

Below the Ringing Plains of Windswept Cooleman

Keir Vaughan-Taylor
SUSS

SUSS TRIPS IN YEARS 2007–2012 AND 2013 AUSTRALIA DAY

People involved: Michael Bates, Katrina Badiola, Nicole and David St Vincent Welch, Ian Cooper, Deborah Johnston, Mark Euston, Andreas Klocker, Bill Lamb, Lauren Harmsworth, Rowena Larkin, Pina Luzzi, Phil Maynard, Rod O'Brien, Megan Pryke, Alan Pryke, Mel Stammell, Denis Stojanovic, Al Warild, Thomas Wilson and the infamous author: Keir Vaughan-Taylor.

Apologies to anyone left out. Special appreciation to NUCC cavers.

NOTE

National Parks do not use apostrophes in place names to indicate the possessive, for example, Nicoles Gorge Walk. This article follows this convention; however, speleologists know the correct usage is Joe Jennings' Walk. Keith's Faint Hole is an exception, because Keith actually fainted and owns his Faint and this is the way the Keith's Faint Hole's name appears on cave maps.

OVERVIEW

This article is adapted from numerous SUSS Cooleman trip reports from 2007 to 2012, culminating in a more explicit description of our seminal trip on the Australia Day Week 2013. Key sites were explored, finally revealing new passages and geological wonders. We have surveyed hundreds of metres of new underwater and streamway passages each trip, thus changing our original theories of the hydrology.

The path and character of the hydrological passages are surprising. Underground rivers thought to be sections of the main river defy expectations, presenting instead as separate river courses. We hope to identify and survey converging tributaries and new rivers sourcing from the array of obscure cave sinks and dolines, many on the edge of the limestone plateau.

Most of our investigations cover areas upstream from the magnificent Blue Waterholes, from which all the water resurges in a yet to be discovered configuration. The



Phil Maynard, Katrina Badiola and Michael Bates sheltering under a rock from hail

underground rivers are mainly walking size passage formed with a few collapses, suggesting we may be able to penetrate to the Blue Waterholes themselves.

At Blue Waterholes the river percolates out of the ground and then flows on the surface, ambling along beside the hills and gracefully turning away from a highly prospective karst valley into a 60 metre high limestone canyon. It is beautiful limestone countryside where caves play a part in the course of the river, especially around the cascading waterfalls. In this area another series of linked caves, both old and new, behave in unexpected ways. New caves are now recognised to be forming a matrix of waterways leading to Easter Cave. In addition to this, there is huge potential downstream from Easter; however, we have only one lifetime.

The following summary covers our probes into two cave areas. One is in the area of River Cave, Glop and Murray, trying to trace water sources and expand the lines representing underground water on the maps so they join together, thus helping to describe the Cooleman karst landscape. The other fertile exploration has been around Easter Cave, yielding sections of new caves and the puzzling assembly of how the water travels, moves and creates caves in this

magnificent place. Diving at Cooleman has, in my opinion, made it the most significant cave site in New South Wales.

SCHRODINGERS, WHITE FISH AND EASTER CAVE

Downstream from Blue Waterholes, the Easter Cave Efflux is an attractive body of water exiting from the side of a cliff slightly downstream from a series of cascades and waterfalls and carrying far more water than appears at first sight. It is a small cave but is part of a far more complex cave system than we realised in our initial Cooleman visits. From the entrance, Easter visitors need to swim ten metres along the efflux channel to a duck-under, then pull themselves 3–4 m underwater along a stoutly placed rope.

With a diving mask the 3.5 m deep channel can be seen to have a slot in the floor connected in parallel below to a secondary 50 cm diameter phreatic tube. In places, you can descend into the lower tube to find it is home to many white fish. They are apparently trout.

Beyond the entrance free-dive, the stream canyon normally escorts cavers to a small, dry cave area. However, the surface hides the true source of the water flow—an underwater hole in the left wall (looking downstream), only visible with a diving

BELOW THE RINGING PLAINS OF WINDSWEPT COOLEMAN

EXPLORATION

mask. An unobtrusive dive line is now tied just above the water to a small protrusion and from there to a stouter second tie-off under the water in the floor—the true safety belay.

A smooth passage textured with strong scalloping connects through a smooth tunnel to the lake at the back of the cave. Along the way, a number of white fish make their presence felt, sometimes banging into a diver's face mask.

While not spacious, there is sufficient room to move without restriction. The strong current can be overcome by pulling along the sculpted rock protrusions in the floor. Visibility is generally poor, maybe ten centimetres. Ambient visibility is approximately 15 cm, not a lot but enough to see a wall and find a tie-off. In the strong flow

disturbed silt on the walls or floor is quickly swept away.

Our group, free-diving the entrance sump, made its way to the back room lake. It is not far. I have a second-rate point-and-shoot camera, waterproof to ten metres. I took a few pictures and then surfaced unexpectedly in Back End Lake. This is normally the place last seen by cavers—and the underwater passage continues. I can hardly believe this hasn't been looked at before.

Underwater the passage transforms from a rounded, scalloped tunnel into a structure eroded smooth and vertical, splitting into numerous smooth rifts, each trending to several points of the compass. Everything is smooth because there is a strong, ever-flowing current. In flood these confines would be formidable.

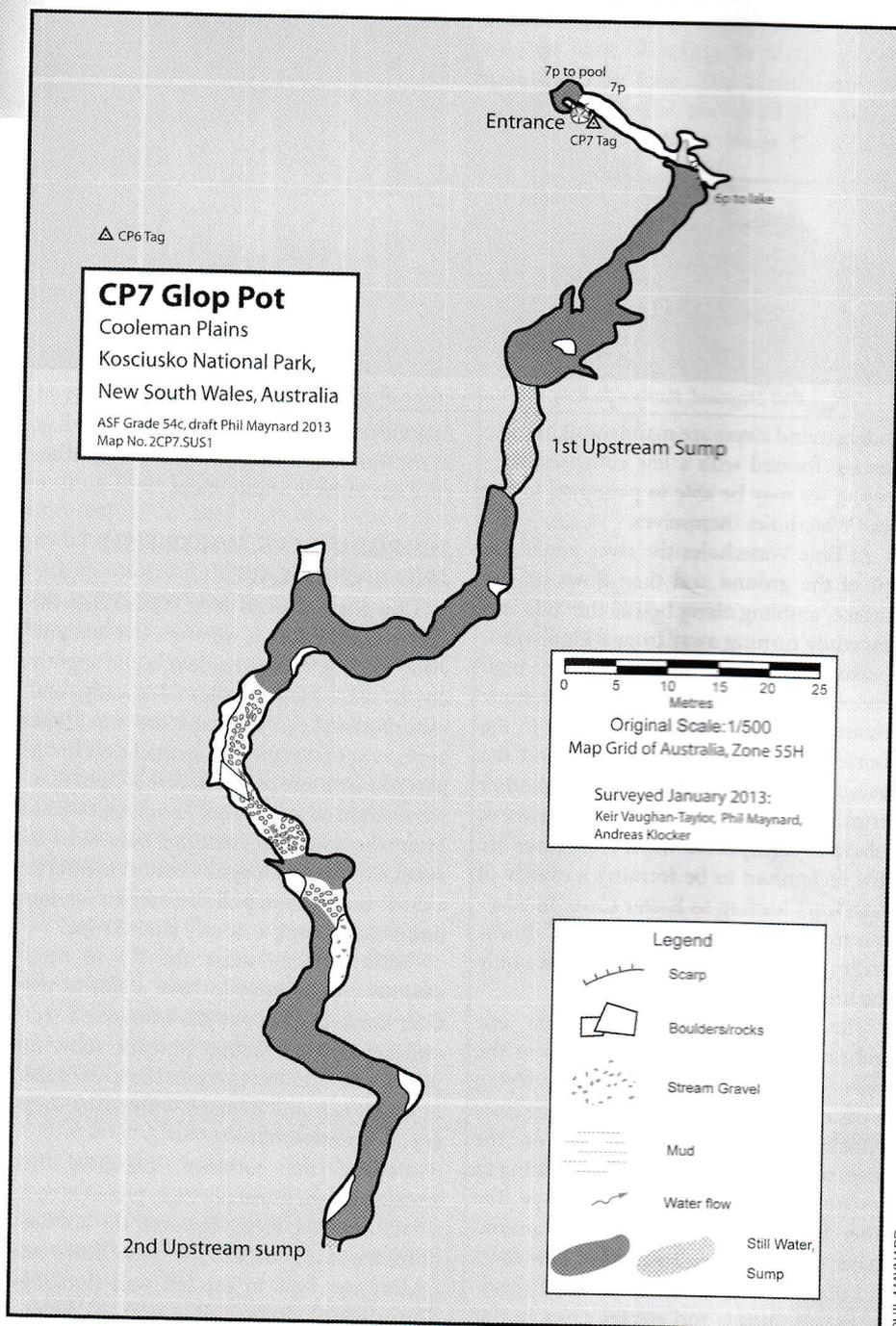
This was only meant to be a quick look-see trip and there was suddenly a significant job ahead. One lead tapered off, ending in a small room, and a couple of others also stopped abruptly. After tying off I returned to the entrance, surprised that we had found such a significant river with so much flow. It was likely to go somewhere new.

