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The Western Caver

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Abbreviations used in this publication

ASF	Australian Speleological Federation
CAC	Caves Access Committee
CCC	Chillagoe Caving Club
CDAA	Cave Divers Association of Australia
CEGSA	Cave Exploration Group (South Australia)
CEGWA	Cave Exploration Group Western Australia Inc.
CLinc	Cavers Leeuwin Inc.
CMAC	Caves Management Advisory Committee (for Leeuwin-Naturaliste National Park)
DEC	(former) Department of Environment and Conservation
DPaW	Department of Parks and Wildlife
HSC	Hills Speleology Club
ISSB	International Society for Subterranean Biology
MCCC	Mole Creek Caving Club
MESDOC	Marine Engineering Special Duties Officers Course
SES	State Emergency Service
RH	relative humidity
SRGWA	Speleological Research Group (Western Australia) Inc.
TDI	Technical Diving International
WAPET	West Australian Petroleum Pty Ltd
YCAC	Yanchep Caves Advisory Committee

On the cover:

Front: Luana Dwyer in WI-9. *Photo Danny Wilkinson*

Back: Cave pearls in WI-62. *Photo Paco Murray*

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Administration, Conservation and Technical

WASG Committee for 2014-15

President:	Rob Susac
Vice-President:	Tim Moulds
Secretary:	Andrew Thomas
Treasurer:	Fran Head
Property Officer:	Ian Collette
Co-ordination Officer:	Greg Thomas
Conservation Officer:	Rob Susac/Dene Buckley*
Librarian:	Robin Doust
Committee member:	Alan Poore
Committee member:	Weidi Koh
Committee member:	Jane Wong

*Rob Susac was elected at the AGM but ceded the position in June to Dene Buckley, who expressed interest and was duly co-opted.

President's Report *Rob Susac*

As we slide out of the Year of the Snake into that of the sure-footed Goat, it is a time for reflection on all our achievements as a group. Our membership is strengthening and it is excellent to see a lot of newer members getting actively involved not only in caving, but in the committee and various club activities. This has included advancements to Full Member and Trip Leader status and with this impetus, new caving initiatives such as international travel and research. With this in mind, let's not forget to acknowledge the depth of our demographic, with our founding member, Lex Bastian, caving now for 66 years and producing valuable work. Indeed our youth have much to aspire toward.

Work has continued on recording cave locations from various contributors, in particular in the South-West, Yanchep and Cape Range areas, for inclusion in the WA database. Regular trips to these areas have been ongoing. We need your help to continue this valuable work, so please get involved and contact the relevant area coordination representative if you can provide any information. This data collection is an interclub initiative supported by the Speleological Council of WA, which has been working to unite the efforts of cavers from different WA caving clubs (to varying degrees of success).

Of major significance is the upcoming 2015 ASF Conference, *Ningaloo Underground,* to be held in Exmouth in June. This has required a great deal of attention from the organising committee, comprised of members from WASG, SRGWA and CLinc, with WASG playing a key role. Special thanks go to Darren Brooks for providing the lion's share of this as our man on (and under) the ground up there for what will be a must-attend experience. We look forward to seeing you all at it – have you committed your involvement yet?

Inter-club liaison continued strongly, with SRT training at WI-27/28 and Wellington Dam quarry organised by Ross Anderson, which complements Ian Collette's regular workshops that are open to members of other clubs. Continued representation on CMAC, YCAC and CAC has ensured our involvement as major stakeholders in all cave-related issues in these areas. This has included a campground proposal for Boranup, gating issues and fire equipment exclusion zone mapping, and, in the wider Australian context, donating to the Save Cliefden Caves appeal. The business of karst conservation has remained a core objective for the club with various issues always arising with which I urge you to involve yourself. This can be as simple as documentation, track marking, rubbish removal or cleaning right through to whole cave rehabilitation projects. I have relinquished my role as Conservation Officer into the safe hands of Dene Buckley, whose report can be read below. Got any ideas? – formulate a plan.

Regular cleaning and maintenance has continued down at the WASG hut. This valuable club asset remains a core area from which we can focus our activities in that region.

Remember to document your experiences for our future and get involved in research. Of particular interest is the archaeological work performed by Carly Monks in E-30 and the potential future work in the area that this coming year may bring. This has been an area of expertise little investigated by members in recent years. I would recommend members to get out into other areas with different trip leaders so as to broaden your experiences, as different people have different skills and knowledge to impart. Let's make 2015 a great year to remember for WA caving. I wish you all a happy and safe year underground.

Treasurer's Report *Fran Head*

The accounts for the year have been audited (see overleaf). The financial statement shows a surplus of $1370 for the past year (rounding to the nearest dollar), and a closing balance of $9890, of which $1007 is reserved for conservation.

The healthy surplus can be attributed to largely to good income from hut fees, which saw the significant sum of $672 received from the Scouts for a Rover camp held at the end of 2013 – thanks are due to Alan Poore for organising this – plus $476 for four school camps.

Membership numbers for the year were good. The number of members for the full year was up to 61, as opposed to 55 in 2013; and I am pleased to say that all of the four individuals who joined for the second half of 2014 have gone on to renew for 2015.

In addition to these fee-paying members, WASG also has 3 honorary life members who maintain an interest in the club although they do not wish to pay ASF fees.

STATEMENT OF INCOME & EXPENDITURE, 1/1/2014 - 31/12/2014

INCOME		
Membership fees	5102.00	
Hut: usage fees	1168.00	
Equipment hire	105.00	
Donations, miscellaneous	92.00	
Sales of stickers	34.00	
Bank interest	1.00	
TOTAL INCOME		**6502.00**
EXPENDITURE		
Membership fees & insurance to ASF	3325.50	
Hut lease and maintenance	194.90	
Equipment purchases	119.92	
Western Caver	620.73	
External memberships & subscriptions	100.00	
Admin: PO Box, meeting room, website etc	471.20	
Conservation	300.00	
TOTAL EXPENDITURE		**5132.25**
EXCESS OF INCOME OVER EXPENDITURE (surplus)		**1369.75**

BALANCE SHEET, 1/1/2014 - 31/12/2014

OPENING CASH BALANCE	**8519.58**	a
SURPLUS 2014	**1369.75**	
CLOSING CASH BALANCE	**9889.33**	b

Notes to accounts

a Includes an amount of $1279.56 reserved for conservation

b Includes an amount of $1006.56 reserved for conservation (D Buckley mislaid a cheque for $27 and donated this amount back to conservation)

WASG MEMBERSHIP 2014

Single members	23
Family members (no. of families)	34 (14)
Honorary life members of WASG who also paid ASF membership	3
WASG members who paid their ASF fee to another club	5
TOTAL ALL-YEAR MEMBERS	**61**

Half year (new members joining after 1 July): Single	4
TOTAL HALF-YEAR MEMBERS	**4**

Three-month introductory members	2
TOTAL INTRODUCTORY MEMBERS	**2**

Conservation Officer's Report

Dene Buckley

- The ASF conference is being hosted in WA this year. The *Ningaloo Underground* committee has done a great job organising the event and hosting the conference website. While this is a great opportunity to showcase WA caves, the increased visitation can have an impact and steps will be taken to minimize this. It's shaping up to be great event and a must-do for 2015.
- The club has been actively helping researcher Carly Monks with her investigations into early Aboriginal occupation. This has culminated with a successful archaeological excavation in E-30, Drip Cave. A great example of the importance of preserving karst features for ongoing scientific research.

- The proposed fracking in WA is an ongoing concern; the situation is being monitored by the committee. In April 2014 Norwest Energy gave a presentation on a proposed 3D seismic acquisition survey in the Arrowsmith area. This is a precursor to commercial fracking operations in the area. From a conservation standpoint any commercial fracking in WA is undesirable, with groundwater contamination, habitat destruction and drilling wastewater runoff just some of the concerns.
- The WASG Conservation Fund made a $300 donation to the Save Cliefden Caves Appeal. The area is under threat of flooding from a proposed new dam. Cliefden Caves is a significant area of limestone both within NSW and internationally. The area is one of the most cavernous in NSW and is rich in fossil material.
- The ongoing work of updating cave GPS co-ordinates has been progressing steadily. Some new karst features have also been discovered and mapped due to Ian Collette and other WASG members' hard work.
- Rob Foulds is continuing with his data collection in Yanchep caves, which is a valuable resource for future research.

Property Officer's Report and SRT Training *Ian Collette*

The only equipment purchased in 2014 was two headlamps, to replace some which were becoming worn out and to ensure that the club has five full sets of gear (helmets, lights and vertical gear). However, the new lights have had very little use as yet, as most new members now seem to have their own lights.

Indeed, it has been noticeable this year that our newer members have moved quickly to acquire their own gear, which is pleasing.

SRT nights continued at the Vertical Services workshop for members to practise knots, ascending and descending, changeovers and rescues. These were attended by 27 individuals, who between them made up a grand total of 73 training night attendances. A table of attendance is included here to serve as a training record. I would like to thank everybody for helping with the training, passing on alternative ways of doing things, and making sure everyone was safe.

In addition, it should be noted that 16 members attended the roping day organised by Ross Anderson at WI-27/28 on 23 August 2014; and that Paco Murray held around 10 vertical training sessions at Mountain Quarry and the trees in South Perth for those going on his New Zealand trip.

Name	**SRT training sessions attended**								**Total p/p**
	27 Feb	**13 Mar**	**6 Apr**	**29 May**	**17 Jul**	**12 Aug**	**16 Oct**	**18 Dec**	
Collette, Ian	√	√	√	√	√	√	√	√	8
Koh, Weidi	√	√	√	√		√	√	√	7
Thomas, Greg	√	√	√	√	√				5
Woodcock, Kim	√	√		√		√	√		5
MacCracken, Rob			√		√	√	√		4
Martin, Belinda	√	√	√			√			4
Murray, Paco			√		√	√	√		4
Tan, Cindy			√		√	√	√		4
Dwyer, Luana				√		√	√		3
Wong, Jane				√	√	√			3
Boon, Tim (visitor)					√	√			2
Buckley, Dene		√				√			2
Joyce, Natalie			√			√			2
Lampard, Asha				√	√				2
Moulds, Tim		√					√		2
West, Steve		√		√					2
Wilcox, Louis					√	√			2
Wilkinson, Danny			√			√			2
Wiltshire, Brett		√		√					2

Name	SRT training sessions attended								Total p/p
	27 Feb	13 Mar	6 Apr	29 May	17 Jul	12 Aug	16 Oct	18 Dec	
Coops, Lockie						√			1
Forrest, Kathryn					√				1
London, David		√							1
Nykiel, Patrick			√						1
Thomas, Andrew		√							1
Woodcock, Karen				√					1
Kimber, Tom (visitor)				√					1
Straughan, Libby (visitor)				√					1
TOTAL	**2**	**11**	**10**	**12**	**10**	**15**	**8**	**2**	**73**

Arborite: An alternative term for rootsicle *Lex Bastian*

The roots of trees or plants which grow into a cave cavity and become calcified, came to be given a colloquial term 'rootsicle'. This colloquialism came into popular use, apparently in the United States, without being defined. In Australia a paper on the repair of such a speleothem at Wombeyan was published by Garry K. Smith.[1] Since there had never been a definition, Smith included such at the conclusion of that paper.

Discussion

There are problems with this term. Firstly it sounds – not to exaggerate the point – flippant. 'Rootsicle' does not sit comfortably in cave language. Some person in the USA seems to have coined the term. The fact that no definition was ever offered in the USA from which it originated, suggests it was never more than a colloquialism, and that nobody in USA was ever going to define it. Smith of course felt the need to define it while reporting on a repair exercise. But one may ask whether the originators of the term ever planned to give it a definition, but rather left it as a colloquialism: a 'funny'. In fact, it seems that this type of decoration would have been regarded in the USA as an oddity, for which the word coined may have seemed appropriate.

The second point is the suffix, which is decidedly not a spelean type of suffix. Speleothems generally have the suffix '-ite', which is normal for mineral materials. Whereas '-icle' clearly belongs to such things as icicles which, while they occur in cold climates, are not an Australian cave phenomenon. Furthermore, '-icle' applies only to pendant material, whereas the calcification of tree root systems also occurs upon those which have reached the cave floor and become a stalagmitic column. It appears again that this peculiar suffix was chosen to be consistent with its place as a 'stand-out' amongst what would have been regarded as normal speleothems.

For some years the present author has been using an alternative term – admittedly again colloquially.

The term is 'arborite', using the base word 'arbor' making it applicable to any arboreous speleothem. One should note that the '-ite' ending is also appropriate for a mineral deposit. This is particularly relevant to the caves developed in aeolian calcarenite along the west coast of Western Australia. The word had become generally accepted by cavers in WA, until the other term recently came to my attention. There is of course no problem for there being alternative terms for speleothems, as for example 'shawls' as against 'blankets', or 'straws' as against 'soda straws' in the USA.

These speleothems are anything but an oddity in this region, but are very common in caves developed in aeolian calcarenite along the western seaboard. The most common tree in the cave belt north and south of Perth is the tuart (*Eucalyptus gomphocephala*), which has an affinity for limestone. Tuart trees have a very strong root system, and in recent decades familiar to this author tuarts have been known to wedge out rock masses around cave entrances, including causing at least one major rock fall adjacent to work that was taking place outside a tourist cave. This, plus the relative friability of calcarenite, makes it very easy for tuart roots to penetrate a cave ceiling. As a result, tuart rootlet bundles occur over many cave ceilings. When calcification of these occurs, they can be described as 'arboritic'; one may contrast this with any attempt to describe them as 'rootsicleitic': an adjective which doubtless nobody would ever attempt.

Conclusion

Finally, the definition as given in the above paper, is directly applicable to 'arborite'. The attached figures give some idea of the range of arboritic speleothems to be seen in this region. All photographs are by the author.

Reference

Smith, Garry K. 2010, 'Repairing the Rootsicle in Wildmans Cave, Wombeyan, NSW', *Caves Australia* No. 181, pp. 18-20.
Definition: Rootsicle. n. Roots of trees or plants which grow into a cave cavity and become calcified. The roots and speleothem comprising the rootsicle.

Figure 1: A long arborite in Yellagonga Cave at Yanchep, somewhat resembling a thickened straw stalactite. Note in the background several small root bundles which have not become calcified. Such are very common in the caves throughout Yanchep.

Figure 2: An area of smaller arboritic speleothems, also in Yellagonga Cave. The largest group is clearly a calcified root bundle.

Figure 3: The tip of the arborite of Figure 1, with the fallen portion from a calcified root bundle adjacent to it.

Figure 4: An arborite column in Alcheringa Cave at Yanchep, with some of the living root visible.

Figure 5: Bundles of calcified roots which have fallen from the sides of the column of Figure 4. The tree root has obviously been present for a considerable time.

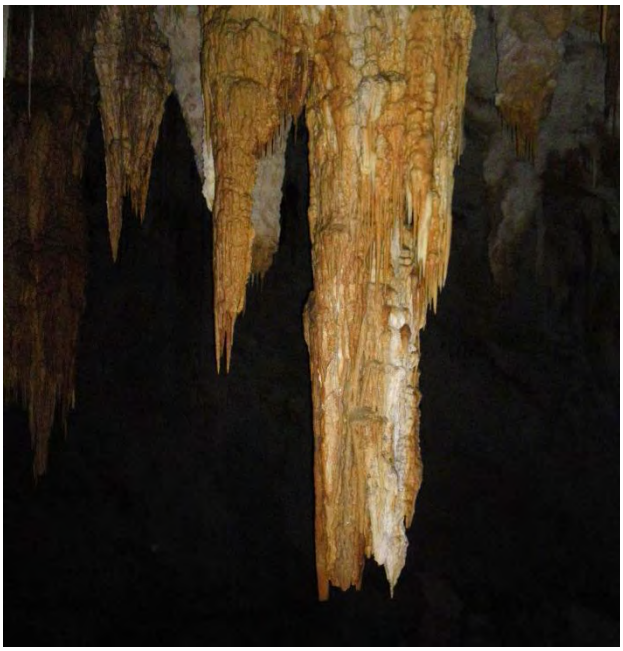


Figure 7: Large stalactitic arborites in Giants Cave, Margaret River. They appear to have formed from large root masses, which remained so firmly adhered to the cave ceiling that they have stayed suspended. In this case the roots are probably those of karri trees (*Eucayptus diversicolor*). Giants Cave is an 'adventure cave', and for the adventurers' interest the chamber has been called the Arborite Chamber.

Figure 6: An unusual stalagmitic arborite, also in Alcheringa Cave, for which no broken portion can be seen nearby of what might have been its upper half. Speculations can be made as to how this may have come about.

All WASG Trips for 2014

Date	Area	Participants	Caves visited
Please note that in addition to the listed trips, Rob Foulds conducted monitoring at Yanchep on many Saturdays			
25 Jan	YN	Lex Bastian, Rob Susac, Kim & Karen Woodcock, Darren Trengove	Loch Overflow as far as Cairn Extension; followed a rift deeper than the cave's water system and discovered a dried-out lake with huge mud slabs. YN-566 - Rob discovered a lead with potential.
25-26 Jan	AU, WI	Ian Collette, Brett Wiltshire, Patrick Nykiel, Paco Murray	AU-6 Harleys Cave, WI-221, MR-19 Milligans.
28 Jan	C	Darren Brooks	C-48, C-49, C-80, C-72, C-131, C-51, C-56, C-11.
7 Feb	YN	Rob Foulds, Carly Monks, Madonna & Dave Mulholland, Rob Susac	YN-1, Emu Cave, Orchestra Shell Cave.
7 Feb	C	Darren Brooks	C-54, C-588, C-587, C-537.
15-16 Feb	WI	Greg & Andrew Thomas, Bert De Waele, Belinda Martin, Jane Wong, Gregoriy Tsaplin	Golgotha, Nannup, Giants, Mordang Dar, Terrys.
22 Feb	YN	Lex Bastian, Richard Wood, Danny Wilkinson	Yanchep Cave - Richard feels more track marking and stabilisation should be done in the newly opened adventure section; Catacombs - reported broken gate; north-west extension of Loch Overflow.
22-23 Feb	SH	Bert De Waele, Brett Wiltshire, Andrew Thomas, Gregoriy Tsaplin, Belinda Martin, Natalie Joyce	SH-36, SH-5, SH-1 Super Cave, SH-2 Weston, SH-17 Brown Bone. Also relocated and GPS'd entrances to SH-20 Tick, SH-9 Pretty, SH-29 Ranger, SH-45 Scallop, SH-57, SH-55 Abrasian Overflow, SH-6.
23 Feb	C	Darren Brooks	C-358, C-832, C-612, C-190, C-374, C-210, C-189, C-608.
27 Feb	Perth	Ian Collette, Greg Thomas, Weidi Koh, Belinda Martin	SRT training night at Vertical Services workshop.
1 Mar	C	Darren Brooks	C-77 Saddle Cave, C-108, C-836, C-839.
10 Mar	C	Darren Brooks	C-726, C-727, C-728, C-544, C-545, C-605.
13 Mar	Perth	Ian Collette, Greg & Andrew Thomas, Weidi Koh, Dene Buckley, Tim Moulds, Belinda Martin, Dave London, Kim Woodcock, Steve West, Brett Wiltshire	SRT training night at Vertical Services workshop.
14-15 Mar	WI	Ian Collette, Fran Head	Surface survey and numbering of W1-150 area; water measurement in Ruddocks.
16 Mar	C	Darren Brooks, Ken Cameron	C-839, C-840, C-307.
22 Mar	YN	Lex Bastian, Robyn Doust, Jen Lee, Rob Susac	Gilgar, small cave to its north, and YN-19 Pophole.

22-23 Mar	C	Ian Collette, Greg Thomas, Dene Buckley, Tim Moulds, Paco Murray, Weidi Koh, Danny Wilkinson, Andrew Thomas, Rob MacCracken, Cindy Tan, Jane Wong, (SRG) Beatrice Borkenhagen, Fabian Weidemann & 4 others	On Saturday Ian led Dingo, Greg led Block, Crystal and Giants, and Dene led Golgotha and Nannup, then all joined up at Brides. On Sunday Greg led Conference and Ian led Rudducks.
23 Mar	C	Darren Brooks	C-840.
30 Mar	C	Darren Brooks, Ken Cameron, Mick Hall (SES)	C-368, C-600, C-60.
6 Apr	Perth	Ian Collette, Greg Thomas, Weidi Koh, Belinda Martin, Natalie Joyce, Danny Wilkinson, Paco Murray, Patrick Nykiel, Rob MacCracken, Cindy Tan	SRT training night at Vertical Services workshop.
12 Apr	YN	Lex Bastian, Rob (& Ryan!) Susac	Mambibby, to attempt to clean away some of the green graffiti.
14 Apr	C	Darren Brooks	C-236.
18-21 Apr	WI	Ian Collette, Greg & Andrew Thomas, Danny Wilkinson, Paco Murray, Weidi Koh; (from Sat) Jane Wong, Asha Lampard	WI-150 area to complete further surveying, tagging and exploration; WI-59 Mill Cave, WI-86, C0-10 Trichosurus Hole, C0-6 Snake Pit, WI-48 Connelly. Paco also visited Nannup on Monday with some CLinc members.
25-26 Apr	E	Ian Collette, Fran Head, Ian McCann, Carly Monks, Brett Wiltshire	E-1,2,3 Stockyard Gully complex, E-9 ANU, E-19, E-11 Emu Cave, E-36, E-33 & 34, E-12 Seismic Cave, E-35, E-30; J-2 Drovers Cave, J-7 Old River.
26 Apr	C	Darren Brooks	C-452 Camerons Cave.
26 Apr	YN	Bert De Waele, Lex Bastian, Richard Wood, Rob Susac	Loch Overflow, to organise survey from Cairn Extension across dried lake to join previous survey line; found a corner shaft containing a lot of fauna. YN-138 Yellagonga, as far as Broccoli Chamber.
3-17 May	C	Darren Brooks, Bill Humphreys (WA Museum), John & Joan Mylroie (US geologists), Greg Middleton (STC)	
	3 May	.....	C-460 Bunburi Cave, C-414 Wobiri Rockhole, C-99, C-774 Bailer Cave, C-773 The Tunnel, C-772 Orb Cave, C-771 Honeycomb Cave.
	4 May	.....	C-222 Loop Cave, New Camp, Old Camp, C-225 Bat Cave, C-230 Column Cave, C-233, C-234, C-235, C-236 Kojak Cave .
	5 May	.....	C-23 Dozer Cave, C-105 The Gnamma Hole, C-73 and unnumbered caves on Charles Knife Road (later to become C-841, C-842, C-843, C-844, C-845, C-846 and C-847).
	6 May	.....	Unnumbered caves round the upper section of Charles Knife Road.
	7 May	.....	Mandu Mandu Gorge walk, C-801, C-802, C-803, C-804 Not Craw, *Craw!*, Milyering Well.
	8 May	.....	C-149 Tulki Well, C-130 Tulki Cave, C-461 Chugori Rockhole, C-94.

	9 May	.....	Unnumbered caves at Lighthouse Hill.
	10 May	.....	C-111 Breakdown Maze, C-325, C-770.
	12 May	.....	Unnumbered features near Telstra tower.
	13 May	.....	Unnamed gorge south of Badjirrajirra Creek gorge.
	14 May	.....	Unnamed gorge north of Badjirrajirra Creek gorge.
	15 May	.....	C-59, C-57 and C-19.
	17 May	.....	Badjirrajirra Creek gorge northern branch.
17 May	YN	Lex Bastian, Rob Susac, Weidi Koh, Jane Wong, Aimee Leong	YN-8 Catacombs, YN-151 Alcheringa.
29 May	Perth	Ian Collette, Greg Thomas, Weidi Koh, Steve West, Jane Wong, Asha Lampard, Luana Dwyer, Libby Straughan, Tom Kimber, Brett Wiltshire, Kim & Karen Woodcock	SRT training night at Vertical Services workshop.
9 Jun	C	Darren Brooks	C-840, C-841.
10 Jun	C	Darren Brooks	C-843, C-844.
18 Jun	C	Darren Brooks	C-845, C-846.
21 Jun	YN	Rob Susac, Lex Bastian, Rob MacCracken, Cindy Tan, (am) Johnny Cobby (Yanchep NP)	Loch Overflow (surveying), YN-151 Alcheringa.
21 Jun	AU, WI	Dene Buckley, Luana Dwyer, Asha Lampard, Paco Murray	Old Kudardup, Dingo, Nannup.
	WI	Greg & Andrew Thomas, Kim Woodcock	WI-225, WI-221.
	WI	Ian Collette, Steve West, Belinda Martin, Nat Joyce	WI-226, WI-227, WI-228.
22 Jun	MR	Greg & Andrew Thomas, Weidi Koh, Jane Wong, Asha Lampard, Luana Dwyer, Danny Wilkinson	Milligans, then joined others at MR-25.
	MR	Ian Collette, Paco Murray, Steve West, Kim Woodcock, Belinda Martin, Nat Joyce	MR-17, MR-18, MR-25.
23 Jun	C	Darren Brooks	C-847, unnumbered features nearby.
23-24 Jun	C	Danny Wilkinson	Unnumbered feature (where he met Darren); entrances to Owl Roost, Twin Holes and Spiral.
27-29 Jun	E, SH	Ian Collette, Fran Head	Little Three Springs and nearby features; E-52 Weelawadji West and Lake Logue cliffline; SH-17.
1-5 Jul	4BR	Paco Murray, Brett Wiltshire (participated in a CCC expedition)	Various caves – see trip report.

5 Jul	C	Darren Brooks, (DPaW) Keely Markovina, Pete Firth, Jack Brodie	C-848, C-849, C-850, C-345, C-659.
8 Jul	C	Darren Brooks	C-15 Papillon, C-851, C-13, C-160, C-161 The Star Chamber, C-816, C-715, C-852, C-151.
12-13 Jul	WI, MR	Greg Thomas, Jane Wong, Danny Wilkinson; (from Sat pm) Rob MacCracken, Cindy Tan, Luana Dwyer	WI-221, Arumvale Pipe, MR-25.
13 Jul	C	Darren Brooks, Mick Hall	C-62, C-118, C-167 Spiral Cave, C-162 Rockbench Cave, C-126.
17 Jul	Perth	Ian Collette, Greg Thomas, Rob MacCracken, Cindy Tan, Kathryn Forrest, Asha Lampard, Paco Murray, Tim Boon, Louis Wilcox, Jane Wong	SRT training night at Vertical Services workshop.
18 Jul	C	Darren Brooks	C-420, C828, C-853, C-163 Wanderers Delight.
19 Jul	YN	Lex Bastian, Rob Susac, Jane Wong, Asha Lampard	Alcheringa (visited from both ends), Pophole.
12 Aug	Perth	Ian Collette, Dene Buckley, Weidi Koh, Lockie Coops, Tim Boon, Danny Wilkinson, Rob MacCracken, Cindy Tan, Luana Dwyer, Kim Woodcock, Jane Wong, Louis Wilcox, Paco Murray, Belinda Martin, Natalie Joyce	SRT training night at Vertical Services workshop.
16 Aug	YN	Lex Bastian, Richard Wood, Tim du Toit; (morning only) Rob Susac, Rob MacCracken, Cindy Tan	Loch Overflow - entered YN-92 entrance, exited YN-270; surveyed a section parallel to the main line. Terminal chamber previously had tree roots which are now dead; possibly the tree has died. In afternoon visited Red Carpet Cave but failed to find the carpet (a flowstone slope coloured red).
16 Aug	C	Darren Brooks, Scott Noblett	C-854, C-171, C-163 Wanderers Delight.
23-24 Aug	WI, CO	Greg Thomas, Kath Whiteside, Asha Lane, Jane Wong, Belinda Martin, Rob MacCracken, Cindy Tan, Paco Murray, Luana Dwyer, Natalie Joyce, Weidi Koh, Gregoriy Tsaplin, Patrick Nykiel, Danny Wilkinson, Dene Buckley, Ross Anderson and various CLinc members	WI-27/28 for roping, WI-7 Skittle, WI-17 Mordang Dar, CO-1 Quinninup Lake, CO-6 Snake Pit.
1 Sep	C	Darren Brooks	C-18 Dry Swallet, C-79.
3 Sep	C	Darren Brooks	C-106 Shot Pot.
6-7 Sep	AU, WI 6/9	Ian Collette, Danny Wilkinson, Rob MacCracken; (am only) Asha Lampard, Luana Dwyer Bert De Waele, Brett Wiltshire, Lockie Coops, Cindy Tan; (pm only) Asha Lampard, Luana Dwyer	WI-226, WI-227, WI-228, WI-140, WI-141. AU-1 Deepdene, AU-17, WI-17.

	7/9	Ian Collette, Danny Wilkinson, Rob MacCracken; (am only) Cindy Tan, Asha Lampard, Luana Dwyer; (pm only) Fran Head	Kudjal Yolgah, Pentorifice.
		Bert De Waele, Brett Wiltshire, Lockie Coops, Melanie Roberts	WI-53 Zamia Nut, WI-93 Arnor, WI-51 Rudducks.
20 Sep	YN	Lex Bastian, Richard Wood, Robyn Doust, Jane Wong, Louis Wilcox, Steve Beckwith (visitor)	YN-53 to YN-54 Melaleuca Cave, YN-247 Burnup Cave, YN-151 to YN-263 - formations interesting; YN-263 exit needed some clearing.
4-5 Oct	WI	Dave, Roslyn & Dana London; (Sat am only) Kath Whiteside	Old Kudardup, Block, Crystal.
16 Oct	Perth	Ian Collette, Weidi Koh, Kim Woodcock, Luana Dwyer, Rob MacCracken, Cindy Tan, Tim Moulds, Paco Murray	SRT training night at Vertical Services workshop.
18 Oct	YN	Lex Bastian, Richard Wood, (pm only) Rob Susac	YN-126 Mistaken Melaleuca (surveying), YN-263–YN-152.
18-19 Oct	AU, WI		
	18/10	Greg Thomas, Gregoriy Tsaplin, Danny Wilkinson, Jane Wong	Easter Cave surveying.
		Ian Collette, Tim Moulds, Andrew Thomas, Rob MacCracken, Luana Dwyer	AU-6 Harleys, tagged AU-7, AU-28 Foundation.
	19/10	Greg & Andrew Thomas, Gregoriy Tsaplin	Block and Crystal to investigate gating options.
		Ian Collette, Tim Moulds, Rob MacCracken, Luana Dwyer, Danny Wilkinson	WI-69, WI-64; GPS'd WI-65, WI-125, WI-118, WI-68, WI-74; (IC, LD & DW only) WI-140 area.
23-26 Oct	Hobart, 7JF	Ian Collette, Rob MacCracken	Joined a Tasmanian cave rescue exercised organised by STC.
1-4 Nov	E	Danny Wilkinson	Joined Carly Monks' dig at E-30; also visited Stockyard Gully and Little Three Springs areas.
14 Nov	C	Darren Brooks	C-215.
15 Nov	YN	Lex Bastian, Richard Wood, Matej Lipar, Luana Dwyer	YN-126 Mistaken Melaleuca (completed survey and pushed minor leads); YN-262 (visited A and B survey posts and found alternative route from A to the entrance).
15-16 Nov	AU	Greg Thomas, Paco Murray, Brett Wiltshire, Weidi Koh	Easter Cave surveying, Skull Cave.
19-22 Nov	C	Darren Brooks, Bill Humphreys	C-452 Camerons Cave, C-168 Dugite Cave, C-23 Dozer Cave, C-105 The Gnamma Hole, C-73, C-495 New Mowbowra Cave, C-28 Bundera Sinkhole, C-509, C-25 Kudumurra (or Palms) Well.

26-27 Nov	C	Darren Brooks	C-23 Dozer Cave, C-452 Camerons Cave.
1 Dec	C	Darren Brooks	C-452 Camerons Cave.
6-7 Dec	E	Ann-Marie Meredith, Matej Lipar, Mateja Ferk, Jason Hewish	Stockyard Gully system – tourist trip, some rubbish removal. Also visited the Pinnacles in connection with Matej's research.
6-7 Dec	WI	Greg & Andrew Thomas, Luana Dwyer, (Sat only) Rob MacCracken, Cindy Tan, (Sat am only) Kath Whiteside	Terry, Skittle, WI-64 Soil Chute, WI-122 Pentorifice.
13 Dec	YN	Rob Susac, Lex Bastian, Richard Wood	Through trip from YN-66 Mia Mia Cave to YN-70 Tree Cave – several other entrances around YH-70 doline to be investigated further; YN-304 Pophole – some trackmarking
13 Dec	C	Darren Brooks, Barry Cullen	C-589, C-147 Oolite Cave, C-103 Trionomo, C-146.

Figures 8-10: Random trip shots *(left to right)*: Luana Dwyer gears up for Harleys while Ian Collette lurks in the scrub, 18 October *(photo Tim Moulds)*; **in Easter Cave** *(photo Danny Wilkinson)*; **watching others struggling in MR-25, 22 June – Belinda Martin, Dene Buckley, Kim Woodcock, Greg Thomas, Ian Collette** *(photo Weidi Koh)*

The South-West

Easter Cave: A history of its exploration and survey

Barry Loveday

Barry's map of Easter Cave was published in The Western Caver *Volume 53, 2013, pp. 30-33. This 'accompanying' article was prepared in July 2014 by reference to various volumes of* The Western Caver*, as well as from the author's personal knowledge.*

The entrance chamber to Easter Cave was known from the late 1890s, and probably the wooden stairs were put in place in the early 1900s along with the other tourist caves. However, I could not find any information mentioning the cave in the Caves Board Reports from 1901 to 1911. All the tourist caves were taken over by the State Hotels Board in about 1914. These consisted of 15 tourist caves, but there is no mention of a cave fitting Easter Cave's description. People must have visited the cave because of its close proximity to Moondyne (it is in the adjacent tourist block). There are some old names written on the wall in one of the small chambers of Easter Cave, but there is no clear information on its use as a tourist cave. Most of the old tourist caves were closed down due to fading interest, lack of funds and bushfires sometime after the First World War.

In the 1950s a group of cavers (who later formed WASG) visited Easter Cave and in 1958 found an air draft. The tunnel was dug out by Terry Bain and three others.

In June 1960 Terry Bain and Lloyd Robinson explored into the cave as far as the first duck but did not find a way through. In May 1961 Bain recorded the entrance ladder pitch at 35 feet.

December 1963 saw David Lowry investigate the first duck, but it wasn't until January 1964 that Keith Dekkers, Peter Henley and two others got through.

In February 1964 a team started a Grade 2 survey and a party of eight pushed beyond Lake Nimbus and found new extensions.

April 1964 saw the cave explored past the second duck. The water in Lake Success was so deep that it went over some people's heads. At the same time the survey was extended. Also, the gate in the tunnel was installed by Peter Bridge and Peter Henley. It was christened St Peter's Gate and paid for by the Augusta/Margaret River Tourist Bureau. On the same weekend a piece of formation called The Corkscrew was discovered in a chamber off the Epstein Sculpture Chamber. That same year the water started to rise and the entrance to the first duck was blasted to make it easier to get through the sump.

When the ASF Conference came up in 1965 a reasonable map of Easter Cave was available. Water depth markers were in place in the cave near the first duck and in the Epstein Sculpture Chamber where the Gondolin starts.

More exploration took place in 1966 and 1967 and it was decided to restrict access to the cave.

November 1967 saw the Lands and Surveys Nomenclature Advisory Committee accept Easter Cave as the official name. (It had been dug out on an Easter Weekend.)

Rumour: In the early 1970s a small group tried to blast a solution pipe out beyond Lake Nimbus. It was thought that this solution pipe could make another entrance. It was not successful and a second attempt never occurred.

In August 1971 Peter Bridge recorded water levels at their lowest point. Paul Caffyn recorded the entrance solution pipe at 6.8 m and the total length of the first pitch at 11.5 m. Also, the cave survey was now only 80 m from the known end at that time.

May 1972 saw problems with the lock on the gate and prevented a survey party from entering. In July the survey party found new extensions beyond Lake Nimbus and broke formation trying to get through a possible duck.

In October 1972 Paul Caffyn and Peter Henley dived from the Epstein Chamber through three small syphons to find the entrance to the Gondolin Chamber. This took three trips and between the second and third ducks the Crystal Labyrinth extension was discovered.

April 1973 saw SRGWA put the top gate on Easter Cave. They also covered over the old main tourist entrance with iron bars and galvanised sheeting; soil and timber was put on top. The other pipe was completely closed with cement, rocks and sand.

In May 1973 Keith Dekkers and Hugh Morrison went through the water-filled passage to find the rest of the Gondolin, and other dives were done in other parts of the cave. The name of the Gondolin Chamber came from the first book of the *Lord of the Rings*. By December 1973 the water in the cave had risen and the Gondolin extension was cut off; also the first duck became impassable.

After two years as a WASG member, I first entered Easter Cave in March 1975, when the water level was still so high that the first duck could not be found. By the end of 1975 the water level had started to fall. Also in 1975 Bob Shoosmith started a miner's dial survey of the entrance chamber of Easter Cave. In December 1975 Kerry Williamson, Barry Loveday and Frank Loveday started the Grade 5 survey. Two more survey trips were carried out that month.

In 1976 thirteen survey and mapping trips took place. The CEGSA extension was found by some CEGSA members from South Australia.

Rauleigh Webb joined the survey team in 1977. The water level had dropped significantly to allow teams to get through to the Gondolin by free diving on a line. In 1978 Jim Campbell started surveying

in the Gondolin Chamber. Rauleigh took over the rest and finished off the Grade 5 survey.

In April 1978 Rauleigh Webb and a team of cavers released Freon-II gas in the Gondolin extension. It was later picked up in the Flat Roof Chambers of Jewel Cave, which proved there was an air connection. In 1979 Rauleigh did water sampling and flow measurements to try to discover which way the water was flowing.

Figure 11: The Gondolin Chamber in 1977. *Photo Barry Loveday*

In 1980 Webb's team surveyed the Bastian Extension and parts of the Gneiss Extension and by 1981 most of the leads in Easter Cave had been completed. The surveying work was finished but we still had no detailed map.

In 1999 track markers were strategically placed to preserve the cave.

In 2002 CaveWorks needed a complete map of Easter Cave, and WASG passed on the old survey information. CaveWorks then asked WASG, SRGWA and CLinc to supply two members from each club to complete the survey of Easter Cave, as new sections had been found. Peter Bell compiled data in digital format and drew an outline map incorporating the additional data. All the work was finished and discussed at a Mega-Caving Weekend that year; but there was still no detailed map, just an outline.

In March 2005 Greg Thomas and other WASG members modified the top gate to prevent people from catching their helmets when entering the solution pipe, making it safe.

In 2009 Lindsay Hatcher from the CaveWorks staff asked me if I would like to draw up a detailed map of Easter Cave. This was negotiated with WASG. After two weeks of sorting the information given, it was obvious that a lot of data was missing or not available. I redrew the map from the original figures that I had received. I then approached Lindsay Hatcher and it was agreed that more information could be gathered. It was arranged that two teams made up of members from the four different caving clubs (WASG, SRGWA, CLinc and CEGWA) could carry out more surveying in Easter Cave. This took place between 2009 and 2013. The cave was closed at certain times because of high CO_2 levels.

As the survey information became available, I proceeded to draw up a detailed map and by the end of 2013 the known survey work was completed. I drew up three original detailed maps between January and March 2014. CaveWorks received one map, WASG received a second and I retained the third for myself. Copies of the WASG map were made and provided to SRGWA, CLinc and CEGWA.

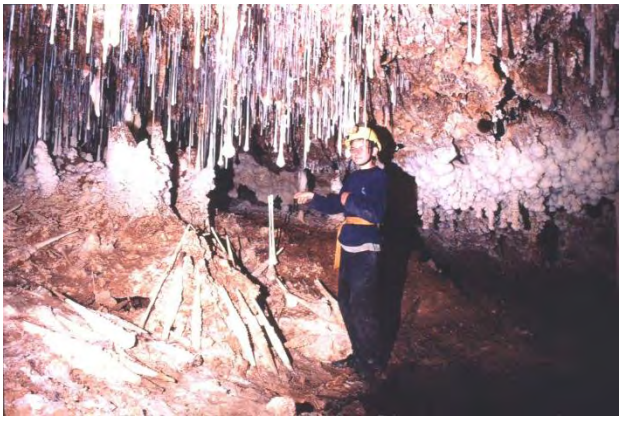


Figure 12: Heath Loveday in the same part of the Gondolin, 2002. *Photo Barry Loveday*

There is always more surveying to be done. Over the years when I was visiting Easter Cave the water level had dropped at least 2 m, exposing more cave. Rauleigh Webb once said to me that he estimated there were 8.5 km of surveyed passage. With the new sections found, there is probably another 1.5 km. As I only drew a plan I never actually worked out the depth of the cave.

I would like to thank Lindsay Hatcher for allowing me to undertake this project. Also all the people that worked on the survey – Rauleigh Webb who did a good proportion of the original work, Paul Hosie, Greg Thomas, Ian Collette and Michael Bradley, and many others who have contributed their time over the years to complete this map.

A zoological weekend, or The Beast in Harleys Cave *Brett Wiltshire*

Dates: 25–26 January

Caves: AU-6 Harleys, new cave (now WI-221), MR-19 Milligans

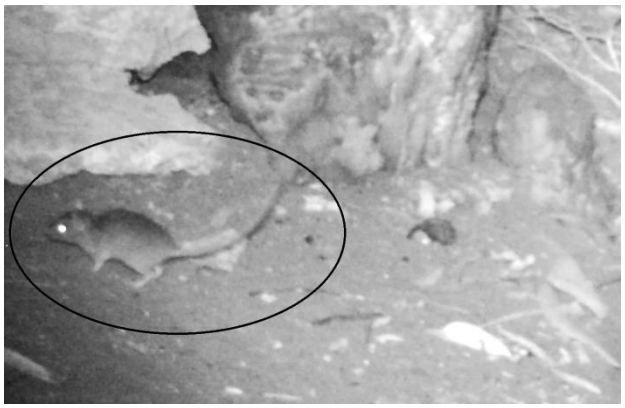
Party: Ian Collette, Brett Wiltshire, Patrick Nykiel, Paco Murray

The caving weekend started with a return to Harleys Cave to collect Ian's motion-activated camera left the previous month. We did not see any animal tracks over our footprints left from the previous month. Patrick and Paco did the squeeze down into the side chamber and noted a breeze passing through tightly packed stal formations but no passable leads.

Later when the pictures were downloaded from the camera, the pictures showed a long-tailed furry creature with round wiggly ears. For the month the camera was active, the creature only appeared in

the four days before our return but during this time, it was recorded on ~20 separate occasions. Active times were mostly nocturnal but once occurred in the sun ray from the entrance at midday. A copy was left with the staff at Calgardup for identification.

Figures 13, 14: The 'furry creature' in Harleys, captured by infrared photography. *Images Ian Collette*



(*Ian's note:* I sent the photographs off to the Zoo and DPaW to see whether they could be identified. The Bush Book *Mammals of the South-West* led me to believe that my creature might be a mardo or *Antechinus*, but the Zoo responded at once that it was most probably a rat. Well…rats!)

Figure 15: Slow drip in WI-221. *Photo Brett Wiltshire*

Figure 16: The green frog. ***Photo Brett Wiltshire***

After visiting Harleys Cave and eating a quick lunch we headed to the new cave that Ian first entered the previous month (now WI-221) and started a meticulous survey from the entrance. A few very slow drips, a healthy green frog *(possibly a motorbike frog? – ed.)* and some small yellow jawbones were photographed during this time.

Having reached the second drop-off Ian rigged an anchor around the nearest boulder wedged into the fissure above the drop. After finding the boulder soft and not looking particularly wedged into place he also anchored the rope to a similar rock further up the passage. During this time everyone had felt or commented on some sort of tiredness or breathing difficulty and Ian's subsequent butane flame test showed a flame burning 1–2 cm above the lighter. Having agreed it was not safe to abseil the ~10 m down because of CO_2 we derigged and returned to the surface to call it a day.

Figure 17: Survey sheet and rigging for the second drop. *Photo Brett Wiltshire*

On Sunday we headed via the scenic route to Milligans Cave (a former tourist cave) and descended in. A ~50 cm snake (later identified as a western crowned snake, *Elapognathus coronatus* – thank you Paco!) mostly ignored our visit from about 1 m from the landing spot. This was my first visit to Milligans Cave and I mostly noted a lot of damage, but there was still some good decoration. Most notable was one formation with a fast drip that gave

an entertaining bounce of water droplets at the end of the cave. Near this was a nice curtain formation next to a shattered stalactite. There were a few isopods crawling through the tree roots descending from the ceiling and enough other points of interest that by the time we had finished photographing and exited the cave it was time call an end to the caving trip.

Revisiting some familiar caves

Greg Thomas

Date: 15-16 February

Caves: Nannup, Golgotha, Giants, Mordang Dar, Terry

Party: Greg Thomas, Andrew Thomas, Bert DeWaele, Belinda Martin, Jane Wong, Gregoriy Tsaplin

This was a weekend of visiting what are generally thought of as beginner caves, although most of the party were not truly beginners any more. However, none of them had been to all these caves, and for most it would be a chance to see them with 'cave adapted' eyes.

In the morning we visited Nannup. Gregoriy did a bit of worming in the rock pile at Nannup and was pretty surprised when his head popped up into a dark chamber with a bunch of people sitting on the far side (us with our lights off)! Golgotha is always pleasant, and after lunch we went to Giant's and then Mordang Dar.

On Sunday we visited Terry, which was a pretty hot walk though the bush at this time of year, so it was really good to abseil in and get underground where

Figures 18, 19: Patrick and the western crowned snake regard one another. *Photos Brett Wiltshire (left), Paco Murray (below)*

it was cooler. Water levels very low – just a few puddles. We exited at WI-43, collected the rope and gear from WI-47 and headed back to Mammoth car park and thence home.

Beginners and others at Witchcliffe

Greg Thomas

Dates: 22–23 March

Saturday morning

Caves: WI-106 Block and WI-62 Crystal

Party: Greg Thomas, Rob MacCracken, Cindy Tan, Fabian Weidemann, Beatrice Borkenhagen

We drove up the track and parked out front of Block. Fabian and Bea were new CLinc members and had been to a few beginner caves. Cindy had been to some adventure caves in Malaysia but was pretty much a beginner too. The entry is the trickiest bit of the cave with a crawlway followed by a tight climb down 2 m or so. Everyone was soon in and we walked down the track to the bottom of the entry chamber to view the pretties before climbing up to the top of the 'block'. When we came back down everyone was surprised to stand in the entry chamber and see where we had been – Block packs a lot of cave into a small package.

After this we headed off through the scrub looking for Crystal, which we duly happened upon. We found a cigarette butt at the base of the entry pitch next to some ripple-sole desert boot prints, which were also sighted in the Chunder Chamber. Apart from this the cave appeared to have had little or no visitation for some time. We strolled around the entry chamber and crawled along the now dry streamway to the Chunder Chamber. We zig-zagged up the slope to the upper shelf area for a look at the pretty formations and a bit of a nap. From there we went back down and up into the Hydrogen Chamber for a look at some more pretties including the helictites. We then headed out to

meet up with the other cavers at Lake Cave Tearooms for lunch.

Saturday afternoon

Cave: WI-21 Giants

Party: Greg Thomas, Tim Moulds, Danny Wilkinson, Rob MacCracken, Cindy Tan, Fabian Weidemann, Beatrice Borkenhagen, Bart Mulder, Danielle Parish plus children Noah and Kyron

After a delicious lunch we dropped some gear at Brides and then headed to Giants. Tim was delegated trip leader and he fell right into the role, taking a big nap in the ballroom. We cruised through having a good look around, particularly at the roof as several people had powerful spotlights. The two young boys, Noah and Kyron, were a little disappointed at the stairways (not 'real' caving), but had a good time anyway. There was some consternation at the back gate and Noah was trying to push Kyron through the bars until Tim produced the key!

After this we all joined Ian at Brides Cave for a bit of abseiling fun.

Sunday

Cave: WI-44 Conference

Party: Greg Thomas, Tim Moulds, Dene Buckley, Paco Murray, Danny Wilkinson, Rob MacCracken, Cindy Tan, Andrew Thomas

We parked at the Mammoth Cave car park and once again Tim was delegated trip leader. Bashing through the bush, Tim took us to visit every doline and cave entrance on the way to Conference. Indeed, Cindy was surprised to find out we were actually at the right cave after so many anticlimaxes: she thought that Tim had given up and was just taking us into the next cave entrance he found. Greg rigged a handline and shadowed Cindy down the entry slope and we all proceeded eagerly into the cool interior of the cave.

