

MULU CAVES 2013

An Anglo-Malaysian Expedition to the
Gunung Mulu National Park, Sarawak



REPORT
on the findings of
THE MULU CAVES 2013
EXPEDITION
to the
GUNUNG MULU NATIONAL PARK
SARAWAK
During October 2013
Expedition Leader: Mark Brown

Edited by Mark Brown

Maps & Diagrams by expedition members and Hugh St. Lawrence



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Figure 1 – Mark Brown and Tony White route finding in Whiterock Cave – photo by Andy Harp

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Cover design by Hugh St. Lawrence

Front Cover – Rosie Hadfield in Mysterious Minstrel in Whiterock Cave – Photo by Jeff Wade

Rear Cover – Rock sculptures in the Melinau River at Camp 5 – Photo by Nicky Bayley

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ABSTRACT

Mulu Caves 2013 was the 21st Anglo-Sarawak Expedition to Gunung Mulu National Park and operated in the field between 8th and 31st October 2013. The expedition based itself at Camp 5 in the Melinau Gorge, with a satellite camp near the Medalam River, north of Gunung Benarat, for part of the time. The team was led by Mark Brown and comprised seventeen members from the UK, Australia, Denmark and our hosts at Sarawak Forestry. The expedition was further assisted by National Park Management, staff and local people. The expedition had a mixture of scientific and exploration objectives which were successfully completed.

Science - *The geological study focused on the progressive mechanical modification of the dissolutional cave passages in Whiterock cave. In the cave a sequence of passages at different elevations were visited and their morphology, structural control and mechanical modification were recorded. The geological control on cave passage form was found to be complex with a variety of joints, paleokarst fractures, crackle breccias and shear zones being important rather than simply the dip and strike of the beds. The relative elevation of the phreatic or paragenetic tube passage roof and the through-cutting notch associated with gravel transport through the cave was also important in controlling the extent of breakdown. Passages tended to evolve with initial loss of roof and hanging wall blocks to a sloping bedding roof. Thereafter there was a change to an arched form. This remained stable in massive beds, but was modified by unravelling (block loss) in areas of high joint frequency. The latter can also be seen in Api Chamber. Samples to define the timing of breakdown in the chamber were collected for Uranium Series analysis. Fourteen guano crust samples were also collected to extend the collection from the Southern Hills.*

Exploration, Surveying and Photography - *Teams followed up leads from previous expeditions, exploring, surveying and photographing a significant number of new passages in existing caves and locating some new entrances from surface searching. In total the expedition surveyed 8660m of new passages.*

Api: *Most of the newly explored and surveyed passage was in **Whiterock Cave**, part of the Clearwater system in Gunung Api. The total added to Whiterock was just less than 8km, which increased the total length of the Clearwater system to 197.077km – moving it up from 10th to 9th place in the ranking of the world's longest caves. **Red Tip Racer Cave** is in an intriguing location to the East in the Melinau Gorge. A climb was undertaken to look for a way on in this cave, with no success, but other leads remain. Some digging forays were made into the **Doline Sink**, which is a stream route into Northern Whiterock from the Melinau Gorge – as yet impassable for humans.*

Benarat: *The other major cave explored was **Deliverance** in the Northern end of Gunung Benarat. 596m were surveyed in this cave, including a bolt climb of 103m vertically. A doline reached by the 2011 team was explored (previously thought to be the location of the **Gawai Cave**). A cave entrance was found in the doline, but it is thought to be a high window into a passage of Blue Moonlight Bay cave. An airy abseil was made down the full height of the Benarat cliff in the Melinau Gorge, to investigate an entrance below Hole of the Moon.*

And finally, a helicopter flight, generously organised by Andy Eavis, allowed the location of new entrances by the team and a tour of the National Park for the retiring Park Manager and his wife.

INTRODUCTION

LOCATION

The Gunung Mulu National Park is situated in north-eastern Sarawak, with its northern boundary forming part of the border with Brunei, (Fig. 2). It was officially constituted in 1974 and opened to visitors in 1985. Lying 4° N. of the equator it now covers an area of 813.9km².

The Park is dominated by the sandstone mass of Gunung Mulu, which rises to 2376m. to the west of Mulu, and on its flank lies a band of Melinau limestone, which forms the lesser peaks of Gunung Api and Gunung Benarat. The lower slopes are covered in dense tropical rainforest, which rises to meet the montane forest of Mulu's upper slopes.

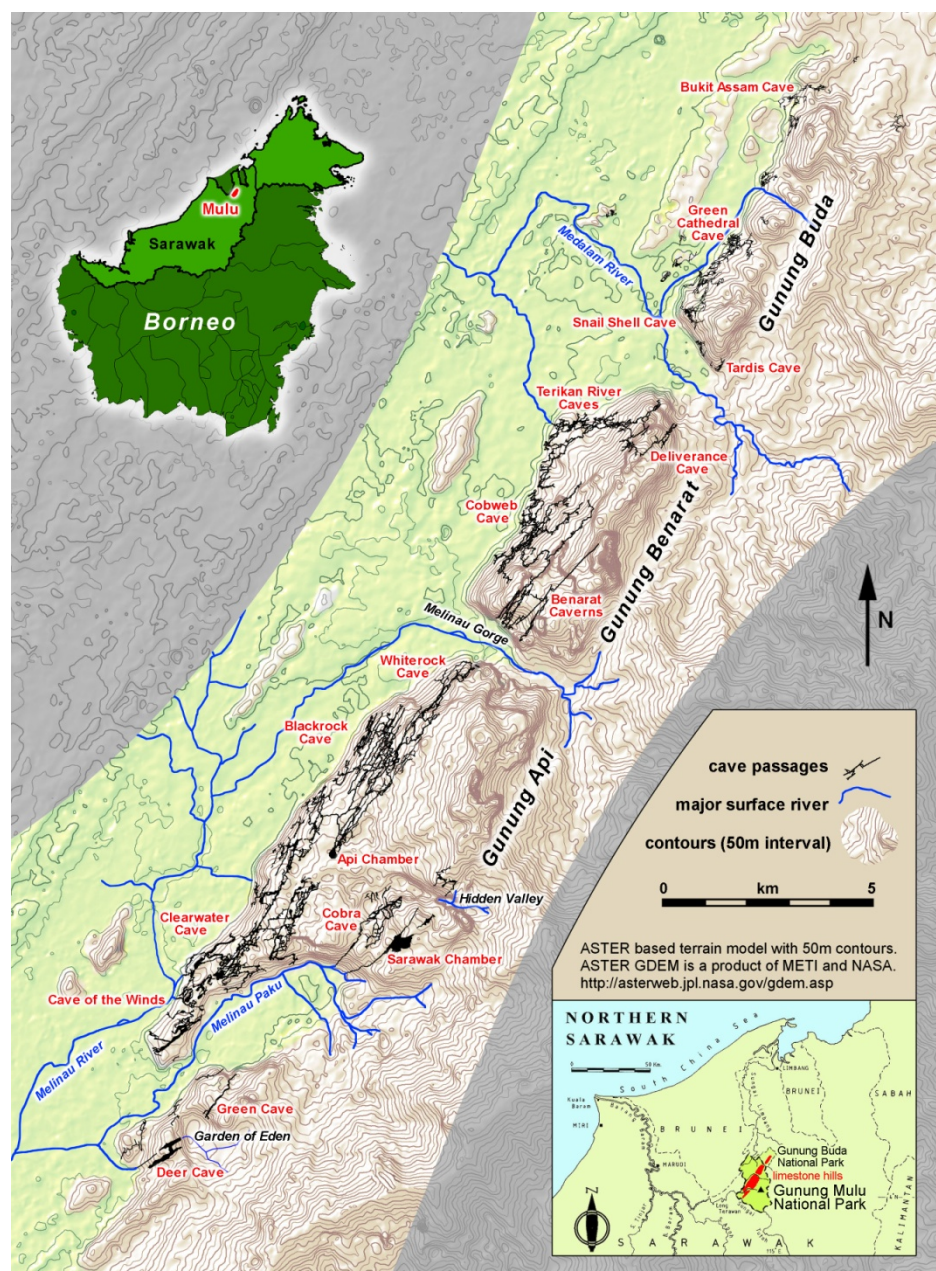


Figure 2 – Mulu Location, Topography and Caves Map.

HISTORY of EXPLORATION in MULU

A comprehensive account of the exploration of the Mulu caves is set out in the report of the 2011 Expedition¹ and for the sake of brevity will not be repeated in full here. In summary, exploration commenced during the 1978 Royal Geographical Society expedition to Mulu and has continued since then with groups of UK cavers visiting the Park and working in partnership with the Forest Department and National Park employees to explore and study Mulu's underground landscape.

Exploration and survey work have established Mulu as one of the pre-eminent speleological sites in the world. Although precise definitions of 'the largest' or 'the biggest' cave passages and chambers remain open to debate, the Park contains the world's largest natural underground void by floor area, Sarawak Chamber. It also holds what is arguably the world's largest cave passage (Deer Cave), the largest cave by volume (Clearwater) and what is currently believed to be the 8th largest chamber (Api Chamber, in Whiterock).

The early expeditions to the Park (1978, 1980, and 1984) made rapid and significant discoveries with over 140km of passage explored and surveyed. Although the pace of exploration has slowed somewhat, new caves and additional passages continue to be discovered in the Park.

The most recent expedition to Mulu took place in 2012, under the leadership of Andy Eavis and Dick Willis. This was based at park headquarters, and included renewed exploration in the southern hills of Mulu, combined with several science objectives. The expedition also reunited the original explorers of Sarawak chamber and recorded the occasion on film for the National Park.

The successful expedition mapped significant extensions to Lagang's Cave, bringing the total length to 5,785m.

Working from a camp approximately 600m above the entrance to Nasib Bagus, in the Melinau Paku valley, four caves were explored. Red Leaf Monkey Caves 1 & 2, Gift Horse Cave and Train Cave. A connection was established from Train Cave to Bridge Cave, bringing the length of the Cobra – Cloud – Bridge – Train system to 20.25 km.

Scientific work was carried out on:

- Bell holes in caves.
- Dating of sedimentary sequences in Lagang's and surrounding caves to correlate their formation with aggradation of the Melinau Paku and Melinau River.
- Continuing studies collecting and dating speleothems, mud and quartz crystals to provide a more refined estimate of the regional rate of incision and timings of cave evolution within the Gunung Mulu National Park.
- Continuing a study of samples of guano and the related crusts and derived powdery sediments from a number of caves to obtain an understanding of the geochemistry and mineralogy of these deposits. Further details can be found in the 2012 expedition report²

¹Mulu Caves 2011 Report, Kirby M. (editor)

²Mulu Caves 2012 Expedition Report, Willis R.G. (editor)

Figures 4 and 5 contrast the extent of exploration after the 1984 expedition with 2012.

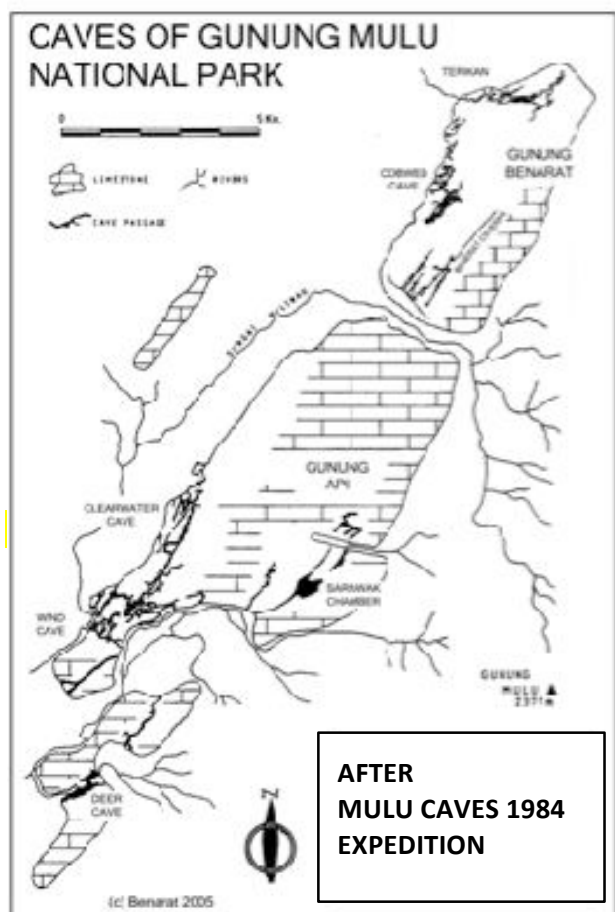


Figure 3: Exploration up to 1984

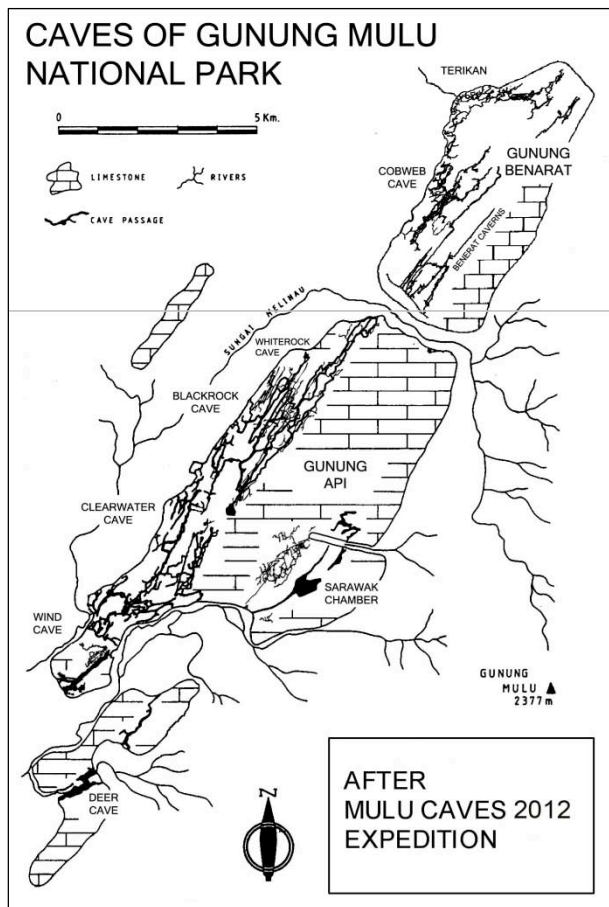


Figure 4: Exploration up to 2012

By the beginning of 2013, Mulu had seen 20 major expeditions, bringing the total of surveyed cave in the G. Mulu National Park to 372km. In addition, the adjacent G. Buda National Park contains a further 74km of cave.



Figure 5 - The Gunung Benarat Cliff overlooking Camp 5 in the Melinau Gorge – home to numerous Mulu Caves Project expeditions – photo by Mark Brown.

ACCESS

Mark Brown (after Matt Kirby)

Access to the G. Mulu National Park is now very straightforward with twice daily flights taking tourists and local people to and from Miri. An advance party met our logistics coordinator Veno Enar in Miri and purchased the usual supplies. Most of these are now air freighted up to National Park Headquarters, with items such as the generator, fridge and fuel still making the drive by 4wd vehicle with Veno's assistant, Leo. On arrival at Park HQ, we were accommodated in the spacious research building, complete with air conditioning, showers and a kitchen – which was perfect for our needs.

The team set to work at HQ, sorting through the equipment store and preparing porter loads for the journey to Camp 5. Camp 5 requires a longboat ride up the Melinau River, from Park HQ to Kuala Lutut, the upstream navigable limit. The boat journey is either relaxing and scenic, or strenuous and scenic, depending on water levels (when levels are low, jumping out to push the boat through sections of rapids is required). From Kuala Lutut, the rest of the journey is on foot. A footpath follows the east bank of the river to Kuala Berar, where the tourist “Headhunter’s Trail” officially starts. From here to Camp 5 is an 8.4km walk along the alluvial plain, through primary rainforest, over two suspension footbridges. Two to three hours walk carrying all your kit leads to the welcome site of Camp 5, quickly followed by a refreshing dip in the river.

Deliverance Cave (and potentially Gawai Cave), at the Northern end of Gunung Benarat, was a further 4 hour trek from Camp 5. As a result, permission had been sought to erect a lightweight forest camp in the Medalam Gorge.



Figure 6 – Pushing the boats through shallows in the Melinau River towards Camp 5 - photo by Andy Harp.

CAMP 5: BASECAMP

Matt Kirby

Camp 5 lies on the south side of the river at the downstream end of the gorge. The site is dominated by the massive cliffs of Benarat to the north which reflect dramatic orange tones in the light of the setting sun. The camp was first established in 1978 as a field base during the RGS expedition. It has evolved considerably since then and now provides a comfortable night's rest for travellers visiting the Pinnacles or midway on the 20km Headhunter's Trail between Kuala Berar and Mentawi Ranger Station.



Figure 7 - Camp 5 visible from Hole of the Moon Cave (lower left of photo) – photo by Tony White.

The camp is permanently manned by Park staff with one guide and one housekeeper on duty at all times to cater for tourists passing through. Accommodation is in dormitory rooms typically ten to a room, and sleep mats are provided. Mosquito nets are not provided, these are particularly useful to keep the sand flies off at night; mosquitoes are less prevalent. Camp 5 can house sixty visitors in its five dormitories. The expedition occupied two dormitory rooms in the main block. There is a separate shower and toilet block where 'interesting' creatures can be found scurrying around once the lights go out. A large kitchen just off the dining area provides stoves for cooking. The dining area consists of three large tables and at night bats swoop around and around taking any sort of flying insects which are attracted to the lights; they never fly into anyone.

The weather conditions during the expedition were varied but on the whole there was little serious rain. Although there are cold showers on tap the preferred method of washing was in the river, which provided a quick dip to wash away the grime of a long caving trip.

The last time exploration had taken place from the Camp 5 base was in the second phase of the 2011 expedition, under the excellent leadership of Tim Allen. The first phase of the 2011 expedition, based at Park headquarters, had carried out a 3-d laser scan of Sarawak chamber and Deer cave, in conjunction with a modern high quality digital photo of the chamber by Robbie Shone. The second phase continued mainly with exploration in Whiterock Cave, part of the Clearwater Cave system. By the end of the expedition, Whiterock was 80.4km in length, with plenty of unexplored leads remaining, and Clearwater was 189km long, making it 10th longest in the world. Other projects included radio locating the extreme northern end of Whiterock, in the hope of finding an entrance more local to Camp 5, and searching for the “lost” Gawai doline on the NW flanks of G. Benarat, last visited by the Japanese in 1997. The northern end of Whiterock was found to be tantalizingly close to Camp 5, underneath it in fact, but an entrance in the Melinau gorge was still elusive. A team reached the rim of the Gawai doline, but ran out of time to explore its depths.