It was only a small advance on this trip to Easter. However, walking back to the camp site we were to make a serendipitous find. Someone in the group observed that the volume of water flowing in the river was much less by the time it reached White Fish Cave. We stalked around the cliffside next to a bend in the river where the river volume suddenly decreased. Like a pride of lions, the group was in hunt mode with a definite cave to be found. In the banks of the river a sink was located and a number of small openings. Caves? We would return later to examine this.

White Fish is at the top of the cascades. In normal conditions about half the water in the river plunges out into the waterfalls some 60 m below, ultimately flowing into the distance to meet the Goodradigbee River. It's a great trip to hike to the river junction, marked by a limestone overhang suggesting more limestone caves but it is a long hike to get there. At the waterfall's top half of the river diverts into White Fish Cave, a mini-Tasmanian-style swallet taking water that drops through steep tunnels choked with logs. There are several plunge pools reaching a sump. A swim through a narrow rift connects to dry sections of cave. SUSS has no maps or survey data for Whitefish. Alan and Megan began surveying so that it might be positioned in relation to surveys that we have of nearby caves, and of course Easter Cave, where the water entering White Fish must surely drain back into the river.

At one end is an awkward head-first squeeze that coats you with coarse gravel, presenting an upside-down drop into a room with another sump. It is best to take a tape to help with that drop. The rockpile in the floor hosts largely inaccessible small streams and, on the right, what at first sight seems to be a deep sump. There are small passages leading from the main sump and heading towards the back of the main chamber. Jason, pushing down the sump, was able to raise his hand into the surface of a very small area, which proved too small to follow.

With the sump no longer interesting, Jason squeezed and crawled off into the distance, grunting his way through the rockpile, then disappearing. Uninspired by grovelling, I turned to moving small boulders, hoping to locate the bona fide



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river that could perhaps just be heard only a short distance into the rocky collapses. Small flows discernibly sighted through the jumble of perched stones were no help in getting to a substantial stream course.

It is amusing that in all the years I have visited, I've never seen these local dry sections being the focus of a dive line through the sump. The short dive may have an inflow near the start, because in retrospect, 3-4 m into the sump there is a change in temperature, water quality and visibility. The rift leads a little unnervingly through a few log jams to surface in the middle of a large chamber, perhaps 30 m long.

Year 2011

Phil and I retraced the previous Easter Cave dive to the end of the line tie-off at the furthest point of exploration. After trying a number of terminating leads, water flowing from one of the fissures signalled a passage heading upwards. I set another belay at a junction above where Phil was waiting and where more ways to go were apparent. Milkyness in the water makes it difficult to guess which one is the main flow. Finding one possible way, without very much space: a photo of the ongoing realms was later voted to not win a photo award. Nevertheless, my artwork illustrates the nature of the passage and the realm yet to be explored. With guide line securely placed, we have a good exploration point from which to continue next time. It was time to hoick our packs onto our shoulders and trog back up the slippery cascades where we would discover how the others were getting on exploring around the river outside White Fish Cave.

Just upstream from White Fish is a sink at a bend of the river dropping over a small waterfall. The speleological clues seem obvious in retrospect. There is a small waterfall in the river. It meets a limestone outcrop and adjacent to the river are dolines with water. Some very accommodating person has poisoned many of the rose thorn bushes so the banks with the exposed sinks are now more easily found.

Nicole, Dave, Michael and Katrina squeezed into a slot, discovering a significant cave later dubbed Schrodinger's. This name provides enormous opportunity for jokes for physicists and chemists, but I suppose it is motivated by my bush walking buddies' ridiculous assertion that the cave doesn't exist until it is explored. For the physicist, the cave exists when first observed. However, the group's philosophers argue it doesn't exist when no-one is there. Care for a chestnut? Of course the assertions only apply to caves. At least we agree on the special place of caves in the universe. For the reader, just go with the

name. When you find a cave you can call it something else. Schrodinger's is a mini cave complex, part of a very interesting set of caves apparently connecting into White Fish. From there we know nothing about its connection to other caves in the area. Alan and Kat spent time surveying the nearby cave, CP92.

The White Fish sump may have an inflow, but nothing as big as this new capture. The water in this cave somehow finds a path independent of White Fish and possibly escapes again to the river from Easter Cave at the bottom of the waterfall cascades. The volume of water is much greater than that estimated to be flowing in White Fish, and like White Fish there is an interesting and beautiful river passage.

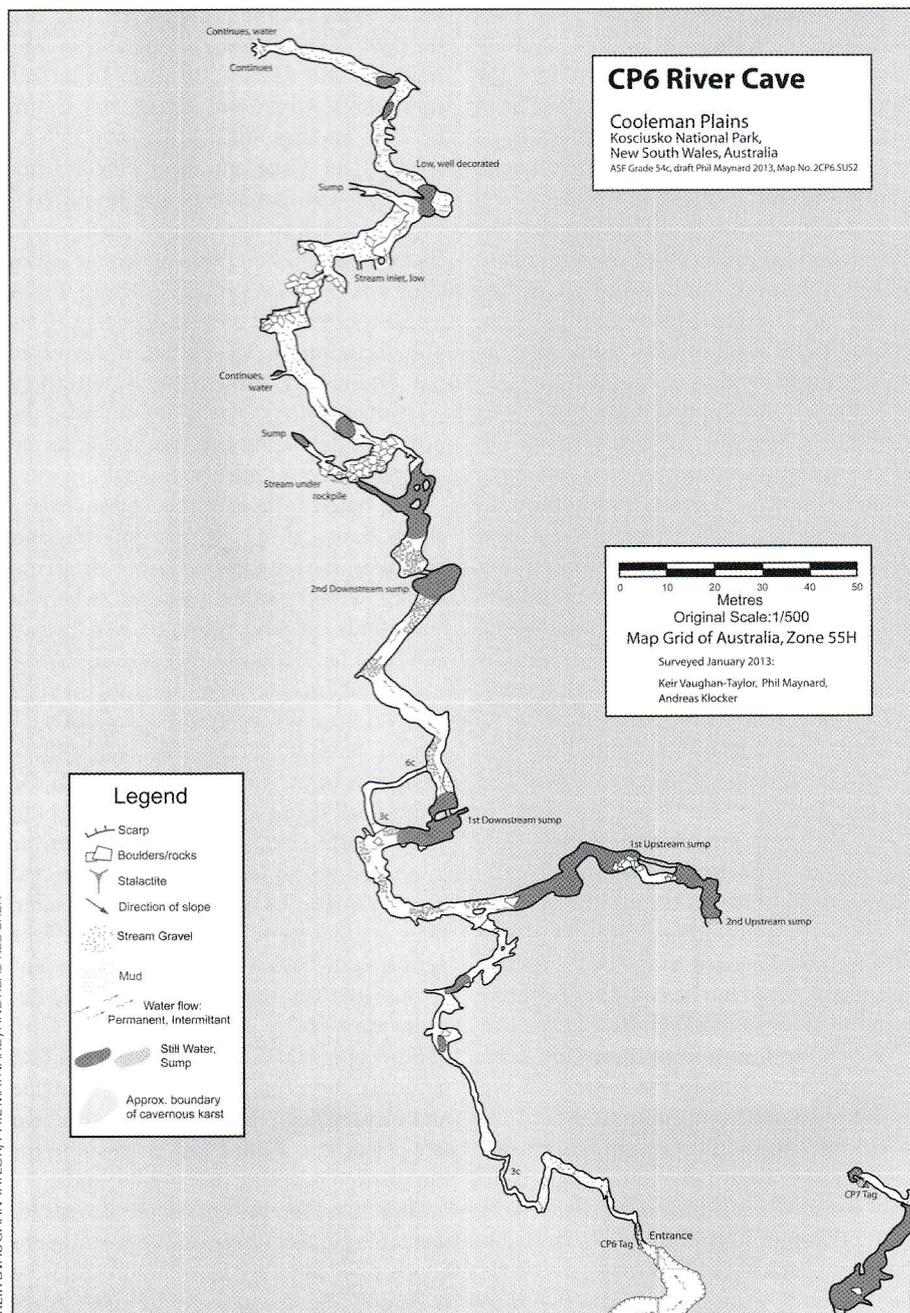
Katrina wanted to borrow a diving mask so she could investigate the onward going sump in Schrodinger's. She returned to the

