

Shan Plateau Expedition 2013-2014

Final Report

Summary

The Shan Plateau Expedition 2014 was a five person three week caving expedition to the Southern Shan State in Myanmar (Burma), focusing on the area of Ywangan Township close to the border with Mandalay Division. The expedition was the fifth in the (British) Shan Plateau series and the third to focus on the area around Ywangan.

This year the expedition was distinctive due to the additional permissions gained which allowed us to stay outside of Ywangan in the local villages, staying in rural monasteries. This new development was a major advantage because it allowed the team to be closer to the significant caves in the region and facilitated exploration. It also gave us a closer experience with the local community which was valued for its own sake.

The expedition was split into two parts. The first part was based in Linwe village and facilitated exploration of the caves around the large closed depression in the area known locally as Na Gar Kann (or "Dragon Lake"). We had visited this area briefly the year before and seen the potential, but with no time for any substantial exploration in previous years. Here we mapped Na Gar Gu (Dragon Cave) to 1654m, Yae Htwet Kyote Khine Gu (Stone Spring Cave) to 1917m, Linwe Sink Cave to 254m and Sa Lae Myone to 266m. This was highly successful with two major new systems of over 1.5km length. In particular, Na Gar Gu (Dragon Cave) was pushed to within < 1 km of Myanmar's longest cave (Kyauk Khang or Stone Cave) in the neighbouring valley. It was established that Na Gar Gu carried the monsoon overflow water from Stone Cave. A through trip from Na Gar Gu to Kyauk Khang would be a future objective forming a world-class, 4-5km outing. We also explored the new cave of Skylight Hole (643m long), connecting it both to Linwe Sink on the upstream side and to an exit (Black Rising) in the Red Indian River gorge at the downstream side. The short Chaung Myaung Cave and Hole first encountered the previous year was also mapped to 236m.

The second part of the expedition was based at Kyauk Ngauk (Stone Bird) village, which had been the starting points for walking to Kyauk Khaung (Stone Cave) for the previous two years. The option of staying in this village rather than commuting from Ywangan was a clear benefit for the expedition. While staying at Kyauk Ngauk, the main aim was to extend Kyauk Khaung, and ideally connect it to Na Gar Gu (Dragon cave). However, the technical nature of the caving at the end point of Kyauk Khaung did not permit a connection, although a new final pitch made Khaung Khaung the deepest mapped cave in Myanmar. Future expedition would need to bolt traverse along the upper part of a rift in Kyauk Khaung or break through a major drafting choke in Na Gar Gu to make the connection.

Importantly, the expedition also made a large step forward in understanding the hydrogeology of the area. The Silver Rising located in the Red Indian River gorge is thought to be the year round resurgence for the Elephant Whirlpool River which sinks in Kyauk Khaung. The monsoon water flow route which we had been following in Kyauk Khaung for the previous two years lines up well with a monsoon overflow passage in Na Gar Gu which then discharges into Na Gar Kann. All the water resurging into this seasonal lake then must return to the ground at Linwe Sink and pass the short distance to the Black Rising in the gorge.

In total the Shan Plateau Expedition 2014 mapped 5km of cave at 8 sites and recorded a further 16 sites of speleological interest.

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Expedition Members

Peter Talling, Expedition Leader

Lui Hong

Fleur Loveridge

Paul Mackrill

Ben Wright

If you would like further information regarding this expedition then please contact the Expedition Leader, Peter Talling on Peter.Talling@noc.ac.uk

With Thanks

Myanmar is not always a straightforward place to travel and this expedition would not have been possible without the ongoing help and assistance from Mr Phyo Wai Yar Zar, Managing Director of All Asia Exclusive and vice chair of the Myanmar Tourism Promotion Board. We are also indebted to our guide and translator Khun Soe Kharn who worked tirelessly to help us achieve our objectives and also to our driver U Pan Nyo.

We were also fortunate to receive financial support from the Ghar Parau Foundation and the Mount Everest Foundation. Visiting Myanmar is not a cheap activity and we are therefore extremely grateful for this contribution which makes a big difference in helping to make the expedition viable.

This year we stayed locally in the villages of Ywangan Township and we are extremely grateful for the tremendous hospitality we received in Linwe and Kyauk Ngauk. This thanks extends to the monks who let us use their buildings, the families who fed us and the local farmers who took time out of their work to show us caves and share stories with us.

Introduction

Background

This was the fifth Myanmar Shan Plateau Expedition organised by a British Team, and in particular followed on from the successful 2012 and 2013 trips to the Ywangan area. These expeditions in turn built on the early trips organised by Joerg Dreybrodt and Imogen Furlong to a number of different locations within the Shan States before settling on this location.

The expedition was based entirely within Ywangan Township in the Southern Shan State, close to the border with Mandalay Division. This area (Figure 1 and Figure 2) had originally been identified by the team as having karstic potential during early geological research prior to the 2010 expedition. However, differences in spellings of place names between colonial and current terminology meant that it was not until the expedition in 2011 passed through the area en route to Lashio that both the actual location and real potential were identified and a separate expedition was suggested. This was very successful, leading to the exploration of Kyauk Khaung (or Stone Cave), the longest and deepest known cave in Myanmar.

In 2014 the expedition objectives were both to continue exploration in Kyauk Khaung and the push out into new areas to the north of this cave around the large closed depression (Na Gar Kann) near the village of Linwe. A brief day visit here in 2013 had suggested the continuing potential in this area.

Permissions

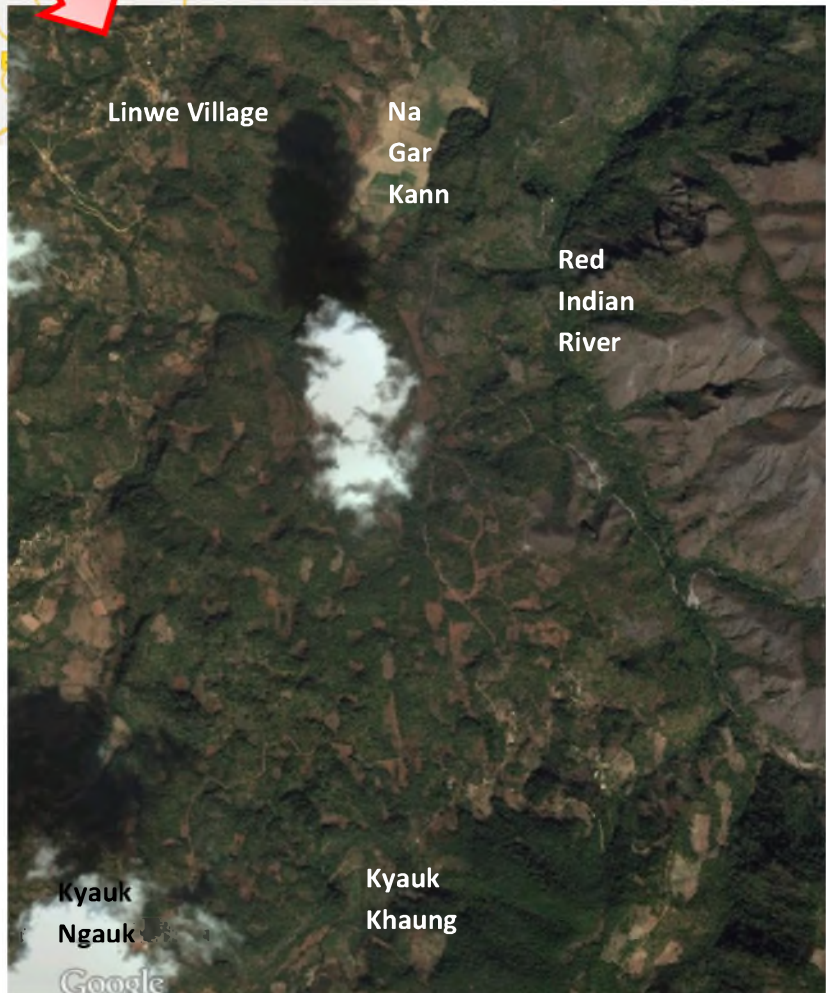
Permissions for the 2014 expedition were obtained at the national level via Mr Phyo Wai Yar Zar, Managing Director of All Asia Exclusive and vice chair of the Myanmar Tourism Promotion Board. Mr Phyo was able to arrange for special permission for the expedition to stay both in Ywangan Township, and also within monasteries located in the surrounding villages. This is a special privilege not normally afforded to foreigners who are required to stay in licenced hotels only. Without such special permissions it is clearly impossible to carry out expeditions in these rural areas and we are grateful to the authorities for facilitating this.

Locally, the Immigration department in Ywangan was also required to grant permissions day to day with respect to the destinations we wished to visit. This was accommodated by agreeing to visit a certain village for specific period of time, following which we must return to Ywangan. In addition we needed further permission from the monasteries with respect to accommodation and from the head man in each village. We found all these parties to be very welcoming and extremely hospitable.

Figure 1 Location of the Shan States; a) Location of the states in Myanmar; b) Area of the Shan States



Figure 2 Location of Expedition



Travel & Accommodation Logistics

All five expedition members entered Myanmar at Yangon airport having travelled from Britain via Doha, from France via Bangkok or directly from China. Internal flights were then taken to Heho, the regional airport which serves the nearby tourist sites around Inle Lake. At Heho the expedition team was met by its guide, Soe, its driver, Pan, and the expedition vehicle. Based on dust related welfare issues in previous years, in this case we had opted for a closed vehicle for the first time.

Table 1 Expedition Time Line

Date From	Date To	Comments
21 th Dec 2013		Arrive in Yangon, fly to Heho and travel by road to Ywangan.
22 nd Dec 2013		Travel to Linwe and make arrangements to stay at monastery.
22 nd Dec 2011	30 th Dec 2013	Caving around Na Gar Kann, near Linwe
31 st Dec 2013		Return to Ywangan
1 st Jan 2014		Travel to Kyauk Ngauk and make arrangements to stay at monastery.
2 nd Jan 2014	9 th Jan 2014	Exploring caves around Kyauk Ngauk
10 th Jan 2014		Return to Ywangan
11 th Jan 2014		Travel overland to Heho and by air to Yangon
12 th Jan 2014		Leave Myanmar

Ywangan Township

Ywangan Township had been the main base for the previous two expeditions, but this year acted as a stopping off point, a location for arranging permissions and supplies. We spent only three nights there at the beginning, end and transition part of the expedition and utilised the same guest house as in previous years. The guest house is essentially a truck stop and offered good facilities for washing equipment at the end of the trip.

Linwe

Until the 2014 expedition we had not even visited Linwe village, having previously accessed Na Gar Kann by vehicle and then on foot from Kyauk Ngauk. This year we managed to drive all the way to the village from Ywangan direct and arranged to stay in the monastery. The monastery supported a small number of monks living in a small dwelling adjacent to the main temple. The expedition members all slept within the main temple building, with Soe and Pan sharing the monk's accommodation.

As the monks subsist on alms they are unable to offer meals to visitors and consequently we were fed by a family living opposite the monastery. This set up was arranged by the head man of the village, and it later transpired that similar arrangements had been previously used to accommodate student geologists from a university in Yangon. Interestingly, in this case the female students stayed with the family rather than in the temple, although this restriction was not placed on our small expedition team.