All this meant that there was plenty to go back to in 2013. Tim Allen had decided it was time to move on to new projects elsewhere, so a team was assembled under the leadership of Mark Brown. Mark had visited Deliverance cave, in the northern tip of Gunung Benarat, on the 2005 expedition with Andy and Rob Eavis. They had discussed ideas with other Mulu veterans about some interesting leads there. Deliverance had been explored by the American team in 1997 and 2000, but several question marks remained, mainly in the form of climbs. The Survex model of G. Benarat suggested that Moon Cave (also explored in 2005) was on the same geological bed and at the same elevation as Deliverance, so theories were enthusiastically raised that the two could connect in a line - charging straight through the middle of G. Benarat.

Although the primary focus of the expedition was to be exploration, some science was to be carried out as well. Prof. Peter Smart wanted to continue his work on passage stability and large chamber formation, so was particularly interested to visit Api chamber and many of the passages in Whiterock cave. He was also planning to collect further speleothem and sediment samples to extend Mulu's cave-dating programme; and to continue his study of guano crusts in the caves.

So, with these objectives in mind, the 2013 team was confirmed, dates were set and permissions were duly sought from the Director of Forests.

THE MULU CAVES 2013 EXPEDITION

OBJECTIVES

- To continue exploration and survey of a number of outstanding leads in the Whiterock/Blackrock Cave system.
- To visit Deliverance cave in Northern G. Benarat and investigate high level passages at the end.
- To locate and survey Gawai's Cave in northern G. Benarat
- To continue exploration and survey of a number of outstanding leads in the Benarat Caverns system (e.g. Moon cave).
- To conduct surface searches for new entrances in G. Benarat and G. Api, possibly with the use of a helicopter.
- Investigate the climbs in Red Tip Racer Cave



Figure 8 – Frank Pearson and formations in northern Whiterock Cave – photo by Nicky Bayley.

ACCESS TO THE CAVES

ACCESS TO WHITEROCK AND BLACKROCK

Matt Kirby

Whiterock's entrances are located on the northwest flank of Api just to the south of a prominent north facing white cliff. The route to the cave follows the Headhunter's Trail south from Camp 5 to a point just before the first main river crossing. During the first forays into this area in 2003, a track had been cut which followed high ground heading directly to the white cliff. However, this limestone terrain proved difficult to cross so in 2005 another track was cut which avoided the higher ground and passed through the low lying alluvial terraces. Although this route became very swampy following heavy rain it proved far easier to follow and has been used for several expeditions. It appears to have been used by swift nesters who visit the cave occasionally. The track arrives at the base of the mountain, just south of the entrances, at a point known as Whiterock Junction. Turning north the track up to the upper entrance is found after 50m and the lower entrance is located a further 250m north from here. The upper "Midnight" entrance is now the favoured route into the cave as it bypasses an awkward step and the 60m "Zebra" Ramp up to the Ashes Series. This track climbs steeply up the foot slopes and is well worn. The Upper entrance provides a clear view out over the canopy towards Bukit Berar. To the south from Whiterock Junction an indistinct track leads, after 1.5km, to Blackrock's Racer entrance, a difficult journey of approximately one hour.

ACCESS TO DELIVERANCE

Mark Brown

Following the Headhunter's Trail over the suspension bridge at Camp 5 leads North on the alluvial plain near the base of the western slopes of Gunung Benarat. 8km leads to a rope bridge crossing the



Terrikan River just by the Lubang Cina shelter (1.5 – 2 hours walk). From here the Headhunter's trail is left behind – an unmaintained trail continuing along the foot of the mountain slopes is followed northwards. This leaves the base of the slopes up an alluvial ridge to skirt around some large dolines at the NW end of G. Benarat, before returning to flat ground and the Medalam river (another 1.5 hours). A bearing was followed up steep limestone talus slopes towards the 3m x1.5m entrance of Deliverance (from the Medalam river a gully can be seen leading up to a deep cleft on the north face of the mountain – Deliverance is on the west side of the mouth of this gully, 1km from the river bank).

Figure 9 – Jeff Wade crossing the rope bridge over the Terrikan River at Lubang Cina – photo by Andy Harp.

ACCESS TO THE UNDERGROUND CAMPS

Whiterock has a number of well appointed underground campsites, used to explore further reaches of the system several hours from the entrance. The focus on the Northern end of Whiterock in 2013 was to be carried out from “Flying Monkey Camp”, but there was a small problem – no one on the team had ever been there before! (Hugh was going to be our guide, until he had to drop out at the eleventh hour!).

Thankfully, Hugh still acted as a guide, all the way from remote Yorkshire! He had produced some incredibly detailed guides, complete with the relevant bits of survey, on how to get to Propeller and Flying Monkey Camps and some of the main leads in the area. So we set off with our laminated guides, reading snippets such as “...after a large pit on your right you will reach a 5m climb, where a handline can be rigged from a spit...”. We were gobsmacked at the accuracy of these descriptions, from Hugh’s memory, without which we would have had a much more time consuming route finding task.

Whilst they won’t be published in this report, the guides have been added to the database of information on Whiterock for future use.

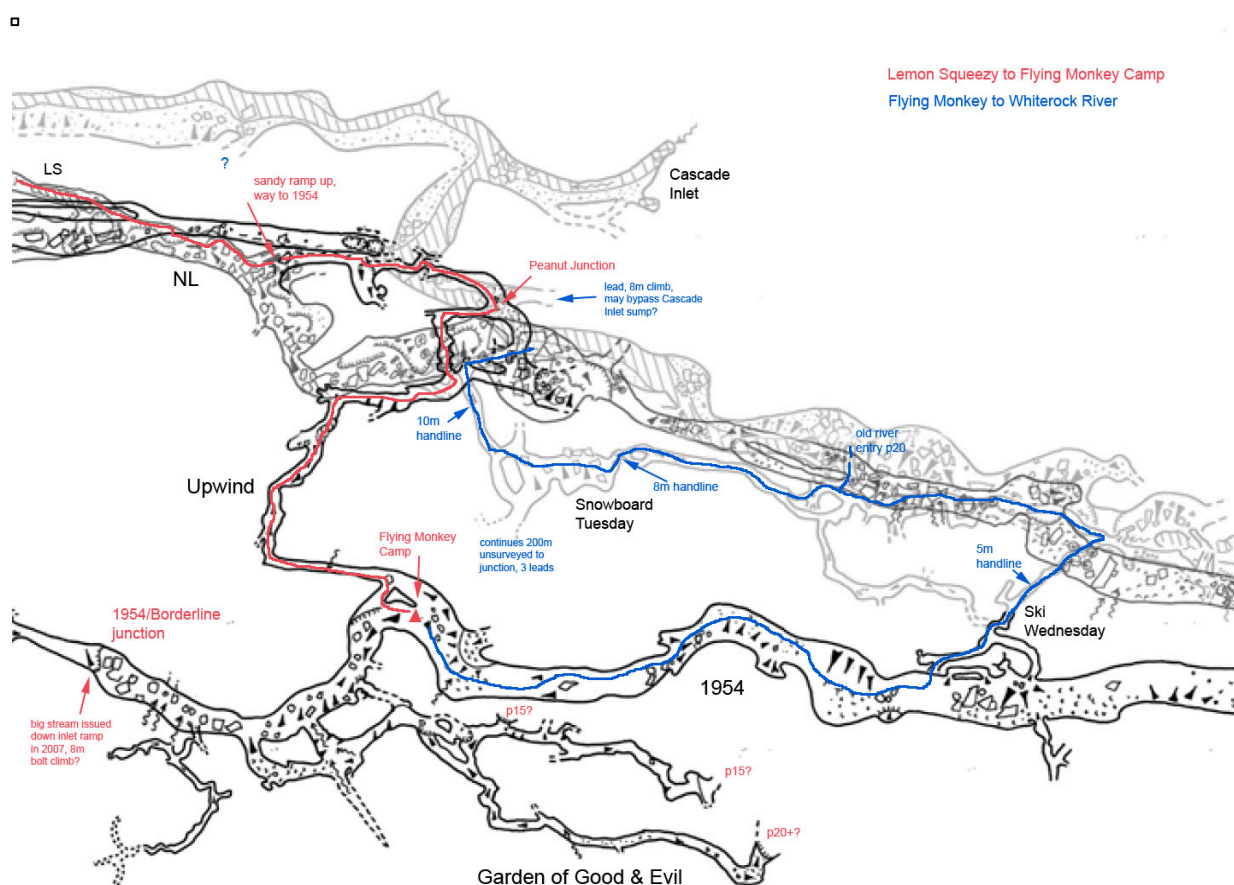


Figure 10 – A sample of one of Hugh’s guides to northern Whiterock Cave.

Each team member carried their own gear to Camp 5, and then there were 15 porter loads of group equipment, and the same of food.

Most impressive carry award went to Sudin, who carried the 30kg fridge to Camp5 (most of us could barely lift it); it was also quite surreal to follow what appeared to be a fridge on legs making its way through a tropical rainforest!

Veno, Andrew, and Park Guide, Syria helped us relocate the entrances of various caves and sensitively mark one or two trails through the forest, ready for the caving commuters to follow.

After locating the entrance to Deliverance, Veno and two of his helpers erected the forest camp close to the Medalam river in a couple of hours. In case of problems from local bird's nesters, we employed a guide and cook, Andrew, to look after it whilst the team were caving. The camp was a traditional Mulu ridge pole with camp sheets (lightweight tarpaulins) guyed out over it, with pole hammocks erected underneath for sleeping. The first rainstorm brought the realization that the camp sheets had probably arrived in Mulu in the 1980's – so they resembled sieves in places. Some running repairs, careful choice of sleeping spot and additional tarps from Veno soon sorted the problem out though. Andrew provided some incredible food (considering the basic facilities) and some interesting tales around the stove.



Figure 11 – The Forest Camp near the Medalam River, used to access Deliverance Cave – photo by Frank Pearson.

To maximize caving time, we employed a chef at Camp 5, Matthew Mani, who had catered for several expeditions and had a good idea of what our western palates preferred.

The expedition brought its own 1 kVa generator to Camp 5 for battery charging and running of the fridge to keep the fresh meat and veg cold, which was supplemented at busy times by Veno's portable generator.

Midway through the expedition, Andy Eavis very generously hired a helicopter from Layang Layang helicopters in Miri, and arrived with Pete Smart and some supplies at Camp 5. This provided a useful and interesting diversion for the team, with everyone getting a flight around the area, and getting a good view of the landscape. Numerous potential entrance sites were identified for future expeditions. Included in the tourist flights were soon to be retiring Park Manager and his wife, Brian and Sue Clarke. Some steel cable for the new suspension bridge at Camp 5 was also transported, and some of the team who were departing early got a quick trip back to HQ.

Not to be outdone, Veno arrived at Camp 5, near the end of the expedition, with some tubs of (still frozen) ice cream for the team – thus meeting a challenge set by Hugh St. Lawrence on a previous expedition.

When the end of the expedition arrived, a day was spent washing and packing up gear, ready for another 15 porter loads back to Park HQ for storage. The fridge was sold back to Veno and the generator looked after by him for next time.

Most of the tackle is now carefully counted and stored in Mulu, with “top up” ropes and other tackle added by every expedition.



Figure 12 – Helicopter landing at the Camp 5 helipad in the Melinau Gorge – photo by Torben Redder.

EXPLORATION FINDINGS

The expedition surveyed significant extensions in Whiterock Cave, including 3.5km off the base of one pitch “Out of Africa” which dropped into the Exodus series. Numerous question marks were pushed and surveyed at the northern end of the cave. Deliverance had most of its leads ticked off and the climb above Civet Hall went 103m vertically, unfortunately without significant horizontal development. Various other leads underground and surface, were pushed to a conclusion, and many new leads discovered.

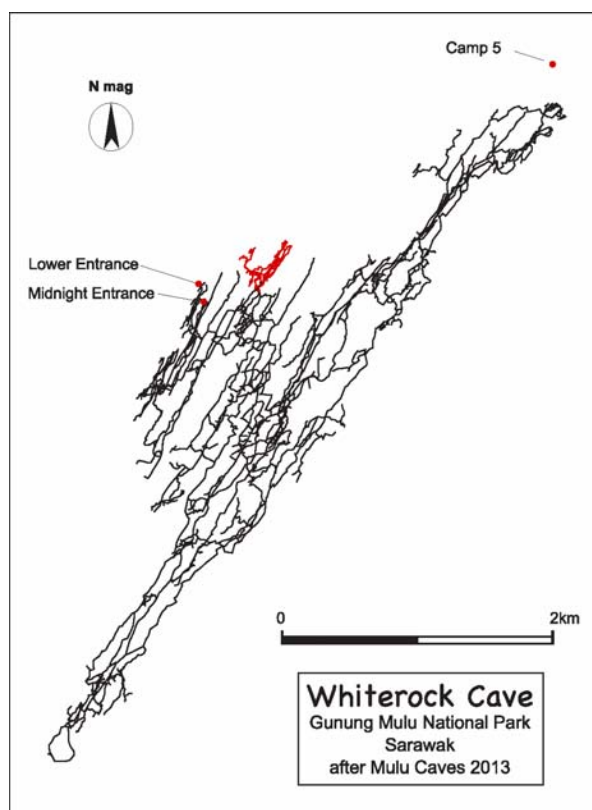
UNDER GUNUNG API

WHITEROCK CAVE (GUA BATU PUTIH)

The following descriptions are of the individual Survox sections of the cave grouped into their geographical areas. Each title may contain subsections of cave which have been given individual names in the final drawn survey. Survox filenames and subsections are shown in brackets. The corresponding area is shown highlighted in red on the whole cave centreline survey next to the description. The author of each section is indicated in **bold**.

EXODUS SERIES

Nile Express, Diluvium (Exodus series: pitch and upstream). *Explored 10 Oct ‘13; Length 531.1m*
Explored by Rob Middleton, **Tony White** & Torben Redder.



This area, referred to as Out of Africa 3, was last visited in 2011 by Rambli and Ian and Liz Lawton, who rigged the undescended pitch at the end of the east branch of the northern end of Out of Africa. Their rope was nowhere near long enough. The pitch, now known as the Nile Express, is rigged from naturals and bolts, freehanging to a rebelay, then another drop to land on a huge chockstone bridge. Then past flakes to land on a sloping ramp with many loose rocks. The same rope was used to clamber down through a short easy section and down to further rebelay for the last 6 m to land near the base of a massive flat lunch boulder, in a chamber with at least four ways leading off. Ropes of 60 m to the top of the ramp and 30 m for the ramp were used. The ramp had lots of loose boulders on it. Most have subsequently been moved but caution is still required.

EXODUS

Whiterock Cave - Clearwater System - Mulu

Surveyed to BCRA Grade 5

T.Redder, R.Davidson, T.White, S.Brooks, R.Middleton

Sept 2013

Surveyed length: 3539m Vertical range: 101m

drawn by H.St.Lawrence



scale meters
0 25 50 75 100

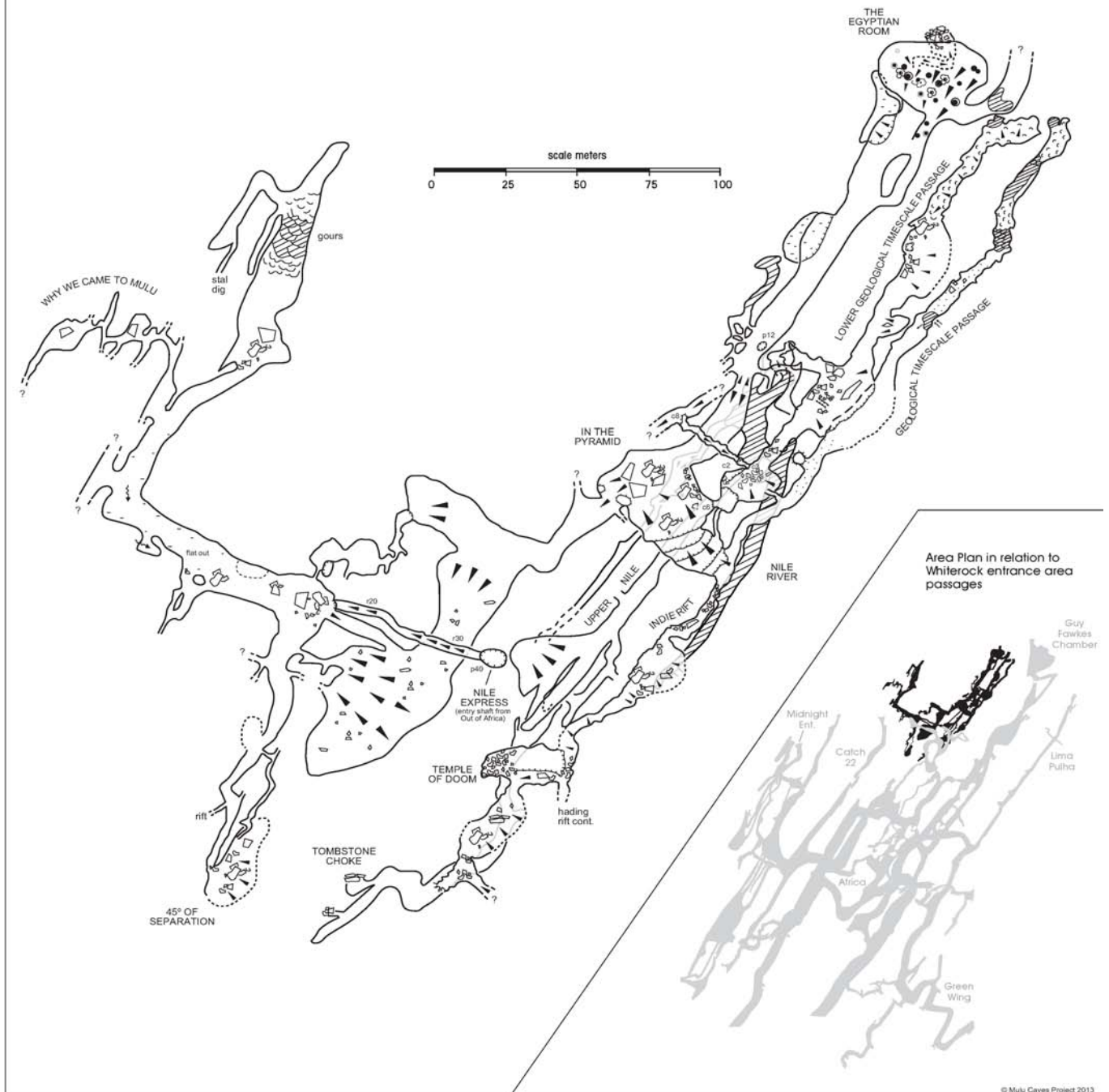


Figure 13 – Exodus Series Survey.