cave and free dived into the sump, making primitive dolphin noises and also a primitive video of the way on, while the group looked on at the mysterious water.

GLOP POT AND RIVER CAVE

This large karst drainage area upstream of Blue Waterholes collects water from the west, south and south-east. There are multiple (number unknown) underground streams and the junctions are also unknown to us.

Glop Pot has a narrow, cave ladder shaft entrance and then a choice of ladder pitches down to water which in one place drops to a twin lake, separated by a low roof. Rod dived the upstream sumps of Glop Pot in our early years, passing a short sump and then another long sump. He reported being unable to find the way on from a final chamber. At the same time, Jason Cockayne



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dived upstream River Cave, reporting considerable passage in which he didn't leave any line. Within cooee of the Glop Pot entrance is the slotted climb down into River Cave's entrance.

Year 2010

Jason and I returned to Glop to follow Rod's orange line, discovering that it spanned hundreds of metres upstream. There is one short sump, followed by 80 m of walking passage, then another sump, maybe 60 m long and surfacing in a pure white marble room. There is nowhere to get out to sit, although there are blades of limestone just below the surface that are equally rest proof, leaving no option but to float in very cold water. There is one exploratory line dropping into a rift and surfacing back in the same chamber. Exploration revealed that there was not a way on. There is a pure white 75 cm wide tube in a side wall from which a stream drops as a small waterfall into the lake room. This flow is not the full water flow. The tube is wedged with many rounded 25 cm white marble stones, around which water flows. Upstream from the White Room is yet to be found.

Jason's upstream lead should make the connection to Glop Pot and so we set out to join the not-too-distant caves. I placed line in and out of various pillars and passages. The last of three air surfaces would become our 'return to' rendezvous point.

With my reel emptied, I returned to an air bell where Jason waited, perched out of the water on a near surface limestone blade, keeping just a little warmer. It was his turn to rig line on from the furthest final tie. Jason connected to my last exploration point and moved off from there, enduring the usual limited visibility. Dropping to 14 metres, a dyke where the river has burst through marked my last tie-off. Jason moved from here up the silt floor where its upward slope made it clear the floor was rising to a surface, but he was almost out of guide line.

He was only just able to surface with his reel at arm's length underwater. His head was just able to broach the surface. He could see a large chamber. Getting cold by now, Jason needed to retain the line to the outside world but he could not properly examine the new chamber. He tied the end of the guide line to a dive weight, then dropped the weight to the bottom at the furthest point and returned.

His later report in our cold rendezvous station was frustratingly tantalising. "Well, is it Glop Pot?" Half-frozen, he chattered, "I d-d-don't know. It looked a bit like the Glop chamber". Back in one of the return air bells it would seem so easy to reload new line in

the reel and push further. The reality is that we are restrained from exploits of bravado by the chill grip of Boreas, the Greek god of cold. The Greeks had a god for everything, although Boreas was really to do with cold wind. No regrets; back at the campsite we drank to our successes. With the entrances of River and Glop caves separated by about 25 m, it seemed to our group inevitable that the fairly large stream in Glop would soon connect to the equally large stream in River Cave.

On each trip to River we walked the grassy plain with our tanks, wetsuits and gear roughly packed and carried on our backs. We noticed spiders nestled in tussocks, amazing creatures we later identified as Musgrave's Alpine wolf spiders. Spirited brumbies grouped in suspicion and eyed us cautiously for a brief time before moving off. River Cave entrance is at the end of a blind valley, possibly once capturing water flow in the valley, geological time ago. Maybe it still flows a little now in intense rain events. All the real water action in this epoch is underground.

At River Cave entrance, kitted, I announced with confidence we would connect Jason's last find to the surface and that this would be Glop Pot. Either it was Glop Pot, or it was Parallel Universe. I took a small waterproof camera, good to 10 m. The maximum depth is 15 m, so I encased the waterproof camera in a watertight container just to make sure it survived the upstream depth pressure. Michael Bates accompanied me as my dive buddy.

The slotted River Cave entrance is a climb down, dropping into low passage. It snakes its way into a squeeze drop and thence along muddy passages, where it soon finds the underground river. It usually takes ten minutes to get organised for a hands and knees crawl up and into the river where it is soon deep enough to swim.

The passage surfaces in two airbells along the way. At the opposite end of the second bell the passage submerges to about 12 m depth. Upon finding the end of the line where Jason last tied off, I connected the guide reel line and set off. Soon after, there is a steep rise in the floor where lake pendants and dykes re-characterise the environment. It is difficult to say for sure because the visibility is always a blurry 25 cm. Following up the floor, we surfaced into a large chamber. This time I had plenty of line and I laid it along the left wall, fixing at two key places and staging one in position for the suspected way on back under water.

This chamber was not Glop Pot. Instead, it is some parallel universe. While similar to Glop's twin chamber, this parallel universe is bigger. The above-water chamber is 25

m long (see sketch) with an enclosed roof. Although there are places on the side where a diver can sit, there is no place where a ladder might access the water from above. The structure of the limestone is similar to the earlier parts of River Cave, with basalt dykes in a fragile stage of decomposition protruding from the walls. Michael and I eddied about trying to find a way on while taking photographs with a flash, spoiling each photograph with a hundred globular blurs. Foggy back-scatter is not a friend of flash photography.

