# RESULT OF NULLARBOR DOLINE SEARCH

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## Introduction

The Nullarbor caving region is a large area of nearly horizontally bedded limestone that lies on the south coast of Australia. The majority lies in Western Australia with about a quarter of the total in South Australia.

In 1961 most of the Nullarbor plain was photographed from the air with the South Australian side not being photographed until March 1963. Photos were made available with a scale of about 1:85,000 roughly equivalent to the current 1:100,000 topographic map series.

In September 1963, J. N. Jennings and David C. Lowry (Lowry 1968) after discussing the photos, separately to examine them. Initially Jennings concentrated on the SA portion of the plain and Lowry on the WA portion. But Jennings went on to examine the entire Nullarbor area. The aim was to determine what dolines could be detected.

At this time Koonalda Cave (5N4) was the longest of the seven deep caves of the Nullarbor that were known to cavers. Only 34 karst features had been numbered on the Nullarbor. Three of the known deep caves were not yet in the records system. The seven known deep caves being, from west to east, Cocklebiddy 6N48, Murra-el-eleven 6N47, Firestick 6N70, Abrakurrie 6N3, Weebubbie 6N2, Warbla 5N1, and Koonalda Cave 5N4. All these caves led off from large collapse dolines, and the hope was that by finding more dolines, other caves would be found.

Lowry (Lowry 1964) had the first success in November 1963 when he used locations that he had derived from his examination of the photos, to locate three dolines near Madura. Two of these, Kestrel No 1 and Kestrel No 2, were deep caves and the third a 20m deep doline with an overhang cave. At this point the strike rate for new deep caves was two out of three.

In December 1963 Ted Anderson was given maps by Jennings (Jennings 1964) that showed the location of nearly all the collapse dolines from Koonalda to Cocklebiddy. This led in January 1964 to Anderson (Anderson 1964) finding eight large dolines N35 to N39 and N43 to N45. Though N36 had not been identified off air photos, it had been found in looking for N35.

Of the seven new dolines visited only two were deep caves, but these both contained lakes, namely Mullamullang Cave 6N37 and Winbirra Cave 6N45. This trip was therefore among the more successful of all Nullarbor trips. In addition, in January 1964, Anderson numbered the caves he had found, as well as N40 to N42. And this presumption by Anderson to number the caves caused some consternation and even a little resistance by the CEGSA people who supposedly had that job.
At this point four deep caves had been found in nine dolines.

## J. N. Jennings and D. C. Lowry Doline Lists

On 17 December 1963 Jennings supplied CEGSA and WASG with lists of dolines he had so far identified on the air photos. The lists detailed:

- 74 dolines in WA
- 25 dolines in SA

for a total of 99 dolines.
Jennings supplied David Lowry with the list of 74 WA dolines.

Though in March 1964 Jennings (Jennings 1964) said "So far I have listed 105 dolines from the air photographs". A further six dolines evidently having been identified. Jennings final list had 111 dolines, 75 in WA and 36 in SA

In May 1967 Lowry (Lowry 1967) listed 89 dolines in WA. Working for the WA Geological Survey, Lowry was not concerned with South Australia. This gave a total number of dolines identified by Jennings and Lowry of 90 WA and 36 SA.

Lowry stated that "the list of (89 dolines) is basically that of Mr J. N. Jennings, with some minor additions". But these were not detailed:

- There were 16 additions: N49 N93 N46 N138 N50 N137 N127 N139 N55 N143 N89 N90 N51 N86 N87 and N88.
- And one deletion: X678 (Forrest airport quarry).

In March 1964 Jennings (Jennings 1964) predicted that of the 105 dolines so far listed he did not expect more than 35 deep caves in total. Even this figure proved overly optimistic. By the end of the earnest searching in 1967 the total number of deep caves stood at nineteen. An increase of only twelve from the original seven. And two of the new deep caves had not even been on the doline list, namely Arubiddy Cave 6N81 and Dingo Donga Cave 6N160. No new deep cave had been found in SA, despite 36 of the new dolines being there.

## Initial attempt to summarise the position

Alan Hill, as Nullarbor records officer for CEGSA, compiled data sheets for each new karst feature. However the allocation of new karst numbers proceeded very slowly, but hastened eventually by the publication of MULLAMULLANG CAVE EXPEDITIONS 1966 which listed features up to N80.

In September 1967, Alan Hill (Hill 1967) presented a "Checklist of caves and related features". By then, most of the dolines had been visited and N numbers allocated. This list features up to N154. A reference system indicated if a feature had been discovered using Jennings' air photos or Lowry's doline list. But there was no attempt to summarise what had been found.

On a second checklist, Hill listed 26 dolines with photo coordinates and no N numbers, because they had not yet been investigated. These included 24 from WA and two from SA. Three of these have since been numbered, Handprint Cave 5N210, Wave Cave 5N215 and False Hope Doline 6N713, leaving 23 (NX389 to 394 and NX396 to 412).

