display, its columns being over 18 metres high. Large formations such as these are particularly common due to the high rainfall and humidity. They are nearly always found in the upper levels of the caves.

Calcite crystals can be seen in three of the caves. Jewel Cave has some fine crystal pools which can be seen on inspection of the cave. Deeondeeup which is part of Jewel Cave has the best display. Here a wall of the cave some 18 m high is completely studded with crystals up to 10 cm in length. Easter Cave has *Tiffanys*, an old crystal pool 4 m long and 1 m deep. Crystals up to 10 cm cling to all sides of the pool.

Deepdene Cave AU 1. This cave is noted for its massive formations. Consisting of two large chambers, the cave is just over 100 m long and 35 m deep. The two chambers are heavily decorated with columns and stalactites. When visiting the eastern chamber, take note of the old rimstone pools, some of which are over 1 m deep. Deepdene was developed to a small degree as a tourist cave around 1900. It was never opened to the public. Although only a small cave, a typical photographic trip can last several hours so be sure to take water with you. While in the cave examine the walls. Deepdene is packed with small helictites. No special equipment is needed to enter Deepdene Cave, which is all horizontal.

Harley's Cave AU 6. Surveys have proved that Harley's Cave, which is about 100 m from Labyrinth on the surface, comes to within 1 m of Labyrinth underground. There is limited photography in the cave, the main attraction being the entrance pitch, a fifteen metre solution pipe which opens out into a large bell-shaped chamber with excellent acoustics. A small extension on the southern wall will lure the more sporting caver. A series of vertical squeezes leads to a small well decorated chamber. It is at this point that it is carved closest to Labyrinth. Typical time in Harley's would be no more than two hours. Equipment needed is a 15 m ladder and rope as there are good belay points nearby.

Old Kudardup Cave AU9. Formed on the high slopes of the new dunes, this cave is one of the most interesting to see. The cave is a large single chamber with no side extensions. It has formed in massive dimensions, over 30 m deep with a ceiling 30 m above the cave floor, massive columns have grown up to 18 m high near the entrance. Photographically, Old Kudardup can offer impressive shots of the columns. Most of the roof decoration is too high to be photographed. Old Kudardup Cave is recommended to everyone, just to see a really nice easy cave.

Jewel Cave AU 13. Jewel Cave is a complex phreatic cave 3 kms long, of which only 40% has been developed for tourism. Opened to the public in 1960, Jewel Cave has been thoughtfully developed to show the cave off to visitors and not to make just the easiest path. Lighting is all natural and indirect. Formations in Jewel are identical to Easter and Labyrinth Caves. Formations are excellent. A straw measuring about 580 cm is the longest in any tourist cave.

There are many flowstone canopies, including the famous Organ Pipes. Myriads of straws can be seen reflected in the lake at the lowest level of the cave. The price of a tour is reasonable and the tour lasts for one hour. Photographers are encouraged, so take your cameras and get some rewarding shots.

Easter Cave AU 14. Easter Cave is the longest and most heavily decorated cave in the south-west. A typical trip lasts 8 hours so supplies of food are necessary. The entrance is a 12 m shaft which is best laddered. This opens onto a large sand floored chamber, a small crawl leads to the system. From here on it is wadeable most of the way. As you enter the crawl, look to the right for cave pearls. These are 30 years old and began growing when the tunnel was dug through. The Epstein Section contains the most well-known formation in the cave, the Epstein sculpture, a helictite of massive size hanging from the ceiling.

Labyrinth Cave AU 16. Labyrinth is a phreatic maze of interconnecting passages. Entry is as with Easter, a 12 m shaft best laddered. The formation is excellent, straws being the dominant feature. Labyrinth has two main trends, north-west and south-west. Both are photogenic with the south-west having the edge. A visit to the Winged Eagle's Nest is worthwhile. Labyrinth is also very sporting. There are a few sumps and lots of mud squeezes. Most of the trip is spent walking or crawling along phreatic tubes containing water and mud.

Moondyne Cave AU 11. Moondyne is an old tourist cave which was closed in 1958. It has been the subject of an exercise in cave restoration. A concentrated effort by W.A.S.G. has seen the introduction of track marking, removal of old stairs and the cleaning of formation. Fortunately a lot of the damage has been reversible and Moondyne still retains its beauty and is excellent for photography. The cave has good displays of columns and helictites. Consisting of two large chambers, Moondyne is the smallest of the four caves which reach the water table. The lower chamber which was once an old crystal pool, is completely covered with calcite flakes. This known as the Snowflake Chamber and contains some side extensions with fine displays of helictites. Carbon dioxide levels are often high in this chamber. The upper chamber is in complete contrast to the lower containing many large columns and stalagmites, and also some very long straws. Moondyne Cave is one to be enjoyed by all cavers.

There are few active surface streams and places to obtain water in the Augusta caving area during summer. Take supplies of water on all field trips. Temperatures are likely to be high and considerable distances must be walked to reach caves. If at any time you are separated from a party and become lost, always head east and you will arrive at Caves Road.

WITCHCLIFFE

The most extensive caving area in the south-west is the Witchcliffe area, stretching from south of Calgardup Brook to the Boranup Sand Patch. This sector contains over 135 speleological features of which 40 are major caves. The camp sites of the two main caving groups can be found in the Boranup area of this section. From these sites most of the caving activities are conducted. A good proportion of the stream caves are to be found in the northern part of this area. The best example of these is the Mammoth Chain, consisting of three large cave systems formed by the same stream but separated only by the collapse of limestone. **Mammoth Cave** is the inflow and is also a

tourist cave. It is followed by **Terry Cave**, then **Conference Cave**. Another chain of caves, slightly to the north is believed to be where once the stream flowed and could possibly be an older stream system. **Terry Cave** is the only cave in this system which requires equipment, that is, a 15 m ladder and rope to descend the main entrance pitch. The other caves in this area are also well worth a visit and require no equipment but a guide is needed to locate them.

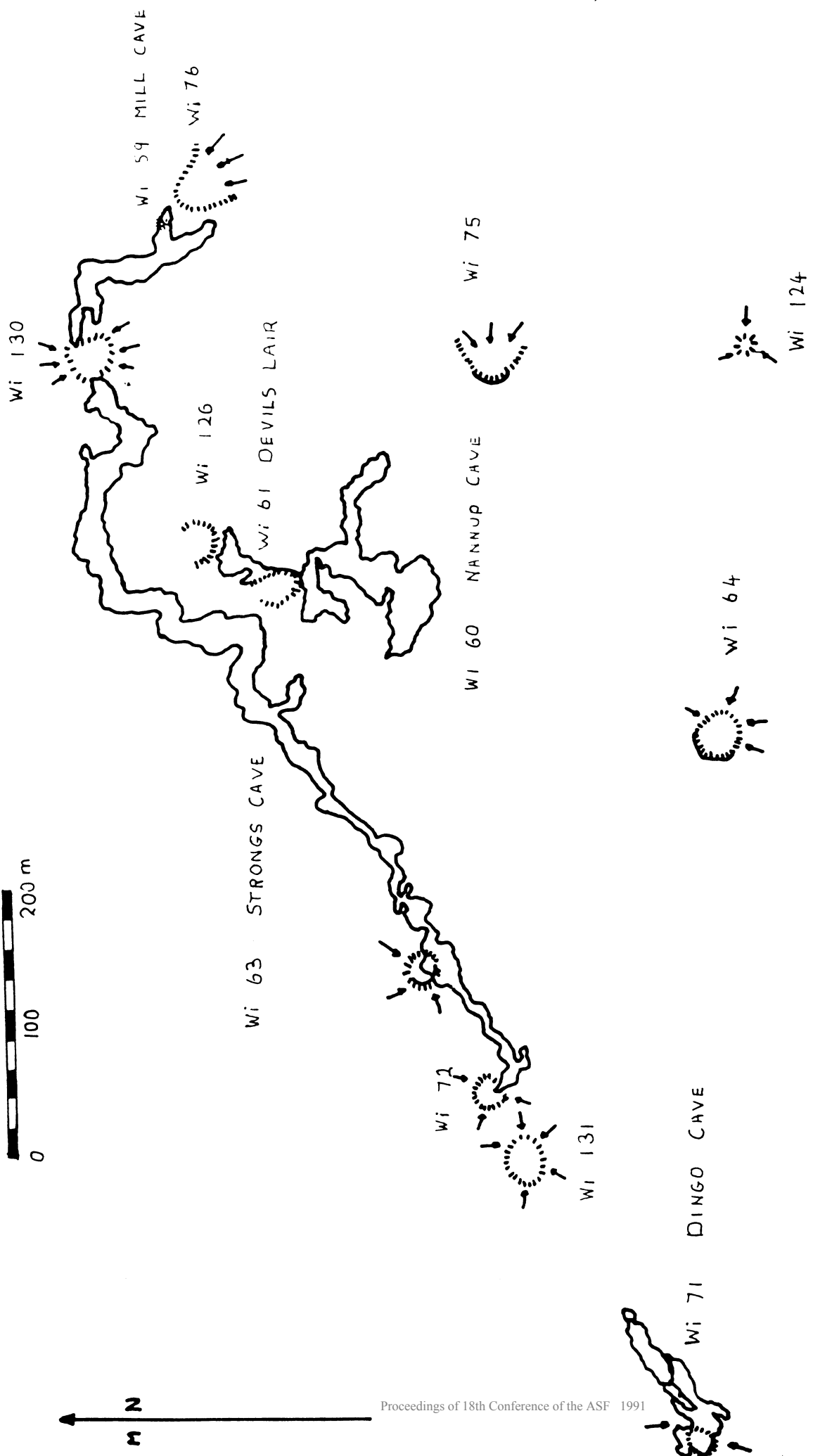
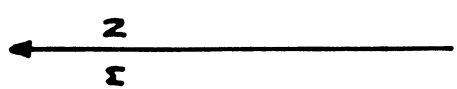
A little over 1 km to the north of **Mammoth Cave** is **Calgardup Cave** which used to be an old tourist cave. From here one can take the **Bobs Hollow** track to the beach (4 WD is advised) to see **Bob's Hollow Cave**, the only example so far known, of an efflux cave to be found in close proximity to the sea. Inland from **Bob's Hollow** is **Connolly's Cave**, this being the longest known stream cave in the **Witchcliffe** area. It is an excellent sporting cave consisting of over 2 km of passageway. There are vertical squeezes and also a number of good mud crawls to be found. It requires more than six hours to see this system properly. A guide is required to find this cave and a 12 m ladder is needed to descend the entrance pitch.