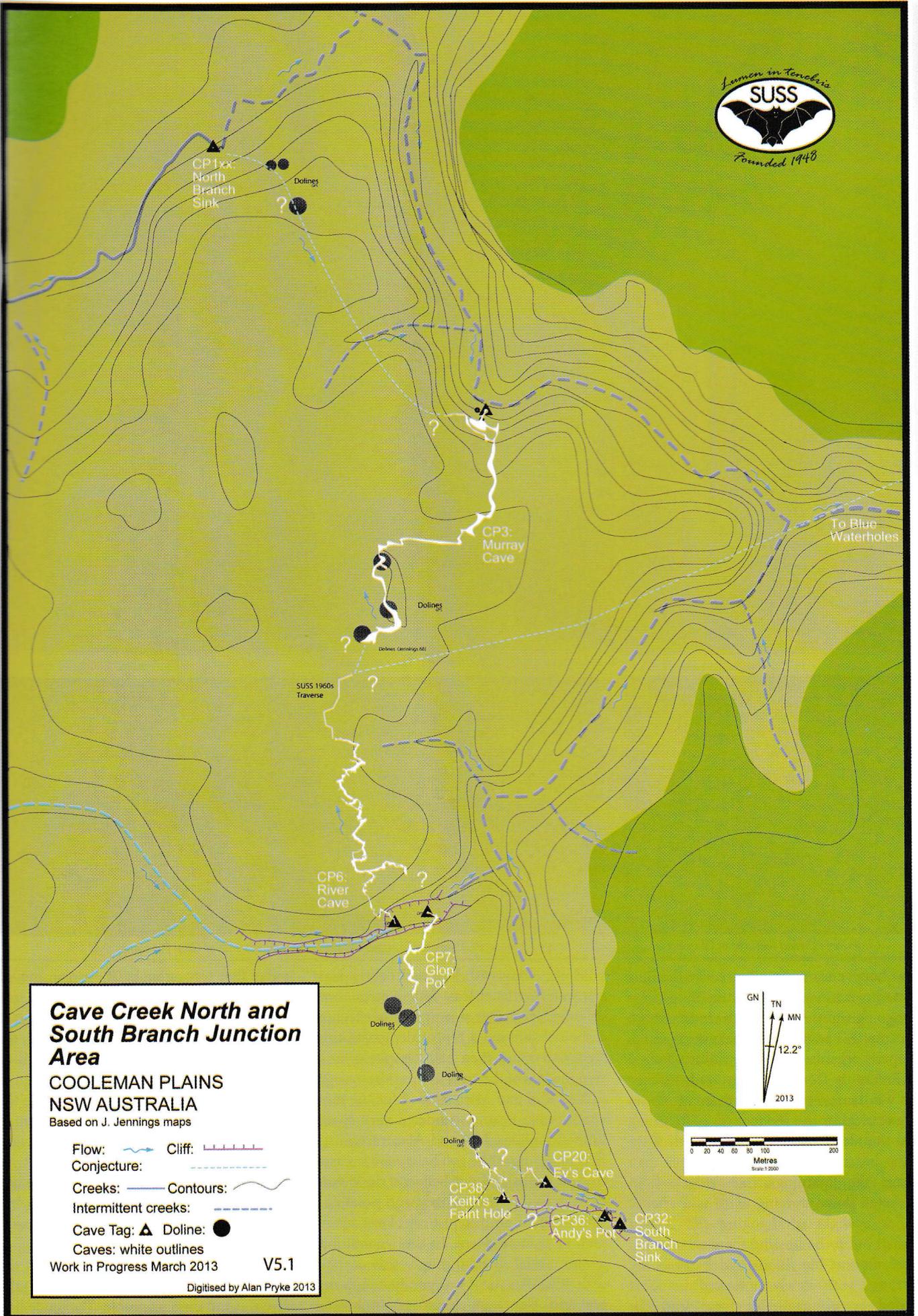
By some lucky reading of the passage we guessed the position of ongoing passage. It descended steeply into an elliptical, smooth phreatic passage, gradually enlarging to 2.5 m with a floor of 1 cm river gravel stones, perhaps laid out 1.5 m wall to wall. As it went deeper, it grew bigger and I ran out of line, so it was time to turn round. In reality we approached our limits because of the cold. The goal for the day had been to get into the mystery chamber and determine if this was a Glop connection or not, and we successfully achieved this goal.

Upstream from Glop's lake, hundreds of metres of walking and wading knee deep in river passage led us to think that this was the main drain. However, it may be that this is a smaller and separate tributary because the water volume flowing across the gravels of the walking sections seems less than that of River Cave. It still seems that there should be a connection. In the poor visibility a stream could join just about anywhere on the path along the placed dive line without having been seen. Parallel Universe and the underwater approaches are estimated to be heading upstream towards the east, making its path in a different direction to any of the other known caves and section of river.

Year 2011

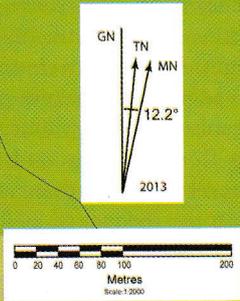
We needed more people to help if we were to put a team of three into River Cave. The idea was to spread the cave-diving expertise through a larger group, ready for later surveying. A NUCC team was going to help but they, of course, wanted to engage in walks and other such activities. There is a lot to do at Cooleman. We carried our diving gear in packs for three persons across the plain to River Cave for a dive, helped by our caving colleagues from NUCC.

Inside the cave at the underground river's edge, we strapped hoses and regulators onto the tanks. We realised there was a missing yoke-to-DIN converter for one of the regulators. It had somehow been left back at camp. I need to replace the yoke valves on the tanks but that is yet another expense. The problem meant no diving that day. After working all week and then



Cave Creek North and South Branch Junction Area
COOLEMAN PLAINS
NSW AUSTRALIA
 Based on J. Jennings maps

Flow: Cliff:
 Conjecture:
 Creeks: Contours:
 Intermittent creeks:
 Cave Tag: Doline:
 Caves: white outlines
 Work in Progress March 2013 V5.1
 Digitised by Alan Pryke 2013



ALAN PRYKE



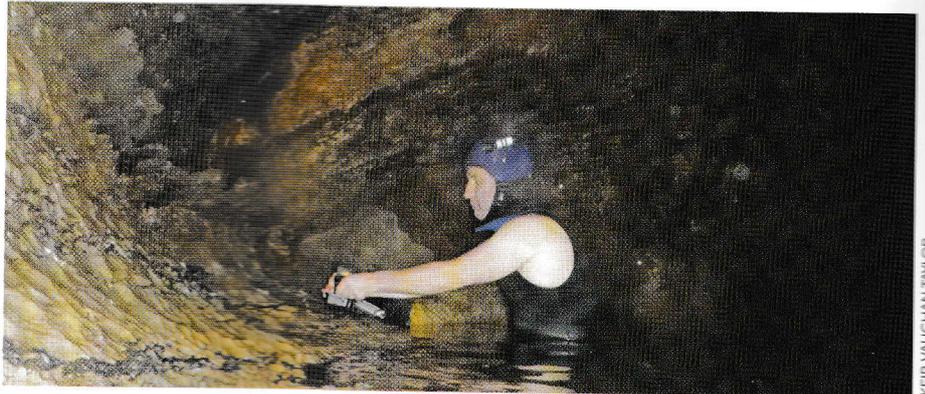
Mel Stammell exploring Keith's *Faint Hole* with Alan Pryke

ALAN PRYKE



Glowworm thread features in Glop Pot

KEIR VAUGHAN-TAYLOR



Phil Maynard unpacks disto X on the other side of Glop Pot sump

KEIR VAUGHAN-TAYLOR

nine hours coaxing an ailing car to the Blue Waterholes it seemed that little things were not going right. A little recovery time back at camp was advisable to make sure gear is properly organised. Recovery time—I wish.