Kyauk Ngauk

We had visited Kyauk Ngauk many times, but this was the first opportunity we had to stay there. Our accommodation was based in a new annex building to the main temple at the monastery. Again, Soe and Pan stayed with this monk, this time in the main temple building. With better roads,

a shop and more monastery buildings (despite there being only one monk), Kyauk Ngauk was clearly a more affluent village than Linwe. However, the welcome we received there was equally warm, and again the head man of the village arranged for a local family to prepare our meals.



The main monastery building at Linwe



The expedition team outside the main monastery building at Kyauk Ngauk

Equipment

Over five Shan Plateau expeditions we have now built up a supply of rope and rigging gear in Myanmar to allow exploration of small more vertical caves. This year for the first time however, we considered that we needed a drill to more rapidly place bolts for vertical caving. This was because the end of Kyauk Khaung was left open at a pitch in a large rift passage (The Heart of Darkness) and it was anticipated that progress would need to be made by either descending, or a combination of vertical and horizontal ropework for some distance. In addition a brief foray into Linwe sink in 2013 was abruptly halted at a small pitch. With a strong draught and the proximity to the gorge we anticipated that this cave may descend for several hundred metres. In the event we made little further progress in Kyauk Khaung, but did need to rig more pitches than ever before in various caves and the availability of a drill made this task much more efficient.

The drill was customised specially for the expedition by team member Ben Wright. It was modified to carry both longer lasting batteries and to be useable with external batteries. Charging of both drill and lamp batteries was potentially an issue for the expedition, but we were able to obtain a certain amount of electricity at the monasteries either from local solar systems or from a generator.

As in previous years, where climbs were commonly found in the large phreatic passages we made liberal use of tapes as light weight handlines to aid progress.

Surveying

All caves were surveyed to BCRA Grade 5 and the entrances logged using GPS. Surveying was by a mixture of traditional (hand held compass and clinometer in combination with a tape measure) methods and digital techniques. The latter used the a "DistoX" which allows laser measurement of distances, bearing and inclination.



Using the drill in Na Gar Gu

Caves Explored

Most of the caves explored or logged during the 2014 expedition were located around the two villages of Linwe and Kyauk Ngauk to the east of Ywangan. Descriptions for the major surveyed caves are given in the following sections.

In addition, at the very end of the expedition a small reconnaissance was made to the west of Ywangan with is considered in the following section.

Kyauk Khaung (Stone Cave)

4813m long, 165m deep (at the time of writing – deepest and longest known cave in Myanmar)

The entrance to Kyauk Khaung is a large arch in a limestone cliff into which the Sin Lea (Elephant Whirlpool Creek) flows. It is accessed from the village of Kyauk Ngauk (Stone Bird), being approximately 40 minutes walk down the closed valley from the village. The cave was first identified by the Shan Plateau expedition in 2012 and has been further explored over the two subsequent expeditions.

The River Passage and the Catwalk

The river almost immediately flows down a short waterfall and progress is best made by clambering along and down the large mudbanks on the right hand side of the passage as you look down stream. The main river (below) passes around several bends before sumping after approximately 200m. Just before the sump it is possible to climb up to an eyehole, but no way on could be found.



About 100m back from the sump a large high level passage, The Catwalk, goes off on the right. Despite being approximately 12m above the streamway The Catwalk, contains large amounts of fresh mud and large flood debris from the monsoon. In this mud, feline paw prints are numerous. The roof of the Catwalk soon rises up into a very large hading rift, the top if which has not been explored. About 100m further on, it is possible to climb up a mudbank to the right and enter Over 18 Series.

Continuing along The Catwalk, the passages becomes lower, crawling in places, but always drafting. After a further 150m a brief flat out section leads immediately to a junction. Right leads to a large chamber from which the stream may be heard but not accessed. It is likely that the far side of the chamber connects through to the area around Englightenment, but this was not pursued due to a dangerous slope of mud and boulders. Back at the junction, straight on soon leads to a balcony overlooking the main stream, which flows from left to right.



At the start of the high level sump bypass, The Catwalk

The Cat-Flap Extensions

A short distance along the catwalk shortly before climb up to Over 18 Series, it is possible to climb up with difficulty on the right. A high step up behind a boulder and further scrambling up steep boulders leads to the top of the main rift. It is then possible to duck under the roof into a second medium sized chamber, and then follow a tortuous upward route between boulders. There is a route at the same level along the top of the rift heading towards Ooo-La-La. Returning to the initial chamber, this route continues upwards through an even more tortuous series of boulder, climbs and

a small lateral narrow crawl for a considerable distance. The route is locally highly polished and is used by animals. The ascending route was left at an upward tubular squeeze, and a 30 cm window into an adjacent large chamber. It is likely that further exploration will find a way on. The end of the passage is now the highest point in the cave, over 50 m above the entrance, and most likely leads to a further entrance.

Right Downstream & Enlightenment

Back at the balcony over the main stream, it is of noticeably smaller volume and soon splits again at a diffluence. To the right the water sinks into a choke of flood debris. However, shortly back from this it is possible to ascend a large mudbank via The Slayer's Staircase (a line of bamboo stakes) and enter Enlightenment. This huge chamber is effectively a steeply ascending boulder pile, some 60m wide and with 100m vertical range. The boulders can be very loose in places and care must be taken. At the top of Enlightenment the boulders, almost, but not entirely fill to the roof. Here, on the right hand side, it is possible to crawl between the resulting gap into Stalagmite Slalom. A wide but low passage extends for over 150m, often in close proximity to stalagmites and stalactites, make this difficult and stressful. Towards the end of the explored passage the elevation starts to dip down steeply, until the limit of exploration. The cave is likely to continue here, but has not been pushed to a conclusion. It is very likely to continue downwards through loose boulders to the southern end of Edge of Enlightenment. It is also likely that similar passage can be entered at the left side of Enlightenment, but given to trend of Stalagmite Slalom this has not been pushed to a conclusion.

The east side of Enlightenment is likely to connect back to the large chamber accessed from The Catwalk. However, as time and the difficult terrain did not allow inspection of all of the wall in Enlightenment this has not been physically verified.

To the west side of Enlightenment it is possible to rigged an assisted climb down to connect to the area above the flood debris choke and then enter a small tube. This leads to an undescended 6m pitch.

Left Downstream – The Great Leap Forward

Back at the diffluence, the left hand fork of the streamway leads under a low arch to continuing stream passage. This does not last for long, however, as the stream then sinks, and a 3m climb down leads into a dry continuation. 10m further on it is possible to enter an oxbow heading back upstream where a pit allows the last sighting of the streamway.

A further 10m downstream another climb down (~4m) lands in a chamber. The only way out is via a small U-tube which leads to the foot of a climb up to a second chamber. From here further ascent is required, via a very steep mud slope into which steps were cut. As the gradient reduces the climb enters a passage full of boulders, with another climb up and a pitch down. However, ultimately no way on could be found.

Upstream

From the balcony the upstream passages continues for approximately 150m to a junction with an inlet. In these 150m, some of the flow sinks behind a stal boss. At the junction, an inlet comes in from the right. To the left, the main streamway continues unexplored through deep water, but is at this point only 50m from the downstream sump.

The inlet passage, The Road to Mandalay, continues for over 500m to the south west. For the first 150m the "inlet" is actually dry, but then water is finally met cascading down a rocky section before sliding into a rift on the left (true right). Above the climb the stream continues in fine style, past calcite formations and flowstone. Several times the water sinks and reappears. After a short constricted section, walking passage resumes. However, the passage soon became blocked by boulders running in from above, and is notable for the abundance of gently waving leeches on the walls. A pool is present in the stream at a low level, but there was no obvious way on.

Over 18 Series

Back in The Catwalk, Over 18 Series is entered by scrambling up a mudbank. To the right, this may connect back to the high hading rift encountered earlier in the Catwalk, and possibly the Catflap extensions, although this was not explored. To the left a large beautifully decorated chamber is entered. This leads, on the left, into a wide passage with numerous stal columns and a mud floor. After around 100m a very large junction, Ooo La La, is reached. To the left leads via a smaller section of passage, to the impressive Independence Day. This large passage-chamber contains an untouched mud floor and many columns, other calcite formations, and some idyllic crystal pools. There is no major route out of Independence Day, but a small descending muddy slope was not explored.

Right at Ooo La La leads over large house sized boulders to another beautifully decorated chamber, arguably an extension of the same large passage. Climbing down at the eastern end of this chamber, enters a smaller muddy passage, Off the Page.



Over 18 Series

Off the Page

This is clearly a major flood overflow route and is extremely muddy, with numerous pools of water, the deepest of which is known as the Liquid Limit, which was originally crossed using a bamboo pole, The Stemple of Doom. These pools were seen to drain during the course of each expedition as the monsoon water evaporated. About 400m along the passage a high aven enters from the left. Shortly after this some water drains down a small passage to the left which leads to a short undescended pitch.

After another 400m, shortly after passing a small drain on the right, a major cross passage is encountered. To the right this is choked with mud almost immediately, while to the left it continues for around 100m to a steeply ascending boulder choke. Interestingly the choke soon rises above the muddy flood line, but no safe way through could be seen.

A further 200m down Off The Page the passage splits. The main way on is to the left up a mudbank, but it is also possible to continue in crawling passage straight ahead (The Cat Latrine). This eventually reconnects to the main route via a climb up.

Taking the main route, this soon emerges into a much larger area containing a major junction.



The Stemple of Doom at the Liquid Limit in Off the Page

New Upstream - Infinity and the Edge of Enlightenment:

Turning left the upstream passage can be followed for several hundred metres. However it soon degenerates. Instead progress is made by ascending a mud bank on the immediate left as one exits

Off the Page. From here a large and well decorated chamber – Infinity – is entered. An 8m climb down from the right hand side of Infinity allows the upstream passage to be re-enters. This leads to over 1km of passages, but unfortunately includes much crawling. There are occasional glimpses via boulder chokes of potentially larger passages in the area above, but these cannot be entered. This area – known as the Edge of Enlightment – is heading straight for Enlightenment, but at a substantially lower level. Ultimately it ends in a choke.



Infinity

New Downstream – Absolute Truth and The Heart of Darkness:

Turning right at the end of Off the Page leads in the downstream direction to the northern extent of the cave. The passage is large with a (dry) stream trench between mudbanks. The trench may be followed down into a smaller muddy passage, down several climbs to a short pitch. This leads on through a muddy crawl to a further undescended pitch.

Back in the main passage it is possible to ascend the mudbanks on the left to enter a large chamber called Absolute Truth. At the top (north west) end of this chamber are some large calcite formations. At the north east end of the chamber it is possible to climb down over boulders and gain access to a high rift passage – The Heart of Darkness.

The rift is entered by abseiling down a mudslope before a shorted bolt-climbed pitch is ascended to regain the same level. From here the rift continues 2 to 3m wide and up to 20+m vertical range. Progress is generally made at the mid level where many boulders are wedged. After ascending the

pitch the next 15m of progress is gained via a protected traverse which ends in a pitch down shortly followed by a further pitch up. A short section of unhindered progress is then followed by a more significant drop, which has been descended for around 40m to a low point in the mud floor of the rift. The base of the pitch has no way on, and is exceptionally muddy and unpleasant.

While the rift continues high and straight it is not straightforward to make progress at any level and significant time investment in bolting would be required. The passage, however, does continue heading directly for the upstream limit of Na Gar Gu.

Htwet Kyote Khine Gu (Stone Spring Cave)

1917m long.