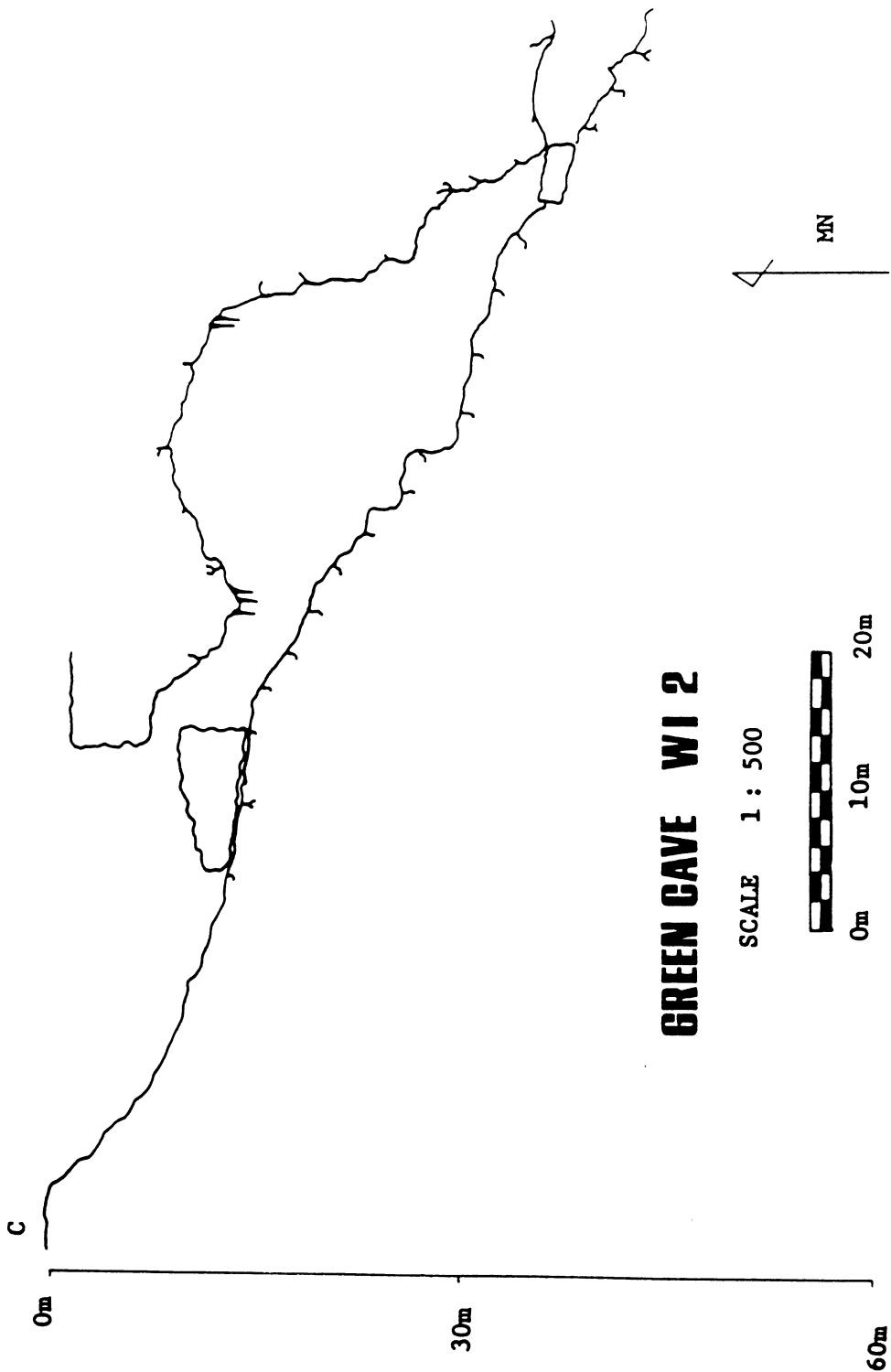
South of **Mammoth Cave** are **Lake**, **Bride**, **Giant's** and **Golgotha Caves**. **Bride Cave** is a large doline approximately 100 m across. This is a good cave for SRT fanatics and has a pitch on the deep side of over 50 m with a cave at the bottom. These caves are easily found from **Caves Road**. **Golgotha Cave** is 1 km south of **Bride Cave** on **Caves Road**. Also in this area are several other caves of interest.

Eight kms south of these caves is the **Boranup Camp Site**. Very little is known about the area between **Golgotha** and the campsite as only one large cave has been found, namely **Green Cave**, and several fissure caves found in the seventies near **Blue Rock Road**. They are believed to be formed by the action of water from a swamp opposite, undermining the limestone causing it to collapse forward in large blocks, forming deep fissures in the limestone.

From the **Boranup** campsite, many fine caves can be visited as some are within a short walking distance from the campsite. These are **Dingo**, **Nannup**, **Mill**, **Strong's**, **Crystal**, **Arumvale Caves** and **Arumvale Pipe** plus numerous smaller caves and karst features. **Strong's** is the finest stream cave in the area.

Strong's Cave is an excellent one to visit. It has a small circular doline with a vertical shaft at the bottom leading down to a rubble pile and then down to the stream. Downstream from the entrance, the passage is low and of the 80 m of passage, only 50 m can be comfortably traversed. From the entrance to the upstream section, the **Western Australian Museum's** palaeontological dig must be walked around and a hole negotiated to get to the lower chamber. Several other rockpiles and crawls are passed through, including the **Snowflake Passage**, before reaching the main stream passage. Moving upstream past the rapids, which consist of gneiss bedding covered with tree roots, one comes to the **Devil's Horns**. This is a helictite formed on the bottom of a straw. The next point of interest from here is the calcified bones in the wall on the left-hand side if proceeding upstream. Around the bend from here is the **Judge's Wig**. This is a large impressive mass of crystalline formation of pure white calcite which stands out well against a dark background. On from here is one large rockpile and then the terminal chamber in which the world's longest straw can be seen. Surrounding it are some equally long tree roots, making it difficult to distinguish the straw. A soil band can be seen in the roof throughout the cave. This is thought to be where one dune has settled and soil has been allowed to form, and later more sand has blown over forming another dune.





