Documentation and Ground Exploration of Nullarbor Karst

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In 1998 when I first became involved with Karst documentation on the Nullarbor, one of the first questions which came to mind was, how many features and caves will I find?

Initially I found that if you travel 100 km and given an average effective view for spotting features of 40 m either side, you can find an average of around 4 features. This was based on random travel on a motorbike across country and works out to be 1 feature in an area of 2 km^2. This equates to a lot of traveling if you are only finding the 1 feature for every 25 km traveled. On a bike that's 5 features per refill of fuel, or 4 to 5 hours riding, and if traveling cross-country by vehicle and you manage to only have one flat tyre every 200 km, (that would be pretty good in places) that's one flat per 8 features.

On a conservative estimate of 50,000 features on the Nullarbor, that starts adding up to pretty hard yakka. Now it stands to reason that if you are looking at these sorts of figures. Then the last thing you want to do, is have to travel back to half of these features, to get more information, when you are getting a pattern emerging and you happen to be missing data. So recording as much data as possible in a consistent format, at the time I first visited a feature, soon became my priority. Not just the location and "does it go".

The past history of the Plain along with the number of features which can be found all seemed to indicate the number of features documented is very small, but also indicated a high number of features which have been located in the past but never recorded.

Ground based exploration of the Nullarbor has been an ongoing process which dates back to the late 19th century has involved a large number of people. Documentation has also spanned this time frame, but it has been a lot more limited. Early exploration faced far more difficulties than faced with today. Any mishaps were far more costly, (Stevens G P 1938). Even today given modern technology and equipment we must remind ourselves of the realities of the physical environment we are searching, and maintain safety as a priority. Early exploration was limited and mainly concerned with opening up the plain for pastoral use, but there are a number of karst features found during this time which have been mentioned in records. The thing which stands out through the past history is the number of features which have been encountered and then lost in the memories of those who found them. This is mainly due to the problem of defining positions on the Nullarbor.

Post European settlement a group of people who have spent a large amount of time on the Nullarbor is the Rabbiters (most notably the Carlisle family). Rabbiters would have undoubtedly located a large number of features. The sheer number of meteorites they located indicates their powers of observation (Bevan 1992, De Laeter 1983). But unfortunately they never had either the means nor motivation to record features, yet they have in recent times along with pastoralists had the greatest knowledge of the Nullarbor Karst. Only a few of the features they found have ever been transcribed.

Limiting factors of previous documentation:

- Needs for documentation: Early documentation focused more on survival, ie. rockhole location or caves containing water, (such as that by Turner in the 1880's), and suitability of the Plain for Pastoral purposes, (Jones 1880, Gair 1933, 1888)
- Difficulties of remoteness, past and present traveling on the Nullarbor has always been a case of being totally self-sufficient even for pastoralists etc.
- Physical nature of the plain: by and large the surface is treeless, featureless, rock-strewn, and for most of the year hot and waterless. To anyone who has spent a great deal of time on the treeless plain or "Plain Proper", "Strewn with Rocks and Bluebush" are the words which paint the scene the most appropriately.
- Difficulties in giving features any form of accurate location. Without an accurate location there was and still is, very little chance of relocating the same feature.

Features which have been logged previously include those by Keith Quatermaine and Harry Wheeler who as a team achieved the highest visitation/documentation in pre GPS days by recording over 600 features. Some of these features have accurate locations, while others further off the beaten track do not. In a worst case scenario they could be over 10 km's out. Even for people who know the plain intimately recalling positions away from tracks is still a case of error of 1 + km. The fact that almost all features (>95%) recorded in pre GPS days lie close to established tracks should be no real surprise. And again even with the Quatermaine/Wheeler features 90% are close to tracks. The only real exceptions to this were the Jennings data. (Lowry 1967), and then post GPS with the Plane Caving finds in the 1990's.

Simply the lack of definable location due to the physical nature of the plain and the chance of redefining and relocating the same feature has been the greatest limiting factor in past documentation. The advent of the GPS and subsequent ability of computer processing has made the task of relocating and redefining features, a lot more accurate and quicker.

In early 2000 whilst in the middle of an extended Nullarbor trip I found myself with the time, having the luck of no immediate pressure to return to work; and the resources, namely a fairly up to date laptop (set up with the Nullarbor Database in lieu of the, at the time, missing-in-action Max Meth) and GPS for crosschecking features found. I then had the good fortune to be invited to be a part of Ken Boland's team. Being part of Ken Boland's team enabled me to help,laongside Peter Ackroyd and the rest of the crew, in the enormous and at times, daunting task of documentation and ground Exploration on Ken's trips. Both Peter Ackroyd and myself have been involved with the processing the large quantities of data which Ken has produced.