West from the top of the lunch boulder, a walking size passage passes a large funnel shaped washout on the right to reach a junction. The slope down to the left is an oxbow re-joining the main passage via a crawl a few metres further on. This oxbow also leads south to a climb up into a narrow rift which has a small inlet which sinks in the floor through a tiny hole. The main passage, which is taking the draught, continues west to a tight muddy bedding crawl on the right which emerges after 20 m in a walking size passage. This crawl can be bypassed by climbing down on the left. A slope down from this bypass enters a low unpromising crawl. On a subsequent trip on the 20th October this crawl flooded to a depth of 2 to 3 metres minutes after leaving it. The draught going through the bedding crawl had been lost and was found to disappear under the western wall 40 m from the crawl just before the stooping section. An awkward 2 m climb up over prickly popcorn led into a series of crawls and cross rifts dubbed Why We Came To Mulu and described later.



Figure 14 – Tony White and Torben Redder on the pitch into the Exodus Series – photo by Andy Harp

The walking passage beyond the bedding crawl lowers to a stoop, then a crawl before opening up again to walking size with fine dry gours at the far end before choking with stal. 20 m before the end a small passage on the left turns south becoming too tight after 50 m. It would need stal removing to continue and is heading back towards Why We Came To Mulu.



Figure 15 – Rapid increase in water levels due to surface rainfall in part of the Exodus Series – photos by Torben Redder.

Inside the Pyramid, Egyptian Room (Exodus Series: Egyptian Room). *Explored 11 Oct '13;*
Length 868m. Explored by Rob Middleton, **Tony White** & Torben Redder.

Heading south from the lunch boulder at the bottom of the Nile Express the passage descends over blocks to a junction after 20 m. Straight on south continues mainly walking, past a narrow oxbow on the left to reach a climb up through boulders into a steeply inclined 30m long breakdown chamber, 'Forty-five Degrees of Separation' which rises about 20 m. Any leads here are tight and unpromising. Back at the junction 20 m from the pitch the east branch drops down and then climbs up into a 30 by 40 m breakdown chamber with a curved roof. This is choked at the southern end and at the northern end a slightly awkward drop down on the left leads directly back to the bottom of the Nile Express. However this is the less preferred route. Continuing north over more breakdown slabs for about 50 m there are two ways. Left (west) leads into another breakdown chamber with a climb down past an undescended 4 m deep slot on the left and into a short awkward crawl to a cross-rift. Over the other side emerges beside the lunch rock at the bottom of the Nile Express. Again this is not the preferred trade route.

Returning to the junction after the breakdown slabs where we turned left, right (east) leads down over boulders and at its eastern edge, rather than dropping down to the bottom which is choked, the way through is on the left at mid height. 30 m further a 3 m climb up through a hole almost blocked by boulders emerges into a black void, 'Inside the Pyramid'. Two avens on the western side of this chamber have not been climbed. One needs bolting, the other may not. At the SE end of the Pyramid chamber is a steep ramp which can be climbed easily for about 40 m to look across left into a high level tube (described in the next section).



Figure 16 – The Egyptian Room – photo by Andy Harp.

The exit from the northern end of the Pyramid chamber descends down some slabs to a junction. Right led later to the Upper Nile. Straight on (north) is a nice 10 m diameter tube. A side passage on the right leads to a climb down to a dip in the passage and a rise up into a rift which comes to the head of a steep ramp. This was subsequently descended using a handline and expected to drop into a lower streamway but all ways became too tight. The main passage continues north, descends over calcite to where there are three holes at the sides of the passage (which lead to Nile River see later), then continues north and up to an increasingly well decorated part of the cave. (The first of the three holes leads to Nile River, see later) A free climbable descent on the left leads down to a mud-choked rift with no way on. A calcite floored oxbow on the right re-joins after 20 m at a well decorated grotto where care is needed. This emerges a few metres on into the Egyptian Room, a fine chamber dominated by a steep boulder slope covered in many imposing stalagmites. A lake down on the right has a possible passage beyond but was not entered due to the risk of destroying the pristine look.

Timescale Passage and Temple of Doom (Exodus Chamber Ramp). *Explored 15 Oct '13;*
Length 868.31 m. Explored by Simon Brooks, Ross Davidson & **Tony White**.

Timescale Passage

The 40m climb on the SE side of the Pyramid leads to an easy traverse north into Geological Timescale Passage, a 5 m diameter tube heading NE. A rope is useful to safeguard the traverse. It is an easy stomping passage with deep mud in places waiting for the unwary. There is a small lead on the left (NW) after 30 m. The passage then develops into a steeply hading rift and 80 m from the start a steep slope on the left drops about 15 m to a lower level (Lower Timescale Passage). The upper passage continues along strike, past a pool with water entering from the right and into a heavily calcited passage with wet active flowstone. Flowstone almost blocks the passage at 'Just In Time' named because flowstone will have sealed the passage in another 50,000 years. A traverse on the right around a pool leads to another area of flowstone, 'Just Too Late' where calcite completely blocks the passage.

In Lower Timescale Passage, heading north-east, after 20 m you can climb down further on the left, then climb 10 m up a small tube to reach a short crawl into another hading rift. This ramp looked slippery and was not climbed but may have had a continuation 6 m up. Lower Timescale Passage continues north-east for about 200 m over much flowstone until it is completely choked with calcite like the upper passage.

Heading south-west in Lower Timescale Passage you progress by traversing along the left wall, passing a passage 3 m up in the right wall to a slope down and then an 8 m pitch down into the Pyramid chamber. The passage in the right wall 3 m up is followed by another climb up of 2 m and continues up steeply to emerge on a balcony 8 m above a 4 x 5 m tube ramp. The ramp was not explored. It goes down to the left for 36 m and could well drop in to Pyramid Chamber through one of the avens seen from below. The ramp goes up steeply to the north-east.

Temple of Doom

The climb leading SE out of Pyramid Chamber continues up from the start of the traverse into Timescale Passage for a further 12m to reach a small and unpromising passage with shattered limestone heading south-west, Indie Rift. After 80 m of rift, quite narrow in many places, it opens out onto a balcony near the top of a large extremely shattered breakdown cavern, the Temple of Doom. Huge slabs dip at 50 degrees into the void and rocks fall another 20 m to the floor. It is possible to traverse to the left and with one exposed step gain access to the southern side at roof level where there is a continuation of the hading rift heading south which was not explored. From this point there is a crack going down one of the big slabs which provides a route all the way to the bottom of the chamber. No way on was found amongst the boulders at the bottom but part way back up the climb a passage heads south-west for 50 m to a choke. There are possible leads heading up dip in the roof along this section.

Egyptian Room Choke and Nile River (Exodus Series: Egyptian Room, pits to streamway (and Upper Nile). Explored 19 Oct '13; Length 721m.

Explored by Frank Pearson, Andy Harp, **Tony White** & Torben Redder.

Egyptian Room Choke

A more thorough investigation of the Egyptian Room revealed a draughting hole up on the north-western side of the chamber just below a fine group of colonnade stals. The draught would have blown out a carbide lamp. The hole leads down to a 4 m drop bypassed by an easy route over the back which lands in a small boulder chamber. The draught was lost at this point. Holes in the floor went down another 3 m but were choked and holes back up through very unstable looking boulders revealed a very slight draught but no way through. On the way out through the draughting hole the draught stopped and reversed to the same strength with no apparent explanation.

Nile River

The Nile River is reached from the three holes in the floor on the way to the Egyptian Room. The first and lower of the two holes on the left leads to a drop down which can be bypassed by ducking down left and underneath to come out on the mud on the western side of a small flowing river passage which sumps about 25 m upstream. It was carrying about 10 l/s at the time. A climb up gives access to a rift hanging out above a deep lake looking downstream. This would have been awkward to negotiate so the hole down on the eastern side of the main passage above was rigged. It dropped 8m over a prickly wall to land in thigh deep water in the streamway downstream of the deep section. Two bolts were placed to try and avoid the prickles. The passage was only partly explored downstream. A showerbath inlet enters from the right but as it was late in the day and apparently flood liable the streamway was left for the next trip (described later).

The Upper Nile

The Upper Nile is a dry passage leading off south if you turn left before climbing back up to the Pyramid. After 20 m there is a 3 m climb down. The main passage continues south-west but on the left is an obvious hole which can be free-climbed down to where a noisy inlet crashes down and disappears into boulders. This is the water which can be seen coming in to the Nile River below but there does not

appear to be a negotiable way through. The main passage continues with superb cracked mud floor. A ledge on the left gives access to a higher level of rifts about 40 m long with a few 60 degree ramp leads heading down. The main passage is choked with mud 50 m further on at its upper level but a slippery climb down to the right drops to a lower level. This point was later reached from the Nile River. Continuing south-west however it continues into some low crawls with more cracked mud for about 100 m. On the right is a hole up through 'hanging death' boulders into the Tombstone Choke. A climb up into a 4 m diameter chamber inside the choke and a further climb up lead to a drop down which remains a possible lead. Below the choke the passage continues SW for another 15 m. This point is possibly within a metre or two of the end of Zahara Passage. The cracked mud floor in both is very similar and a connection might be quite easy.



Figure 17 – Frank Pearson in The Upper Nile – photo by Andy Harp

Why We Came To Mulu (Exodus Series). *Explored 20 Oct '13; Length 151m.*

Explored by **Tony White & Torben Redder.**

This exciting series was first entered on the 10th October and revisited as the flood on 20th October was subsiding. It is a complex area of parallel N-S rifts connected by tight crawls which appear to have been filled with cobbles and gravel and then partly washed out. The route taken followed the draught and several minor enlargements were made to get through. At one point a black space beckoned beyond a crawl blocked by calcite on mud. This was dug through to emerge via a tight squeeze into yet another rift. Passages headed south and north and although not overly promising the exploration ended 40 m

later when the survey equipment packed up. This area is very close to the entrance series of the original Whiterock entrance and would make a really good way in for rabbits.

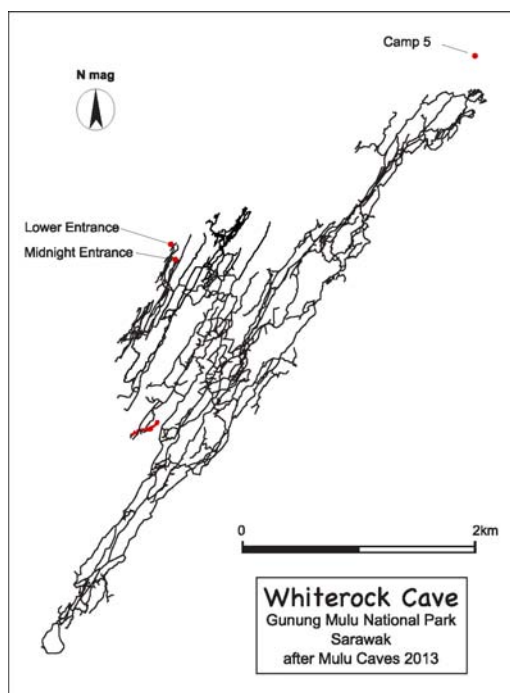


Figure 18 – Torben Redder in Why We Came to Mulu – photo by Tony White.

Nile River Continued (Exodus Series Nile River). *Explored 24 Oct '13; Length 358.59m.*
Explored by Ross Davidson, **Tony White** & Torben Redder.

The Nile River streamway was revisited early in the day to avoid potential afternoon flooding. It is a meandering stream, walking to start with in knee deep water and mud but later stooping height and chest deep. A short duck is reached followed 20 m further on by a sump. There are two side passages in this streamway. One leads to the showerbath inlet from the Upper Nile but no way through. The other is an oxbow starting very close to the pitch which comes back into the streamway but also continues through a short crawl, up a little climb and traverse and over boulders to emerge in the Upper Nile passage.

WHITEROCK CENTRAL AREA - LEADS OFF API BIRTHDAY AREA



Api Ending. Explored 10 Oct '13; Length 205.54m.

Explored by Simon Brooks, Ross Davison & **Phil Walker**.

From station 12r at the end of *Api Birthday South* the main passage heads downwards for 10m in large passage, before a well decorated section is met. A gentle ramp continues for 20m, passing an 8m blind aven on the right. The passage continues downwards, following a small stream, through boulders and another large well decorated section.

The ramp continues for another 40m until a sharp right is encountered at an area of obvious large breakdown. A further 30m of passage gradually gets muddier before another area of large breakdown is met. Here an obvious passage to the west was not explored. The main ramp continues downwards for another 25m getting muddy and slippery. The final section is largely flat out on hands and knees crawling. At the very end

the passage continues flat out but was not pushed. There was no obvious draught at this point.

Technical Underpants. Explored 11 Oct '13;

Length 164.99m.

Explored by Simon Brooks, Ross Davison & **Phil Walker**.

From station 12r at the end of *Api Birthday South* heading NE, the passage rises over large boulders and small climbs for 30m before reaching an obvious climb up. An awkward 10m bolt climb, leads to a large ledge with large stalactites above and behind. A further 8m aven above has not been climbed. The explored route on is to the right, traversing around an obvious hole in the passage floor. Immediately after the traverse a bold step leads to an ascending ramp with a very small stream running down. The downwards continuation of the ramp was not explored, but is assumed to be the same water as seen on the ledge in *Api Dreams*.



Figure 19 – Ross Davidson finds an Api Ending – photo by Simon Brooks.

The ramp continues up for another 10m before a small awkward crawl is encountered. A tight squeeze leads to a small chamber with another awkward squeeze down into a passage heading north. The passage gets gradually larger until a large pot is met in the middle of the passage. The pot (not descended) can be traversed on the left to 30m of well decorated passage. The passage gradually starts to descend and become lower until hands and knees crawling is required.

After about 10m the passage starts to turn right and a further descending ramp is seen on the left. This was not descended, but appears to descend a further 20m before getting low and silty. The main passage continues for another 10m before turning sharply south and gets larger and well decorated. A small squeeze over boulders leads to a large chamber with an unclimbed 11m aven. Further boulders leads after 20m back to the undescended pot.

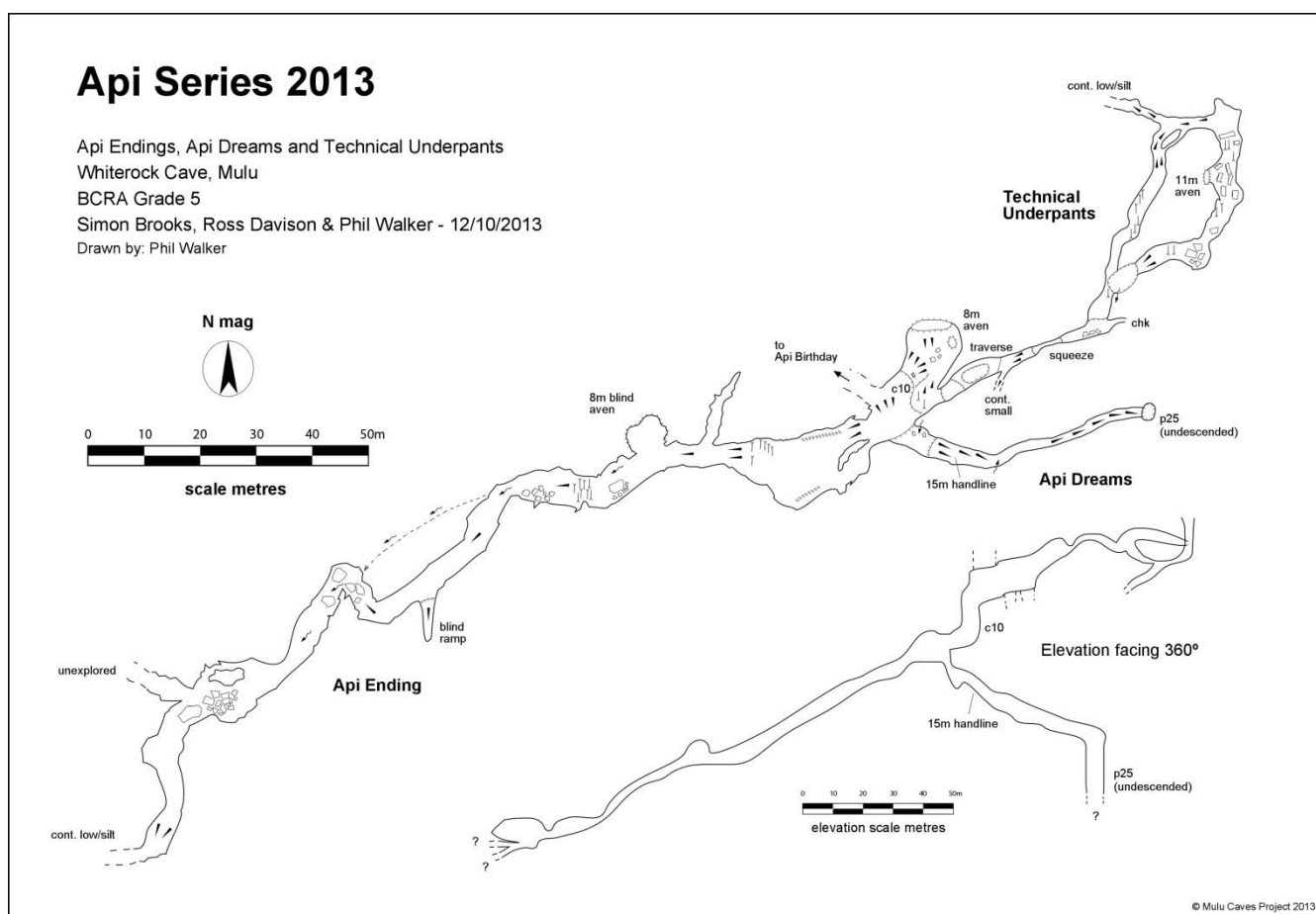


Figure 20 – Api Birthday Extensions survey.

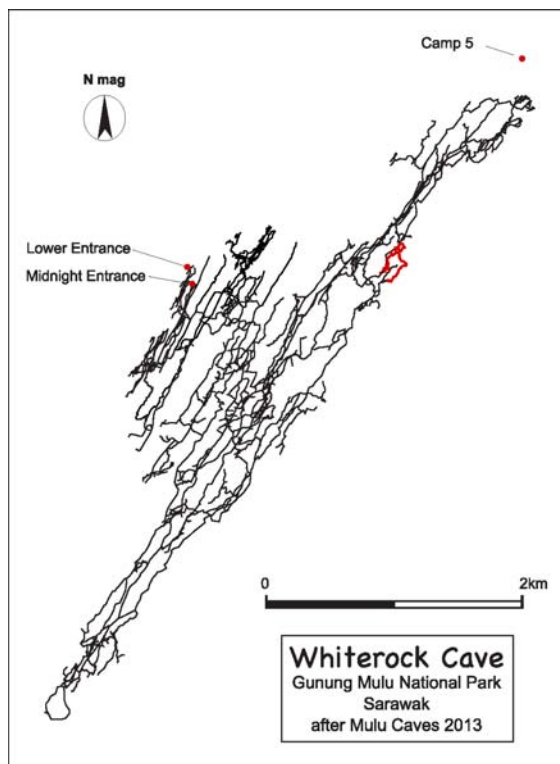
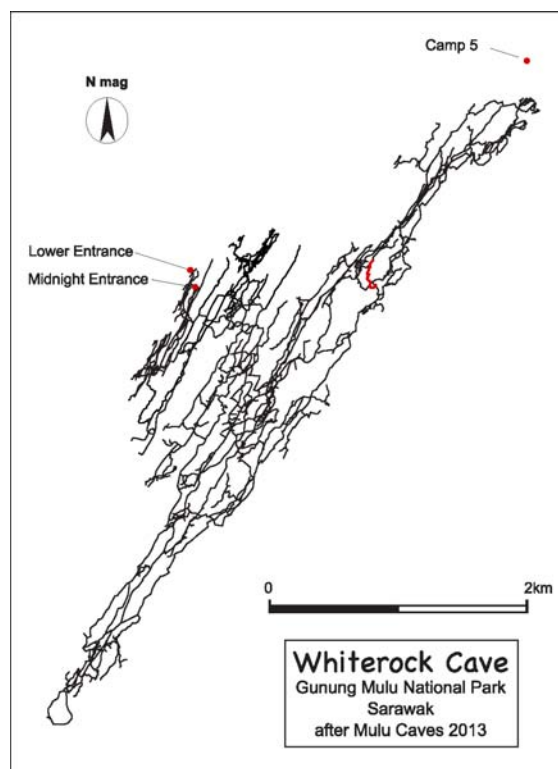
Api Dreams. Explored 12 Oct '13; Length 86.87m.
 Explored by Simon Brooks, Ross Davison & **Phil Walker**.