GREEN CAVE WI 2

SCALE 1 : 500



0m 10m 20m

SURVEYED BY:

RAULEIGH WEBB, JOANNE WEBB,
DAVE JAMES, KEVIN BECKHAM,
EVELYN TULP, JOHN JURY,
KAREN ATKINSON, BERNIE TAGGART
and WAYNE MARRELL.

DRAWN and DRAFTED BY:

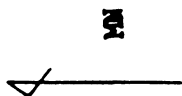
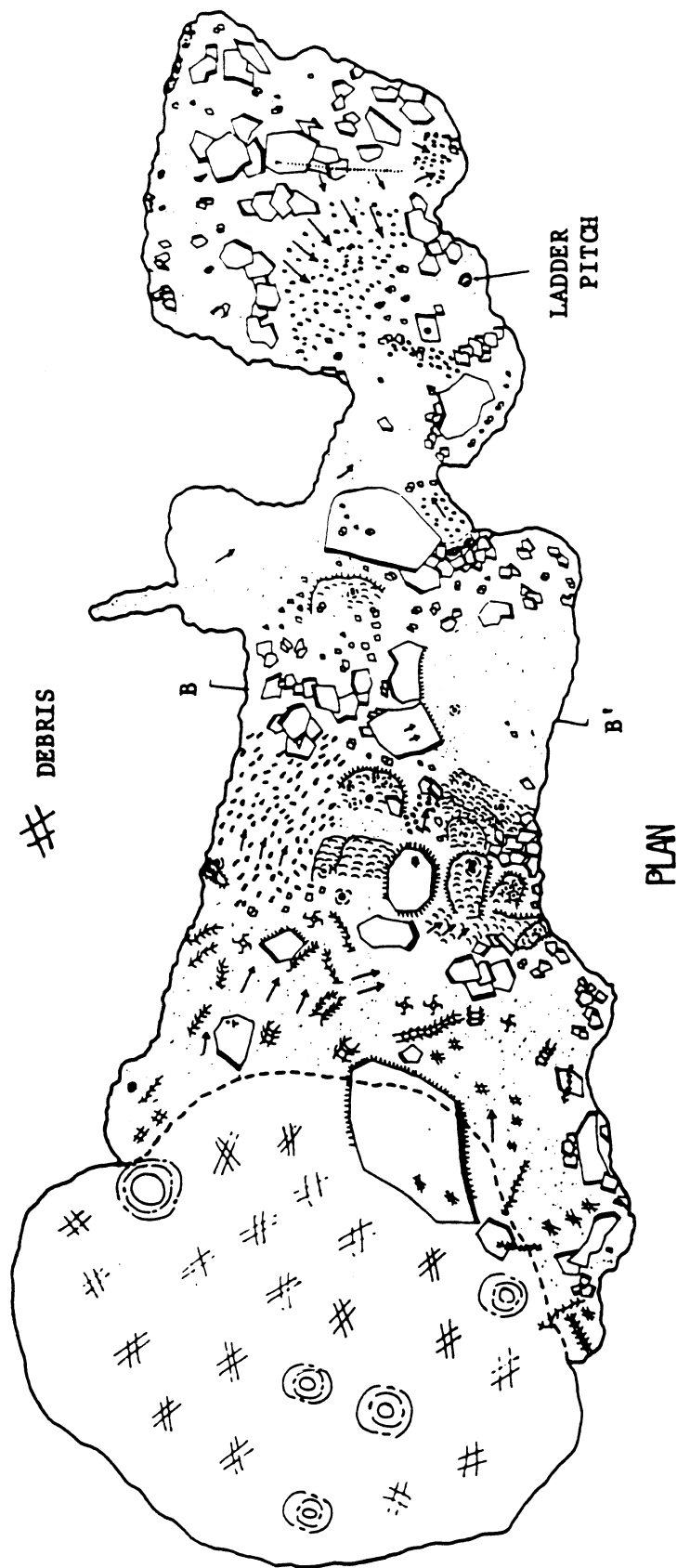
RAULEIGH WEBB
11-7-'77

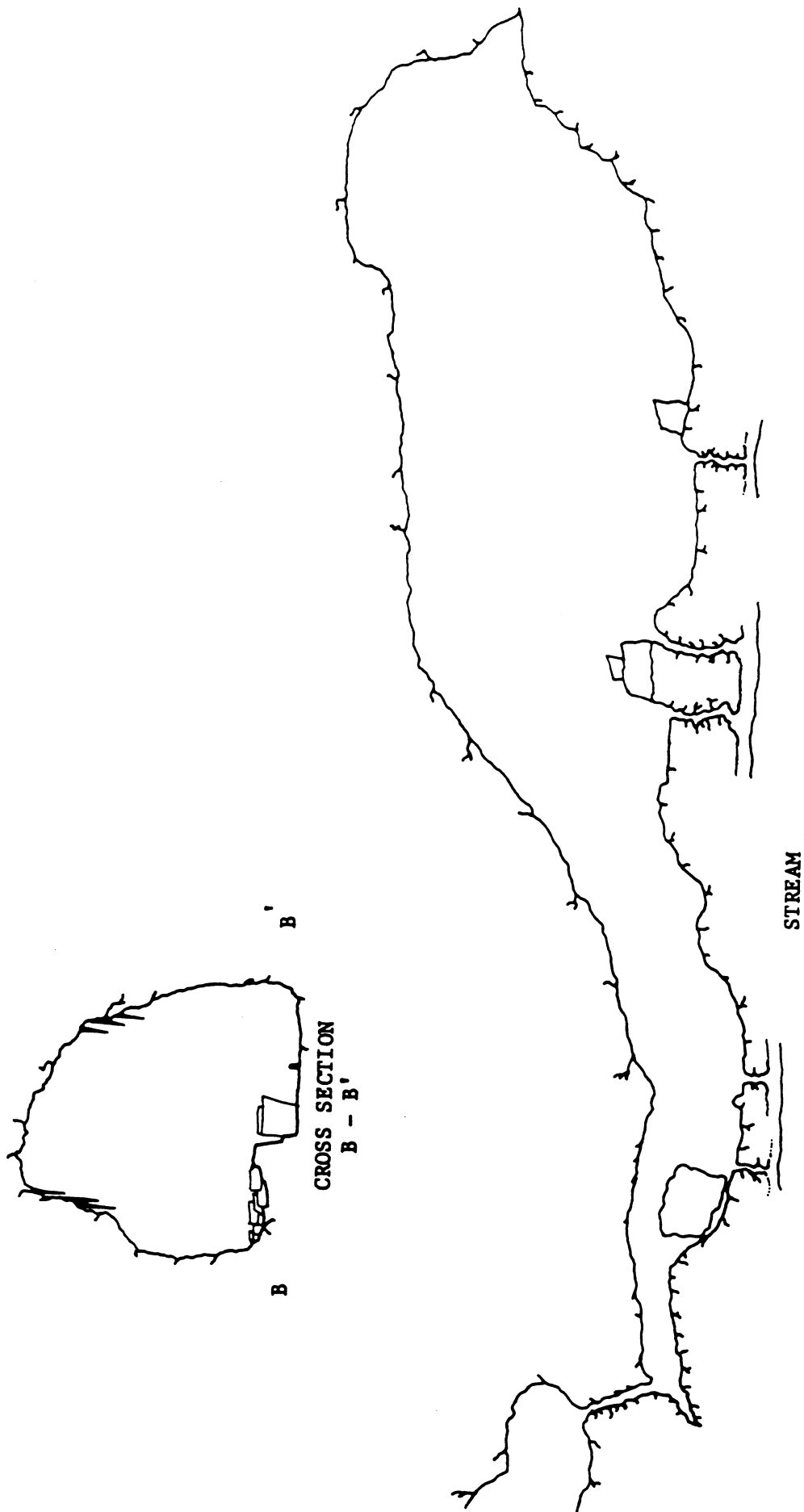
SURVEYED WITH:
SUUNTO COMPASS & CLINOMETER
and RANGING 120 OPTIMETER
20-5-'77 & 18-6-'77

ASF GRADE 4-5

 TREE
 -T POSITION OF TAG

 STALAGMITE
 STALACTITE
 VERTICAL CAVITY UPWARDS
 VERTICAL CAVITY DOWNWARDS
 SMALL FALLEN TREE
 LARGE FALLEN TREE
 DEBRIS





KEY:

 BEDROCK WALL

 VERTICAL CHANGE IN GRADIENT

 ROCKS, BOULDERS

 SAND

 RUBBLE

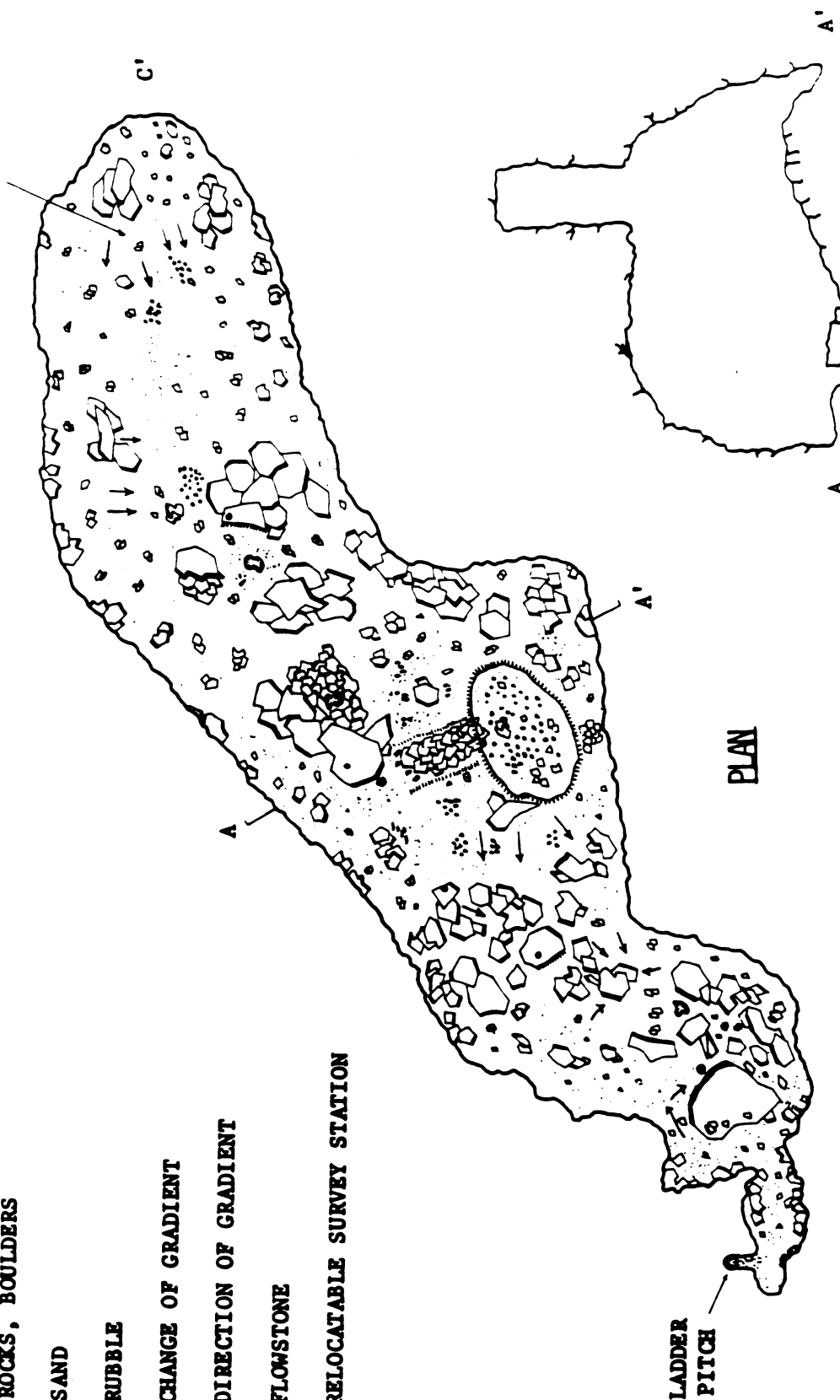
 CHANGE OF GRADIENT

 DIRECTION OF GRADIENT

 FLOWSTONE

 RELOCATABLE SURVEY STATION

**WARNING: UNSTABLE SLOPE
AVOID CLIMBING.**

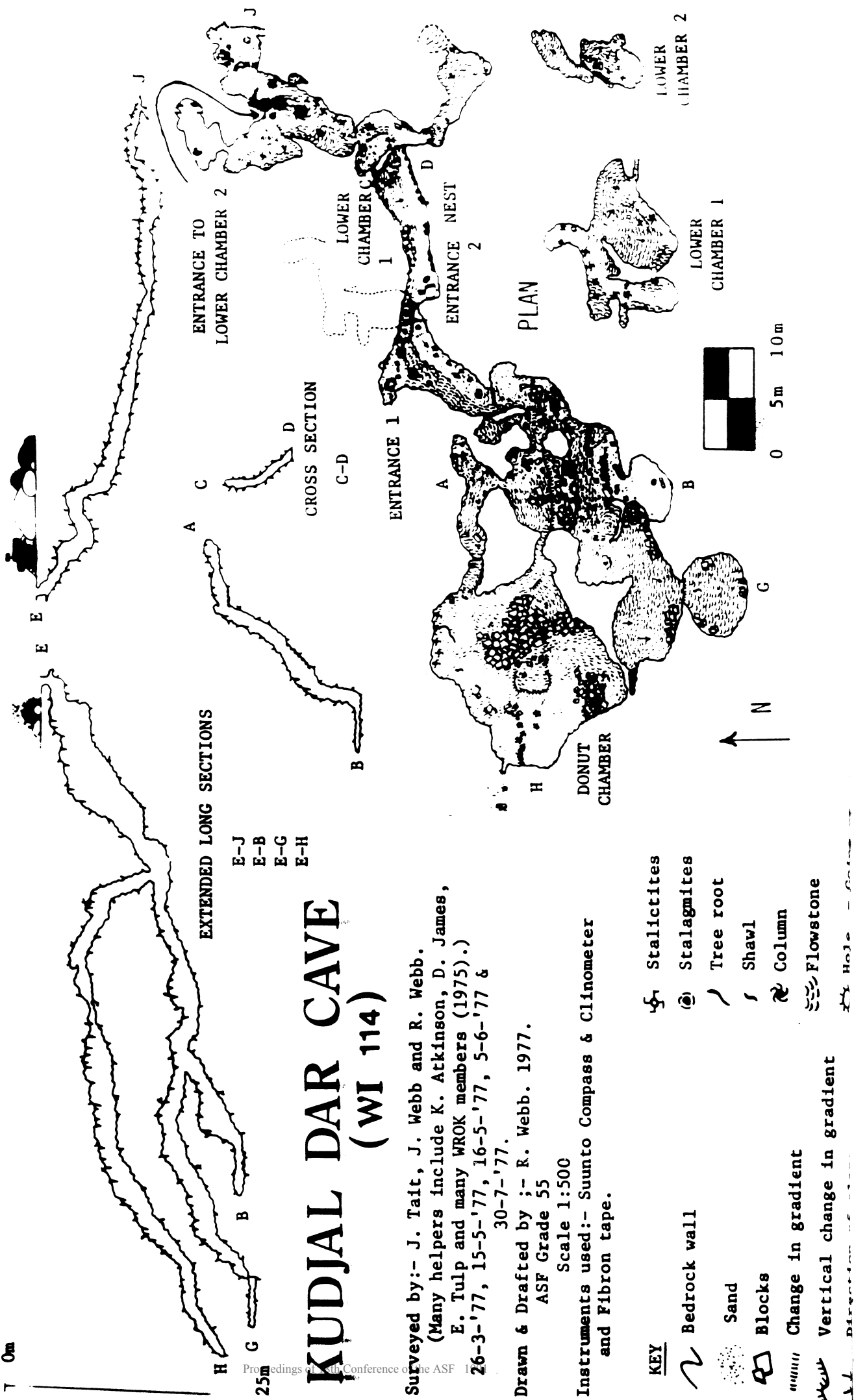


PLAN

CROSS SECTION

A - A'

7 0m



KUDJAL DAR CAVE (WI 114)

Surveyed by:- J. Tait, J. Webb and R. Webb.
(Many helpers include K. Atkinson, D. James,
E. Tulp and many WROK members (1975).)
26-3-'77, 15-5-'77, 16-5-'77, 5-6-'77 &
30-7-'77.

Drawn & Drafted by :- R. Webb. 1977.

ASF Grade 55

Scale 1:500

Instruments used:- Suunto Compass & Clinometer
and Fibron tape.