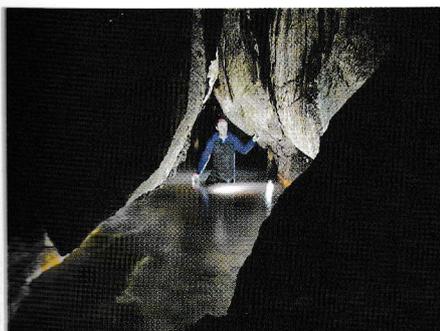
Emerging from below ground, inclement weather presented as a dramatic series of electrical storms. Sequences of lightning and thunderclaps motivated our retreat to camp but through the valleys rather than across the lightning-struck ridges. Rain bucketed down, forcing us to take shelter under a slight overhanging cliff, which turned out to be hosting the sink into Evs Cave. Recent big floods had blocked the entrance with newly upturned boulders hurled by unimaginable force into the

entrance along with logs and debris, leaving watermarks at least four metres above river bed level. Our stormy weather seemed to be considering a repeat demonstration. Rain eased and then hail. Despite a lot of rain the bed of the river at this time was dry as Kat, Phil and Michael vied for the most comfortable position under a very space-limited boulder. Mel and Alan recognised that smashing white golf balls were a reason to squeeze in and out between the debris, seeking Evs' protective roof and possibly a cave to be found. You just can't keep a good man or woman down. In these conditions a substantial breakthrough was a plan with risks. For me it was good enough that Mel and Alan were able to get in, but for

today that was enough. The storm moved on but other storm cells approaching in a line from the south bid us a hasty retreat to camp along the Joe Jennings' Walk, with the upper plains taking many lightning strikes. That night storms and rain dumped a lot of water into the caves that was to make the next day's dive difficult. By early morning the rains had passed and we had an advantage with our gear already stacked in River Cave. The difficulty was struggling into our wetsuits. I think my suit is shrinking but everyone likes to point at my middle-aged gut and laugh.

Gear was all where it should be; the river level was markedly higher but the dive was not unmanageable. The guide line

KEIR VAUGHAN-TAYLOR



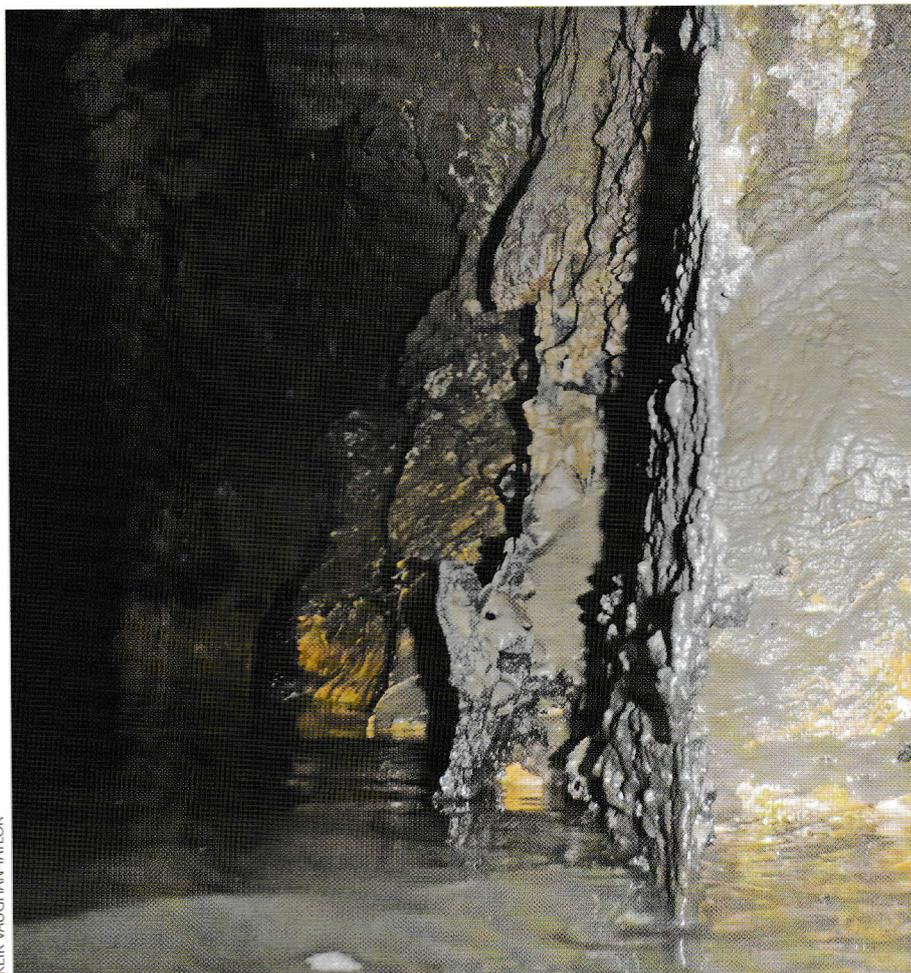
Phil Maynard in Downstream River Cave

PHIL MAYNARD



Keir Vaughan-Taylor in Glop Pot entrance

KEIR VAUGHAN-TAYLOR



Walls, basalt blades and river in Parallel Universe

KEIR VAUGHAN-TAYLOR



Paul Lewis, Murray Cave Sump in drought; note the wall of fossils

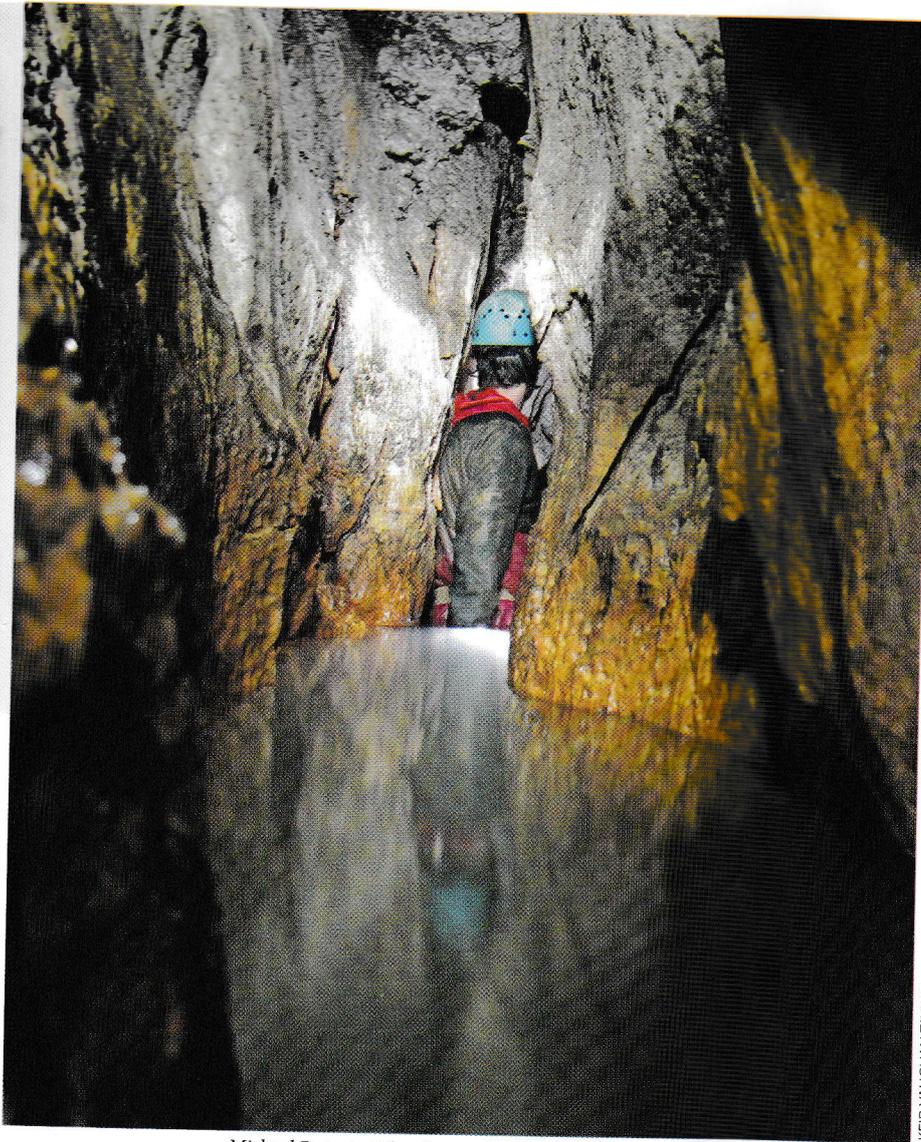
had, in places, collected grasses from flood waters but remained secure and needed only minor maintenance. The temperature of the water was unusually warm, being about 14°C. Phil, Michael and I made our dive through the first three sumps and met in the Parallel Universe Chamber. I eased into the new lead to place new line from the forward tie-off established on our last trip. While I was gone Phil tried out my camera to get some pictures in the cavern of Michael floating about in the black void. Mostly we captured the essence of the black void.