Htwet Kyote Khine Gu is a large (dry) resurgence entrance at the north western extent of Na Gar Kann. It is clear that substantial flow exits this cave during the monsoon, but that during the dry season only a small stream is seen within the cave, although this sinks before the entrance.



The cave is entered following the dry river bed and it is soon necessary to climb up over old gour barriers to reach the main passage. This soon rises to significant proportions, following a dry stream

bed, and well decorated with hanging pendants and stalactites. The air is initially still and muggy, but after a couple of hundred metres, coinciding with a 90 degree right bend, a small inward draft is present and the air improves. There is also a small side chamber on the left at this corner, with two possible small routes on, which are not yet fully explored.



Main passage with initial stream.

Continuing north for a further few hundred metres the draft increases and the sound of running water is heard. The passage mostly continues in fine style, with stooping only required a few times. The stream is finally reached approximately seven hundred metres into the cave where it sinks in the river bed. Continuing upstream the passage again enlarges. However, over 1km from the entrance the roof lowers again and two low airspace ducks are reached.

Beyond the ducks the river passage continues which splits into two branches after around 40m. There is also a large higher level gallery up on the left immediately after the duck. It is possible to climb into this and a handline has been left in situ. However, due to time constraints this was not fully explored and left ongoing.

The left hand branch of the river enlarges significantly and may also have high level passages above which were not entered. However, it soon lowers again and eventually the calcite formation come down from the roof to meet the water and no way on is possible.

The right hand branch of the river continues to a canal and then to a further two ducks.

No Light at the End of the Tunnel

Around 500m into the cave a small side passage can be entered on the right. This muddy tube continues as a flat out crawl for approximately 35m until walking passage is reached. However, after a total of around 100m the air quality decreased and dangerous levels of CO₂ were encountered. This was strated when a cigarette lighter would not light. Although the passage continued it was not explored further.

Na Gar Gu (Dragon Cave)

1654m long

Dragon Cave is located at the southern end of Na Gar Kann. There is a static pool of water at the edge of the cultivated land and this forms a monsoon overflow resurgence via a sump. Above the pool, in the cliffs above, there are three dry entrances to the cave which all connect. The uppermost entrance is the largest and the most commonly used (below). There is evidence of nitrate pits in this area and of significant historical use of the cave by the local population.

This unusually well decorated cave is the monsoon overflow from Myanmar's longest and deepest mapped cave (Kyauk Khaung or Stone Cave) in the neighbouring valley, and offers the potential for a major (4-5 km) through trip. The end of Na Gar Gu currently points directly at the Heart of Darkness rift that forms the end of Stone Cave, with an unexplored gap of just under 1km.



Upper Entrance Chamber and Beyond

Taking the upper most entrance you enter a large chamber with extensive calcite decorations. To the left and downslope the middle entrance is soon reached, while a pit in the floor, also at the left hand

side of the chamber gives a connection to the lower entrance. Sticking with the right hand side of the initial chamber, ahead leads through one of two windows in the calcite formations to the top of a slope down into another large chamber.

From this second chamber several ways on are possible. Keeping left, a large ascending ramp can be followed for approximately 80m before it closes down. Three quarters of the way up this passage, on the right hand side there is a hole in the floor which is believed to connect to the passage beyond Pussy Choke underneath.

Back in the second chamber the other two routes converge to overlook a rift passage containing water. The easiest descent is made by continuing straight on from the chamber, climbing down and around blocks to arrive on a balcony ledge from where natural belays can be used to make a 5m descent to Gour Parau Chase.

Gour Parau Chase

This is a very finely decorated flood-overflow passage containing many pools of water impounded between gours. There is no flow in the dry season and progress is often made by climbing the gours.

Downstream in Gour Parau Chase a couple of gours are descended before deep water is encountered. It is not certain whether this sumps, or continues with less airspace to connect to the canal seen beneath the lower entrance.



The gours in Gour Parau Chase

Upstream in Gour Parau Chase it is initially possible to progress by traversing the spikey walls. After around 50m, at a kink in the passage it is possible to scramble up on the left to enter Bye Heck Chamber and the route back to the Pussy Choke. Continuing upstream, there are a further three locations where windows connect with the higher level, one of which can be climbed to with care.

After a total of about 200m upstream, having climbed a number of gours, a section of deeper water is reached. This is only out of depth for a short section before the passage dries. There continues to be connections with the higher level at times, particularly from an area of slight enlargement around 200m upstream from the deep water. Here a mud slope can be scrambled up on the right hand side and progress can be made in both directions.

Returning in the downstream direction at the high level approximately 200m of exceptionally well decorated passage can be followed until it degenerates with no way on. Upstream in the high level the passage continues for a shorter distance, more directly in line with the passage underneath and hence riddled with holes in the floor.

Back underneath in Gour Parau Chase the main passage continues for a further 50m or so where it breaks out into a very large chamber with many fallen blocks. A small passage on the left is an oxbow connecting back downstream, while the way on upstream continues smaller and occasionally partially blocked with boulders. It is possible that high level routes may exist from this large chamber, but none could be found without out the recourse to serious bolt climbing.

Continuing upstream there are several places where it is possible to climb up through the boulders into larger and well decorated breakdown above. One of these leads to an old stream bed in a crawling height passages. However there is further breakdown and further crawling is required through boulders. This area is complex and eventually a draughting choke with a small squeeze is reached which would need hammering. It is also possible to climb steeply up into a hading rift with poor air and no draft. The entrance to the choke is marked by a remarkable stalagmite with secondary horizontal growths in the wind direction, testifying to the strength of the draft during monsoon flow. The choke has a floor of fine gours and is mud free between boulders. This complete lack of mud contrasts with the exceptionally muddy termination of Stone Cave's Heart of Darkness Rift, at which it points. It appears that the as yet unexplored passage traps the mud.

Below the lower level continues to a narrow canal. Across the canal there are two ways, to the left a narrow passage leads to a crawl through a "sump" to reach a muddy and dangerous breakdown area. To the right is the main way which briefly enlarges for 20 to 30m before ultimately ending in a loose choke. There may be ways on straight ahead or up in this area, and it may also relate or link to the choke at higher level. However, the whole area is loose so care is required.



In the high level above Gour Parau Chase

Lower Entrance and Connections

The lower entrance is 30m further down the cliff line and closer to the pool below. A stoop through the entrance arch leads to a walking sized rift. A large hole in the floor on the right connects to a canal at lower level. It is possible to descend via a pitch (2 bolts) and reach a ledge above the canal. While not fully explored it is expected that upstream the canal leads to Gour Parau Chase, while downstream it connects via a sump to the pool.

Also on the right in the rift it is possible to climb up and make a connection to the Upper and Middle entrance chamber.

After the hole down to the canal, a passage continues to the left (Civit Way) to a choke (Pussy Choke). By following the animal wear through the choke it is possible to enter a larger passage beyond. This connects to the higher level ramp mentioned above. Eventually Bye Heck Chamber is reached, from where it is also possible to scramble down to Gour Parau Chase. Continuing on from Bye Heck Chamber, the main way eventually connects to Gour Parau Chase again via a climb down from a window to arrive not long before the deep water. Two other window connections are also possible.

Sa Lae Myone

266m long

First entered in 2013, this short cave is an active resurgence at the southern end of Na Gar Kann, further up the valley from Na Gar Gu. It is found by following the small stream in Na Gar Kann until it exist from arch. Deep water here leads to a sump, but higher on the slopes above a further entrance is located from which the sump can be bypassed to regain the stream.

The entrance leads to a dry descending passage which gives access to the top of a series of old gours. These are steep and must be carefully down climbed to enter a chamber overlooking the stream. To access the stream, cross the chamber and climb down 3m to a lower level. From here it is possible to go back underneath yourself and climb down again (a further 3m) to reach stream level.

Downstream soon sumps, but upstream leads to a majestic river passage with ankle to thigh deep water. This enters a widened area. Upstream continues but low, while up on the left it is possible to climb into a higher level. Moving forward and right over boulders reaches a larger well decorated fossil passage. At a junction, up leads steeply upslope in a well decorated passage which appears to reach close to the surface. Left leads via a lower area to a climb back down to the stream. Due to boulders it is not possible to travel downstream from here.

Upstream lowers, and eventually the water sumps. The passage draughts and it maybe that there is a way on in the roof, but this could not be located.



The streamway in Sa Lae Myone

Linwe Sink Cave

254m long

Linwe Sink Cave is the drain for all the water that ponds in Na Gar Kann during the monsoon. The entrance is on the east side of the depression, where an initial descent through large boulders soon reaches a short (7.5m) pitch. A further pitch of 6m follows before the passage leads into a very muddy low point where water must pond before evaporating. Ascending out the other side of this dip, a further short climb/pitch down follows before a very high and very straight rift passage (below) is entered. The rift ends at a corner (which connects at high level to Skylight Hole) where the main passage turns left before dropping down into a narrow lake with steep slippery sides. Progress is made by ascending a bolted pitch to on the right hand side and traversing at higher level, before crossing over the passage and dropping down to a mud ledge over-looking the lake. It is possible to traverse further along the ledge and climb up on the left but no way over the calcite blockages at the end of the passage could be found. The lake is believed to be connected via a sump to the upstream canyon passage in Skylight Hole.



The high rift in Linwe Sink

Skylight Hole

643m long (897m including Linwe Sink), 133m deep

Skylight Cave and Hole is located high on the ridge between Na Gar Kann and the gorge. It has two entrance, a Skyliht entering the top of the entrance chamber, and a small walk in entrance which leads down slope via many calcite formation to a balcony overlooking the main chamber. To the left from this balcony it is possible to climb down and descend through boulders to a decorated descending passage. A climb down through a stal grill leads into a large extremely well decorated passage (below) which continues to a large drop at a right angle (straight on – right hand) junction. This is directly above the corner at the end of the high rift in Linwe Sink Cave and descending here (p20) allows that connection to be made.

Descending to the right from the balcony in the initial chamber beneath the Skyliht it is soon necessary to descend a pitch in an open area through boulders. The initial 20m pitch leads across a boulder flow to a 9m and then a 6m pitch (Big Wind, Big Knickers) to exit the boulder choke at its base. The pitches land in a sandy chamber from which an exit is made via a small hole emitting a howling gale.



Near the connection between Skylight Hole and Linwe Sink

Through the hole one must climb down immediately and descend a steeply dipping decorated passage. A small side passage is passed on the left before the main passage arrives at the head of a 20m broken pitch (Super G). This can be descended largely on natural stalagmite belays to enter a (dry) stream canyon with steep mud sides. Upstream soon leads to a static sump pool very close to the end of Linwe Sink Cave. Downstreams continues through a boulder choke into a “sump” and a further choke on the other side with no ways on. However, just before the first choke it is possible to climb up on the right. High above there is a skylight and by keeping right it is possible to exit the cave through a hole in boulders in a wall of the Red Indian Gorge. The location of this exit is in proximity to the Black Rising, the monsoon resurgence to the system, connecting it both to Linwe Sink on the upstream side and to an exit (Black Rising) in the Red Indian River gorge at the downstream side.



The first through trip to the Black Rising

Chaung Myaung Cave and Hole

236m long.

This short cave is only a short walk from Kyauk Ngauk, out of the village towards Linwe, and then down through fields on the right hand side. There are three places where the large chamber below intercepts the surface, leading down to a steeply dipping old phreas. A 5m pitch down flowstone is required from one of the branches, before the passage continues large and well decorated before ultimately being choked with calcite.