Inexplicably, Hill had failed to list seven further dolines from SA that had not been investigated (NX413 to NX419). I say inexplicably because Jennings' final list, undated, gave details of 25 dolines. This list was titled, "Unnamed, steep-sided, enclosed depressions or sinkholes, which may or may not have caves leading from them. Not explored to my knowledge or in speleological society records. Landmarks in Plain." An impressive title, if nothing else.

The first seven dolines on the list are numbered as N104 111 103 107 109 108 and 110. The next seven were simply ignored, and in 1995, I numbered them as NX413 to NX419. The others on the list are N124 125 148 179 178 210 215 144 146 145 and 173.

This last (6N713) was the first of the unvisited Jennings dolines to be located in over 25 years. It was located in 1993 by Plane Caving after Max Hall (pers com) suggested they fly over the area. I had given Max the AMG having noticed that a yardage map reference was actually given in CotN. And it was named False Hope Doline, when it failed to contain any cave.

The situation in 1967 regarding the doline search was, to a large extent very unsatisfactory:

- A large number (about 90) dolines had been visited and placed in the records system with an N number.
- There were 26 dolines listed in CotN for which the only location information was a photo coordinate
- 7 dolines had been omitted entirely.

This is the situation that has persisted up to the present date.

## Current attempt to summarise the position.

I have for some years felt that a report of the final result of the 'doline search' should be written.

- Specifically, the search begun by the listing of dolines visible by Jennings and Lowry on air photos in 1963.

In 1997 the events have not quite finished, because 30 dolines have not yet been examined on the ground. At least there is no trip report in records for any of these dolines.

It is very interesting to note that a few cavers have advised me that all the Jennings dolines have been visited, but this is certainly not reflected in the records system. It is possible that some of the 30 dolines have been visited, and that trip reports either were not written or not placed in records. My feeling is that most of the 30 dolines have not been visited by cavers.

One difficulty that would stop potential explorers from locating these dolines is a lack of location information. A photo reference is NOT a useful tool to locate a doline. The requirement is a map coordinate. All the dolines still not located can be printed on a map, and an itinerary to visit each one can then be planned. Of course, having the relevant air photos on such a trip will aid in the location of each doline.

There was a major difficulty: How to derive map coordinates for the 30 unvisited dolines. Lowry (Lowry 1967) offered a solution, "The system for obtaining the photo coordinates is difficult to describe briefly, interested readers can obtain details from Mr J. N. Jennings or myself". Oh good.

But Lowry was working overseas and did not have access to his papers that were in storage. And Jennings had died in 1984.

With help, notably from Ken Bowland (Bowland 1995) of VSA, I did decipher the photo coordinate system. Lowry had been correct, the system was difficult to describe and worse, it was difficult and confusing to operate.

It was a great pity that Jennings or Lowry, once having located a doline, did not then record its map location. But it was not until 1965 that the series of 1:250,000 maps that has coordinates first became available.

I have now computed map coordinates for all the remaining dolines. I was amazed to see that some of these dolines lay close (within 10km) to areas that are regularly visited by cavers. A split of map sheets with dolines remaining to be visited is:

| 250,000 map | 100,000 map | | |
|---|---|---|---|
| EUCLA | Eucla | 1 | X389 |
| EUCLA | Monaghan | 1 | X391 |
| EUCLA | Sexton | 1 | X390 |
| LOONGANA | Turner | 2 | X392, X393 |
| CULVER | Caiguna | 1 | X394 |
| CULVER | Culver | 1 | X396 |
| BALLADONIA | Mardabilla | 6 | X397, X400 to X403, X405 |
| BALLADONIA | Gambanca | 9 | X398, X399, X406 to X412 |
| MALCOLM | Mount Dean | 1 | X404 |
| NULLARBOR | Nullarbor | 7 | X413 to X419 |

On the Jennings/Lowry lists there are a total of 138 karst features. But twelve of these are blowholes and small dolines, not visible on the air photos. These twelve features were listed by Jennings as help for persons trying to locate the other dolines. They are N5 6 11 12 13 14 15 19 20 21 23 97.

This leaves 126 Dolines on the lists. The split of these is:

| | |
|---|---|
| 1 | Forrest airport quarry (not a doline) |
| 30 | not yet investigated |
| 3 | investigated by Lowry in 1963 N40 41 42) |
| 47 | WA dolines on Jennings' original list |
| 18 | SA dolines on Jennings' original list |
| 12 | On Jennings' additional list |
| 15 | On Lowry's list |

The last five items constitute 95 dolines that have been examined and placed in the records system.