The water was particularly turbid and underwater navigation instrumentation required a left and right hand to feel

a way on and perceive rocky geometry without sight. The stone walls were mostly smooth, without projections, and the floor was gravelly. As we followed the roof of a downward-trending passage it bottomed out, passing under what felt like highly scalloped arch where the river had reached the bottom of a phreatic loop. I attempted to find a rising passage and made my way into a rift that rose into a blind, water-filled aven. I could only tell this from feel and had to reverse along the passage and back into the chamber just downstream of the arch. It had been too soon to try going back up again and it was time to go back. I would try again tomorrow. In the chamber I could not find a place to tie off and was obliged to

return without marking the furthest point of exploration. We all returned to the start of the cave and returned to camp, taking the tanks which needed to be refilled. That was all of them.

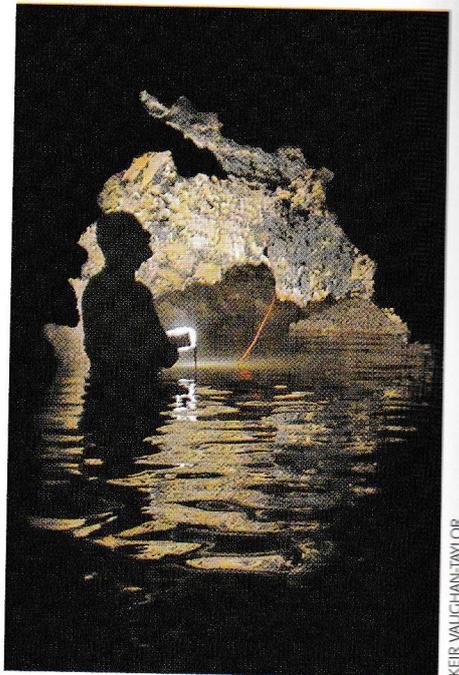
While we were diving Mark, Mel, Alan and Kat located Keith's Faint Hole. The initial entrance pitches are tight, taking a number of hours to negotiate. They surveyed the extent of the cave, pushing right to the bottom and documenting its extent for the first time. The bottom of the cave, as can be seen from the photographs, is likely to be one of the main water inlets to the main Cooleman River. The hydrological role of the two caves, Keith's Faint Hole and Evs Cave, is that both deliver water to



Michael Bates in Schrodingers Cave prior to river collapse



Glop Pot pitch with diver in the water



Murray Cave sump in drought

the main known caves either in series or as parallel tributaries.

The next day we tried River Cave again. This time Phil and I dived. Michael helped to carry gear. NUCC began the process of packing up to leave. Phil had to leave the next day to go overseas, so this would be our last dive. Alan and Phil were to re-survey River Cave to be consistent with our current survey data and also to later link in surveys of the underwater section that we hope to do in the future.

We retraced the guide line to the lake chamber now known to be Parallel Universe. Phil waited on a mud bank while I set off to push the passage further, with the goal of fixing a line at the furthest point of exploration. The difficulty lay in finding something to tie off onto. The turbidity was much the same as the day before, but this time I followed the floor for clues in the darkness as to where the passage may continue. The railway-shaped tunnel has plenty of room, which I estimate to be 1-2 m wide. With smooth walls all around, finding something to tie guide line to is a

problem. At 14 m depth, near the floor, I found a small vertical projection to tie off. Exploring outwards, I found this point is on the upstream side of the arch. Following the floor I found an upward going canyon along the left wall that ended in a blind aven. The aven was possibly the same one as last time but it is difficult to say. Returning to the tie-off, I disconnected the reel from the fixed line and returned to where Phil was waiting.

The growing length of the dive was requiring more air. I was approaching the full third out of each twin 7-litre tank for the inward journey but also I spent time improving line configuration. Deborah and Rod both used much less air and returned with a bigger surplus. The current smaller tanks will be appropriate for another push trip but if much more line is placed it will be necessary, at least for me, to use larger, heavier tanks and that means greater difficulty backpacking them across the Cooleman Plain.

Alan and Kat returned from surveying CP92 in the Easter Area. New passage

was found and an excellent map has been drafted.

MURRAY CAVE AND CLIFF CAVE

Cliff Cave is an easy, beautiful cave with predominantly walking passage. Although meant to be a simple walk-through passage that terminates, I was interested to visit a back section through a squeeze, since this is apparently an outflow cave. Sure enough, here is another active sump occasionally overflowing in the same way Murray Cave does but with a much bigger and cleaner passage leading to the outside world. The squeeze prior to the sump is a challenge for me. Nevertheless, the sump is calling to us and soon we will have to make the effort. At worst, I can help someone else to do an exploratory dive.

The dry valley outside Murray has some really fine fossils. Usually you can only see crinoid stems but with a little looking, stones in the creek bed can be found containing sections of fairly rare crinoid flower tops. Back in 2007 our whole team visited Murray when a drought had lowered the

BELOW THE RINGING PLAINS OF WINDSWEPT COOLEMAN

sump so far that the whole team was able to enter what only cave divers can usually get to. We waded through the normally impassable sump, noting thousands of shells embedded in the late Siluro-Devonian limestone.

Murray's vertical slot outflow entrance merges to a passage almost devoid of formation. However, once past the sump, prolific decoration is everywhere, testament to the damage done to the entrance ways. A group of pure white stalagmites hangs in the middle of the passage and right at its root are the names of the early settlers from the late 1800s and then a speleological group, that shall remain nameless, from the 1960s.

Descending a mud ramp brought us to the second sump. It is a triangular passage, normally underwater, but on this trip it was another wading pool. On the other side, the main Cooleman river empties into a pool disappearing somewhere into the wall. A small slot appears to take the water but it's far too small for a person, even Mark. In flood, the river rises up the mud embankment along the passage into the first sump, flowing out of the main Cooleman entrance into the surface river. Towards the back is another short sump, after which the river filters out of a rockpile through which no-one has found a way on. The final room is a big collapse and although there is rock-filled passage on the right, the water comes through rock breakdown straight ahead.

Australia Day Week 23–30 January 2013

This Australia Day week-long trip was one of the most productive of all the trips, resulting in hundreds of metres of surveyed passage. New sections of cave were discovered, surveyed and photographed, helping to piece together the puzzling hydrological relationship in two important cave areas, Easter Area and Glop Pot. All the rivers, both surface and underground, were silted up.

Vivid green algae grow prolifically in the main river as soon as the water emanates from the underground, suggesting a nitrate problem further upstream than just at the camp site. It could be the brumbies, as their population has exploded. A horse will deposit its manure in one place rather than spread it far and wide over the grass it wishes to eat. The trouble is that each horse does the same and dung is piled in hundreds of places along the tracks. I like horses, but there are too many on Cooleman Plain.

You need a couple of days just to prepare for a trip to Cooleman and I left work at the earliest possible minute to get things

done. Phil, our in-house forensic chemist, tested the air from my scuba compressor to make sure it was safe. Oil used in a diving compressor isn't ordinary oil but something highly synthetic that doesn't contaminate air with hydrocarbons. It costs hundreds of dollars for a small container and it was time for a compressor change. The high pressure valves needed to be serviced. I could do the rebuild but I had to pick up parts from an outlet on the other side of Sydney. My diving regulators needed servicing—hundreds of dollars. It may be time to buy new regulators since it's probably cheaper than a service, but ouch—another expense. Oh well, everyone needs a hobby.