Monastery Cave 3

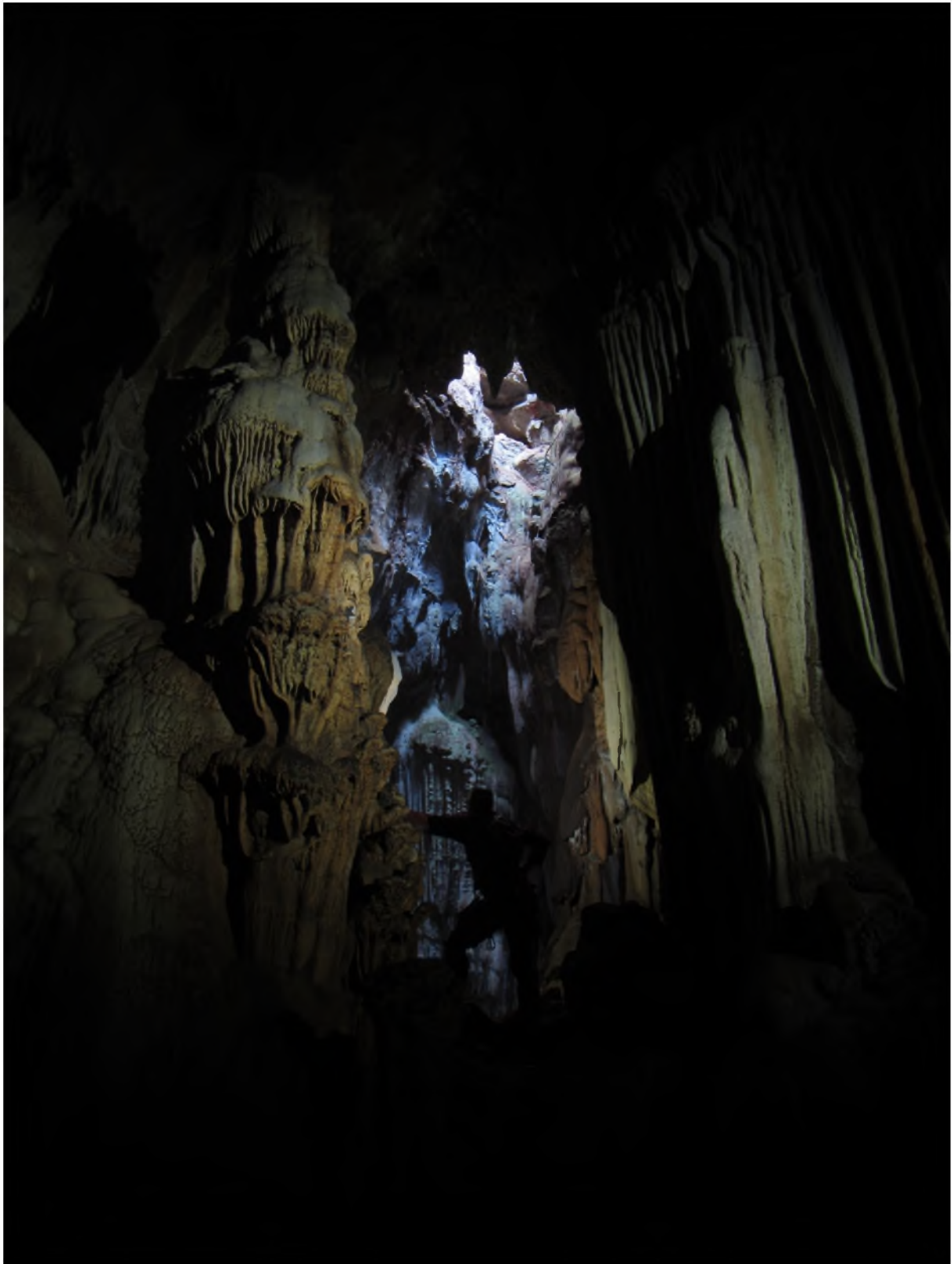
Survey length 81m.

A small entrance leads to a 30m shaft. There is a calcite choked passage at the mid-level and similarly at the base.

Monastery Cave 5

Surveyed length 86m.

A large open oval shaft 30m depth. There is no way on at the base.



Monastery Cave 3

Reconnaissance Work

The mountains to the West of Ywangan are formed in a distinctive ridge trending northwest – southeast and it is believed that this is the same geology as the cave forming ridges near Kalaw. Consequently attempting a reconnaissance to the edge of this area was a suitable target for the end of the expedition, based back in Ywangan.

We travelled first to the nearby village of Nwabangyi and from there crossed to the edge of the limestone ridge at the Golden Big Cave Monastery. Here there was both a cave in the cliff (very small) which formed part of the temple complex and a small sink full of spiders. While there were karstic features in the landscape here, it was not the home of a major system being right at the edge of the limestone.

We travelled north from Nwabangyi following parallel to the base of the limestone ridges. From here there were also small sinks and holes, but more interestingly local people told us that there were many caves in the mounts to the west, but that these were 2 to 3 hours walk away. To pursue this possibility we would need to arrange for guides with the head man of Nwabangyi and potentially need to camp in the mountains.



Environment

Geology

The caves of Kyauk Ngauk and Linwe are all formed within the Thitsipin Limestone Formation, part of the Permo-Triassic carbonate sequence of Easter Myanmar. The cave forming part of this formation appears massive and the caves we have seen are well developed. The Formation is described by Oo et al as comprising five main lithofacies:

- a. Poorly bedded conglomerate
- b. Laminated calcareous shale and other fined grained carbonate sediments
- c. Massive fined grained calcareous sediments
- d. Thick bedded calcareous sandstone with some calcareous mud
- e. Massive or poorly bedded cherty wackestone (matrix supported calcareous grains within carbonate mud)

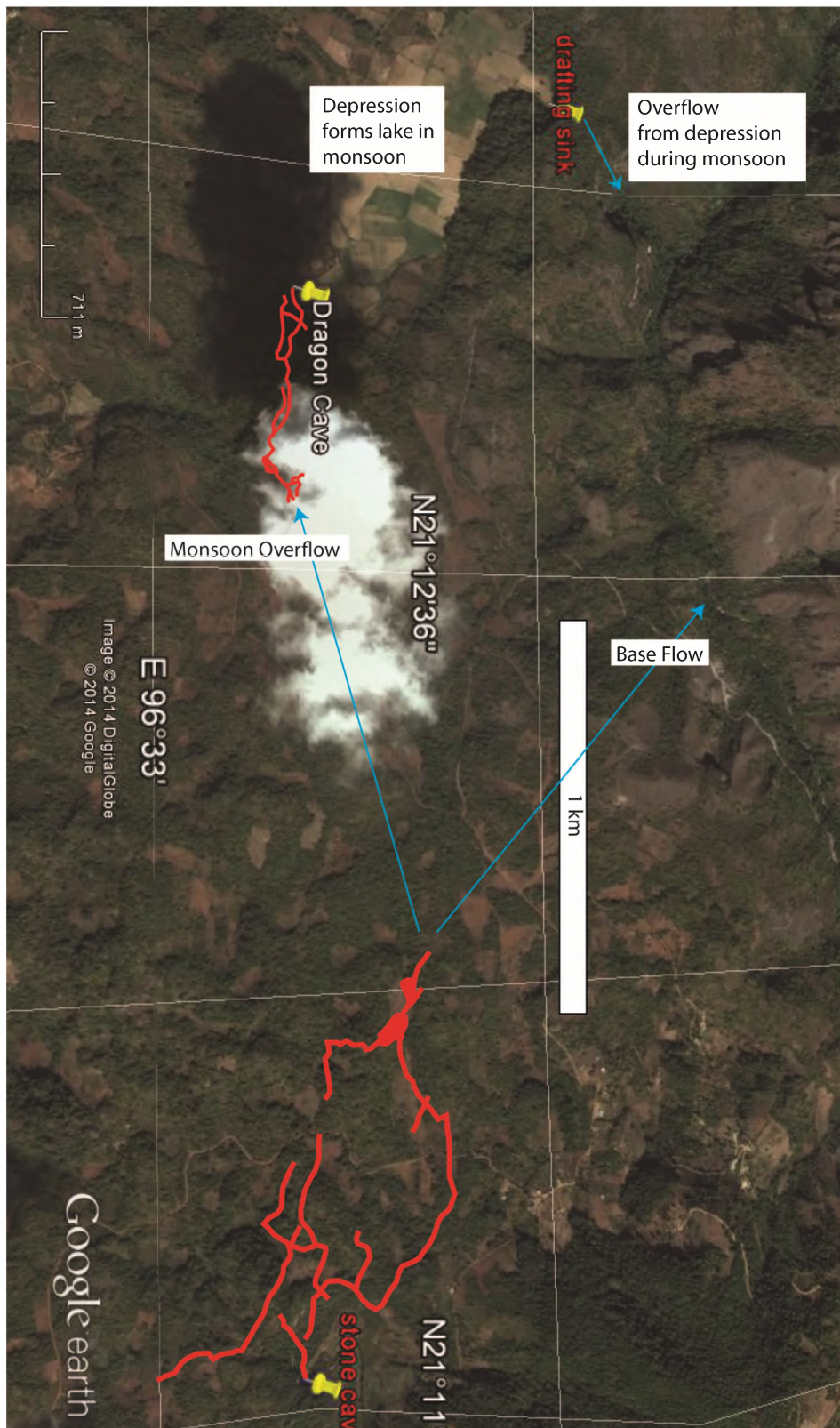
To the west of the Ywangan the ridges which run northwest to southeast are comprised of the Pinnacle Limestone, a Jurassic unit which is also known from further south in the regions of Kalaw. It is recorded as being karstic in the Ywangan area with “numerous potholes” (Garson et al, 1976) but with difficult inaccessible terrain. This tally’s with our own reconnaissance and it would require some effort to look for caves in this area.

Hydrogeology

In the Thitsipin limestone we are now starting to understand the subterranean hydrogeology. The water which sinks in Kyauk Khaung (the Elephant Whirlpool River) we believe does indeed resurge in the Red Indian River gorge. Having visiting the gorge this year we were shown an active rising at Silver Cave / Silver Rising where the volume of water is compatible with that sinking at Kyauk Khaung.

This resurgence, however, is quite a small cave and would not be able to take the volume of water which must pass through the ground during the monsoon. Instead, as we have seen in Kyauk Khaung there is a substantial flood overflow path underground, passing through Off the Page and the Heart of Darkness. We believe that this is seen again in Gour Parau Chase in Na Gar Gu before resurging into Na Gar Kann. Na Gar Kann is a very large closed depression and a number of caves resurge either year round or seasonally into this area. It is known that in the monsoon the area becomes a lake, as the only exit point for the water is via Linwe Sink. This contains within it a small sump behind which much backing up most occur. Nonetheless the water does eventually pass through Linwe Sink, cross the short distance through the ridge, to exit at the Black Rising further downstream in the Red Indian River gorge.

Figure 3 Relationship between Kyauk Khaung (Stone Cave) and Na Gar Gu (Dragon Cave)



References

Oo, T., Hlaing, T. & Htay, N. (2002) The Permian of Myanmar, *Journal of Asian Earth Sciences*, 20, 683-689.