- KEY**

 - Bedrock wall
 - Sand
 - Blocks
 - Change in gradient
 - Vertical change in gradient
- KEY**

 - Stalactites
 - Stalagmites
 - Tree root
 - Shawl
 - Column
 - Flowstone

Not far from Strong's Cave is **Devil's Lair**, situated in the Nannup doline. The Department of Palaeontology of the W.A. Museum, under the direction of Dr Duncan Merrilees, has performed excavations in this cave over a period of years. The results of this dig have been extremely interesting, indicating the presence of aborigines in the south-west for a greater time than previously supposed. **Nannup Cave** itself is worth a visit, being an old abandoned stream cave with some good formation. Also some historic graffiti can be seen on the formation. Dingo and Mill Caves are not far away. These two caves were formed by the same stream that carved out Strong's Cave and are separated only by collapses. **Mill Cave** is upstream of Strong's Cave and the entrance pitch can be free climbed. A shallow lake once graced the main chamber but has disappeared as a result of the receding water table in the Leeuwin-Naturaliste area. The large tree root in the middle of this chamber has been badly vandalised in recent times. Two hours is ample to study the cave.

Dingo Cave is downstream from Strong's Cave. The entrance solution pipe can be free climbed. The **Christmas Tree** and some beautiful **crystalline filled solution pipes** in the ceiling nearby, are two examples of the speleothems to be found in this cave. (See if you can spot the bat partly entombed in flowstone.)

Arunvale Pipe and **Arunvale Cave** are about 3 km south of the campsite. The pipe is 23 m deep and is the best abseil into a cave in this area. This cave is a small stream cave, 160 m in length, terminating in a large chamber filled with rock. Voice contact has been established here with **Arunvale Cave**. Two hours is quite adequate to visit this cave. **Arunvale Cave**, (a locked cave) is located further up the hill. The entrance is very unstable and several ladders are required to reach the bottom which is at a depth of 57 m from the surface. A camera should be taken as the formation is excellent. The total length of the cave is about 500 m, the first 200 m being dry and well decorated. The last 300 m is wet and muddy, and one must crawl to the end of the cave in the stream. About four hours is required to see this cave. Extreme caution must be exercised at the entrance pitch.

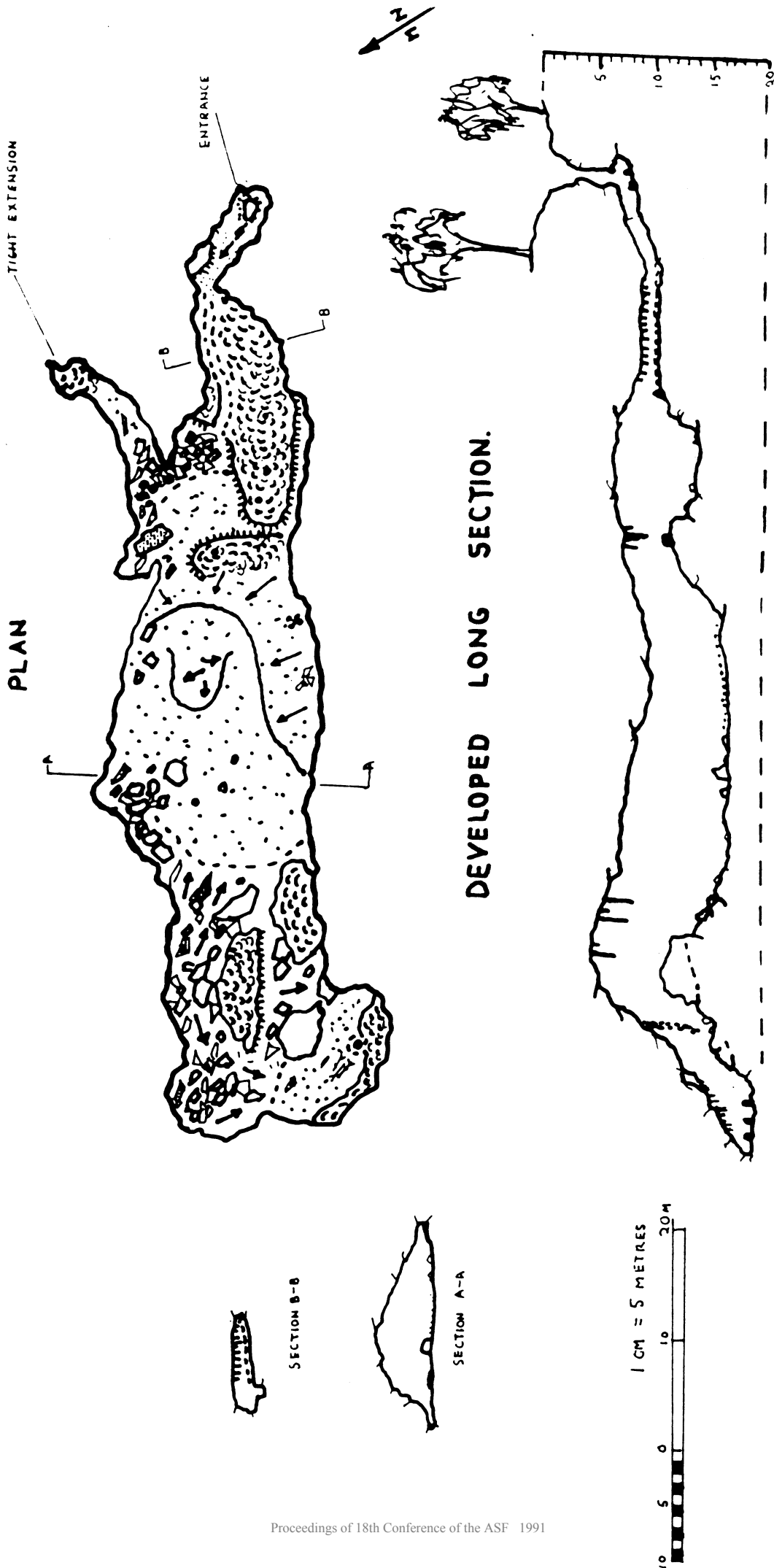
While stopping at the campsite, it is a must to drive through the Karri forest to the **Boranup look-out**. Also, a trip to the beach is worthwhile though a four wheel drive is advisable on the rocky road. The **Boranup Sand Patch** is a recorded aboriginal site. For those who do not want to go caving, a day here is well spent and it is near an excellent beach.

MARGARET RIVER

The area north of Witchcliffe is Margaret River, starting at Calgardup Brook and finishing at Ellensbrook. There is only a small karst area containing 20 known karst features of which six are major caves. Four of these, Milligan's, Walcliffe, Blackboy Hollow and Witchcliffe Caves are old tourist caves.