There were a few stagnant pools of water in the streamway and we sighted a cave-adapted amphipod in one of them. The crawl through the first rockpile proved more of a physical challenge (for some) than a navigational one, and we walked and crawled progressively deeper into the cave, with Tim and Paco waiting for the slowpokes to catch up at suitable rest stops. The cave is a lot of fun and has some excellent decoration on the roof and in a few raised areas; the black stained floor and dissolved rock is also great to crawl through.

We reached the far end, checked out the pretty side chamber and then headed back out. The return trip was a little quicker and Paco rescued a small lizard or skink from the bottom of the entrance chamber. I am not sure if he appreciated having fifteen minutes of forced modelling for a series of cameras before release on the surface – perhaps he would have preferred to make his own way out.

Tim took the lead again and we headed for Caves Road. Hopefully a bit of a track is getting established now and it will not be such hard going for the next group.

An Eastertime trip to Witchcliffe and Cowaramup

Ian Collette and Greg Thomas

Dates: 18-21 April

Caves: WI-150 complex, WI-59 Mill, WI-86, CO-10 Trichosurus Hole, CO-6 Snake Pit, WI-48 Connelly

Party: Greg & Andrew Thomas, Ian Collette, Paco Murray, Weidi Koh, Danny Wilkinson; (from Saturday) Jane Wong, Asha Lampard

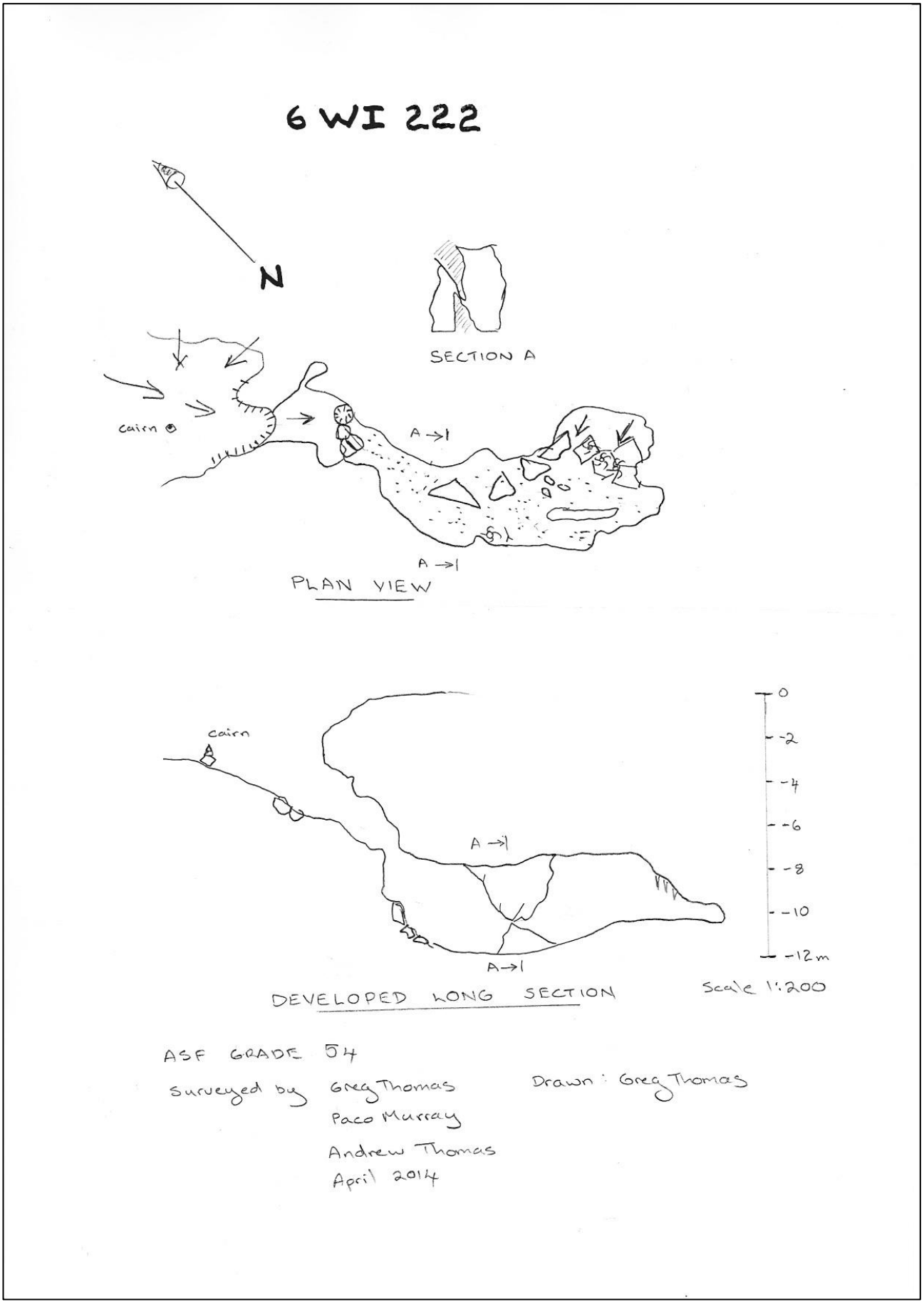
On Friday we were off again to the WI-150 complex near Blue Rocks Road to continue with the survey. There had previously been only three numbers, WI-150 to WI-152, assigned to this area, but since there were clearly many more features than that it was now impossible to tell what they were supposed to refer to, and difficult to manage the survey without clear numbering to refer to.

Ian had now consulted with the area co-ordinator, Anne Wood, and the member most recently active in numbering features in this region, Barry Loveday, and had established that the next vacant number was WI-121. Accordingly, Ian and Fran, while visiting the area on 14 March to double-check some details of the surface survey, had re-allocated the numbers WI-150 to WI-152 to the three southernmost features, and had numbered the remained WI-121 to WI-129. Now we could all know what we were talking about (see the surface map on p. 19).

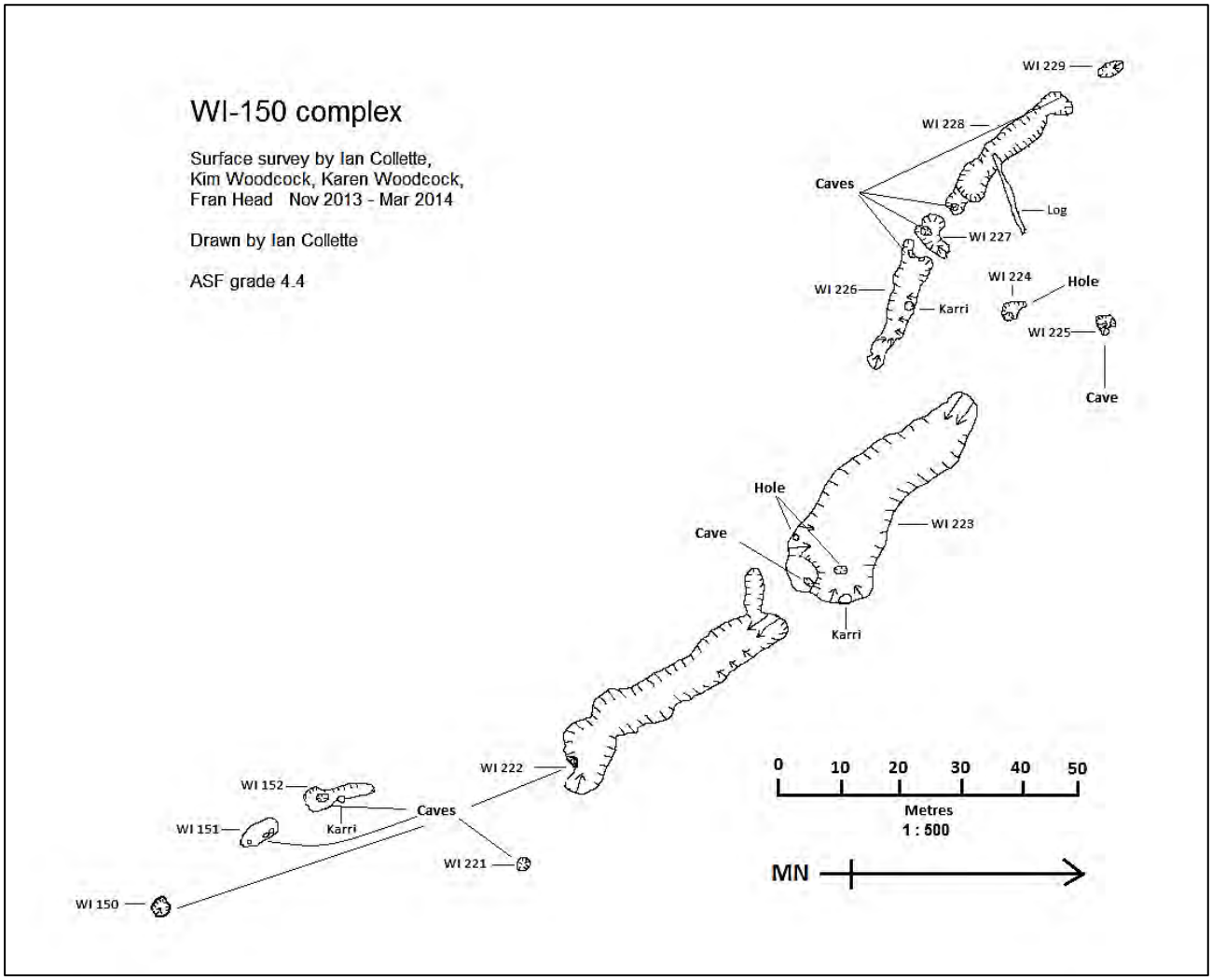
Some of the maps from this area appear in this volume; others are not quite finished and will be published next year.

While Greg, Paco and Andrew surveyed WI-222 and made a start on WI-225, Danny, Weidi and Ian surveyed WI-150 (the small chamber where we found the bullock bones last December) and WI-151, and also tagged the majority of the rifts/dolines and entrances. Greg was also able to reach the bottom of the rift WI-221, which had been full of CO_2 when visited in January; this remains to be surveyed fully.

In the evening a group visited Mill Cave to look at the ladder which was undercut in the rain last year, and found the cave full of CO_2 and quite unpleasant. The platform and ladder are effectively supported on a large area of calcite flowstone and the undercut has washed away the loose rubble from underneath this (fig. 20). The ladder and platform are still stable and the foot of the ladder is still well supported. We took some pictures to send to Bob Baker at Calgardup.



Map 1: WI-222, drawn by Greg Thomas



Map 2: The WI-150 complex: surface map drawn by Ian Collette

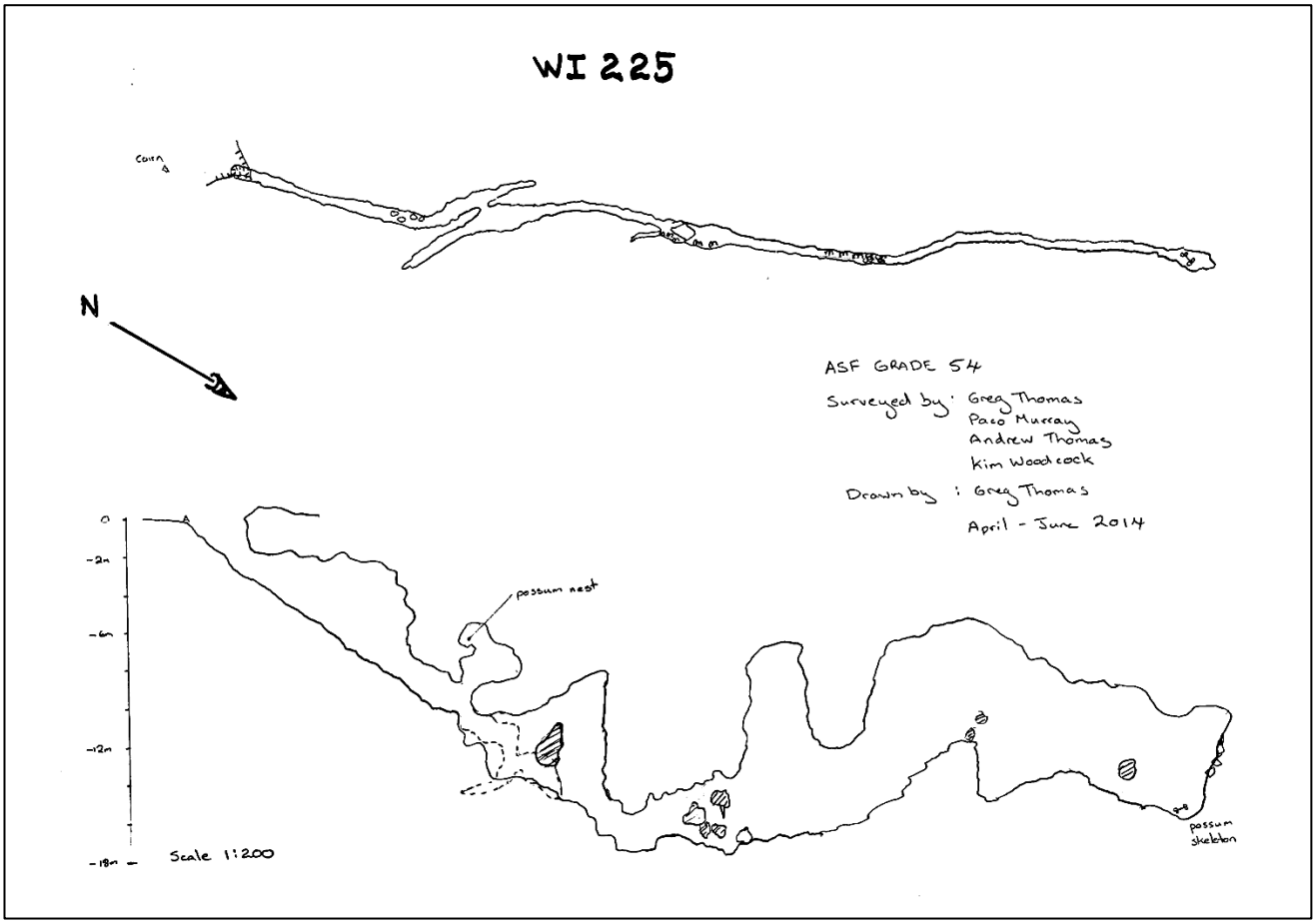
Figure 20: The ladder in Mill Cave. The 'washaway' area (brown dirt area) is visible behind Ian. *Photo Greg Thomas*

On Saturday we were joined by Jane and Asha and first visited WI-86, the small hole near Orchid Cave which Gregoriy Tsaplin and Patrick Nykiel had already been unsuccessful in entering. Despite Ian's determination to see someone get down it, Greg gave it as his opinion that it could not be made to 'go', and besides there was CO_2 present.

The team then drove up to Cowaramup, where we found that a boulder had collapsed into the entrance to CO-10. This didn't surprise Fran when she was told about it later, as she recalled having trouble getting out of this cave and finding the large rock loose while wriggling around. We had to do a little clearing in the vicinity to gain entry. The entrance to CO-3 was tagged, and then off to the main objective, CO-6 Snake Pit. We entered via the main or abseil entry, and those who hadn't seen the cave before were duly impressed by the multitude and variety of skeletons, skulls and mummified bodies of the animals who had found their end in this pit-trap. Ian set up his motion-activated camera down there to see what could be seen wandering around. Climbing out via the back entrance, we cleared up a bit of the loose rock and stone which had collapsed there earlier. Greg and Andrew then left to go home.

On Sunday morning the rest of the group visited Connelly's. There was a dead snake at the entrance which was very smelly, and we also spied a small western crowned snake at the bottom of the abseil (those things are suddenly everywhere!). There was no water in the cave, and the mud at the back was dry.

After this the group broke up, although Paco went out on Monday with some CLinc members to do some cave photography (see back cover).



Map 3: WI-225, drawn by Greg Thomas

Witchcliffe and Margaret River 1

Greg Thomas, with input from Ian Collette

Dates: 21–22 June

Saturday

Caves: WI-225, WI-223

Party: Greg Thomas, Andrew Thomas, Kim Woodcock

We parked along Caves Road north of Blue Rocks Road and pulled on our raincoats to make our way to the cave and hopefully complete the survey of this cave begun the previous visit. Ian and his crew headed for one of the other caves to do some surveying of their own. WI-225 has a generous 1 m wide entrance rift which slopes steeply down, so we were able to walk right in and remove our raincoats once out of the weather.

After a few trial shots Kim was reasonably confident with instruments so we put Andrew on point and carried on from where the survey had left off. The cave is basically a long, high, gradually narrowing rift with a few constrictions caused by chokes and/or narrowing of the walls. About three-quarters of the way through Kim got instrument fatigue and made some ridiculous excuse about the restriction being too tight and how he couldn't fit to carry on any further. Really, there is no shame in saying you are too tired and can't hack the pace. Gosh, it was like 11.30 a.m. and we had done maybe 50 m of dry cave passage, which is lot for a cave diver used to just floating through.

In any event Andrew and Greg soldiered on, doing maybe as many as three more survey shots over the next half-hour before we got to the decomposing possum and the end of the cave. Poor possum must have fallen out of his nest at the back of the twilight zone and lost his way, stumbling ever deeper into the rift. After the obligatory dead possum pictures we tucked up our gear and headed out, wistfully hoping that it would not be raining. Of course it was, but luckily we had our raincoats and off we headed to Lake Cave for lunch with the others, who had already left.

In the afternoon Ian pointed us into the other cave he wanted surveyed (WI-223), which appeared to have several entrances, all of which were vertical and required a rope. Kim rigged his rope up and then took measurements from the cairn on the surface. Andrew was first bunny in the hole and did a little scouting about as Greg entered. Greg gave a big yell as he dislodged some rocks in the undercut just below the entrance, concerned they would bounce down on Andrew, but no worries. The entrance is – you guessed it – a rift, but once inside the first chamber is more of a big collapse with a pile of rocks in it and a few smaller short rifts running off it and another hole up in the roof. We did a thorough explore, took a heap of survey points including two closed loops and were pretty

exhausted when we finally called it a day. The whole cave would fit in a 20 m cube!

Once out we packed up gear and headed gratefully back to the hut for a well-earned beer.

Caves: WI-226/7/8

Party: Ian Collette, Steve West, Belinda Martin, Natalie Joyce

Steve, Belinda, Nat and Ian spent the day surveying WI-226/7/8. From the rift/doline at WI-226, the cave drops down and splits into two 'arms'. The WI-227 opening can be seen above as a daylight hole. The two arms rise up rocky climbs to join again before emerging into the 'roofless chasm' of WI-228. At the far end of the roofless area the cave continues for some 40+ m, narrowing down until it becomes impassable.

As this was Nat and Belinda's first experience of surveying, and the terrain was wet, muddy and far from simple, they were most impressed to discover that we had 'closed the loop' formed by the two arms.

Sunday

Caves: MR-19 Milligans

Party: Greg Thomas, Andrew Thomas, Weidi Koh, Jane Wong, Asha Lane, Luana Dwyer, Danny Wilkinson

After a lousy night, with hail and torrential rain, the day dawned bright and fine! Greg left early to drop off keys and pay permit fees at Calgardup, but soon caught up with the rest of the convoy heading for the area just north of Kilcarnup Road. Ian was in the lead but must have been in la-la land as he sailed on past the turnoff and went a few extra kilometres before pulling over to consult. We backtracked, parked the 2WD cars and squeezed everyone into the 4WDs.

Parking near Milligans Cave we divvied up the party, and while Dene and Ian headed for MR-17, MR-18 and MR-25 Greg led his trusty crew into the bush in search of Milligans. This is an old show cave with a short solution pipe entrance into a series of nice-sized chambers. After checking out the easy part of the cave Jane wanted more, so after studying the map we took off crawling into the side areas, one of which has some very interesting roof formation and the other of which leads over some flowstone into a low area with sandy crawlspace and occasional decoration.

After we had all had our fill we headed out, prusiked up and returned to the vehicles. We phoned Ian who was busy setting up a rope at MR-25 (the one cave for which we had not had a GPS location). We drove on up the 4WD track and parked next to their vehicles and then with some basic directions we went in search of the others at MR-25.

This had proven a bit of a challenge to get into as the entrance was a solution pipe a few metres below the surface into which the surrounding soil was gradually collapsing, leaving an overhanging lip around the edge thick with vegetation. We watched Danny and Paco abseil in, listened to their occasional yells and brief report – solution pipe, small chamber, two more chambers involving climbing and or crawling, not much decoration.

It was getting on and no-one else was too keen to drop in so we de-rigged, returned to the cars and headed for home.

Witchcliffe and Margaret River 2

Greg Thomas

Dates: 12–13 July

Caves: WI-221, WI-56 Arumvale Pipe, MR-25

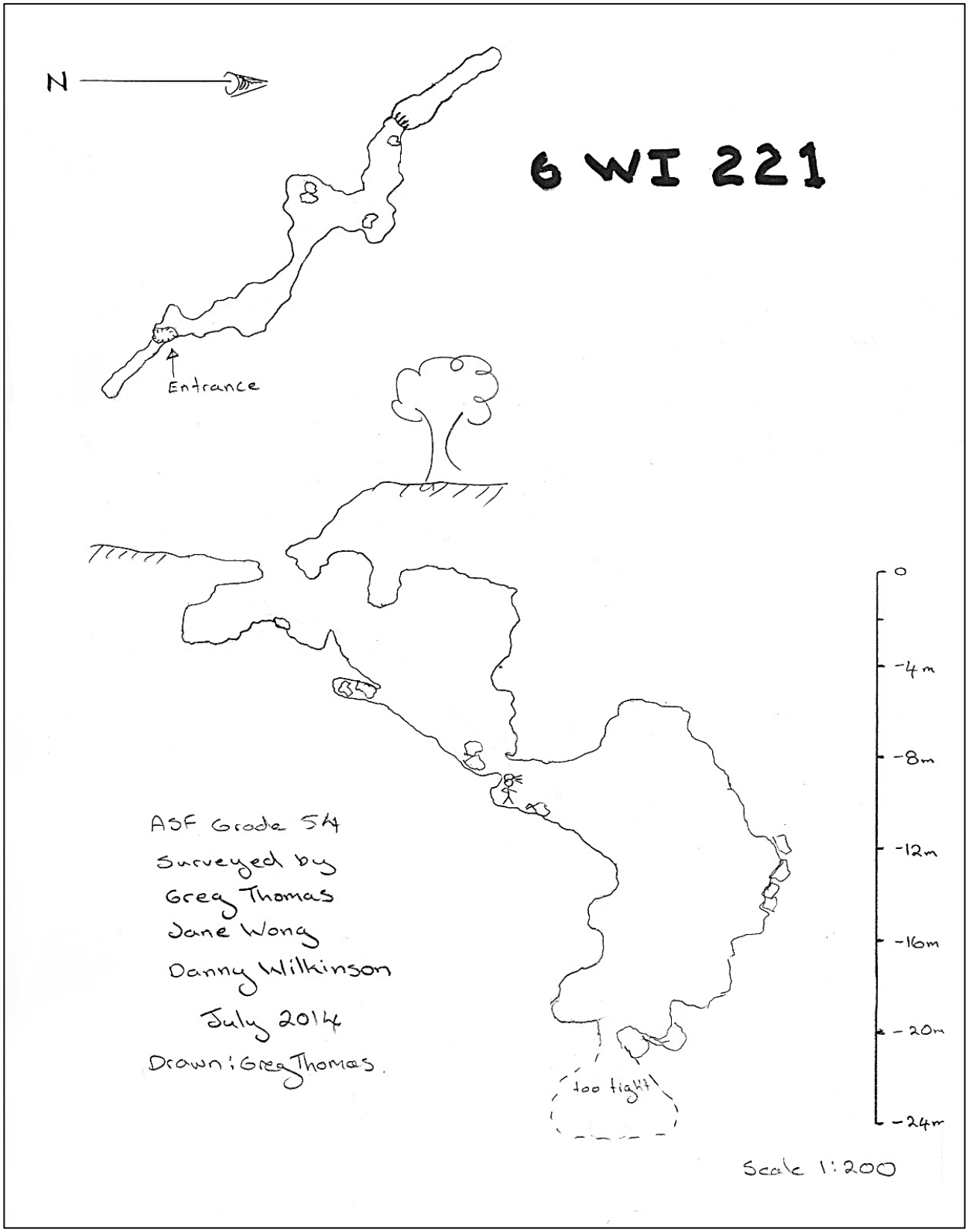
Party: Greg Thomas, Jane Wong, Danny Wilkinson, Luana Dwyer, Rob MacCracken, Cindy Tan

On Saturday morning Greg installed a new 'chinaman's hat' on the chimney while he waited for Danny to finish his gourmet cooked breakfast and Jane to make herself beautiful. We three then headed for the area north of Blue Rocks Road to do some survey work at WI-221 while Rob and Cindy went off to do some mountain biking. (Not sure why they joined WASG…. I mean, they could have joined CLinc for multisport activities….) Luana was to meet us at Lake Cave Café at lunchtime.

The cave to be surveyed (WI-221) was amongst the collection Ian Collette had been working on since earlier this year. It was another rift type but this one had an internal pitch which had been redolent of CO_2 earlier in the year and so had not been fully explored by the current generation of cavers. After a few practice shots on instruments Jane took tapeworm, Danny instruments and Greg recording and sketching. We did a series of shots up to the pitch head and Greg then rigged the rope back to a solid-looking rock several metres up the rift.

The rope went straight down about 8 m to a false (rock choke) floor and sloped up very steeply into the continuing rift. Greg descended and chimneyed across to the far side but there was no continuation possible from this point without climbing a very unappealing collection of overhanging rocks and sand. Danny then descended and they did a couple more survey points down under the overhang to the base of the rope, with Danny losing his spare torch on the abseil down.

Greg removed his harness and climbed down into the wedged rocks below the rope to discover that the apparently solid sand floor at the bottom of the pitch was just sand on some wedged rocks and the rift continued on, albeit only 250–300 mm wide. There was no sign of the recently lost torch, but Greg did pick up a karabiner that some previous caver had dropped. A few shots with the disto elicited several 6.5–7.5 m shots and one of 10.5 m. The air was a little fresher down in this crawlspace but it looked like a great place to get stuck permanently so Greg elected to call it quits.



Map 4: WI-221, drawn by Greg Thomas

Danny and Greg prusiked up and we exited, making it to Lake Cave Café just on 1.00 p.m. along with everyone else – Luana running late because of the big cow muster up in Cowaramup, where she got stuck in traffic with over 1400 people in cow onesies, and Rob and Cindy just back from their ride.

After lunch we headed for Arumvale Pipe. This proved a little challenging for some of the girls with the combination of the sharp edge plus the rope being very slow and sore hands from squeezing the handle on the Petzl Stop. Jane exhibited a level of leg flexibility usually demonstrated only by Olympic gymnasts as she negotiated the edge. Inside the cave was a pleasant stroll, with water at the usual low level of 5–10 cm but evidence of flood levels at least 500 mm high in the past couple of months. We checked out the fossils, had a little sit in the dark and then ambled out.

Figure 21: Jane abseils into Arumvale Pipe. *Photo Danny Wilkinson*

Ascending again proved a bit challenging. Cindy had got 'the boys' to shorten her foot loop; unfortunately this had been done with a bodgy slip knot so by the time Cindy reached the top she had a very long foot loop with a tourniquet on one foot. She was most relieved when Greg finally assisted her up over the edge (hint: you should be able to figure out who 'the boys' were). It was now getting dark so we de-rigged and returned to the hut to light the fire and dress for the tavern.

On Sunday morning Greg swept the roof of the hut and cleaned out the gutters, Luana raked the concrete paths around the edge of the hut and Jane swept the floor. Other people had gourmet breakfasts. Actually I think Jane had a cooked breakfast too, plus did her hair and was still ready before everyone else. (I wonder if anyone reads these reports besides the editor?) Eventually we got going, heading for Kilcarnup Road and MR-25.

We parked at the end of the gravel section and piled into the two 4WDs, cruised up to the top of the hill in sight of the ocean, grabbed our gear and started bush-bashing for the cave. The scrub is really thick around the cave and Greg decided to concede defeat, so pulled out his GPS and was able to confirm that we were in fact almost on top of the cave. Spreading out slowly we found the entrance less than 10 m away. It is a solution pipe about 1.5 m x 1 m but the rocky bit starts about 4 m down and there is a soil collapse about 5.5 m x 4 m wide above this where the edges are all overhung and only held together by the dense shrubbery.

Pulling out rigging gear, Greg realized he had left the compass/clino back in the car, so he braved the bush again to retrieve this. We rigged the rope off the same puny tree Ian had used last month (well, it held Paco that time!); down went Rob, soon followed by Danny, then Luana. Cindy worked her way to just over the edge but then (prudently) chose to give this one a miss. After escorting Cindy back to the car Greg sent Jane down and followed over. At the bottom of the pitch you are on top of a big sand pile over rocks, which cascades down one side through a series of chambers created by rock chokes to a terminal floor. Negligible decoration, some tree roots – including one about 40 mm thick going horizontally through the paleosol layer 25 m below the surface – and lots of loose and gnarly rocks.

In ones and twos we cautiously made our way to the bottom and prepped to survey out. At this point Greg realized he had left the disto on his harness at the base of the solution pipe. He had been planning to shoot the solution pipe but had forgotten about it in the excitement. After retrieving this we started the survey, again a very slow process mostly because of the need to move one by one up each steep section. Rob was the victim of some rogue rocks which leapt from the wall and smashed his shin when he tried to give them a hug. The prusik out was handled well by all and we were all relieved to be out of the cave knowing we had finished the survey (see map overleaf). We followed Greg's highway through the scrub back to the cars and headed home.

Figure 22: Jane exits the 'messy' MR-25. *Photo Danny Wilkinson*

Joint roping day, etc *Greg Thomas*

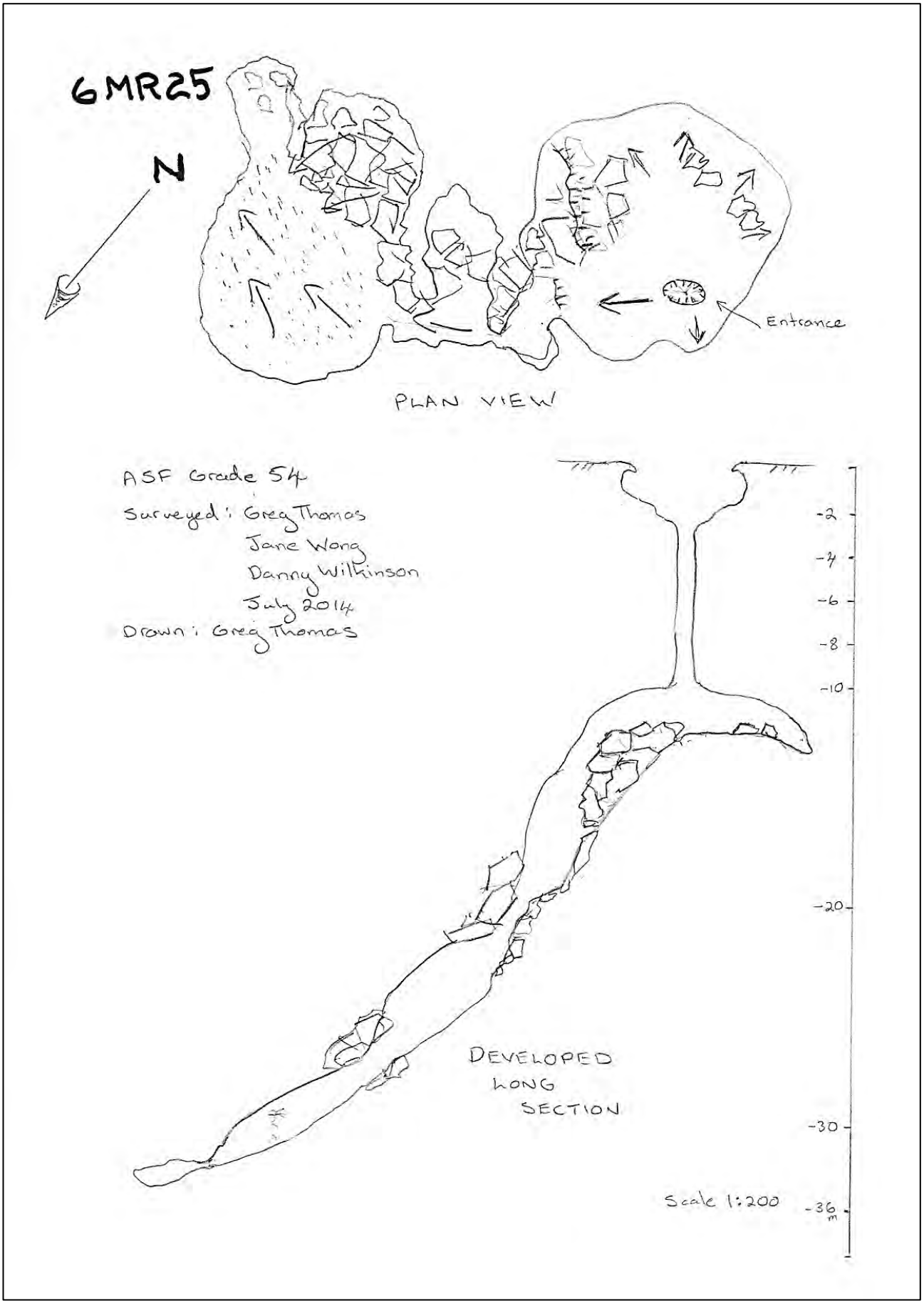
Date: 23–24 August

Caves: WI-27/28 doline for roping**,** WI-7 Skittle, WI-17, CO-1 Quinninup Lake, CO-6 Snake Pit

Party: Greg Thomas, Kath Whiteside, Asha Lane, Jane Wong, Belinda Martin, Rob MacCracken, Cindy Tan, Paco Murray, Luana Dwyer, Natalie Joyce, Weidi Koh, Gregoriy Tsaplin, Patrick Nykiel, Danny Wilkinson, Dene Buckley, Ross Anderson and various CLinc members

This was the weekend of the big dinner in Margaret River to mark Anne Wood's retirement. With such a large crowd down for this, Ross Anderson had organised a joint clubs roping day for Saturday at the WI-27/28 doline.

While Paco took a small group to Skittle Cave in the morning, the rest of us met at Lake Cave and then carried gear into the doline and started setting up



Map 5: MR-25, drawn by Greg Thomas

Figure 23: Cavers practise their SRT skills in WI-27/28. *Photo Cindy Tan*

ropes. The weather delivered a few very brief spots of light rain but it cleared up and most of the day was fine.

In the afternoon Greg took a small party to WI-17 and Ross got Paco to rig a set of ropes up in the trees, with redirections and rebelays, and even got some members to remove and modify these while up in the air. While many of the members present had done quite a bit of practice in the factory, their 'real world' experience was a limited and the exercise was very valuable for everyone. While the knots are the same, the sense of exposure you get on the edge of a drop-off at a doline is quite different and a lot more confronting than a concrete wall in a factory unit.

On Sunday Greg took a party to Quinninup Lake, where we did a big explore of the whole cave, and then we went to Snake Pit and retrieved Ian's infra-red camera, which disappointingly had nothing to show, even though we found a lizard inside which we rescued. We think it needs to be focused on a smaller area and perhaps baited. Small movements in a chamber shot probably don't trigger it off. There were plenty of skeletons to photograph before we crawled out the back entrance.

Figure 24: George the dragon, rescued from Snake Pit. *Photo Danny Wilkinson*

Figures 25, 26: Skeletons and skulls photographed in Snake Pit. *Photos Danny Wilkinson*

Caving without your gear

Ian Collette

Date: 6–7 September 2014

Caves: WI-150 area, WI-140 area (rift complex north of Blue Rocks Road), WI-9 Kudjal Yolgah, WI-122 Pentorifice

Party: Ian Collette (trip leader), Danny Wilkinson, Rob MacCracken, Cindy Tan, Asha Lampard, Luana Dwyer, Fran Head

The weekend began with a hiccup, when late on Friday night at the hut Luana locked her keys in her car. As only her caving gear was locked in, we decided to ponder this matter further in the morning.

First light confirmed of course that modern cars are impossible to break into. Everything was tried, to no avail – including relaying the sound of the spare remote control from Perth through a mobile phone(!). Eventually Luana made complicated arrangements for her parents, who were flying in later that day after an overseas trip, to bring her spare keys from Perth home to Cowaramup. She had feared that she would be unable to go caving, but thanks to very kind loans of spare shoes from Cindy and spare overalls from Rob – both of which fitted more or less adequately – she was able to participate after all.

On Saturday morning Danny, Rob, Asha, Luana and I continued the survey of the WI-150 rift complex. (Cindy was caving with Bert, and Fran was bushwalking.) We linked WI-227 in to the rest, took some final shots necessary in WI-228 and tagged it, and those unfamiliar with the complex were able to have a look around.

After a late lunch at Lake Cave, Rob, Danny and I returned to the area to look for nearby blind dolines marked on the area map as WI-140 and WI-141. We located two small rifts and a promising solution pipe which is yet to be explored.

That evening Fran was keen to tell us what she had seen – a snake skeleton, greenhood orchids, a young emu near Strongs Cave.

On Sunday morning Luana was on the phone again, trying to persuade her sister to come down from Cowaramup with the spare keys, but having no success she had to go out again in borrowed gear. The whole group apart from Fran made a tourist trip to WI-9 Kudjal Yolgah, where we noticed very little CO_2. Considerable time was spent in photography, particularly in the de-trog section.

Figures 27, 28: Close-ups of crystals and a stalactite in Kudjal Yolgah. Photos Danny Wilkinson

In the western branch of the cave, there was no longer any ruler at the tube. The mud was caked, with deep cracks, and damp; sufficient moisture was present for a little to gather in the heel of a bootprint. There were a lot more tree roots than the last time I was here, with droplets on the bottom of

them. In the eastern branch, site 1 was completely dry; at site 2, the water measurement was 140 mm, but it looked as though the ruler had slipped or been pushed a long way down. Clearly it is time to repair or refurbish these measurement stations.

Meanwhile Fran, emerging on to Vlam Road from the old railway track where she had been photographing wildflowers (again!), met a couple pulled over taking a phone call – Luana's parents, who had just dropped off Lu's keys. These lovely people, hearing that she did not know 'The Secret Waterfall', bore her off to look at quite an impressive fall in what she realised was Breakneck Gully, leading to Arumvale Cave.

When our group returned for lunch, Luana thought it would be more than advisable to go up to Cowaramup and spend time with her parents. Asha had to leave too, and Cindy decided not to cave any more. The remainder – Danny, Rob, Fran and I – went up to WI-122 Pentorifice, mainly to assess how much risk might be posed, to the cave and also to casual visitors, by the location of the proposed DPaW Anchor Road campsite.

The cave showed no signs of recent visitation. The upper chamber has some decoration – some inactive, some still active – and a large number of drips entering through various shafts and cracks to gradually form calcite deposits below. The lower chamber was sandy and without decoration.

The doline is close enough to the track to be fairly obvious to any walkers who had penetrated this far. The extreme difficulty of gating the cave, and its limited decoration, would make gating it a fairly low priority; however, I did wonder whether at least one of the open shafts should be covered with a grille to protect the unwary, particularly children.

On a separate issue, as mentioned to DPaW staff, I believe that now is the time to burn off a large block surrounding the proposed campsite, for the safety of construction workers and future campers. All the work and vehicle movements will bring increased risk of fire in an area which has not been burnt off for at least 20 years (to my knowledge), and has a very considerable accumulated fuel load. If it is done now the regrowth of the understorey will hide the caves by the time the first campers occupy the site.

...And what the other half did

Bert De Waele

Date: 6–7 September

Caves: AU-1 Deepdene, AU-17, WI-17 Mordang Dar, WI-53 Zamia Nut, WI-93 Arnor and WI-51 Rudducks

Party: Saturday (AU-1 and AU-17): Bert De Waele (TL), Brett Wiltshire, Lachlan Coops, Cindy Tan; (WI-17) as above plus Asha Lampard, Luana Dwyer; Sunday (WI-53, WI-93 and WI-51): Bert De Waele (TL), Brett Wiltshire, Lachlan Coops, Melanie Roberts

AU-1 Deepdene

The team found its way to AU-1 Deepdene through the still wet vegetation and undergrowth. The first feature accessed was the so-called 'witches chamber' immediately to the right in the entrance, where large tree roots and white moon-milked decoration make for an impressive small antechamber. There are a lot of spiders and webs in here.

Figure 29: A stalagmite in Deepdene swathed in rootlets *Photo Brett Wiltshire*

We found tree-root-entwined stalagmites on the slope going in, and other formations that made us think of alien eggs.

Figure 30: Alien eggs! *Photo Brett Wiltshire*

Then the team worked itself down into the spacious caverns, looking at the walls filled with helictites and weirdly shaped decorations, one reminding us of an elephant. Pencilled graffiti dating to 1888 was found

on the right walls, and further into the cave on a central column.

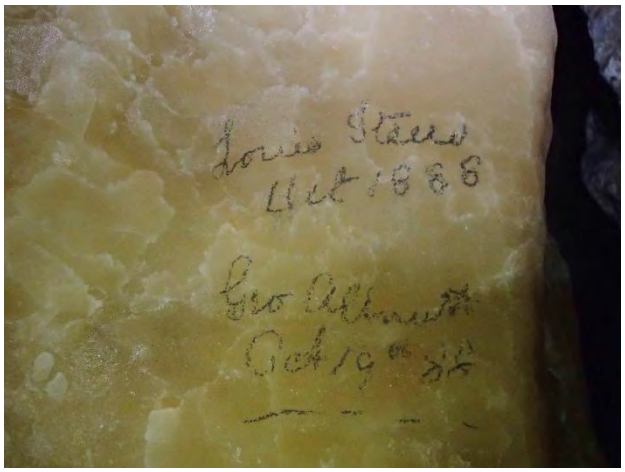


Figure 31: Some of Deepdene's historic graffiti. *Photo Brett Wiltshire*

At the lower level of the cave we found various invertebrates among the tree roots (fig. 32), over a calcified rhizome mound and on small (1 cm) droppings all along the flowstone and cave floor. We also noted two specimens of an orange spider, several millimetres in size, that 'played dead' when disturbed, as well as an even smaller white spider.

Figure 32: Spiky isopods, also in Deepdene. *Photo Brett Wiltshire*

Our group admired an old crystal pool, which though now dry exhibits a lot of evidence of the historic water table in the form of limestone ridges at the old water level (fig. 33). The bottom chamber has some impressive large columns, massive flowstone and well developed decoration with dry pools.

AU-17

The team went on to forge a path to AU-17. The entrance of AU-17 is a shallow, 2 m deep semi-circular collapse doline, with access to the cave via a narrow fissure in the northern and north-eastern side of the feature. The tag is placed in the middle of the subcircular entrance, and to the right one gains access to an inclined fissure, consisting of collapse material and ending at the far wall on a flat sandy floor (~12 m in). In the far east of that fissure, in the upper level, a small subhorizontal

Figure 33: Evidence of earlier water levels. *Photo Cindy Tan*

development pinches after about 4 m. In the centre, behind the tag, columns occur, green with algae, behind which further collapse material is located. The western part of the fissure (to the left of the tag) leads to a similar collapsed slope, with a hole at the back leading vertically down some 8 m in amongst the unstable and friable blocks.

Figure 34: In the entrance to AU-17. *Photo Lockie Coops*

More to the front of the cave, west under a larger block, a similar subvertical opening leads with twists and turns vertically down for about 8 m into a 15 m wide lower chamber, from which a further subvertical descent leads to even lower areas between the collapsed blocks (fig. 35). There is graffiti in both lower developments, and in the lower chamber an impressive 35 cm straw occurs.

WI-17 Mordang Dar

Soaking wet and cold, but revived after a late lunch at Lake Cave Café, the brave elements of both caving groups joined together to visit Mordang Dar in the Golgotha cave system area. This cave is accessed behind the abseiling area, and has an

Figure 35: Bert emerging from the lowest level of AU-17. *Photo Lockie Coops*

Figure 36: Melanie in Arnor. *Photo Lockie Coops*

impressive collapsed doline entrance leading steeply over blocks into an end chamber covered by sand and surrounded by flowstone (behind a red reflector 'barred' area). The size of this cave and decorations are impressive, as is the fact that both the block-covered floor and walls are predominantly white crumbly calcarenite. The cave wall shows a clear dark brown subhorizontal palaeohorizon (palaeosol), as well as gently dipping large-scale bedding, typical of aeolian sandstone (fossil dune sediments). At the end chamber, the team sat down on the sand and waited for the eyes to adjust. After about five minutes a faint glow can be discerned coming from the direction of the entrance.

WI-93 Zamia Nut

On Sunday our team of four parked about 650 m in on the east–west running track, and hiked through the bush in a south-easterly direction to locate WI-51, WI-93 and finally along an eastward trajectory to WI-53. The entrance is a small fissure, some 2 m wide, giving access to the cave to the south-west. The entry is a gently sloping crawl, part flowstone, under a low (1.5 m high) ceiling decorated with moonmilk, some straws and decorations. The floor of the cave is covered with black organic sand on which zamia nuts are present. At the end of the low chamber there appears to be a small dig into the soft black sandy floor, which appears to terminate on limestone and was therefore abandoned. On the moonmilk ceiling rough graffiti occurs, which is unintelligible.

WI-93 Arnor

The entrance to Arnor consists of two holes immediately next to each other, both leading to a gently sloping low, decorated chamber. The floor is covered in black organic soil, and the cave develops in a south-south-easterly direction but terminates after about 15 m in a pinch. A low crawl of ~ 6 m to the east and under stalactites leads into a larger much decorated chamber. There, the ceiling is literally covered in large brown-orange stalactites. An upper level has been formed by the subsidence of a block from the roof, and that level also is covered in beautiful decoration from the ceiling. The bottom of the large chamber is covered in brown-black organic sand, with various bones and lots of organic matter on which cockroaches and isopods are plentiful. Some of the decoration is active and wet, and in places drips are evident. The chamber leads further east into a lower part past a collapsed section, where a water pipe has been placed in the stream bed. The bottom of the pipe was found to be wet, but no standing water was seen anywhere in the cave or in the pipe.

WI-51 Rudducks

The last (but not least) cave visited was Rudducks, which has developed as part of a still active stream. The entrance is guarded by a large bees' nest, and the team quickly entered into the twilight zone to escape detection. Only Lockie got stung.

We measured the water level at the entrance (163 mm), and took along the 1 m ruler for measurement at the end. After the first 20 m knees and arms got wet, and it got worse as the team penetrated deeper along the system. A small white crayfish-type crustacean was identified in the stream about 10 m into the cave, and more were found up to about 30 m in, after which the water turned too muddy to see anything. Some isopods were also detected among the plentiful organic debris.

Figure 37: Brett takes a photo in the upper chamber of Rudducks. *Photo Lockie Coops*

Deeper inside, the cave nicely exposes the granitic/ gneissic basement, with development of glittering greenish clayey soil. A nice upper section was accessed, with nicely decorated developments up- and downstream. The upstream section has one stalactite with very pretty crystalline aragonite outgrowths.

The keyhole passage finally immersed the team, with Lockie undressing for the occasion. A measurement of the water level in the pipe at the end was made (520 mm), and Bert penetrated some extra 10 m until the going got too tough. The team made their way back out of the cave to sunlight and a well-deserved late lunch. Needless to say the overalls and shoes were a sight to behold.

Easter Cave survey 1 *Greg Thomas*

Date: 18 October

Cave: AU-14 Easter

Party: Greg Thomas, Danny Wilkinson, Gregoriy Tsaplin, Jane Wong

We all packed into Greg's dual-cab ute and headed for Jewel Cave, arriving about 8.45 a.m. Greg collected the key and then led us round the Jewel Cave facilities and on a scenic tour through the bush, eventually spiralling into the Easter Cave doline. We rigged up and abseiled down. After a brief pep talk and another gear check we set off into the cave proper, heading for the Lemon.

Figure 38: Super helictite. *Photo Greg Thomas*

The purpose of the trip was to check potential leads and missing survey sections, primarily in the area just before the Lemon and maybe halfway towards Tiffanys. We dropped bags at the Lemon and retraced our steps to the area between the Lemon and the Mousehole. Greg went off track to reconnoitre while everyone else had a look at the local pretties and a bit of a nap. After about twenty minutes of painstaking progress scouring the eastern wall for possible leads Greg was certain there were none and we returned to the Lemon.