Garson, M. S., Amos, B. J. & Mitchell, A. H. G. (1976) *The geology of the area around Nyaungga and Ye-ngan, Southern Shan States, Burma*, Institute of Geological Sciences, Natural Environmental Research Council, HMSO, London.

Appendix A: Cave Database & Surveys

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Htam Sam	3menwashing spring		2010	0326397	2302445	1227	10m		spring - too small	dead
Htam Sam	Barefoot Cave	HatHu Parla Creek	2010					718.00	active stream passage, sumps both ends, but can exit to lunchstop cafe sink	dead
Htam Sam	Barefoot Sink		2010	0326520	2302482	1228	10m		Where Barefoot Cave water sinks. 1m2 entrance, with flood debris.	not explored
Htam Sam	Gawpin Gu		2010	0325776	2302152	1289	-		Small depression, start of small stream, sinks after 8m, 2 3m climbs, possible way on, good draught.	not explored
Htam Sam	Gold Pot		2010	0325990	2302243	1309	8m	122	pitch to well decorated cave	dead
Htam Sam	Htam Sam		2010	0326826	2302879	1234	-	587	Major temple cave to sacred lake	ongoing
Htam Sam	lunchstop cafe sink		2010	0326724	2302750	1248	-	-	Connects to Barefoot Cave, expected to connect to Scaffolding cave	ongoing
Htam Sam	Muddy Waters cave		2010	0324919	2302988	1278			Connects to stream sink	dead
Htam Sam	no name		2010	0326024	2302382	1304			sink to stal filled recess; no draught	ongoing
Htam Sam	Overlooked cave	Undersold Cave	2010	no-cordinates					Flood overflow to muddy waters	dead

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Htam Sam	Scaffolding Cave		2010						not explored, expected to connect to lunchstop cafe	ongoing
Htam Sam	Stone Scripture Cave North Entrance	Windy Cave (Kyauk Sa GuE2)	2010	0326604	2302710	1241		225	well decorated through trip	dead
Htam Sam	Stone Scripture Cave South Entrance	Quarry cave (Kyauk Sa Gu E1)	2010	0326604	2302710	1253		225	well decorated through trip	dead
Htam Sam	Supernatural Cave	Ganbiya Gu	2010	0326776	2302901	1239		163	well decorated	dead
Htam Sam	Thaye Gu (Ghost cave)		2010	0326067	2301827				not surveyed -ends in choke	
Htam Sam	Waterbuffalo Cave	Kyu-wa gu	2010	0326005	2301814				not surveyed -ends in choke	finished
Parpant	Happy Monk Cave		2010	0316861	2306630	1161		429	large passage, possible hammerable squeeze	lead
Parpant	HoPon Spring Cave		2010	0315165	2303004	1115		1654.00	river cave to calcite climb	ongoing
Parpant	Parpant Cave		2010	0316576	2306491				temple cave	dead
Parpant	Thant PharaThe Spring		2010	0316770	2306510	1059			Major Sink	
Parpant	White Water Buffalo and Tiger cave		2010	0316533	2304470	1128		1343	major river cave with two branches, sumps upstream in both cases	dead

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Truck Stop	Truck Chock Stop Cave		2010	0320749	2302235				not surveyed -ends in choke	dead
	no name(madphil find)		2010	0324863	2303209				not explored	
Htam Sam	Mingalaba Cave		17/01/2011	9719423	2049231	1306		88	pitch to small muddy passages	dead
Htam Sam	Boor Tree Gu		17/01/2011	9719490	2049323	1314			climb down to narrow slot and short drop, no draught	ongoing
Htam Sam	Waterbuffalo Bore Pot		17/01/2011	9719478	2049377	1330			5m deep, 3mx4m wide pot, slight draught	ongoing
Htam Sam	Small Mammel Pot		17/01/2011	9719471	2049370	1329			two adjacent pots, 7m deep, contains mammel bones	ongoing
Htam Sam	Loifuee Cave		17/01/2011	9719583	2048423	1240		263	large depression, well decorated but ultimately choked cave	dead
Parpant	Hopon Spring Sink (overflow)		19/01/2011	0315269	2304123	1134			too small, choked with water and flood debris	dead
Parpant	Hopon Spring Sink I		19/01/2011	0315392	2304152	1134	8m		active sink filled with debris, several overflow entrances all choked with mud	dead
Parpant	Teenop	Hopon Spring Sink II	19/01/2011	0315269	2304128	1124	9m		active stream sink with cascades and gowers. Sumps.	dead

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Parpant	Palace Column Cave I	Parpant Cave I	19/01/2011	0316694	2306575	1184		381	large fossil cave about Parpant	dead
Parpant	Palace Column Cave II	Parpant Cave II	19/01/2011	0316695	2306573	1191		381	large fossil cave about Parpant	dead
Parpant	no name		20/01/2011	0317497	2306614	1164	12m		small dry streambed sink	dead
Parpant	Water Under Cave		20/01/2011	0317721	2306401	1177	12m		stream passage which villages have been inside	ongoing
Parpant	Kong Kiamg (South)		20/01/2011	0317841	2306519	1184	14m	654	6m climb down into large passage	ongoing
Parpant	Kong Kiamg (North) I		20/01/2011	0318035	2307004	1240		654	northern entrance to Kong Kiamg	ongoing
Parpant	Kong Kiamg (north) II		20/01/2011	0318038	2307004	1234		654	northern entrance to Kong Kiamg	ongoing
Htam Sam	Rat Gu		21/01/2011	0326121	2301833	1258			large entrance at base of 20m cliff in jungle	dead
Htam Sam	Loifuee Rift		21/01/2011	0326829	2302387	1276		49	hading rift to choke and bad air	dead
Htam Sam	no name		21/01/2011	0327297	2301846	1241			major sink for valley beyond Loifuee	dead
Htam Sam	no name		21/01/2011	0326881	2302658	1256			major sink for valley beyond Loifuee	dead
Htam Sam	Star Hole		21/01/2011	0324320	2307948	1472			large shaft adjacent to road, 4 miles north Htam Sam, local criminal bodies at base!	ongoing

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Htam Sam	Hill Hole		21/01/2011						500ft shaft near village near Star Hole	ongoing - not seen
Htam Sam	Hill In Cave		21/01/2011						Cave which goes "in" near Hill Holw	ongoing - not seen
Parpant	Aik Kham		22/01/2011	0315591	2303095	1170	10m	305	Large well decorated fossil passage, climbs up gowers, needs rope	ongoing
Parpant	Tam Meen Gu	Cat Cave	22/01/2011	0315887	2303704	1148	2m	170	old fossil passage, well decorated, descending, local hammered squeeze to chamber to low crawl to terminal muddy chamber	dead
Parpant	no name		22/01/2011	0316911	2307135	1157			choked cave entrance	dead
Parpant	no name		22/01/2011	0317133	2307127	1156			choked cave entrance	dead
Parpant	no name		22/01/2011						doline to east of Parpant	dead
Parpant	Tale O	Hopon Spring Shaft	23/01/2011	0315108	2303457	1165			40m shaft to large river connecting to Hopong Spring Cave	ongoing
Kutcai	Natural Bridge		28/01/2011	0404986	2591294	1382			short natural bridge within gorge	dead
Kutcai	Naung See No.1 Cave		29/01/2011	0388330	2599521	1297			short mud choked chamber	dead

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Kutcai	Naung See No.2 Cave		29/01/2011	0388271	2599503	1304		859	complex multilevel cave, possible high level lead remains, plus small crawl with hairy mary	ongoing
Kutcai	Htan La Moh		29/01/2011	0388762	2601605	1296		141	short muddy cave	dead
Kutcai	Ong Song Dwi		30/01/2011	0391742	2601266	1290			large ongoing cave with excellent potential	ongoing
Kutcai	no name		30/01/2011	0391576	2601135	1283			unentered dolines near Ong Song Dwi	??
Kutcai	no name		30/01/2011	0391349	2600978	1298			unentered dolines near Ong Song Dwi	??
Kutcai	no name		30/01/2011	0391339	2600955	1300			unentered dolines near Ong Song Dwi	??
Kutcai	16 stupa cave		31/01/2011	0392710	2583647	1268			gps on road near cave behind large group of stupas. Water allegedly resurgances at Hsenwi	ongoing
Lashio	Htam Fu Yam I		01/02/2011	0352120	2543133	1281			large entrance at side of doline, one large passage, possible ongoing tubes, possible rift at back, low prospects	ongoing
Lashio	Htam Fu Yam II		01/02/2011	0352142	2543111	755			as above	ongoing

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Lashio	Htam Nam Lay		01/02/2011	0364221	2556316	667		24m	large resurgence cave, ongoing with excellent potential	ongoing
Heho	U Yoe Gu		25/12/2011	0277853	2298345	975			2 small pitches and handline climb lead to further drop which was not descended	ongoing
Ywangan	Pete's spider cave		26/12/2011	0227962	2358084	1239			small cave following bedding, after two climbs chokes with mud	dead
Ywangan	Kyaw Khaunng Gu	first day cave	26/12/2011	0233489	2351635	1434		69	large arch entrance leads to smaller passage and two pitches down to mud choked chamber	dead
Ywangan	U Mya Ohn Gu		26/12/2011	0233062	2352275	1403			large arch entrance totally choked with calcite	dead
Ywangan		Grovel down valley from Pete's spider cave	26/12/2011	0227967	2358195	1241			narrow shaft for 3m, can see to mud floor	dead
Ywangan	Linnloe Cave	Bat Cave	27/12/2011	0234691	2350523	1373			large arch entrance to handline climb to very large chamber with 3% CO ₂ . Continues to further climb down	ongoing

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Ywangan	Bamboo ladder cave	1000ft cave	27/12/2011	0234214	2351081	1562			Two shafts that interconnect via elaborate bamboo ladders	dead
Ywangan			28/12/2011	0238747	2349337	1379			Sink on route to fish caves	dead
Ywangan	Thein Khong Cave 1	Fish cave 1	28/12/2011	0241081	2348214	1348			Mendip esq grovel to sump	dead
Ywangan	Thein Khong Cave 2	Fish cave 2	28/12/2011	0240884	2348598	1361			Climb down to small stream which sumps	dead
Ywangan	Pho Tha Oo Cave		28/12/2011	0241719	2347885	1353			shaft of four potches	dead
Ywangan	Kyauk Khaung	Stone Cave	29/12/2011	0245912	2345267	1200		4813	BIG river sink cave	dead-ish
Ywangan	Myhakalay 2	Fish(es) Cave 3	30/12/2011	0232032	2338782	1078			Tim et al. found many fishes	dead
Ywangan	Myhakalay 1	Pete's Pool Plunge Cave	30/12/2011	0231496	2340576	1127			Pete rearranged toes with rock	ongoing
Ywangan	Kaseppin 1	Kaseppin 1	31/12/2011	0235048	2350533	1233			rift in doline, close to Kaseppin 2	ongoing
Ywangan	Kaseppin 2	Kaseppin 2	31/12/2011	0235051	2350375	1257			Rubbish fill	dead
Lashio	Khaung Ka I		08/01/2012	0368498	2531511	1019		207	Complex cave in remanent karst tower. Spiritual significance	dead
Lashio	Khaung Ka IB		08/01/2012	0368548	2531487	1020		"	"	"
Lashio	Khaung Ka II		08/01/2012	0368609	2531449	1024		71	Short cave in same karst tower as above	dead
Lashio	Khaung Ka III		08/01/2012	0368632	2581443	1033			Short cave in same karst tower as above	dead