DATA COLLATION OBJECTIVES

- Maintain a consistent data format, which is easy and effective to use.
  It also has to be maintained to ASF and Nullarbor Database standards.
- Crosschecking with previously known features.
  This has been achieved by two methods - manual transcription/plotting of features on maps and computerised logging and plotting.

Both methods have drawbacks and both are labour intensive. Computerisation offers a quicker and more versatile tool, from communication with GPS's to cross linking to the Nullarbor Database. But it is by far the most vulnerable system and failure could be drastic. Hence a need for manual reference material. Manual transcription is the most labour intensive, as each point must be hand recorded and then plotted manually onto maps. In 2001 and 2002 Peter has spent copious amounts of time to ensure hard copies are maintained for reference and storage.

EXPLORATION AND DOCUMENTATION

Ground exploration and documentation is still extremely time consuming. Through efforts of all involved, this has led to a 33% (540+) increase in documented karst features on the Nullarbor. The basic aims are to visit, document and explore as many features as possible. This can involve traversing large distances. Hence field time on the trips is split between traveling, checking, and documenting Ken's features, and whatever else is found along the way. On most trips the team splits up into groups of 3 to 5 people who visit separate areas thus enabling a greater number of features to be explored and documented.

With Ken's flying patterns he locates a fairly even distribution of features. Whereas ground exploration is far more sporadic, turning up features localised in the areas of travel and visitation. Background research, route planning and increasing visibility, ie. scaling pole, along with increasing the amount of time spent looking, are probably the only methods of increasing finds on the ground.

Whilst searching on the ground extra features rarely turn up more than a hundred metres from the path of travel. The majority of new features turn up in local proximity to the features Ken has seen from the air. People in the ground team who are not needed in documenting, explore the area in the immediate vicinity, and then often find the next feature to document. Only on average of 3 or 4

of Ken's features are visited each day per ground team. Generally for each feature Ken has seen from the air a further 1 or 2 are located on the ground. Using a quick, effective and consistent data collection routine for features visited on the ground is necessary to be able to record all features encountered and complete your planned trip for the day.

A quick overview:

- Due to the possible errors associated with previous feature locations, a constant broad crosschecking with previously known features is required to establish each feature as being either known or new.
- All information gathered is documented to ASF Standards.
- This includes feature position data and location descriptions.
- All surface details, ie. doline and entrance measurements and descriptions.
- The horizontal and vertical extent below the surface, future prospects or leads, along with tagging and photography details.

WHAT YOU FIND

The average density of features appears to be greater than previously calculated at around 1 per 1.3 km^2. In general the karst features found still fit into the Thompson (1950), Jennings (1962) assertions as to shallow and deep caves, the only real difference to the past trends is the lack of deep caves and the relatively high proportion of solution shaft "BH" (Blowhole) karst features being noted. There are very few exceptions to this. The most under-recorded feature is by far the shallow dolines, ones <10m in diameter with no visible leads. These are almost as numerous as BH's.

Blowhole development is by and large shallow, (area dependent) ranging in depth from 3 to 5m, avg. 3.5m depth. Few BH's extend beneath this. Most penetrate the Nullarbor limestone capping only to diffuse into the underlying porous and intense small scale phreatic tubing (5-10 cm), or simply end in choked flood squeezes. In the few caves which do exist we find that they are mostly horizontal and consist of small networks of tight passage. In general they contain only small chambers which rarely exceed a few metres.

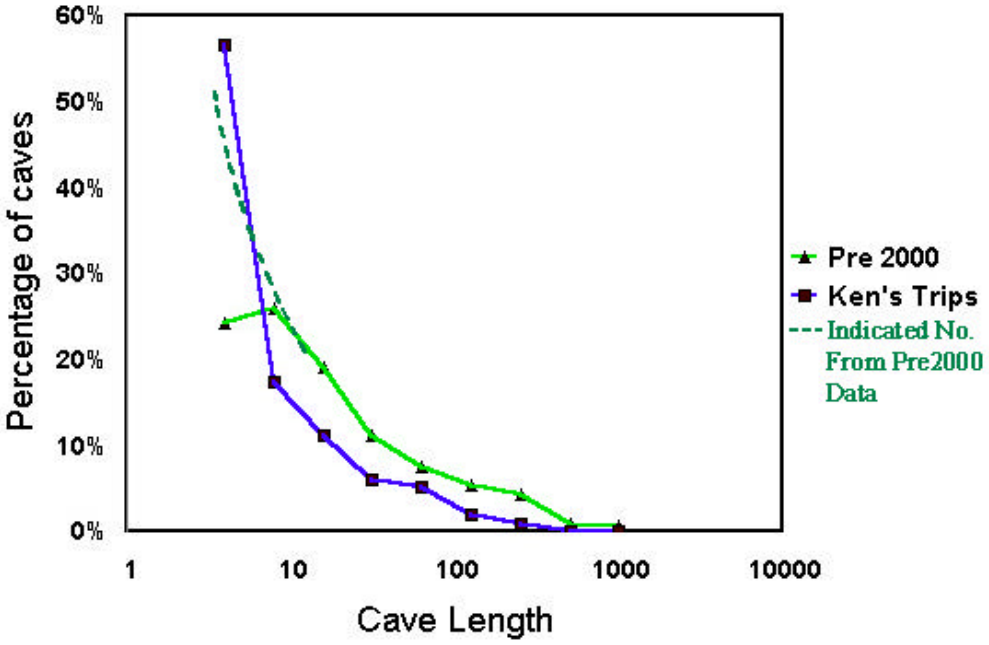
By and large most of these caves are features which have been exposed to the elements for long periods of time, such as the effects of dissipation of rainfall runoff. The most important things noted in these shallow caves are localised fauna populations consisting mainly of cave crickets *Pallidotettix nullarborensis* and *Tartarus* sp. spiders. These caves often contain recent fauna remains, which on a rare occasion date back to pre European times; examples of these are the lesser sticknest rats *Leporillus aspicalis*, and western quoll *Dasyurus geoffroii*. But apart from this, these caves as a rule contain very few noteworthy aspects.