We then checked a lead on the south side just before the Lemon: this proved to be a sump area and was pretty accurately outlined on the map with no higher-level leads, however the sump area went down to dried mud. This crawlspace headed back towards the known passage of the Tuta Kuri area and popped out on the edge of this after a short distance, before dropping back into a larger chamber with some small lakes. There was evidence of at least one person visiting this spot,

Figure 39: Gregoriy admires the Corkscrew feature mentioned on p. 13. *Photo Danny Wilkinson*

going down to near the water level. Greg speculated that this may have been Stefan Eberhard during his hydrological survey. This chamber headed off in possibly two directions (the Lemon area and maybe following the Tuta Kuri wall?). We decided not to survey this section at the time as it looked like it would involve movement over damp mud areas which had not previously been disturbed and we would probably need to do some de-trog work or perhaps just have spare boots to do this.

Figure 40: The Wasp Nest. *Photo Greg Thomas*

Back at the Lemon we had lunch and then headed deeper into the cave. There were no leads north-east of the Eagle's Wing, so we continued in to look from the other direction for the 'missing passages' which had been hinted at on old surveys. We dropped bags on the main route and left Danny to take some pictures and headed in on the old survey pathway. The passageways got progressively narrower with decoration crowding in and we dropped Jane at one squeeze, then Gregoriy at the next, while Greg pushed on to what proved to be a dead end with a 'long' squeeze off it which Greg decided was too decorated to go into. He left a distinctive cairn (two stones with a short horizontal piece on top) at the start of the squeeze so that if we saw it from the other direction we would know. This section of passage, while previously trogged, was not on the map. Back near Gregoriy, Greg took another squeeze and popped out in the back of the White Room. This seemed strange as we did

not think we had travelled a sufficient distance in the right direction.

We re-grouped and started surveying, starting from the first squeezy bit and heading back out and around to the White Room, so that we could ultimately generate a survey loop and so ensure the accuracy of our work. This consumed most of the rest of our available time and we then headed out.

Figure 41: Something new in surveying? The blue dress. *Photo Danny Wilkinson*

Checking cave gating possibilities

Greg Thomas

Date: 19 October

Caves: WI-106 Block, WI-62 Crystal

Party: Greg & Andrew Thomas, Gregoriy Tsaplin

At the August 2014 Cave Management Advisory Committee (CMAC) meeting, we had heard about proposals for a new camping area in the Leeuwin-Naturaliste National Park. The camp area would be quite close to a number of caves, including Block and Crystal. It had been discussed at the CMAC meeting that gating works should be considered for caves which would be made more vulnerable by the campgrounds, with Block and Crystal the main candidates.

Block is within twenty metres of a 4WD track at the base of a small limestone cliff area, which is clearly visible from the track. You crawl in a couple of metres, then drop down a squeeze to find yourself at the top of a dirt and scree slope in a large chamber. We crawled in and followed the track marking down to the bottom, had a look at the pretties then followed the route marking up to the top of the 'block' for which the cave is known. Heading out, we discussed possible gate locations and agreed that a spot just inside the entrance crawl and before the drop down would be best. There were a few daylight holes above this which might be enterable and would require the strategic placement of some rocks. Greg took some pictures and some measurements.

Figure 42 shows a view looking just inside the entry at the spot where the gate would go. A triangular frame, 130 cm x 130 cm x 90 cm, could be

Figure 42: Suggested location for Block Cave gate. *Photo Greg Thomas*

prefabricated with bars and a gate. This could be placed in position and fixed using chemset bolts.

After this we hiked on to Crystal, which is a couple of hundred metres away and not visible from the track. It does, however, have a large doline and is not very hard to find if you know the general area to look. There is a big entrance chamber at the bottom of a scree slope. It would be very hard to gate this and the consensus of discussion at CMAC had been that we should not try to. The entry chamber has track marking in place, plus circles of rocks around features, so it already funnels or controls movement in the cave without being too overt. There are three branches to the cave. Two of these are already gated.

The Protemnodon Extension: This gate is well hidden and quite difficult to find so no additional work should be required here.

The Stream Section (which contains the Christmas Star Extension): This gate is in the wall about halfway along the entrance chamber. While clearly visible it is in the dark zone and can be easily missed. If the campgrounds proceed we should look at stacking up a low rockpile or wall in front of the gate so that it will not be easily noticed by the casual visitor.

The Chunder and Hydrogen Chambers: At the end of the easy walking path in the entry chamber you can crawl down a short sandy section into an old stream passage which after a little more crawling reaches the Chunder and Hydrogen Chambers. These include some fragile rockpiles, dangerous climbs and quite a bit of good formation. This was the section where the CMAC meeting agreed we should consider gating.

Step one would be to tidy up the path through the entrance chamber, keeping it away from the Stream Passage gate and making a clear 'end' of the path before the entry to the Chunder and Hydrogen Chambers. A gate for this area could be installed a few metres into the crawlway, so that it would not be visible to the casual visitor. After we had visited the cave Greg took some photographs and measurements at a possible location.

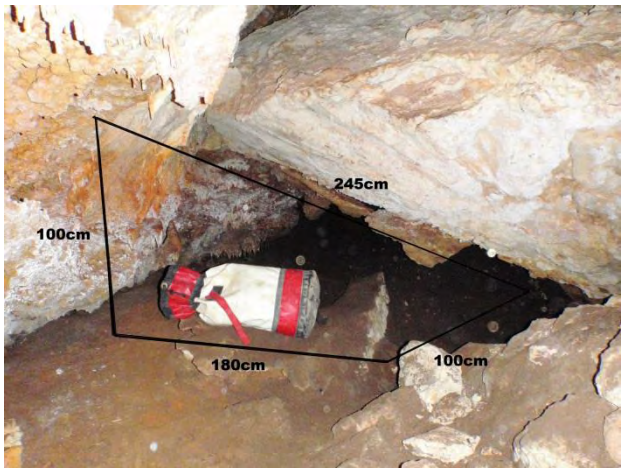


Figure 43: Suggested location for Crystal Cave gate. *Photo Greg Thomas*

Figure 43 shows the suggested gate location, looking out of the cave. It would probably need to be made in three pieces, two frames with grilles and a third with a hinged gate. These could be bolted together inside the cave and installed with chemset bolts. A 'squeeze' hole above the entry passage would need to be blocked with a large rock, cemented or glued in place.

The next step would be to make some timber forms or templates and take these into the caves to check sizing, both for the gate location and for carrying pieces in.

Margaret River in spring

Tim Moulds, with input from Ian Collette

Dates: 18-19 October

Caves: AU-6 Harleys, AU-28 Foundation, WI-69, WI-64, dolines WI-65, 125, 118, 68, 74, WI-140

Party: Ian Collette, Tim Moulds, Luana Dwyer, Rob MacCracken; (Sat only) Andrew Thomas; (Sun only) Danny Wilkinson

It was time to head back to Margs to get underground again now spring was well and truly here. A very active weekend was promised by Ian Collette, with a plethora of caves on offer to explore. We started on Saturday morning packing up gear around the hut as Greg and his team prepared for their trip into Easter Cave. There was much discussion around the appropriate size of pee bottle required for an 8-hour versus a 10-hour trip, while Jane was busily trying to eat a scotch egg and cook two steaks, and wondering how much protein she could fit into her cave pack.

With the Easter crew getting sorted, Ian started to round up the motley bunch of cavers who were going to the less glamorous but still lovely Harleys Cave. After some bashing around in the scrub trying to follow a GPS we finally arrived at Harleys and Ian rigged the short pitch into the cave. I was first down, checking carefully for hiss sticks. No problems, so the rest followed. Some went off in search of small crawly spaces and explored the extension, while I tried to calibrate a Disto X2 and Ian positioned his motion-sensor camera. Luana mixed up some tasty 'universal baits' which were then dotted around to attract the animals which had previously been spotted running around in the cave.

Following lunch at the Jewel Cave café we headed off to Foundation Cave. This has an unusual (and slightly hazardous) entrance that just drops from the ground level with no warning doline around it. A lovely freehang entrance pitch leads to a surprisingly large chamber below with lots of pretties to look at. We also noted big dripholes everywhere. After an hour or so, and efforts to find a way on at the back of the cave, we headed out and back to the WASG hut to get ready for the final expedition of the day – to the Karridale Tavern for dinner.

On Sunday the team was much the same, except that Andrew joined Greg and Danny came with us. We went off first to WI-69, which has a large flat-bottomed chamber that has taken large amounts of water at times. Over the rockpile at the back we descended down into some smaller chambers and typical Margaret River cave features of loose boulder piles choking off. A few more pictures here and then out.

Figure 44: Poor Ian! *Photo Tim Moulds*

We then returned to the cars and drove further north, heading off on a bushwalk to locate a series of dolines and caves that needed to be tagged and GPS'd. We located doline WI-65, and a cave which is marked on the surface map as WI-64, although when we started to descend it did not seem to match the map for WI-64 Soil Chute. Ian tagged the entrance and got a small scratch on his hand in the process – aaah! I saw a philloscid isopod (slater in common parlance) running around in the moss which kept me interested for a little while (fig. 45). On the way back we swung wide to locate and GPS the features WI-125, 118, 68 and 74.

Figure 45: Philloscid isopod. *Photo Tim Moulds*

That was enough for me, and most of us left at this stage to head back to Perth. Ian, Luana and Danny went to the WI-140 area to investigate the solution pipe found on 6 September. They think it has definite promise of 'going' if pushed.

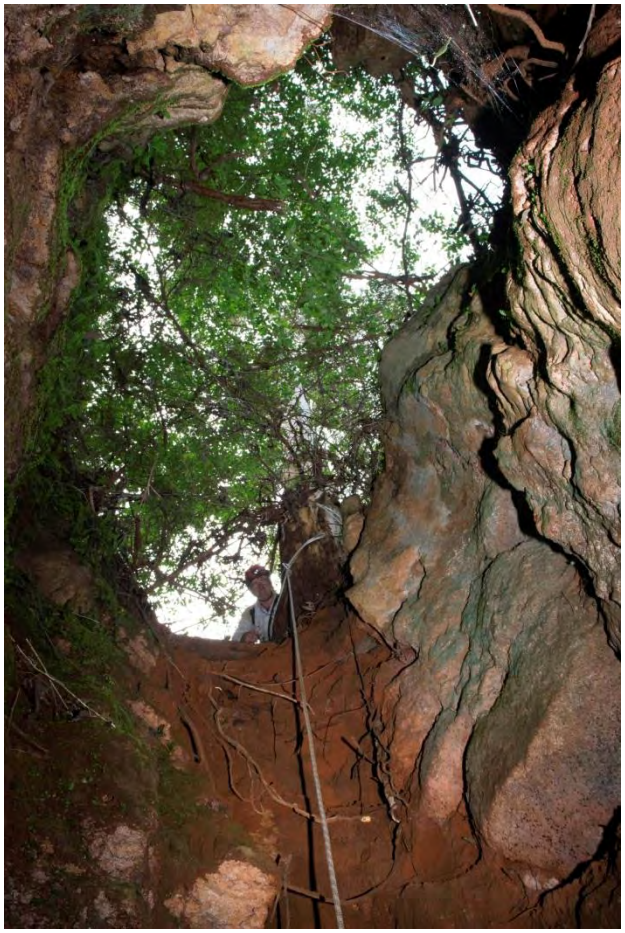


Figure 46: Ian looks down the solution pipe at WI-140. *Photo Danny Wilkinson*

Easter Cave survey 2 *Greg Thomas*

Date: 15 November

Cave: AU14 Easter

Party: Greg Thomas, Paco Murray, Brett Wiltshire, Weidi Koh

We all packed into Paco's beast, arriving about 8.40 a.m. to find the gates already open. Greg collected the key and then led us round the Jewel Cave facilities and (almost) directly to the Easter Cave doline – probably just as well, since the GPS was still 'acquiring satellites'. We rigged up and abseiled down, and after a brief pep talk and gear check headed into the cave and for the Lemon.

The primary purpose of the trip was to complete survey work started the previous month in a section of passage going eastwards from the White Room which rejoined the main passage or pathway. We moved along steadily with a few short rest stops. CO_2 seemed noticeable from entrance to first duck, but certainly down past the Lemon the air was good and no one developed any headaches or other symptoms.

Once at the White Room we dropped packs and divvied up the survey gear. Greg sent the tapeworm (Brett) and recorder (Weidi) through the hole in the wall which led to the unsurveyed passage, and away we went taking shots and sketching. The passage was mostly low (less than 1.5 m) and a few metres across, with plenty of long straws to make progress rather nerve-wracking. The far end of this survey reached a section choked with soil and a narrow squeeze which Greg had suspected led straight back to the rear of the White Room. It was too tight and well decorated to traverse so we left a green tape dangling at this point in the hope that we could get a shot to it from the other end.

Figure 47: Weidi sketching in Easter. ***Photo Greg Thomas***

Heading back out, we continued surveying to rejoin the main passage and came back via the lake loop. Everyone was pretty worn out from the narrow passage work and difficult surveying, so we took a late lunch and relaxed for a while at the White Room.

After some brief reconnaissance Greg spotted the green survey tape which we were able to reconnect to the main survey with two extra stations. Sketching indicated loop closure to within 300 mm, so pats on the back all round. After this we took a few more splay shots of passage behind the White Room to fill out the survey, then packed up and headed back to the Lemon.

Our next objective was a small chamber before the Lemon, which we surveyed and then tied back to existing points plus a shot to the Lemon, then on to the 'muddy' chamber. Brett was sent in to reconnoitre while the rest of us started surveying into the chamber.

The whole chamber is pretty much covered in a thin layer of mud, with some big slabs of rock and down to water on two sides, with lots of mud-covered stals. By only getting 'half wet' Brett was able to establish that there were no further extensions unless we had scuba gear. Rather than trog the whole area, the rest of us stopped just inside and took a series of splay shots for the survey, and Brett helped Greg sketch in the bits he alone had visited.

We pulled out of there, Brett changed out of his muddy gear and we headed back towards the main route. It was not worth starting a new section of survey, as we would have needed to go deeper into the cave to get to the next spot, and by then it would have been time to head out, so Greg allowed a half-hour of photo time before we started to exit.

Figure 48: Paco in Easter – where to look? *Photo Weidi Koh*

Figure 49: Amazing Easter helictites. *Photo Greg Thomas*

We proceeded out uneventfully and were back in the car park a little after 6.00 p.m. Unfortunately this did not translate into an early dinner at the Karridale Tavern: while we were enjoying an ale and waiting for our meals there was a burst of flames in the kitchen and some brief shouting, quickly scotched (the shouting and the flames). In any event there were no meals coming out for nearly an hour after this!

Skull Cave at last! *Greg Thomas*

Date: 16 November

Cave: AU-08 Skull Cave

Party: Greg Thomas, Paco Murray, Weidi Koh, Brett Wiltshire

Greg was keen to visit Skull Cave as he had been tantalised by it on at least three previous occasions, being led around the bush by Dave London, Rob Foulds, and Ian Collette while looking for other caves and holes – viz Old Kudardup, Bat and Lloyd's Dig respectively. Now as a fully fledged and experienced trip leader he could at last indulge himself and visit this most excitingly named cave.

Greg's memory of Skull (from perhaps the last pass by ten years or more ago) was of a huge doline, as big as or bigger than Brides, and of there being a table and chairs arranged in an overhang with a can of soft drink on the table. The cave was known to have a number of archaeological excavations in it which were primarily being done by Roger Howlett, although no-one in the club knew whether he had been there in more than a decade.

How fickle is memory! The doline proved to be rather small, only eight or ten metres across, and surrounded by very thick underbrush and tall trees. We had a choice of two sturdy trees for anchors on more or less opposite sides of the doline, and chose the one closest which also happened to offer the shortest abseil, landing us on top of the soil cone in the doline in the only circle of direct sunlight.

The floor of the doline is much larger than the top opening, perhaps twenty metres across, with overhanging walls on all sides. There is a bit of cave on one side with a bunch of flowstone (no true dark zone) and a flat sediment area. There are several areas of archaeological digs in the cave, mostly in the flat sediment area. There are a few large sheets of black plastic with dirt spread out on them (presumably to help look for bones), a wooden table, some bubble wrap and some metal sieves, etc. On the ground was a Solo can with the edges folded over to form a cup. A couple of jars held sugar and some very badly degraded coffee.

The bubble wrap is starting to disintegrate, and some of the bits and pieces are rusting and should probably be removed. I am thinking it would be good to have a big clean-up... take out the black plastic as well and remove any items that will corrode or are just general rubbish.

Checking with DPaW after the trip we found that there was no record of any visits to the cave except for Roger Howlett in the early to mid-1990s. Bob Baker from DPaW advised that they had on file some sketchy trip reports from the 1990s which mention the digs, putting infrastructure in the cave, creosoting(!) furniture, and that some thylacine and human remains were found/identified.

I will try to contact Roger and then we will perhaps have a clean-up in the cave. It would be a good cave to set up tram lines over the doline and a haul system so maybe we can make it into a roping exercise.

Last southern trip for the year

Greg Thomas

Dates: 6-7 December

Caves: WI-47/WI-42 Terry, WI-7 Skittle, WI-64 Soil Chute, WI-122 Pentorifice

Party: Greg Thomas, Andrew Thomas, Luana Dwyer, Rob MacCracken, Cindy Tan, Kath Whiteside

We picked up Luana as she exited Vlam Road and cruised up to Mammoth, where Kath was waiting at the gate. The show cave guide arrived at the same time so we were able to park in the Mammoth carpark. After introducing ourselves to the show cave guide we hiked up the steps, over the road and into the scrub on a general bearing for Terry.

The bush is not prickly any more, but it is very thick and it was tough going. We spotted the dolines and Sunshine Pot along the way before lobbing up at WI-47, the abseil entrance to Terry. Rob rigged the rope with a grigri as a safety precaution so that we could lower down anyone who had problems. Once down we spotted a small black snake who had curled himself up into a hole in the rock. Greg tied the pack with all the harnesses inside onto the rope so that it was suspended; a few years ago he had hauled up a collection of packs with a hitchhiking snake and did not wish to repeat the experience.

Figure 50: The graffiti in Terry Cave. *Photo Greg Thomas*

We proceeded through the cave, following the route markers. Near the end of the streamway section Greg found a camera memory card on the ground next to the track. Subsequent examination showed it to have with pictures from 2010 of a dog and a pair of four-wheel motorbikes on a trailer. Just near this point, though presumably unrelated, Greg noticed some graffiti on a white section of wall, done with a muddy finger: FU+☺+. Again, accessible while standing on the main pathway. Seems odd that this would have been done recently, right near the 'middle' of the cave – although it should be said that everybody else had walked past it without noticing, so maybe it has been there for a while and we have all just walked right past it too. We did not see evidence of any other damage in the cave.

We exited via the WI-42 doline and went in search of the chamber into which Sunshine Pot shines. After much crawling and squeezing down different passages, we gave up and headed for WI-47 to collect the rope and harnesses, then return to Mammoth. Two soldier ant bites later we arrived sweaty, tired and hungry at Mammoth, about 2.30 p.m. At this point Kath elected to bail – she was going home for a swim, while the rest of us headed for Lake Cave Café and a late lunch.

There was a wedding on at Lake Cave, so we got to watch the well attired guests arrive, and then the bride in her cream dress and some very high, very bright red shoes.

After lunch we went in search of Skittle Cave. Unfortunately Greg did not have a GPS position, nor did he have his mud map, but even so it is pretty easy to find…. An hour later we did find Skittle and had a good poke around. It is a very 'dusty' cave.

After this we headed back to Boranup Drive to find the wedding party taking pictures on and beside the road. We drove past slowly to minimise dust and offered our congratulations. Back to the hut for a cold beer!

We were down to three on Sunday with Kath off to her Dad's 70th birthday party, Rob pleading out from a sore shoulder strained in Terry and Cindy not feeling too well.

We parked on the track, spread out through the bush and headed off on a bearing looking for Soil Chute, which we duly came across. The entrance and much of the cave is pretty much lightly solidified soil and rock agglomerate. We climbed down through the first couple of levels and chambers, and Greg looked down the last section which is a sort of rift that goes down several metres. This brought back bad memories of dirt running through hair and down through clothing in a slight but inexorable flow while descending and ascending in a sort of horrible chimney. Yes – this was the Soil Chute Greg remembered from twenty years previously and had vowed never to return to – at least not that lower part.

While Greg was reminiscing, Luana explored a little too zealously and pulled a few lumpy rocks down on herself, scoring a graze on the cheek and a thick lip. After application of some papaya cream Andrew, Greg and a somewhat more cautious Luana exited the cave. We hiked back to the car and drove further on to visit Pentorifice. This was quickly located, being right next to the track, and we had a good look around the upper and lower levels. We counted the five entrances pertaining to the cave's name – four solution pipes and a doline collapse to the main entry. After this we did a bit more bushwalking looking for WI-69 but did not find it – will have to come back with a bearing from Pentorifice or a GPS position.

Yanchep

Cave description:
YN-474 Tuart Cave *Lex Bastian*

Tuart Cave is in the Carabooda district south of Yanchep. The cave is located approximately 950 m SSE of Doogarch Cave (YN-428) and 500 m east of Wanneroo Road, in a natural woodland area. The area is not at present under threat from developers, but could well be a prime target in the future. It is 70 m north of Koala Cave (YN-118).

On 18 February 1998, after placing tags on Koala Cave (YN-118) and several other caves in the vicinity, I came across a tract of ground north of Koala Cave, consisting of several sinkholes in close proximity. On 3 April I revisited the area, and found most of the holes to be choked with soil around 1–2 m down, one also having a burnt-out tree in it. They were given the single number YN-474, as the holes were intervisible, and solution pipes at the base of each almost certainly went down to the same cave.

Entry was first effected into this cave on 10 April 1998, by Richard Wood and the author. This entailed pulling stones out of the southernmost of the solution pipes, which was broader than the others, consisting of several coalesced pipes, making it roomier to descend and work together. The hole clearing took about 1½ hours. The opened hole at the base gave access to an initial slightly sloping crawl, which ended at a short drop-off into the main cave. After an initial look around the cave we found that the largest (5 m) solution pipe, which was just NW of the hole with the burnt-out tree, was not as blocked as it seemed from the surface. It was free-climbable, so we later used it to exit; however, we decided it would not be safe to use unless the rock was completely dry. The main chamber has a central ridge which is deeper on the western side. My notes for that day add that there were large soil mounds beneath each hole, plus the cave has several groups of stalactites and several white shawls. We also noticed some bones, including a skull and jaw.

The cave was named Tuart Cave because of its location in the midst of good quality tuart (*Eucalyptus gomphocephala*) forest.

The cave was further explored on 9 May, during which we were joined by Lindsay Hatcher, Rob Foulds and Murray Thomas. To the left (south) of the entry crawl the cave drops off steeply to a small lower chamber, with calcite flake and water level marks. We checked extensions to the NE, plus I went down a series of small chambers beneath the central ridge of the cave, which bottomed with some more flake calcite. Murray also noticed another daylight hole in the NE corner. A jaw and skull previously seen in the cave were identified by Lindsay as those of a foal, which had obviously fallen in.

A partial survey of the cave was carried out a year later on 19 June 1999, with assistance from Vicki Bresnan. The survey was sufficient to outline the main chamber, although its SW corner with its deeper chamber, and the small chambers beneath the central ridge, were not reached. The chamber is about 48 m NNW/SSE, with a width varying from 10 m to 20 m. There are six pipes of varying sizes into the cave ceiling. During this survey others in the group (Howard and Pat Richardson, Ida Newton) pushed a connection to the main chamber from a hollow (not a pipe) NE of the original entrance. A quirk of caving is that Pat and I pushed the connection from both directions and came face to face, but were unable to close the gap because of a tree root barring the way.

The cave is well worth a visit, which could be done in conjunction with a visit to Koala Cave and several other caves in the near vicinity.

Yanchep and Carabooda area
Rob Foulds

Date: 7 February 2014

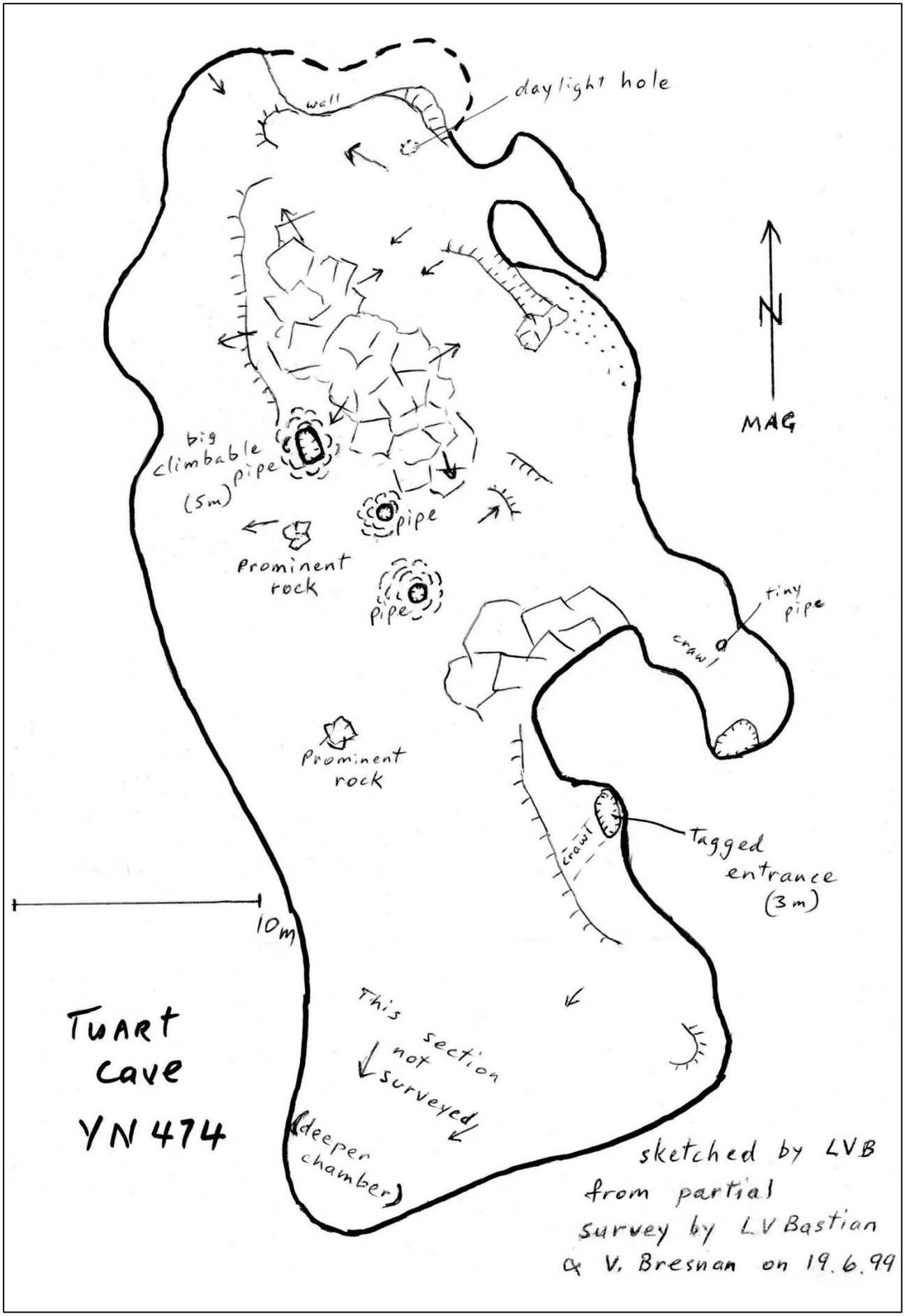
Caves: Crystal Cave, Emu Cave, Orchestra Shell Cave

Party: All caves: Rob Foulds; Emu and Orchestra Shell: Carly Monks (UWA); Emu: Rob Susac, Madonna Mulholland, Dave Mulholland

7.30 a.m. In Crystal Cave, the RH measurements are classic readings – near holes to the outside, low readings (~87%), and near drip or other sources ~95%. The dust that causes spots on the visitors' photos is evident near the new 'Reflection Pool' (fig. 51). These dust spots were from just one person (me) passing by, and visitors complain that this detracts from their photos and thus their enjoyment of the cave experience.

Outside Crystal I found a near-deflated tyre on my car and attributed it to my following the firebreak to the cave early that morning. The new poly pipe to provide for the new bore supplying the Park 'ring' system is buried 0.4 m below the track, and my car bounced all the way to near Spider Cave, where I checked with the ditch-witch driver that he knew the position of the hole next to the track. I put 50+ pumps into the tyre but it still looked 'suss'. I found about ten 'pepper ticks'.

1.50 p.m. By now I had been joined by Carly Monks, a UWA PhD candidate interested in sites with potential for Aboriginal usage or occupation, and Madonna and Dave Mulholland. We went in Madonna's car to Emu Cave. A huge pile of spoil and mulch has been stored not far from the entrance since our last visit. We passed Rai (Rob Susac's dog) as we entered, but saw no Rob at that time. Carly thought the entrance was too small for Aborigines to have utilised the cave as a shelter. I mentioned to Carly that one story had described the patchwork of balgas covering the ridge containing



Map 6: YN-474 Tuart Cave, drawn by Lex Bastian

Figure 51: The dust spots at the Reflection Pool in Crystal Cave. *Photo Rob Foulds*

the cave as the 'crocodile's hide'. The story as related by Ken Colbung described the crocodile as growing a long neck and long legs before becoming an emu, and pretty much eliminated the theory mentioned at a WASG meeting that the cave's name might be taken from the 'egg' features found in it.

In the dark section I left Rob S. to do sketching of details, whilst Dave and I re-measured the clinometer readings for a rift along the back wall. Madonna and Carly looked around and took photos. Dave found using the clinometer difficult, a not unusual situation. Rob S. checked Dave's accuracy for a very steep measurement. I was happy that we had found the error from the last trip, and after about an hour Dave and I started to take photos of minute spiders in a section where a large, but soft, flake had peeled off a block because of tree-root pressure (fig. 52). The now-dry root mat in the cavity was an extensive source of energy for cave life. Most of the photos were poor, as my own Olympus Tough 830 has limited focusing capacity, and Madonna's camera was a little too sensitive.

Figure 52: This space in Emu Cave is about 15–20 cm. high. There is little moisture on these roots, but the cave still has active drips. Nearby were many collembola, midges and a cockroach. *Photo Rob Foulds*

When we emerged out of the rift, Madonna and Carly had stopped viewing and started a long conversation. I thought that, as I had finished my task and the new guys had obviously become bored with the cave, our time could be better spent at another cave.

Carly found macropod bones in the entrance chamber, which again reflects possible resources for Aborigines many years ago. As we moved back through the entrance chamber Madonna found a pseudoscorpion under a small rock close to a theridiid web on a stalagmiform tree root ('root stalagmite').

3.30 p.m. The others went home, which left Carly and me to look for the Orchestra Shell Cave. This cave presented the right combination of a nearby lake with water, turtles and waterfowl resources not far from a rock shelter. As we walked down the limestone road past the lime-kilns I described Karippa Cave and Doogarch Cave as other Aboriginal sites that Carly might be interested in, especially as they had a nearby lake. I mentioned also Karli Spring as maybe being associated with circular or other dunes that could have artefact showers.

Figure 53: The explanatory sign at Orchestra Shell Cave. *Photo Rob Foulds*

I went down the track too far and as we entered the bush we encountered the rift with Murray's Cave and other stuff south of our objective. We ended up walking almost around the collapse before we found the fenced section with explanatory sign (fig. 53). During a very brief examination I described the anthropological excavation that I had seen in 1973 or 1974. I indicated the 'scratchings' area. Carly said that Sylvia Hallam had charge of the excavation at that time. In the conversation Carly mentioned Cataby Roadhouse and I enquired if she had seen the aboriginal site behind that stop. She said 'no'. The cave has a Wanneroo number.

As we returned to the cars I referred to a 'handprint' to the south I had seen on the same geography excursion in 1973 or 1974 when myself and two other students had briefly sought shelter from the rain. I had already told of this occurrence to other researchers since that time and they had not been able to find the place.

A 'bonus' for the day was the 40+ tick bites I have!

Observations of airflow and condensation in Crystal Cave (YN-1)

Rob Foulds

My close association with Yanchep National Park started with making observations and occasional collections of animals, overwhelmingly invertebrates, from caves for the WA Museum long ago. I always had to describe these in the context of their habitat, in effect ecological descriptions for which the basic measurements of temperature, relative humidity, and any connections with what might have been food for the invertebrates was recorded. Once the groundwater fell the source of the RH in the caves disappeared, and so did the animals.

As the groundwater level receded permanently below the lowest points in the floor of the caves, so I made observations of other things such as remnant animals, soil and air temperatures, the root growths in the maintained Wishing Well in Crystal Cave, etc. My progressions from well station to well station within the cave continued, as did the background measurements, but as data against other observations considered useful for Park purposes. A particular need was seen to be monitoring cave wells, as evidence for the efficacy of the re-watering scheme where water was pumped into selected caves in an attempt to save the stygofauna. My hydrological recording also transferred to the lakes.

As regards the re-watering scheme, the original overall concept was good, but the implementation in the cave itself was an exercise in futility, born out of an ignorance of very basic calcarenite characteristics. However, I was asked to continue my visits as part of the overall collection of data from the three lines:

(a) cave wells;

(b) land wells to the east of the Loch; and

(c) the Loch stations as well.

I was relieved when the re-watering scheme was officially ended. The collected data was of later use for verification of regional data in a Department of Water groundwater study of the Park and Loch at the end of 2012, so my continued efforts seemed to have some justification.

Then a new nuisance, dust, was believed to be a problem in Crystal Cave, both for visitors and for staff. My focus shifted to airflows in Crystal Cave as a possible factor in the movement of dust. Also, as a person often moving through Crystal I was asked to supplement cave guides' observations of any soil intrusions, for public safety.

My monitoring showed that past accumulations of dust, now cemented onto the decorations, were mainly in places where there were outlets from the cave, usually restricted outlets either to a higher level void above the main chambers, or directly to the surface outside. The upper level void spaces exist in many places in the Park but are usually too low in height to be accessed themselves; and this appears to be also the case in places above Crystal Cave. The direct links to the outside are in the Annex chamber and nearby fissures. In wet weather rain and debris enters via the open solution pipes. In heavy rainfall events the other, more convoluted 'entrances' can introduce black soil and rubble into the cave chambers. These debris 'entries' either accompany infiltrating meteoric waters, or in heavy rainfall events are flushed from the tops of depressions in the epikarst. As the years passed, other matters came to my notice.

I had in years long gone by noticed in the East Moore area caves, and in some Jurien Bay caves, that condensation fringed the bottom of some solution pipes on the entrance chamber roof. Also, down south in Crystal Cave at Boranup in the distant past I had noticed that often the wall immediately above the outside of the gate to the stream section had condensation on it. Putting a hand into the air streaming out of the inner chamber revealed that it was warm air, manifestly moist, which caused condensation to form on the first cool rock wall it encountered.

Yanchep's Crystal Cave is like a 'V' with northern and southern 'arms'. In Crystal Cave at Yanchep it was apparent early on in my measurements of airflow direction that very large areas of condensation occurred in three main areas. Because the extent of these 'sheets' of moisture expanded and contracted on the wall and roof I believed it was a transitory phenomenon associated with parcels of warm air emerging with airflows close to where the condensation took place. Small parcels of air, already saturated, move over cold rocky surfaces which further cool the air in contact with those surfaces, resulting in supersaturation and condensation.

I think this is a very localised phenomenon; and as it has a seasonal maximum, I think it results from inversions on the surface at night. The boundary layer in shallow depressions overlying the cave tends to be at a higher temperature than the nightly easterly winds coming down the scarp. The cave has a metal plate door with rubber flanges protruding to make a better air-seal. When the door is open during the day the air rushes out, whereas during the night or early morning when the door is opened, air rushes in. This airflow through the door and the tunnel leading to the Pantheon chamber are the only places where my vane anemometer will record the flow. Elsewhere in the cave, in squeezes and high up or very low down even in restrictions, the airflows can be detected and direction noted, but velocity cannot be determined by my instruments. Generally the airflows are light, but relatively constant with the most regular of the airflows coming from the Annex, through the tunnel into the Pantheon, which is the largest air space in the cave.

The direction of airflow at the lowest levels is constant, but with a winter maximum. A less straightforward airflow on the other (southern) side of the cave appears to commence near the Wishing Well and invariably flows east to near Well 3A, close to the Elephant's Foot, and then out to the

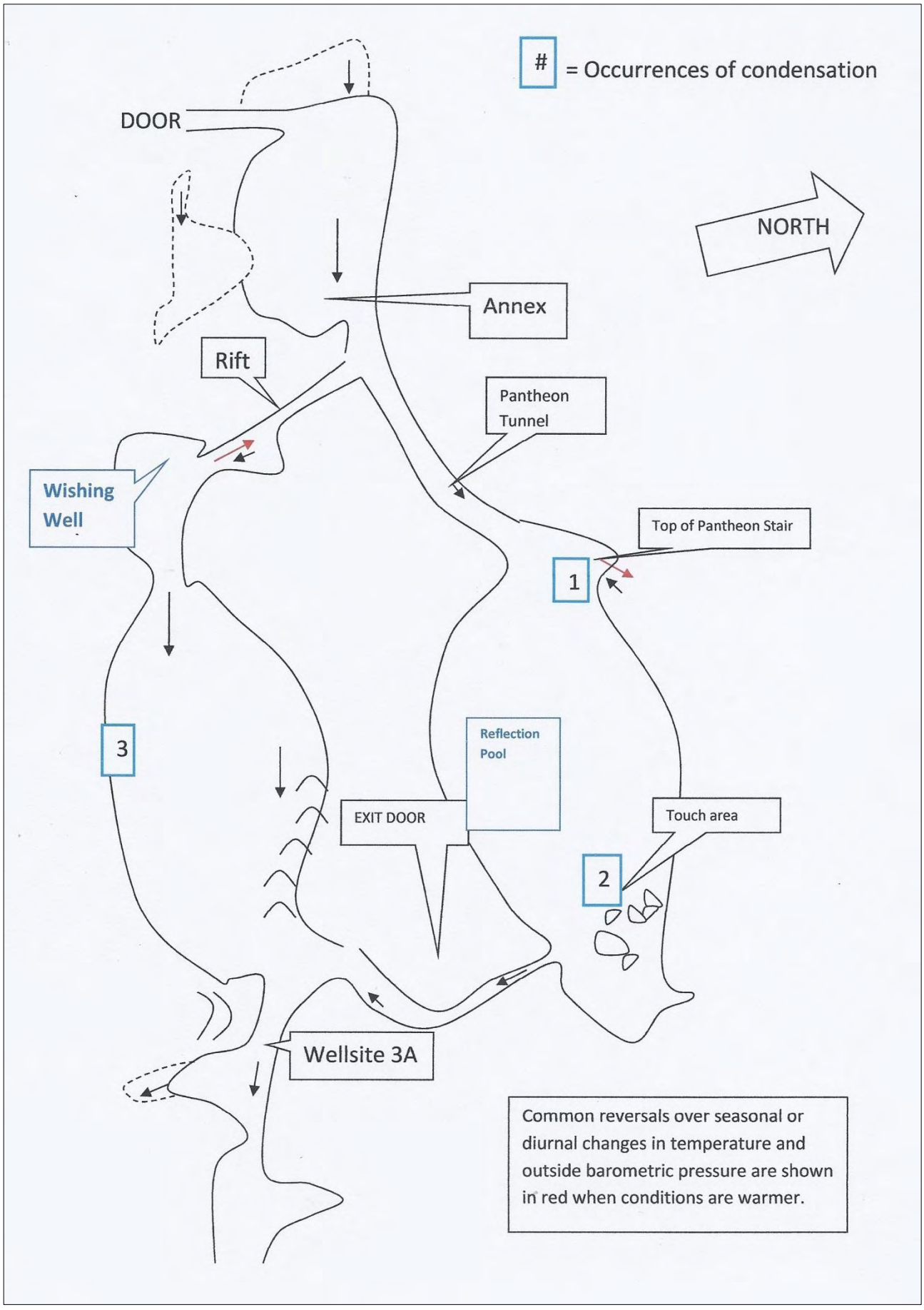


Figure 54: Schematic of Crystal Cave, with arrows indicating the most persistent breezes and numerals showing the main condensation areas. *Image Rob Foulds*

back of the cave. There are very considerable sections of the cave east of the breakdown pile next to the Touch Area (near Well 6) and also eastwards past the Elephant's Foot. In most cases the airflows are to the east past these points; but, on rare occasions the airflows are gently reversed. The Annex or entrance chamber always varies greatly from the innermost stations, Wells 3A and 6, in both temperature and RH.

In the case of my weekly monitoring trips into Crystal Cave, looking for dust at first led to examining airflows. As the 'zephyrs' experienced in the cave were normally less than required to register on my vane anemometer, so my attention focused on airflow directions, also on the temperature of parcels of air as a surrogate for air density, and whether the air blew into or out of the cave when the door was open. Mats were purchased to alleviate the worst aspects of the dust, and financial requests for elevated walkways have been included in the requested Park budgets for some time. Hmmmm?

Generally the longer one looks at things, then the more it is likely that a 'pattern' might be discerned between the objects of observation and other associated features. In order to ascertain if the 'pattern' exists it is usual to quantify, or use numerical values which can aid in determining

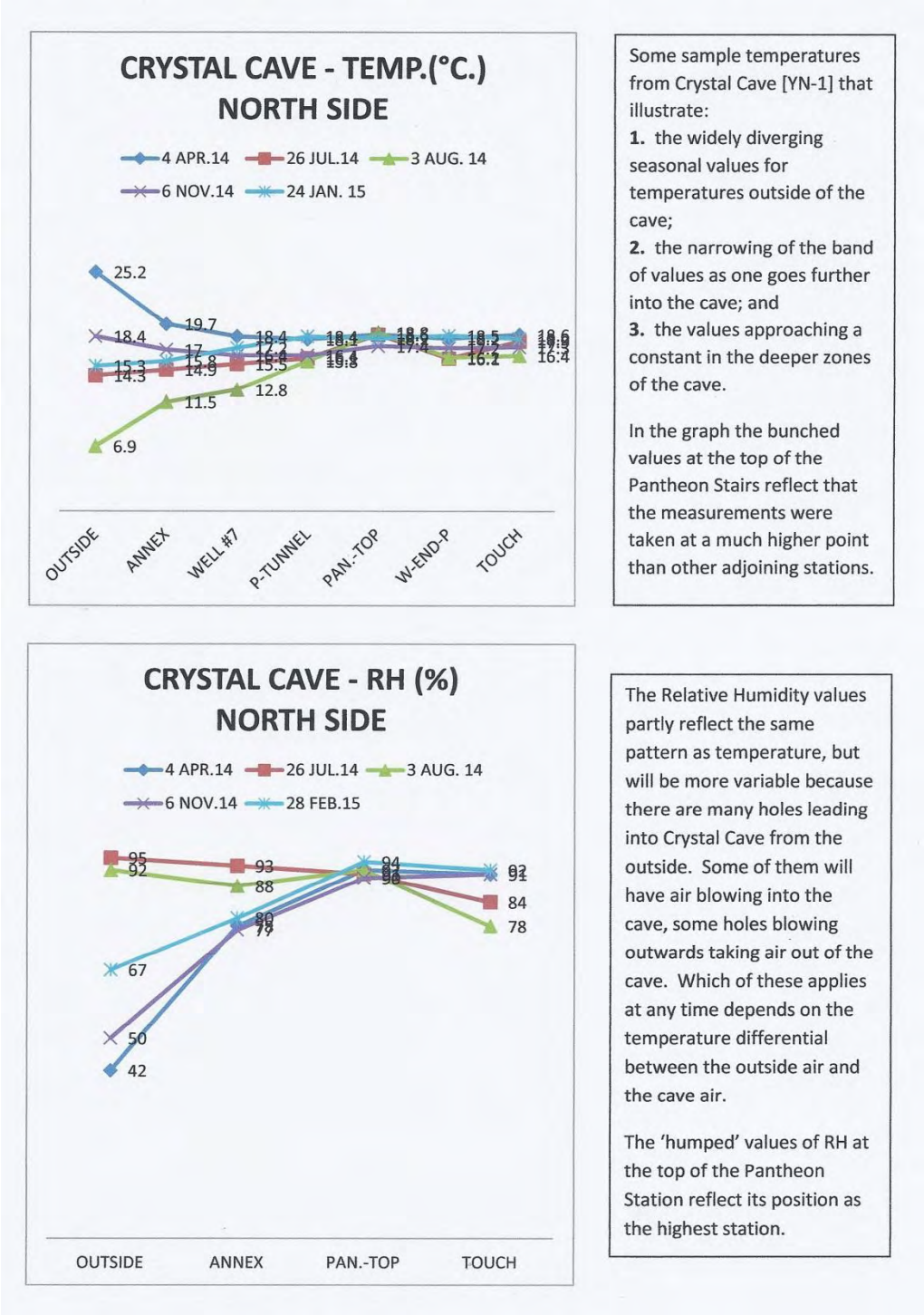


Figure 55: Temperature and relative humidity readings from the northern arm of the cave

whether relationships exist or not. Internal airflows originate where temperature differentials exist. Some of the most obvious meteorological contrasts in Crystal were:

(a) the presence of condensation along a high ledge next to the upper level in the Pantheon in winter, but absent in summer;

(b) the condensation area on the roof over the Touch Area which was greater in extent during winter, causing a crescent-shaped line of droplets falling to the floor; and

(c) the almost complete cessation of internal dripwaters from infiltrating meteoric waters six months after the July rains.

These seasonal characteristics were overarching phenomena with respect to the diurnal airflow patterns noticed. The lack of dripwaters was associated with the 17% reduction in rainfall since the 1970s and the loss of autumn rains meaning that the soils were kept wet for a much shorter period in the year which restricted infiltration.

Eventually I determined that the connections to the main caverns from smaller passages or chambers out of sight, but with different temperatures, were the reasons for the short-term local airflow reversals associated with cold air drainage overnight. My barometer was insufficiently sensitive to discriminate between the high and the low sections

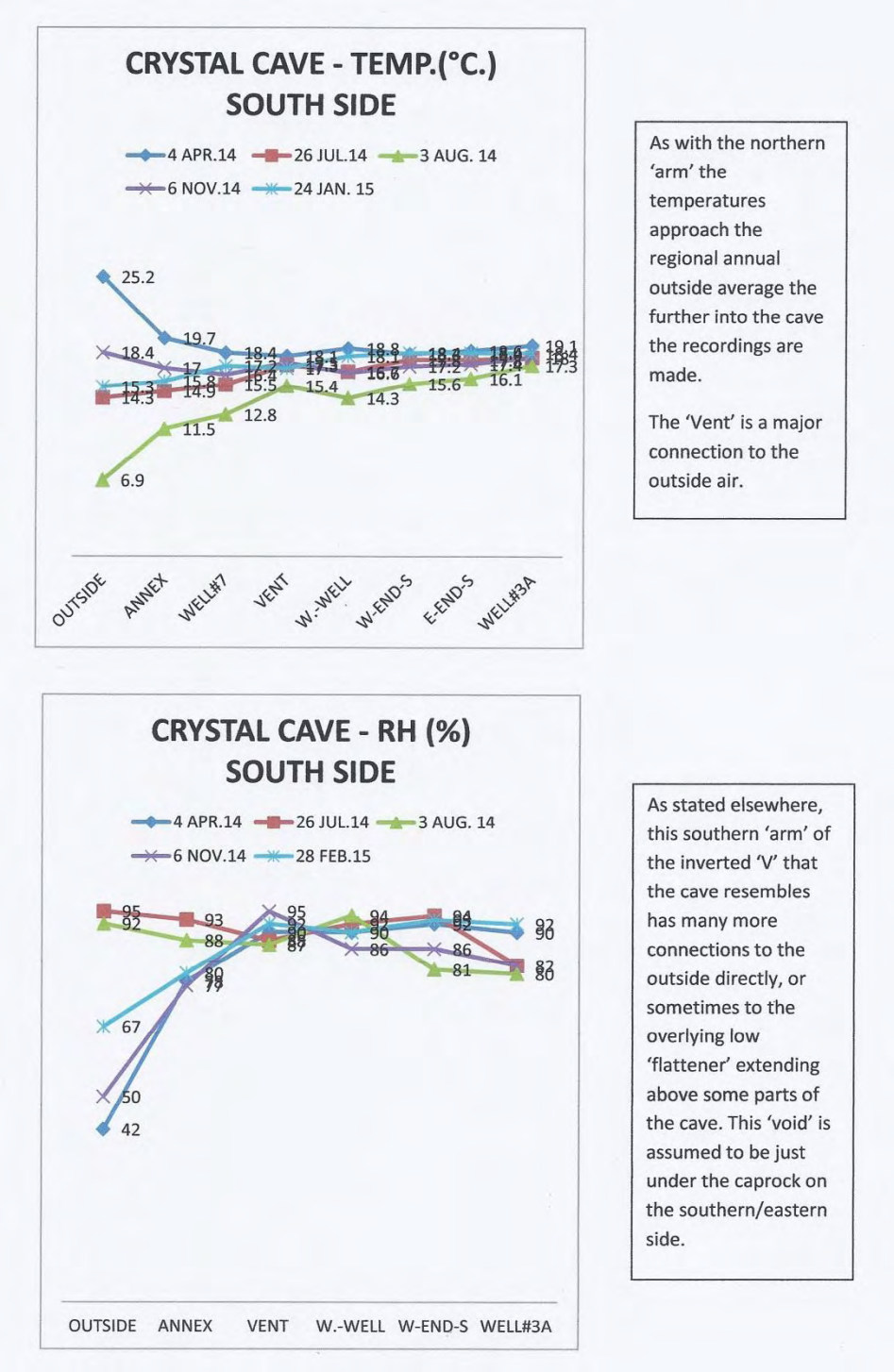


Figure 56: Temperature and relative humidity readings from the southern arm

within the cave, despite a different in elevation of 8–10 m in a couple of places. I had at least the comfort of knowing that with no heavy de-gassing (and calcite deposition) there would be no building up of CO_2 other than that from visitor exhalations. Airflow is the transport mechanism to transfer heat and moisture around the cave. The continued presence of a large area of condensation over the Touch Area made me think of 'condensation corrosion'. My immediate mission became to ascertain if the condensation dripwaters were likely to damage the decorations on the roof. Because the dripwaters have almost ceased, the condensation is not now flushed off the roof and decorations, as it was before the autumn rains cut out and the winter rains diminished.