From station 12r at the end of *Api Birthday South*, an obvious pitch / climb of 3m to the SE leads to a spray filled large ledge overlooking a 15m descending ramp. The ramp can be free-climbed with care, but is best treated as a pitch or hand-lined climb. The passage continues in an Easterly direction for 30m, getting gradually steeper, until arriving at the head of a 25m pitch that is undescended.

WHITEROCK NORTHERN AREA.

Snowboard Tuesday Inlet. *Explored 11 Oct '13;*
Length 324.21m. Explored by Hannah Moulton,
Nicky Bayley & **Frank Pearson.**

At the pitch head of the Snowboard Tuesday Ramp, up the continuation to the east, lies the Snowboard Tuesday Inlet, an obvious passage with an intermittent stream running down it. The passage is entered by a relatively steep scramble though the angle eases and the passage divides into three inlets, each carrying a small stream. The passage to the right is made up of mud-banks and low crawls under arches, the penultimate one drops into a wide, deep pool with a considerable flow of water pouring from cracks in the roof. Beyond the pool lies another mud-bank with a small gap beneath the arch, climbing the mud out of the water would require digging tools. The middle passage follows the stream swiftly to a choke, while the left hand passage is followed for a couple of hundred metres in grand style to the final choke. The survey shows the inlets to be beneath the entry chamber of 1954, the area around the Flying Monkey Camp. One source could be the stream sinking in the rift passage leading into 1954, the other being the sink of the waterfall – the camp's water source. Both of these stream sinks carry enough water to match the flow in Snowboard Tuesday Inlet.



1954 Garden Extension. (off Garden of Good and Evil)
Explored 14 Oct '13; Length 386.91m.
Explored by Nicky Bayley, Hannah Moulton
& **Phil Walker.**

The Garden of Good and Evil side passages off 1954 were explored in 2007, both arms ending in pitches. In 2009 the pitch at the end of the lower arm was descended to a blind chamber, but the end of the upper level remained unexplored. An awkward 5m climb out of the lower passage gains a 3m diameter tube which climbs steeply up and then descends to a short climb and ramp to the lip of a pitch, the limit of previous exploration.



Figure 21 – Phil Walker descending the pitch into Garden Extension
photo by Nicky Bayley.

The pitch is rigged from the top of the descending ramp using 1 bolt and 1 thread. The ramp is 15m to the top of the pitch. The main pitch is 18m with a rebelay on a loose rock bridge (2 bolts) about 5m down. At the bottom of the pitch is a rift, which appears to carry on at the level of the rebelay bridge on the pitch. This would require a traverse line to explore further.

A transverse passage at the bottom of the rift leads to a dry mud sump. A small crawl at the top of the mud is tight but after 5m quickly leads to larger passage. Further hands and knees crawling for 30m leads to an inlet streamway. Upstream was not explored, but probably pinches down where the water enters. Downstream leads to a junction. Left leads via 50m of small climbs and ramps, with impressive green formations, to a window overlooking *Friilly Knickers*. Right leads to an impressive 13m waterfall that can be easily free climbed down to a boulder floor. The passage continues for another 100m swinging South in muddy style until it ends in a small mud sump.

Friilly Knickers. *Explored 19 Oct '13; Length 431.24m.*
Explored by Hannah Moulton & **Rosie Hadfield.**

Friilly Knickers is a continuation of the Garden of Good and Evil series off 1954. From the last survey station (19), a 25m rope was rigged off 2 bolts and rebelayed on a rock bollard to descend the western-most window. However, it is recommended that if people return it should be rebolted (there was a shortage of equipment on this occasion). This landed on a steep slope trending NNW to a sump (no way on). South-west of the rope a significantly sized passage continued over mud and boulders for 40m before turning southerly for a further 40m. Along this passage bat skeletons were seen, and the passage was decorated with formations on the walls and ceiling. The passage was gently trending upwards, and in a south/south-westerly direction, until (survey station 101) the passage changed dimensions and became ~15m high in a tapered rift. Here a steep climb (no protection needed) lead to a chamber with a number of leads (survey station 133). To the NW there was a small alcove that led nowhere, and at a higher level

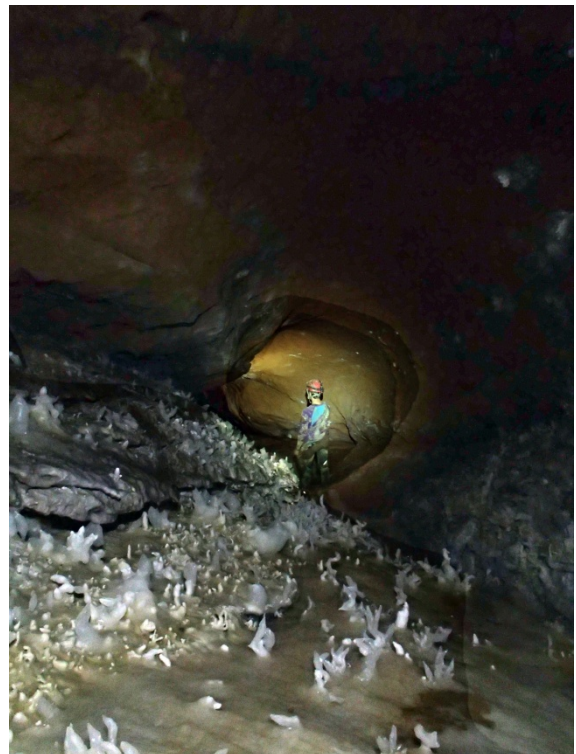


Figure 22 – Hannah Moulton in Friilly Knickers
photo by Rosie Hadfield.

there was an inlet but this was not fully investigated. The easterly lead followed a foot-wide calcite river up a ramp to a calcite boss, before trending back downhill NNW to a window. Due to its location and the well-decorated nature of the passage, it was assumed that this would reenter the rift with the steep climb, mentioned above, so it was not descended. However, the data suggests that this may be a parallel rift to the one described previously.

The main route on from station 133 trends upwards and southwards to a large chamber. This chamber has steep muddy slopes all leading down to a rocky balcony which overlooks a 3-4m hole in the floor. Two inlets enter the chamber from the south but these passages soon become too small to continue. At the western end of the chamber a loose, muddy and sketchy climb was ascended to just a couple of metres below the Northern Line; this is not advised without protection. Down through some loose bouldery sections, and a couple of 2m climbs (handline advised), the passage continues downwards and gets smaller. Here there is a small inlet, below which the passage becomes muddy and eventually too tight to continue, filled with mud. There is evidence of animals, with a number of bat skeletons and two distinct claw marks in the mud.

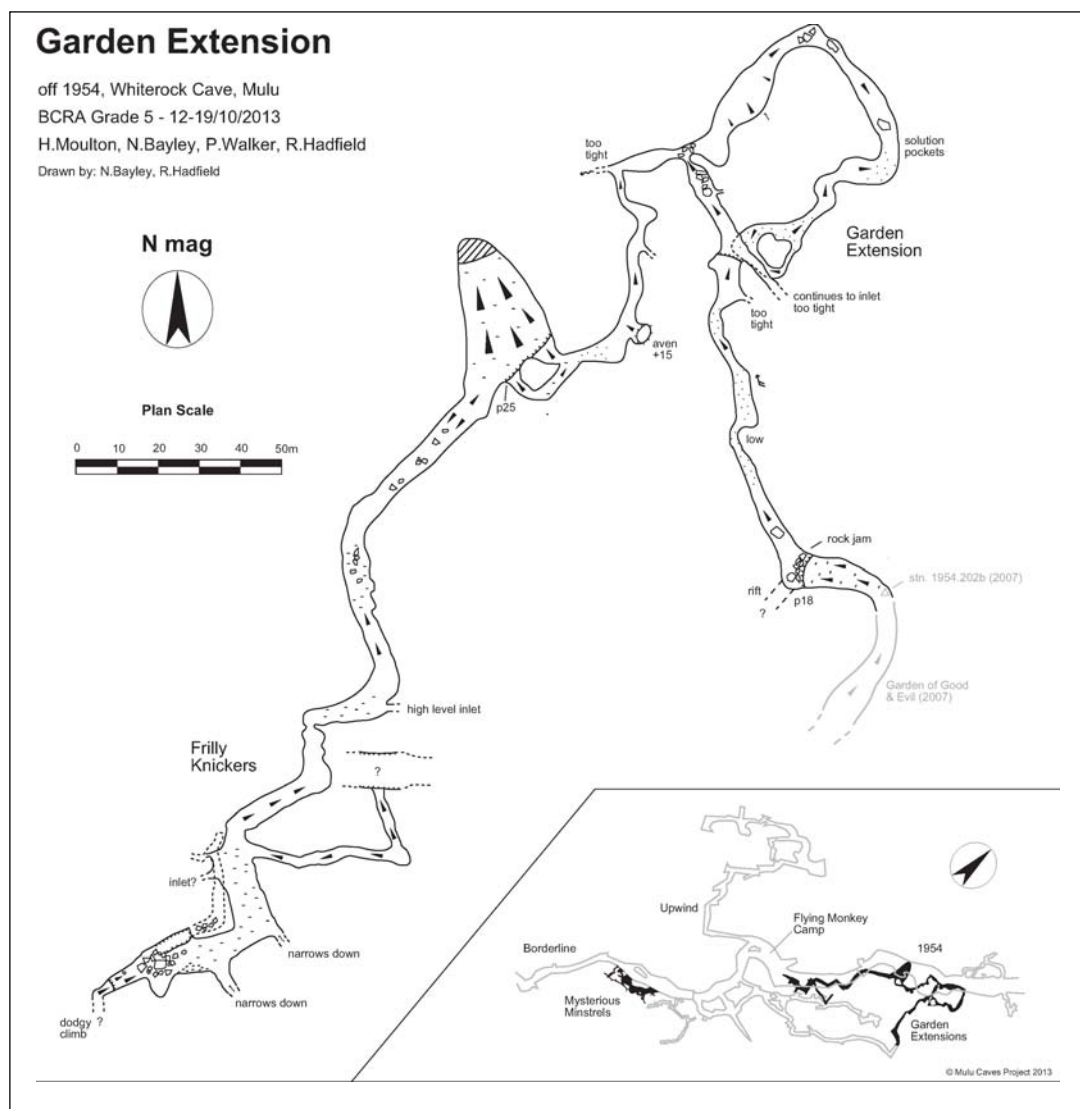
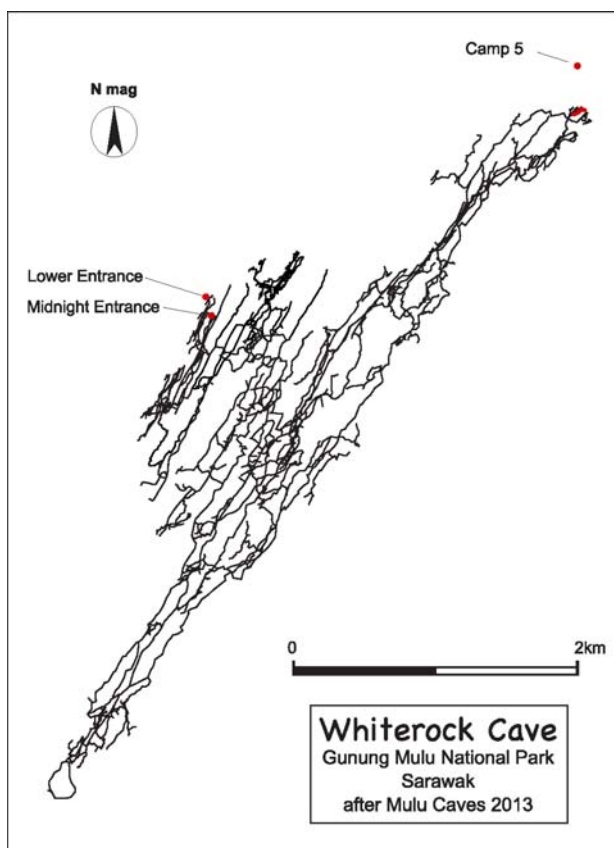


Figure 23 – Garden Extension and Frisly Knickers Survey.

No Hope. *Explored 15 Oct '13; Length 109.13m.*
Explored by Nicky Bayley, Hannah Moulton & **Phil Walker.**

At the top of the calcite chamber in Hopeless a 15m pitch, *No Hope Pitch* enters a rift. Turning right at the bottom of the pitch follows a SW rift passage with large cobbles. After 60m the passage lowers to calcited crawls that end after 20m in a too tight rift with a slight draft.

Left at the bottom of the pitch leads through an awkward crawl to the top of a climb, where numerous routes lead down into an area of large breakdown. Right at the bottom of the chamber drops into a reasonable size rift passage 3mx8m with a mud floor, *No Hope Passage*.



No Hope Passage. *Explored 19 Oct '13;*
Length 190.25m. Explored by Simon Brooks,
Jeff Wade & Phil Walker.

Heading southwest downstream in the muddy No Hope Passage leads after 20m to a large shallow sump. Upstream to the east leads to an obvious smaller inlet over cobbles, this is followed by 10m of dry rift passage above the water, which reaches a deep sump rising from a hole on the left and running to right underneath the level of the rift passage. Climbing over the top of the sump is a short bedding continuation that quickly chokes. There is strong airflow in this area of the cave but no open leads as all choked with mud and cobbled.

Prior to entering the inlet a short climb to the north (left as looking upstream) connects back to the area under No Hope Pitch. Here to the east ascends a bedding passage with a perched rubble floor. After 15m a 10m high aven is reached (no obvious passage in roof). To the south a small rising passage can be followed for 20m (last practical survey leg 3/4 to 3/5 is given as an indication of this passages direction). A tight 3m climb up leads to a body sized passage, which after 5m breaks out into the top of ~20m deep curved pot. The body sized passage can be seen to continue some ~7m away across the other side of the shaft. The bottom of the shaft is similarly unexplored.

Pointless Boulder Chamber. *Explored 19 Oct '13; Length 100.72m.*

Explored by Simon Brooks, **Jeff Wade** & Phil Walker.

Eastern Climb Passage heads northeast off the Pointless East passage at survey station 15 and is 70m in length along the main passage, involving a short but committing 4m climb at the start, for which a handline may be useful. Part way along this main passage a side branch heading east ramps up, with several steps and short climbs. After 20m this leads to a small unstable eyehole up into a chamber full of boulders on a slope at the same angle as the ramp. Movement in this eyehole almost blocked the exploration team in the chamber above. The chamber is 20m long, 15m wide and 5m high with a small blind 4m shaft at the N end, with no continuations. Back in the main Eastern Climb Passage this ends in an aven 15m high that has been climbed and can be seen to be blocked at the top, although snail shells are found in this area.

The explorations completed in 2011 and 2013 link at the following stations: eastern_climb_passage.7 and pointless_boulder_chamber_series2.8, respectively. The 2013 exploration was also completed in two parts whereby pointless_boulder_chamber_series1.3 links to pointless_boulder_chamber_series2.0.