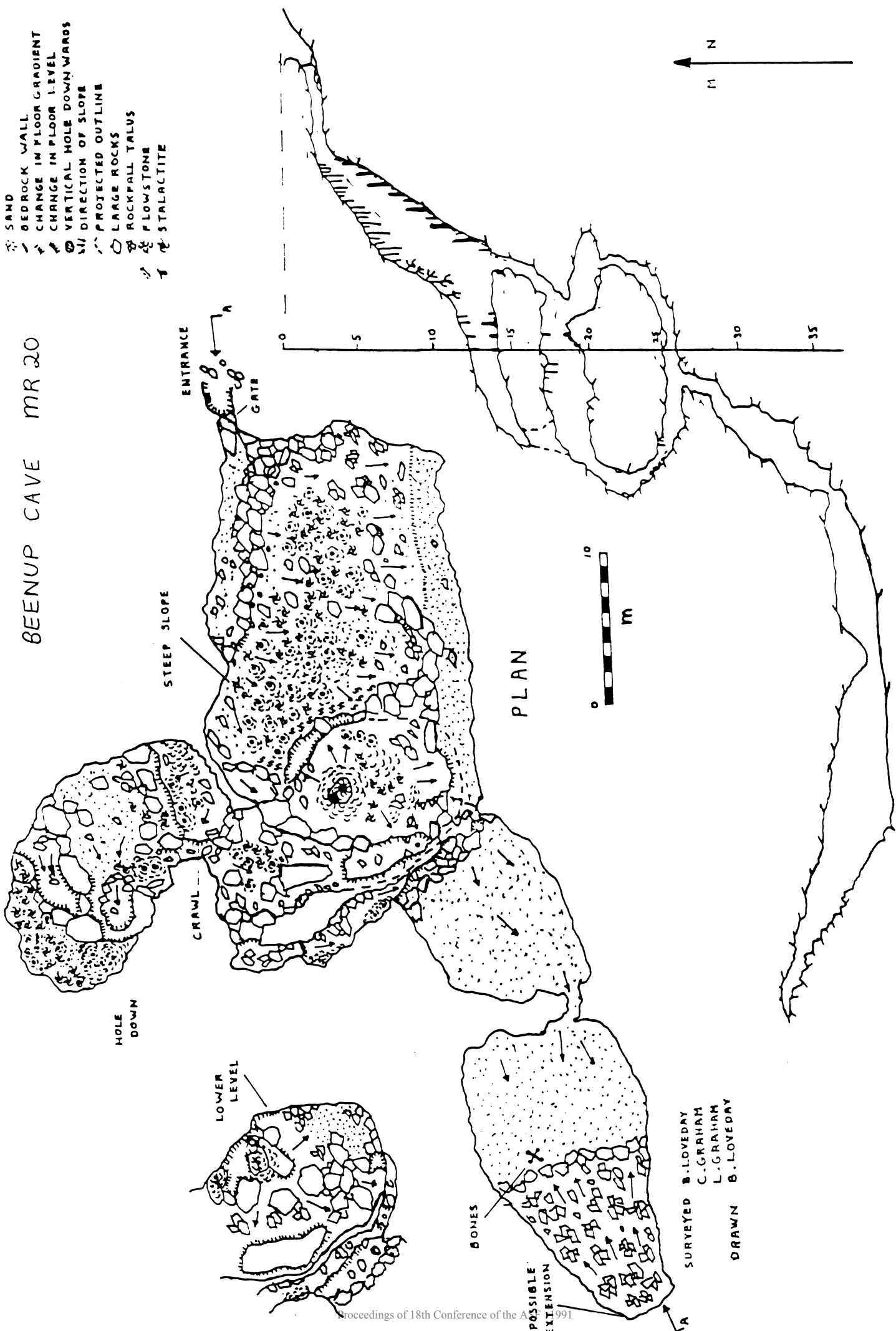
Milligan's Cave MR 19, can be visited while you are making a trip to Meekadorabee Cave. Equipment is needed to descend into the cave as it has a 6 m entrance pitch. This cave was used as a tourist cave at the turn of the century. A descent into the cave passes through a fairly heavily decorated section on the left before reaching the main chamber. The floor of the main chamber consists of sand and rock with some bone material. Proceed onwards around a large rockpile to the terminal chamber which contains some good examples of calcified tree roots. A guide is needed to find this cave.

MILLIGANS CAVE. MR 19.



SURVEYED :	P. H. CAFFYN J. SCOTT K. WILLIAMSON	15 SEPT 73	STALACTILE STALACTITES STRAWNS TREE ROOTS ROOF COLLAPSE BLOCKS	STALACTILE STALACTITES STRAWNS TREE ROOTS ROOF COLLAPSE BLOCKS	TOTAL PLAN LENGTH = 85 M	TOTAL DEPTH = 20
DRAWN :	P. H. CATTYN	16 SEPT 73	STALACTILE STALACTITES STRAWNS TREE ROOTS ROOF COLLAPSE BLOCKS	STALACTILE STALACTITES STRAWNS TREE ROOTS ROOF COLLAPSE BLOCKS	ROOF COLLAPSE BLOCKS	
					SAND	
					MUD	
					FLOWSTONE	
					STALAGMITE WITH FLOWSTONS	

BEENUP CAVE MR 20



Further south near the mouth of the Margaret River are two other caves of some importance, both completely different. One of these is **Wallcliffe Cave** MR 4, an ex-tourist cave found by Grace Bussell in 1870. This cave is situated at the back of Wallcliffe House on the edge of a paddock and is easily reached from the road. This cave has been vandalised badly and many old names can be seen written on the formation.

Situated in the limestone hill overlooking Prevally Park Caravan Site is **Beenup Cave** MR 20. This cave was discovered in 1975 by members of WASG and is locked. The system is a classic inclined fissure cave and is heavily decorated. The entrance was dug out and the cave itself is over 300 m long, no equipment is necessary. The terminal chamber ends in a rockpile and the floor is a rich black loam washed in from outside. The possibility of extending this cave is good. Approximately 100 m away is a large doline known as **Rainbow Cave**. This is worth a visit if only for photographic reasons. **Foxhole Cave** MR 9 is not far away and could be visited if a guide knows where it is. This cave has three chambers, one of which is well decorated and the terminating chamber contains scattered bones of many small animals.

Blackboy Hollow and Witchcliffe Caves could be visited in the one day for those who feel energetic. Parking the car at the Boodjidup Brook, one would need to walk for approximately 2 km to reach each of these caves. **Blackboy Hollow Cave** is considered the finest cave in this area. Equipment is needed to negotiate the 6 m entrance shaft into a large chamber but you will have to unlock the gate first ! The key is held by the CALM ranger at Cowaramup. This cave was an old show cave. The old pathways lead down into a magnificent lower level of immense proportions. Formation in this chamber is very good. Deeper into the floor of this chamber can be seen the old stream course.

Witchcliffe Cave is an interesting walk from the car. It has a magnificent setting above Boodjidup Brook where it opens into Devil's Pool. A cliff face at the head of the valley at the west end of the pool and on the north side of the stream contains the cave entrance. An overhang contains a 2 m drop down to water. Old wooden tables and a small stream, which requires some 7 m down a steep slope, can be seen. Stairs lead to the cave entrance above the overhang. Many old columns in two small chambers divide the cave and add to it's interest. This is an old tourist cave and a guide may be needed to locate it.

COWARAMUP

The next area is Cowaramup, stretching between Ellensbrook and Quinninup Brook. This narrow belt of limestone has very little cave development that is known. **Quinninup Lake Cave** is one of the better known caves to visit. Situated near the beach at Quinninup, this cave is reached by a pleasant walk along the beach and across the sand dunes. A small colony of bats has been observed here for some years. This is quite important because this is the only known cave in the Leeuwin-Naturaliste Ridge in which bats have been recorded. The cave contains two small streams. One of these can be examined by climbing down through the entrance rockpile. The other is seen in the south-eastern section by looking down a hole under some flowstone. These streams seem to be at different levels and resurge some distance below the cave entrance to form a small lake. This lake is trapped behind the dunes and it is assumed that the water percolates beneath the sand into the sea. The cave is well known to the public and has suffered accordingly.

Members of WASG have recently embarked on a stalagmite repair program code named 'Operation Jigsaw', to repair the many vandalised (though in some cases naturally degraded) stalagmites in the main chamber of the cave.

Further to the north-east is **Snake Pit Cave** CO 6 which is believed to be part of the same system. Equipment is needed to descend the 23 m vertical entrance pitch. When the bottom is reached, a medium sized chamber is seen, its floor covered with sand and rocks.

Cowaramup Cave is also worth a visit. A guide is needed to find this cave as very few people know its location. It is found in a valley within which a dune has arisen and through which a stream flows, forming a small but interesting cave containing a small waterfall.

Another cave to inspect in this area is **Meekadorabee Cave** CO 8 situated on the Ellensbrook Stream. This is a good example of a cave which is formed by the action of a stream cutting through an arm of limestone overlying a valley. The entrance is well endowed with tufa and calcified rushes. A waterfall also flows over the entrance, seeping through the roof and forming an excellent display of cave pearls on the flowstone below. The trip through the cave is very wet but short as the cave is approximately 100 m long. The recently constructed walkways have somewhat reduced the aesthetics of the area particularly as the stairs go very close to the stream and eastern entrance of the cave. However to the uninitiated the area still has a lot of charm with its Peppermint Groves and Arum Lillies. It is worth walking to the beach to see the early historic property built by the Bussells which is now part of the national park. It is also a very pleasant walk in the direction of Milligan's Cave if you are interested in getting away from the crowds.

YALLINGUP

The Yallingup area has some of the thickest limestone of the Leeuwin Naturaliste Ridge, but despite this very few large caves or extensive systems have been found, probably because there are very few streams to allow for the development of large systems.

One example of a large cave in this area is **Katelack Cave** YA 26. This system is a typical example of an inclined fissure cave found in dune limestone. This cave is approximately 36 m deep. No equipment is needed for entry into the system. The cave is in an open field on the edge of some thick bushland. This cave has two small entrances and is well worth a trip. To reach the lower level, a slot type squeeze must be negotiated and from here a rubble slope leads down to the final crawl into the bottom chamber. The upper part of this chamber has some fine formation. There are several extensions to be found in this cave while crawling around. The total trip should not take more than three hours. Two other caves which could be visited while in this location are **Seven Sisters Cave** YA 3 and **Barbilla Cave**. Both of these caves have good formation. By driving several kms along the road, one can spend a pleasant afternoon at the beach near Canal Rocks.