The roof of the cave is warmed by conduction, at first through the soil, and then below the soil zone through the epikarst zone overlying the more integrated caprock. The first question was whether the expansion/contraction of the condensate-covered roof patches was due to seasonal effects – i.e., was the moist air advected into the cave from outside in winter from the boundary layer warmed during the day? Were the roof/rock surfaces cooler in winter, causing greater condensation? Did any of this mean that the moisture layer/condensation layer had a longer time of residence against the roof decorations in wintertime despite the apparent greater dripping rate?

The extent of condensate seemed to expand or contract in the southern arm of the cave with a different frequency than that in the Pantheon (northern arm of the cave). The diurnal airflow changes/reversals were more frequent in the southern side of the cave. This may be due to the presence of the Wishing Well waters, which are warm, and introduced from outside and allowed to drain away. More likely it is due to the greater number of connections to the outside along the southern arm. However, because the water supply for this pool comes from the Park 'circle' supply the higher of the Wishing Well temperatures (~23°C) are almost always in summer, autumn and spring, and are somewhat warmer than any of the lower-level stations in the cave. Annoyingly, I don't have enough data for winter, or for the two high-level stations in the cave. Using dataloggers still does not remedy this.

OK, this means that while the Park's pH meter is away being fixed I will have to extend the RH and air temperature measurements to more stations. The temptation to see if the upper and deeper soil layers experience a seasonal temperature differential reversal has been resisted, and in the figures tabled below, only the within-cave data is analysed.

Graphs of air temperature/RH from the entrance to the innermost ends of the cave (e.g. figs 55 and 56) show small variations away from the entrance. Entrance reversals over the night/day cycle are also indicated (though not illustrated in the figures). More interesting, from my point of view, are the readings over high and low stations (in terms of their elevation) associated with condensation sheets on the roof (fig. 57).

I have already described the high decorated area at the top of the Pantheon stairs as another different from the lower stations. Based on such pathetically few instances one can still see the agreement with theory here, where the warm moist air rises as cool air is forced from the entrance, giving up heat as condensation takes place on the roof, but leaving the neighbouring air less saturated. In the case of the high area back from, but over the Wishing Well, the air current advecting moist air from another small chamber complicates matters.

4 April 2014	Temperature (°C)		RH (%)		Breeze
Station	low	high	low	high	
South branch (west end of Shelter)	18.3	19.0	92	82	none
North branch (Touch Area)	18.6	19.7	91	90	light to east
11 April 2014	Temperature (°C)		RH (%)		Breeze
Station	low	high	low	high	
South branch (west end of Shelter)	19.8	20.8	93	92	strongly in
North branch (Touch Area)	18.6	20.0	91	91	light to east
19 April 2014	Temperature (°C)		RH (%)		Breeze
Station	low	high	low	high	
South branch (west end of Shelter)	18.6	21.6	93	93	strongly out
North branch (Touch Area)	18.2	19.8	90	84	to east

Figure 57: Temperature and RH readings measured at high and low stations at each location

The areas of interest are illustrated in the figures. Figure 58 shows the southernmost section of the largest area of condensation in the cave (location 2 in fig. 54). It is about 5 m across and is smeared across a connection to a low extension to the cave. It is here about 8 m up from the floor of the Pantheon. The condensation has another side benefit, in that it provides water for life. While up high over the Touch Area I saw a tiny (<1 mm) red spider/mite race away from the rock I moved and gallop off to avoid my light. A terrestrial troglophile perhaps?

Figure 58: The southernmost section of the largest area of condensation in the cave (location 2). *Photo Rob Foulds*

Adjoining the above, Figure 59 shows the northernmost part of the condensation sheet at the eastern end of the Pantheon (also location 2).

Figure 59: The northernmost part of the condensation sheet at location 2. *Photo Rob Foulds*

The cross-section (fig. 60) may make this condensation clearer: the view is from the south.

This major spread of condensate is downwind from the larger of the two pools, and in a chamber where the groups of visitors spend the longest time, so that all of the outlined causes described later can be part of the reason for such a feature. In summer, the airflows down the Pantheon chamber, door open or door closed, are invariably from west to east, taking parcels of air upwards and into the back recesses of the cave. Assuming the rock

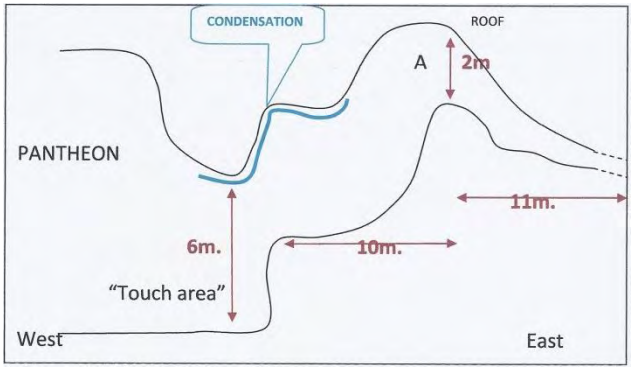


Figure 60: Cross-section indicating the condensation sheet at location 2. *Image Rob Foulds*

temperatures were similar, the persistence of this showing of condensate on the rocky roof means that the air near the film of water is slowly moving and at nearly the same state of saturation. Temperature and RH measured near point A in Figure 60 were 19.7°C and 90%, whereas within an hour of these measurements the values at the Touch Area were 18.6°C and 91%. Barometer readings were the same everywhere in the cave, regardless of height above the floor. This same place in winter accumulates so much more condensation that it rapidly drips a great deal of water over a crescent-shaped area in the Touch Area, whereas in summer there are very few drips there.

Figure 61: The other permanent area of condensation (location 3). *Photo Rob Foulds*

Figure 61 shows the other permanent occurrence of condensation in the cave (location 3, fig. 54). It is near a low connection to a small chamber to the south (right in the picture). The small extent seen reflects the summer extent. Like that at the eastern end of the Pantheon, it is at its greatest extent in winter.

The temperature and RH within an hour of the measures already described for the Pantheon were 19.0° C and 82% respectively. At this time there was no detectable airflow either way. The rock temperature up near this position was 18.6°C. Immediately below this position on the path, the figures were 18.3°C and 92%, with rock temperature of 18.3°C. With the difference in height

of about 9 m it makes you wonder, but no jumping to conclusions.

The other major occurrence of condensation is seen along the ledge shown in Figure 62 (location 1, fig. 54). The ledge is pictured in summer, but unlike the other two places, condensation along the arrowed edge occurs only in winter and there is nothing there in summer. This ledge is about 8 m up from the floor of the Pantheon. Airflows go past this spot before crossing the surface of the Reflection Pond. This 'wind' direction, down near the floor, is persistent. Behind from where the picture was taken there is a gap of about 0.8 m between the roof and the breakdown pile which extends nearly up to the roof here. In summer the air flows out of the Pantheon through this, and in winter airflows enter from there. It is very tempting to connect these factors. The other high level connections behave similarly but less intensively in terms of condensation.

Figure 62: Ledge at location 1 where condensation is seen in winter. *Photo Rob Foulds*

Crystal Cave is one of the most important of the Park attractions, so it has to be better protected than it has been in the past. Some condensation can be acidic.

Thanks to Ian Collette I can use Extech dataloggers for the two stations requiring climbing into the high stations near the roof.

Why do we care about condensation anyway? Because, with visitors exhaling CO_2-charged air, and de-gassing occurring next to the decoration, 'condensation corrosion' is a possibility. The condensation, especially in winter, covers the decorations adjoining these areas of condensate described before. This water can sit there for very considerable periods from autumn onward. (I have not tested the pH of the dripwater in winter as the Park meter has packed up). In the high roof area over the Touch Area the heaviest drops pause on the flowstone roof to form really big drops before they increase in size and roll down, usually to the bottom of a stalactite. This of course means that any long period of residence is on the flowstone, not on the stalactite. Even if the condensation water was saturated with CO_2 – and it probably isn't – any etching would most probably be on the roof sinter, which is not visible to visitors. All they would see is the shimmer of condensate over the top of the sinter-covered roof in that place, hopefully.

Possible sources of moisture from within the cave are:

(a) *Exhalations* by groups of visitors, but these are almost never visible as the cave is open for tours after 10.30 a.m. and the last tour is usually at 3.00 p.m., finishing at 3.50 p.m. (My own visible exhalations are occasional seen, in winter, and usually confined to the vicinity of 'entrances' other than the Annex.)

(b) There are two *pools of water* within the cave. The smallest, the Wishing Well, is very shallow and only about 2 m across. The other, the Reflection Pond, is much larger, but has only been enlarged recently, whereas the condensation existed prior to the pool. (This pond is very seldom topped up and only usually because the water slowly 'wicks' up to the floor-level sands where the circulating pumps operate. There have been extended periods when this pool was dry altogether.) There is never any roof condensation directly above either of these pools, but the largest area of moist rock is downwind of the Reflection Pond.

(c) The *dripwaters* from the roof. These have been drying in recent years as the rainfall has diminished. (We have lost our autumn rains, leaving a very short winter period for infiltrating waters to overcome bonding forces within the topsoil horizons and percolate downwards through the caprock.)

(d) The *height to the roof* where these condensation sheets occur is less than 10 m and adiabatic cooling is unlikely(?), but the air in the highest levels of the cave is in most cases the warmest. This is also where the caprock (about 4 m thick) is also most likely to be heated by conduction from the surface. But the soil layer over the epikarst zone is 6–8 m thick above the greatest extent of the condensation, providing some insulation, if the soil is dry.

There is also the possibility that outside air is forced into the cave when the majority of air masses outside are cool. The main door is closed at night time, so only the other 'entrances' exhibit advected air from outside. None of the possible sources mentioned above seems likely on its own to be the main cause for all occurrences, because a main occurrence of condensation lies in the wrong direction from the ponds in terms of airflow, or like both occurrences in the Pantheon, the condensation surfaces are greatest in winter and not in summer. I tend to think that moist air from near the ground at night, advected in as outside temperatures fall, is a significant contributor. However, the pools cannot be discounted as both have airflows continuously across their open surfaces.

The cave as a tourist attraction suffers already from thick layers of past dust accumulations cemented

onto the decorations, making them dull. The cave infrastructure is old, rusty and unappealing. The only pools now in the cave are the result of water from the Park circle main. The decorations have largely ceased to drip and shine. In short, the cave as an attraction is limited, and damage from re-solution would possibly be the 'last straw'. If condensation corrosion is at work – and fortunately it doesn't seem to be – an answer might be to encourage greater ventilation in winter.

Since making most of these observations the Park pH meter has returned. No acidic dripwaters have been recorded (readings were 7.21 on 23 January 2015 and 7.55 on 28 February 2015). The dust however persists, requiring 'wetting down' every 48 hours. This problem has been extant for a very long time, and detracts from the enjoyment of the cave by visitors. The Government budget cuts every year, combined with the micro-management of the Park from outside, which focuses on different problems, indicate that the dust problem will continue, and that Kent Henderson of ACKMA may well be proven correct in his assessment of Crystal Cave as 'the worst tourist cave in Australia'.

Figure 63: Scutigerid in SH-36. *Photo Brett Wiltshire*

Northern Agricultural Region

A trip to Cervantes

Bert De Waele and Brett Wiltshire

Dates: 22–23 February

Caves: SH-36, SH-5, SH-1 Super, SH-2 Weston, SH-17 Brown Bone, plus cave entrances inspected and logged: SH-20 Tick, SH-9 Pretty, SH-29 Ranger, SH-45 Scallop, SH-57, SH-55 Abrasion Overflow, SH-6

Party: Bert De Waele, Andrew Thomas, Gregoriy Tsaplin, Brett Wiltshire, Natalie Joyce, Belinda Martin

First off on Saturday we found the entrance to SH-20, Tick Cave, and inspected the lock, which was fine.

The next stop was SH-36 where we found two small joeys, one dead and one still living, at the base of the 2 m vertical entrance. We gently took the living one out to the surface and provided some water. The animal looked weak, however, and had laboured breathing. We then entered the cave and found a scutigerid near the entrance (fig. 63).

Next we visited a number of cave entrances – SH-9, 29, 45, 57, 55 and 6 – in order to verify their GPS locations, or in some cases to take new ones. There was no evidence of tampering with the lock at SH-9, Pretty Cave, and no water noted at SH-55.

Figure 64: Possible dingo skull in SH-5. *Photo Brett Wiltshire*

At SH-5 we explored fully. The cave runs in two directions, is decorated and has a (dry) stream passage. Under one small overhang there is a fully preserved and *in situ* skeleton of what we thought was a dingo (canine teeth, size of a medium dog).

Deeper in the cave there were some more petrified large vertebrae of unknown nature (possibly megafauna?), which were left in place (fig. 65).

Figure 65: Some older vertebrae in SH-5. *Photo Brett Wiltshire*

We also found an intriguing cluster of insect exoskeletons at the top of a stalagmite (fig. 66).

Figure 66: We found an a eerie cluster of exoskeletons. *Photo Brett Wiltshire*

We entered SH-1 Super Cave along the larger inclined northern entrance and explored the cave. We also GPS'ed the second inclined, narrow and mostly blocked entrance; the adjacent vertical man-made shaft; and the steep to vertical entrance accessible via a half-rotten log. Based on these, the cave is estimated to be ~70 m from east to west and ~75 m from north to south. One small pile of guano with a few fresh leavings was noted near the entrance with the log.

We had lunch at the car after visiting Super Cave but soon had to leave in a hurry as the bees quickly gathered in numbers and swarmed around anything damp.

SH-2 Weston Cave is a collapse doline offering three separate entrances into the cave. There is a small bees' nest in the rock (not as visible as an externally built nest), which presents some risk for entry. The cave itself is a low, multi-room feature, decorated in places. In one spot there is some pink surveyors' tape tied around a stalactite which has been calcited over, becoming completely enveloped in the stal. We estimated the aggregated length at ~60 m.

On Sunday we visited SH-17, Brown Bone Cave. The entrance, just next to the track, is guarded by several bees' nests of impressive proportions. Entry is best gained by keeping close to the northern side of the doline and decline. The cave then flattens out into a dry stream passage, which at the end lowers and becomes a wet sump. Passing that there is a crawly, blocky passage that opens up into the main stream passage. This splits up into a dry southern branch, with some wet areas, and a northern wet passage. The northern wet passage ends in the water, while the southern ends dry. The water seemed undisturbed and was in many places covered by very thin circular calcite rafts, with some pools completely covered by calcite. Wherever possible, the group avoided disturbing these features. The water was clear, and some invertebrates were observed.

Figure 67: Beautiful circular calcite rafts. *Photo Brett Wiltshire*

Figure 68: Flowstone and water in Brown Bone Cave. *Photo Brett Wiltshire*

Looking for sites for Carly's research *Fran Head*

Dates: 25–26 April

Caves: E-1/2/3 Stockyard Gully complex, E-9 ANU, E-19, E-11 Emu Cave, E-36, E-33/34, E-12 Seismic Cave, E-35, E-30 Drip Cave, J-2 Drovers Cave, J-7 Old River

Party: Ian Collette, Carly Monks, Ian McCann, Brett Wiltshire, Fran Head

On the Anzac Day weekend, a small party went up to Eneabba and Jurien with Carly Monks. Carly, a UWA PhD student, was hoping to do an archaeological dig along the lines of Devil's Lair, but concentrating on the area north of Perth. Her supervisor, Joe Dortch, had suggested that WASG might be able to assist; she had come along to a couple of meetings seeking our advice, and had now joined the club. The objective of this trip was to investigate 'rock shelter' type sites likely to have been occupied or used in the past by Aboriginal people, or – as a second possibility – 'pitfalls' with palaeontological potential.

On Thursday night as Ian and I were driving up, the weather was looking a bit threatening. At Lake Indoon the sites near the toilet block were all taken, and we had to drive way to the left round the lake, through muddy puddles on the track. Sure enough, as soon as we got the tent up the rain began, and we sat under the 4WD awning drinking coffee in a downpour, periodically shoving the awning up to release a small collected lake of water.

Immediately I had changed and gone to bed, the others rocked up in quick succession. I confess I didn't get up to welcome them! Carly put up her tiny tent under our car awning – I had visions of her drowning in a 'lake collapse', but these weren't enough to keep me awake – and Ian McCann and Brett crawled off to sleep in their cars.

Figure 69: Carly takes measurements. *Photo Ian McCann*

Against all odds, Friday dawned overcast but dry. We started our 'quest' at Stockyard Gully, where Carly photographed and measured some minor rock shelters at the south-eastern or 'lake' end of the tunnel which she felt could have been used as shelter from the midday heat and to watch for wildlife. I found numerous tiny frogs enjoying the damp soil and vegetation after the recent rains. We also checked the side cave to the right before you enter the main tunnel, but while the light entering from the back shaft could be seen as holding special significance, the cave seemed a little too steep and rocky for an occupation site.

Figure 70: A tiny frog in the damp sand at Stockyard Gully. *Photo Ian McCann*

We then walked straight through the tunnel – noting one of the southern boobook owls in residence – to check out the arch (with one small bat) and the entrance to the cave. Interesting as ever, but we didn't find what we were looking for on this occasion. I think Ian McCann was very disappointed not to go into the side chamber of the tunnel or to the back of the cave, but we had a lot of ground to cover today!

Next came an interlude purely for enjoyment, as the four others abseiled into ANU to enjoy the view of the pierced roof. Brett captured a great photo of a blue-tongue lizard and the abseil in the some picture. Meanwhile, I walked over to check E-19, which is a wide shallow doline in a clump of trees, with two or three apparently blocked shafts at its lowest point. (I say 'apparently', because they may have 'gone' with some poking and digging, but between my knees and the bees I wasn't doing any of that!)

Figure 71: Blue-tongue/abseil, ANU Cave. *Photo Brett Wiltshire*

Finally, we undertook a cross-country circuit to check the various features to the north. These were all relatively shallow dolines or collapsed areas into which one could walk, most with an obvious area of exposed rock and a number of blocked shafts but no entry. A couple, however, had a chamber or rock shelter, as noted below.

E-11 Emu Cave was a doline with a cliff and considerable limestone at one end, very popular with goats. It was possible to enter a small chamber, but not on this occasion as the way was blocked by a very rancid, recently dead fox.

E-36 and E-33/34, a large oval doline with limestone at either end, were both apparently 'blind', though I could sense that Brett really wanted to get into all the shafts and test them thoroughly. We'll have to come back and explore when we are not on another mission.

E-12, Seismic Cave or Facts-of-Life Cave, was the most likely prospect from today's caves. A boulder-filled doline slopes steeply down at one side into a fairly considerable rock shelter. Carly and Brett

seemed unconcerned by the ferocious bees hanging off the overhang and spent quite some time measuring and photographing in the sandy floor of the cave. Ian C and I were not game to brave them (particularly me, as I would have had to work slowly down on my bum); Ian M was moving into the cave but beat a hasty retreat when he heard the bees fire up.

Figure 72: A massive rock collapse leads down into E-12. *Photo Ian McCann*

While I treated my knees to a rest, the two Ians wandered over to E-35 and photographed it. Then it was high time to be leaving; Ian M got a few sunset shots on the return walk (anyone would think the sun had been shining all day), but it was quite dark as we drove out along Pearsons Track.

On Saturday we headed for E-30 Drip Cave, stopping at a small shaft along the way. Brett entered this and reported that it had potential, but as it was not what we were looking for on this occasion we had to note and leave it.

Figure 73: Fran in front of E-30. *Photo Ian McCann*

At Drip Cave we had obviously hit the jackpot from Carly's point of view. This is a wide rock shelter with a large chamber behind, dropping into near-darkness at the back. Evidence shows that it has been used by random campers/drinkers over a considerable period – not to mention goats, bees and swallows. There are also many deposits of small bones, including at least one from an owl roost and some tiny bones calcited on to the rock surface. Many measurements and photos were taken.

Figure 74: Tiny bones calcited on to the rock. *Photo Ian McCann*

We then went to Jurien where Carly wanted to check out Drover's Cave; although it turned out not to be useful from her perspective, we all enjoyed the very black and white decoration. The cave has obviously suffered much damage over the years, but it was free of rubbish on this occasion, and we noted that someone has cleaned off a lot of the graffiti. A new lock had just been fitted by the rangers, and the tight door required extreme strength and perseverance – plus whacking with a variety of tools – to open and close. We really must resurrect the issue of manufacture of a new gate.

Finally we went to J-7 Old River Cave, which we did not intend to enter as we had neither time nor approval from the Caves Access Committee (CAC). However, Rob Susac had asked if we could see about changing the lock, as the old padlock was seized solid, and the rangers had duly provided a new one. We faffed around for ages round the very constricted entrance in rapidly increasing rain, and would have got nowhere if someone – Brett I think – had not produced a small saw fashioned from a hacksaw blade which was the only thing that would fit in the space. Thanks to the sterling efforts of Ian McCann the old lock was cut off and replaced. Then, in several cases wet to the skin and very cold, we squelched back to the cars and set off for Perth in a fug of heaters and steaming bodies.

Carly will now be applying to the Departments of Aboriginal Affairs and Parks and Wildlife for permission to excavate in E-12 and E-30.

A fracking good investigation

Fran Head

Dates: 27–29 June

Area: Eneabba

Party: Ian Collette, Fran Head

Ian and I went out this weekend, in the light of the recent fracking controversy, mainly to see what exploration and drilling had been done in the past north of Lake Indoon; but while we were there we wanted to check some locations and references.

On Friday we explored the area around the Little Three Springs Reserve south of Stockyard Gully. First we located the actual springs, then found and GPS'd a couple of features further north, one of which may or may not be E-54 Syg Cave. It was an extensive karst pavement which I believe warrants more investigation than we were able to give it in the failing light.

Figure 75: A fine karst pavement: perhaps E-54?
Photo Ian Collette

Next morning we spent quite a while following up the most tenuous leads from old documents quoted in early *Western Cavers,* looking in vain for E-25, Honey Cave. Giving this up, we wandered off to Weelawadji and located Weelawadji West and two other small holes, which I don't know why we haven't been able to find before – probably looking too far afield.

After a pleasant lunch in the sun by one of the small local lakes, we drove round a circuit identified from Google Earth, looking at the various gas exploration bores which have been drilled in the vicinity. I don't really know what to think about these: sure, they are mainly inactive now, and I have to admit I wasn't aware of them before, but there are lots of them and they leave big scars in the reserves. I don't like to think what would happen if a significant reserve of gas was identified; and I certainly wouldn't want them on my farmland!

Figure 76: Heavily sculpted boulders round the shore of Lake Logue. *Photo Fran Head*

However, the main reason for this report is what we discovered when we took a short cut via one of these fracking sites to drive around Lake Logue. Around the western shore of the largely dry lake, very close to the access track to Weelawadji, is a kind of 'karst shoreline' extending about a kilometre. The limestone cliff, 4–5 m high in places, is deeply indented and eroded, with frequent collapses of the edge leaving heavily sculpted boulders. Although we didn't find any true cave formation, we both found this a very interesting karst feature.

Figure 77: The 'karst shoreline' round Lake Logue.
Photo Ian Collette

On Sunday morning we took a quick detour to the entrance of Brown Bone Cave on the way home.

Archaeological research at E-12 and E-30 *Carly Monks*

Dates: 27 October – 7 November

Caves: 6E-12 and 6E-30

Party: *UWA:* Carly Monks (PhD candidate, WASG), Joe Dortch (PhD supervisor), Rebecca Stewart, Rebecca Foote, Shannon Henderson, Callum Forsey, Andrew Horn, Tania Phillips, Jacquie Brisbout, Daniel Monks; *Amangu Traditional Owners:* Thomas Cameron, Buddy Edwards; WA Museum: Alex Baynes, Cassia Piper; *Curtin University:* Tess Cole, Mike Bunce; *WASG:* Danny Wilkinson

Much like those of the Leeuwin-Naturaliste region, the caves of the coastal plain north of Perth provide excellent opportunities for archaeologists to better understand the ways in which Aboriginal people

used the land and its resources. The remains of fires, animal bones, and artefacts are often not preserved outside of the caves, making the caves important resources for this research. The purpose of the archaeological research trip to E-12 and E-30 was to excavate a couple of small test pits within the caves to look for stone artefacts and bones, so that we can begin to understand how Aboriginal people were using these sites and the surrounding environments over the last 5,000–10,000 years.

The research trip involved a large team including archaeologists and archaeology students from UWA and Curtin University, and Amangu Traditional Owners Thomas Cameron and Buddy Edwards. Some people joined us for the whole trip, but most just helped out where they could, for a few days between other commitments. We planned to dig test pits at two caves, E-12 and E-30, which had been visited earlier in the year and showed the most promise as archaeological sites. Unfortunately, this plan hit a snag on the first fieldwork day, when we reached E-12 only to find that the bees at the entrance had increased in number and ferocity since the previous visit. The decision was made not to attempt fieldwork at E-12 on this trip, so we trudged back to the cars… only to find we had staked the sidewall of a tyre. With our spirits as deflated as our tyre, we ended the first day on a bit of a low note. Fingers and toes crossed for the following day we tried to boost our moods with a discussion of the many ways in which the other cave, E-30, would be better.

Figure 78: Looking north towards Test Pit 1. *Photo Carly Monks*

Thankfully, we were right. Our first test pit in E-30 was positioned in the northern end of the entrance, about four metres back from the dripline in an area with smoke staining on the roof. It was flat, dry, and just out of the reach of the afternoon sun: all the hallmarks of a good spot to make a fire. We strung out a small test pit (1 m^2), and started to dig… and before we'd even removed three buckets of sediment (mostly comprised of goat hair, goat manure, and goat bone), we'd found our first artefact. It's not an exaggeration to say that this small quartz flake buoyed everyone's spirits (particularly mine) instantly: we had an Aboriginal site!

Over the next few days, the finds kept coming. We soon found a hearth pit, full of ash, charcoal, emu eggshell and bone. Three more hearths followed in quick succession, along with many artefacts made from a variety of stone types – quartz, basalt, silcrete, chert and limestone. The graffiti on the northern wall was photographed and recorded, and Thomas and Buddy told us about their uncles, who had lived rough in the area in the 1930s and 1940s, making use of caves like E-30 during harsh weather. Both Thomas and Buddy were very happy with the excavations, and would like to give E-30 an Amangu name reflecting its use by Aboriginal people. They are currently discussing possible names with senior Amangu elders.

Figure 79: Stratigraphy of Test Pit 1 showing a hearth. *Photo Carly Monks*

Later in the first week, Alex joined us to lend his expertise. He and Tess (a PhD candidate at Curtin) began to sort through small samples of the bone to collect tiny fragments for ancient DNA analysis. Tess will analyse these samples later in 2015, to search for traces of some of the species that are more difficult to identify.

The weekend of 1 and 2 November was particularly busy, with more people able to join the research team. This gave us an opportunity to open a second 1 m^2 test pit in a different part of the cave. Test Pit 2 was positioned towards the rear of the front chamber, next to a shallow channel created by water erosion. Joe began the excavation, and within moments he had uncovered a small fragment of marine shell!

We were joined over the weekend by WASG member Danny Wilkinson, who was quickly co-opted into helping with the excavations, as well as the survey of the front chamber. The finds kept coming, including complete mandibles of kangaroos and possums. Danny, Alex and others identified several bones and partial skeletons within the cave, including the jaw of a dingo pup and most of a fox.

Early in the second week, we reached our maximum depth of 1.5 m in the first test pit and

closed it off. We placed green plastic along the base and walls of the pit, and backfilled.

Figure 80: Test Pit 2 getting deeper and deeper. *Photo Carly Monks*

The excavation of the second test pit continued for the rest of the week with a steady stream of bone and artefacts being noted. We reached a depth of 1.5 m on our last afternoon, and finished backfilling in the late afternoon.

Overall, the trip was a resounding success. The material brought back from the cave will be cleaned, sorted and analysed this year, and I have high hopes that the many thousands of bones and artefacts will give us great insight into the last several thousand years of human activity around the cave.

Eneabba *Danny Wilkinson*

Dates: 1-3 November

Caves: E-30, Gamma, Delta and Beekeepers dolines, Stockyard Gully

Party: Danny Wilkinson (sometimes joining Carly's team)

I got to the camp grounds at Lake Indoon on Friday afternoon – a great, quiet spot but a little windy in the afternoon!

Early the next morning I set out for E-30 to meet Carly Monks and her team, who were digging for artefacts to confirm early human habitation. This they were very successful in doing, finding fish bone, basalt and evidence of stone tool construction, which was fantastic. I got an opportunity to dig a layer of the second test pit.

Later in the afternoon, I set out to pinpoint a possible cave location in the vicinity of Little Three Springs, that had been given to Ian Collette by former WASG member Mike Newton. After a couple of hours hiking around the given GPS position I only came up with a second active spring, a small wet hole the bees went crazy over and a soil-funnel-shaped depression in the ground. This did indicate that there might be a small collapse or solution tube under the sand layer, but nothing to get excited about.

The next couple of days were spent watching over Carly's dig and learning what I could about the processes they go through to ensure accuracy of data and preservation of the artefacts that come out, as well as hiking around some known caves to get a feel for what the Eneabba karst is like. I located Gamma, Delta and Beekeepers dolines and ANU cave, none of which I entered. I ventured into Stockyard Gully to escape the heat of the day and was blown away with the sheer size of the tunnel. On my way out I met a group of people walking their dogs through the first part of the cave before the 'Cave Danger Area' sign – hopefully that's as far as they went.

Overall I was impressed with the area and again by how differently the caves form there compared to Exmouth and Margaret River. I will be looking forward to getting back there with some WASG members to do some real caving and possibly finding some new caves.

Figure 81: Danny in Stockyard Arch. *Photo Danny Wilkinson*

The Cape Range

1988 expedition: some unpublished stories and pictures

Darren Brooks

Recently I dragged some old slides out of a box where they have lain in storage for the past 27 years. They have now been scanned and included in the Cape Range Karst Database. I wrote a short, cringeworthy piece for the 1988 *Western Caver*; not a detailed report but just reminiscences.[1] *(But there's plenty of interest in it – ed.)* I didn't know how to write a proper trip report in those days and I'm still trying to find out! No images from that expedition have been published. Brian Vine wrote an unpublished report for Bill Humphreys.

Most of my early photos were consistently crap as I had no idea how to take a good photo so I must apologise in advance for the following images. I have selected my 'best of the best' and that's not saying much. I will briefly relate the stories attached to the pictures.

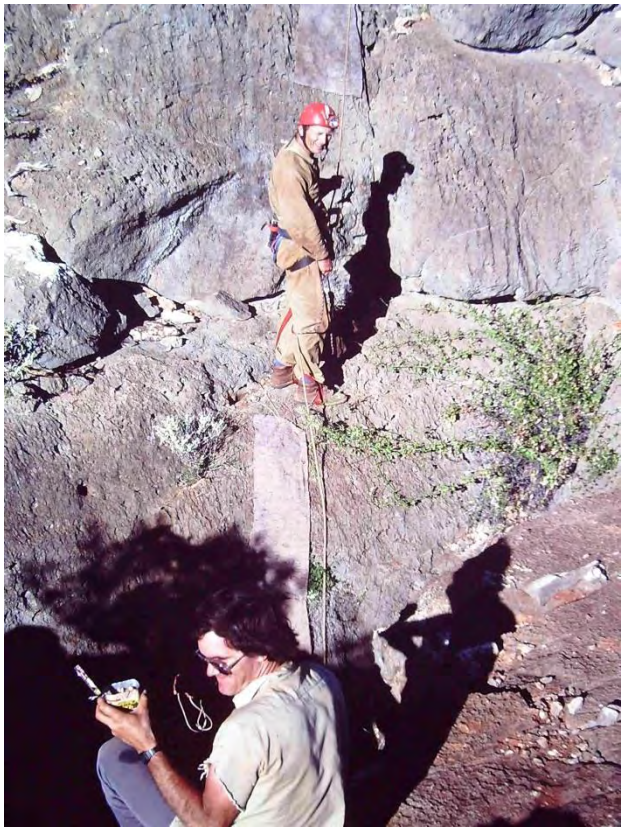


Figure 82: C-200 with Malcolm East and Brian Vine (about to abseil). Malcolm chomps down some processed chicken straight from the can. *Photo Darren Brooks*

The expedition was aimed at finding and exploring as many caves as possible and searching them for troglofauna. If we were successful it could lead to further funding (which it did, in 1989) for more research. At the start of the expedition just Brian and myself were locating sinkholes marked on the topo maps and looking at aerial photos to find more targets for us to explore. We ranged far and wide all over the Range and were later joined by many volunteers.

On the last day of August Brian and I were accompanied by Malcolm East to C-200, Trealla Cave. We'd found this cave a couple of days earlier and were champing at the bit for an opportunity to explore it (fig. 82). It was an interesting cave with a second chamber that contained a vast amount of old, dry bat guano and just a couple of bats. In the years since I have not found another chamber with so much bat guano.

Figure 83: Malcolm in the guano chamber. *Photo Darren Brooks*

Richard Curtis, a member of WASG at the time, joined the expedition. On 11 September Bill Humphreys, Rae Young, Brian Vine, Richard and I went to C-207, later to become known by some odd circumstance as Two Hundred Cave, to attempt the first entry and exploration. Richard received the vote as first to enter.

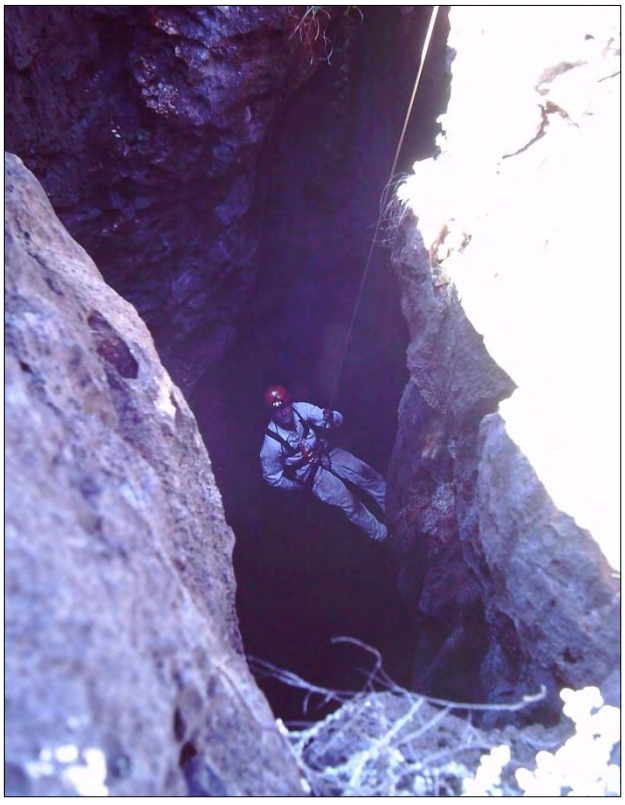


Figure 84: Richard Curtis is the first to enter C-207. *Photo Darren Brooks*

Figure 85: Richard Curtis, Rae Young, Bill Humphreys (seated) and Brian Vine at the bottom of the second pitch. *Photo Darren Brooks*

The cave consists of a 50 m pitch followed by walking passage and then an 8 m pitch (fig. 85) and more walking passage before the cave ends in a soil plug. Back at camp that afternoon beers were drunk in celebration.

Figure 86: Malcolm East met us in camp later that day and he and Richard Curtis celebrate the first exploration of Two Hundred Cave (C-207) with an icy cold beer. *Photo Darren Brooks*

Stefan Eberhard also joined the expedition for a week or two. On 22 September a party did a tour of the G, H and A surveys in C-163 Wanderers Delight, which was led by Malcolm East. The party being led consisted of Stefan, Sue White, Brian Vine and myself. Stefan was keen to try the pioneering knee pad system of Ray Wood, one of the early explorers of the cave. This consisted of cricketers' pads. They are bulky and heavy but boy, they sure offered a lot of protection for the knees and shins, which get a severe battering from the long, cobble-filled crawlways of Wanderers. Later that day Ron D'Raine of the West Australian newspaper (who had accompanied Alex Harris, the intrepid reporter) had Stefan dress back up in his Wanderers outfit for a photo shoot for the paper.

Figure 87: Stefan Eberhard dressed in the fashionable caving garb of the early Wanderers Delight explorers. *Photo Darren Brooks*

Stefan was also a participant in the great palm-tree debacle. The reporter Alex Harris and the photographer Ron D'Raine were part of this palm tree trip, which consisted of two vehicles and Brian Vine, Bill Humphreys, Rae Young, Brendan and Eva Hart, the arachnologist Dr Mike Gray, Stefan and me. The plan was to visit the unlikely, out-of-place palm trees, by now becoming slightly famous, and document them for posterity with media coverage and also the taking of some identification material for the WA Herbarium.[2] The story is related in an October 1988 issue of *The West Australian* newspaper, and is probably told much better than I can relate it but I can't resist telling some of the little personal details that I can still vividly remember and that have never been retold.

Firstly, the eucalypt forest (which it turns out were coolabahs) we encountered where I saw my first blue-winged kookaburra. This little forest was unlike any other patch of trees I or any of the longer term explorers like Brian Vine had yet seen. In my subsequent wanderings on the Range I haven't seen anything else like it. We stopped the vehicles and walked around this little grove marvelling at the uniformity of the trees which looked almost like they had been deliberately planted there. It was quite a

magic little place. I regret not taking any photos of this spot.

Secondly, the punctures. The ground, consisting of sharp limestone where we drove around a little bit lost, was deadly to rubber tyres. We ended up with at least five punctures by the afternoon, in effect disabling the vehicles until we had carried out repairs. Fortunately we had plenty of patches and glue; unfortunately our compressor wasn't up to the job. In fact it was crap. Brian, in his talented way, managed to get it working on and off with repairs made from bits of Coke can etc, but it just wasn't going to happen that afternoon and we were left late into the evening pumping tyres up by hand. It got dark so we had to settle down for an unplanned night on the range. It was pretty cold too. People did what they could to keep warm, even to the extent that a bit of spooning was happening down one side of the fire (fig. 88). I did what I could down my side of the fire by swapping sides and alternately roasting and chilling opposite sides of my body. At one stage I awoke and felt like my back was about to catch fire. I sat up. The fire was blazing away and flames were being swept over my overall clad body by the breeze. I was a bit singed and smoke wafted off me. The culprit was Eva Hart. She had stoked up the fire and she sat there with an evil grin on her face. She didn't say anything, just sat there gloating at her handiwork of nearly setting me on fire. It was a little disconcerting, to say the least, possibly a bit scary. Her leer is engraved indelibly on my brain.

Figure 88: The great palm tree debacle: stuck on the range and sleeping rough on a cold night. *Photo Darren Brooks*

Brian and I returned to the palms on 29 September to collect the specimens. We drove up an old exploration track to the west and walked across a low, undulating range of hills for about an hour and a half. Brian climbed Carter's initialled palm tree to collect samples. He estimated Carter's palm at 9 m tall but looking at the photograph of me standing at the base it looks taller than that (fig. 89). I gathered some specimens from one of the two smaller palms about 250 m downstream of Carter's palm (fig. 91). We took several photos of the palms but once again, looking back, I wish I'd taken many more.

References

1. Brooks, Darren 1988, 'Reflections of Cape Range', *The Western Caver,* Volume 28, pp. 13-18.

2. Humphreys, W.F., R.D. Brooks and B. Vine 1990, 'Rediscovery of the palm *Livistona alfredii* on the North West Cape Peninsula', *Rec. West. Aust. Mus.* 14(4): 647-650. May also be viewed online.

Figure 89: Carter's 'cabbage palm'. In around 1899 Thomas Carter initialled this tree, the trunk of which is now stored in the Milyering Discovery Centre on the west coast of the Cape Range. *Photo Darren Brooks*

Figure 90: Brian photographs the trunk of one of the two smaller palms. *Photo Darren Brooks*

Figure 91: Darren collecting a sample from one of the two smaller palms downstream of Carter's initialled tree. *Photo Brian Vine*

Dawn raid 1: mainly C-48

Darren Brooks

Date: 28 January

Caves: C-48, C-49, C-80, C-72, C-131, C-51, C-56, C-11

Party: Darren Brooks

My reason for this trip was mainly to visit C-48, a cave known to have high levels of CO_2 on every visit to it on record. I wanted to see if there might be some seasonal fluctuation in the level that might allow me to investigate the unexplored regions at the bottom. My reasoning was that, in the middle of the dry season after many months without rain, maybe the level would be lower than in the winter months. Rain generally falls in the early part of the year, either from cyclone-associated activity or around April when the first winter rain (usually) arrives. With rain being forecast to occur in the coming week, I wanted to get down the cave asap.

With an early 5.00 a.m. departure to beat the heat, I arrived at the cave just after dawn. There was a dark line of cloud on the eastern horizon stretching up into the sky, so dense as to create the illusion that the sun was yet to break free of its pre-dawn bonds, regardless of the fact that it was already well above the horizon.

Unpacking gear, I immediately discovered I had left my survey pad behind. Curses! A little A6 notepad would have to suffice. The cave had previously been surveyed, back in October 1991, to the bottom, but CO_2 at that time had prevented further exploration of the 3 m high tunnel that wound off to the east where it could be seen disappearing around a bend some ten or so metres away. In 1991 I remember abseiling down to the floor and then hurriedly clipping on to the rope to get up out of the suffocating atmosphere.

Figure 92: The entrance to C-48. *Photo Darren Brooks*

The cave has two small entrances (fig. 92), one just large enough to slip into and then a climb down to about -12 m to a tiny ledge where the cave gets too vertical for further free-climbing. I clipped on to the rope before negotiating the free-climb. There is a further 25 m of vertical shaft beyond the tiny ledge.

Figure 93: Looking down from the ledge at -12 m. *Photo Darren Brooks*

At the -12 m ledge there is a convenient pinnacle of rock overhanging the shaft where a cord or tape can be threaded through a small hole to give a good free-hang down the shaft. There is another ledge at about -22 m. I passed this ledge without rebelaying the rope. Three metres above the floor the chamber bells out and just above here a deviation into a tiny solution hole with a tri-cam provided an easy drop to the floor.

Figure 94: The ledge at -22 m. *Photo Darren Brooks*

Figure 95: Looking up from the ledge at -22 m. *Photo Darren Brooks*

I abseiled very slowly, testing, with my physiological response, for CO_2 as I went. The air quality seemed very good until about two metres above the floor. It didn't seem too bad so I dropped to the floor and unclipped. I readied my prusiking gear while sucking down the air to see how things went.

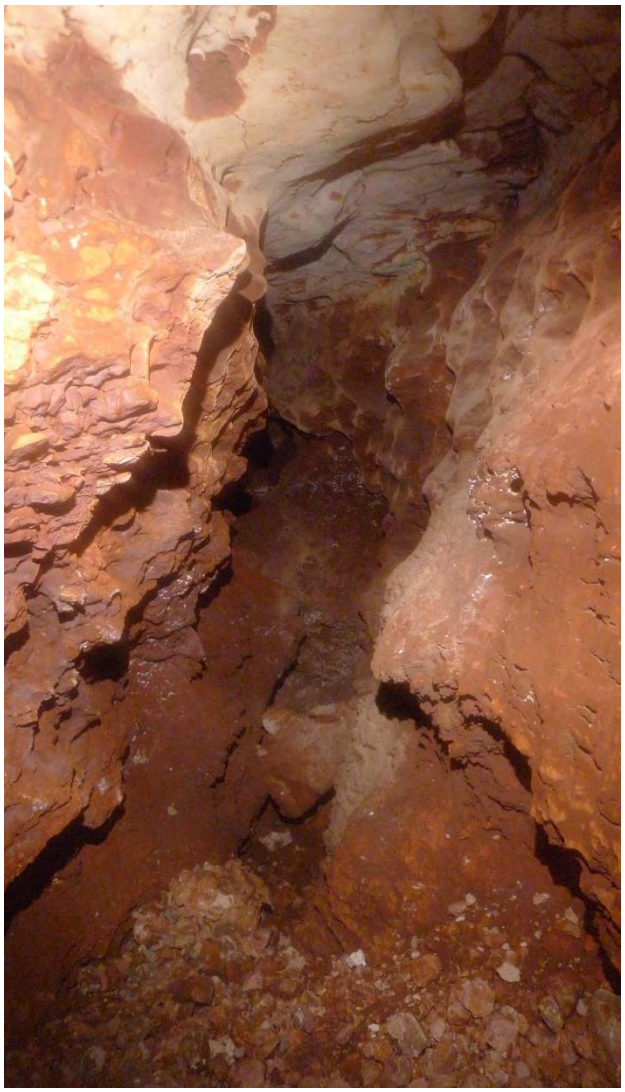


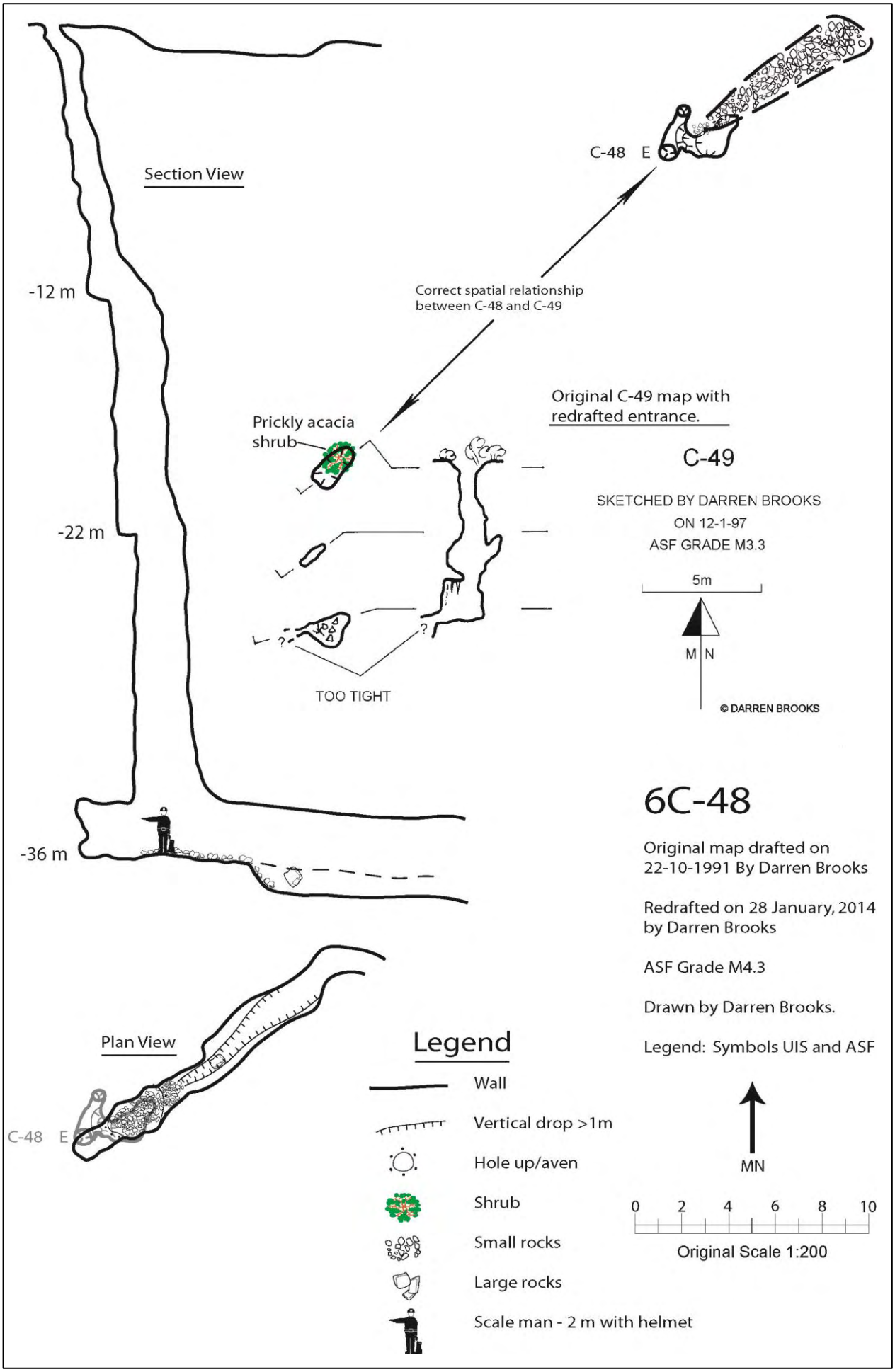
Figure 96: Looking along the unexplored rift. *Photo Darren Brooks*

I observed that the floor of the tunnel has a rift that goes down at least another couple of metres. With the disto I measured the distance from the upper edge of the shaft/chamber opening to the far corner where the tunnel disappears around the bend. What I really wanted to see was an easy way over the rift but it looked like I would have to climb down into it to get along. That was my least desirable option so I had to satisfy myself with bridging as far as I could. Unfortunately I couldn't get to the bend to have a look around it as the floor drops away to the walls and so where it leads remains a mystery.