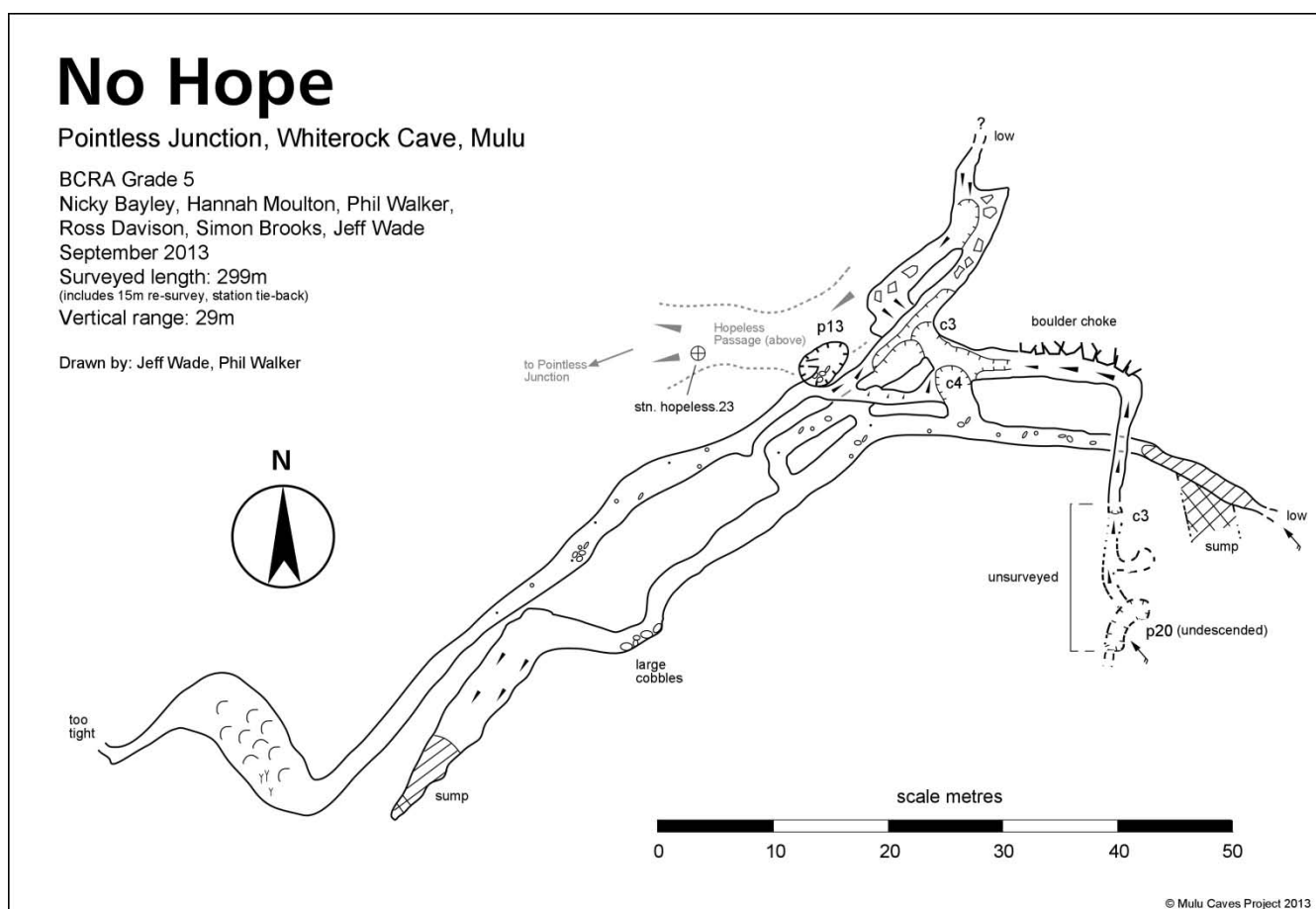


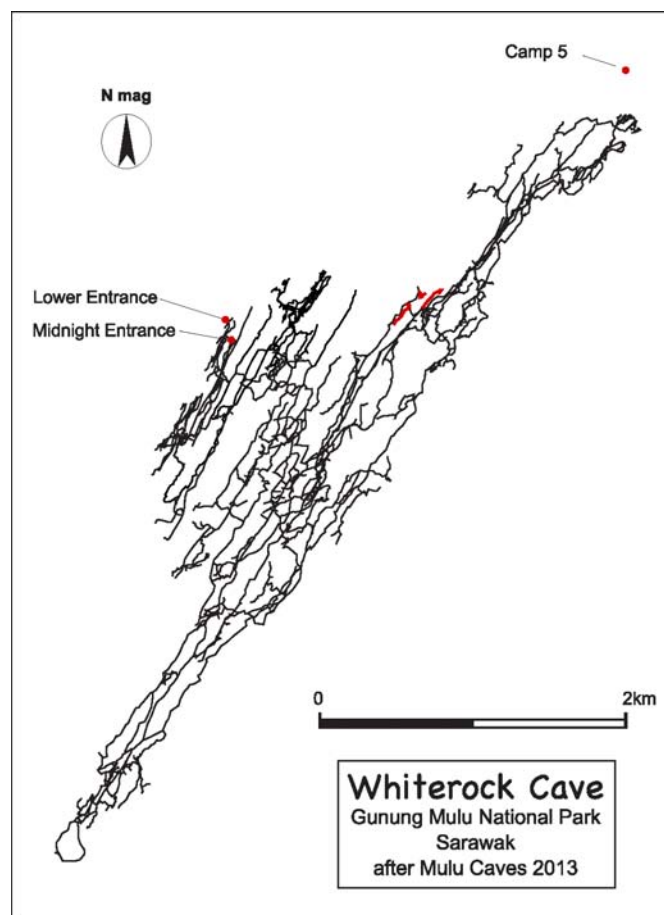
Figure 24 – No Hope area survey.

WHITEROCK RIVER AREA

Balcony Climb. *Explored 28 Oct '13; Length 216.92m.* Explored by Simon Brooks, **Frank Pearson**, Ross Davidson & Tony White.

On the west side of Whiterock River, downstream of the Snowboard Tuesday Ramp and 50m before the clearly obvious Cascade Inlet is another inlet with a stream falling into a chaos of huge boulders. A steep climb of 10m with good holds leads up by the waterfall and gives entry to a high and wide rift passage running parallel to upstream Whiterock River. This is followed to a larger boulder chamber with no way on, other than a window in the east wall that provides a balcony overlooking the river some 20m below.

Cascade Inlet. *Explored 28 Oct '13; Length 98.85m.* Explored by Simon Brooks, **Frank Pearson**, Ross Davidson & Tony White.



Cascade Inlet enters Whiterock River on the west bank, about 150m downstream from the Snowboard Tuesday Ramp. It is a powerful stream and an obvious feature, not to be confused with the smaller stream of Balcony Climb. The stream pours out of a sump pool and we hoped this passage would provide a by-pass, but it didn't. It lies up the northern slope of the inlet, some 30m before the sump, at the top of a mud and rubble heap. It is a small passage which gradually closes down.

Mudslide Monday. *Explored 28 Oct '13; Length 215.36m.*

Explored by Simon Brooks, **Frank Pearson**, Ross Davidson & Tony White.

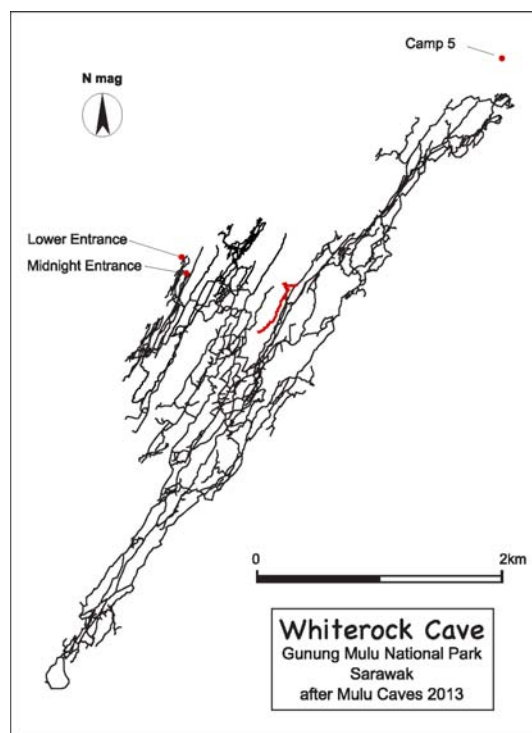
Directly opposite Cascade Inlet, on the east bank of the river, lies Mudslide Monday. A window opens above a steep cliff and just round a bend in the river downstream a boulder pile and mud-bank rise up to the same spot. An easy climb leads to the final 10m steep mud-slope and traverse left into the passage. We put on a rope retrospectively as it would be a committing and potentially lethal descent. The large and very well decorated passage heads south, running parallel with the downstream river. The passage contains two large windows onto balconies that overlook the river until the final window that opens out onto the huge breakdown area of the river 200m south of Cascade Inlet. The climb down from this window is far too steep without a rope. These three windows are all clearly obvious from the river banks below.

Midnight Express. *Explored 28 Oct '13;*

Length 717.24m.

Explored by Simon Brooks, **Frank Pearson**,
Ross Davidson & Tony White.

About 400m downstream of Cascade Inlet on the west bank of the Whiterock River, a large elliptical rift can be climbed into and followed for about 30m to a junction. The right, or northern passage leads into a high, narrow muddy rift which gives access to a bedding plane crawl, which was not been pushed to a conclusion. The passage directly ahead, to the west, leads via tight squeezes to a small chamber with a chimney climb of 5m, another climb of 5m descends beyond but requires rope, and has also not been pushed to a conclusion. The passage to the left, or to the south, opens out impressively onto a classic Mulu reclining dip passage, about 20m from top to



bottom. The passage is a double decker with a silt plug in the middle and follows the strike for several hundred metres.

The lower passage silts up completely in places whereas the upper level is continually wide open. About 200m along the upper deck a small passage leads off east and the floor gives way to what appears to be a chimney dropping into the roof of Whiterock River. The main passage continues to a large chamber, the passage being high up the wall. The way on is an airy traverse across mud stuck onto a steep rock slope. The traverse is about 20m long and leads to a series of muddy climbs in gullies which eventually lead into a number of mud-lined chambers with no way on. As it is running parallel with Whiterock River there is the possibility that a by-pass to the sump could be found.

Figure 25 – Flying Monkey Camp – photo by Jeff Wade.



Figure 26 – Whiterock Streamway at pointless Junction - photo by Jeff Wade.



Figure 27 – Rosie Hadfield at the end of Pretty Painful - photo by Jeff Wade.

Whiterock Streamway Bolt Climb (See leads map, no.9 below). *Explored 20 Oct '13*

Explored by **Jeff Wade**, Simon Brookes & Rosie Hadfield.

From the Whiterock streamway (near survey station 24) a calcite cascade to the southeast and some 15m back from the streamway has been bolt climbed approximately 10m. This gains access to a ledge with no further continuation due to the calcite blocking all ways on. At the base of this climb are some dry gour pools in a sheltered oxbow.

Swiftwater Streamway Bolt Climb (See leads map below, near no.8). *Explored 29 Oct '13;*

Explored by **Jeff Wade** & Rosie Hadfield.

From the Swiftwater Inlet (near survey station 14) a climb up of 3m onto a ledge directly above the streamway on the E side leads to a scree filled ramp. At the back of this a 6m climb up brings you back into the main passage, with no further prospects at roof level.

Pretty Painful. *Explored 20 Oct '13; Length 96.45m.*

Explored by Simon Brooks, **Jeff Wade** & Rosie Hadfield.

The Pretty Painful passage branches off the Whiterock streamway in a NE direction close to station 28 (this is on the bend downstream of the roof shower bath inlet/formation), which is the tie-in station for the Pretty Painful survey. This finely decorated tube (initially some 2-3m in diameter) continues for 96m to a point where it becomes too low and blocked by stal to be pushed further. The final 6m of passage requires careful crawling through a low area festooned by many stalactites, curtains and stalagmites.

Swiftwater Inlet Side Passage Extensions. *Explored 29 Oct '13; Length 221.91m.*

Explored by Simon Brooks, Frank Pearson, Ross Davidson & Tony White.

Partial resurvey of the end of the left branch of Swiftwater plus some additional small side passage exploration was undertaken. This area is more complex than first appears and requires a revisit to conclude all leads and passage descriptions.

Swiftwater Inlet Oxbow. *Explored 29 Oct '13; Length 63.89m.*

Explored by Simon Brooks, Frank Pearson, Ross Davidson & Tony White.

Swiftwater passage divides at a sandy junction; the left hand branch is a rising narrow ramp with a shallow block rift above it. This is followed for about 30 metres to a squeeze and scramble through boulders into a chamber with a boulder floor sloping down at about 20 degrees. The chamber is about 4 - 5 m high and 12m by 8m wide. At the foot of the boulder slope, at the right hand side of the chamber is a gap between the boulders leading under the wall. An extremely tight series of squeezes between boulders is followed for about 10 metres to solid rock and a narrow rift that was blocked with boulders. To the left, further squeezes lead to small chamber filled with calcite formations and no way on.

Leads - Whiterock North - from Flying Monkey Camp - and results in red

1. Inlet passage at Borderline/1954 junction, issued sizeable stream in 2007. 10m bolt climb. Also passage in opposite wall. - **completed, Mysterious Minstrel**
2. Undescended pitches in 1954 side passages - several to go at, upto 30m deep? - **completed, Garden Extensions**
3. Up-Ramp aven, 10-15m bolt climb - **not investigated**
4. Snowboard inlets - partially explored but not surveyed, several unfollowed leads, one draughting strongly. - **completed, Snowboard Inlet Series**
5. Cascade Inlet - look for sump bypass, side passage nearby ends at 10m climb up - **no sump bypass, Balcony Climb passage explored**
6. Whiterock River downstream - none of the side passages explored. - **new explorations, Mudslide Monday & Midnight Express**
7. Swiftwater - choke in left branch has holes down. - **minor side passage extensions**
8. Swiftwater - sump in right branch, may be short shallow dive? - **dive not thought to be short, aven in passage explored but no go**
9. Ramp in calcite oxbow area - **bolted, no passage**
10. Small passage from 2009 - bats seen flying in and out. Passage partially explored but not to conclusion, not surveyed. - **completed, Pretty Painful passage**
11. Hopeless - undescended 8m climb in final chamber. Climb/pitch. - **completed, No Hope series explored**
12. Eastern Climb Passage - avens at end require climbing (snail shells at base), upper level chamber to investigate fully and survey - **climb not fully pushed, Pointless Boulder chamber explored**
13. Big aven in roof of Pointless East, bats in this area, bold 30m bolt climb? - **not investigated**
14. Gone With the Wind Rift - steep mud slope ascending to jammed blocks requires climbing, appears to open out at top. rope/bolts/crampons (this may lead to same level as passages at bottom of Ski Wednesday and would be at same level as passage seen up 30m aven climb at Pointless Junction...this level also equates to ground level of the track from C5 to No Country for Old Men...ie. not way up the cliff) - **not investigated**

Plenty of other bits and pieces.



Figure 28 – Whiterock North Leads.

Mysterious Minstrel. Explored 30 Oct '13; Length 236.08m.

Explored by **Jeff Wade** & Rosie Hadfield.

The Mysterious Minstrel passages are situated on the S side of the Borderline passage where a stream inlet runs in from Mysterious Minstrel. The tie-in station for Mysterious Minstrel is 166 on the Borderline survey.

To gain access to the Mysterious Minstrel passages an 8m aid-climb to the left hand side of the cascade can be completed. A 25m rope would be needed for the climb to then reach suitable tie-off points at the top and approximately 8 hanger plates to re-use the bolts in-situ. This climb gains access to a 20m long (parallel to the Borderline passage) and 15m deep alcove ramping up in stages with a mixture of mud, popcorn and crystal formations. Looking into this alcove a number of passages can be seen, but the most major passage to the left (NE) is a 6m wide x 8m high and 30m long oxbow back into Borderline.

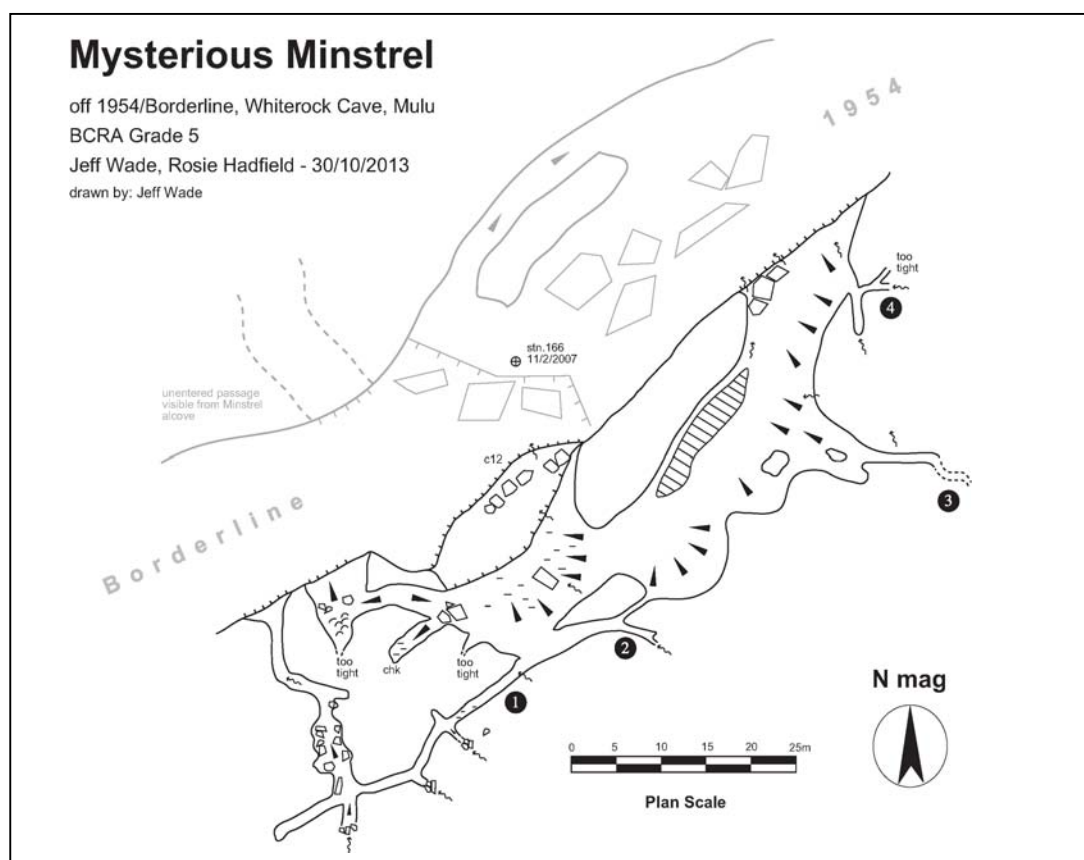


Figure 29 – Mysterious Minstrel survey.

Several smaller passages lead off from the main alcove back wall. At the rear of the alcove and 5m beyond a mud blocked tube, another smaller tube continues down in a SW direction (labelled 1) and is the most extensive side passage off the main alcove. Several small inlets from the left (SE) enter this descending passage, all of which either close down or lead to calcite blockages. After 20m this descending crawling and stooping passage reaches a crossroads. To the left (SE) an inlet enters through boulders blocked by calcite. Ahead (SW) a decorated passage continues for a further 5m until it closes down. To the right (NW) the passage is initially low, but develops to a standing size shortly before breaking back into the Borderline passage.

Back at the main Mysterious Minstrel alcove, the next passage to the left (labelled 2) is also at the rear and directly opposite the previous tube. This tube is of a similar size but with an upward trend, which after 10m becomes too small to continue. Halfway along this an impassable passage to the NE branches back off to the main alcove and large oxbow passage.

In the 6m wide x 8m high oxbow, 15m along this on the right (SE) approaching from the main alcove a draughting ramp can be followed for 10m upwards (labelled 3). This draughts strongly and seems to be the most promising lead. However, it soon closes down through a small squeeze between formations, and after a further 10m reaches an area of very dark rock. This change in rock type reduces the passage to a series of impassable solution inlets, despite the draught. Back in the oxbow passage a small passage to the right (SE) ramps up for 5m (labelled 4) and then forks. In both directions this also meets the dark rock described above, but with water flowing on the floor and without a draught. Both of these forks close down to an impassable size within a few metres.

From the original bolt climb up to the Mysterious Minstrel alcove/ledge it is possible to look back across into a passage that bisects Borderline. This is a large tube which looks promising; although it would be an overhanging bolt climb to reach it from the floor.



**Figure 30 – Looking across Borderline from Mysterious Minstrel to the unentered tube
photo by Jeff Wade.**

WHITEROCK SOUTHERN AREA

Chance Encounter and Better Late Than Never Pitch, off The Big Issue.

"All went up into The Big Issue from The Middle Order Collapse via Broken Chain. Mark and Louise went south along Big Issue to investigate a large undescended pitch on the survey, whilst Pete and Andy went east to check out side passages identified by Hugh."