## Conclusion

Of the 95 dolines listed by Jennings and Lowry that have so far been documented:

- 14 were already known to cavers prior to 1963, namely: N1 2 3 4 7 8 9 16 17 18 22 47 48 and 70.
- 25 have no cave namely: N65 69 71 76 77 78 80 89 92 93 95 107 108 124 129 130 134 135 141 143 144 146 148 179 and 713
- 16 have tiny caves or overhangs up to 10m in length, namely: N35 43 54 66 67 86 87 88 90 125 128 137 138 140 142 and 178
- 40 have caves longer than 10m, namely: N37 38 39 40 41 42 44 45 46 49 50 51 53 55 56 57 58 59 62 64 72 74 79 82 83 85 91 96 98 103 104 109 110 111 127 139 145 147 210 and 215

Of the 40 new caves found:

- 20 have caves deeper than 20m, namely: N37* 40* 41 42* 44 45* 46 49* 50* 53* 55* 56* 58 59 64 74 79 83* 147 and with ten of these marked * deeper than 50m.
- 6 contained lakes: N37 45 46 49 53 and 56.
- 20 had caves longer than 50m: N37* 39 40 42 45 46 49* 50 53 55 56* 58 59 62 64 72 83* 103 and 210 with four of these marked * longer than 500m.

New caves continue to be discovered.

There are 30 dolines identified by Jennings that remain unvisited. Listed here are their locations and Jennings' description (if any was given):

| | easting | northing | 100,000 map | description |
|---|---|---|---|---|
| 6 NX 389 | 490000 | 6508000 | Eucla | Very degraded, cave unlikely. |
| 6 NX 390 | 443000 | 6516000 | Sexton | Shallow, shallow cave only possible |
| 6 NX 391 | 467000 | 6515000 | Monaghan | Very degraded, but large, no cave likely |
| 6 NX 392 | 745000 | 6593000 | Turner | Small irregular shallow doline |
| 6 NX 393 | 746000 | 6592000 | Turner | none given |
| 6 NX 394 | 743000 | 6410000 | Caiguna | none given |
| 6 NX 396 | 663000 | 6378000 | Culver | Slightly degraded, unlikely for cave |
| 6 NX 397 | 591100 | 6351100 | Mardarbilla | Degraded, unlikely for cave |
| 6 NX 398 | 596400 | 6352800 | Gambanca | Degraded, cave unlikely |
| 6 NX 399 | 596800 | 6354400 | Gambanca | Degraded, unlikely for cave |
| 6 NX 400 | 584600 | 6348400 | Mardarbilla | Degraded, cave unlikely |
| 6 NX 401 | 584000 | 6356500 | Mardarbilla | Degraded, cave unlikely |
| 6 NX 402 | 587000 | 6353400 | Mardarbilla | Degraded, cave unlikely |
| 6 NX 403 | 589400 | 6354400 | Mardarbilla | Degraded, cave unlikely |
| 6 NX 404 | 575300 | 6340700 | Mount Dean | Small, but promising |
| 6 NX 405 | 555800 | 6349000 | Mardarbilla | May be exposure of basement of depression |
| 6 NX 406 | 622500 | 6366800 | Gambanca | Gentle degraded doline, no cave likely |
| 6 NX 407 | 622100 | 6365800 | Gambanca | Gentle degraded doline, no cave likely |
| 6 NX 408 | 619700 | 6365600 | Gambanca | Gentle degraded doline, no cave likely |
| 6 NX 409 | 617800 | 6362000 | Gambanca | Promising fresh doline |
| 6 NX 410 | 617300 | 6363900 | Gambanca | Elongated degraded doline |
| 6 NX 411 | 617800 | 6358500 | Gambanca | Small but fresh doline |
| 6 NX 412 | 607200 | 6355900 | Gambanca | Degraded doline |
| 5 NX 413 | 669100 | 6540700 | Nullarbor | none given |
| 5 NX 414 | 653400 | 6539900 | Nullarbor | none given |
| 5 NX 415 | 667800 | 6539300 | Nullarbor | none given |
| 5 NX 416 | 677100 | 6534500 | Nullarbor | none given |
| 5 NX 417 | 677100 | 6535600 | Nullarbor | none given |
| 5 NX 418 | 677200 | 6534200 | Nullarbor | none given |
| 5 NX 419 | 677600 | 6533600 | Nullarbor | none given |

A summary of all known Nullarbor caves reveals:
16 caves longer than 500m: N1 2 4 37 47 48 49 56 83 132 193 206 360 707 1411 1426
23 caves deeper than 50m: N1 2 3 4 36 37 40 42 45 47 48 49 50 53 55 56 70 81 83 160 206 707 734

The longest cave on the Nullarbor, Old Homestead Cave, 6N83, approaches 30km. There are still twelve fewer deep caves than the 35 predicted by Jennings in 1964.

Exploration and documentation of the Nullarbor karst continues to provide many challenges.

## References:

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