Figure 97: Breccia in the entrance. *Photo Darren Brooks*

The tunnel, like so many examples in the range, indicates the original nature of the feature in that it once received a fairly regular inflow that has carved out a stream drainage with vadose slot development in the floor. The breccia visible in the entrance photos indicates that there was once a substantial deposit, or even blockage, of pindan earth and rocks. I wouldn't call the rocks cobbles: they are rather sharp-edged and more indicative of breakdown of the native rock through natural physical processes. The entrance is located on the top of a weathered ridge of stripped limestone.

Figure 98: The entrance to C-48 in the context of the weathered ridge. *Photo Darren Brooks*



Map 7: C-48 and C-49, drawn by Darren Brooks

Later I studied the picture I took of the rift at the bottom of the cave (fig. 96) and although it looks simple enough (in the picture) to get over, at the time I didn't dare take the chance of dropping down into an even higher level of CO_2. I was feeling the strain from the minute or so I had already endured and the effort I was putting into gasping down the air made it quite clear that it really was time to leave. I probably descended only a metre below the point where I landed at the base of the pitch.

However, before I departed this most unpleasant of atmospheres I needed a couple of pics. At the base of the pitch I stood up as tall as I could and my breathing eased a little. The CO_2 was at its densest just below my head level. I couldn't wait for the lens to unfog itself so I tried a few shots and managed, after trying to find a dry spot on my shirt to wipe it, to get just one of reasonable clarity. Did I mention that the sweat was running off me in rivulets?

Once on the rope and just a few steps up I immediately noted the difference in the air quality. I satisfied myself with more crappy shots of the pitches as I prusiked out.

The entrance seemed inordinately difficult, beyond all reason, and it took some time to get out into the relatively cool morning air where I collapsed next to the pothole to rest and allow the sweat to dry off a little. Just as I dragged my drenched (and quivering, I might add) self over the edge I heard the high-pitched metallic tinkle of something hitting the rock below me. I instantly glanced at the finger on my left hand…uh oh… Visions of a gold ring tumbling down in slow motion (à la *The Hobbit: An Unexpected Journey)* instantly filled my vision. I lay there hoping that my wedding ring hadn't gone too far down the hole.

Sadly, it was very humid outside the cave and I swear that as I lay there two small pools of salty brine formed over my closed eyes and I had to roll my head to the side several times to empty them out.

After my extended recovery period, I looked back down the hole. Oh Lord (of the Rings!), there it was, sitting on a tiny ledge about a metre below. I oh so carefully eased myself back into the entrance with an intricate manoeuvre and then retrieved the ring. Thank Bilbo for that, I thought to meself.

I set to packing up gear and taking some entrance pics and videos. On the return home I took the opportunity to stop by some trackside features and take more of the same. At this time of year the bush is full of the giant cicadas which produce a noise I liken, in sound and volume, to 50 cc scooters. Their song is clearly audible in some of the entrance videos I took of the other features, particularly C-51 and C-56. I have read somewhere that some cicadas can create sounds as loud as 120 decibels. These would have to go close. To stand next to one that is in full revs makes your ears ring – they are just deafening.

Dawn raid 2: a wander around C-587 *Darren Brooks*

Date: 7 February

Caves: C-54, C-588, C-587, C-537

Party: Darren Brooks

Up early to beat the heat as usual. Heard on the radio at 5.30 a.m. as I was driving to Charles Knife Road that at that moment the highest and lowest temperatures in WA were Learmonth at 33° and Manjimup at 14° respectively. As it was extremely humid with no wind I was looking forward to a torrid morning's walk in the scrub.

I first stopped at the WAPET lookout plinth to take pics of the spectacular sunrise. I was already sweating.

I pulled up near C-54 and wandered over to it to take pics and video and check the tag. All seemed in order. I then headed up the hill to the south of the vehicle towards the nearby C-587. I remembered this as having potential for some excavation and then access to a nice deep vertical cave. My memory is not what I'd like it to be (i.e. infallible).

Figure 99: C-587, my promising dig site. *Photo Darren Brooks*

I first wandered across to C-588, a tight vertical hole. This one will never be a dig, it's far too tight and in solid rock; impenetrable. My second wandering was supposed to take me to C-607 but it wasn't where the GPS said it was. Must have moved. My third wandering hit the spot okay. C-587 was a little smaller than I was thinking. The

upper part is fine for entry (fig. 99) but the supposed dig is pinched off with a very tight section of rock (fig. 100). Some rock shaving may do the trick here but I chucked a few rocks down the hole and it didn't sound like it was very deep, perhaps four to five metres maximum. Just not worth the effort at the moment.

Figure 100: C-587: not so promising after all! *Photo Darren Brooks*

After this investigation I wandered around again looking for the missing C-607. I didn't find it but I did wander as far as C-537 where I checked for the tag, took pics and video. It is located on a ridge where a wonderful view is available, looking east down the big gorge to the north side of Charles Knife Road (fig. 102). Some more wandering after this did not yield the missing cave. Perhaps on the next trip.

Figure 101: C-537. *Photo Darren Brooks*

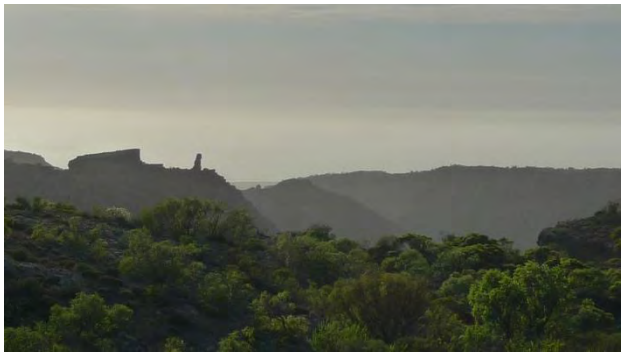


Figure 102: A stunning view from the entrance to C-537. *Photo Darren Brooks*

Dawn raid 3: the lost cake

Darren Brooks

Date: 16 February

Caves: C-832, C-411, C-155, C-359

Party: Ken Cameron and Darren Brooks

Another nice and early start, and a magnificent sunrise over the glassy waters of Exmouth Gulf (fig. 104).

I wanted to head out with Ken to try and find the currently missing C-607. With our combined knowledge and memories I thought this would be a piece of cake. The cake must have been stolen.

Ken happened upon a very degraded doline which we tagged as C-832. With all the tramping that has occurred over the years so close to the road I'm amazed we didn't find this back in the good ol' days. I didn't have my pad with me so I will survey this another day. The doline has some drain holes at one end filled with soil. No obvious air movement and very dry.

We continued our search for the elusive cake. We happened upon some more features (C-411, C-359 and C-155), all too small to penetrate to any distance, and photo-tagged them. Ken had a look down C-155 and managed to squeeze his whole body into it, which is more than I ever could achieve.

Figure 103: C-155 spits out a Ken doll. *Photo Darren Brooks*

Dawn raid 4: further photo-tagging

Darren Brooks

Date: 23 February

Caves: C-358, C-832, C-612, C-190, C-374, C-210, C-189 and C-608

Party: Darren Brooks

It's another Hahn 3.5 sunrise over Exmouth Gulf (fig. 105) as I drive up Charles Knife Road to look at features on the south side of the road. (Doesn't roll off the tongue as well as 'tequila', but too many Hahns still turn an early start into hard work.)

I didn't sketch C-832 on last week's trip, and I wanted to find C-358 and various other features listed above for GPS corrections and photo-tagging.

I did find C-358 on the first pass across to C-832. I surveyed C-358 back in 1997. The entrance, two

Figure 104: Greeted by a glassy Gulf at sunrise on Charles Knife Road, 16 February. *Photo Darren Brooks*

Figure 105: Another gorgeous sunrise on 23 February. *Photo Darren Brooks*

small holes, looked rather tight. Checking the map later, the lower parts looked even tighter. I do remember it being a bit small but it looks positively tiny to me now.

Figure 106: C-358, an entrance I can actually get into...

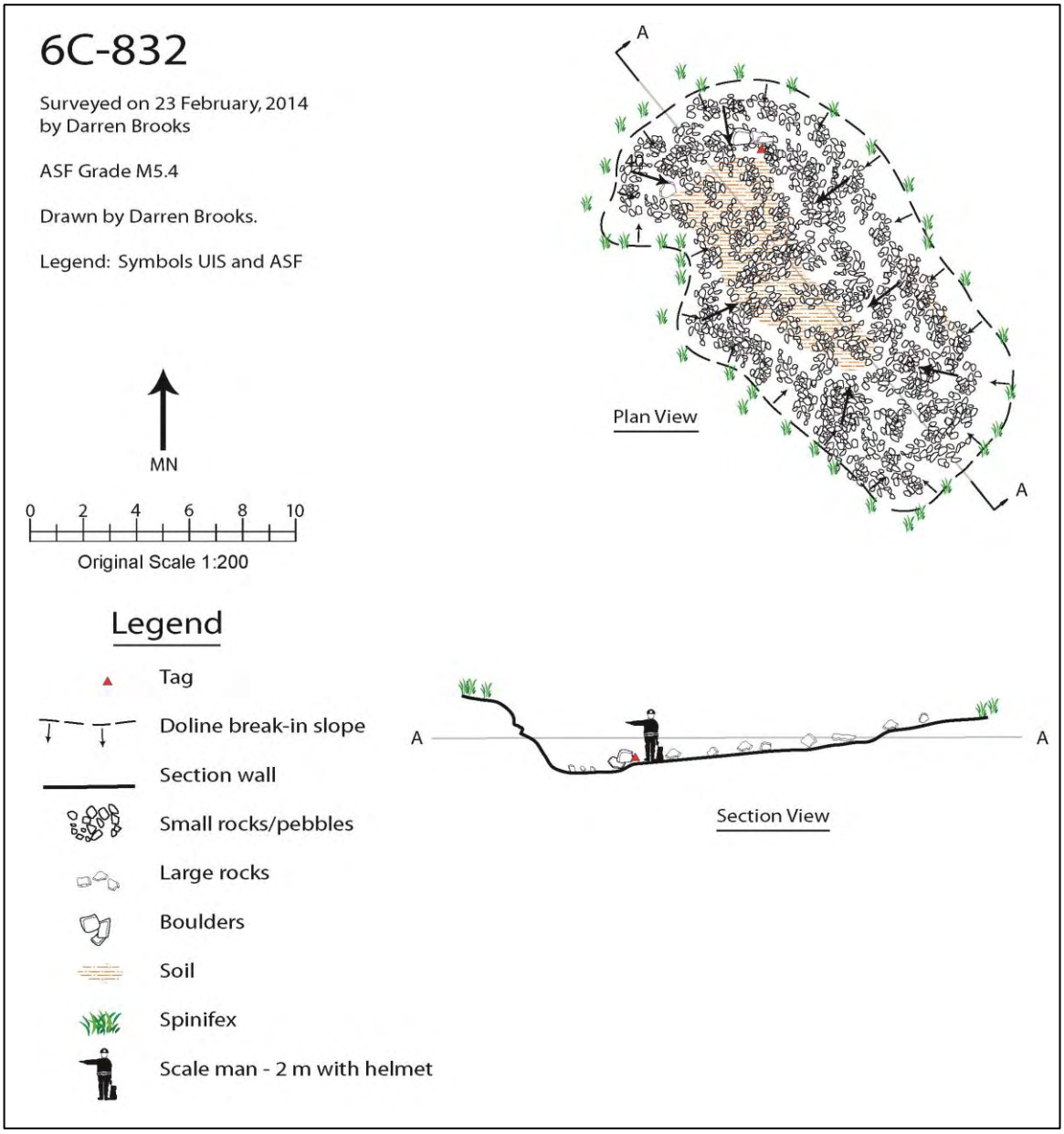
Figure 107: …although it doesn't look much from here. *Photos Darren Brooks*

I sketched C-832. This is about 15 m long, 8 m wide and a whisker over 2 m deep. It is very degraded with the floor consisting of scattered rocks and soil. The surrounding depression is quite sizeable and once upon a time it must have had a decent cave under it. Perhaps it's still lurking there waiting to be excavated. Big job, methinks.

The other features were all photo-tagged in good order. Oh dear, they all look smaller than they used to. Must be the passing of time and the passing of the thin body.

C-612 sounds quite deep, in the order of 20 m or so. Rocks can be heard rattling down quite a way and followed by the duller thud of hitting a soil floor. This would be a rock shaving project with the chance that it is just a slot all the way down. Not promising.

Figure 108: The entrance to C-190. *Photo Darren Brooks*



Map 8: C-382, drawn by Darren Brooks

I visited C-190, the entrance to a vertical shaft of 23 m depth (fig 108). It is located just below the crest of a ridge and at the head of a small creek that flows towards the north and then turns southwards for about 800 m to flow down into the big sinkhole of C-107.

C-374, which I once thought was a digging prospect, didn't look too promising after all. I couldn't get any rocks past the blockage, which consists of a dirty great boulder which would require a tripod to lift out. The nearby C-210 is just a very tight fissure, partially explored many years ago.

On the way back to the road I stopped near the corner of the radar track turnoff to look at C-608. This is a small doline with just a little inflow area, again filled with pindan soil and rocks.

The heat was oppressive and I was still hoping for a breeze to spring up. It was time to head for the air conditioner.

Returning to Saddle Cave

Darren Brooks

Date: 1 March

Caves: C-77 Saddle Cave, C-108, C-836, C-839

Party: Darren Brooks

I hadn't been in Saddle Cave since 1997 so it seemed a good time to get there again while following up on my current south-of-Charles-Knife-Road photo-tagging project. With C-108 just a little further south and a doline feature marked some years before down near C-107, my morning would be full. I was also hoping to get to some features located near the weather tracking station.

Over the ridge from the weather tracking station I wandered across several small depressions, as I scouted around the heads of the small creeks, that were hard to recognize as being such. Very degraded and with large clumps of eucalypts

growing out of them. Must have been past the fig tree stage and now the hardy eucalypts had taken over. It occasionally took a bit of a circling around to get the right view.

Saddle Cave was a pleasant surprise. I hadn't remembered how well decorated it was for a small cave. However, the usual semi-decayed corpse of a large kangaroo added somewhat to the ambiance of the chamber's atmosphere. Time always seems to help here though and after a while I stopped noticing it.

Figure 109: The bedding layer in the entrance of Saddle Cave. *Photo Darren Brooks*

There is a bedding layer in the entrance wall that dips at 28° with a strike of 45° magnetic. With the generally level deposition of limestone layers in the region, I conjecture that maybe it was a result of local slumping during deposition? It is much too severe an angle to be the result of the generally gentle regional warping of the limestone. The main ceiling of the cave follows this dip down at the same angle, as can be seen from the images. The dip angle looks a lot steeper in the images. A large, flowstone-covered boulder (or stalagmite?) in the middle of the chamber exhibits the same angle of slope on its upper surface.

Figure 110: A feature in the chamber exhibits the same angle of slope. *Photo Darren Brooks*

I took several photos to show the algal growth on the decoration and rock at the bottom of the cave due to the amount of light that enters from the entrance at the east end of the cave. I popped myself into a couple of the shots to give the whole thing a bit of scale. I need to start carrying a scale pole – it'd look a lot better.

Figure 111: Algal growth in Saddle Cave. *Photo Darren Brooks*

I measured out and drew up a cross-section through the boulder/stalagmite area to indicate the roof angle and chamber dimensions at that point. I took some quick dimension measurements to check against my original survey at home.

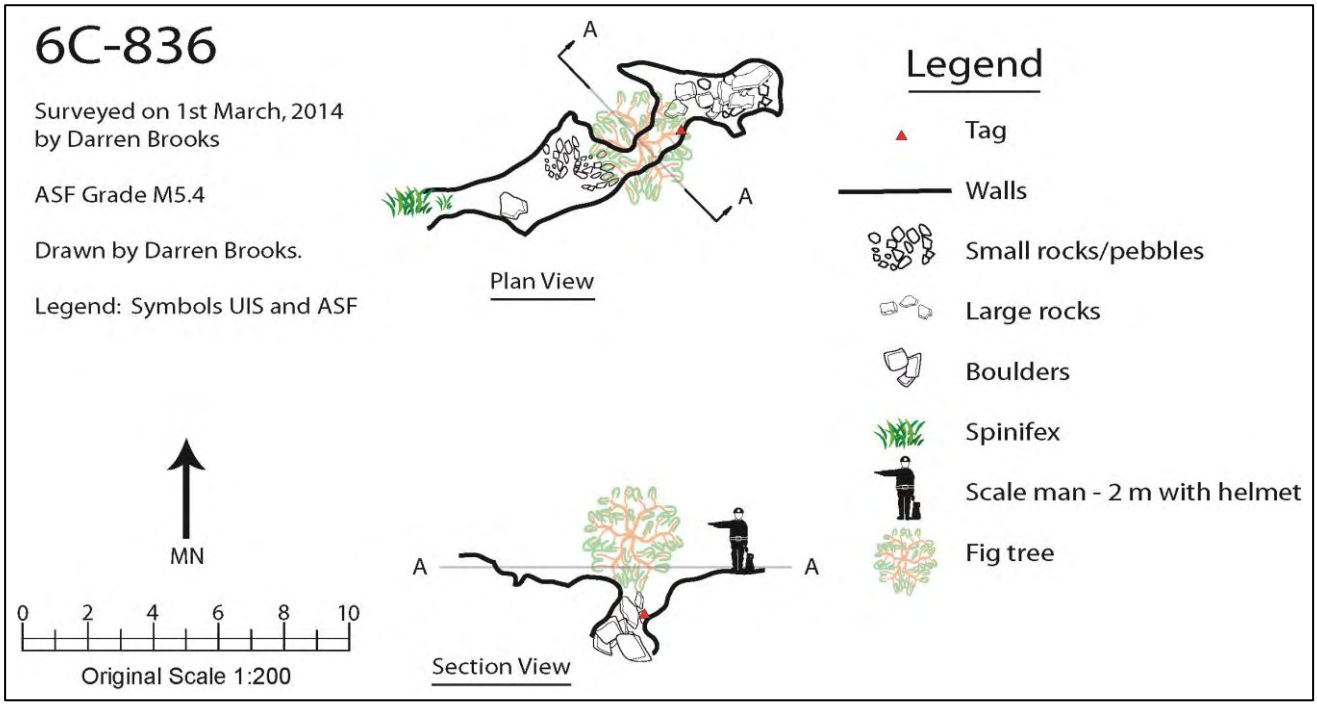
There is a large cairn near the entrance on the north side. I don't know who built this but I'm conjecturing that it was probably Malcolm East or associates, from the late eighties. It hasn't been mentioned in any previously published trip reports.

I headed further south to C-108, a shallow shaft about 6 m deep and with a maximum horizontal extent of 2–3 m in all directions. A photo I took of the floor captures pretty much the whole cave in one shot.

Finally, I headed over towards a feature that has been in my waypoint list for several years, which I called 'Newby'. Now, memory has failed me, so I looked through all the trip reports I could relate to the area to see when I marked it. I could not find any reference to it. It wasn't that long ago I'm sure. The mark was spot on so I'd guess it was within the last five years or so. A tantalizing flicker of images keep fluttering away at the edge of my mind; I see Dad, or Kenny (Cameron). Anyway, I re-found it, tagged it C-836 and sketched it.

Figure 112: C-386 with attendant fig tree. *Photo Darren Brooks*

C-836 is a small fissure with a fig tree of 2 m height sticking up out of the breakdown on the floor. It is clinging to the side of a jutting protrusion of bedrock. There is a small chamber in the bottom. This was too small for me to climb into (more likely I was too bloody hot to be bothered).



Map 9: C-386, drawn by Darren Brooks

From here I arced around in the valley slowly making my way back to the weather radar station. I finally hit the ridge at a point to the north of Saddle Cave. I took a look at a feature on the top of the ridge that had caught my eye on the way south to Saddle. It looks like a solution pan of about 3.5 to 4 m diameter, almost circular and about 0.3 m deep. It is floored with red pindan soil and has large clumps of spinifex in it. It was interesting and unusual enough for me to take pics and video. Later, at home as I reviewed the images, it occurred to me that this was more likely a solution shaft. Cut off sometime in the past by erosion and solution of the overlying strata and filled in over the eons with soil and rocks, here it was, exposed in horizontal section. A pretty good-sized shaft too.

What inexorable forces nature unleashes on the solid rock, to weather away so much of the earth. Even though at any moment in time the forces seem small, the persistent and infinitesimal solution and erosion and infilling disguises and eventually removes any trace of once existing chambers and shafts. It causes me to reflect on the great shafts I have explored where the entrance is on the top of the ridge where rushing waters can no longer flow, where boulders and pebbles can no longer be tumbled in by muddy, tumultuous rapids. It makes me appreciate even more what is still here and has been explored and what is still to be discovered. I looked at the feature and wondered how far up the shaft to the entrance it would have been had I been standing there a million – no, ten million years ago!

That was a rather dramatic little piece. I wandered further around in the valley on my way back to the vehicle, happening across another nearly non-existent depression near the head of a short creek, and then shortly to the car where I poured cool water into my shrivelled, dessicated cadaver and headed home.

Location checking in the C-544 area

Darren Brooks

Date: 10 March

Caves: C-726, C-727, C-728, C-544, C-545 and C-605

Party: Darren Brooks

I parked up near the weather radar thingy so I could look at some of the features just to the south of it. These are small caves or just dolines. The first feature I encountered about 80 m or so south of the radar is C-726.

C-726 is a small fissure with just a tiny chamber at the western end. There are a couple of small solution holes in the roof of this chamber as well. The whole feature barely reaches 2 m in depth. It's a bit of a struggle to see what happens at the bottom of the feature because of the fig tree over the top but once through it it is obvious that that is not much. How's that for word repetition! The feature is already sketched so, as at all the features visited, I did the GPS, pic and video stuff.

I headed towards C-727 but was drawn to a depression off to the side of my path. This turned out to be C-544, which I thought was a lot further downstream from my position. I sketched this degraded doline-in-a-wadi the best I could although it was a little hard defining the boundary of it. It is very shallow with some bedrock at one side, lots of small stones and heaps of spinifex around the non-rocky parts. The central area is soil, probably kept bare by goats or kangaroos, of which there was evidence in the disturbance to the soil patch.

C-727, not far away, is a small cave at the edge of a bit of karst pavement. A kurrajong grows near the cave, an easy visual reference to guide me to it.

Figure 113: Kurrajong revealing C-727. *Photo Darren Brooks*

The cave is a tiny chamber of only 3 m depth with a rocky floor.

C-545 was the next feature to get some attention. It is a large, degraded doline with patches of rock and soil at the bottom with some small drain holes in the soil areas. This thing is huge. I couldn't figure out how to sketch it so I walked up the side and around the edges with the GPS where the drainage slope breaks in. Like I said, this thing is huge, over 200 m across. The track to the radar goes up one edge on the ridge line. There is a small feature of developed joints within the depression. A bit of work with the laser disto and a clino is needed to do it justice so it is a project for the future.

Figure 114: The entrance to C-605. *Photo Darren Brooks*

I next hit upon C-605. This, like C-726, is another fissure-type cave but is deeper at about 5 m depth. Easily free-climbable. The fissure/joint is quite extensive, well developed over about 20 m, and clearly dissects the ridge at a south-west/north-east angle where it can be picked up on the north side of the ridge heading down towards the radar track.

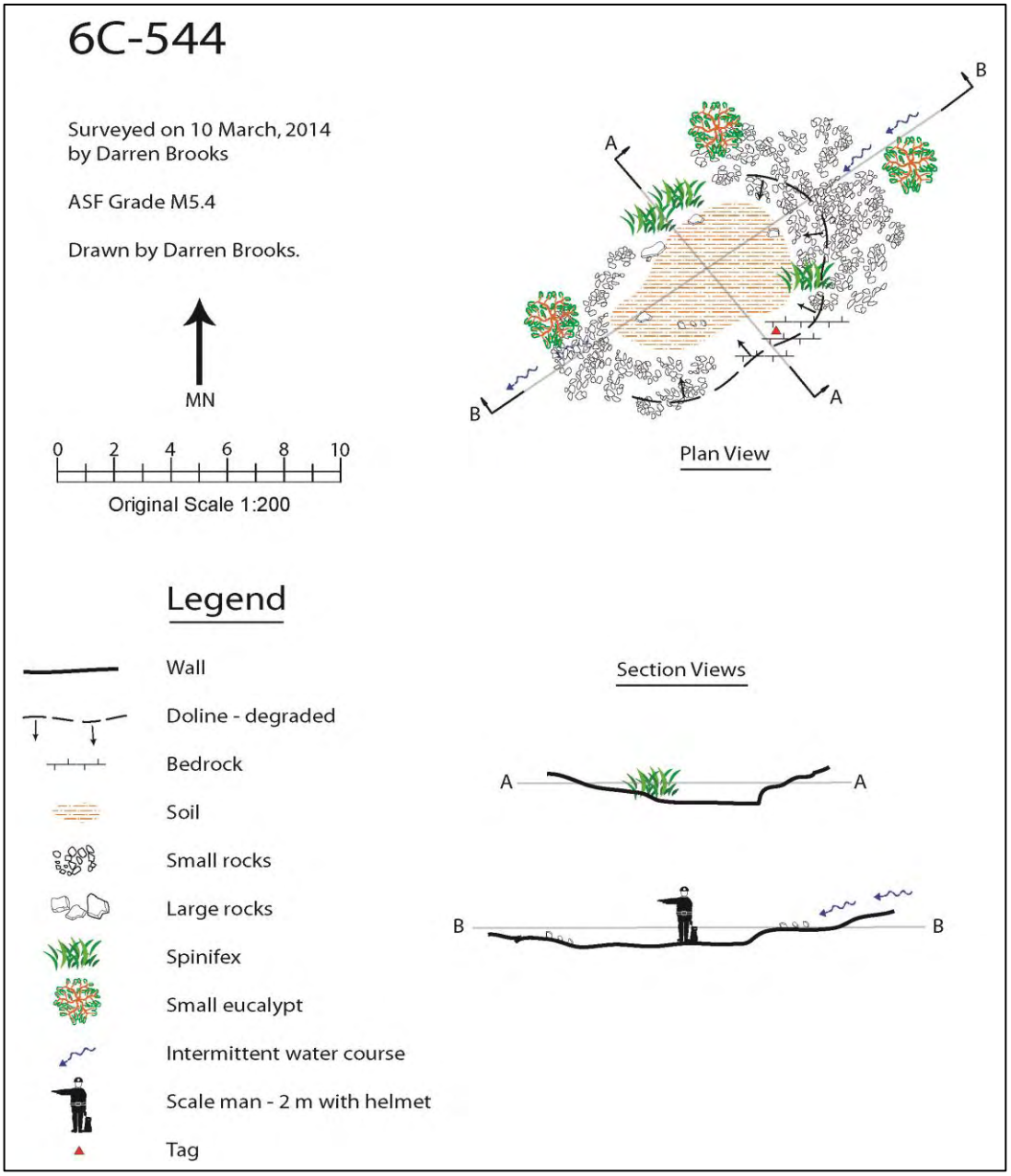
I then found C-728, another small cave. This cave has a bit of an unusual entrance. There is a bedding step in the limestone and the entrance has no obvious indications of inflow or collapse. I'm not impressed with the map I did many years ago. It doesn't clearly show the small step at the entrance bedding plane. But it's not that important. What the pics show is how much the spinifex has grown since 2004. It's now nearly covering the entrance, while back in 2004 when I found this feature and took a pic it was just 10 cm high. It's now about waist high. It would make for a prickly exploration without some extensive gardening work first.

Figure 115: C-728, showing the massive growth of the spinifex. *Photo Darren Brooks*

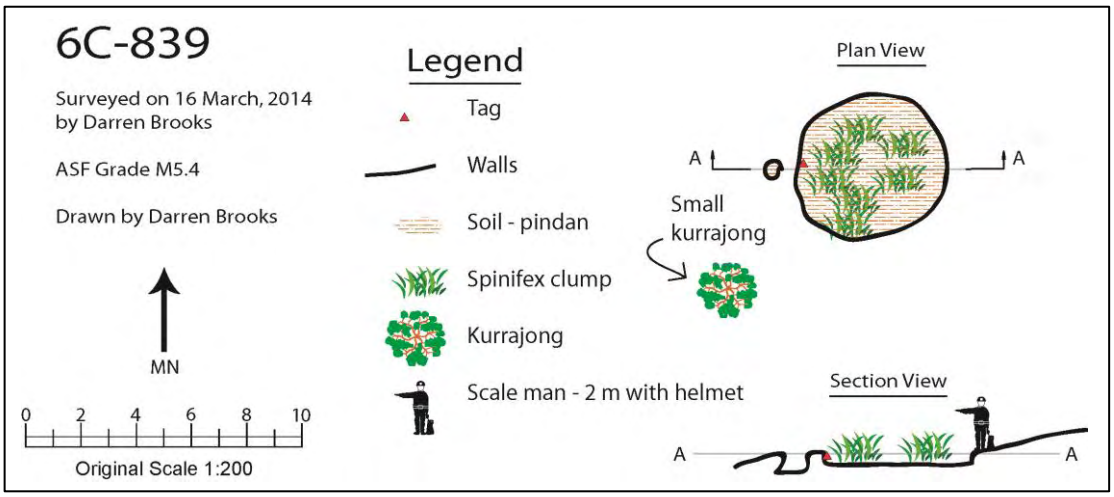
Postscript: Ways back in them thar olden days – February 1995, to be exact – when I tagged C-544, I thought I was at a sinkhole marked on the 1:50,000 topo map. Well, a look at the topo map today with the new location data and it seems I was out by a fair bit. The marked sinkhole is still further downstream from C-544. So, I have another feature to investigate in the hopefully not too distant future.

It was an easy mistake to make in those days when all you could do was read off the map and GPS's weren't a common item. Certainly it was still a few more years before a lowly middle-income-earner like myself could afford one. The first time I'd seen one was in 1994 when Bill Humphreys of the WA Museum had brought one up when we did water sampling and fauna collecting through the Cape Range and Ashburton areas. It was a big clunky job that had a great averaging function because the signal available for civilian use had 'selective availability' – in other words, the civvy signal was intentionally degraded to around 100 m accuracy, and a single fix was generally woefully inaccurate. The task then was to mark the fix on the map and then translate that to the topo features to work out the most accurate position possible for your location. Eventually selective availability was turned off at midnight on 1 May 2000 and now we enjoy an average fix of about 20 m and I think modern improvements are giving far greater accuracy than that. And you wondered why people like Einstein thought about relativity and all that confusing stuff,

well, GPS with satellites hurtling through space at breakneck speeds couldn't work without it! Sometimes, working out the location of a feature took more time than it did to explore and map it. Those were the days!



Map 10: C-544, drawn by Darren Brooks



Map 11: C-839, drawn by Darren Brooks

Expounding C-839 *Darren Brooks*

Date: 16 March

Caves: C-839, C-840 and C-307

Party: Ken Cameron and Darren Brooks

Back to the weather radar for the park-up and we headed south to C-839, the solution-pan-or-shaft feature which I expounded upon in my report of 1 March.

With Ken there I could really get into my expounding and I thoroughly expanded and (ex)pounded his ears with some superb expounding about how I thought it was an ancient truncated shaft. Having thought about this deeply during the past week I realized that most of the caves we have been in probably exhibit truncation of the entrance shafts. One I visited early this year readily comes to mind; C-48 displays conglomeratic deposits right in the entry hole and around it, clearly because it was once part of a deeper (higher?) cave.

We surveyed C-839 (map on previous page) and I took lots of pics with Ken as scale man (not quite 2 m with helmet! Possibly about 1.8 m? I'll have to measure him.)

Figure 116: C-839 with Ken Cameron as scale man. *Photo Darren Brooks*

We then headed north-west to look at the sinkhole marked on the topo map downstream of C-544, which I once thought was at the mark but recently found out was upstream of it. I didn't hold high hopes for it, considering the size of it – it would probably just be a soil-floored depression with a clump of trees.

Figure 117: Ken's new find, as yet unnumbered. *Photo Darren Brooks*

On the way Ken found a new feature. As yet unexplored, it could possibly be free-climbable for an agile free-climber but lately we're both free from free-climbing ambitions due to physical limitations so we'll come back another work-free day with some vertical gear.

The sinkhole on the topo map marked as downstream of C-544 lived up to expectations. There is a soil area with some small drainage holes but the whole thing is very shallow. I couldn't even tag it as there was no rock available to attach the tag to. We wandered across some interesting areas of karst pavement around it. We wandered west to the ridge and then back to the vehicle via a circuitous route. The whole area along the edge of the ridge is dotted with solution pipes filled with soil and rocks. The adjacent wadi to the west and south drops down extremely steeply, to about 50 m lower down within a few dozen metres.

Figure 118: The large doline C-307. *Photo Darren Brooks*

Back at the car we rolled down the track to near C-307, a large doline between Charles Knife Road and the radar track. It was much bigger than I remembered it after many years since my last visit. I don't know if anyone has really wandered around the area much but it is another large enclosed depression with several tantalizing, but not quite delivering, areas of karst pavement in the immediate vicinity.

Surveying C-840 *Darren Brooks*

Date: 23 March

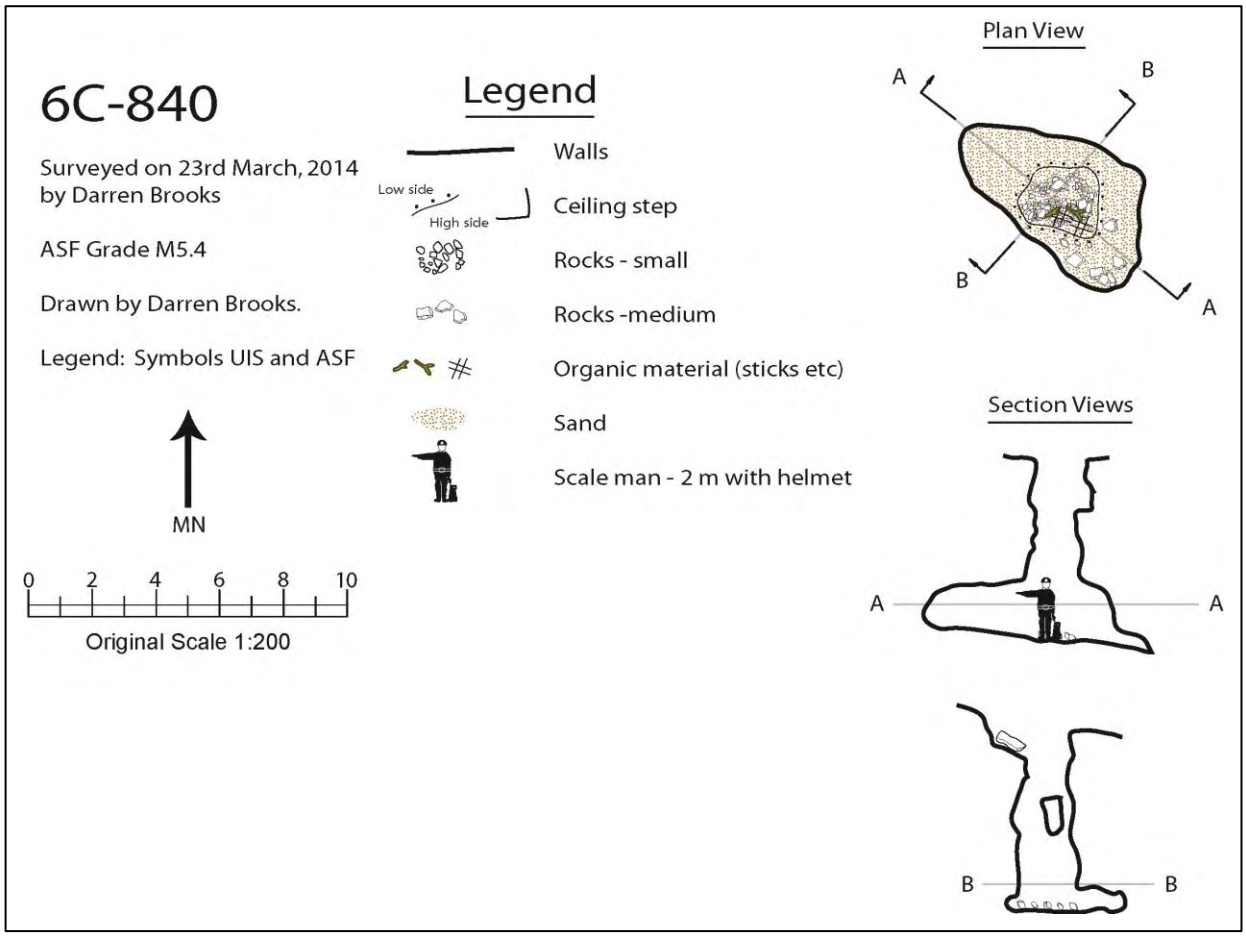
Caves: C-840

Party: Darren Brooks

Called past Ken's house; unfortunately it was all in darkness and it was already 5.45 a.m. I was running a bit later than usual and Ken had overslept. Oh well, back to the cave he found last week to explore it. (Ah, sunrises!)

Arriving at the cave, which I numbered C-840, I kitted up and descended. It was pretty much what it looked like from the surface – a pit. There was some minor development out to the sides but not much. The floor was of fine, dusty sand with rocks under the entrance, a scattering of dead sticks and the odd leaf or two. Total depth was about 5.5 m and horizontal development not much more than about 6 m by 3 m. No decoration. I took a couple of pics of the chamber. There are a few rocks at the lowest side where rain water drains away.

Figure 119: Sunrise over Kailis Fisheries. ***Photo Darren Brooks***



Map 12: C-840, drawn by Darren Brooks

The batteries in my disto were dead. Typical. Careful measurements of a cord with a sheet of A4 paper gave me pretty accurate measurements. Luckily it wasn't some monster pit or endless crawlway. I'd have been crying tears of blood (possibly).

I walked the ridge to the south for an hour or so until it was time to return to the car. I found lots of old filled-in pits. Would have been a wonderful area for vertical pits a long time ago. Similarly to the nearby area to the north that Ken and I walked last week (16 March), the nearby gorge dropped away extremely steeply. The karst near the edges of the gorge is extremely dissected which makes for difficult walking. There are also many areas of dissected karst pavement, some so much so that in a different area with few features of note I would have been tempted to number them, but not here.

I headed for home.

Updating the survey of C-60

Darren Brooks

Date: 30 March

Caves: C-368, C-600, C-60

Party: Mick Hall, Ken Cameron, Darren Brooks

Met Mick at the SES building and we then picked up Ken before we headed off to Charles Knife Road. The plan was to find C-60 to descend and survey it and to update data on anything else we might encounter. Malcolm East created a profile map of C-60 back in 1989.

We parked at the Well 2 site at the end of the road. There used to be a track leading from here that wound its way up the hill to the west where we left the car. The track now appears to be completely overgrown. Some motorbike tracks were visible in the dirt beyond the parking barriers erected by DEC

Figure 120: Sunrise from Charles Knife Road, 23 March. *Photo Darren Brooks*

many years ago. (A later search of Google Earth did not reveal the track; regrowth since the big fire after Cyclone Vance on 22 March 1999 has completely obliterated all evidence of a track in the area.)

Walking out in the relatively cool morning air (compared to what it has been for the past few months) we first came across C-368, a developed joint feature that Perry Raison and I numbered back in 1990. A quick look and then we pushed on to C-600.

C-600 needs thorough investigation with some tools to see if there's any chance of extension. Next trip though.

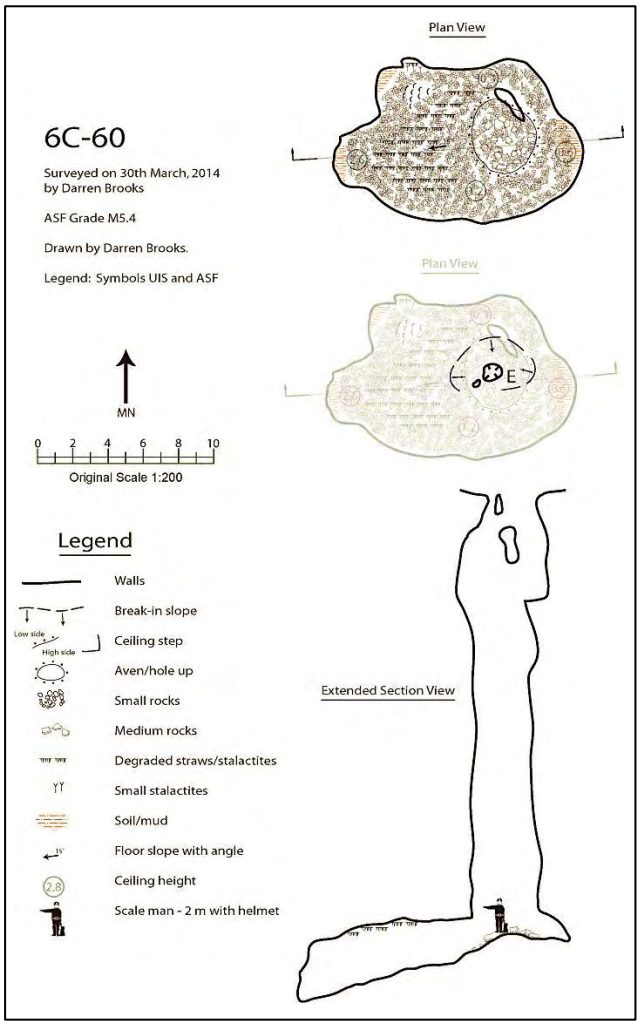
It took a while to find C-60, even after we found the large cairn that Malcolm and crew, including myself although I have no memory of it, had built in 1989. I didn't enter the cave on that trip. I forgot the karst index so had no information about the bearing from

Figures 121 and 122: The developed joint feature C-368, with Ken Cameron and Mick Hall. *Photos Darren Brooks*

the cairn. The three of us scouted about for a bit until Mick and I heard a yell from Ken. I recognized the entrance straight away. I'd entered this cave to collect millipedes for Bill Humphreys many years ago, in 1990, and had visited the entrance in 1997 to update the location data.

Figure 123: The entrance to C-60. *Photo Darren Brooks*

Ken hadn't brought his vertical gear along and wanted to wander around looking for new caves while Mick and I explored. I rigged the 19.4 m pitch and descended, followed by Mick. A quick survey followed and when finished I took a few pics of the chamber (fig. 124).



Map 13: C-60, drawn by Darren Brooks

The cave is a single chamber with a 15° slope down to the west where it terminates in a tiny patch of soil. The floor is covered with many small rocks. The ceiling has a fair few dirty, old stalactites and straws, mostly quite degraded. There is a small patch of flowstone on the floor at the north side which would have been deposited after the flooding events that had dirtied the ceiling decoration had ceased to occur. The infilling at the base of the pitch has extended nearly to the ceiling level at the east side and has created a small tunnel around the rear of the chamber at the north side.

At the surface there is a small drainage area leading into the cave but this would probably serve to only dampen the floor during high rainfall events. The entrance has two holes that can be entered but a rig off the arch between them gives a free-hanging rig through the smaller one. The larger shaft can be free-climbed for about 4 m to a ledge but rigging the rope for a drop beyond this point is problematical. From the base of the pitch, the chamber extends down a further 4.5 m, giving the cave a total depth of 25 m.

Figure 124: Mick in the chamber of C-60. *Photo Darren Brooks*

There was a low level of CO_2 that kept our breathing rates up to a steady pant but it wasn't unduly distressing. There were a few ancient, small bones scattered about.

Mick and I prusiked out and met Ken who had just returned to the entrance after his walk. He hadn't found anything new and we didn't find anything else during our sojourn back to the car.

A tale of two cameras *Darren Brooks*

Date: 14 April

Caves: C-236

Party: Darren Brooks

Last year I borrowed a couple of monitoring cameras from the Department of Parks and Wildlife. One was placed in C-236 Kojak Cave (on 8 November 2013), hopefully to see if any animals are currently associated with the black, tarry deposits on ledges in some caves, and the other in Camerons Cave (also on 8 November). I also had my own camera wired to a tree outside Kojak. The time had arrived to retrieve the cameras and see what sort of images, if any, I had captured on the cards.

When I arrived at the cave I found the DPaW camera on the ground outside the cave. At first I briefly wondered if the camera had been dislodged from the ledge I'd jammed it into and then somehow bounced or rolled to its current position, however unlikely that seemed. Picking it up I noticed the latch was opened and I then found that the batteries had been removed. Very disappointing indeed. This was human interference.

I noted that my camera was still attached to the tree outside the cave. I inspected it and found it still in working order. The LED at the front was flashing, indicating that there was life in the batteries. This meant that whoever had taken the batteries from the other camera may have had their image captured by this camera.

I collected my camera off the tree and returned home with the two devices. I was eager to download the images and see who had been to Kojak Cave. A little bit of voyeurism, oh yeah….

At home I first checked the DPaW camera and found that the memory card had been removed.

Naturally the offenders would have been looking at the camera, had their photo taken several times, and would have needed to remove any evidence. It's curious that they hadn't taken the whole camera, rather than just removing the batteries and card.

Figure 125: A black-footed rock wallaby with joey at Kojak Cave. *Image Darren Brooks*

My camera had captured a whole suite of fauna pics including the threatened black-footed rock wallaby *Petrogale lateralis*. Feral goats and the common euro made themselves famous by spending many hours in front of the lens. But no *Homo sapiens*!

Figure 126: A feral goat. *Image Darren Brooks*

I checked the dates on the pics. The last one was taken a little over two weeks prior to collection. I checked the camera. It seemed to be taking pics but each time I checked the card there were no new pics on it. I changed the batteries. Problem fixed. The batteries were strong enough to get the LED working but too weak to fire the shutter mechanism. Very disappointing. The thieving visitors must have been to the cave in the last two weeks or so, thus avoiding detection. I was gutted. I'd really been looking forward to retrieving the other card to see if any animals had been photographed on the tarry deposits. And to see who was stealing DPaW goods!

The last two dozen or so pics had been taken of the euro, which seemed to lounge about the cave for a day or two. This would have used up the batteries until they were too weak to operate the camera any longer. Damn euro, I wanted to kick it up the backside! I should have used better batteries.

Figure 127: The male euro which used up the last of the batteries! *Image Darren Brooks*

Another disappointment

Darren Brooks

Date: 26 April

Caves: C-452 Camerons Cave

Party: Darren Brooks

I needed to collect the camera from C-452. I was quite keen to see what I might find had been going in and out of Camerons.

When I got in the cave I noted a lot of disturbance around the area where I had set the camera up. This may be normal in this entrance area of the cave but I had never noticed how much loose material was moved around on the loose entrance slope and its near surrounds.

Where I'd set the camera up with a pile of rocks to hold it steady the area had more or less been demolished. The camera was further down the slope and face down so I was hoping for some good material on the card from whatever had disturbed it.