As previous systematic searching has begun to suggest, enterable large caves shallow or deep, are not the norm, rather they are exceptions too. They are more sparse and make up a smaller proportion of Nullarbor Karst features than previously thought.

Some of the reasons for why you find what you do, could be equated to:

- Our recording techniques, emphasis by the whole group to record all karst features and all details.
- In the past recording has trended towards being focused on features which "do go" ie. ones with more substantial caves. Minor features were a lot more likely, to be left unrecorded.
- Previous records (pre GPS) have been dominated by features which have been easier to find and relocate eg. ones near populated areas, areas of easier traveling, or near tracks. There was also a bias, towards larger features, in other words ones which are easier to spot from the ground and air. This is opposed to BH's, small dolines and other Karst features which are harder to see and find, even though there are a lot more of them.
- Areas searched after the advent of GPS , had resulted in a more representative sample being gathered. There was still some bias toward features with bigger caves. This was still partially due to the trend of documenting only features which "go". It is also due to some of the areas searched by Plane Caving which turned up large numbers of shallow but long caves.

- Have all larger features and entrances been found???? Apart from exceptions, undoubtedly the vast majority of collapse dolines, are in records. As these features were more likely to have direct access to deeper caves they have caused a bias in previous data.



Graph showing the number of Caves vs their Length
The number of caves is expressed as a percentage of 1650 features for pre 2000, and 540 for Ken's trips. The regular trend shown in pre 2000 caves between 10m and 250m in length, indicates that there should be a much higher number of small caves/features which are not shown in earlier records.

The dedication for meticulous recording of all features by the teams on Ken's trips can be shown by a more representative sample of Nullarbor caves. These have a high proportion of minor features and features which don't go. The features recorded as a result of Ken's trips, 18.5% have caves; of these caves ones with lengths between 4m and 8m make up 56%, and caves which are >50m make up just 10% of the total. Pre 2000 29% of all feature records had caves, caves with lengths between 4m and 8m made up only 24% and caves which were >50m made up 26.5% of all caves. In the future the percentage of minor karst features will continue to climb, and hopefully a continuing representative sample will result. The future benefits of this are the ability to spot trends, patterns and predict which minor features are likely to "go" when pushed.

It is not always the big features which will access caves and turn out to be significant or important. Thanks must go to all those involved whose hard work and efforts produced the data and ultimately the finds of 2002.

FOOTNOTE

A cave in this instance is determined as a feature which has >=4m horizontal extent or a combined total of >=8m for depth and horizontal extent.

Teams for 2000 included:

- (VSA) Ken Boland, Peter Ackroyd, Daryl Carr, Margaret James, Rudy Frank, Jose Curras, (VCC) Greg Leeder, (CLINC) Rob Klok & Dawn Graves, (CEGSA) The Author.

Teams for 2001 included:

- (VSA) Ken Boland, Peter Ackroyd, Daryl Carr, Margaret James, Nick White, Hank Coppus, Rodger Taylor, Lyn & Brendon.
- (CEGSA) Aaron, June & George MacLucas, Ray & Chris Gibbons, Graham Pilkington, Max Meth, The Author, (CLINC) Rob Klok & Dawn Graves.

Teams for 2002 included

- (VSA) Ken Boland, Peter Ackroyd, Daryl Carr, Margaret James, Nick White, Tom Porritt, (NSS) Jake Turin, (CEGSA) Ray & Chris Gibbons, The Author & (SRGWA) Eve Taylor.

Apologies to anyone who is missing from this list.

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