Yallingup Cave itself is well worth a visit. It is currently a tourist cave. A palaeontological dig was carried out in this cave over a period of five years by a member of WASG. The formation in this cave is excellent and there are several sections to visit. It is the largest cave system known in the Yallingup area and a new extension was recently found in this cave ! A short walk from this cave leads to Yallingup Gorge. This is a karst feature worth visiting as there are several caves in the area, YA 12 and YA 29 being two of them.

Driving from Yallingup to Bunker Bay, one can visit a number of interesting sea caves and other karst features. One of these sea caves is YA 14, a cave which is developed in medium grained granulite, beach conglomerate and aeolian calcarenite. It also has a hole in the roof in which one can see the bedding planes.

On the way south along Caves Road, **Northcote Grotto** can be visited. In this cave a stream can be seen flowing in the lower sections, this being only one of two caves in the area in which a stream is visible.

LOWER WEST COAST

This limestone area extends from Cape Naturaliste to Perth, a distance of 250 km. There are two significant concentrations of caves in this area, at Blackwall Reach and at Mandurah. In other places the limestone is too soft and friable to support cave systems. (Bastian, 1964)

The Mandurah caves occur along the southern and western edge of Peel Inlet, a drowned river valley. The caves are all typical inclined fissure collapses, in some cases reaching water level, for example, **Morfitt's Cave**. There are springs along the edge of the estuary. Some of the caves are decorated and make a pleasant diversion from a trip between Perth and the Leeuwin Naturaliste.

Blackwall Reach contains two of the most interesting caves in W.A. displaying features of mechanical (that is, wave) erosion, vadose stream action and nothephreatic spongework. The two main caves are 100 m plus muddy crawls and open on to the south bank of the Swan River where it makes a narrow passage through the north-south coastal limestone belt near Fremantle. Night trips to these caves are easily arranged, if you feel like getting really grotty !

YANCHEP

The cave area is contained mainly within the Yanchep National Park but extends south to the semi-residential Wanneroo area. There is currently only one tourist cave in the National Park, namely **Crystal Cave**, though there is talk of reinstating **Yonderup Cave** as a tourist cave in the redevelopment plan for the area. There are also many 'wild', mainly small caves. The area has possibly as many as 1000 caves and karst features some of which are waiting to be rediscovered such as **'The Catacombs'**. The limestone here is only 10m above the water-table resulting in frequent collapses. This restricts the size of the stream caves. Caves are of the small, crawly inclined fissure type.

Caves occur mainly in the western section of the park. The exception to this rule is **Gibb Cave** YN 140, entrance to which is gained by a small solution pipe. The cave is large and well decorated for Yanchep and well worth a visit. Other notable caves in the park are **Yanchep Cave**, with its obvious cave fauna, old bat domes and large chambers; **Mambibby Cave** which has been subject to extensive vandalism, both official and unofficial; **Loch Overflow**, which takes water from Loch McNess; **Minnie's Grotto**, **Surprise Cave** and **Concinna cave**, which have some of the best Speleothems to be seen in the Yanchep karst. The almost water-filled **Water Cave** provides a cooling end to a hot summer's day at Yanchep. Also to be noted in this cave are the *Galaxias* (fish) and *Gilgies* (freshwater crayfish) plus the iron-stained **'Trog's End'** flowstone.

GEOLOGY AND GEOMORPHOLOGY OF YANCHEP

East of Yanchep area is a vast area of sandplain at the base of the Darling Fault Scarp. This area serves as a catchment for the Gnangara water mound, a feature of great importance in the future of Perth's water supply. The slope of this mound increases in the area of the Yanchep caves and the water moves mainly as streams down this gradient. The numerous enclosed water-logged depressions and lakes within the karst no doubt play a role in recharging karst water and may themselves be the result of a series of cavern collapses and stream diversions. Springs have been seen in the sea west of Yanchep.

MOORA

This area contains a limited number of caves developed in highly silicified Proterozoic dolomitic limestones of the Moora group. Caves show high degrees of structural control along joints. There are three notable caves.

Coorow Cave M 1. The longest cave in the area, with more than 500 m of passageway. The joints have been infilled with quartzite and this remains as a sheet across the cave after the limestone has been corroded away.

Bishop's Hole M 7. A 33 m pitch gives access to a couple of chambers reaching a total depth of 36 m. Guano mining occurred here before 1916.

Jingenia Cave M 6. This is a 20 m deep amphitheatre, geologically and meteorologically interesting. This cave has been extensively mined for guano around the same time as Bishop's Hole.

NAMBUNG

This area is mainly within the confines of the Nambung National Park. Caves and other speleological features have the prefix SH for South Hill River, an area which includes some features north and south of the Park.

History: The sand dunes of this area which are 120 m above sea level, were recorded by 17th century Dutch Navigators. In 1839, caves were first noted in the area by a member of Sir George Grey's ship wrecked party on their 500+ km walk back to Perth. In the 1900's, guano was mined from some caves, at first spasmodically by local farmers and then by an ill-fated scheme by the then Minister for Agriculture. A temporary reserve was placed over the valley of the Nambung River in 1927 to protect the caves. At the time of the phosphate mining, The Pinnacles, only a few miles south, were not mentioned, possibly because they were covered with sand. However, it was these karst features which prompted the formation of the present Nambung National Park in 1966. The first speleological activity occurred in 1962 and since then the area has seen intermittent bursts of activity. A comprehensive caves list and accounts of the area was published in 1973 (Shoosmith, Poulter). The National Parks have gated delicate caves in consultation with speleos.

Geomorphology: The Nambung River sinks in a series of lakes and inflow points caused by repeated deflections of the river by active dunes. The complicated hydrology of the Nambung has been described by Shoosmith (1974) which tells of 1 km long lakes appearing virtually overnight and of solution pipes spouting columns of water.

Though there are a few caves which are solution tunnels which flood to the roof, for example, Brown Bone Cave, most are inclined fissure collapse caves, often well decorated. In Quandong Cave there is a preponderance of volcano-like stalagmites formed over small soil cones below solution pipes which are not calcite filled.

The spectacular **Pinnacles** are the result of subsoil karst erosion (Lowry 1973), the soil having been deflated after the stabilizing vegetation had been killed by the encroachment of active dunes.

Caves: The inclined fissure caves of the Park, for example, **Cadda Cave** SH 18, **Weston Cave** SH 2, **Thousand Man Cave** SH 7 and **Pretty Cave** SH 9 to name a few, offer good potential for photography, mapping and exploration.

JURIEN

This area is centred around the Drover's Cave National Park just north-east of the Jurien Bay townsite.

In the early 1960's W.A.S.G. visited and named Old River Cave J 7 and Mystery Cave J 6. However it was not until the 1980's that major discoveries were made in Old River Cave, taking its length from a few hundred metres to 1.9 km. Other important caves in the area are Drover's Cave J 2, after which the National Park was named, and **Gooseberry Cave** J 1 which is on private property and is a bat maternity site for *Charlinolobus morio*.

Drover's Cave J 2.

A locked cave containing a large amount of graffiti a major portion of which, was removed in 1990. This cave was once a bat roost but locking the cave forced the bats out of the cave. (The door had no escape hole.) Drover's contains the most decoration of all caves so far found in this area. A calcified skeleton of *Macroderma gigas* was reported in the cave in 1990.

Moorba Cave J 3.

This cave is located near the north edge of the Jurien karst area. It is sometimes known as Smithy's Cave, after a local resident who mined the cave extensively for guano during the 1920's. As much as 2,000 tons of guano is said to have been removed. The cave has a steeply inclined walk in type entrance. There is extensive development of roof solution pipes which apparently served best as roosting places for the bats, as the guano deposit is deepest beneath some of the larger ones.

Old River Cave J 7.