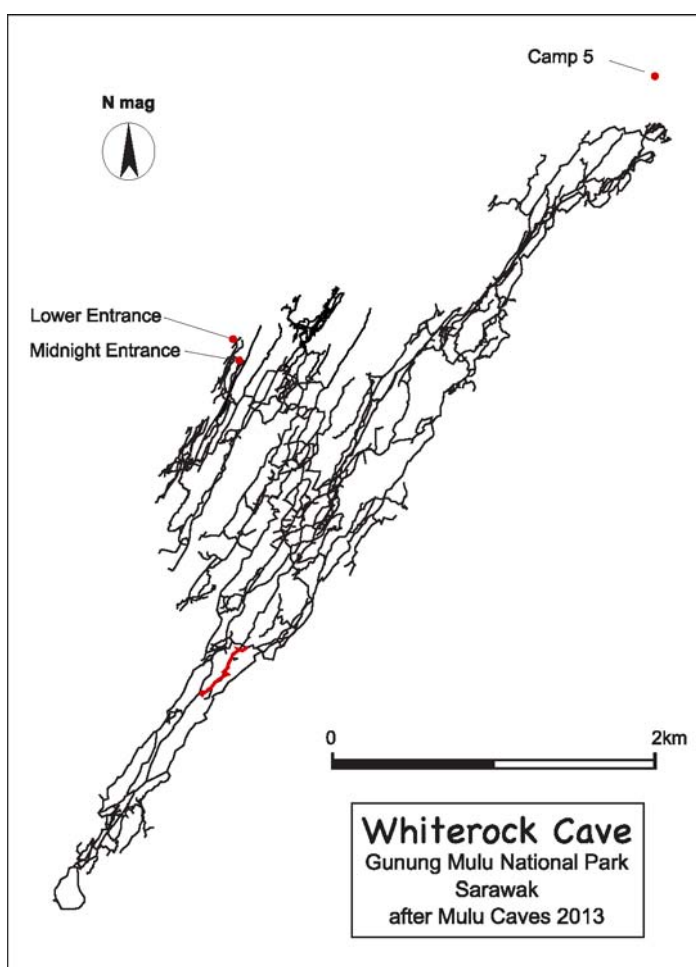
Better Late Than Never

Explored 29 Oct '13; Length 47.39m.

Explored by **Mark Brown** and Louise Korsgaard.

The large hole (20m diameter) in the floor of Big Issue was found to be topped by a funnel of loose sediment. Back tracking a short distance led to a parallel tube on the east side of the passage, 5m in diameter, with fang like stals overhanging another window into the large passage just seen below. The spectacular pitch head was rigged from a stal boss and a bolt rebelay to give a 20m hang into the passage. As there was a possibility they had just dropped back into known cave such as Daydream Believer, a thorough search was carried out to check for survey stations or footprints. None were found. As there were passages heading off north, south and southwest it was decided they would make good leads for the next expedition so the explorers ascended the pitch back up to Big Issue.

At the pitch head, the familiar voices of Pete and Andy were heard below...



Chance Encounter, *Explored 29 Oct '13; Length 493.9m.*

Explored by Andy Eavis and **Pete Smart**.

From the climb up into Big Issue from Middle Order Collapse, the passage was followed to the east to a drop into Bigness South. Returning, an area of south side passages, dashed on the survey as possible leads, was checked whilst Pete wrote some notes. Andy disappeared and, as usual, didn't either say where he was going or re-appear. Eventually he returned with the main south side passage still going. A survey in was started from Big Issue station 58. The passage dropped steeply down a sand fill slope, picking up other likely connections to the side of Big Issue (not explored in detail). A 5m climb down a jammed block lead to a more difficult and rather slippery 5m climb down. This relatively small phreatic passage lead into a nice joint guided fissure up to 25m high, and eventually to a low point where a



**Figure 31 – Louise Korsgaard at the head of the pitch down to Chance Encounter
photo by Mark Brown.**

small stream channel lead off in the floor. This was not conclusively pushed, as a flowstone slope lead invitingly up towards jammed blocks to the south.

With suitable encouragement, Andy climbed the blocks (5m, quite exposed because of the slope) into the floor of a much larger passage. To the east was a blank wall, with the passage probably continuing above (not climbed and a good lead), whilst to the west the passage rose and enlarged. An easy 3m climb up led into a large hading passage. Traversing around a hole in the floor (back under the passage) led to a boulder slope and a second traverse on flowstone and stalagmites, on the south side of the passage. With the passage becoming bigger and the forward view dark and echoing, we heard voices. Surveying on in the boulder strewn passage 15-20m wide, the pair ran into Mark Brown and Louise Korsgaard, who were just climbing up the 20m rope pitch they had dropped from another of Hugh's leads further to the south in Big Issue. To hasten the exit, SRT gear was shared and all climbed the pitch, now named Better Late Than Never. The rope was left on.

From the base of the pitch, the passage was named Chance Encounter and continues large, inviting and unexplored beyond twin 10m high stalagmites to the south west. Possible connections are to chokes at the side of Highland or northern end of Paint It Black some 700m away. The possible north east lead may link back to holes in the floor of Bigness South, whilst a link from the first part of the passage to the somewhat similar Swift Shadow might also be a possibility. This area is very complex with many different levels and interconnections between Big Issue and Bigness South (see 2009 report).

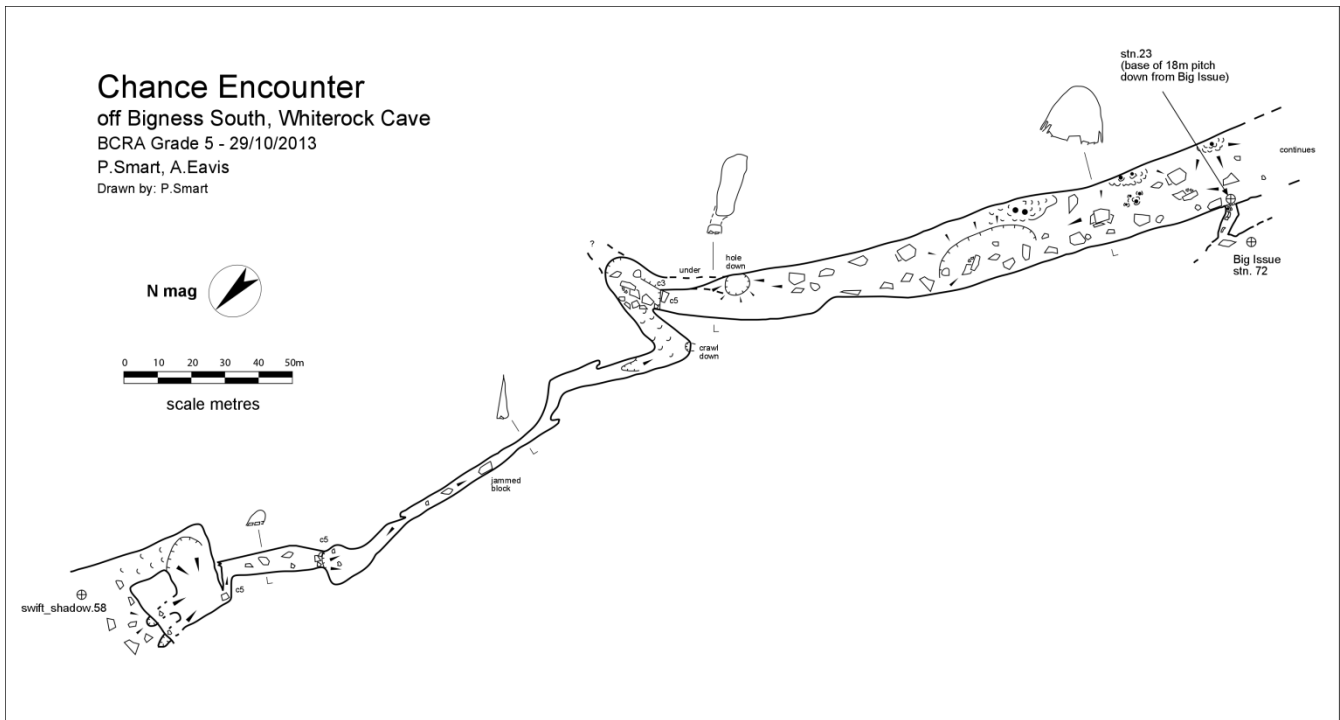


Figure 32 – Chance Encounter Survey.

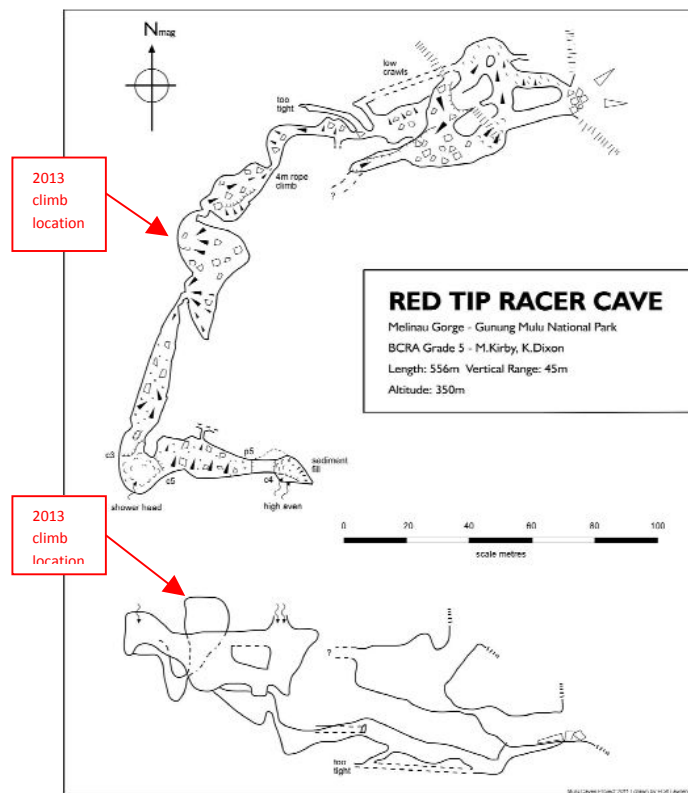


Figure 33 - Red Tip Racer survey showing 2013 climb location.

RED TIP RACER CAVE.

Explored 25th Oct '13. Explored by **Mark Brown**, Pete Smart, Christopher Imang Ngau, Andy Eavis.

Some question marks remained after 2011 in this cave, so a return was made. In the cave, Pete Smart was very enthusiastic about the geomorphology, suggesting that it displayed characteristics that were typical of a passage that could run right through Api along the strike. As the cave is several hundred metres further east than any of Whiterock, this was an intriguing prospect. The plan was to attempt a climb half way into the cave, which had been left by Pete Hall in 2011 after he ran out of solid rock. Mark pendulumed from Pete's high point onto a rib of better rock, which he bolted up to reach a high level false floor, 12m up. Unfortunately, the high level was completely choked with calcite so no way on could be found. There were some climbs to possible high level passages in the large chamber at the entrance which were not investigated.

The party had installed their own rope on a handline climb on the route into the cave, due to the existing fixed rope being of unknown vintage. After a discussion in the cave, it was decided to remove the new rope, but leave the original one in place. In doing this, the original one broke when Mark weighted it, leading him to tumble down the climb, luckily only sustaining bruises and scratches and a sore elbow. Inquiries later suggested this rope could have been in place over twenty years. The point at which the rope failed was also where it was lying on cave sediments. Analysis of the failed rope by Hull University has suggested chemical attack, presumably derived from the sediments.

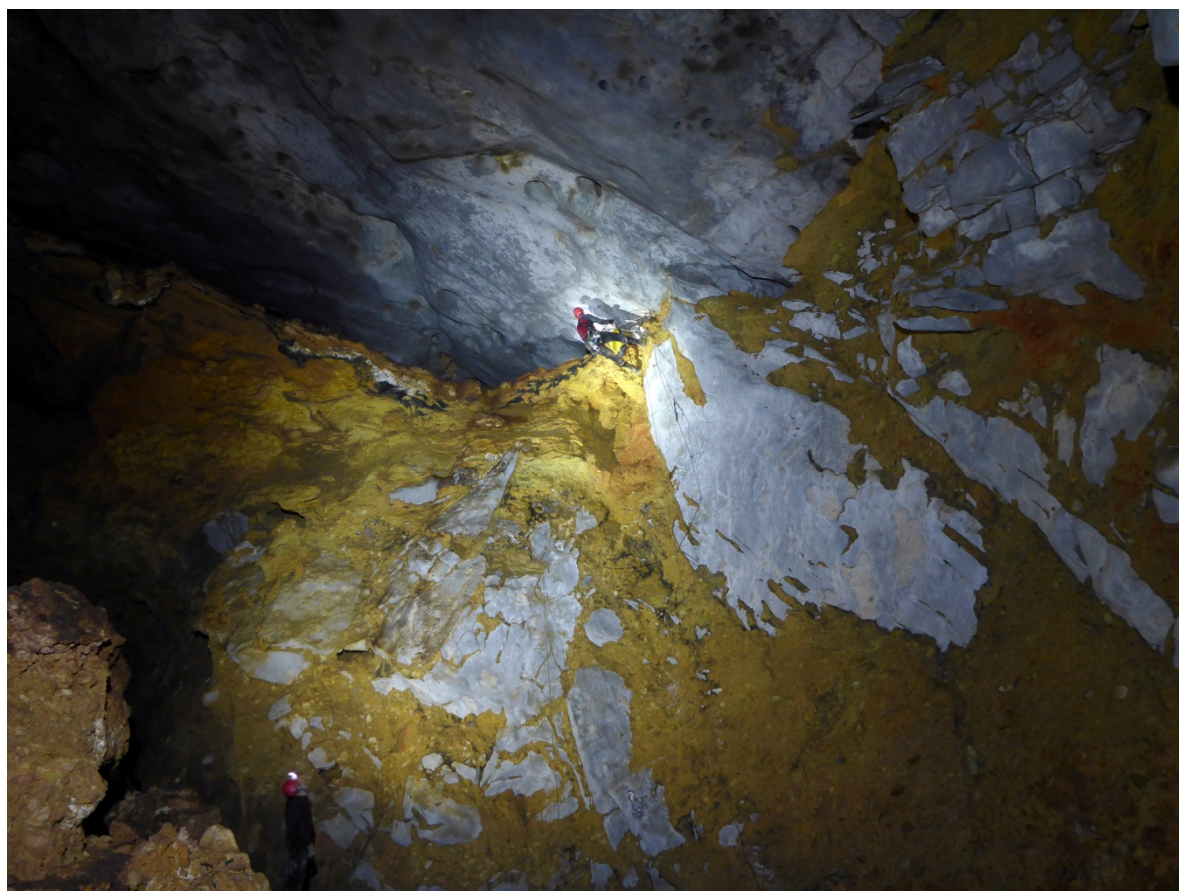


Figure 34 – Mark Brown reaching the top of the aid climb in Red Tip Racer Cave – photo by Andy Eavis.

UNDER GUNUNG BENARAT

DELIVERANCE CAVE

Deliverance Cave is located on the northern tip of Gunung Benarat approximately 1km from the Medalam River. It was first discovered by a team of cavers from the USA in 1997 and again explored to a total length of 4.3km in 2000. Unfortunately, the US team were unable to return, leaving the way open for us to continue exploration. The US report suggested a number of good leads remained within the system, which were mainly of the aven and ramp climbing variety.



**Figure 35 – Logistics Coordinator and guide, Veno Enar, with Jeff Wade and Rosie Hadfield at the entrance to Deliverance Cave
photo by Andy Harp.**

Due to its remote location, 4 hours walk from Camp 5; Deliverance required a forest bivvy camp to be set up. This was basic but practical, consisting of pole hammocks with a rain shelter, and a surprising amount of bush furniture crafted by Andrew, one of the local guides who manned it. 3 trips were made to the camp in total.



**Figure 36 – Local assistant, Ibun, sharpening a parang in the Medalam River, Gunung Buda in the background
photo by Andy Harp.**

Living Joy. *Explored 14th -15th Oct '13.*

Length 118.9m

Explored by **Rob Middleton, Jeff Wade,**
Andy Harp, Rosie Hadfield

Rob, Rosie, Jeff, and Andy H began ticking off leads. The first discovery was made by accident, when Rob climbed a 17m mud ramp above 'Waterfall City' thinking it was the way on. This led to an attractive high level passage, “Living joy”, which dropped back into the known passage with a 10m pitch.

Ginger Crunch Dream. *Explored 14th -15th Oct '13.* Length 73.04m

Explored by **Rob Middleton, Jeff Wade,**
Andy Harp, Rosie Hadfield

Next, Ross bolted up a 5m pitch on the South side of the passage beyond Civet Hall (to the south) to discover ‘Ginger Crunch Dream’. This eventually circled back to join the “terminal choke” at the South West end of the passage and with a bit of sharp squeezing was connected. Jeff then bolted a short climb on the other side of the passage to locate the continuing tube which was blocked after only 10m. Following the long walk in from Camp 5, this seemed plenty for one day, so the team made an exit.

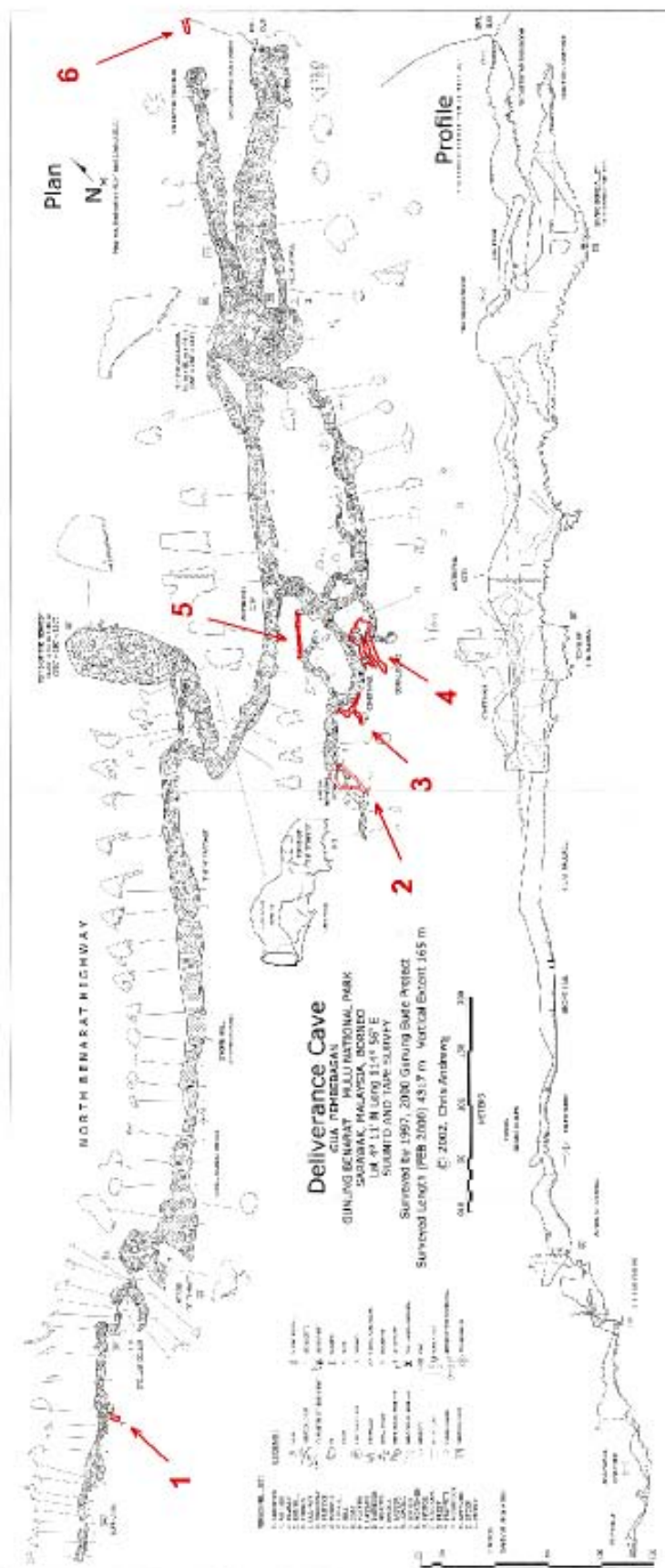


Figure 37 – Rob Middleton bolting into Living Joy,
belayed by Jeff Wade – photo by Andy Harp.

