Burnabbie Cave Exploration 2006

Merry discoveries on the Nullarbor, using Closed Circuit Rebreathers and Aerial Mapping





The Roe Plains of the Nullarbor hold some incredibly complicated cave systems. Fortunately, for ASF cave divers, most of them are full of hypersame, crystal clear water! Passage development has accurred at the water table, some 10-15m under the surface of the plain as well as at multiple levels underwater where severe haloclines are experienced. The average diving depth is approximately 7m and the maximum found so far is approximately 15m which means that some very long dive times can be achieved.

Burnabbie Cave is undoubtedly the current King of the Roe Plains caves with over 2.7km of surveyed passages, 95% of it underwater. There are some large, half submerged chambers and passages which are rich troglobitic fauna habitats. The ceilings of these chambers are festooned with tree roots. Water droplets hang suspended off the tree root draperies and make a spectacular sight to the surfacing diver. As the draperies die and decay, they provide the basis of the food chain which includes a multitude of cave adapted cockroaches, centipedes, isopods and spiders.



Burnabbie Troglobitic Spider.

Underwater in the fauna chambers, troglobitic amphipods feast on the nutrients provided from above. The rest of the underwater cave passages contain jelly-like mantles of bacterial colonies hanging from walls and ceilings whose beauty is only exceeded by their extreme fragility. Because of the delicate nature of these caves and the fauna habitats they contain, only ASF cave divers following the ASF Minimal Impact Caving Code have so far been provided access to them. In the interest of protecting these unique caves from unwitting damage, this requirement is unlikely to be relaxed.

Bakers and Home Handymen into Action

With a difficult cave diving penetration of over 900m from the entrance (p=900m) of Burnabbie Cave, exploration and mapping was continued by WASG members Alan Polini and I during the period 30 Oct - 04 Nov 06. During our trip planning, we decided that travelling to and from the end of the cave would be more efficient using our Closed Circuit Rebreathers (CCRs) and then conduct our explorations using normal sidemount open circuit SCUBA. Naturally, this required us to carry and stage cylinders of gas along the main line to be used in the case of a failure of our CCRs; this also meant we dived one at a time to guarantee each other's safety with respect to the bailout gas supply. Preparations for the trip included modification of our CCRs into an 'off-mount configuration' as well as familiarisation with their use before taking them into the cave.

Alan's Megalodon rebreather was comparatively easy to reconfigure as an off-mount due to the modular design of the unit. A sturdy blue breadbasket was used by Alan (as a professional baker, Alan is well qualified in the use of breadbasket technology) to house his scrubber cannister, counterlungs, oxygen and diluent cylinders. My own Inspiration rebreather was slightly more difficult to modify but a suitable plastic tub was found at Bunnings (as a professional tinkerer, I am well qualified in the use of Bunnings gadgets) which was sawed and drilled to provide easy yet secure access to all the rebreather controls and displays. The Inspiration also had to be modified by the addition of electronics for a head up display (HUD). A HUD is a critical requirement for diving on a rebreather in a cave as it allows continuous monitoring of the oxygen level in the breathing loop without adding to the task loading normally encountered whilst cave diving (such as buoyancy control, gas supply and guideline management).



Alan Polini... Breadbasket Technologist.

Set Up Dive - Exploration Continues!

The first dive was done by both Alan and I together with four cylinders of open circuit scuba each to check whether the modified rebreathers would fit through the restrictions or not. Our secondary objective was to assess the main lead found on my last dive of the previous visit in October 2005. It took us about one hour to swim to the wide room that was identified as the current end of the cave (p=930m). It was clear to us on our journey into the cave that we would have no problems negotiating the restrictions with the CCRs. Finding ourselves at the end of the cave with gas to spare, I tied on a fresh reel of knotted line and explored what I had hoped was the most promising lead for the cave's continuation. A fairly low and flat but wide passage went for 75m before pinching out. This was the first place in the cave that a diving penetration of over 1000m was realised which was excellent, but not guite the major conduit we were wishing for! A number of other leads were noted in the area on our return journey.

Enter the Closed Circuit Rebreathers

On the next two dives, Alan and I independently used our rebreathers to stage our 100cuft stage cylinders in the cave as safety backups for the rest of the weeks rebreather diving (one was placed at p=500m and the second was placed at p=930m, the 'ends' of the cave). If the cave continued in a big way (ie. p=2000m+), we had more stage cylinders to place every 500m which we calculated as being a suitable and highly conservative approach. The most important thing we had to be mindful of whilst diving this type of scenario was that if we had a failure of our open circuit scuba at the limit of our exploration and got back to our rebreather to find it dead (ie. loop flooded or electronics failed), then we would be in a 'spot of bother'. Our solution to this was to commence our open circuit exploration from a staged bailout cylinder next to which our CCR was secured



- thus providing full redundancy for the one hour swim out of the cave.