On the computer at home I was in for more disappointment. All I had was a series of shots of an increasingly sweaty-looking individual with rocks in his hands as he piled them up around the camera. Quite ugly too. Very hairy eyebrows. Fat gut. I found them so distressing to look at that I deleted them all immediately. No need to subject any other poor individuals to that sort of horror.

It would appear that whatever disturbed the camera set-up had worked its way in from the back end. Possibly an echidna – they're quite the little bulldozer when they're searching for food.

May expedition to investigate rock shelter caves *Darren Brooks*

Date: 3–17 May

Caves: *3 May:* C-460 Bunburi Cave, C-414 Wobiri Rockhole, C-99, C-774 Bailer Cave, C-773 The Tunnel, C-772 Orb Cave, C-771 Honeycomb Cave

4 May: C-222 Loop Cave, New Camp, Old Camp, C-225 Bat Cave, C-230 Column Cave, C-233, C-234, C-235, C-236 Kojak Cave

5 May: C-23 Dozer Cave, C-105 The Gnamma Hole, C-73 and unnumbered caves on Charles Knife Road (later to become C-841, C-842, C-843, C-844, C-845, C-846 and C-847)

6 May: Visit to the upper section of Charles Knife Road to examine unnumbered caves

7 May: Mandu Mandu Gorge walk, C-801, C-802, C-803, C-804 Not Craw, *Craw!*, Milyering Well

8 May: C-149 Tulki Well, C-130 Tulki Cave, C-461 Chugori Rockhole, C-94

9 May: Unnumbered caves at Lighthouse Hill

10 May: C-111 Breakdown Maze, C-325, C-770

12 May: Telstra tower area unnumbered features

13 May: North of Charles Knife Road up unnamed gorge to south of Badjirrajirra Creek gorge

14 May: Another unnamed gorge north of Charles Knife Road, this time the one north of Badjirrajirra Creek gorge

15 May: C-59, C-57 and C-19

17 May: Badjirrajirra Creek gorge northern branch

Party: Bill Humphreys, John & Joan Mylroie, Greg Middleton and Darren Brooks

John and Joan, from the US, had recently arrived in Australia to liaise with Bill in Perth, and then later in the Cape Range to study the local cave morphology. John is a sedimentary geologist with a particular interest in how rock shelter caves (in this case 'flank margin caves') are formed.[1] He has an impressive list of publications to his name. Joan is also a geologist of note and has travelled widely with John working in caves and on geology projects worldwide.

Greg Middleton, a charming, bearded individual, is well known to many Australian cavers and has worked extensively in cave conservation, amongst other things. In recent years he has travelled and worked with the Mylroies in various parts of the world. He's a keen Tasmanian caver and has notched up a phenomenal number of cave hours over his career.

3 May

I travelled north to the Lighthouse Caravan Park where Bill had booked his accommodation up on the hill. Great view from there, and only a little lower than the lighthouse itself. I met with Bill, John and Joan and we chatted for a bit before heading off to Bunburi Cave. With the recent heavy rain and flooding that had occurred locally, there were plenty of active drips and lots of small pools on the decoration and we examined some of the archaeological remains.

Figure 128: Grinding dishes, fore and middle ground, at Bunburi Cave. *Photo Darren Brooks*

Figure 129: Another grinding dish on a large rock outside the entrance. *Photo Darren Brooks*

John expounded enthusiastically about the features of the cave that identified it as a flank margin cave. We looked at the nearby features in the adjacent cliffs. All appear to be flank margin caves, not all on the same level, indicating formation at different times, from the last interglacial sea level high of 6 m

about 125,000 years ago to possibly back to the middle Miocene era, about 8 million years ago. It brought to me a new awareness of the need to survey holistically, with regard to tying the different caves on the same and different levels into one main survey for the immediate area. A new project for me in the Bunburi Cave area.

After this we headed northwards to the C-99 area, stopping along the way to look at Wobiri Rockhole. We saw several *Milyeringa veritas* in the pool at the northern end of the rockhole.

Figure 130, 131: Turtle shell fragment *(above)* **and bailer shell remnants** *(below)* **in C-99.** *Photos Darren Brooks*

Further east along the track we visited C-99, which, like Bunburi Cave, has archaeological significance. After examining the cave we walked up the ridge and over the top of the cave to look for more features. There is some interesting banding of different materials exposed above the cave.

Figure 132: Limestone interfingering above C-99. *Photo Darren Brooks*

There was some speculation about one particular piece potentially being formed by stromatolites (fig. 133). We wandered along to the north and

Figure 133: Possibly stromatolitic layers above C-99. *Photo Darren Brooks*

eastwards along the south side of the nearby gorge, crossing to the north side of the gorge at a nick point. Several unnumbered features were examined in this area, but nothing of particular note compared to C-99. John and I finished up at Bailer Cave, where we looked further around the corner to the north and spotted the entrances of The Tunnel, Orb Cave and Honeycomb Cave before heading back to the vehicle. It was a warm afternoon.

4 May

Today's plan was to look at caves that Bill suspected could also be flank margin features, irrespective of the fact that their location is well up in a gorge behind town. This also presented an opportunity for Bill to examine Loop Cave for millipedes. C-222 is currently the only known location of *Stygiochiropus isolatus*.

The journey up the hill through the access track was interesting indeed. The recent rains had obviously reached over two metres deep in places. Where we crossed the main creek we had to 4WD upstream for a bit to find our way across as the main track was a pile of debris consisting of rocks and cobbles and brush banked up against the old pipe on the downstream side of the road.

Figure 134: An indignant common sheathtail bat. *Photo Darren Brooks*

We had no luck with the millipede search but John found the cave morphologically quite interesting and was looking forward to examining caves further up along the gorge. We looked at nearly all the caves

in the area except Jail Cave and Monstro Cave but the ones we did visit were fairly representative of the features in the area. I showed them the deposit of 'tarpiss' (potentially the dehydrated urinary deposits of native rats) in Kojak Cave. Another enjoyable day trip, improved further by the discovery of a bower of the western bowerbird *Chlamydera guttata*, underneath a small, dense shrub. There was a good collection of white snail shells on display, plus some pieces of wire to really impress the ladies!

Figure 135: The well-decorated bower where the green glass belongs with the green berries. *Photo Darren Brooks*

We could identify the sorting of cobbles in the stream beds according to size and current strength.

5 May

Today we had to pick up Greg Middleton from the airport. First, though, we headed out to take a look at Dozer Cave and other features in the area. Dozer Cave was interesting as it still had water flowing into it, so we all got to see a cave with a waterfall – a rare event up here – and even The Gnamma Hole had some inflow happening. It was starting to rain a little and the ground was very wet. Bill tried to turn the vehicle around and got bogged. This required us to heave-ho against the front bumper until the car regained traction and Bill could park up in a grassy spot. A fair bit of shoe scraping then ensued and it felt like I removed about four tonne (approximately) of mud from my boots.

Figure 136: Bill and Joan admire the waterfall into Dozer Cave. *Photo Darren Brooks*

Our next stop was Charles Knife Road. We stopped on the lower reaches to admire some of the large rock-shelter caves visible in the gorge to the south. Then a walk from here to the north to look at some more easily accessible features that were visible in the nearby cliffs. It was now starting to rain a bit. We climbed down the side of the gorge where we immediately found some caves. Bill headed across the gorge and I went with John and Joan along the south side of the gorge to a small cave (now C-841) where John immediately stood next to a beehive tucked away in a low opening at ground level. The hum from the hive was audible but the bees weren't very active, probably because of the rain, which was lucky for us. John and Joan then headed across the gorge to join Bill whereas I headed west along my south side towards another visible feature.

Figure 137: Dozer Cave was awash with foam. ***Photo*** *Darren Brooks*

It was now starting to rain in earnest and in the cliff wall I was traversing I passed a couple of outlets with water flowing out fast enough to make me shuffle carefully past to avoid a further soaking.

Figure 138: A phenomenon rarely witnessed in the Cape Range. *Photo Darren Brooks*

This next cave (now C-842) was considerably larger than the one we had just examined. Water was pouring off the cliff above onto old flowstones and the cave was welcome shelter from the cold rain. I watched the others for a while through the rain (fig. 139) until it eased off a bit and then I crossed over to see what they had entered and been in, out of sight, for so long.

The cave where they did their disappearing act was a tunnel (now C-843) about 15 m long and of walking height until about 6 m from the end where it can be explored in a crouch. There is some nice decoration at the point where the passage reduces in size, and the front-most part has some old but once nice curtains and shawl decoration. In the last 6 m of the cave the ceiling domes up where some

Figure 139: I sheltered in C-842, which looks out at C-843 and C-844. *Photo Darren Brooks*

bats are roosting. They looked like *Taphozous georgianus*.

There is a larger but shorter cave (now C-844) next door. This also contains some old flowstone and a small stalagmite in the act of falling apart. These must have been attractive features when the caves were still walled in and inaccessible to any creatures but aesthetically unappreciative troglobites.

From this north side of the gorge I observed further caves (now C-845 and C-846) along the opposite cliff from where I had explored previously, but time was running short and we had to get to the airport to pick up Greg.

At the airport things were strangely quiet. We went in and it reminded me of a scene from that Stephen King story, *The Langoliers*. We eventually found a staff member (I breathed a huge sigh of relief when I found he could see and hear me – you have to read the story or see the movie) and he explained that the flight had been cancelled due to the low cloud and poor visibility conditions. Oh well. We headed back to town. I was a little disappointed that things were still normal in the physical world.

6 May

Now it was time for the real picking up of Greg. The plane arrived without a hitch, we squeezed into the vehicle and off we went. Being on the airport side of the range it was natural that we again headed up Charles Knife Road. This time John wanted to look at features higher up in the range to see if he would observe the same morphology as in the lower reaches.

We did indeed visit some interesting features further up the road and spent some time looking them over. It was a hot day again and after introducing Greg to his first caves for this trip we also drove up to look at the old Wapet Well 2 site before heading back into town.

7 May

Today was a look up Mandu Mandu Gorge. When we got there we found the access track in had been closed. In an audacious move (for us) we dropped the rope and drove in anyway. We found the track to be in perfect condition and unaffected by the floods. It was probably still closed because park staff wouldn't have had the time to check it out yet due to the more pressing demands of attending to the huge amount of damage at other sites in the park.

We spent an enjoyable day scrambling up the sides of the gorge to check out interesting-looking features, and traversing the floor of the gorge which had huge scour pits around massive boulders. The gorge was virtually devoid of vegetation but thick tree stumps sticking up out of the cobbled creek bed were testament to the irresistible force of the water. In places the water had reached over four metres deep and fresh banks of precariously balanced cobbles teetered and collapsed when walked upon. Stones of approximately equal size were deposited into their respective banks, some overlapping onto each other as the force of the floodwaters increased or diminished. This landscape will alter again with the tramping of tourists and kangaroos and the general flattening effects of the weather. The soft banks will collapse and even out until the next major flood.

We headed up from the bottom of the gorge onto the north bank where some surviving guide poles were visible and followed the cliff edge west back to the vehicle. In various spots along the trail, where it gets close to the edge of the cliffs, it is decorated with what I think are ridiculous signs stating that 'Cliffs occur beyond this point'. Any person with even mediocre eyesight would be more than aware that there are cliffs there. I've often wondered why the signs aren't printed in braille. They're ugly and unnecessary and I think are only there as an arse-covering exercise.

We noted a couple of small caves in a re-entrant that we crossed.

Back at the vehicle we had a quick refreshment and rest stop before heading over to some small caves visible in the terraces facing the west, and visible from the main road, to the south of the gorge. In this area there are four numbered features in the lower terrace and three further up towards the ridge top in the upper terrace.

Everyone was a bit fagged out by this time so an executive decision was made to visit the lower and easily accessible caves. The first three caves were a bit iffy when it came to the flank margin proposal of origin but the fourth cave, Not Craw, *Craw!*, is more extensive and of far more interest. This cave was named after I saw a huge forearm from a deceased kangaroo lying on the floor with its massive claws sticking up in the air like something out of a horror movie. However, the forearm did not try to grab me as I walked past, nor did it claw its way across the floor to rake the flesh of my cheeks with its spike-like talons.

On that note we headed for home.

8 May

Another west coast trip saw us dropping in at Milyering Well. We saw some blind fish, *Milyeringa veritas*, in the water below us while we lay on the covering mesh over the well and used our hands to

shield our eyes from the glare off the galvanizing on the wires.

I wanted to show the party a shark tooth I had found several years ago, which is located up on the terrace a little to the south of the Milyering Discovery Centre. This was a lunch interlude so once we'd spent a bit of time casting around for said tooth we sat down and enjoyed our lunch-with-a-view. Bill explained that shark teeth are generally more useful as paleontological material when the basal part of the tooth is preserved. Unfortunately mine is the pointy bit of the tooth embedded pointy-bit-first into a patch of sandy limestone.

Figure 140: Hidden danger in the spinifex: a death adder lurks. *Photo Darren Brooks*

After lunch was devoured we headed off down the terrace towards the car. Walking at the rear of the party I spotted a small death adder on a clump of spinifex under a small, sparse acacia shrub. I called out this discovery of interest and we photographed and generally annoyed the little serpent. As it moved around I noted that it seemed to have a long, spindly piece of dried spinifex hanging out of its jaws. It occurred to me that this was more likely to be the tail of a small lizard of the dragon family and when the snake turned in the right way we could actually make out the shape of the lizard as its body stretched the neck skin of the adder. Gruesome but quite fascinating.

Figure 141: The echidna in Tulki Cave wouldn't cooperate. *Photo Darren Brooks*

From here we next dropped in at Tulki Well where we examined the well and some of the surrounding features. We looked at Tulki Cave and found an echidna which quickly tucked itself up tightly into a small ledge and became immediately very un-photogenic as a result. Tickling of the dorsal spines only served to convince it to wedge itself in even tighter.

Not far beyond Tulki Well we stopped at a low roadside terrace and spent quite a bit of time looking at some small caves. The assumption was that this was probably the Jurabi Terrace. This was an interesting stop, with John waxing lyrical about cave formation and ice age maximums and minimums.

Figure 142: Examining small caves in the Jurabi Terrace. *Photo Darren Brooks*

It was time to head back to camp, but not before dropping in to look at Chugori Rockhole (fig. 143). Last time I visited the hole I took the wrong track and had a bit of a walk to find it, but this time we located the correct track first time. It is a track that has persisted from some seismic work performed by Ampolex some time back in the nineties and it goes past, and is only a few metres away from, this important archaeological site. Obviously, and as has been demonstrated in other parts of the country (e.g. the Burrup Peninsula), the search for the mighty oil dollar is far more important than any cultural sensitivities. Apart from the curious looking line of stones that has, I believe, been interpreted as a fish trap, but which seems to my eye to be more representative of a rainbow snake (a notion first suggested to me by Bill Humphreys many years ago), there are several other arrangements of stones in various shapes. I think the area is worthy of more in-depth examination (which possibly it may have already received, but I have no knowledge of this). The amount of bailer and conch shell remnants around the area and the presence of the waterhole would indicate that this site and its surrounds were of great importance to the Jinigudira folk who once inhabited the Cape. Water pools in the nearby shallow claypans.

Figure 143: Bill, John, Greg and Joan in discussion at Chugori Rockhole. *Photo Darren Brooks*

After all this excitement for the day the party was quite drained, but the plan was also to visit C-94, a cave located in one of the lower terraces. This cave is about 70 m long and contains quite a few bats. We wandered over to the entrance from the access track that leads to the old disused quarry on the west coast just south of the lighthouse. The cave has two entrances: a horizontal one that requires a bit of a crawl, and a climbable vertical one that needs a bit of a squeeze at the bottom. There was a putrid smell emanating from the vertical entrance. How pleasant. The corpse of a large kangaroo was located just out of sight down the vertical hole and I knew we would have to traverse around this when we entered through the horizontal entrance. Luckily there is plenty of room in the chamber to pass by the stinking putrescence lurking in wait below.

The party spotted a Stimson's python (also known as Children's python) hanging from an impossibly narrow ledge just above the floor on the south side of the passage not far from the entrance. Both Greg and I crawled past without even seeing it, such is the deliberate furtiveness of the serpent family (or it could say more about foggy specs and failing eyesight than snake sneakiness). Observation seemed to indicate that it was lying in wait for bats to fly past and possibly hit it so it could grab them in mid-air, a commonly observed behaviour for some species of the python family.

We made it to the end of the humanable (a term I borrow from Susac of Yanchep fame) parts of the cave, where we sweated it out for a while discussing cave morphology, bats and snakes.

Outside we removed kneepads and headlamps and packed our gear away. I noted a car parked up on the side of the hill to the north. It was just close enough to make out that the occupants were also studying us. I would guess they were rather curious as to what we were doing. I surmised that they must have been parked on an extension of the track to the quarry which leads up to the top of the ridge, where it meets another track running southwards along the ridge from the old disused radar site (not the WWII one).

Finally done in, we headed back to camp.

9 May

Working a little closer to camp today, we wanted to go up the direct access track to the old temporary radar site mentioned above. This involved a bit of rigmarole, as the track up the hill on the east side of the Lighthouse Caravan Park is now gated, and as the park has their borefield up along the track they have the keys to the gates. Our request was met with a little concern at first but the manager relented and explained that once we got up on the site we would be on Commonwealth property and could potentially suffer the consequences of being caught trespassing. We could have the gate key but he would not take any responsibility for our actions once past the borefield and on the Commonwealth land. I'm not sure that cop-out would suffice in a prosecution case, seeing as he gave us the key, but I wasn't overly concerned as this site is generally abandoned and I don't think the Commonwealth has any interest in policing the area anyway. Also, it is much visited by locals and tourists alike via the access track through the disused quarry just to the south on the west coast – the same track that we had used to park close to C-94. In the past the track stopped at the quarry but people have pushed it up the hill to the high point. This old site is often erroneously thought to be Pap Hill by the locals, but the real Pap Hill lies several kilometres to the south.

Figure 144: Caves exposed by cliff face retreat. *Photo Darren Brooks*

There are several numbered caves on the west-facing terraces not far below the top of the ridge where we parked, but we saw some features at the base of the cliffs down in the gorge to the east and decided to examine these first.

These features turned out to be surprisingly large. I have never looked at these caves before and they were much more interesting than I was expecting. Several of them had some very interesting decorations in the form of tubular castings that resembled worm burrows.

Figure 145: Detail of the ceiling features in one of these caves. *Photo Darren Brooks*

Some of these were in the region of 50-60 mm in diameter although most were quite a bit smaller. The sandy material of which they are composed is more resistant to weathering than the native limestone and some tubes exited and re-entered the limestone at different levels of their vertical structure.

Figure 146: Joan, John and Greg recording the unusual features of this unnumbered cave. *Photo Darren Brooks*

Wandering around the ridge, admiring the view and reversing our direction as we headed around a buttress, Greg crossed over the gorge and examined some caves while we used him as a scale man for a few entrance photographs. Just before re-crossing to meet up with us, he called out a comment about not stepping into deep clumps of spinifex where death adders could lurk (furtively), in reference to our prior meeting with the death adder up on the side of the hill near the shark tooth. As he was shouting this across the intervening gap, I was sitting down to get a steady hand to take a pic of him across the gorge. I thought I'd put my hand in some soil and went to brush off the dirt to protect my camera, but found there was no dirt there. I looked at the spot where I'd put my hand and there was another death adder.

Figure 147: Another close shave with a death adder. *Photo Darren Brooks*

This one was quite a bit smaller than the other one but, nevertheless, I was lucky that they tend to rely on their cryptic camouflage rather than on aggressive behaviour to defend themselves. This one was still curled up on the spot where I'd nudged him and hadn't moved yet. I notified the others and another photo session ensued.

Walking up the ridge, John spotted some spent cartridges of various types – some shotgun shells and even some old .45 cartridges which would probably date from the US occupation, as they seemed an unusual type to find so close to the lighthouse area.

We'd had a late start to the day so we headed back to base.

10 May

Taking advantage of another opportunity to visit a cave where rare millipedes could be found, Bill made the executive decision to visit Breakdown Maze. This was also an opportunity to see what John would think about the morphology of this cave.

The track Bill and I had followed a couple of years ago, in July 2012, had been well and truly washed out by the recent flooding, so we parked as close as we could and walked up the gorge towards the hills before cutting north to the cave. There was a huge scour along the base of the cliff a short way from where we parked and we examined this fascinating feature before heading up to the top at the end of the cliff line.

Breakdown Maze has a fair bit of inflow and the evidence of massive flooding was clear to see. At the point where we dropped our packs the clean washed rocks were preceded further upstream by torn and flattened spinifex and shrubbery and a tidemark of leaf litter.

There were still lots of small pools of water in cups in the rock and the cave was not as hot and humid as I would normally have expected. There was flood debris right up near the highest parts of the ceiling and only at the southernmost and highest part of the cave was there a flood gap of about 2 m below the ceiling. There is a very ancient and degraded deposit of bat guano at this high level, just a small patch a metre or two square.

We had a look for millipedes and, after starting to think it was a hopeless task and they'd all been killed in the flood and wouldn't be back for months until re-colonisation had occurred, I found one. Once the first one had revealed itself to our murderous intent they started to flock around us like seagulls around a child with a bucket of chips.

We migrated from this southern chamber back to the entrance and then into the northern tunnel and chamber. This ends in breakdown and I have examined this in the past and found no chance of extension. We also found millipedes in this area and they were immediately persuaded to donate their bodies to the cause of science. John made note of a massive conglomerate formation and several detailed pictures were taken of this.

As we traipsed our way out of the dark zone of the cave and up onto the rock pile on the doline floor towards the climb out, I spotted a slithering animal amongst the rocks at my feet – not a snake but a Burton's legless lizard (*Lialis burtonis*) (fig. 148). This fascinating creature is most closely related to geckos but has a snake-like body. If you look

closely you can usually detect its tiny, rudimentary hind limbs. We handled it for a couple of minutes for examination and photos and then released it back into the rock pile where it rapidly disappeared down a fissure.

Figure 148: The Burton's legless lizard in Breakdown Maze. *Photo Greg Middleton*

We climbed out and de-sweated for a bit and had a bite to eat. I wandered along the inflow wadi with Bill just to have a bit of a look at the vegetation damage and sauntered into the doline of C-327. I have looked for this before and failed to find it. I was amazed at how blind I must have been many years ago not to see it. Even worse, it was pretty close to my grid reference for it. With no tag and no survey gear I had to leave these duties for another day.

We made our way back to the vehicle, most of the crew journeying up along the ridge directly to the car. I followed more closely to our original trail, with Joan in tow, to have a look at a small cave that Bill had discovered, again in July 2012 on our previous visit, and which only Bill had entered. I was hoping to get a look in here but when we poked our noses in, the stench and the hordes of green blowflies buzzing around in it instantly overcame the urge to explore. So this plan was abandoned until a future time when hopefully the climate within the cave will be more amenable to pleasant investigation.

Back at the vehicle we came across a couple of the Exmouth locals (human), accompanied by their children, who were heading up the gorge for a hike and to have a look at the effects of the flood on the countryside. We left them there and set off back to the road and down to Yardie Creek.

Yardie Creek cuts down through Tulki limestone to well below sea level and the limestone cliffs are exposed up to a height of probably about 40 m in places. We spotted black-footed rock wallabies, *Petrogale lateralis*, on ledges on the south side opposite us. Many short-billed corellas (*Cacatua sanguinea*) dotted the cliffs and flew back and forth in their noisy and larrikinish way. Further up the creek we looked down upon old stone fish traps at the base of the cliffs.

Figure 149: Fish traps in Yardie Creek. *Photo Darren Brooks*

We interrupted our trip back to camp with a look in at the Milyering Discovery Centre. This had been well and truly inundated with what looked like about 0.75 m of water which flowed across the flood plain and into the buildings, pouring in mud and debris and flooding the below-ground composting toilets. The small bridge that one walks across from the carpark to access the place had also acted as a bit of a dam, with vegetable debris building up and completely blocking the small creek, which would have caused the water to back up and from the looks of things, forced it straight towards the Centre. The bridge had been pushed off kilter a bit and it was surprising that it didn't actually get washed away. In fact, the Centre is located on the floodplain below a reasonable-sized gorge and it is no surprise that this event occurred given the amount of rain experienced on the west coast. It is estimated that possibly over 450 mm of rain fell on the day of the flood.

Figure 150: Some cleanup work required at the Milyering Discovery Centre! *Photo Darren Brooks*

11 May

A day of rest for the hard-toiling crew. Bill had to leave today and boarded a plane to Perth.

Figure 151: I filled my water bottle here. *Photo Darren Brooks*

12 May

Today we headed up over the dunes along the track north of the naval base to explore some caves visible from the Yardie Creek road on the west coast. These caves are overlooked by the Telstra mobile phone transmitter tower. I have looked at these caves for years while driving along the Yardie Creek road, and finally an opportunity to visit them had arrived.

At the tower we headed north down the nearest gorge where we examined several features. At the furthest point down I examined a small cave right next to the creek bed where I found a small deposit of the dark tarpiss I have found in several caves on the east coast up behind town.

After a lunch break nearby we headed around to the west-facing cliffs where we located more substantial features. Several of these showed the effects of the recent rains, with one having a small rivulet pouring out of the ceiling where I filled my water bottle with crystal clear, sweet-tasting water (fig. 151) – a first for me in the Cape Range. This was in a feature about 20 m wide and 6–8 m deep to the rear wall. The whole series of caves along this cliff line approximated this size. Greg filled his water bottle from another feature further south along the cliff. In one of the caves I found a piece of bailer shell which had probably come from a water-carrying shell, or possibly had been consumed in the cave by the indigenous folk.

Figure 152: Bailer shell on the floor of a cave. *Photo Darren Brooks*

I recorded the location of seven or eight features along here, with several more unvisited, but did not tag any and will not do so until I return to survey them.

It was a hot day again and we gladly retreated to the cool of the car's air conditioning.

Figure 153: 'The Hand' stretches out from one of the rock shelters. *Photo Darren Brooks*

13 May

This was attempt number one for me to get the crew into Badjirrajirra Creek gorge. We followed the track from the foot of Charles Knife Road northwards until we hit a torn-up creek we didn't dare tackle in the 4WD. Walking from here, it was not clear on the GPS topo map which creek was actually Badjirrajirra (unless they're copies of real topo maps, I have found that the raster maps available for Magellan GPS's are rather crap), but we walked up to a very sizeable canyon feature and immediately saw several interesting cave features on the northern slope below the upper cliff line. We made a beeline for the nearest and worked our way east along the base of the cliff. Greg cut across at a point where another creek entered and walked along the slope opposite us.

Some of the caves were of reasonable size and it was interesting how many of them seemed to occur in patches: often there were sections of cliff with no appreciable features to be found, and then a mass of well-developed rock-shelter caves in one area. If these prove to be flank margin caves then this could

possibly have been caused by preferential freshwater flow down conduit areas where the freshwater lens mixes with the salt water.

Figure 154: A small pool lies hidden in an alcove. *Photo Darren Brooks*

Figure 155: John looks into a small tunnel. *Photo Darren Brooks*

Figure 156: Greg examines a large window. *Photo Darren Brooks*

The day being spent climbing across and up and down steep slopes, we were fairly exhausted by the early afternoon and headed back to the vehicle and a well-earned rest. And I worked out later that this gorge was a minor outflow and not the real Badjirrajirra Gorge.

14 May

We headed up Charles Knife Road to Thomas Carter Lookout where we set out north down the track, passing between C-122 and C-123. Soon afterwards we headed east down the headwaters of the gorge which crosses the walking trail between Charles Knife Road and Shothole Canyon. This is commonly assumed to be Badjirrajirra Creek gorge but it is in fact an unnamed gorge, the dimensions of which rival Badjirrajirra Creek gorge anyway, and also offer a similar geologic profile.

Early in the trip we noted many potential flank margin caves. In fact, the gorge was rife with them. The scenery was spectacular and we enjoyed a good stroll down the creek and many diversions up the flanks to examine interesting features.

Figure 157: Fossiliferous limestone. *Photo Darren Brooks*

Figure 158: Some parts of the gorge were marked by recent collapse of the banks. *Photo Darren Brooks*

It was again a warm day and it took a good while to get to the most well-developed sections, where we encountered a huge overhanging cave feature (fig. 159) and shortly beyond this a vertical nick point about 7 m in depth (fig. 160). This is free-climbable with care, but we took this as our turn-around point and headed up a flank on the south side of the gorge to return to the vehicle.

Figure 159: One of the outstanding features encountered in the gorge: a vast overhang with a steep slope of fine sediment. *Photo Darren Brooks*

Further east beyond this nick point are two numbered features, one a small cave and the other a small deposit of fossilized leaves.

Figure 160: Looking down the gorge over the big nick point. *Photo Darren Brooks*

I assumed that once we got up on the ridge the walking would be easier, but it transpired that the re-entrant creeks made it hard going and turned it into a much longer walk than expected. The brush-covered ridges near Thomas Carter Lookout also slowed us down considerably but eventually, tired but satisfied, we reached the cars and headed back to camp.

15 May

C-729 The Three Amigos was the target for this morning, and later in the afternoon another trip up Charles Knife Road to visit C-59, as this was a cave I thought would fit the flank margin model and it was at a fairly high elevation as well.

We headed up the Water Authority track behind town that we had used on 4 May. Some repair work had been carried out by the authority and the track was now graded and fairly comfortable to drive along. We soon found the entrance to C-729 and kitted up for entry. There was quite a strong breeze blowing into the cave, most noticeable at the entrance where dimensions were most restricted. This cave heads northwards across the low ridge but there is no sign of cave on the other side. It must have a fair bit of volume not enterable by humans to entertain such a strong flow of air movement. Either that, or there is another entrance and it is causing a chimney effect. I shall have to survey the ridge over the cave to see how close the cave comes to the surface and how far it actually reaches across the ridge.

It was reasonably early when we got out of C-729 and headed towards Charles Knife Road. Our goal, C-59, is a rock-shelter cave located east of the Thomas Carter Lookout. We took the track leading off from the lookout track. Our route followed a ridge line to the west, above the valley overlooking C-18 Dry Swallet to the north. The track passes by several caves and we stopped next to C-48 and C-49 before it plunges down the slope to the north.

Figure 161: Joan unpacks in front of C-59. *Photo Darren Brooks*

Walking westwards, I found C-57 where I took some pics and a location update. We continued on to C-59. I have surveyed this but I don't remember seeing the other large cave to the north of it (fig. 163). So there are two caves at this location, with C-59 being the slightly larger. Steve Janicke recorded this cave in 1974 and mentioned that there was a slight breeze in the crawlway leading off from the main chamber. Both John and Greg crawled in for a look, but neither noticed any air movement and their reports of a large, smelly kangaroo carcase put me off having another look for myself. I shall, possibly, force myself in the next time I visit this cave to survey the other feature. Joan observed a couple of small bats. We had a bit of fun with a large set of goat horns that Greg found outside the entrance.

Figure 162: John explores the lead in C-59. *Photo Darren Brooks*

Figure 163: The cave next door is similarly roomy. *Photo Darren Brooks*

On the way back to the vehicle I zipped past C-19 to get a location update.

16 May

Layday.

17 May

After my confusions with the Badjirrajirra Creek gorge outflow point, and then our journey down the unnamed gorge, I finally sat down with the topo map and bothered to work out how to get to the *real* Badjirrajirra Creek gorge!

We left a vehicle at the foot of the range near the lower end of the creek and drove up to Thomas Carter Lookout. Joan then drove back to town, leaving myself, John and Greg to make the trip all the way to the bottom. This worked out well and we didn't take long to find the headwaters and start getting into some steeper country. To gain the headwaters of Badjirrajirra Creek from Thomas Carter Lookout you have to first head south, then eastwards until intersecting the eastward-flowing creeks. If you don't wander far enough south then you are likely to end up travelling northwards, back into the unnamed gorge that we partially explored down to the 7 m deep nick point on the 14th.

This northern branch of Badjirrajirra Creek was a lot flatter as we headed east compared to the other gorge to the north, but eventually, after passing several small nick points, we encountered one much deeper than was in the other gorge.

Figure 164: We arrive at the large nick point. *Photo Darren Brooks*

Interestingly, this nick point is also a kilometre further east than the one in the northern gorge. I don't know if this is related to erosional processes and the age of the gorges or whether it is caused by geologic structural differences. This big nick point I estimated to be at least 10 m deep but it had quite a few handy ledges to slither down, like giant steps. There was also a nice pool of water at the bottom with a huge boulder perched on one side of it. A few taddys were swimming about. It felt a bit too cold for a dip, unfortunately. In hindsight I should have gone in anyway. Going down the climb John dropped his soft-drink bottle which lost its lid and dropped into the pool, spilling the contents, sadly for John who testified several times that he really enjoys his bottle of pop.

We continued further down the gorge through several small rocky down-climbs until four or five hundred metres further on we encountered a spring flowing down from the northern wall (fig. 167). Our

Figure 165: John is the first down. *Photo Darren Brooks*

Figure 166: Our climb down was facilitated by the rock steps. *Photo Darren Brooks*

investigation revealed that about 15 m up the wall there was a vertical hole where the water was issuing up out of the depths. It was small and I pulled out a few rocks and forced my arm in up to the shoulder, but it was tight with no obvious enlargement further down the hole (fig. 168).

Figure 167: Water cascades down the side of the gorge. *Photo Darren Brooks*

The surrounding rock seemed pretty solid with no collapse material. There is a huge, blank sinkhole, C-305, up on the middle of the ridge about 1 km to the north-west. Could this be the source? It would be worth the walk from Thomas Carter Lookout to check the sinkhole and have a look around on the ridge above the spring to see if there are any other features above the outflow.

Figure 168: An impenetrable spring. *Photo Darren Brooks*

Below this point we climbed down quite steeply for a while until we emerged in a much degraded section of the gorge that was far wider than previously encountered. We were now at the lower point of the gorge and headed through a creek bed with large cobbles and boulders, flanked by steep talus slopes with cliffs high above at the upper edges.

Figure 169: The gorge is strewn with giant boulders. *Photo Darren Brooks*

Figure 170: Talus on native rock. *Photo Darren Brooks*

Shortly before emerging onto the coastal plain we encountered the southern branch of Badjirrajirra Creek. Here the main flow again took on a somewhat battered look due to the influx of the huge volume of water from the southern branch combining with the flow from the northern branch. I took a photo of John under a tree in the creek where the flood debris is tangled high in the branches above his head.

From here it is a straightforward walk out between the cliffs and talus slopes of the gorge, where we saw some spectacular-looking caves up above us. We found the track leading back to the vehicle and along the way lucky ole me picked up a nice 10 mm ring/open-ended spanner that someone must have lost from their vehicle. This was our last trip for the expedition.

Reference

1. Mylroie, John E, & James L. Carew 1990, 'The flank margin model for dissolution cave development in carbonate platforms', *Earth Surface Processes and Landforms* 15: 413-425.

Surveying C-841 and C-842

Darren Brooks

Date: 9 June

Caves: C-841 and C-842

Party: Darren Brooks

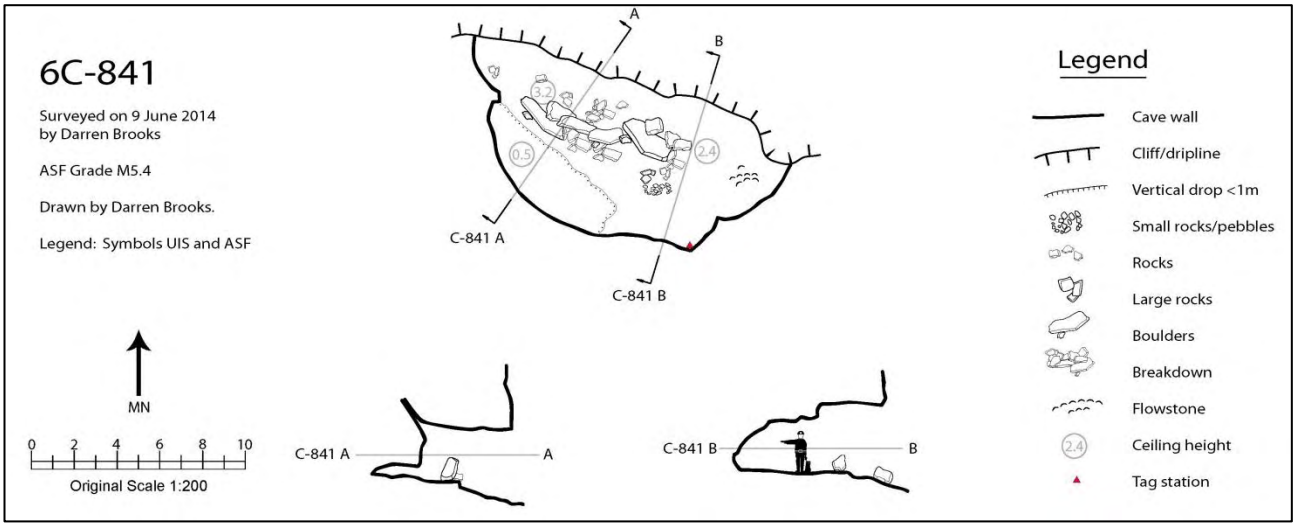
It was a windy, rainy day and work had been cancelled, so it was off to Charles Knife Road to start surveying the series of small caves that I'd looked at with Bill Humphreys and John and Joan Mylroie back in May.

I started with C-841, the first feature on the south wall where we encountered the beehive with John last month. I avoided the hive as far as possible but again I could hear the hum from the feral inhabitants. It would be nice to have something to kill them with without getting stabbed to death by them first. It didn't take long to survey this small cave, so I packed up my gear to head west along the wall to the larger cave. Now for some reason some agitated bees decided to attack me, buzzing around my head and landing on me. I bravely swatted at them frantically and fell arse over tit in my haste to make space between me and the hive. A couple of persistent little buggers followed me for a while but eventually gave up after a couple of good whacks from a leafy stick I plucked from a small acacia. I got away unscathed (except for my pride and a bit of a scratch or two) and sting-free.

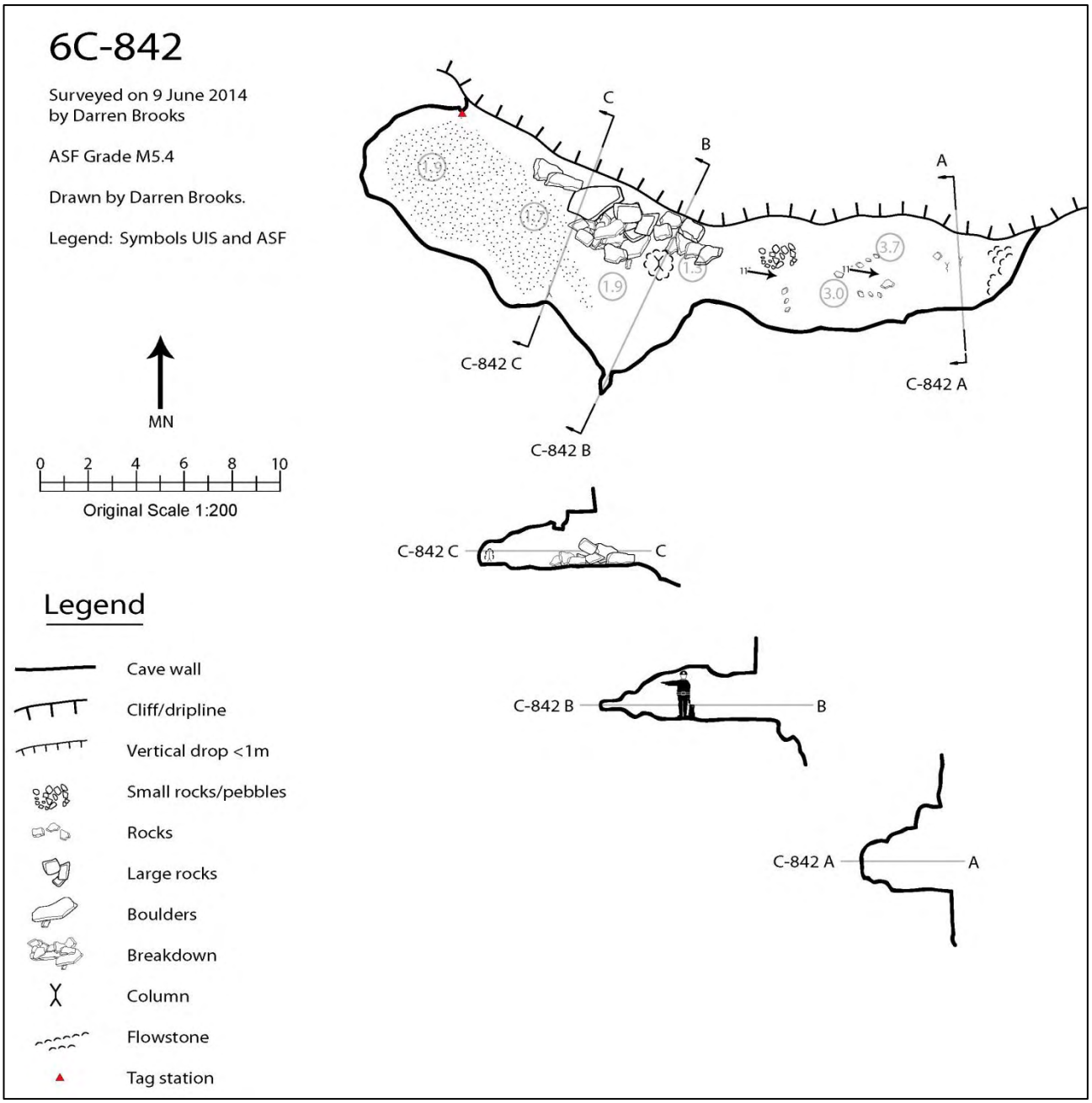
C-842 is larger and more interesting. It has some fair deposits of decoration and a small hole at the rear that invites investigation but peters out after a metre. Disappointing. There is a nice column at the front of the cave that was still dripping with water.

I wanted to survey back to C-841 and tie the two features together but after my little encounter with the bees, and owing to the time, I headed home.

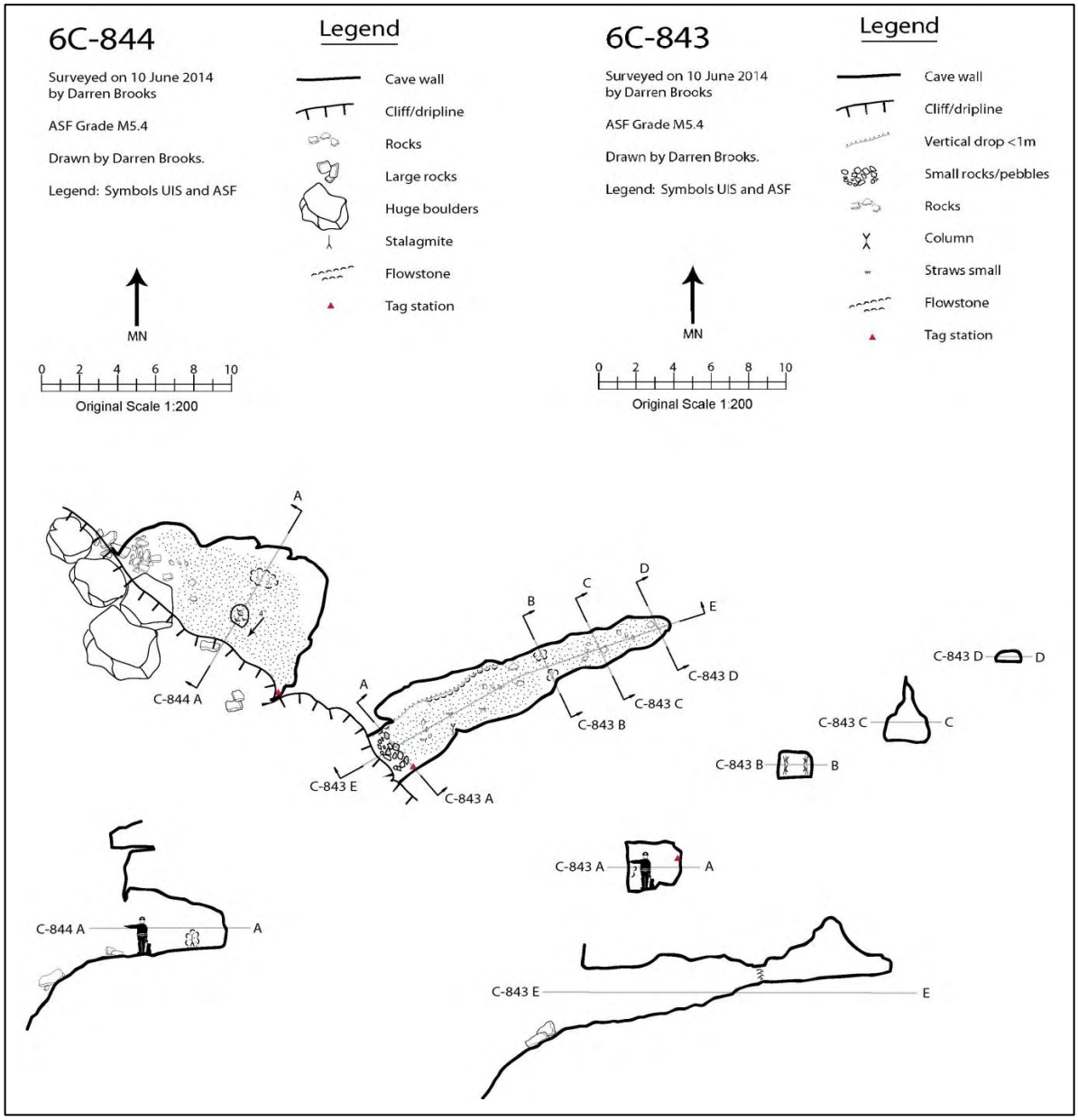
See overleaf for maps.



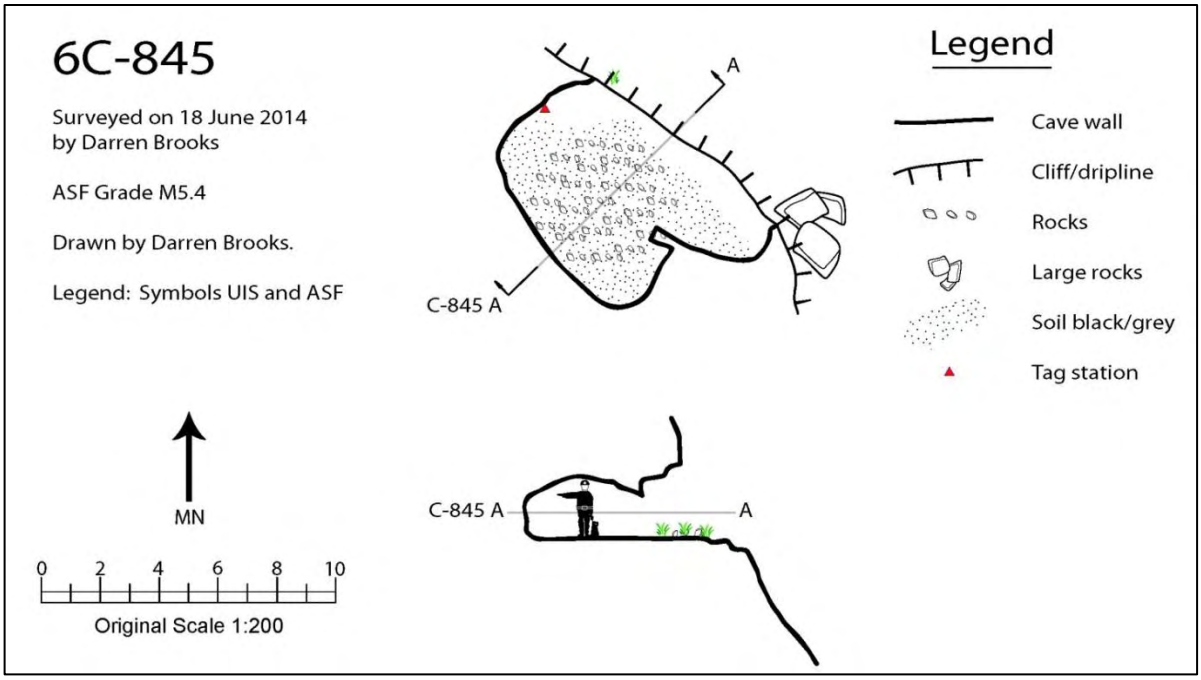
Map 14: C-841, drawn by Darren Brooks



Map 15: C-482, drawn by Darren Brooks



Map 16: C-843 and C-844, drawn by Darren Brooks



Map 17: C-845, drawn by Darren Brooks

Surveying C-843 and C-844

Darren Brooks

Date: 10 June

Caves: C-843 and C-844

Party: Darren Brooks

With work cancelled again due to inclement weather I returned to visit the Charles Knife Road caves, this time the ones across the gorge from C-841 and C-842.