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Lashio	Lim Nho		08/01/2012	0369245	2532879	1052		589	Two stream caves rising and sinking in depression. Downstream sumps, upstream continues to low crawl. Spiritual significance	ongoing?
Ywangan	Bear Hole		01/01/2013	0245269	2346026	1198		413	series of very large chambers, not all walls checked	ongoing?
Ywangan	No name		01/01/2013	0245093	2345993	1282			Short passage which chokes	dead
Ywangan	Dragon Lake Static Resurgence Pool		07/01/2013	0246213	2348077	1242			static pool resurgence in Linwe depression	no passage
Ywangan	Sa Lae Myone	Linwe Wet Resurgence	07/01/2013	0246019	2347791	1173		266	resurgence cave sumps, but entrance above leads to bypass. Two levels in cave, but draught goes into small hole in the roof.	dead
Ywangan	Yae Htwet Kyote Kone Gu (Spring Stone Cave)	Linwe Dry Resurgence	07/01/2013	0246393	2349315	1136		1917	dry resurgence cave; large passage eventually leads to river and via duck to two inlets both of which end	dead

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Ywangan	Linwe Sink Cave		07/01/2013	0246788	2348666	1122		254	dry sink; climb down over boulders to reach series of small pitches. Ends in sump lake, no way on over water.	dead
Ywangan	Chaung Myaung Cave and Hole		10/01/2013	0245582	2345277	1307		236	Small hole leads to big chamber and short ongoing passage; choked with stal	dead
Ywangan	Na Gar Gu	Dragon Cave	24/12/2013	0246195	2348022	1157		1654	Monsoon resurgence cave with complex multi-levels, ends in chokes	dead-ish
Ywangan	Bell Lu Gu	Devil Caves	24/12/2013	0246604	2349145	1120			small holes in cliff	dead
Ywangan	No name		27/12/2013	0243782	2349612	1451			hole in field without draught	ongoing, but poor lead
Ywangan	No name		27/12/2013	0241559	2349988	1385			small stream sink, too small to enter	dead
Ywangan	No name		27/12/2013	0242614	2351909	1412			6 to 8m wide arch into rift leading to small pitch	ongoing
Ywangan	Black Spring		30/12/2013	0247004	2348429	1081			Exit for Linwe Sink Cave	dead
Ywangan	Silver Cave		30/12/2013	0247136	2348009	1057			Ongoing resurgence cave, quite low	ongoing

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Ywangan	Sylight Hole		30/12/2013	0246832	2348386	1192		643	8m diameter hole in forest, 25m pitch. Two ways on - one to Linwe Sink and one to Black Rising	dead
Ywangan	Skylight Cave		02/01/2014	246804	2348354	1182			As above	dead
Ywangan	Pete's doline (no entrance seen)		30/12/2013	246679	2348157	1207			no entrance seen	dead
Ywangan	Shattered Cave		02/01/2014	246833	2347791	1140				dead
Ywangan	Cleft		02/01/2014	246744	2347924	1161				dead
Ywangan	Elephant Cave	Bamboo ladder cave BLT	02/01/2014	247044	2347684	1078			above rising; rope needed to belay down BLs	ongoing
Ywangan	Elephant (River) Rising		02/01/2014	247099	2347655	1027			rising from between boulders -stone cave water most likely	dead
Ywangan	Hermit Cave	Hermit Alcove	07/01/2014	0247598	2347221	1108			alcove - shown by novices	never alive
Ywangan	Monestary Cave 1	Mon 1	07/01/2014	0246968	2346022	1217			small entrance - no way on	dead
Ywangan	Monestary Cave 2 (hydro)	Smelly Hole	07/01/2014	0246972	2345908	1209			stream sinks and way on is open down smelly (poo? Bats?) rift	ongoing
Ywangan	Monestary Cave 3 (hole)		07/01/2014	0245918	2346260	1240			30-45m shaft with ledges; draft?	ongoing

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Ywangan	Monestary Cave 4 (shelter)	Shelter Skylight	07/01/2014	0245938	2346344	1251			large shelter cave; well decorated with skylight. No way on.	dead
Ywangan	Monestary Cave 5 (Big Hole)		07/01/2014	0245903	2346201	1273			large elongate open hole; 40m deep with ways on?	ongoing
Ywangan	Chaung Myaung Cave and Hole	15 Minute Hole	04/01/2014	0245613	2345250	1337			Alternative entrance to Chaung Myaung Cave and Hole	dead
Ywangan	Yaa Home Tea Spring		09/01/2014	0241849	2345780	1281			A small monsoon resurgence	dead
Ywangan	Dak Twin Sink		09/01/2014	0241934	2345813	1251			Seasonal sink, sumps immediately, lots of fish	dead
Ywangan	Old temple cave		09/01/2014	02402662	2345813	1251			Delapadated, unloved short temple cave	dead
Ywangan	Golden Big Cave		10/01/2014	0231361	2343865	1457			Very short temple cave	dead
Ywangan	Spider Sink		10/01/2014	0231235	2344002	1457			Short monsoon sink full of spiders	dead

Appendix B: Expedition Log

Date	Who	What
21/12/13	All	Arrive in Yangon, fly to Heho and travel by road to Ywangan.
22/12/13	All	Travel to Linwe and make arrangements to stay at monastery. Make initial explorations in Sa Lae Myone (wet resurgence).
23/12/13	FL, PT	Survey Sa Lae Myone high level and stream level to sump.
23/12/13	PSM, BW	Rig pitches in Linwe Sink Cave, discover sump lake.
24/12/13	FL, PT	Shown Na Gar Gu (Dragon Cave), Bell Lu Gu (Devil Caves), start surveying in Yae Htwet Kyote Kone Gu (Spring Stone Cave).
24/12/14	PSM, BW, LH	Rigging to bypass lake in Linwe Sink Cave.
25/12/14	PSM, FL	Climbing up looking (unsuccessfully) for lake bypass in Linwe Sink Cave.
25/12/14	PT, LH, BW	Survey to duck in Spring Stone Cave.
26/12/14	PT, PSM	Climb at end of Sa Lae Myone to follow draught.
26/12/14	FL, BW, LH	Commence survey in Dragon Cave.
27/12/14	BW, PSM	Survey inlets in Spring Stone Cave.
27/12/14	FL, LH	Descend pitch and explore Gour Parau Chase in Dragon Cave as far as short swim.
27/12/13	PT	Surface reconnaissance in area of Ngwedaung village.
28/12/13	BW, PSM, PT	Derig and photo in Linwe Sink Cave.
28/12/13	FL, LH	Continue exploration of Gour Parau Chase in Dragon Cave to a muddy canal.
29/12/13	BW, PSM	Connect lower and upper entrances of Dragon Cave, connect boulder choke in lower cave to Gour Parau Chase.

29/12/13	FL, PT	Explore and survey high level passages above Gour Parau Chase.
30/12/13	FL, BW	Survey beyond canal at end of Dragon Cave.
30/12/13	PT, LH	Complete exploration and survey of high level passages in Dragon Cave.
30/12/13	PSM	Surface reconnaissance above Linwe sink and into the gorge to the south and west. Identify the Black Spring, Silver Cave and Skylight Hole.
31/12/13	All	Return to Ywangan to wash and dry equipment
1/1/14	All	Fettled gear and shopped. Drove to Stone Bird Village (Kyauk Ngauk) and arranged accommodation with Monastery
2/1/14	LH, PT, BW	Starting rigging in Stone Cave (Kyauk Khaung)
2/1/14	PSM, FL	Skylight Hole via main (side) entrance; found Elephant River resurgence in gorge, and nearby Elephant Cave.
3/1/14	BW, LH, PT	BW dislocates knee briefly – heads out. PT and LH rig tims traverse and then have drill fiasco at pitch
3/1/14	PSM, FL	Rigged Skylight Hole to connect with Linwe Sink Cave
4/1/14	PT, LH, BW	Rest day, especially for BW knee.
	BW	Fixed drill batteries.
	PT	Shown alternative entrance to cave near monastery, first seen last year, but not yet mapped.
4/1/14	PSM, FL	Made connection from Skylight Hole to the Black Spring.
5/1/14	FL, PSM, PT	Dropped Apocalyptic Poo pitch in Stone Cave and derigged.
5/1/14	LH, BW	Sample hunting in Stone Cave, with new loop passage
6/1/14	PSM, PT, BW, LH	Push upstream in Skylight Hole, photo and derig.
6/1/14	FL	Rest day
7/1/14	LH, PT, PSM	Monk's magical mystery tour
7/1/14	FL, BW	Survey and photo "15 minute cave", near Stone Bird Village; recover rope from Stone Cave entrance and clean.

8/1/14	FL, PSM	Descend holes seen with novice monks on previous day. Both are blind.
8/1/14	BW, PT, LH	Descend Elephant Cave, but cannot complete due to absence of belays.
9/1/14	BW, FL, PSM, LH	Shown three small caves to the east of Stone Bird Village. Clean,organise and inventory equipment.
10/1/14	All	Return to Ywangan. Reconnaissance to the west of the two.
11/1/14	All	Travel overland to Heho and by air to Yangon
12/1/14	All	Leave Myanmar.

Appendix C: Equipment in Myanmar

23 thru'-bolts

10 thru' bolts on hangers and maillons

25 hangers and maillons without bolts

11 bolts

20 maillons and 23 hangers (for use with spits)