I picked up Alan Pryke at Mittagong. His photographic gear had just been stolen from his car so it was up to my point-and-shoot to record any new cave we found.

EASTER CAVE AREA

Full dive kit is heavy to carry, especially when we are in this perfect heatwave weather. Despite the sweat of the day, we would soon experience contrasting cave water, so we needed that wetsuit for which I'd just laid out all that cash. Deborah and I packed all our gear: tanks, weight belts, and several layers of thermals for under the wetsuits.

The gorge is beautiful and the river track climbs and falls on one side of the river over rocky embankments. My shoulders started to get that ache from the weight of my pack and Deborah, carrying the same weight as me, is unfairly young. She made not one note of complaint, in contrast to my bitching about the state of our national politics. Alan will chat about anything and everything. He is a human talk machine, which I mean in a good way, especially when I have to drive back to Sydney.

After White Fish Cave the river cascades over a series of plunge pools and rocky prominences. It could be nasty if you were to fall. With extra caution no such calamity struck, but it was something of an effort. I certainly needed lunch by the time we sat outside the swift currents sweeping into the river from the mouth of Easter Cave. Munching on beef jerky and nuts, I noted that the efflux waters were brown, which did not bode well for our underwater vistas.

We slipped into the river that flows at the bottom of a limestone wall, turned, and surfaced beyond the first short duck under without even turning on our air. Previously placed guide line was abraded and swept out, floating forlornly in turbid waters. Easter's water was seriously silted and uncharacteristically warm. I tied off, once again setting off through a cylindrical underwater passage into the backmost

chamber, with nothing to see at all. In the chamber it was not possible to progress any distance in Easter Cave and I called off the dive, to Deborah's disappointment. She uttered not one word of complaint.

Rather than struggle up the slippery cascades, Alan suggested walking up the valley side to the top and walking around the ridge to White Fish. I think Deborah chose a better path than me, since I sported long rose-bush scratches down my legs, like the motif from *The Matrix*. After stuffing about crossing unforeseen gullies, rock climbs and slippery grass, we regrouped at the entrance of White Fish with me completely stuffed from the effort. I lay in one of the river pools, raising water temperature several degrees. (Honest. I measured it.)

In White Fish it was apparent there had been a significant flood event. White Fish Cave was missing its guide line, swept and tangled in the first sump. Previous line had remained in place for more than 20 years. Normally a simple dive, attempts to lay new line were thwarted by poor visibility and blockages from logs. The small rooms were choked with grasses rent from the hillsides and swept into the underground, and were wedged into log cracks and crevices, waving about like some television hair commercial. Several attempts to pass the sump weakened my resolve, spooked by grassy hands enveloping a previously empty room. White fish were present in numbers, attracted by the light and possibly keen to find a way back to the sunlight. Hard to say, really, since no-one knows what a fish thinks. Fish in Easter can get out any time but choose to live in the dark recesses. Again for the second time, new line could not be laid. There was no water flowing into the entrance of White Fish. The new situation in Schrodingers suggests this may not occur very often from now on.

Schrodingers swallet had changed. Where once a pool formed in the bend of the river and some water penetrated from the back eddy pool of the river into Schrodingers, now the eddy pool is a sandbar over which half the river water flows straight into the cave. Inside the cave, the sump we intended to dive and explore was completely gone, leaving dry passage instead. This was followed into a difficult rock fall with possible leads. Outside on the hill a new shaft has opened, dropping into another section of Schrodingers but was unstable and was not descended.

Alan visited a nearby cave, CP92, discovering new sections and surveying his finds. Maps are delayed because of errors later found in surveying instruments that need to be recalibrated. Nevertheless, these surveys will prove integral with all the other

BELOW THE RINGING PLAINS OF WINDSWEPT COOLEMAN

finds we are making. Rod O'Brien arrived after working at Lake Jindabyne installing large Snowy Mountain Scheme pipe valves. Talk about keen—work all week in some cold deep lake and race to Cooleman for a cold cave or at least a cold beer.

A black snake hurried out of the atrium of my tent on my approach. I decided thereafter to keep the main tent section securely zipped up and to be cautious rummaging in the tent's alcove. That night two mice cavorting in my electrical box scampered up between two fabric sections of the tent and over my head. Perhaps they were what the snake was after.

While Cooleman baked in a Snowy Mountain summer, news came that the rest of Australia was drowning in what many think is the climate change reckoning. Brisbane flooded yet again and Bundaberg also in flood crisis. The sky clouded but potential storms continued on into the north.

The next day was River Cave for Deborah and Rod while the rest of us rigged ladders in Glop Pot. Rowena, arriving about this time, was now part of the group and her help with logistics was greatly appreciated. It was mainly a gear-carrying trip. There was considerable tackle to carry across the plain to River and Glop Pot. The walk is beautiful, with flies made more tolerable for me by continuously swishing my face with a branch from a bush.

Deborah and Rod set out to extend the upstream River Cave dive. Phil, Andreas and I set up the rigging in Glop Pot for a surveying dive the next day. River Cave water visibility was extremely poor. Although the guide line was largely intact, the impact of flooding had dislodged sections and this line needed to be re-fixed. Rod and Deborah managed to safely re-secure line as far as the previous exploration point in very poor conditions. Although the visibility was preventing easy exploration, the temperature at 15°C was much warmer than we were used to at Cooleman. We have experienced temperatures as low as 7°C.

At the furthest point Rod made multiple attempts to find the way on, discovering the same blind passage I had found on previous trips. With persistence, he located a downward progressing passage, extending the distance from the last exploration point perhaps another 15 m. Not very much, but importantly, the main flow passage had been located ready to explore in better conditions on a future day.

Andreas, Phil and I set out the following day to dive Glop Pot. Over two trips we surveyed from the entrance through to the start of the second sump.

The Glop entrance is located about 50 m from the River Cave entrance. Inside are

two 7 m pitches, separated by a crawl tunnel maybe 10 m long and the second pitch looking down upon black water. The sump viewed from the top of the second pitch appears as a single pool but is part of a larger lake chamber separated into two by a swimmable constriction in between.

I was the first diver in the water cognisant that the fixed guide line might not be fixed any more. That was indeed the case. Abraded guide line untidily wrapped round a speleothem was replaced with a more stout orange 3 mm line. I wound the old line up into a ball, stuck it in our pack and set about making forays into the sump with the hope of laying a fresh fixed line. I knew this sump was short, but with zero visibility it took three attempts entering and backing out of the sump to find the way on.

Rowena, free-swimming and keen to make sure no-one was drowning, descended the ladders and finned her way around the figure-eight chambers, accompanying the scuba-equipped Phil. Rowena was, I think, assessing whether this trip was a goer or not. If not, there would be some slightly less than exuberant de-rigging of ladders. I was sure, knowing this sump from a previous trip with Jason, that a way could be found. At least there were no bloody logs and wavy grass. The final trick to getting through was feeling along the river gravels which indicated a main water flow. The gravel surrendered to a frothing silt bank, but to one side a scalloped rock surface completed the directions into the next air chamber. Although I had the perception that I was spiralling to the left, it was actually a straight line.

The guide line was intact on the other side but traced another circuitous route back through underwater fissures, an older path not at all congenial compared to the new blind luck navigation. Andreas removed all this old line, leaving only the new in place. We were easily able to run a survey tape measure through the sump in a straight line, estimating the length, depth and angle. With this reasonably reliable estimate of the sump extent we can connect the survey of the outer cave to the stream way passage within.

Last time I visited Upstream Glop the floor was gravel with a trickle of running water. The gravel was now gone and the passage filled with knee-deep water all the way to the next sump. The flood had removed all the gravel, possibly lowering the sump and enabling the current civilised route into the next chamber.