I first tagged the tunnel as C-843 and surveyed this unusual feature. I say unusual because, unlike the other caves in the sides of the gorge in this area which are probably flank margin caves (they display features which would identify them as such), this cave is a tunnel heading into the hill. Perhaps an ancient conduit outflow feature?

Figure 171: Looking into the tunnel of C-843. *Photo Darren Brooks*

The tunnel is standing height at the entrance but soon deteriorates into a low duckwalk up to the sudden end where a layered and lithified sediment plug blocks the way on. Just before the end there is a small aven where some bats reside.

Figure 172: The final 'plug', with clear layering of sediments. *Photo Darren Brooks*

At one point in the tunnel a joint fracture has let water in and there are small columns and some flowstone on each side of the passage.

I surveyed across into C-844 to the immediate west. This is a much more open cave but does have some ancient flowstone on the floor and a small stalagmite as the most obvious feature of the cave. This chamber is quite high and has standing room throughout.

See map on previous page.

I then ran a survey line down into the gorge and up to the other side to tie into the tag of C-842 before heading out to the road and home.

Surveying C-845 and C-846

Darren Brooks

Date: 18 June

Caves: C-845 and C-846

Party: Darren Brooks

This trip was to survey C-845 and C-846 and tie them into the surveys of C-841 to C-844, all located in a small gorge just to the north of Charles Knife Road.

The caves were higher up than the other caves but also smaller and didn't take long to survey. The overground survey was far more difficult as I had to survey down the talus slope and back up to each feature. It was a real pain, particularly since I'd forgotten my tape and was trying to use the disto in bright sunlight where it was almost impossible to see the laser dot more than four or five metres away. By the time I'd finished that I'd noticed another small cave around the corner of the little bluff next to C-846 where it was hidden, beside and a little beneath the aforementioned, behind some dense scrub. The connecting survey took so long that there was no time to survey the third feature.

C-845 is a chamber about 9 m wide and goes back 7 m. Maximum ceiling height is about 2 m. There is some low shrubbery and spinifex growing in the entrance. The floor is the usual goat, 'roo poo and soil combination with a few small, scattered rocks.

C-846 is perched high up on the side of the gorge just beneath the top edge and it requires a bit of a vertical climb to access it. There is a small patch of ancient, undercut flowstone at the rear of the chamber. The floor is generally devoid of any soil but there is a smattering of goat and 'roo dung.

Meeting Danny *Darren Brooks*

Date: 23 June

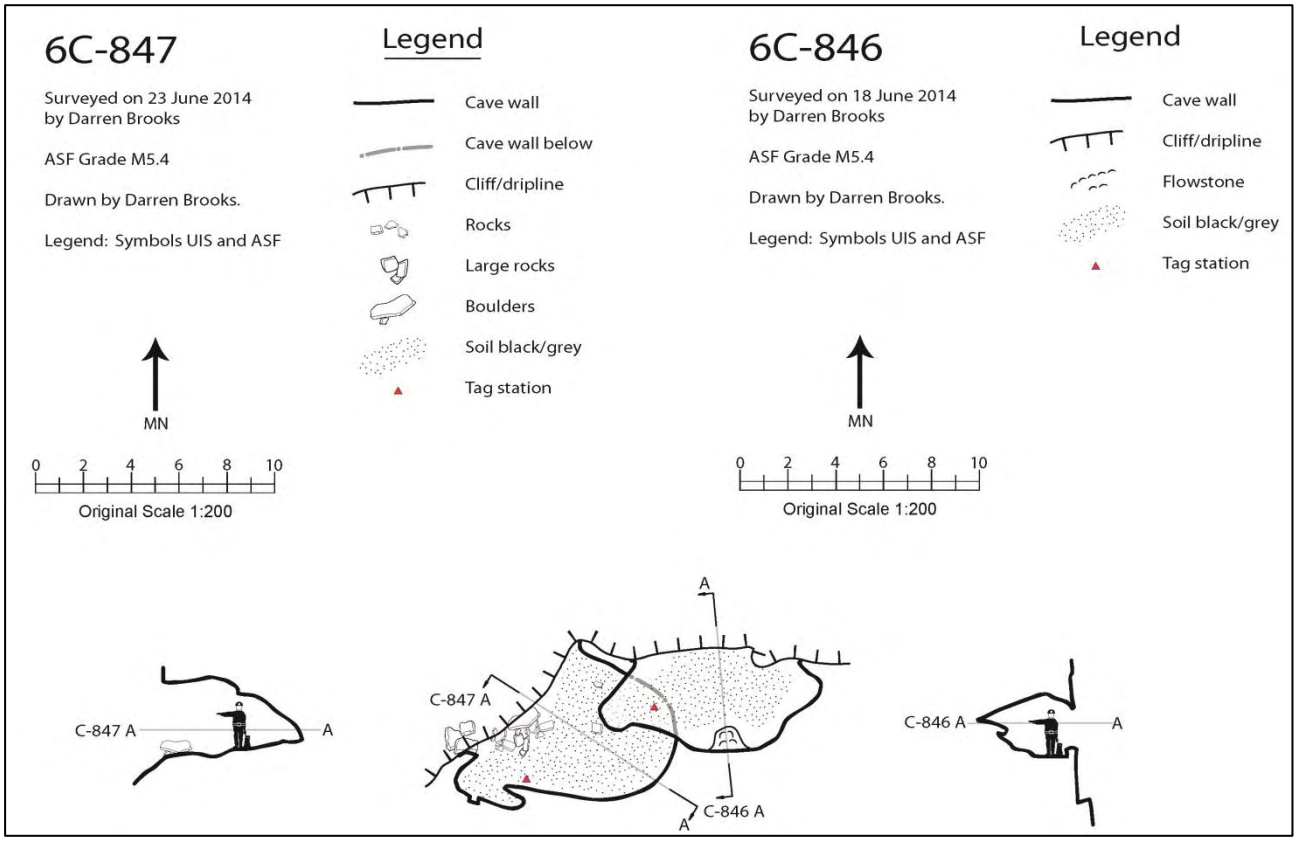
Caves: C-847

Party: Danny Wilkinson and Darren Brooks

I had one last known feature to survey in this series of caves located to the north side of the lower part of Charles Knife Road. I wanted to complete this and also have a walk up the gorge to see what else of interest I could find.

I tied into the between-caves survey line and soon linked it to the tag in C-847, which is a small cave that lies partially under C-846. There are only a couple of metres between the floor of one and the ceiling of the other. The cave seems quite degraded but there is evidence of solutional development in features on the ceiling.

Leaving here I found another small cave to the west which appeared to be under a giant slab of rock that may have been the cliff face that has slumped down



Map 18: C-846 and C-847, drawn by Darren Brooks

Figure 173: C-847, showing the precipitous entrance and the phreatic solutional features on the ceiling. *Photo Darren Brooks*

or it may still be native rock *in situ*. I couldn't make up my mind about it but decided to leave it until I returned for my gear after completing my walk up the gorge. The entrance is a climb down to get into the cave and is not unduly tight or awkward but just a little so for a pot-bellied old fart like me.

Figure 174: Small alcove at the western end of C-847. *Photo Darren Brooks*

I proceeded up the gorge for a couple of hundred metres, discovering several interesting, small features. One is a short tunnel with a lithified sediment blockage. I wondered if it was once an extensive tunnel or if it was a case of 'what you see is what you get'. There is an old, old plastic 4 litre oil carton sitting right in the entrance. I was going to carry it out but as soon as I touched it, it crumbled into dust in my hands, so it seemed appropriate to just leave it there as I had nothing in which to store the damn thing. It could have washed or blown down from the road which drains into the gorge from further up the hill.

Shortly beyond this feature, as I was passing through a brushy patch in the thalweg (lowest point of the creek bed, sounds very scientific and it is a very specific term so useful here), I heard some disturbance up ahead. It was the sound of rocks being moved around. This was curious. Could it be a goat or maybe a kangaroo disturbed by my noisy approach? I proceeded up the creek bed and discovered a hole which had recently removed rocks and fine gravel around it. It appeared to have been dug out within the last few hours or maybe days. Could an animal have dug it out? An echidna? I envisioned all sorts of scenarios. Could there be another caver in town exploring around here? I assumed that the sound of rocks I'd heard just a short while earlier could have been some boulders around the edge falling down the hole as soil settled about the edges. I even imagined that this could be an outflow that had pushed soil and boulders out under great pressure during the big flood a few weeks past. A closer examination of the rocks revealed that they were still dirty on the

posterior parts so they hadn't been washed. It definitely wasn't an outflow.

I walked further up the gorge, seeing nothing out of the ordinary. Whoever or whatever had been digging in the creek bed wasn't here at the moment. I returned down the creek bed but a short way downstream past the mysterious dig I decided to climb up the talus slope on the north side to see if I could see anything from my higher vantage point. I spotted a vehicle on the road above the dig area and, spied occasionally through the dense scrub on the slope downhill from the car, a figure with a backpack heading towards the dig. So I headed back down to the creek and once again upstream to meet whoever it was.

I scrambled through the scrub and emerged in front of this unknown explorer and, not thinking of anything particularly clever to say, introduced myself. He immediately identified himself as Danny and as a WASG member. He told me he had been chatting to Ian Collette not long previously. We had a look at his hole and discussed things caving. We then walked down the creek to explore the small cave I had found a little while earlier. This turned out to be an angular cobble-floored chamber which really looked like it wasn't a solutional cave as such but more a feature formed from collapse boulders forming a roof over an old stream bed. I can't make up my mind about it. It's an odd little feature.

We parted ways, me to go home and Danny to go back and explore his new cave. I phoned Ian from the car on the way down the hill and we had a good laugh at the coincidence of him talking to Danny earlier and us meeting up in a gorge a short while later up Charles Knife Road.

Danny's story *Danny Wilkinson*

Dates: 23-24 June

Caves: Unnumbered cave, Owl Roost, Twin Holes, Spiral

Party: Danny Wilkinson

On my way back from visiting the Kimberley on a solo five-week holiday, I came back along the coast to have a look around Exmouth. I wanted to get a feel for what Cape Range was like ahead of the 2015 ASF Conference in the area. I was impressed with how different the limestone is to Margaret River, as well as by the sheer number of caves there.

Finding the access road to the hiking trails closed due to road works (following some heavy rain), I decided to turn back. On my way back down Charles Knife Road I pulled over to have a look at some flank margin caves not far from the road, a short walk down a small creek bed. As I was stepping down off a large rock into the sandy bed of the creek, I noticed a small hole under the rock. Scooping away some of the dirt around it, I stuck my phone in and took a photo to see what was inside. After confirming that it was a fair amount larger than expected, I walked back to the car to call Ian Collette for advice. He advised me to get the GPS location and to call Darren Brooks.

As I got back to the solution pipe/cave to get the GPS location, I heard a rustling in the scrub and what I originally thought was a bushwalker appeared. Then I noticed he was wearing a WASG polo shirt! It was Darren Brooks himself. We had a bit of a chat, then exchanged details and arranged to meet up later to discuss some of the local caves. After a little more 'gardening' I then entered my cave. The entrance was only about 45 cm x 35 cm, opening into a shaft some 80 cm x 90 cm and was approximately 2.1 m deep at its lowest point.

Figure 175: A view into the hole that Danny found. *Photo Danny Wilkinson*

The next day, armed with details from Darren, I set out to locate Owl Roost, Twin Holes and Spiral, which was fairly easy as they are very close to the track, and proceeded to have a look around. There was a lot of evidence of the locals using Owl Roost and Twin Holes very regularly, and Owl Roost even looked to be in the process of being turned into someone's shrine, with an 'RIP Bobby' plaque, flowers and many tea candles. Spiral was very wet and humid; being by myself I only ventured to the first pitch, but I was still amazed by how different the caves are.

I spent the rest of my time there taking photos and doing a little hiking on the Range, and am now very excited about the coming *Ningaloo Underground* conference.

A trip with DPaW *Darren Brooks*

Date: 5 July

Caves: C-848, C-849, C-850, C-345 and C-659

Party: Keely Markovina, Pete Firth, Jack Brodie and Darren Brooks

Keely is an employee of the Department of Parks and Wildlife (DPaW) who was leading this trip to recover trail cameras used to monitor feral animals in the Cape Range National Park. The cameras were set up a month previously in the southern branch of RAAF Canyon, and were installed by walking from the Well 2 site at Charles Knife Road and then returning to that point. This time we were walking from the creek crossing on the west coast road, and journeying right up the gorge to a vehicle that had been deposited the evening before at the Well 2 site.

We started early and it was just getting light as we parked the car next to the road and geared up for the walk. Keely hit a kangaroo with the bullbar just before we got there and killed it stone cold dead. This was after we'd just stopped to examine another carcase that had been left on the road. This one had rigor mortis and was probably killed the evening before. It had a hairless and deceased joey hanging from the pouch. No, this has no relevance to the report, so on with the story…

The gorge was spectacular and the damage from the floods was plain to see. The main creek bed was virtually devoid of vegetation, although large tree stumps could be seen everywhere and some were sprouting new, reddish-pink leaves. Even where we crossed over a rise out of the main creek the spinifex and scrub was flattened and decorated with debris from the massive overflow.

Our first real stop was at a point where I'd noted on the topo map (for many years) that there was the word 'cavern' poised just above the top of the northern rim. There was also a pinnacle indicated in the creek bed. The pinnacle was first identified as a massive boulder at least 6 m high. The cavern was also visible from that point as a large arch (now C-850) where the sunlight could be seen streaming through and highlighting the scrub on the hillside downslope. We lunched here and then climbed up the talus slope to investigate the arch.

Figure 176: Sunlight shining through the arch of C-850. *Photo Darren Brooks*

The arch appears to have been a large chamber which has been exposed on the gorge side by the cliff face creeping back and the upper entrance is a classic collapse doline on the ridge top. Immediately adjacent to the doline is another valley on the north side. The ridge is very narrow here, probably ~25 m wide. Maximum width of the arch is in the order of 35–40 m, and about 15 m high. I had no survey gear with me and I'd even left the cave tags down on the gorge thalweg where we'd lunched, so everything is just extremely rough estimates. The doline measures about 15 m by 25 m diameter and is an easy climb in and out. The rear, northern edge of the doline is actually already on the downslope of the adjacent gorge (fig. 177). (Later I had a look on Google Earth – I don't know why I'd never done it before – and the doline and arch are clearly visible, even down to the sun streaming through. Quite an impressive image.) There is a fair smattering of decoration in this feature, some of it still active. Other features could be seen across the gorge.

About 800 m further upstream Keely spotted a small cave that seemed to go back a lot further than the many hundreds of other features that abound in the sides of the gorges. She had a bit of a look while the rest of us dropped packs and had a drink of water. She came out and asked me if it was normal that a cave should go in so far. I asked how far. She said very far, out of sight around a bend 10 or so metres away. I scrambled into the entrance immediately. Paydirt! Keely had found an ancient outflow tunnel. The floor was lined with old

Figure 177: The rear of C-850 showing the doline. Pete on the bridge with Jack in the foreground. *Photo Darren Brooks*

Figure 178: One anomalous entrance (upper left) among thousands of small caves. *Photo Darren Brooks*

flowstone and the tunnel was a lovely horizontal oval shape. This was a very exciting find. Naturally, we didn't have any caving gear with us. We had to collect several cameras and stakes to transport out. I had agonised whether to take my helmet or anything like that and in the end didn't even carry a headlamp. Fool that I am! We ventured in 30–40 m using an i-phone torch for the four of us but it's not the ideal situation and so we retreated back out into the sunshine, me to curse my stupidity for not carrying caving gear. The exploration still awaits. At one point Keely shone the light towards me and I saw what looked like a tiny patch of brown fungi on the ceiling. I pointed it out and she brought the torch over. It was a microchiropteran of unknown identity, but the most likely culprit is *Vespadelus finlaysoni*. It suddenly flew about and we were entertained by its antics until it disappeared into the darkness further down the tunnel. I tagged this as C-848 before we departed to our main task.

Figure 178: …Keely's tunnel, C-848, showing old brown flowstone and smoothly polished rock. *Photo Darren Brooks*

We collected camera traps as we travelled up the gorge. Each camera had a bait in front of it in the form of an aromatic sausage wired onto a picket or branch of a tree. These baits were not toxic: they are just for establishing the existence of feral fauna in the area or native wildlife such as monitors.

Once past the last trap, we came upon a vertical cave entrance which Keely said had been found by one of the other staff when they installed the traps. They couldn't find a tag, and when I was given the location a week or so ago I wasn't sure if it was a known feature. The caves and dolines present in the immediate area were found in the early to late nineties, so the location was semi-accurate at best and sometimes out by many tens of metres. However, being somewhat familiar with the area I knew immediately I saw it that it was unrecorded by me. Keely was delighted that we'd established the location and tagging of two new caves in the area. This cave is now C-849. It is a vertical hole down that quickly opens up into a chamber and it looks to be about 12 m to the floor. It now remains to return to these caves and explore and survey. This latter cave is not too far from the road, about 3 km, but C-848 is about 5.5 to 6 km so to approach it through this type of country makes it a full day trip either way.

Figure 180: Keely and Pete at the entrance of C-849. *Photo Darren Brooks*

We left the gorge at this point to travel over to the end of Charles Knife Road and the car that was left for us at the Well 2 site. On the way I dropped in on the entrance of C-345, a 40 m deep shaft, and found it was about 70 m out of whack; and C-695, a blank, soil-filled doline, whose location was out by about 30 m. We walked pretty much in a straight line across the terrain and through a section where I had no caves marked, and unfortunately we found no further caves.

Millipede collecting 1, and photo-tagging *Darren Brooks*

Date: 8 July

Caves: C-15 Papillon Cave, C-851, C-13, C-160, C-161 The Star Chamber, C-816, C-715, C-852, C-151

Party: Darren Brooks

I hit the road early and was already heading up the track behind Learmonth Airport just as it was getting light. My task was to collect millipedes on behalf of the WA Museum where Bill Humphreys was going to run a project using genetic[1] markers on this group of troglobites. I will eventually visit about 30 caves to fulfill the requirements of this project and today was my first foray. We'd had plentiful rain this year and I was hopeful it wasn't going to be too difficult.

Owing to the closure of Shothole Canyon Road for I don't know how long due to flood damage, and the closure of Charles Knife Road while it is being repaired and improvements are made to the road

barriers (because Charles Knife Road is such a frighteningly precipitous and dangerous road – not! – talk about over the top), I decided to start with some easy horizontal caving in the southern genetic zone (as indicated by previous genetic research on the millipedes).

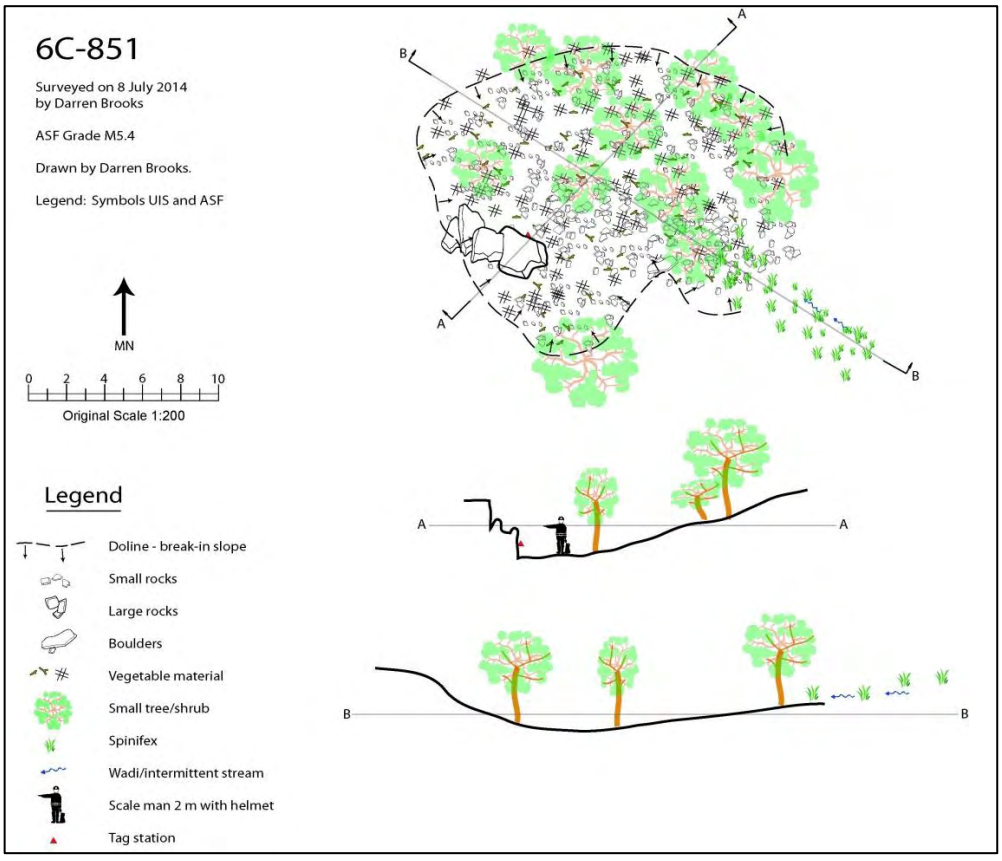
Figure 181: The first view of Papillon Cave belies its awkward entrance. *Photo Darren Brooks*

It was a cold morning and I felt the chill when I removed my jacket before walking over to the cave. Papillon Cave didn't have any butterflies nearby except the usual odd one or two. I was expecting this cave to be a veritable sauna so I doffed my shirt before heading in. I found the entrance awkward but negotiable – nothing has changed since my last visit on 2 October 2008 during the ISSB Conference field trip. The cave was quite wet but the humidity was tolerable, not as high as I thought it would be. I hardly broke into a sweat. Millipedes were in abundance, but not so many adult ones – enough to fulfill collecting requirements. However, every rock I turned over had from several to lots of tiny millipedes attached to it, all swarming away after being disturbed. They were really breeding up fast.

I paused for a couple of pics but it took ages for my cold camera to adjust and stop fogging up. While sitting under the entrance I could feel the cold outside air flowing over me and I started to feel the chill almost immediately.

I note that on the 1989 survey of Papillon[2] the map does not show a couple of small holes/leads and nor is there a cross-section or long traverse depicted; I shall have to return one of these days to get this data. I would also like to explore this cave further. It takes some air and either blows or sucks according to the exterior variations in barometric pressure, so there is probably only this one entrance. The cave has been searched before but one more look can't do any harm and who knows when something new might turn up.

From here my next target was The Star Chamber, but while up here on the range I thought I might as well chase up a few things I've wanted to sort out for quite a few years. So I first headed to a feature not far south of Papillon but on the west side of the track. I'd looked at this blank sinkhole several years ago, probably back during the ISSB field trip again, and so this time I went across to tag and survey it. C-851 is a soil- and rock-filled doline with a low wall on the south-west side where I attached the tag. It is heavily vegetated and has a small catchment area. With a maximum depth of about 3 m and a maximum horizontal extent of 10 m by 20 m out to the edge of the break-in slopes it is not a huge feature, but neither is it insignificant.



Map 19: C-851, drawn by Darren Brooks

Heading off north up the road I stopped at C-13 to take some entrance pics. I've surveyed this cave but had no images of it at all. There is not much to look at inside anyway as it is quite a narrow and stepped shaft, difficult to get in and out of.

To get to The Star Chamber I walked across the stripped limestone pavement area around C-160 and so took a series of entrance pics of it.

Figure 182: The bush at the centre of this karst pavement conceals the tiny entrance to C-160. *Photo Darren Brooks*

Finally I entered The Star Chamber and at the bottom of the entrance slope I found the mud damp – a good sign for millipede collecting. This chamber has been well trodden many times but I noted that the mud didn't reveal any evidence of previous visitation. The water must fairly stir up here to obliterate all the footprints so completely. I found millipedes aplenty once I got my eye in and had my quota in alcohol in about half an hour. I didn't hang around long but exited to pursue my other targets.

Figure 183: The entrance to The Star Chamber is down to the left, while a climb to the right goes to C-816. *Photo Darren Brooks*

The doline of C-161 contains two entrances. The first one, into The Star Chamber, is at the lowest point of the wall at the back of the doline and is a snug vertical climb down due to a large rock half blocking the entry gap. The other entrance is right next to it and is a horizontal crawl to the top of the entry slope into the next part of the cave. I haven't allocated a number to this entrance yet but I have numbered the back entrance to this side of the cave as C-816. On the map they appear to be the same cave; both caves have a north/south orientation as they lead off from the entrance slopes. In fact, you can peer from down the rock slope in C-816 through gaps into The Star Chamber's main chamber. So, really, one cave with a collapse doline somewhere near the middle.

Having photographed the entrances I wandered further west from the track to take some pics of C-715. I did take a quick look inside this small cave just to remind myself of what it was like. It's a small collapse doline with a low, short lateral cave heading off about 10 m to the west.

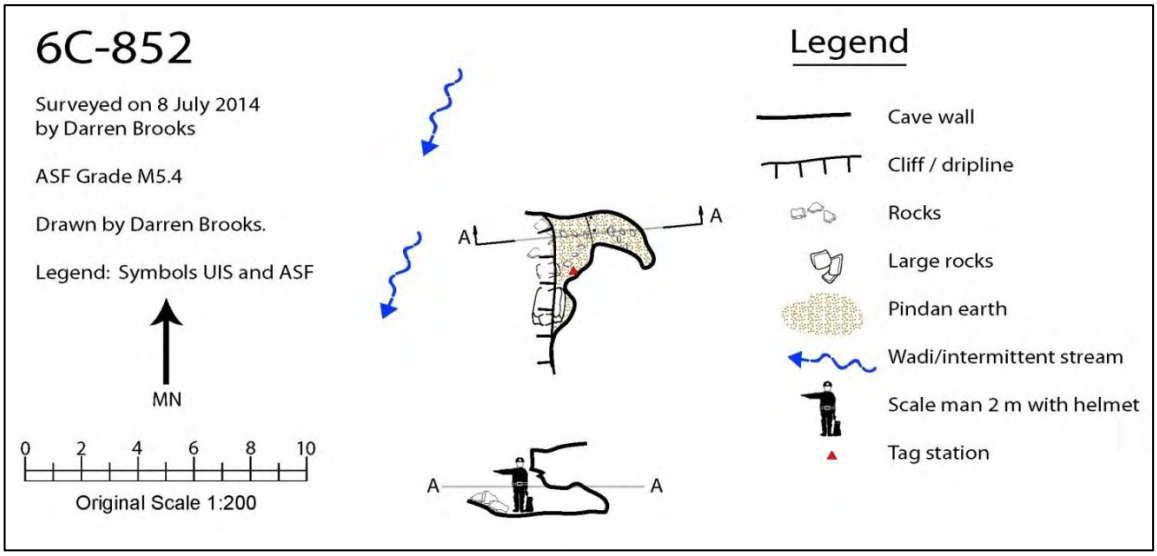
Figure 184: The small collapse doline of C-715. *Photo Darren Brooks*

I thought C-151 was a curious choice to go and look in for millipedes. I'd never been there to the best of my knowledge and records and I didn't remember it as being a cave that was noted for its suite of troglobitic fauna. But it was on Bill's list so there I went. The other opportunity available to me near C-151 was that a couple of dolines not far from it had been marked on Ross Anderson's waypoint list from the 2004 WASG expedition to Cape Range.

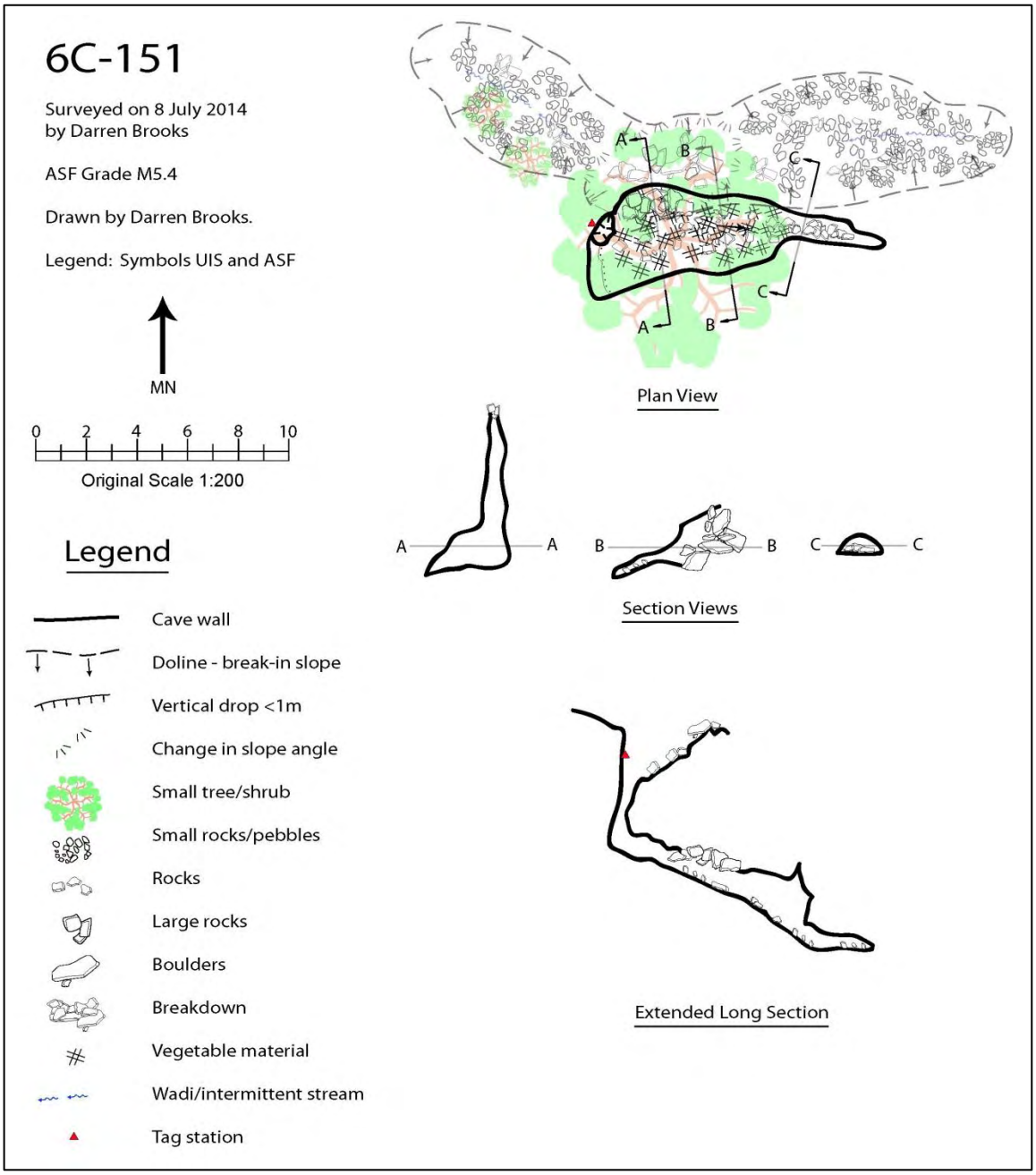
Walking towards the cave I first encountered Ross's second marked doline. This was tagged as C-852 and quickly surveyed, being only a small feature. It is located down in a small valley, just to one side where it has become isolated from the main thalweg by a slight rise. It has a small chamber about 1 m high that goes back a metre or two. I guess it may still take some water during extreme rainfall events when the main creek overflows into it – I couldn't really tell.

Figure 185: The entrance to C-151 is shrouded in fig leaves. *Photo Darren Brooks*

Not far away I located C-151 where it is surrounded by scrub and small trees. It has a small entrance. It is referred to in the trip report by Jay Anderson for the 2004 WASG expedition. The cave was found by Tom Tomlinson back in 1987 but I have no other record for this cave. Ross sketched it when he visited it with Jay, Ian Collette, Ken Cameron and Ruth Lyons but I had no pics of the cave at all.



Map 20: C-852, drawn by Darren Brooks



Map 21: C-151, drawn by Darren Brooks

Figure 186: Looking up the litter-covered slope of C-151. *Photo Darren Brooks*

When I entered it I found the entrance and the steep slope down the chamber were covered with leaves from the fig tree over the entrance, where the leaf litter is channelled down the funnel-like chute. I figured there could definitely be millipedes in the deep drift of litter if it was damp enough. The chamber levels off at the bottom into a tiny room and then a small, impenetrable tunnel that soon stops after a couple of metres. I basically lay down in this low section and started to survey the cave out. Once at the bottom of the entrance chute I started a good search through the litter, half of which, I swear, was now down my boots and in my shorts. It was a tad uncomfortable. I hoped there weren't any bities in there (my shorts and boots, I mean. I expected there to be at least some in the drift of litter.) I found heaps of isopods but not one millipede. I wondered if perhaps Bill had a typo on his cave table. Anyway, I got a couple of shots of the cave and headed out and had a good leaf-litter shakedown before photographing the entrance and heading off to investigate the other feature not far away.

I found this immediately. It was quite small and I pondered whether to tag it or not. Eventually I decided not to as it was so small I was positive it wouldn't be spotted on Google Earth and there were other features in the area far more significant.

After my early start it was getting on for 5.00 p.m. so I headed back to the car and home.

References

1. Humphreys, W.F. & W.A. Shear 1993, 'Troglobitic millipedes from semi-arid Cape Range, Western Australia: Systematics and biology', *Invertebrate Taxonomy* 7(1): 173-195.

2. Papillon Cave map 1989, *The Western Caver,* Volume 29, p. 23.

Millipede collecting 2; plus Mick gains experience *Darren Brooks*

Date: 13 July

Caves: C-62, C-118, C-167 Spiral Cave, C-162 Rockbench Cave, C-126

Party: Mick Hall and Darren Brooks

Another millipede collecting foray. This time all vertical caves. Some of these caves I hadn't been to for years so it would be interesting to see what I remembered about them. Again, I was aiming also to take lots of pics because, although some of the caves, such as C-118 and Rockbench, have been much visited over the years, I don't have any visual record of them.

C-62 is close to the track heading north to the Well 3 site. Thank goodness for that because the scrub was annoyingly dense around the area. The entrance is in a creek bed which is packed with thorny acacias, as are the immediate slopes and surrounds. It was an effort just to find a way down to the hole. I had just two images of the cave that date from 1999: one is of the entrance with some crew standing around and the whole area burnt off, so very different from nowadays, and the other is of the entrance looking out with Dad prusiking up the rope.

I rigged and headed in followed by Mick. I soon found millipedes and after that I used Mick as my scale model (about 2 m without the helmet) for some pics of the chamber.

Figure 187: Mick admires the stalagmite boss in C-62. *Photo Darren Brooks*

I found a large dragon, the bearded variety, I think, and I loaded it into my pack and carried all my gear on my belt so I could safely remove said lizard from the cave.

Figure 188: The rocky streambed between mudbanks in C-62. *Photo Darren Brooks*

C-62 has two pitches of about 6 m each, most easily negotiated by just running the rope from a rebelay at the entrance edge and straight down over the edge of the second pitch. It's only a short distance and no protection is necessary if prusiking

very carefully. The chamber is roundish and about 25 m by 25 m with between 3 m and 5 m headroom throughout.[1] There are boulders just beneath the entrance shaft and a little rocky streambed running away to the rear of the cave where there are drain holes in the soil. The floor consists mainly of mudbanks. There is a deposit of flowstone and a big, fat stalagmite on the south-west side of the entry point. The ceiling has a liberal sprinkling of small stalactites, most of which are muddy brown in colour.

We headed north up the Well 3 track to C-118. This cave was the site of experimental work carried out on troglofauna population levels and breeding rates after flooding by Bill Humphreys of the WA Museum. This experiment was carried out in 1988 and was, I believe, the first of its kind.[2] I have one image of the cave, taken in 1986, that was supplied by Malcolm East and it shows Ray Wood climbing a wire ladder out of the entrance. The image is available for viewing on the WASG website.

Figure 189: Mick in the main chamber of C-118, looking into the upper level. *Photo Darren Brooks*

The cave is about 40 m by 25 m with a ceiling height of about 10 m. There is a sort of poorly defined upper chamber that has a clump of hanging tree roots but my attempts to photograph this feature were a dismal failure. There is a tide mark near the upper edge of this highest section and there would have been only a metre of airspace, probably caused by the dip of the ceiling edge at the open side which would have created an air bell effect.

The floor is generally mudbanks with the obligatory little stony streambed winding along to the far side of the cave where it disappears under a low edge. Now just for the record, for I don't actually have written confirmation of this, Malcolm East told me many years ago that his brother Steve had tried a bit of a dig along the streambed and through the mud but gave up after a while. He came out covered in mud and sweat. I don't think that they thought it held much promise.

There is some decoration around the top of the pitch and a couple of bits in the cave but not much.

Our next port of call was the very likely mis-named Spiral Cave.[3] I really wasn't looking forward to this sauna but it was on Bill's list so there we went.

Figure 190: The entrance to Spiral Cave. *Photo Darren Brooks*

I rigged the first pitch and while Mick was making his way down I had already found some leaf litter near the head of the second pitch where millipedes were crawling about. Wonderful. It was good news for me but bad news for Mick. I didn't have to bottom the cave on this trip but poor Mick missed out on seeing the rest of it. I was happy. I was starting to work up a good sweat lather and looked forward to the cool air awaiting us at the top of the pitch.

Spiral Cave has several pitches and somewhere around 150 m of passage, some of which is quite awkward. Greg Thomas had a hard time in one section near the far end back during the 1999 WASG expedition.[4] At its furthest point Spiral is within about 50 m of the far-reaching F survey of Wanderers Delight.

We headed up the Wanderers track to Rockbench. This is an easy 10 m pitch over the bench and a small chamber waiting below. It is another of the caves which Bill used for his capture and recovery experiment on troglofauna.

At the bench – where I remember spending many a pleasant moment or two resting, eating lunch or just sitting around enjoying the place – the fig tree had spread its branches all over the place, making access nigh on impossible without a lot of pruning. Plus, with all the figs present, the branches were covered with the tiny ants that usually seem to be swarming over the fig trees when they're bearing fruit. The ants may be small but when they get their

jaws into you they don't seem to want to let go and you have to more or less smear them to get rid of them. The initial plan was abandoned and I headed around to the other side of the shaft where there was more space and an easy rig off a thick tree branch. Fewer ants too.

I found my quarry in a muddy drain hole jammed with wet leaf litter. The cave was fairly dry overall with wet patches here and there.

Figure 191: A fringe of fig tree roots frames the entrance to Rockbench Cave, C-162. *Photo Darren Brooks*

While wandering around taking pics I found a cave tag hanging from a stalactite. Very curious. It was the tag for C-630, a small, muddy-floored doline not far away where I had placed the tag on a tree branch, lacking anything else to attach it to, back in August 1997. Now here it was in a cave a few hundred metres away and hanging from a stalactite. This bizarre incident forced me to come up with an ingenious answer. I propose that a bowerbird had found the shiny tag on the branch, worked on it for so long that it finally broke the wire and carried it across to the fig tree above the cave, near where it had a bower, and had accidently dropped it down the shaft. The tag then lay there until a cave explorer came along, found the tag and not knowing where it actually came from or what to do with it, had tied it to the stal, thinking that one day, someone like me would come along and find it and replace it back on the correct feature. The only thing missing here is the caver who found it. The bowerbird theory has good evidence to back it up. Back in November 1991, Mike Fyfe tagged a cave, a shaft under a fig tree, with a temporary aluminium tag. He noted at the time the presence in the fig tree of a curious bowerbird. He returned the next week to explore the cave and replace the temporary tag with a stainless steel one but found no tag, just a very twisted wire where it had been hung. Although there were no witnesses, the bowerbird seems the most likely culprit. I think the 2004 WASG expedition camped next to C-630, but I could be wrong.

While taking pics in Rockbench I looked for convenient ledges to place my camera. I touched one such ledge to feel its flatness and a section of the wall came tumbling down. Adroitly, for one of my ancient lineage, I sprang out of the way just as several basketball-sized boulders slapped down on the mudbank where I had been standing. My nimbleness would have won applause from even the most jaded of gymnastics fans.

Outside the cave I wandered up the track for a bit and found another 10 mm ring/open-ended spanner, just like I did back on 17 May at the bottom of Badjirrajirra Creek gorge. This time a nice Sidchrome jobby. I'm not superstitious but now I'm afraid to remove them from the car. I just know that if I do I will suffer a vehicle breakdown and the only way to fix it will be with a pair of 10 mm spanners.

Our final destination for the day, now that I had warmed Mick up with a few easy, shallow caves, was to go down C-126, a snug climb down a slot for about 6 m to the head of a 60 m pitch where I had to deviate the rope three times to get a rub-free hang. It was a bit scary and I really think to make this pitch safer a couple of bolts at the top would go a long way to improving one's chances of surviving the cave.

Again I didn't have to go far to collect my millipedes and I was just about done by the time Mick hit the bottom. I once again used him for a scale man but it was getting late so I suggested he start up the rope and I'd take a couple of pics in the main chamber of this part of the cave while he prusiked out.

Figure 192: Sentinels stand guard above the main chamber of C-126. *Photo Darren Brooks*

Not having much gear with me my attempts to photograph the entry chamber were a failure so I concentrated on the decorations up the climb into the main chamber. Here are ancient stalagmites that tilt in several directions. Having done with these I looked into the main chamber (fig. 193). The air was thick with water vapour, so dense I could barely make out the details of the dark, muddy wall on the far side. Stepping from the tunnel into the chamber gives the eerie effect of walking into a gloomy, foggy London back alley *à la* the old black and white Jack the Ripper movie. However, the photo with the light offset to the camera doesn't show this effect at all. There is a patch of completely muddy stalactites on the left wall when entering the chamber (fig. 194).

Well, the prusik out turned out to be a bit of an odyssey for Mick. His technique isn't quite down pat just yet and the rope wouldn't run through his chest ascender. So I helped him out by suggesting techniques he could use to make things work. None of these involved me holding the rope below him. Even when he seemed on the point of despair

Figure 193: C-126: the gloomy main chamber lies beyond. *Photo Darren Brooks*

Figure 194: Mud or calcite? *Photo Darren Brooks*

I helped him out by refusing to hold the rope for him. His curses seemed to carry on forever until suddenly he called out 'off rope'. I was on the rope quick as, because it was now approaching 5.30 p.m. and starting to get dark outside. At the pitch head I pulled and packed the rope while Mick worked his way up out of the slot, and this afforded me more entertainment as he swore, kicked and struggled ever upwards through the upper section of the snug rift.

Once out and after a short breather it all didn't seem so bad after all. It was too late to get any entrance pics so we packed up and headed for home.

References

1. Brooks, Darren 1999, Map C-62, *The Western Caver*, Volume 39, p.71.
2. Humphreys, W.F. 1991, 'Experimental re-establishment of pulse driven populations in a terrestrial troglobite community', *Journal of Animal Ecology* 60(2): 609-624.
3. Humphreys, Bill 1990, 'The Location of Spiral Cave, Cape Range', *The Western Caver*, Volume 30, p. 36.
4. Thomas, Greg 1999, 'Stuck in Spiral', *The Western Caver*, Volume 39, p. 49.

Millipede collecting – not!

Darren Brooks

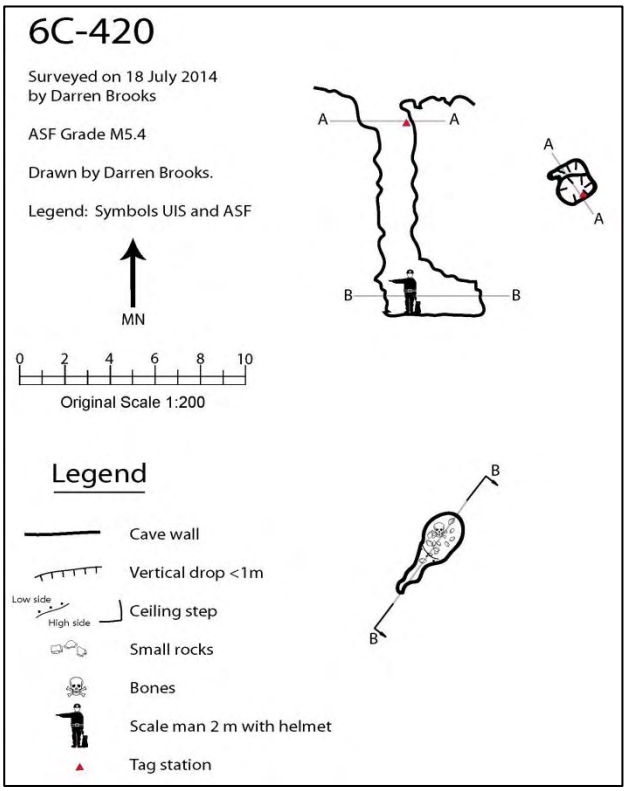
Date: 18 July

Caves: C-420, C-828, C-853, C-163 Wanderers Delight

Party: Darren Brooks

This was supposed to be a millipede collecting trip but once up on the range grabbing my gear out of the vehicle I realized that I'd left all my vials at home. Oh dear. But, with a positive attitude, the day wouldn't be wasted. I'd go and sketch something and hopefully find something new as well. To round out the day after lunch I'd head to Wanderers to look at the re-bolting necessary on the second pitch to replace the dodgy setup I had installed many years ago. I'd also see if the old ladder was still on the short pitch. It was installed 27 years ago in 1987. That's a long time for an already old wooden ladder to be stood in a cave that regularly floods.

I headed west from the Wanderers track fork. Up the ridge about 1 km I found C-420 (fig. 195). This is a simple shaft about 10 m deep. I didn't remember any development at the bottom but I had only entered this cave once. According to my records, I was accompanied by Bill Humphreys and that was on 27 June 1991, the day that we discovered it and I think I free-climbed down it.



Map 22: C-420, drawn by Darren Brooks

I had a look in it and rigged up the rope. No bloody chance of me free-climbing it today. I think of some of the things I used to climb in the past and I now think I was a twit. I don't know why I even took the chances I did back then. Young and dumb I guess. Anyway, easy rig with an overhanging rock to rebelay from straight to the floor. The floor consists

of a small amount of soil and lots of small rocks. Some fissure development heads off to the west for 3 m but stops. It felt cool at the bottom but I could feel warmth and humidity through the tiny cracks at the end of the fissure. I took a couple of pics and exited.

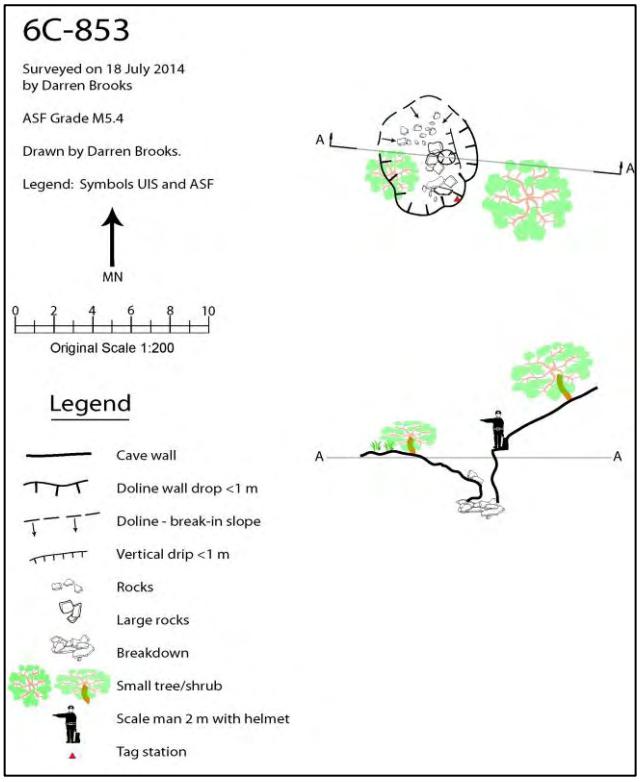
Figure 195: The entrance to C-420. ***Photo Darren Brooks***

I wandered west over the hill to C-828, a feature that I investigated with Ross Anderson and Tracy Robins six years ago in 2008. What was interesting about this doline was that at the north-eastern end, just out of the doline and at the edge of the small wadi running into it, there was lots of green algal growth in amongst the small breakdown rocks. There is a cave breathing under here. I moved a few rocks around, and the soil and leaf litter as well as the rocks were quite wet. I encountered some larger breakdown beneath the smaller stuff, too large for me to tackle today. As I dragged litter and crap out from between the larger stuff a small opilionid (harvestman) crawled across a rock. No collecting gear! Fool!!