47 cones

45 spits

Slings: 2x6m; 2x5m; 1x4m; 3x3m; 8x2m; 6x1m; 4x<1m

Ropes: 100m, 3x40m, 24m, 20m, 2x16m, 1x15m

1 surveying tape (50m, 6cm short); 6 nail polish, 11 pencils

1 spanner with lanyard

8 snaplinks

9 screwgates

1 bolting hammer

1 bolting driver

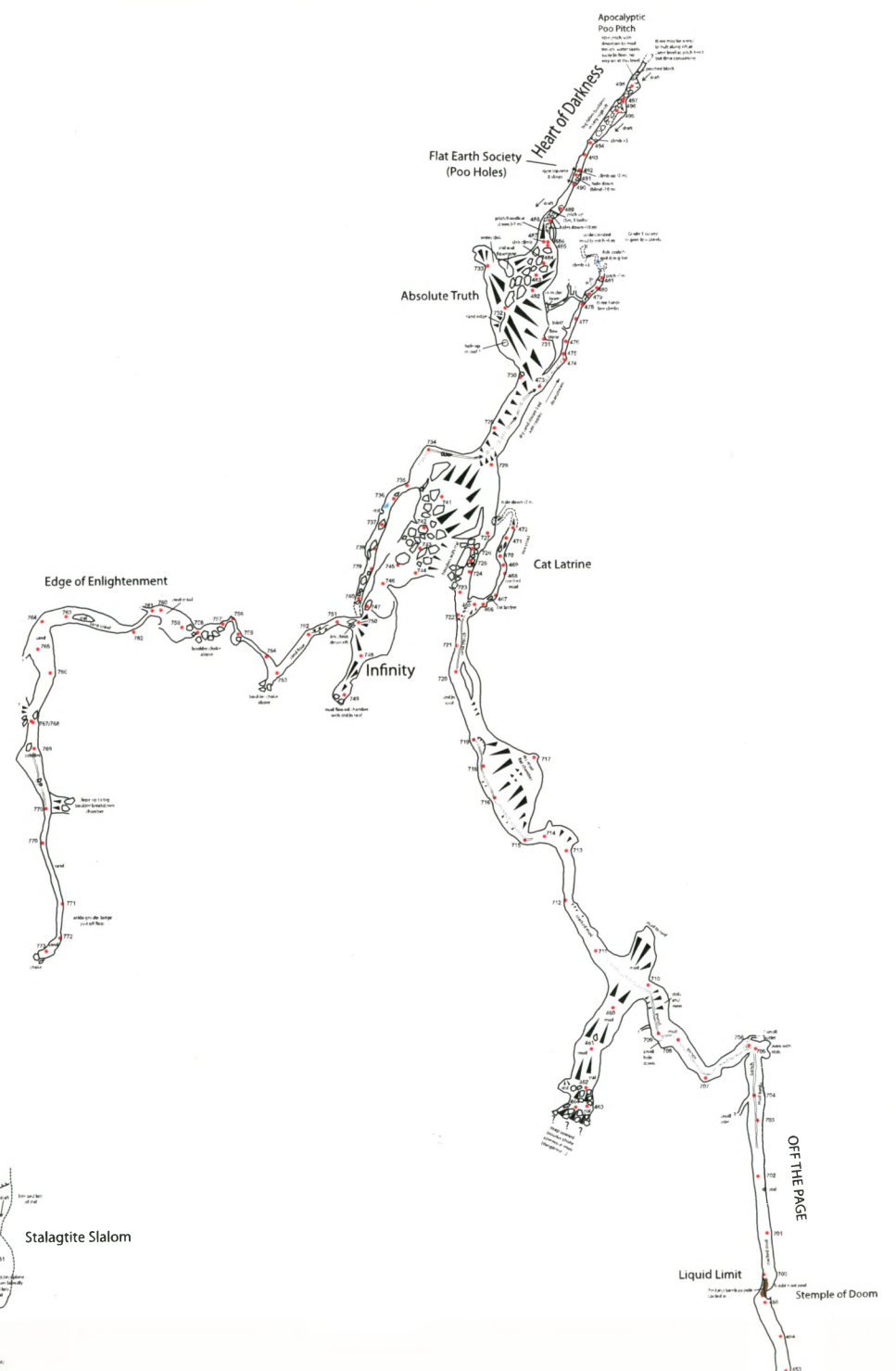
1 grappling hook

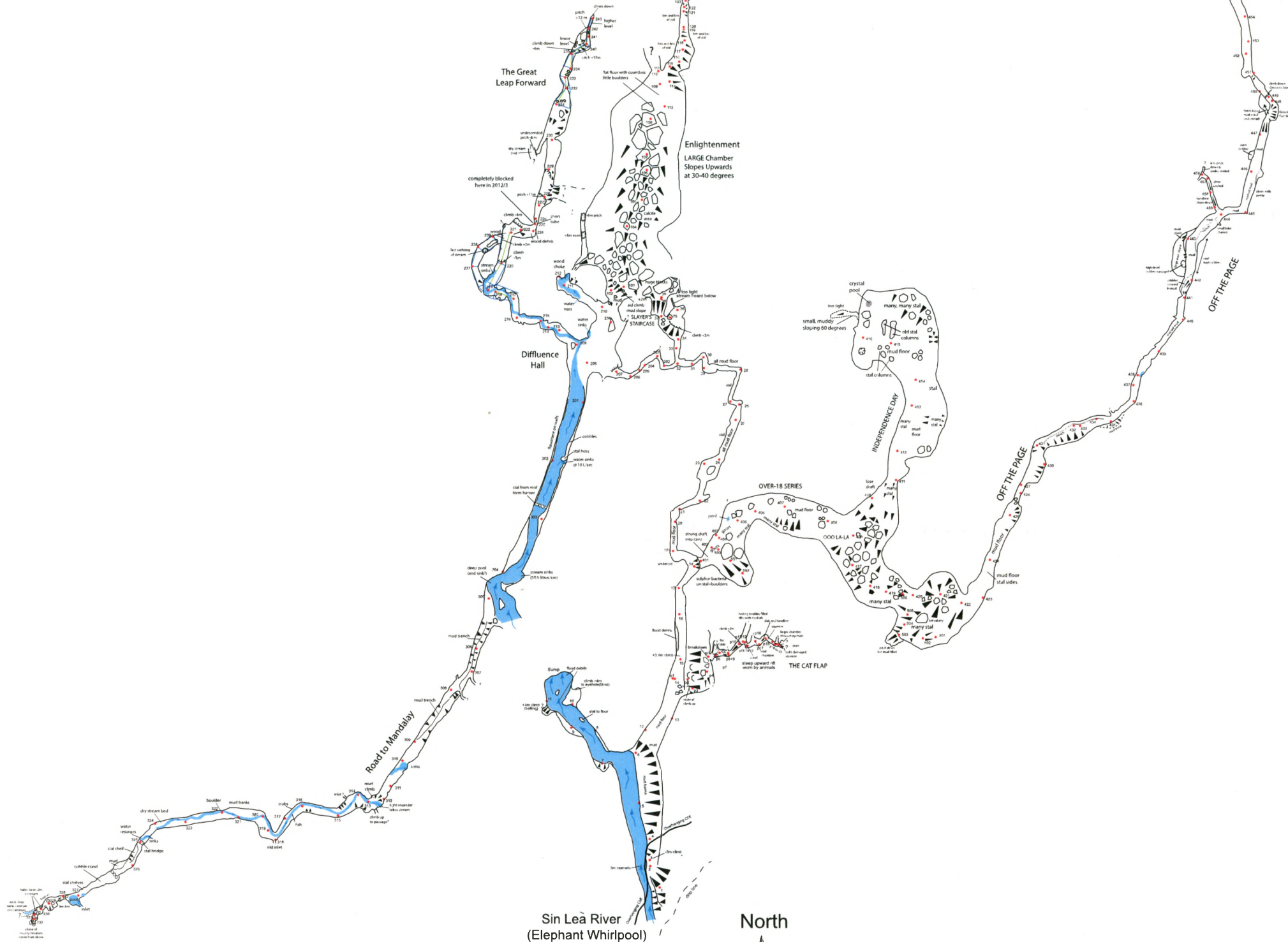
1 chisel

2 tyre inner tubes

Biology kit, including 2 fishing nets

1 figure of eight descender





Kyauk Khaung
(Stone Cave)