On subsequent dives to the 'ends' of the cave. two other leads were pushed past the 1000m mark by Alan and I, but they all closed out the same way - low, flat and silty but no major conduit to be seen Alan discovered and explored a fantastic set of parallel passages of over 130m length near the end of the cave which we managed to connect and survey through to another of our newly discovered passages. The cave seems to branch into low flat, parallel passages in this section of the cave but logic and the shape of some of the passages indicates that a continuance must be there somewhere. Although we systematically checked the side walls and surveyed all the passages we had found, there remains the possibility that one of several small leads near the end of the cave will continue. This has after all, been the story of Burnabbie exploration so far - to reach a passage terminal only to then find during the exit or next dive, a parallel bypass to the conduit's continuation.

Aerial Underwater Mapping?

As an interesting aside, Paul Devine (SRGWA) has discovered that aerial photos of the area clearly show up lines of thick vegetation that we have confirmed track directly over the top of the main cave passages of both Burnabbie and Olwolgin Caves. It is hoped that as well as guiding the direction of our underwater exploration, bushwalking along these vegetation lines will reveal more cave entrances. Between our dives, Alan and I did some wonderful bushwalking and visited over twenty possible karst feature locations provided by Paul Devine. Most were large blind collapse dolines, but three were definitely caves and one of those even made it down to the water level. Without doubt, there are plenty more discoveries to be made on the beautiful Roe Plains and a load more aerial karst feature locations to visit and document for the Karst Index.

The rebreathers worked beautifully and allowed us to safely travel to the end of the cave where our regular scuba cylinders were used to spend the maximum amount of time exploring and mapping the many new passages there. We had no technical problems with the units or their manipulation through the cave. We became guite adept at controlling our buoyancy whilst pushing the CCR ahead of us through a restriction, which may sound simple but is not. As you breathe in, the buoyancy of the CCR decreases (i.e. it sinks) and your body tends to rise as the air transfers from the unit to your lungs. Breathe out, and suddenly the CCR starts floating up - all very much a pain in the bum when you are trying to float on an even level through a restriction! We worked out that shorter, shallower breaths and slower breathing whilst negotiating restrictions helped us maintain good control over the unit's position. We also learned to use the floating and sinking of the unit to our advantage, for instance, going through a restriction with a drop on the exit side of it, just breathe in and the unit drops like a stone and then follow it down!

Once the CCR is clipped back onto the sidemount harness, it's a simple matter again because all the gas is in the same vertical plane. Breathing resistance of the units (on exhale) is slightly increased from the normal configuration but in no unmanageable. We minimised this effect by the of rubber bungeys to hold the unit as close to our ests as possible. Our off-mount CCR dives serve excellent experience for other Australian caveing sites where long underwater distances with low estications are encountered and CCRs offer a clear distical advantage. By the week's end, over 500m new passages had been added to the map, making unabbie the 4th longest underwater cave so far escovered in Australia (after Cocklebiddy, Panniken Pains and Tank Caves).

The Last Dive?

susually happens on exploration trips like this, the last dive turned out to reveal an entirely new section of beautiful underwater passages. This was in effect the last, 'cleanup' dive where Alan and I used our open circuit (yuck!) scuba to remove the stage cylinders we had placed at the start of the week. The new passages were found in a completely unexpected section and depth of the cave where a survey question mark previously considered to be relatively insignificant, opened up and just kept going (it GOES !). Ninety metres of line was laid before the golden rule of thirds reached and the dive was turned; I managed a snappy set of bearing/distance only survey along the way. My head was whipping back and forth like a fair-ground clown's along the way, peering down multiple, handsome looking leads - 'Crikey' I gurgled into my regulator!

This 'last minute' discovery offers some tantalising possibilities because this new passage has a different look to it from the rest of the cave (i.e. clean, white limestone collapse tunnels and chambers) and it heads in a different direction to the main conduits we had spent all week diving. Very exciting and very frustrating too — knowing we wouldn't be back for a number of months and the question of what lays beyond burning in our souls! The use of aerial imagery to guide the direction of our underwater exploration in these new passages is a fantastic new approach which we hope to capitalise on during return trips.

Much remains to be done on the beautiful Roe Plains as well as beneath in it's magnificent caves. We are planning to continue the exploration and mapping efforts in the area during the coming years. If you like bushwalking and exploration (or cave diving!), contact Paul Hosie on paulhosie@trimixdivers.com about joining us on a future trip.

Post Article Note:

During our April 2007 trip as part of the Nullarbor Karst Project we explored an additional 300m of passages in Burnabbie Cave, bringing to total just over 3,000m of submerged passages. A further trip report on this and the broader implications of the Nullarbor Karst Steering Group will be the subject of a future CA Article.





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