Erase and Rewind. *Explored 14th -15th Oct '13.* Length 73.04m

Explored by **Rob Middleton, Jeff Wade,** Andy Harp, Rosie Hadfield

The following evening a return was made, looking for leads further into the cave, which had been identified by the Americans. Many were discounted on sight with the aid of more powerful lights (e.g. Scurion lamps), and in general these lower leads seemed disappointing. However, a look was taken at Euphoria Chamber, which was absolutely stunning, a true once in a lifetime find. One ramp was also climbed around 150m back from the southern limit of Euphoria, which went with a mix of bolt and free climbing technique for over 25m, until it gave up in solution pockets at roof level. 'Erase and Rewind', which was a fun climb but unfortunately yielded very little.



Deliverance Cave - New Exploration in 2013 (outlines shown in red).

- 1) Erase and Rewind
- 2) Ginger Crunch Dream
- 3) Civet's Tail
- 4) Smack My Pitch Up and Pauper's Pitch - Civet Hall Aven Climb
- 5) Living Joy
- 6) Little Deliverance

Figure 38 – Deliverance Cave new exploration map

Smack My Pitch Up. *Explored 18th -19th Oct '13 and 24th-25th October.* Length 318.4m
18th-19th October - explored by **Rob Middleton**, Ross Davidson

Following a day or so's rest and relaxation at base camp, Rob and Ross returned to the forest camp, to climb the big aven, just off Civet Hall; unfinished by the Americans. They were just able to reach the American rope, which had shrunk over the 12 years it had been in-situ. Rob climbed it gingerly, wondering just what it was attached to. He soon learnt the meaning of Indestructible rope technique, as the aven was 50m high and the rope rubbed against the wall many times but was not rebelayed once. Luckily, if not indestructible, the rope did at least seem strong enough and he made it safely to the top, before adding some much needed rigging and rebelay and calling Ross up to join him. The top of this aven entered a complicated area of small and interconnecting passages, which quickly lead to a window 18m up another even larger aven. This had been dropped to a boulder floor by the Americans, but no-one had been up, and it looked massive. This was what they had come to climb.

A quick lunch break with some “banging tunes” from a mobile phone, including a bit of Prodigy, and they began the climb. It was pain staking stuff and Rob managed about 30m on the first night while Ross belayed diligently and cheerfully. At 30m they explored a small side passage which unfortunately led to a choke, before stopping exploration for the “night” (they actually exited the cave at around 8am!).

Following an excellent couple of feeds from the Park guide Andrew, and a good 8 hours sleep they returned to climb some more. After many hours steady progress, Rob ran out of bolts, just as the angle was starting to relent. In a Delboy Trotter inspired “he who dares” moment, he dumped all the bolting clobber and began free-climbing up the precarious calcite slope with Ross belaying dynamically (This is one of the benefits of using a dynamic (rather than low stretch) rope for bolt climbing. Luckily, the climb soon relented and he reached a side passage with the aven appearing to continue, though smaller above. He miraculously found two amazing thread anchors and called for Ross to come and join him for a well earned snack. More Prodigy music ensued and so the name “Smack My Pitch Up” was born. They explored the side passage for 20m, where it unfortunately also choked, and then surveyed out, exiting tired, but very satisfied at 11am.

24th-25th October- explored by **Jeff Wade** and Rosie Hadfield.

Rosie and Jeff returned to Deliverance to continue the bolt climb of “Smack my Pitch Up”, with the aim of continuing as far as possible with the remaining climbing kit, surveying, and then minimising the rigging on the pitches, so that it would be possible to access the avens in the future.

From Rob and Ross’s final belay point in a gully feature, Rosie and Jeff climbed back out into the main shaft using a rock bridge back over the top of the route below. From here it was possible to see the bottom of a perched boulder slope round the corner on left (as looking from the ledge across the shaft) and it indicated that something was joining the shaft at this



Figure 39 – Rosie Hadfield and Simon Brooks high in the climb above Civet Hall – photo by Jeff Wade.

point. Rosie completed a hanging traverse of 8m length, without dislodging the perched rocks back down the shaft on to the ropes below, and then gained access to a chamber, which made a safe place to reconvene and look at the two main ways on.

The first was a window of considerable size, but due to a lack of equipment the climb was not possible. However, it was evidently heading back into the main shaft and could be looked into for around 30m. The other lead was at the far end of the chamber, away from the main shaft. Here a tube (1-2m diameter) in the roof could be seen. Rosie gained access to this after utilising several ledges below and continued to climb, placing anchors as necessary. The tube went up around 15m and spiralled anti-clockwise. This then broke out onto a ledge part way up a large (5m tall x 4m wide) inclined passage, heading down to the left and up to the right (as entering). To the left it dropped of some 5m and was clearly blocked by boulders. Up to the right a series of small climbs and slopes covered in calcite ramped up for 15m to where car size boulders then vertically jammed the way on. Jeff completed this climb up to this boulder blockage and could see darkness through the holes to the other side. However, the combination of the size of the only viable hole to push, very little remaining equipment and various sized boulders above his head, led the team to decide that this would be a good place to stop. The nature of the ramp also suggested it was heading back into the main shaft, and this was later confirmed by the survey.

Rosie and Jeff then surveyed back out to tie-in to the original survey and de-rigged any excess equipment. It is worth noting that the American's first rope from Civet Hall has been left in-situ as it was in a reasonable condition. This has had an additional new length tied onto the bottom so it can be accessed from the floor. This American rope should be climbed with extreme care as the re-belays have been stripped and a multiple person load test at the bottom is recommended before climbing, as per usual practice for climbing in-situ ropes.

Smack My Pitch Up and Paupers Pitch Series (aven above Civet Hall)

Deliverence Cave, Gunung Benarat, Mulu

BCRA Grade 5

Rosie Hadfield, Rob Middleton, Ross Davison,

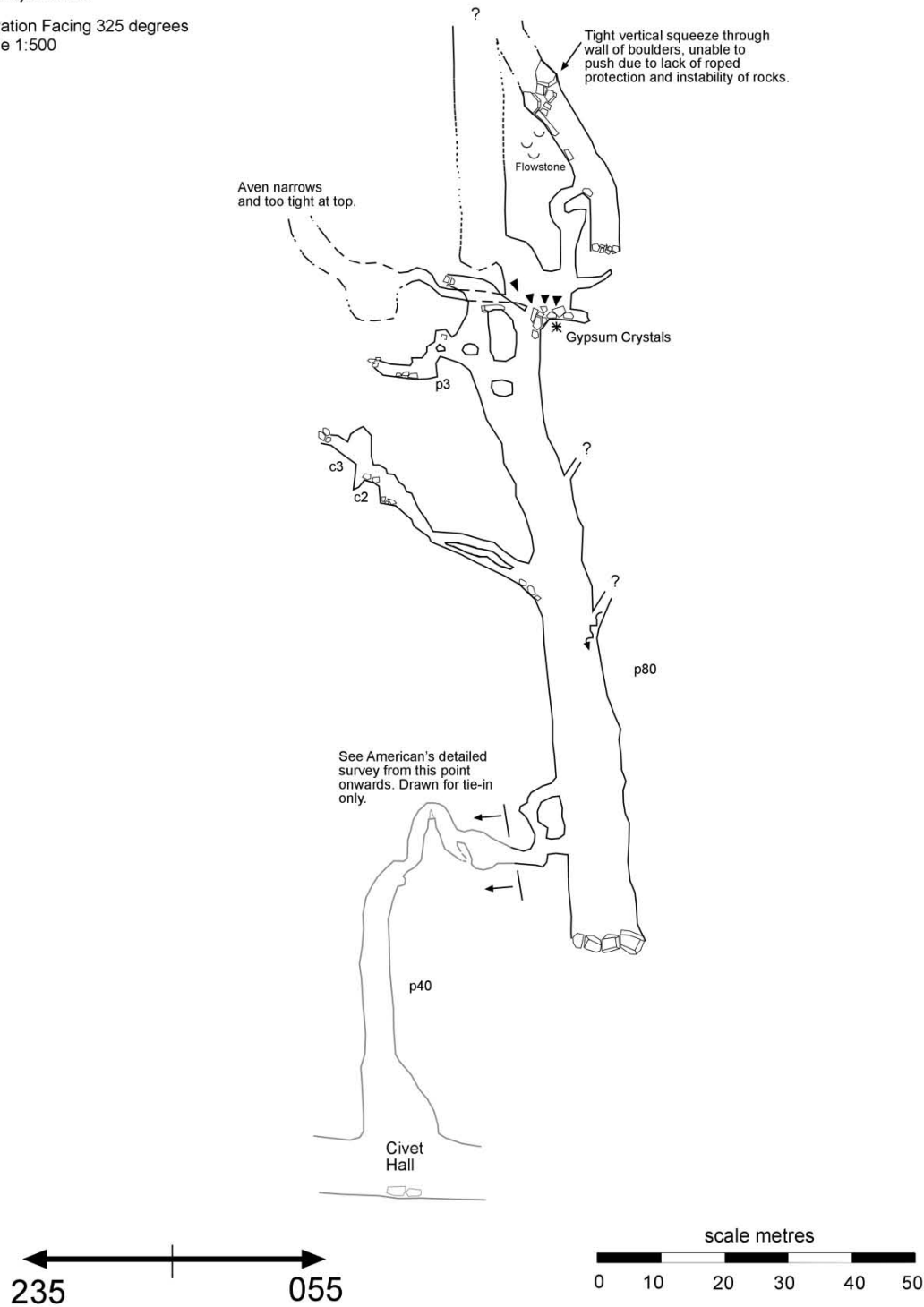
Jeff Wade

September 2013

Drawn by: Jeff Wade

Elevation Facing 325 degrees

Scale 1:500



© Mulu Caves Project 2013

Figure 40 – Elevation of the aven climb above Civet Hall.

Civet's Tail. *Explored 24th Oct '13; Length 51.6m*

Explored by Simon Brooks and **Frank Pearson.**

A scramble down through boulders leads to a low and wide passage, about 1m - 2m high and about 3m wide. The main passage holds water in pools although it was not flowing. The passage is blocked with sand and rubble. Before its conclusion another passage branches off to the right; this passage is equally wide but considerably lower, about 0.5m high. This too holds pools of water and is lined with popcorn stal. The far end of this passage is lined with razor sharp stal and a flat-out crawl would be painful and destructive. A trip back to the main passage above revealed a hole in the boulder floor and a view of this stal-lined low passage, revealing where it comes out.

Little Deliverance. *Explored 24th Oct '13; Length 7.4m*

Explored by Simon Brooks and **Frank Pearson.**

A surface survey was made from the main Deliverance entrance to the two adjacent cave entrances. The nearest of these caves was surveyed to yield 7.4m of passage and a 4.7m climb into a blind chamber. This was likely at one time to have been connected to Deliverance Cave by a route that is now blocked with calcite. The climb to the other nearby entrance on the cliff was inspected but proved far too steep and loose to be attempted without equipment.



Figure 41 – Candlelit dining in the Forest Camp – photo by Frank Pearson.

SURFACE SEARCHING AND ASSOCIATED CAVES

MELINAU GORGE (GUNUNG API SIDE)

MAYPOLE HOLE (CAVE IN CLIFF NEAR CAMP 5 BATHING POOL).

Explored 9th Oct '13; Length 8.3m

Explored by Rob Middleton, Simon Brooks, Ross Davidson, Phil Walker, **Mark Brown**.

Many of the Camp 5 based expeditions had discussed an entrance that was visible a short way up the cliff, visible from the bathing pool, under 5 minutes' walk from the camp. The consensus was "someone must have looked at that- it's so close to camp" but no record could be found in any report or logbook. So, on the first day after arrival at camp 5, whilst one team were finding the trail to Whiterock, a team headed to the hole in the cliff.

The cave was located approximately 100m south from the bathing pool just upstream of Camp 5. A 9m x 4m entrance could be seen approximately 10m up the cliff. A locally sourced "maypole" was used to rig a rope for the first 5m towards better rock. Rob M climbed, placing



Figure 42 – Rob Middleton climbing the maypole, belayed by Simon Brooks and Ross Davidson – photo by Phil Walker.

4 bolts beyond, and finally scrambling to the entrance. Unfortunately the cave was choked with calcite with no obvious ways on after 8.5m. On the right hand side through a squeeze, a small anti chamber in the stal was located, with no ways on. Remains of a small wooden coffin were found in the cave. The cave was de-rigged.



Figure 43 – Ross Davidson in Maypole Hole photo by Phil Walker.

DOLINE SINK. *Explored 15th and 21st Oct '13. Length 47.4m*

Explored by **Mark Brown**, Frank Pearson, Chris Imang Ngau, Andy Harp, Nicky Bailey.

Mark, Frank and Chris had a brief digging session on 15th October to enter walking sized areas between huge boulders, with tantalising draughts where the water sinks in gravel filled gaps.

Mark, Andy and Nicky surveyed the cave on 21st October just before heavy rain and increasing flow rates prompted a hasty exit. The exploration limit is 230m away (and 34m vertically above) the nearest point in Whiterock Cave (in a straight line which passes under Cairn Pot). It is probably not the simplest way to finding a Northern entrance.

MELINAU GORGE (GUNUNG BENARAT SIDE)

Entrances near Benarat caverns. *Explored 12th Oct '13.*

Explored by **Mark Brown**, Jeff Wade, Andy Harp, Rosie Hadfield, and Louise Korsgaard.

After relocating the route to Moon cave and Benarat Caverns/Lower Benarat Caverns, a small hole with a good draft was spotted by Louise (Gardener's World – see below).

Approximately 10m further along the cliff from this new entrance, was a circular entrance approximately 5m up in the cliff. A climb by Mark, with the aid of sling round a stal enabled a look into the entrance which seems to continue.



GARDENER'S WORLD,

Explored 12th and 13th Oct '13. Length 33.75m

Explored by Jeff Wade, Andy Harp, Rosie Hadfield, and Louise Korsgaard. Author **Mark Brown**.

On the 13th October, Jeff, Andy and Rosie surveyed the small cave found by Louise the previous day. After some excavation, Rosie climbed into a small entrance chamber (1.5m x1m x1m), followed by a climb down into a chamber decorated with lots of popcorn. Left was a small pit; around a corner to the right was another climb down into a small pit with the way on above a calcite false floor. There is a potential bolt climb outstanding at the end.

Figure 44 – Rosie Hadfield in the Gardener's World entrance – photo by Andy Harp.

BENARAT CLIFF – HALF MOON PENGUIN CAVE. Tuesday, 22nd October, 2013;
Rob Middleton, Hannah Moulton, Ross Davidson, Louise Korsgaard, **Frank Pearson**

A cave entrance was visible behind trees half way up the Benarat cliff, the north wall of the Melinau Gorge, beneath the explored and strikingly visible cave, *Hole in the Moon*. The task was to rig an abseil line down the cliff, past *Hole in the Moon Cave*, into the already named but unexplored *Half Moon Cave* and down to the forest floor. Hannah and Rob would rig the abseil while Louise, Ross and Frank would carry the 400m of rope to the top and follow them down.

The team left Camp Five at 7.15 am, crossed the Melinau River, followed the trail to the Kerangus Junction, turned right and climbed the densely forested shoulder of the cliff. As well as the 400m of rope, the sacks were loaded with bolts and maillons, drills and batteries, food and drink, survey and radio equipment. The shoulder was a steep scramble and, at times, climb. The faint trail had been pointed out by local guides the previous day as the one cut by the ‘bird-nesters’ who gathered the nests from *Hole in the Moon Cave*, and who had made two camps on the route. Just above their first camp the track traversed the top of the cliff to the abseil point the nesters had rigged above *Hole in the Moon Cave* the.

The path found space between the trees though roots covered everything, the ground was riven by and swathed by roots as grey as Arachne’s web and the razor sharp limestone that they gripped. The roots aided the climbing if trusted, as did the nesters’ ropes – 7mm blue propylene hawser. This rope often had lengths of bamboo knotted onto it to act as flimsy handles and rungs.

The team made it to the battered remains of the nesters’ first camp and to a small though monstrously precipitous window in the forest on the edge of the cliff before the traverse. The view of Camp Five by the Melinau River, in the bed of the gorge, was spectacular. Initially the traverse was a straight forward scramble along clearly defined ledges, with vegetation, so dense that although right on the edge of a 350m drop you had no sense of exposure. This eventually gave way to a vertical labyrinth of towers, pinnacles, gullies, cracks and ridges, a huge limestone pavement of clints and grikes that appeared to be toppling over the edge of the cliff.

Hannah rigged the abseil down the corridor the nesters had cut through the forest growing on the cliff edge. Their thick hawser ropes that swept down and into *Hole in the Moon Cave* were still in place although we preferred to use our own gear. Hannah vanished over the edge to place the first y-hang and dropped into open air and equatorial sunlight, 350m above the forest canopy. The swing and space walk into the cave, from outer space to inner, was a short but stirring encounter with gravity and the ethereal. As indeed was the rest of the descent. Swiftlets flew in and out of the cave past a snake coiled and ready for them at a narrowing of the entrance passage.

Hannah and Rob alternated the lead as they bolted and rigged the ropes down the cliff into *Half Moon Cave*. The three ‘Mulu Mules’ followed down and, as the afternoon storm clouds swept in across the forest from the west, gathered in the cave, “huddled together like penguins” as the riggers continued to the forest floor.



Figure 45 – Rob Middleton climbing through pinnacles on the locals’ route up the side of the Benarat cliff – photo by Frank Pearson.