I had other features in the area to sketch but as they weren't tagged – I hadn't planned on looking at this area so I didn't have the relevant tags with me – I bypassed them and headed back to the car on a route that would take me through an area with no recorded features. Within a few minutes of starting back I came across a doline on the slope of a valley. This also could be a potential dig I reckon. There was some loose breakdown at the lowest point and I did a bit of boulder removal there. I soon broke into a small chamber just large enough to crouch in. There is a lot of larger breakdown on the floor in here and some soil off to one side. With a determined crew… just maybe. I tagged this as C-853, surveyed and took pics.

I continued on without finding anything else of particular interest before reaching the vehicle and a well-deserved lunch in the shade.

At Wanderers I took a good long look around at the top to see if I could improve on the rig setup I already have there. Try as I might, I just couldn't see a position where I can get a hang from the top without a rub point, so I've left that as it was after inspecting the current bolts and deciding that they're still in pretty good nick and probably in the best spot they can be.



Map 23: C-853, drawn by Darren Brooks

I put in a new pair of bolts back from the head of the second pitch and then a pair right at the original hang point so that area is now sorted out. I've still to remove the old hanger from up above the hanging point with the rusty old trace-wire back-up.

I headed down to check out the old ladder. Yeah, it was in crap condition although the recent floods hadn't smashed it yet. Miraculously, it was still standing at the 3 m pitch although, without the 6 mm cord holding it to the wall, I reckon it would have gone down the cave for sure. The top rung was falling out and I climbed down it only to find it sagging and creaking alarmingly, but I had to have just one more climb. I've got lots of good memories with this ladder. Brian Vine has a bad one where he stood on the top of the ladder and he and the ladder both went swinging out from the wall and crashed to the rocky floor. He completed a caving trip that day and several more in the ensuing days, not realizing he had smashed his fibula into several pieces. He's one tough mother, that Brian; an incredible tolerance to pain.[1,2]

Back up above the ladder I put a single bolt and hanger over the pitch head at the right-hand side looking down the pitch. There will still be a rub point but it's smooth rock and only a short drop. The rock is really solid and I think the single bolt will suffice.

I hauled the ladder up, surprised by how light it was (probably due to most of it having decayed away), and tied it to the end of my rope. I slowly prusiked out of Wanderers, stopping at the ledges to haul the rope and attached ladder up. It was a bastard. Never try to lift a ladder with the rope attached a couple of rungs down from the top (which I had to do because the top two rungs were either broken or incredibly flimsy); the ladder sticks out at a funny

angle and will always spin with the stiles under the ledge you are trying to lift it over. At the very top where the entrance is overhung, I was hanging off the anchor, leaning out over the edge and struggling with this poxy old ladder for bloody ages in the hot sun, no wind, sweating like a hairy Greek in a sauna and slowly coming to the point where I realized I hated this ladder that I had so many fond memories of.

Rattling across the bumpy countryside about 1 km from the bitumen I looked in the rear vision mirror to see the ladder once again (frustratingly) coming loose in the tray and falling out the back of the ute. I stopped, picked it up, ran at a thick clump of scrub and dead, tangled tree limbs and threw it over into the lot of it. It blended in well with the dead branches. The termites will have eaten it in a couple of years. It really did deserve a minute's silence and maybe a raising of glasses from tired, muddy cavers to honour its 27 years of faithful service. What a violent and ignominious end to an old friend.

References

1. Brooks, Steve 1992, 'An Accident in Wanderers Delight', *The Western Caver*, Volume 32, p. 11.
2. Brooks, Darren 2009, 'The Longest Crawl – Wanderers Delight', *The Western Caver*, Volume 49, p. 78, section headed '1st September, 1992'.

Millipede collecting 3

Darren Brooks

Date: 16 August

Caves: C-154 (I wish!), C-854, C-171, C-163 Wanderers Delight

Party: Scott Noblett and Darren Brooks

Today I was accompanied by Scott. He is my neighbor and in the past he has caved in Tasmania with the late, and legendary, Jeff Butt. On this millipede collecting trip I remembered to bring my collecting vials, unlike last month's memory failure. Our first objective of the day was to actually find and collect from C-154. However, it wouldn't cooperate and we couldn't find it.

I was sure I had re-GPS'd the entrance on the last visit I made with Ross Anderson and Tracey Robins back in 2008.[1] We followed the directions from the GPS and this led us to an overgrown feature that didn't look at all like the entrance I remembered. However, it was six years ago and things could have changed after the big rainfall earlier this year. We geared up in our harnesses and I headed in through the scrub. Yep, it wasn't C-154 but a completely new feature and of course it didn't require a harness to explore. First point to the cave. I have numbered this small cave C-854.

C-854 is located in a wide-ish section of a wadi that is thick with scrub and spinifex. A lot of water obviously flowed into and over this cave during the floods in May. It goes back only a couple of metres, has a low ceiling about 1 m high, and there are some 1 m deep incised inflow and outflow grooves in the edge of the wadi thalweg. The floor consists of soil and leaf litter with some conglomerate rock. I would guess this was once a pretty decent inflow cave, a bit like the currently lost C-154. We wandered around the area looking for the cairn on the ridge that marks the location of C-154 but failed to spot it. Giving this up as a bad day I sketched the new feature and placed the tag before we headed off back to the car and more promising prospects.

We headed to C-171, a cave I hadn't visited since 1999.[2] This feature isn't far from the road; a short walk brought us to the entrance where we climbed down the slightly squeezy rift and worked our way down to the chamber below. It seemed larger than I remembered it and the atmosphere was a comfortable temperature with not very high humidity. It didn't take long to find a couple of promising patches to deliver some millipedes to our waiting vials so with this encouraging start we scoured all available damp spots until we had obtained the requisite number of specimens. I also spotted a tiny spider on the base of a rock I overturned but with my crappy glasses I wasn't sure whether I managed to get it into a vial. I took a couple of pics of the chamber with Scott as scale-man to make things a bit more interesting. These pics certainly turned out a lot better than my efforts 15 years before.

Figure 196: Scott poses by a curtain of fig tree roots in C-171. *Photo Darren Brooks*

It was time for us to head over to Wanderers Delight so I could finish the re-bolt of the entrance pitches, and to collect millipedes.

The problems I had with the bolts last trip were quickly sorted (fig. 197) and we headed into Wanderers to where I hoped we would find damp soils and millipedes in abundance. You can tell where this is leading. I was surprised at just how dry Goat Chamber, just beyond the gate, was. Plus, the soil and gravel that used to carpet the floor there to a depth of about 0.5 m was swept up against the rocks leading into the B survey and the floor is now bare rock. There was a slight breeze wafting into the cave. I took Scott through into Urchin Chamber. There was a little damp soil but no fauna was observed. I noted arrows chalked all over the place pointing out from Urchin Chamber. Someone didn't want to get lost. The volume of arrows was somewhat of an overkill. They started in Urchin and terminated in Goat, showing the

extent of exploration undertaken by the mysterious visitors. I would have thought a gap of several metres between arrows would have been sufficient, rather than the 0.3 m favoured by some.

Figure 197: Tentatively testing the new bolts at Wanderers Delight. *Photo Scott Noblett*

Scott didn't have any kneepads so I imagined the cave would have started taking its toll on his knees. We ventured a short way down the A survey to the junction of the I and A surveys. I thought this would suffice for our fauna hunt. The section of passage beyond here is worse than what we had already covered. Already very dry here, and in deference to Scott's suffering knees we returned to Urchin Chamber and Scott admired the urchins and took a number of photos on his clever-phone.

Figure 198: Ancient urchins in the Urchin Chamber, Wanderers Delight. *Photo Scott Noblett*

It was late afternoon by the time we got out of Wanderers, so after a pack-up of gear and a short rest complemented by icy cold beer we headed off home. Scott mentioned that it was hard work having to hold his whole body up in the air when going through the crawls.

References

1. Brooks, Darren 2008, 'Trip Report 11th June, 2008', *The Western Caver*, Volume 48, p. 77.

2. Brooks, Darren 1999, 'Trip Report 15-10-99', *The Western Caver*, Volume 39, p. 67.

Millipede collecting 4: some tricky entrances *Darren Brooks*

Date: 1 September

Caves: C-18 Dry Swallet, C-79

Party: Darren Brooks

It'd been a while since I'd been to Dry Swallet. More millipedes to collect on this trip. The vegetation around the entrance is thick but not too obstructive. Someone has pushed the track that stops right next to the doline just that little bit further. Not content with a big hole 10 m in front of the vehicle as being reason enough not to go any further, they have pushed it to the bitter end.

Figure 199: The first pitch in C-18 doesn't look too flash from below. *Photo Darren Brooks*

I threw a rope down the rigging hole and swung it over onto the ledge below the first pitch and then headed over to rig and drop the first pitch. It looks a bit nasty from below but seems pretty solid. The second pitch is fairly exposed and I had a bit of trepidation when it came time to ease myself over the edge. The first pitch is only about 6 m. The second pitch is 29 m but there is a fair bit of unstretched rope above you before you rig to it and abseil in.

Figure 200: Looking up the main pitch past the two deviations. *Photo Darren Brooks*

The cave was cool at the bottom of the pitch and there were a lot of sticks and leaf litter on the floor from the floods in May. I didn't need to go as far as the lower chamber to find millipedes, there were plenty here in the corners of the chamber where the soil was dampest. They did seem rather sluggish in this large, cool room.

Figure 201: Millipedes in abundance. *Photo Darren Brooks*

I wanted to see the lower chamber anyway so I made my way down, taking a couple of pics as I went. The water pool that is occasionally present at the end of easily navigable passage (that is, before it becomes a flat-out belly-crawl) was quite large and I could see it was at least 300 mm deep. It hasn't been seen like that in quite a few years. I would have liked to have checked the blockage in the tunnel beyond the pool, but it was a bit muddy here and I didn't fancy getting too filthy. The air in this lower chamber seemed fairly cool too. I fancied I could possibly feel faint air movement. My imagination, perhaps.

I had a short look for pseudoscorpions under the rocks but spotted nary a one. I had another cave to collect from so I headed out.

Figure 202: The upper passage in C-79 has some reasonable decoration. *Photo Darren Brooks*

At C-79 I climbed in, taking a short rope with me for the pitch into the soil-floored chamber. There is some nice decoration in the upper section. I took plenty of pics of the decoration and of the upper chamber. There is a hole at the top of the pitch one can look through into the upper part of the lower chamber and a section of nice, white decoration can be seen through it.

Figure 203: Looking across the head of the pitch. *Photo Darren Brooks*

I rigged a rope from near the point where I climbed in and ran it along the upper passage to the top of the pitch, tying in to a large boulder on the floor about two-thirds of the way along the passage. This boulder is flat on the floor and there are no tie-off points anywhere with any height, so all rigging is at floor level apart from the initial tie-off. There is a small solution hole right at the top of the second pitch. It's quite tiny and a bit scary but I've used it several times over the years and it hasn't failed me yet. That doesn't necessarily mean that I would

recommend its use to others. There were at least a million rub points on the pitch – I counted 'em.

I landed in a clean, rocky area but that is only at the bottom of the pitch; the rest of the chamber has a coating of brown silt which gives it a distinctly gloomy effect. Things look brighter up high where the previously mentioned decoration, which can be seen from the top of the pitch, is visible near the top of a steep, loose-looking rocky slope that leads up to a small alcove. Foul air has been recorded in here but I did not detect any with my inflatable CO_2 detectors (my lungs).

Figure 204: Some relief from the dark aspect of the lower chamber, C-79. *Photo Darren Brooks*

The soil was dryer than I expected and the temperature did not seem particularly warm. I hardly broke into a sweat. The search for millipedes, however, was not as pleasant as the atmosphere. I managed to collect the required number of specimens but this took over two hours, an interminable period compared to the two or three minutes it took in Dry Swallet. What with all the kneeling and crawling about the old knee joints and legs felt a bit stiff and rickety. The prusik out soon loosened me up again (in the knee joints, I mean).

There is a low-grade survey of C-79 that I did back in 1995[1] but it's pretty weak and needs a proper survey to make it understandable.

Reference

1. Brooks, Darren 1995, Map C-79, *The Western Caver*, Volume 35, p. 88.

Millipede collecting 5: Shot Pot

Darren Brooks

Date: 3 September

Caves: C-106 Shot Pot

Party: Darren Brooks

My last visit to Shot Pot was back in 1992 when I visited with Bill Humphreys and Ken Cameron. My grid reference was out by about 100 m, thanks to selective availability. I spotted the entrance a little further downstream where the scrub was denser and higher. Making my way down to the shaft entrance I wandered around to the south side where the small hole was located. Back in 1988 I free-climbed the entrance with Brian Vine. I looked at it and thought that I wouldn't be able to do it nowadays. It is pretty overhung at the climbable side. A fall would have to result in almost certain death. I sometimes wonder at the audacity of my youth. What a foolish fellow I was. Ah, reflections on the past… but what a great time I was having.

I rigged the entrance with a couple of tricams – a 1.5 and a 2 if my memory serves me correctly – backed up with a tie-back to a large boulder to make a Y-hang of sorts. I needed a rope protector and an easy deviation just below the rig for a nice free drop to the floor.

Figure 205: My rigging for C-106. *Photo Darren Brooks*

It was hot outside but the cave air was pleasantly cool. I had a look down the short shaft on the east side but I wouldn't get down there without a rope so I headed over to the second pitch leading to the lower chamber. I found millipedes on the mud and leaf litter piled up around the rear entry point to the shaft. This suited me as the rock around the top of the second pitch is all over the place – loosely layered and scary-looking. I was quite happy to give this pitch a miss.

I took a few pics of the main chamber and the abseil hole. Casting about the chamber for some photogenic angles I noted a patch of flowstone and a small group of stalactites. There is a little old decoration in the main chamber, but not much, and it is all very deteriorated. I can't remember if there was any decoration in the lower chamber and I don't have any pics of that area. My memory only provides me with images of a circular-ish room with soil and leaf litter on the floor. In fact, the pics I took on this trip are the first ones I have for the database.

Time was getting on and I needed to pick Sienna up from school. I prusiked out, de-rigged and dropped

Figure 206: The abseil hole has some minor decoration below it. *Photo Darren Brooks*

Figure 207: A view of the main chamber, C-106. *Photo Darren Brooks*

the gear into a heap ready to pack up. At that point I remembered my camera. It was perched on a rock down below. Okay… rig up again, zip down and straight back out. Now I was rushing. Finally got to the car and realized I hadn't taken any entrance pics. Too late, another day.

Millipede collecting 6: checking up on C-215 *Darren Brooks*

Date: 14 November

Caves: C-215

Party: Darren Brooks

This was a glorious and windy day, no good for boating, so caving became the prime objective.

After notifying DPaW of my intention to visit C-215 I headed to the west coast and parked at the rear of the bothy (the accommodation quarters over the road from the Milyering Discovery Centre). There I met a ranger working at dismantling the old solar panel array. This system was now defunct since the big flood in May that washed through the valley and flooded the sheds and solar array. A new array has been erected – in the same place. Obviously not expecting another flood any time soon.

The ranger told me he used to guide in show caves in South Australia. I didn't get the details but he did inform me that he'd once climbed down into the upper chamber of C-215 and noticed the small holes leading downwards but they'd been too tight for him to attempt. He is a fairly big guy.

After giving him the expected time of return that he required before I could head off, I made my way up the gorge to the cave. There are two gorges that join just before the Milyering quarters. The southerly one that I crossed first was fairly cleared out of vegetation due to the flood. Where once before I had walked through waist-high spinifex and struggled around thickets was now open channel country with a floor of cobbles. The northern gorge was hardly changed owing to its small size and lack of catchment area. I scared a few kangaroos out from under the fig tree over the entrance.

In the cave's upper chamber I felt the humidity wafting up out of the holes in the floor. I chose to enter via the smaller hole at the very rear of the cave because I hadn't used it since 1989, when it was used as the main entry point to the lower level before the other, easier hole was located and cleared out. I found this original hole tight and awkward. Now I remember why we have used the other hole ever since. D'uh!

In the lower reaches the cave felt exceptionally hot and humid but it was probably just me. The water seemed lower than it normally would but lack of monitoring makes that observation pretty meaning-less. There were a few *Milyeringa veritas* (blind fish), though not as many as I have seen in the past. The root mats at the middle region of the canal were thick and rich. I managed to collect some millipedes even though, when I got my gear out to start collecting, I discovered I had forgotten my glasses. Unfortunately that meant fine observations were out of the question so I couldn't see if any shrimps were present in the water (I'm sure they were there anyway). Worse still, although I could see the big, white millipedes (*Stygiochiropus* sp.), schizomids were completely invisible to me. Schizomids of the *Bamazomus* and *Draculoides* genuses are present in the cave and it would have been nice to get some specimens of those as well. (I did pick up a couple of tiny, moving blurs and identified them later as a schizomid and probably a reduviid bug.)

I was melting like an ice cube so after taking a couple of pics, using settings that were already on the camera, I headed out to the relatively cool and windy day. While I was sitting under the fig tree to dry off for a bit, one of the kangaroos I had disturbed earlier bounced up to the perimeter of the fig tree and peered through the gaps in the branches at me. I sat as still as I could. A joey poked its head out of the 'roo's pouch. The 'roo must have been able to smell my man stink and slowly worked its way off to another shady bush.

I liaised with the ranger again on the way back to the car, with just minutes to spare, letting him know I had survived my harrowing cave trip.

Fauna monitoring around Camerons Cave *Darren Brooks*

Date: 19-22 November, 26-27 November, 1 December

Caves: C-452 Camerons Cave, C-168 Dugite Cave, C-23 Dozer Cave, C-105 Gnamma Hole, C-73, C-495 New Mowbowra Cave, C-28 Bundera Sinkhole, C-509 and C-25 Kudumurra (or Palms) Well

Party: Bill Humphreys (to 22 November) and Darren Brooks

This report encompasses several trips to several features over a number of days. The work was conducted to monitor fauna in and around the Camerons Cave threatened community reserve and was funded by a grant from the Rangelands Natural Resource Management WA. It involved entry to Camerons Cave and nearby features, and netting and litter trapping in bores that were sunk for the purposes of monitoring the local groundwater and stygofauna, as well as in any other nearby bores that we could locate.

19 November

We entered Camerons to search for fauna. This entailed a fair bit of lying around and sweating, but nothing was found. This is not unusual for Camerons, which seems to be a very low-energy environment. It is not flooded by rains and so, unlike many of the larger, fauna-rich caves, it receives no energy boost from major precipitation events. Apart from the first visits to the cave back in the early nineties, fauna had only been collected from installed litter and watering systems (which had been inspired by the discovery of a single millipede). We noted that the 300–400 mm rainfall the area received back in May had raised the groundwater level by about 2 m, leaving a coating of thin calcite rafting over everything below that point as the water table receded back to the norm.

Figure 208: In Camerons Cave, a layer of fragile rafting coated everything in the lower chamber. *Photo Darren Brooks*

I found a string leading down into one of the water holes at the lower part of the cave. It looked familiar. Very much like the small ropes I have in my ute for tying things down. A closer examination revealed that it was indeed one of my ropes. Attached to the end of it was a data logger. It took a while but eventually I dredged up from the depths of my grapeshot mind the memory that the logger was put in around 2008 when I did some support work here with a staff member from the Department of Water. She said she would get in touch with me at some much later date to remove the logger and send it to her but she left the project and moved on to bigger and better things, thus forgetting about the logger, as did I. Hopefully it will provide a couple of years' worth of data.

We then visited the three nearby 'CC' named monitoring bores to take water quality readings and to net for stygofauna. One of these, an equipped bore right next to Camerons Cave, was installed by the Water and Rivers Commission. We located several other bores out along the main road and did the same for these. At the shire offices we were given a map of the tip so that we could examine several bores around the waste facility. Finally, we searched for and found several bores that had been installed in locations on site prior to the construction of the light industrial area about 10 km south of Exmouth. Only one of them was unlocked and accessible, but this was only about 30 mm diameter and so too narrow for our purposes.

This was enough for the first day and would give Bill a full afternoon and evening of sorting specimens. I pottered around constructing a jerry-can watering system to install in Camerons Cave.

Figure 209: A 'jerry-built' watering system. *Photo Darren Brooks*

20 November

We visited several of the caves in the area, namely Dugite, Dozer, The Gnamma Hole, C-73 and New Mowbowra. Two litter traps were installed in each cave. The 'CC' bores were revisited and litter traps installed. Bill also installed a data logger in one of them. In Dozer Cave we had a good look for guppies, as it had been reported to Bill that they had been eradicated by an ichthyologist from the WA Museum. We didn't spot any.

After lunch we headed into Camerons to install some litter points and the watering system. As usual I left a critical part in the vehicle, so after farting about looking for it in the cave I headed out to the car and found it in the tray where I'd dropped it. Back in the cave we tested our new system (fig. 209) and it seemed to be working fine so we headed out, taking some pics along the way. In the ceiling of the second chamber there is a band of

what appears to be flowstone with a layer of black organic matter just beneath it, sandwiched between the flowstone and some sandy limestone bands. We took several photos of this interesting feature.

Figure 210: A layer of soft material in solution-modified rock. *Photo Darren Brooks*

21 November

An early start today as Bill wanted to head down the west coast to Bundera Sinkhole. The low tide was at about 3.30 a.m. so we hoped we wouldn't be too late to make a crossing of Yardie Creek. We arrived to find only about 100 mm of water so we crossed safely after deflating the tyres.

We had a round of bore work to complete and also some work at Bundera Sinkhole, where we sampled some bores that are sunk into the cave chamber and intersect it at some depth, and installed a data logger directly into the sinkhole.

Figure 211: View of Bundera Sinkhole. *Photo Darren Brooks*

Finishing at a reasonably early time we headed south to inspect C-509 (fig. 136), a flank margin cave which we both remembered as having some distinctive rock art, particularly one piece of a snake painted with red ochre. However, I'd visited the cave two years before this visit and been unable to locate the particular piece of work I was looking for. I thought I'd retained a slide image of the piece but after relocating the image, which dated back to 1993, it was not a match. It would seem that time and memory are playing a game on my aged and enfeebled brain. Bill and I both had a similar memory of the artwork but this recent discovery stands us both as corrected. There is a portrayal of a snake but it is a scratching in the rock with no ochre. It is still an impressive piece with a natural protrusion of rock acting as the eye of the snake.

Figure 212: Bill in the entrance to C-509. *Photo Darren Brooks*

We headed north to Yardie Creek but couldn't resist stopping at the junction of the coastal track and the track up into the hills to the bombing range. There is a new three-way sign that points to the north and south sentry points of the Commonwealth area and up into the range. This track is gated by the Commonwealth, with entry restricted to military personnel and anyone else who can get permission. In this remote area the little street sign must have cost a small fortune to install and, to add insult to the taxpayers' financial injury, whoever ordered this little gem needs to learn that 'sentry' is spelt with an 's' and not a 'c'. Let us hope our defenders can shoot straighter than they can spell.

Figure 213: My spell-checker seems to be malfunctioning… *Photo Darren Brooks*

We crossed the creek again without incident and headed north to call in at Yardie Creek Caravan Park where we examined Kudumurra Well. Eels have been seen regularly in this well over the years, but sometime in the last few years a metal top has been bolted into the concrete. We inserted a camera through a small gap to take pics of the water but this was not very effective and we did not have time to remove the lid to investigate further. There is an inscription in the concrete that dates from 1913. A nice little bit of history that no one really seems to care about too much, by the appearance of the work on the lid.

22 November

It was a very late start. Bill had been up half the night sorting specimens from the Bundera foray so I didn't drop in to his accommodation to pick him up until after 10.00 a.m., and we got started on our way even later. Bill and I once again headed into Camerons Cave, carrying in another jerry-can watering rig. A quick search of the litter points

revealed two millipedes, one at each. I thought this was rather startling. I hadn't expected to see any fauna for weeks. It just goes to show that fauna is lurking not too far away, even though the cave seems destitute of large invertebrates after hours of searching. Just a little bit of bait does the trick. Photos were taken of the apparatus and we headed out.

This was the last day of Bill's visit and so we headed back to his digs where he could pack bags and specimens and prepare for the next day's departure. A small circle of friends partook of a so-so dinner at a local venue that evening, a *de rigueur* formality after any expedition (the dining, that is, not the so-so nature of the vittles).

27 November

I headed down the road to look into Camerons Cave to see if any specimens would reveal themselves to my gaze. Nothing, zilch. I passed some time away outside the cave looking for nearby bores that were supposed to be located in the area. Bill had forwarded me a Department of Environment map that showed several points nearby.

To clarify the situation regarding the ownership of the water points information: the old Water and Rivers Commission was created in 1996 but was eventually absorbed into the Department of Environment. This was then split into several entities, with the Department of Water (not to be confused with the WA Water Authority) being the relevant outcome. The CC2 bore, the closest bore to Camerons Cave, was installed and rigged by the Water and Rivers Commission. I'm sure the situation is more complicated than that, but currently it is the Department of Water that is responsible for our fresh water.

Wandering around in the bush to the north of Camerons I did find several abandoned bores. They are all associated with old horse agistments that have fallen into disuse and disrepair. I also found quite a few mounds of earth at the apparent locations of the water points. I think these were once wells that have now been filled in.

(In the meantime, on Wednesday 26th in the evening I visited C-23 Dozer Cave with a couple of people and there were clearly guppies swimming about near the surface.)

1 December

Again I visited Camerons Cave where I recovered one millipede. I increased the delivery rates and frequency on the water systems as the litter seemed inordinately dry already.

I again had a walk around to the north of Camerons Cave to look for bores or wells as indicated on the Department of Environment map. I found a bit of old gear in the bush, again with a couple of big earthen mounds where I think wells had once been. A smaller earthen mound along a fence line had an old stick with RIP on it. Judging by the size of the mound it looks like it could be the grave of a horse.

Millipede collecting 7: Trionomo Cave *Darren Brooks*

Date: 13 December

Caves: C-589, C-147 Oolite Cave, C-103 Trionomo and C-146

Party: Barry Cullen and Darren Brooks

I urged my mucousy eyes open at 4.15 a.m. to get an early start and headed down to the SES to meet the crew at 4.45 a.m. I wasn't surprised when no one turned up – not at all unusual for that hour of the day. Driving up Charles Knife Road I made note of the newly sealed section that now reaches the top of the hill. The phone rang: Barry was on the way asap.

I amused myself for a while taking pics of C-589 and then parked on the radar track to read the paper until Barry arrived. We headed out three-quarters of an hour later than I had planned but still managed to start the 'great plod' (my standard pace) by 6.15 a.m.

I got a bit confused while walking along the ridge to Trionomo and didn't turn west when I should have but kept heading south. Before I knew it I was heading over to Oolite Cave. I didn't bother turning away once I had my bearings about me. I showed the entrance to Barry and used this as an opportunity for some pics.

Figure 214: Oolite Cave: the great toilet bowl in the bush. *Photo Darren Brooks*

The entrance of Oolite looks a little bit like a toilet bowl. Malcolm East once remarked this to me, and the first time I saw the entrance, back in 1988, I didn't know I was about to find Oolite but one look told me this was the cave. For you young 'uns, 1988 was pre-GPS and the crew around at the time used to just wander about finding stuff and pretending to put dots on the topo map in the correct place. If it wasn't for the fact that you can see the sea either to the east or the west of the Cape Range, which was a great aid to navigation, we would all have wandered off and disappeared in the spinifex years ago.

Back to Oolite Cave. Back to it since 1997 anyway, when I entered and sketched it. I don't really remember any oolites. It's a fairly open and dry cave but has a little decoration, according to the karst index.

Barry and I headed off in the direction of Trionomo. I picked a track through deep spinifex and dense scrub. I couldn't really avoid it. The bush has really thickened up since the big fire of January 1999. It makes navigation difficult because it's hard to get a clear view of the ridges when picking a path and any crossing of depressions or valleys is fraught with danger for the nether regions.

Figure 215: Trionomo: Barry starts down the second pitch. *Photo Darren Brooks*

At Trionomo I rigged the first pitch and headed in, followed by Barry. I'd rigged the second pitch by the time he got down. The second pitch is almost impossible to rig without rub points, but there is a solution hole anchor for a rebelay at the second ledge and the first ledge is fairly smooth. I took a couple of shots of Barry (not *at* Barry) as he descended.

Waiting in the chamber at the bottom of the second pitch, I found a skeleton which I'm pretty sure is of a dragon lizard of the family Agamidae. Probably *Amphibolurus longirostris*, which is known locally as a tata lizard but is more commonly called a long-nosed dragon. They are quite common hereabouts.

Figure 216: Skeleton of a dragon lizard, probably *Amphibolura longirostris.* *Photo Darren Brooks*

We headed down the tunnel and rigged the third pitch. At the bottom I set about collecting the requisite millipedes. Barry had a good look around and enjoyed spotting some trog fauna himself. I spotted a small lycosid spider, *Bengalla bertmaini*, and for a little while I watched it wandering around. There weren't that many millipedes about or any other fauna for that matter. It's been some time since the big rainfall event in May, and although there is evidence that the cave flooded, in the form of some large sticks and logs, the energy available now is probably low as the litter and mud banks have been thoroughly worked over by worms. Their casts coat every square inch of the mudbanks in the chamber. It was from this very chamber that the first troglobitic pseudoscorpion ever found in Cape Range was collected. Unfortunately, it was very juvenile and unsuitable for taxonomic purposes.

Figure 217: Barry pauses in his trog search to pose at the bottom of third pitch. *Photo Darren Brooks*

After the collecting session was completed a variety of photos were taken, interspersed with bouts of climbing and de-rigging. Although I didn't take any pics of Flowstone Aven, probably the best decorated section of Trionomo, back in 1988 Tom Tomlinson took some participants in a MESDOC

course into the cave and passed at least one image on to Malcolm East. Although, for some reason, not indicated on the map of the cave, Flowstone Aven is the most southerly point on the map.[1]

Figure 218: MESDOC trainees near Flowstone Aven, 1988. *Photo Tom Tomlinson*

Barry and I took a more direct route north back to the waiting vehicles. We stopped at C-146 to re-GPS the entrance, as all the entrances we visited were a bit inaccurately located. The heat was on, literally. All thoughts of collecting in other caves, my brilliant 'master plan', were abandoned. It was too late and too hot. Halfway back we stopped for a good rest, drink and food. The rock I was sitting on was burning my backside, and the sun was burning my front side. Halfway to go. Halfway along the halfway we stopped for another long rest. We found a small tree and sat or lay on our packs and again downed copious quantities of water – at least I did. This was turning into a two-day recovery period walk for me. Rejuvenated, we headed off on the final section of our return journey to where an esky with cold water and icy cold beer awaited.

Reference

1. Map C-103 1989, *The Western Caver*, Volume 29, p. 19.

The Nullarbor

Figure 219: Karen getting into Weebubbie – or, cave divers take life easy! *Photo Joe Bicanic*

Nullarbor caving – wet and dry

Karen Woodcock

Kim and Karen, as well as being WASG members, belong to the Cave Divers Association of Australia (CDAA). This trip was undertaken under the auspices of the CDAA.

If someone had told me ten years ago that I would be counting the days until my next Nullarbor adventure, I would have said (to steal a quote from *The Castle*), 'Tell 'im 'e's dreamin'!

However, that's exactly what happened in early 2014. In March/April this year my husband Kim and I spent four glorious weeks living the life in our camper trailer under the stars of the Nullarbor Plains – the occasion being the opportunity to complete our CDAA Advanced Cave Course (TDI Full Cave Course) at Weebubbie Cave, Eucla and Murra El Elevyn, Cocklebiddy.

We headed off at 7.30 a.m. on 23 March towards our first night's '24 hour stop', 70 km east of Norseman. This was part of our day and half trip towards Weebubbie Cave.

We were being joined by a number of other cave divers from all States and Territories – some completing the same course, others pleasure diving (and acting as sherpas lugging gear into the caves) – and of course our instructors, Gary Barclay and Linda Claridge.

The next couple of days were spent waiting for everyone to arrive, hauling gear into the cave, brushing up on our theory and practising land drills, before being let loose underwater to successfully complete the various 'stress tests' and diving skills required to achieve competency.

Figure 220: Kim and Karen gearing up in Weebubbie. *Photo Joe Bicanic*

Weebubbie is an amazing cave to dive due to its sheer size both above and below the waterline. The lake area is about 100 m in length, before swimming under the lip into the cave 'proper'. Depths range from a couple of metres to approximately 30 m, and visibility is crystal clear (until someone crashes into the bottom layer of silt, that is. Obviously, this would only happen on a course, when your mask has been removed and you have been tangled in line). Weebubbie Cave has a permanent line in the lake area and also well into the cave. It continues down an area known as the Railway Tunnel, towards the very back of end of the cave to a room known as the 'Snot Room'. This area is covered in bacteria (mantles) which give the room an appearance of – well, you guessed it – snot draped over the rocks, walls and cave floor.

During our time at Weebubbie we also explored the small dry cave which is just to the right of our descent line into the doline. It is a narrow flattener at the entry and the rock falls have created a bit of a talus. The cave goes in about 100 m, taking it right under where our campsite was! There is some interesting layering in the rock formations that look like iron and quartz combined. (I am no geologist, so please forgive my layman terms.) We also found a few stalactite straws and moonmilk formations. In amongst all this we noticed an interesting stalactite that looked like melted wax, coffee-coloured and bulbous. It looked as if a straw had been attached but was broken off.

The course was running ahead of schedule and the 'students' had completed the necessary skills assessments and site dives required for this cave. This enabled us to take a run out to Abracurrie Cave, approximately 33 km north of Weebubbie.

Figure 221: Shell fossil in Abracurrie. *Photo Karen Woodcock*

If I thought Weebubbie was big, boy was I in for a surprise when I saw Abracurrie. Amazingly HUGE. The entrance is not unlike Weebubbie with the doline collapse, but not as steep, and we were able to enter without the use of any ropes or ladders. There was quite a bit of wildlife around as well, with one particularly feisty baby king brown snake, right on the path we were walking on. That was the baby – where was Mum??

There must have been some recent rains in the area as there was quite a lot of evidence of water flow. In part of the cave where the ground held a lot of soil, small seedlings were struggling to germinate. Sad that they wouldn't last long, as there was no light in this particular part of the cave and their struggle for life would be very short.

The cave is also abundant in fossils, embedded in the rock walls. It's hard to imagine the Nullarbor (and Roe) Plains as an immense ocean teaming with all sorts of life. These fossils give us an amazing window into the past.

Back at Weebubbie it was time to haul out, break camp and move on to our next dive site, Murra El Elevyn, 5 km west of Cocklebiddy. This cave is significantly different to Weebubbie, in both its entrance and the actual underwater features.

Access is either by abseiling the high side (approx. 25 m) or via a highly civilised extension ladder located on the short side (6 m) of the doline. A very steep talus provides for a challenging walk/slide towards the cave entrance. Once into the dark zone, it is not too bad, except for a small wall about 2 m high, with only small footholds, which can test your balance, particularly if lugging a scuba cylinder or backpack full of dive gear. Various bruises and scrapes are par for the course.

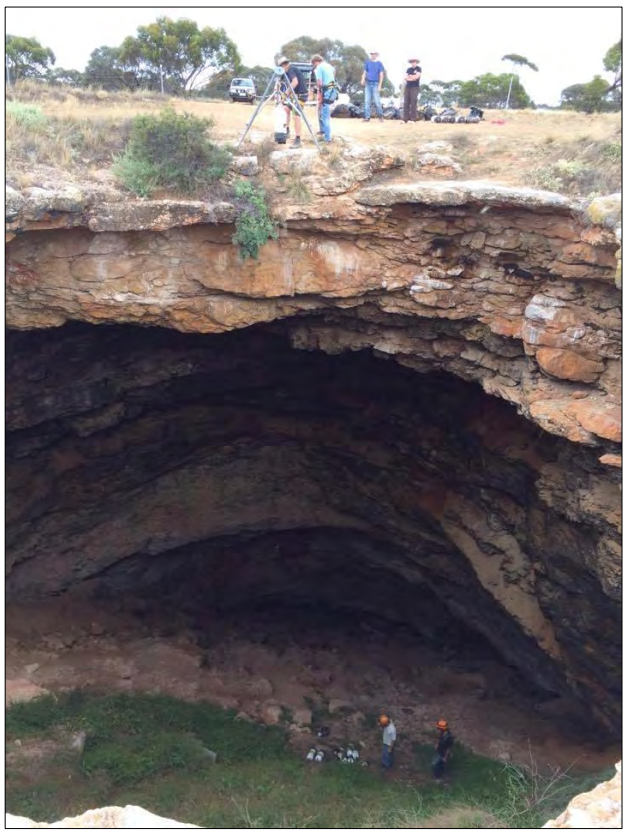


Figure 222: Lowering gear into Murra. *Photo Martin Griffiths*

Murra El Elevyn (Murra) has a small lake entrance which leads off to a smaller passage and then the 'letterbox' slot into the rest of the cave. It is a very pretty cave with lots of smaller passages leading off in various directions.

Once in the entrance passage you have the option of heading left at the 'T' junction and along another passage to the Crystal Room. This is particularly pretty, with an air chamber that can be breathed and mineral deposits above the waterline that shimmer like a wall of diamonds when we shine our torches on them. It is believed that this room actually links up to the dry cave, but not having explored any of the above-ground areas (apart from the well-worn path to the water's edge) I cannot confirm this.

Should you choose to point your indicator to the right at the 'T' junction you will swim along and through a quite extensive low flattener. This is where all your training and skills are tested. If you are the first through, and kick up silt, you will not be very popular. The route takes you into a very large chamber with a lot of passages, squeezes and holes to investigate. Murra doesn't have any permanent line, so reel work is required to put in a 'main line' which is usually left in for the duration of the trip. 'Jump lines' can be utilised by diver buddy pairs, but these are retrieved by them as they return back to the main line.

To the right of the main chamber is another air chamber that allows you to surface. It is at the top of a long slope and brings you up from about 15 m depth back to surface. This chamber is called the Snowflake Room – similar to the Crystal Room, but more like glistening snowflakes, hence the name.

Various other passages lead off this very large main chamber, with some becoming quite squeezy and narrow. Water temperature at this cave is usually about 18–19°C, so a long dive can become quite chilly if diving in a wetsuit as opposed to a toasty drysuit.

The course component at Murra entailed 'site dives' which required us to put our newly learnt skills to the test without notice. You could be swimming along enjoying the scenery when out of nowhere, your mask would be removed from your face. No problem, I am a safe diver, just replace with my backup mask. Too easy… that's gone too, and before you know it, your buddy is suddenly out of air, and trying to share yours. If that's not enough, a catastrophic loss of lights, even though between us we have two primaries and four backup. OK, let's think about this. Remember your training and make your way calmly and confidently out of the cave.

Needless to say, we successfully overcame all the 'disasters', as did all other course participants. Course completed, certificates issued, champagne popped and time to relax. The rest of the time here would be spent enjoying the diving, without fear of an instructor sneaking up behind you.

During our time at Murra, we also took an afternoon off to visit Capstan's Cave, located along the track to Cocklebiddy. This cave is really pretty, with lots of flowstone and moonmilk. It appears to have about three levels and one of our group was sure there is water further down. Unfortunately as hard as we looked, we just couldn't find any passages through. The cave is breathing quite heavily and you can feel a strong breeze throughout. Lots and lots of shell fossils were embedded in the rock.

Twilight was approaching, so it was time to head back to camp. This would be our last night before packing up and heading back to our respective corners of Australia.

Now, the planning begins again. When is my next holiday? Which is the best month to get a crew together? What cave shall we choose? Soon, very soon!!

Interstate

Broken River Expedition, July 2014

Brett Wiltshire, with input from Paco Murray

The accounts below describe the 2014 expedition to Broken River, Queensland, about 130 km as the crow flies west of Townsville. The expedition is an annual, roughly week-long event held by the Chillagoe Caving Club. The main karst area is a strip of limestone approximately 0.2 km x 3 km, uplifted from the surrounding terrain and intersecting Broken River by a gorge. Base camp is on the sandy banks of a permanent pool of water at the gorge entrance.

Expedition participants (in order of the expedition member list): Paul Osborne (CCC), Paco Murray (CCC, WASG), Deb Hunter (MCCC), Ken Higgins (MCCC), Jess Bertels (MCCC), Doug Irvin (HSC, CCC), Mary Ann Irvin (HSC, CCC), Allison Irvin (CCC), Vaneron Christensen (CCC), Kim (Kimberlee) Mee (CCC), Jeff Cotter (CCC), Grant & Deanne (CCC), Brett Wiltshire (WASG), Kerry Barry (CCC), Trent Barry (CCC), Gilbert Price (CCC), Nicholas Wiggins (CCC), the Gurnier family (CCC), Aidan Prowse (CCC)

1 July

Cave: Three Avenues

Party: Paul (TL), Brett, Grant, Deanne, Jeff, Kerry, Kim

After waking from a below-0°C night, I joined a trip described as a 'tiki tour' of Three Avenues. The entrance, marked BR-181 Snake Passage, is a short walk over jagged limestone and a steep climb down to tall gryke passage lined with tree roots. Paul led the way to a chamber just inside the dark zone where at least 50 bats were roosting in a dense huddle on the roof. We visited this chamber one person at a time and heard only a slight increase in noise from the bats due to our visit. I found a single bat roosting in a side chamber and slowly got close and took a picture, but it still turned out much more blurry than Paco's photos so I'm showing his picture from a different trip here. It looked like the same bat.

We stopped for lunch below a daylight hole next to moss and ferns. The remainder of the trip alternated between dark zone and gryke passage, with some entertaining squeezes through phreatic eroded rock and multiple free climbs and returns after finding a dead end or multiple intersecting passages. A highlight of this tour was a daylight chamber with a three-way rock bridge above forming a peace sign shape.

Continuing on, rope belay was used for a couple of free climbs, with the final obstacle of the day being crossing/climbing a steep slope to the surface with a sudden drop at the bottom. This entrance was apparently known as BR-182, 'Slip Slope Splat',

Figure 223: Single bat roosting. *Photo Paco Murray*

although Kerry offered her description as the chilli entrance, because it was painful to get out. Time underground was 4.5 hours.

Meanwhile, Paco was working on an unfinished project and describes a separate trip.

Paco's trip: On the first of July 2014 a group of three cavers including Jess Bertels, Ken Higgins and myself entered Trippers Delight with the intention of connecting to the Beehive system. The day before Van Christensen, Ken Higgins and Greg Gurnier had partially rigged the traverse to a possible lead at a high level. I went first on the incomplete traverse and managed to do a free climb/chimney on descent to bridge the final section of the traverse. Once the traverse was rigged, Jess and Ken came across to the lead. We all entered the daylight chamber on the other side of the traverse, and after a quick look around I recognized the area to be a section of the Beehive cave where we had had a close call with a boulder. After a little 'gardening' and testing of the boulder we went on to enter the system.

As Trippers Delight was the first cave discovered in the system, we have renamed the cave system to Trippers Delight system.

2 July

Caves: BR-83 Bushman's Cave, BR-85 Odyssey Cave

Party: Paco, Brett, Deb, Jess, Kerry, Jeff, Kim, Paul, Mary Ann

Paco led a hiking trip to BR-83 Bushman's Cave. The walk from camp begins through a dark grey limestone gorge streaked with small amounts of white marble. The trek follows the river past large pools of water and tumbled rocks of remarkable variety with many fossil imprints (figs 224, 225) in the limestone further up the bank. After 6.5 km, a short climb up the riverbank leads to another outcrop of limestone tower karst. At the base of this

Figure 224, 225: Fossils in the limestone along the river. *Photos Brett Wiltshire*

outcrop is a small, single-chamber cave about 4 m x 6 m with a bear-cage entrance containing a wooden log platform that was the bed of a possum hunter. Remnants of a suitcase and some newspaper and possum fur in a wooden box covered in old brand names were interesting to see. Climbing over the tower we enjoyed the panoramic view (fig. 226), and on the other side I found the distinctive mound of a brush turkey (4 m x 1m high), which seemed a bit out of place considering the aridity of the area.

Figure 226: Jeff on top of the Bushman's Cave karst. *Photo Brett Wiltshire*

Meanwhile, Paco found another cave entrance on the Bushman's Cave side of the tower. This was tagged BR-85 Odyssey Cave, and while there was only about 50 m of passage it seemed to me to have above-average decoration for the area, with some photogenic gour pool and flowstone areas. A few bats and a large huntsman-type spider were noted. We did the long walk back to camp with a total trip time of 6 hours.

3 July

Cave: Beehive system

Party: Paco, Van, Deb, Trent, Jeff, Kim (through trip); Doug, Allison, Gilbert, Jess, Aidan (revisiting an archaeological dig)

The trip of the day was a tour of the Beehive system which attracted a 13-member group. The entrance was steep so it took some time to get all 13 people in. The archaeological dig people reached their destination about an hour in, a red paleosol layer below limestone with visible small bone fragments protruding.

Figure 227: Part of the team on the walk to the Beehive entrance. *Photo Brett Wiltshire*

Continuing on, the rest of us encountered a couple of tall, vertical climbs, which both saw Paco climbing to the top and belaying others up. Particularly high and difficult was the second climb where one needed to chimney up a relatively smooth-sided vertical wedge about 6 m high.

The top of the climb led to multiple chambers squeaking with bats and then suddenly into a sunlit area covered with moss and ferns. Most impressive is a rock bridge directly above this chamber, by my estimate 12 m long and 3 m wide in a straight line, a testament to the strength of the local limestone and the unusual weathering conditions.

Figure 228: Rock bridge in the Beehive system. *Photo Brett Wiltshire*

After a side trip to see the namesake of the exit/entrance, a large (or large-ish by Perth standards) hanging European beehive, we emerged from BR-194 Bee Sting (125 m as the crow flies from the beehive entrance) after 3.5 hours underground.

4 July

Party: Paco, Van, Allison, Brett

The trip today was to explore a cave previously found by Paco and Van. Splitting up into pairs to explore the multiple nearby entrances, we met up underground and found our way to a chamber with relatively long (~2+ m) stalagmite formations with 40–50 birds' nests above. During our visit we did not see any birds inside the cave, but there were many feathers around the entrance areas and Paco found claw marks around one entrance, suggesting feral cats had destroyed the population. Apparently this was the first year that no birds were seen exiting the caves.

Figure 229: Allison and Paco's head below stalactite decoration. *Photo Brett Wiltshire*

We continued exploring and found some new passage. It had to be unexplored, as the way through was blocked by a spike of limestone preventing entry through a squeeze. After a couple of attempts at breaking the rock with my foot, I managed to break it using another rock as a hammer, but not without doing similar damage to my finger. There was another 50 m or so of passage that separated into two levels.

After lunch we moved to a vertical entrance 60 m away and Paco and Van rigged a rope around some jagged rocks while Allison and I looked around for an alternative. Alison found another entrance 15 m away and by the time Van was on rope we had found a way via some crawly passage to the rope. This cave has smooth curved phreatic rock of a comfortable size for moving through and some nice stalactite decoration (fig. 229).

5 July

Cave: BR-187 Trippers Delight

Party: Paul, Paco, Deb, Van, Brett

After getting to BR-187 Trippers Delight, I understood the reason for the name, which comes from the fluorescent yellow-green splotches of lichen on the rock around the entrance chamber. The point of this trip was for Paco and Van to retrieve their abseil rope and make the traverse rope permanent while Paul, Deb and myself surveyed the new path between the Trippers Delight and Beehive systems.

This was the only abseil I had the opportunity to do at Broken River. The abseil was a free drop of approximately 10 m, anchored by a couple of rock bolts. The chamber below was where the traverse and survey started. The traverse rope led about 30 m through a steep diagonal crack anchored in places by old-looking calcite columns. Deb used a Disto-X and called numbers to Paul, who plotted and drew on his smartphone app. Since I was the third person and my value as a tapeworm had been made redundant by developments in technology, I just took a few snapshots and relaxed.

The traverse ends at a climbable daylight hole, where we stopped for lunch and then left Paco and Van to finish securing anchors for the traverse rope with a hammer drill.

Having connected to past surveys from previous years, Paul showed the result on his phone and we continued on to do a tour of the known passage. I don't have an exact record of how long this took, but it seemed a very long way, and electronic cave map or not there are plenty of dead ends to take despite numerous pieces of numbered survey tape along the way! Of note on this journey was a still living rock wallaby found nowhere near any visible daylight source, and the nearby blood spatter showing that it had landed only a few metres from where it rested. This summed up the local rock for me: very strong, sharp rock with passages leading in many directions but never very deep.

This was the last night at Broken River for some of us. There was something of a celebration, with the archaeology people returning with cloth sacks of samples for future work, a few drinks, and a communal contribution to a pyrotechnic display around the bonfire.

For an expedition photo, see Figure 230 overleaf.

Figure 230: Broken River 2014 expedition team. *Photo Paco Murray*