We went to the furthest planned survey point at the start of the second sump from where we surveyed back toward the entrance. The line in the second sump was

also gone. This second sump is ~60 m long, and in this visibility it was too ambitious to try on this day. I want to get an electronic compass in a waterproof housing to survey this one. That would have to wait until a later trip. Phil and Andreas surveyed while I struggled, trying to get my point-and-shoot to take a half-decent picture.

Many of the photographs taken are poor because of water on the lens, cavern fog and my incompetence. Nevertheless, enough pictures have worked well to give a representation of what is beyond.

RIVER CAVE

Visiting River Cave first in 1967, SUSS was unable to progress far upstream or downstream because of the underground river sumping.

Australia's long drought from 1963 to 1968 destroyed half of Australia's wheat crops, caused the death of 20 million sheep and brought catastrophic loss of farm income. SUSS, returning to River Cave in 1968, set out its usual mad plan, this time to float the river using a raft. They '...found the river was non-existent. It had dried up, leaving only occasional pools and puddles.' We know of this trip from a draft of a letter in the SUSS library that was sent to Joe Jennings in 1969 at the behest of SUSS member, the late Glen Hunt. Associated with the letter is a guesstimate map of the river passage from this trip. The survey bearings were recorded using a Silva compass and distances guessed. Distance estimates totalled more than 1000 ft (or about 300 m) of river passage, but beyond that downstream sump whatever passage existed has not been visited since that time.

I had seen the downstream River Cave sump on one occasion in high water where there was a substantial whirlpool drawing in every hapless object that was sucked into its grip. On previous trips to Cooleman I had not been enthusiastic about a downstream dive. Pushing against the current at Jenolan's Lower River teaches a lesson of caution about diving downstream in a cavalier fashion without sufficient regard for the important return journey. There was so much to explore at Cooleman that downstream River was to me a distraction, although I knew of the 1968 SUSS letter and was intrigued. However, on this occasion the water was low, there was no whirlpool and curiosity is a powerful motivator.

Using a three-litre cylinder Deborah and Rod, with some difficulty, located a slot in the downstream lake. It was a canny piece of work by Rod to locate the position in the lake where the outflow might possibly be. The intrepid pair slotted themselves through a letterbox hole in the side of the

lake, thus re-finding for the first time the cave described by our early SUSS explorers. On the other side, streamway passage similar to the River Cave we all know continues as a river/lake section, entering into small, domed lake-rooms with similarly domed alcoves on each side.

It is evident that the description and map by the 1968 team greatly understates the size and beauty of these passages. There are two connections to a rock-collapse chamber through alcoves on the right side and again on the left along a triangular, water-filled passage that finishes with a climb over jammed river stones. Here there is a climb up to a large chamber of breakdown rocks. After the climb Deborah and Rod found their way into the chamber on the far side to an abandoned river passage containing a shallow pool. They found a second large chamber where the way on appeared to be a long crawl. Deborah, not a fan of crawls in her super-expensive dry suit, chose with Rod to turn round. They were the first to see the 1968 passage since then and the first to see the cave with its characteristic rivers because in 1968 it was all dry.

Rod and Deborah had to leave to go back to Sydney. The next day Phil, Andreas and I went to survey what they had found and see if we could push exploration further. We replaced the orange guide line through the second sump with less visible green polypropylene, fixing the outside end just below the water surface; unnoticeable, unless it is known there is a way on. Surveying through the sump and to the other side we surveyed and mapped our way along the route found by our companions the day before.

There are two connections from the river to the first large chamber, one through an alcove to the right side and another wading along a triangular passage on the left. At the far end of the left passage is a climb over loose, jammed stones and rocks into an upper collapse chamber. A horizontal basalt layer projects out of the limestone in the tunnel and at one point, although small, a delicate insect wing encased in a web casing stood on a piece of basalt. The web material is similar to a glowworm but I have no idea what encased the winged insect in this sealed off environment.

At the last chamber explored by Rod and Deborah, we knew from the map there was a way but it was not obvious. Formed from collapses around the junction of several intersecting streams, a breakdown

chamber seemed to end in all compass directions. The crawl that dissuaded Rod and Deborah from further exploration led nowhere. Andreas scrambled about in the rock breakdown, finding a small squeeze on the opposite side of the cavern from where we imagined the river course might be. Andreas' squeeze dropped back to a stream in a stand up passage often decorated with formation. The stream possessed less water than we experienced in the first passages and so is likely to be another water feed into the river system.

Another small incoming stream joined the main walk-along passage. Somewhere we had lost the main river, but this was brilliant, illustrating that the Cooleman hydrology is made up of many inlets and streams. Unlike the rockfall chambers, the streamway tunnels are well decorated with yellow stalactites, shawls and straws. Stream water percolated across river gravels under many formations and then into a lake with a left-hand bend in the river and a coarse sandbar fully exposed in this low water, referenced in the 1968 map. The ongoing tunnel, exquisitely decorated, finally ended at a small diveable sump and a passage to the left labelled on the 1968 map as 'unexplored left hand branch'. Exploring this, we found a serpentine tunnel with one simple squeeze that terminates after 20 m in another possibly diveable sump.

We surveyed and sketched the cave up to this exploration place (see the map drafts). The 1968 map shows that the sump was dry; it shows a crawlway passage and considerable further passage. The rest of the known cave was estimated at that time to be a number of long survey lengths, totalling more than another 100 m of passage.

CODA

To date we have not surveyed upstream River other than a few rough bearings. The River Cave—Glop map roughly indicates their end points trying to hold hands. The problem is that there is at least 250 m of dive line going upstream in River and still no connection to Glop. If these rivers are separate that is fantastic, because we will have another river of equal size, but I do not yet accept that.

Rod and Deborah's last upstream dive ended in a descending passage, the final tie-off a hammer buried in the gravel. In my opinion, this passage will surface in Glop, but where? We have circled the perimeter of Glop Lake, feeling along the walls try-

ing to find a passage onwards, but to date have found nothing. There is, however, a clue. Finishing a dive in Glop Lake requires climbing a caving ladder to the top of a 7 m pitch. Exiting from Glop, I snagged the buckle of my weight belt and flipped it open. The belt plunged into the lake, watched from a short distance by a floating Phil, waiting his turn for the ladder. He immediately dived after the belt, managing to find it on a clean limestone ledge. This ledge in the middle of the pool may have been a ledge inside our sought-after upstream passage.

My prediction is: the Upstream River dive will continue to descend past the belaying hammer, but then turn up and arise, possibly next to Andy Spate's caving ladder, lost since his adventures with Joe Jennings. The area map shows the old SUSS eyeball survey from the 1969 drought. It is still a distance from the Murray connection, so we need to finish our survey to give a better position. It seems likely that we will connect to the other side of the Murray rockpile and then we will need simultaneous trips into Murray and Downstream River armed with loud voices. No problem there and it will be fun. Glop, in the upstream direction, we think, will connect to Evs or Keith's Faint Hole. Glop's second sump is missing its dive line from the flood and so here we go again. Glop's White Room may connect from Evs or Keith's, so there is no lack of things to do.

Murray Cave is the last we saw of the underground river on its way to Blue Waterholes, and what a find it would be should it connect to the main drain downstream from here. I would have expected the river to trend more to the east but River Cave, Glop and Murray's river section is going not toward Blue Waterholes but instead to the north. In the main entrance section of Murray is a tunnel aptly called the Evil Twin.

Tight, it ends in a sump too small to dive. However, a SUSS trip in 2007 during a severe drought found the sump gone. The Evil Twin Extension crawls towards the north through a series of rockpiles and seems to go on and on.

Found in the last few hours of a trip, it was explored as far as time would allow and not surveyed. The Evil Twin may find its way to North Branch sink, which has recently been exhumed in a flood or alternatively, it could reconnect with our river downstream from Murray and thence to Blue Waterholes.