The storm broke as and very soon water was pouring down the cliff, soaking the two riggers below. The cave mouth was largely filled with a vast plug of rubble; with a possible passage on top of it all, the climb up was next to an impressive towering bee’s nest. As any falling rock would probably drop onto the riggers below, it was decided to leave exploration for the team that would come and de-rig the ropes. The remainder of the descent was no longer free hanging, it was vertical and down through the hanging gardens of Benarat – the rain and the forest get everywhere! The team gathered in the dark at the foot of the cliff and returned to Camp Five in a torrential downpour to find that Veno had brought ice-cream up to the camp especially for Hugh – bowls were raised in his honour.

Saturday, 26th October, 2013; Torben Redder, Tony White.

Torben and Tony descend the ropes into *Half Moon Cave*. They climb into the cave passage above to find the cave is a disappointing 20m in length.

Thursday, 31st October, 2013: Rosie Hadfield, Jeff Wade.

Rosie and Jeff did the hard work and climbed the ropes removing them as they go, meeting two Park Guides at the nesters’ camp who help carry the ropes down.

NORTHERN BENARAT SEARCHING

THE SEARCH FOR GAWAI'S CAVE

24th October '13. **Mark Brown**, Andy Eavis, Pete Smart, Chris Imang Ngau

In 1997 a Japanese team had reported finding a cave at the NW flank of G. Benarat. No survey had been produced, only a centreline. In 2011, the team spent a long day on the forested slopes up above the Arch entrance of Blue Moonlight Bay Cave, until they reached the rim of a large doline feature. On a return visit, they had searched up stream in the doline, finding no cave, and then found Paradise Cave, which drew their attention. As acclimatization for Andy and Pete on their first day, Mark led them up to this Doline and they searched its slopes for a cave entrance. Much clambering through undergrowth and over boulders found them at the base of the Doline, where the dry streambed seemed to end in impenetrable boulders. A quick scout up to the base of the cliff bounding the northern end of the Doline found an entrance into a stal covered balcony, overlooking a large passage, 20m below. Lacking tackle, the team took some bearings and GPS positions and returned to the alluvial plain.

Whilst Pete and Chris returned to Camp 5, Mark and Andy (who decided he needed to give himself larger blisters) called in at the Deliverance forest camp to see how the team there were progressing. Study of the Survex model gave rise to the theory that they had found a new entrance into the Blue Moonlight Bay system, which was bolstered by the fact that the fragile guano crust formations and mud on the balcony pitch head looked pristine, so couldn't have been the entrance used by the Japanese. The theory is that the pitch overlooked part of "The Casting Vote" passage. A return will have to be made in 2015 to confirm this.

OTHER NORTHERN BENARAT SEARCHING

20th October '13. **Mark Brown** and Nicky Bayley

After checking in with the Deliverance team at the Forest Camp, a systematic look at sinks and Dolines in the gap between the alluvial ridge (taken by the trail) and the foot of the Benarat slope. Some impenetrable sinks were noted and some forays up the pinnacle slopes, but no entrances found.

23rd October '13. Andy Eavis, Pete Smart and **Mark Brown**.

During the helicopter flight some time was spend around the northern flanks of Benarat, two significant doline features were noted, including the "tadpole" shaped feature thought to be Gawai's. Numerous photographs were taken to assist future searching.

31st October'13. Andy Eavis and Chris Imang Ngau. Author **Mark Brown**.

Whilst the rest of the team packed up gear at Camp 5 on the final day, Andy and Chris walked to the northwest slopes of Benarat where, just when the light was failing, an entrance was located and recorded by GPS, thought to be at 500m altitude. A draught was reported and the cave appeared to continue, but time constraints prevented further investigation.



Figure 46 – Chris Imang Ngau in the new entrance on northern Benarat – photo by Andy Eavis.

The geological study focused on the progressive mechanical modification of the dissolutional cave passages in Whiterock cave. Preliminary examination of the prior survey suggested that high level passages such as Big Issue and the Northern Line were highly modified by breakdown, whilst lower passages such as Daydream Believer were less so. In the cave a sequence of passages at different elevations were visited and their morphology, structural control and mechanical modification were recorded.

The geological control on cave passage form was found to be complex with a variety of joints, paleokarst fractures, crackle breccias and shear zones being important rather than simply the dip and strike of the beds. The relative elevation of the phreatic or paragenetic tube passage roof and the through-cutting notch associated with gravel transport through the cave was also important in controlling the extent of breakdown. Passages tended to evolve with initial loss of roof and hanging wall blocks to a sloping bedding roof. Thereafter there was a change to an arched form. This remained stable in massive beds, but was modified by unravelling (block loss) in areas of high joint frequency.

The latter can also be seen in Api Chamber, where the first (northern) part of the chamber is dominated by shedding of huge wall parallel sheets; and the second higher part of the chamber by unravelling forming a high dome with much smaller breakdown. It is clear that upward stoping of the chamber from an elevation below that of Daydream Believer has intersected and consumed the Janet's Way paragenetic canyon. Samples to define the timing of breakdown in the chamber were collected for Uranium Series analysis.

Fourteen guano crust samples were also collected to extend the collection for analysis from the Southern Hills.

SURVEYING

Mark Brown

“Distos” (laser range finders) had begun to make an appearance in Mulu over previous expeditions and proved their worth as time savers, compared to a fibron tape measure getting tangled up around stals and coated in mud. As a result of the geodetic positioning and 3d laser scanning work carried out by Kevin Dixon in 2011, Leica kindly donated four X310 ruggedised units to the expedition – which it was hoped would stand up to afternoon rainstorms or in-cave dunkings. The majority of the team used Distos with conventional sighting compass and clinometer, and writing notes onto paper with a pencil.

Team members calibrated their instruments regularly between two fixed points, in order that any problems would be quickly detected (apart from a Professor who will remain nameless, who found a rather embarrassing 27-degree error on his compass after surveying 500m of passage!)

Two team members had learnt to use DistoX devices – these measure and store readings for distance, bearing and inclination at the touch of button, then Bluetooth it to a handheld Personal Digital Assistant computer, where the operator sketches in the detail using Pocket Topo software.

Although initially daunting for its complexity, it is thought that this technique will be further developed and employed in years to come.

Data was then either hand typed or processed through Cave Converter software into Survox, where careful formatting of the data in the structure set out by Matt Kirby should be adhered to.

Centreline “skeletons” were printed out at Camp 5 and drawn up by team members on paper, and scanned into the computer as a backup, before leaving the National Park.

The Mulu Caves Project decided, after some discussion, to continue using the Macromedia freehand software to draw up final surveys digitally (in keeping with the rest of Whiterock so far). The difficulty in chasing people to do this final stage after the expedition has led to calls for most of it to be done in the field in the future if possible.



**Figure 47 – Hannah Moulton, Phil Walker, Tony White and Ross Davidson processing data at Camp 5.
photo by Frank Pearson.**

PHOTOGRAPHY

Andy Harp

For the Mulu 2013 trip, I decided that my photography gear would be that it had to fit in a standard Daren drum, so that I could actively participate in the exploration as well as photograph new finds. I thought it would be unlikely that dedicated photography trips could be scheduled, due to the remoteness of the leads (the further reaches of Whiterock or based in the remote jungle camp). Given that photos would need to be captured on pushing trips and the potential size of chambers, the kit needed to be light enough and small enough to be carried everywhere. It also needed to be able to light the large passages.

The options for lighting include: flashes, flashbulbs and light painting. With regards to flashes, I use a combination of firefly (infrared slaves) or radio slaves and a combination of Vivitar 283 flashes and Yongnuo YN560s. For light painting I have bought a number of 18650 based LED torches sourced via Ebay from China - these range from tiny single cell up to 3-cell monsters. I decided not to take flashbulbs, given that they are bulky and the setup time can be quite extended, which would be problematic if there were no dedicated photo trips.

Given that most of the photography was using light painting, a sturdy tripod was essential. I settled on a Gitzo 0531 tripod and Really Right Stuff BH-25 head. The combination weighs approximately 800g and is very sturdy - easily supporting a large heavy SLR. It will stand to nearly eye level and is obviously very easy to transport. The camera I chose to take was the Nikon D3100 which will comfortably fit in a Daren drum along with 3 flashes, 3 light painting torches, slaves, spirit level, remote release and cleaning kit. Due to the longer exposures in light painting, the hit rate for acceptably sharp images is lower than when using flashes, due to model movement. Therefore I often took multiple photos and composited them later in post-processing.

All images were processed using a combination of Adobe Lightroom and Photoshop. Additional processing was also occasionally performed in Nik photo processing software (for black and white as well as images containing troublesome noise) and photomatix HDR software.

MEDICAL

Andy Harp

This year's expedition was relatively trouble-free from a medical point of view. The main reasons were good camp hygiene and food. Given that fungal infections are very prevalent team members were diligent in applying anti-fungal powder to groin and feet nightly (even at underground camp). This reduced the number of cases of Mulu foot to just a single person who was treated rapidly with a combination of antibiotics and antifungals. The individual only missed two days of caving.

Mark took a fall in Red Tip Racer Cave, apparently only suffering a grazed elbow. Twenty-four hours later, underground in Whiterock, it became swollen and painful. Unsure of the best course of action as the expedition doctor had by now gone home, Ciprofloxacin antibiotics were taken but no change resulted over the next few days. An x-ray was carried out in Miri but showed no issues; the doctor was unsure whether it was insect bite or infection. Pain and swelling eventually reduced two weeks after returning to the UK.

SPONSORS

ANDY EAVIS – generously organized a helicopter flight around the National Park for all the team to carry out reconnaissance.

GHAR PARAU FOUNDATION

The Foundation gave a £500 grant, which helped keep overall costs down, helping some of the younger, poorer team members afford to take part in the expedition.

www.gharparau.org.uk

LEICA

Leica kindly sponsored us with four Disto X310 units after Kevin Dixon's work on 3D laser scanning in 2011. These ruggedized units are ideal for surveying in Mulu and have the advantage of being the base unit for the DistoX conversion.

www.leica-geosystems.co.uk

MARK WRIGHT TRAINING

Mark's premier Industrial Rope Access training firm helped the expedition order technical equipment at a favourable rate.

www.industrialropeaccess.co.uk

COMMENDIUM

Richard Walters' company Commendium kindly provided laptops and backup hard drives for the expedition for processing and recording survey data, descriptions, photographs etc.

www.commendium.com.

PAFBAGS

Richard Bartrop had some tackle bags that were surplus to requirements from an order by the fire service and he kindly donated them to us for Mulu. Although not designed for serious caving (they were designed for carrying fire extinguishers around) they still proved useful for getting peoples' kit to entrances, making up porter loads and storing ropes etc. The material was hard wearing and the build quality excellent.

www.pafbag.co.uk

The Mulu 2013 expedition began with a lot of question marks. Would the unexplored climbs, passages and pitches lead to extensive cave passages, or quickly close down? Was Whiterock, or indeed Mulu, “worked out”, with little unexplored cave left? Had we found the Gawai Cave? Just how do the huge passages and chambers in Mulu form? And would the tarpaulins for the forest camp keep the rain off?

The team worked incredibly hard for a month to answer these questions; the answers were the usual Mulu mixed bag. The underground leads in Whiterock gave up some fantastic passage, notably the nearly 4km Exodus series, after dropping one pitch in Out of Africa. Somehow Exodus was crammed into an already congested corner of the Whiterock survey. Work from Flying Monkey Camp, in north eastern Whiterock has suggested diminishing returns in that area and still no entrance to the Melinau gorge. However, the typical Mulu strike-aligned bore tube of Chance Encounter holds promise to the South and showed Mulu can always surprise you... when you’ve almost given up.

Deliverance didn’t deliver the passage charging off towards Moon cave that was hoped for, but a fine climbing achievement from the forest camp was made nonetheless. Numerous other question marks were also surveyed to a conclusion in the cave.

Red Tip Racer Cave suggested that large passages, of the character that could follow the strike right through the mountain, could exist in the eastern block of Gunung Api, previously thought to be barren of cave.

Gawai Cave is still elusive, but an interesting new entrance to Blue Moonlight Bay cave is now on the map, along with a promising high level entrance on the North of G. Benarat. The abseil down the Benarat cliff to the Half Moon Penguin entrance proved that the adventure of the journey can be more fulfilling than the destination.

Prof Pete Smart has collected more observations and samples and I’m sure many answers to the geomorphology questions in Mulu will be forming as a result.

Returning to the question about the tarpaulins used for the forest camp – we realized they were relics from the 1990’s (like some of the team members) – so they didn’t keep the rain out!

In conclusion, many of the Mulu Caves question marks with which we started have been rubbed out, but considerably more questions have been posed – perfect grounds for another expedition!

EXPEDITION MEMBERS

From the UK: Mark Brown (leader), Simon Brooks, Ross Davidson, Andy Eavis, Rosie Hadfield, Nicky Bayley, Andy Harp, Rob Middleton, Hannah Moulton, Frank Pearson, Pete Smart, Jeff Wade.

From Denmark: Louise Korsgaard, Torben Redder.

From Australia: Tony White.

From Sarawak: Rambli Ahmad, Christopher Imang Ngau, Oswald Braken Tisen, Veno Enar (logistics coordinator), Syria Lejau (guide), Mathew Mani (Chef), Andrew Pengiran (guide and forest camp boss), Norton Ting, Stanley Petrus, Sudin, Ibun.



Figure 48 – The Expedition Team

(Back Row from centre) – Louise Korsgaard, Syria Lejau, Torben Redder, Nicky Bayley.

(Middle Row from left) – Andrew Pengiran, Chris Imang Ngau, Norton, Mark Brown, Rob Middleton, Hannah Moulton, Rosie Hadfield, Simon Brooks, Phil Walker.

(Front Row from left) – Pete Smart, Andy Eavis, Veno Enar, Jeff Wade, Andy Harp, Tony White, Frank Pearson, Ross Davidson, Matthew Mani.

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The Chief Minister of Sarawak
The Sarawak Secretary of State
The Director of Forests, Sarawak
Protected Areas & Biodiversity Conservation Unit, Sarawak Forestry Corporation
The Sarawak Ministry of Planning and Resource Management
The Resident, Miri Division
The Sarawak Immigration Department
The Sarawak Police Department
Gunung Mulu National Park Management & Staff
Brian and Sue Clark
Rambli Ahmad
Braken Oswald Tisen.

In the UK

The Mulu “gurus” Dick Willis, Hugh St. Lawrence, Matt Kirby, Tim Allen.
Leica Geosystems
Ghar Parau Foundation
Printing Plus (Lancaster)
Mark Wright Training Ltd.
Commendium Ltd.
Pafbags
Alys Mendus

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APPENDICES



**Figure 49 – Rosie Hadfield passing typical Mulu “popcorn” formations in Mysterious Minstrel
photo by Jeff Wade.**

APPENDIX 1 – MULU CAVE LENGTHS CHART.

The Caves of Mulu											
English Name	Malay Name	Exped's up to B'rat 2000 inc.	B'rat '03	B'rat '05	Mulu '07	Mulu '09	Mulu '10	Mulu '11	Mulu '12	Mulu '13	Total Lengths
Gunung Api Caves											
Clearwater Cave		73150.70									73,150.70
Cleartop Cave											0.00
Lady's Cave		323.80									323.80
Cave of the Winds		7788.20									7,788.20
Drunken Forest Cave		1300.00									1,300.00
Blackrock Cave		22348.00				93.30					22,441.30
Leopard Cave		3719.10									3,719.10
Whiterock Cave			3707.72	17272.96	21986.14	24075.14		13365.11		7947.44	88,354.51
Nilong's Cave											0.00
Lagang's Cave		3900.00							1660.00		5,560.00
Water Polo Cave											0.00
Solo		259.00									259.00
Cobra Cave		3400.00									3,400.00
Good Luck Cave		2900.00									2,900.00
Prediction Cave		652.00									652.00
Wonder Cave		4970.00									4,970.00
Imperial Cave		705.00									705.00
Birthday Cave		200.00									200.00
Noah's Cave		425.00									425.00
Python Exit		80.00									80.00
Simon's Cave		5307.20									5,307.20
Metric Cave		1085.30									1,085.30
Snail Cave		361.00									361.00
Ipoi's Cave		233.80									233.80
Palm Cave		849.50									849.50
Damocles Cave		244.90									244.90
No Name Cave		70.00									70.00
Yellow Viper's Pit		124.00									124.00
Arch Cave		980.50									980.50
Persuance Cave		1578.80									1,578.80
Bridge Cave		9891.00									9,891.00
Cloud Cave		2209.90									2,209.90
Invader Streamway		618.60									618.60
Tiger Back Cave		296.70									296.70
Tiger Water Cave		1285.80									1,285.80
Highest Cave in Mulu		280.00									280.00
Helicopter Cave		30.00									30.00
Western Front Cave		30.00									30.00
Moonmilk Cave		115.00									115.00
Snail Shell Cave		112.30									112.30
Iree Cave		27.70									27.70
Pinnacle Cave		316.20									316.20
Bat Cave		219.90									219.90
Rat Cave		266.30									266.30
Frog Cave						76.50					76.50
Penan Pot Cave						0.00					0.00
Pinnacle Cave No.2		185.30									185.30
Pre Repast Cave					0.00			26.59			26.59
Rock Shelter					0.00						0.00
Likoh Cave					0.00						0.00
Shatterbox					0.00						0.00
White Rift Cave					83.90						83.90
No County for Old Men						381.59					381.59
Red Tip Racer Cave								556.13			556.13
Cairn Pot								16.55			16.55
Moon Rising (Surprisingly Obvious)									279.00		279.00
Red Leaf Monkey Cave 1									1262.00		1,262.00
Red Leaf Monkey Cave 2									850.00		850.00
Gift Horse Cave									104.00		104.00
Train Cave									5130.47		5,130.47
Consolation Cave									117.00		117.00
Doline Sink										47.41	47.41
Maypole Hole										8.50	8.50
										Api Total	251,887.95
Gunung Benarat Caves											
Moon Cave				6635.00	3787.77						10,422.77
Benarat Caverns		8320.00									8,320.00
Hurricane Hole		372.00	1106.00			102.30					1,580.30
Cobweb Cave		25932.00	4414.00								30,346.00
Sakai's Cave		2645.00									2,645.00
Tiger Cave		3800.00									3,800.00
David's Cave		439.00	349.00								788.00
Deception Cave		1510.00									1,510.00
Menagerie Cave		1875.00									1,875.00
Terikan Rising Cave		775.00	12532.00								13,307.00
Terikan River Cave West		2270.00		20.00							2,290.00
Terikan River Cave East		3840.00		40.00							3,880.00
Blue Moonlight Bay Cave		9400.00	257.00	53.00							9,710.00
Deliverance Cave*		4357.64								596.37	4,954.01
Gawai Cave*		2075.00									2,075.00
Buda Overlook Cave		20.50									20.50
Hole of the Moon						2553.00					2,553.00
Paradise								1192.87			1,192.87
Gardener's World										33.75	33.75
Little Deliverance										7.40	7.40
Half Moon Penguin Cave										0.00	0.00
										Benarat Total	101,310.60

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