A short tight entrance pitch of about 10 m leads to a large boulder strewn passage which leads down a steep, unstable rockpile to a large chamber. This in turn leads to a steep climb up a through a boulder choke into a very large chamber which has numerous holes in its sandy covered and rockpile floor. Wood lice have been found among the root material in the sand piles. At the end of this chamber an "L" shaped slot is entered about six feet up the wall. This is in fact, a huge collapsed block and a low, wide passage leads to a small, well decorated area near the edge of an **INTERNAL PITCH** ! (One of the few found in South West caves) This pitch requires 15 m of rope or ladder and is on the edge of a massive dome shaped chamber the ceiling of which must be a good 50 metres in height. In size, this chamber compares with the terminal "Dome"

chamber in Mullahmullang Cave of the Nullarbor area. A fairly inconspicuous hole leads off the main trend into a streamway in which you can avoid becoming wet for a short while until the passage narrows and the ceiling lowers. A rock pile is then reached and it can be negotiated by a multiple of routes, the left leading to part of an abandoned stream passage. If you go right through the rockpile the remainder of the fossil stream passage is found, which consists of a wide, flat, sandy walking passage which terminates abruptly. Retracing your steps back to, and past the rockpile, the stream passage leads to a fissure in a boulder choke which leads down to a fairly deep pool of water. A climb up from here through more rockpile leads to Nullabor sized trunk passageway ending disappointedly in a small narrowing flattener. You should allow about 5 hours for a small group to visit this cave, though a whole day would be required to properly explore the entire length of passageway. A cave well worth visiting !

ENEABBA

History. This area extends from the Green Head Road in the south to the Irwin River in the north. The area first received attention from speleologists when W.A.S.G. explored River and Arramall Caves in 1960.

In 1963, Jennings visited the Stockyard Gully caves. On this trip E 1 to E 10 were described and positioned. Of these, Stockyard Bridge, Stockyard Tunnel and Stockyard Cave, together with Aiyennu Cave and Beekeepers Hole were the most significant.

In 1969, D.C. & J.W.J Lowry squeezed through a rockfall in Weelawadji Cave and added 1700 m of passageway to the known 300 m of cave (Lowry 1969). Since this discovery, no new major finds have been made in this area.

Geomorphology. The limestone of this area is an older aeolian calcarenite than that of the south-west.

The Stockyard System is formed by the Stockyard River which flows almost all of the year. The gorges between Stockyard Bridge and Stockyard Cave are explained by cave roof collapse (Jennings, 1971: 100). The actual cave is prone to flooding as evidenced by the large logs jammed high in the roof and the mud levels above the logs. Classic karst pavements are typified by Aiyennu Cave (Caffyn, 1973) where the calcarenite has collapsed, resulting in soil subsidence, leaving the kankar peppered with solution pipes.

The overflow of Lake Arramall has formed the two major systems of River and Arramall Caves. Arramall Cave contains the largest chambers which are the result of roof collapses. River Cave contains basic phreatic passageways which finally bifurcate and choke off with mud.

The Weelawadji system contains abandoned stream passages of varying dimensions from the 35 m wide entrance chamber to the small 4 m wide phreatic tubes some 500 m into the cave. The whereabouts of the stream which formed the cave is not obvious although it was thought to be part of the Arrowsmith River system. (Lowry, D.C., pers. comm.) Cave minerals collected from the Eneabba area are Brushite and Gypsum from Weelawadji Cave and these samples are held by Government Chemical Laboratories.

Stockyard Tunnel E 1. The cave is approximately 200 m long, requiring no gear and can be completed at a leisurely walk. Its main features are its size and the meandering of the stream. Bats may or may not be present.

Stockyard Bridge E 2. A bridge between E 1 and E 3. The stream flows beneath a large rockfall. Swallows flying under the bridge are common, many of them nesting in the solution pipes of the roof.

Stockyard Cave E 3. The cave is approximately 800 m long with large chambers being its main feature. The mud coating on most blocks make for interesting sliding while trying to move along the streamway. Bats are sometimes present.

Aivennu Cave E 9. Forty metres of ladder and/or rope are required on the entrance pitch. Of the 100 or so entrances, the largest one on the southern side of the karst pavement is usually used. The nearest tie off is a "twig" some 10 m from this entrance. If SRT is used, some protection is required at the lip. The rockpile below the entrances dips to the north and south where the stream is sighted, but sumps after a short distance.

Arranall Cave E 22. This system extends for 1.8 km as mapped by P. Caffyn in 1973. (Although W.A.S.G. is currently resurveying this cave and the total length will be in excess of 2.0 km) The main trend is mainly walking passages over breakdown. At one point the cave passes beneath the Brand Highway and vehicle noises can be heard. This cave floods very infrequently as a very large rain is needed to flood Lake Arramall.

River Cave E 23. The cave has never been mapped but is approximately as long as Arramall Cave. Very little roof collapse has occurred in the cave and hence the phreatic passages are easy to move in with the flat sandy floor being traversed mainly at a stoop. The end of the cave is a number of small phreatic tubes which choke off with mud. Many leads off the main trend have not been checked. The potential is good.

Weelawadji Cave E 24. A large circular collapse doline heralds the entrance to the largest known chamber in the Eneabba area. From here the passages beyond are developed with some form of structural control with rockfalls at intersections. This cave is locked at the end of the entrance chamber to protect the cave fauna, the good secondary calcite deposits and the untouched guano piles. Also as this system is no longer active, it is very delicate.

Fauna. A large amount of collecting has been done by J.W.J. Lowry in the Eneabba area. She kindly prepared Table 1 which indicates some of the fauna found in Arramall, River, Weelawadji and the Stockyard Gully Caves.

ERRATUM

River Cave E23. page 28.

This cave was in fact surveyed during 1979.
Most leads have consequently been checked.
The length of the cave is closer to 500 m.

LATERITE and GRANITE CAVES

Most of Western Australia is a precambrian granite shield erosion surface of great age. Outcrops are rare and extensive areas of laterite, representing a now dissected erosion surface, are common. In places, granite outcrops through the sandplain as mound-shaped bodies, some only metres high to some such as Peak Charles 650 m above sea level. Laterite caves occur at Kojunup, Chittering and Boscabel at the edges of breakaways or mesas. Cave formation seems to be initiated in a variety of ways, including water and wind action and the action of Eucalypt roots (Lake & Lefroy, 1972). Mapping of these caves has been done by triangulation as the presence of haemitite makes magnetic instruments useless. Small caves, caverns and springs occur in the granite outcrops. Halite exudation and removal of particles by wind is probably the main cause of these cavities. In the south, the possibility of Eocene sea caves should not be dismissed. The large tafoni boxwork filled caves of Peak Charles may be of such a mixed origin.

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TABLE 1

Occurrence of selected fauna in the Stockyard Gully Caves (E 1-3), Arramall Cave (E 22), River Cave (E 23) and Weelawadji Cave (E 24)

Species	Common name	E1-3	E22	E23	E24	Comments
<i>Baiami volucripes</i>	Spider	?	x	x	x	Other species occur including one blind species in E22 & E24.
<i>Protochelifera cavernarum</i>	Pseudoscorpion	x	x	x	x	Associated with guano. There are other small species.
<i>Laevophiloscia yalgoonensis</i> Vandel 1973	Wood louse, pill bug, slater.	x	x	x	x	Also tiny blind troglotic isopods in E22 & E23.
<i>Laevophiloscia unidentata</i> Vandel 1973		x	x	x	x	
<i>Laevophiloscia richardsae</i>		x	x	x	x	There are several other species in all caves.
Scutigeridae (Family)	Centipede		x		x	E22 has a species with red legs and yellow spotted body in twilight zone and a blind species in dark zone (very rare).
Collembola (Class)	Springtails	x	x	x	x	
<i>Lecanomerus flavocinctus</i>	Beetle	x	x	x	x	Abundantly established in E1-3.
<i>Pseudoceneus sollicitus</i>	Beetle	x				
<i>Tripectenopus occultatus</i> Britton 1974	Beetle		x			Blind but pigmented. Has not been found alive since 1969 - could be extinct or very rare.
<i>Shawella douglasi</i>	Cockroach	x			x	Reduced eyes and pigment. Unidentified blind species, eyes present but white, in E22 & E23.
<i>Apis mellifera</i>	Honey bee	x			x	E24 - very ferocious (1974, 1978). E1-3 not active 1974.
<i>Litoria moorei</i>	Frog		x			Other species in E3, E24.

TABLE 1 (Continued)

Species	Common name	E1-3	E22	E23	E24	Comments
<i>Hirundo neoxena</i>	Welcome Swallow	x	x	x	x	Important troglodene at entrances.
<i>Chalinolobus morio</i>	Chocolate Bat	x			x	
<i>Eptesicus pumilus</i>	Little Bat				x	Occasionally seen.
<i>Macroderma gigas</i>	Ghost Bat		Locally extinct			Many piles of fossil guano in E24 and possibly in E22.

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