North

100 meters

LINWE SINK CAVE

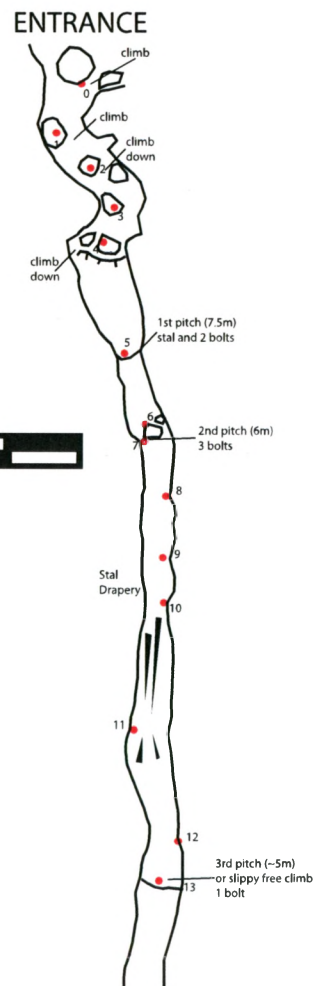
North

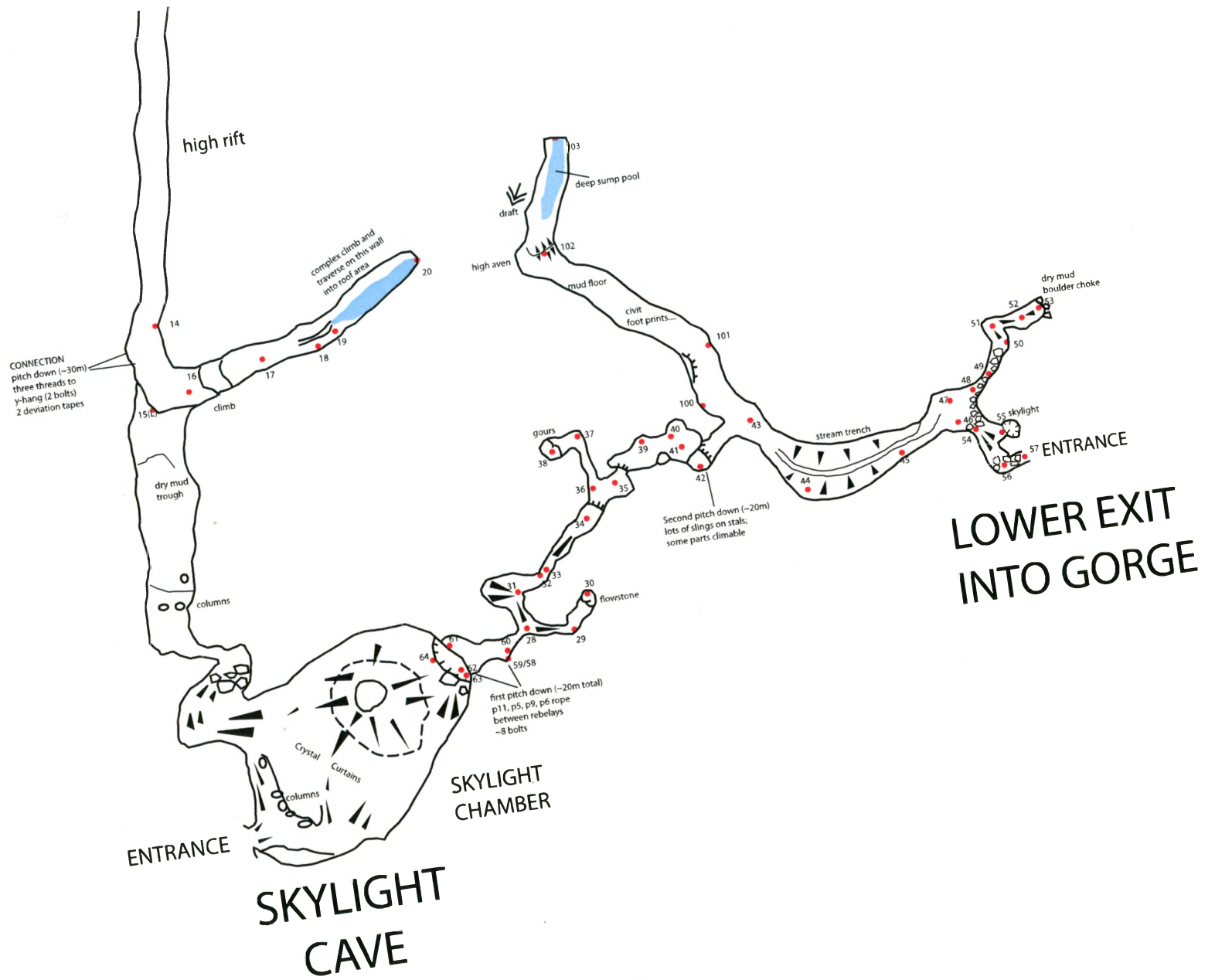


100 meters



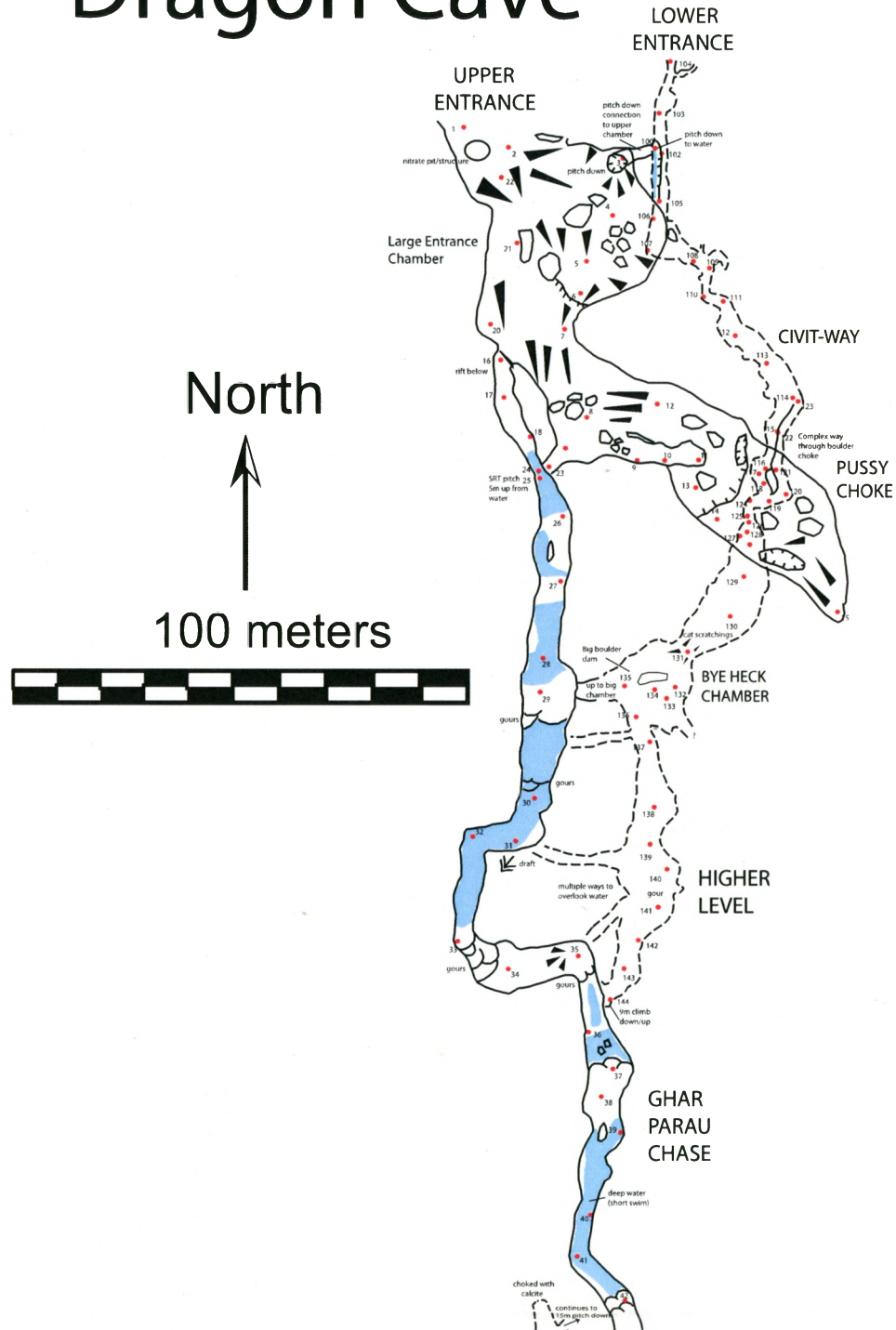
LINWE SINK SYSTEM

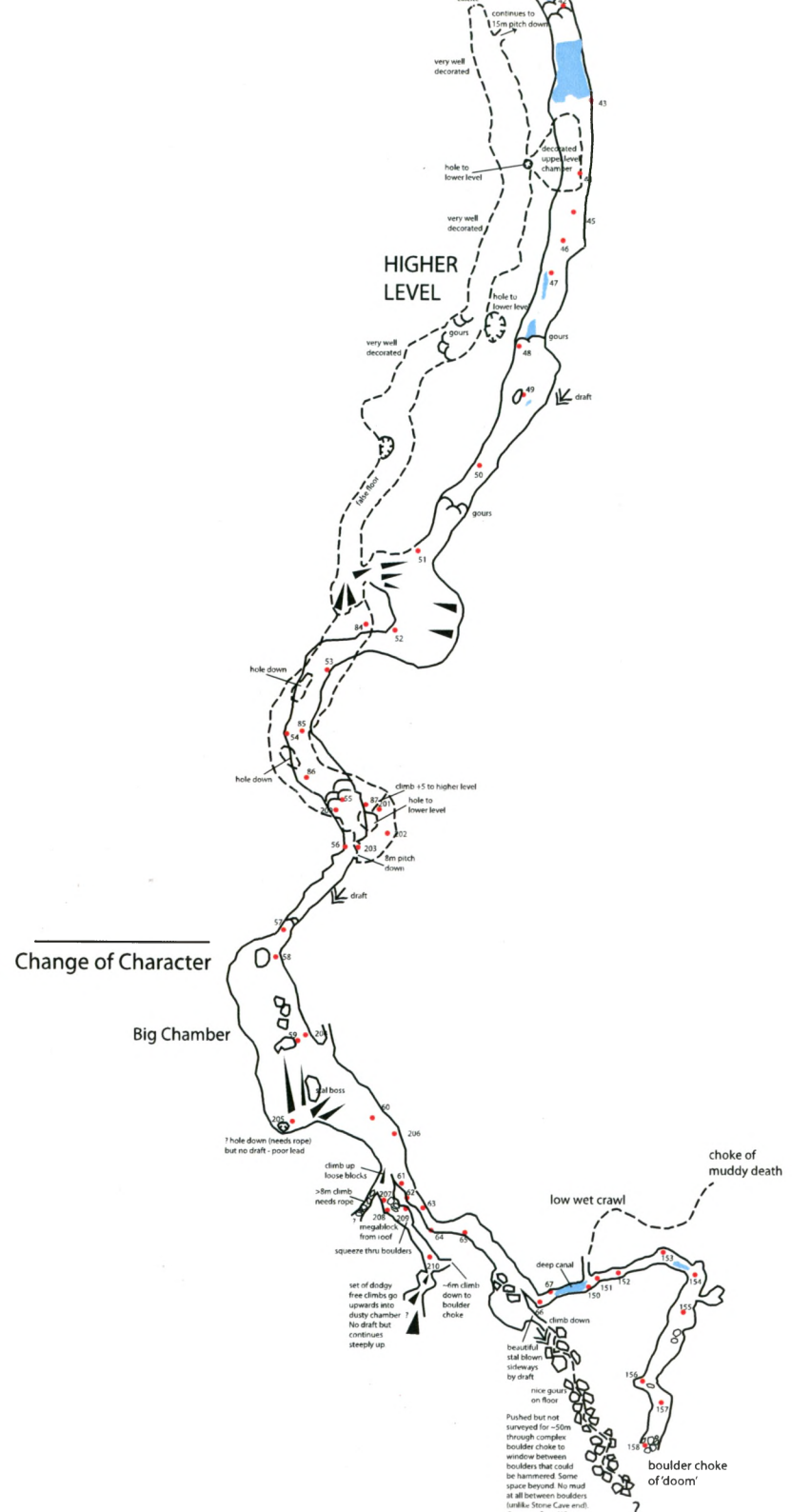


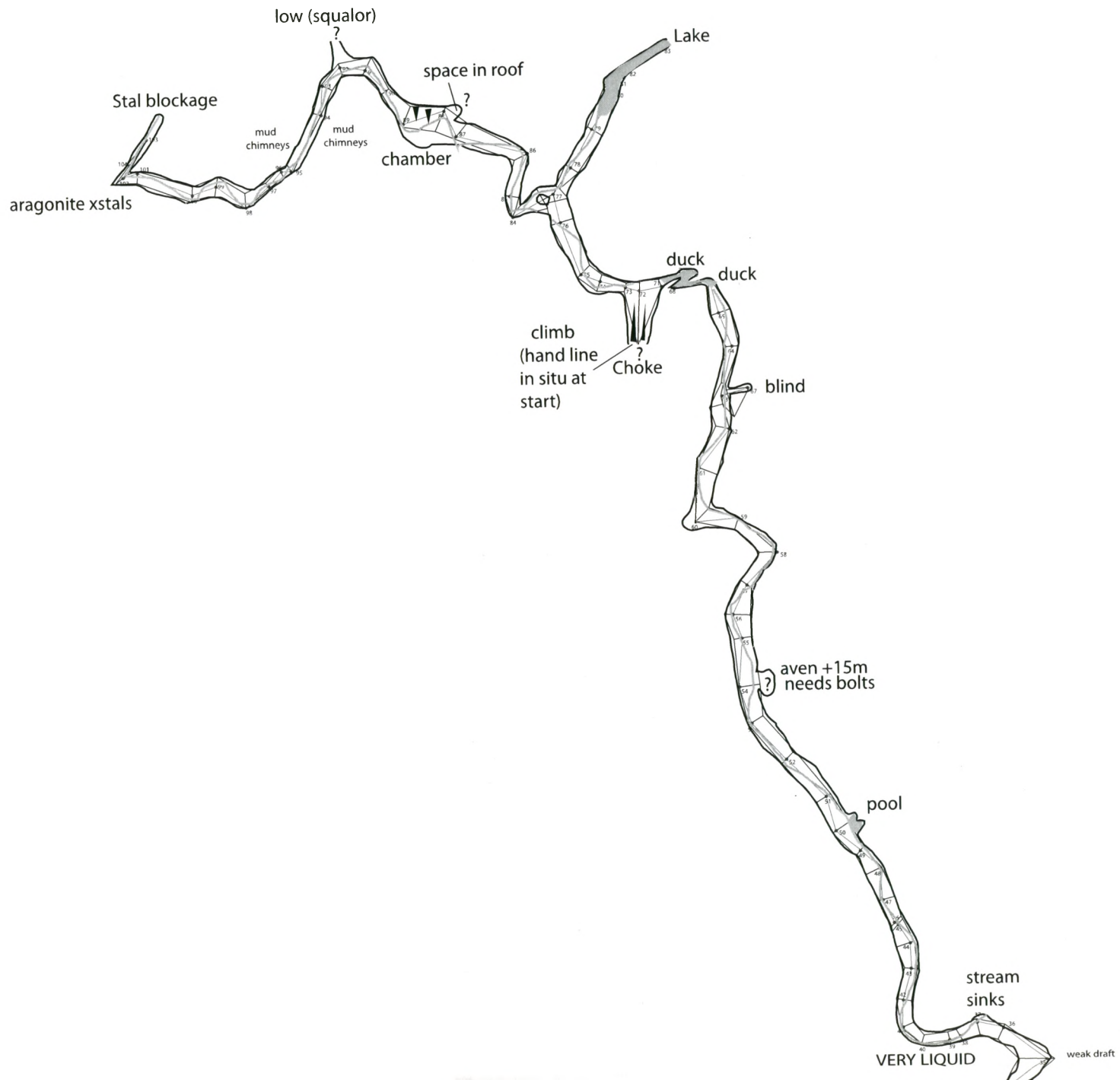


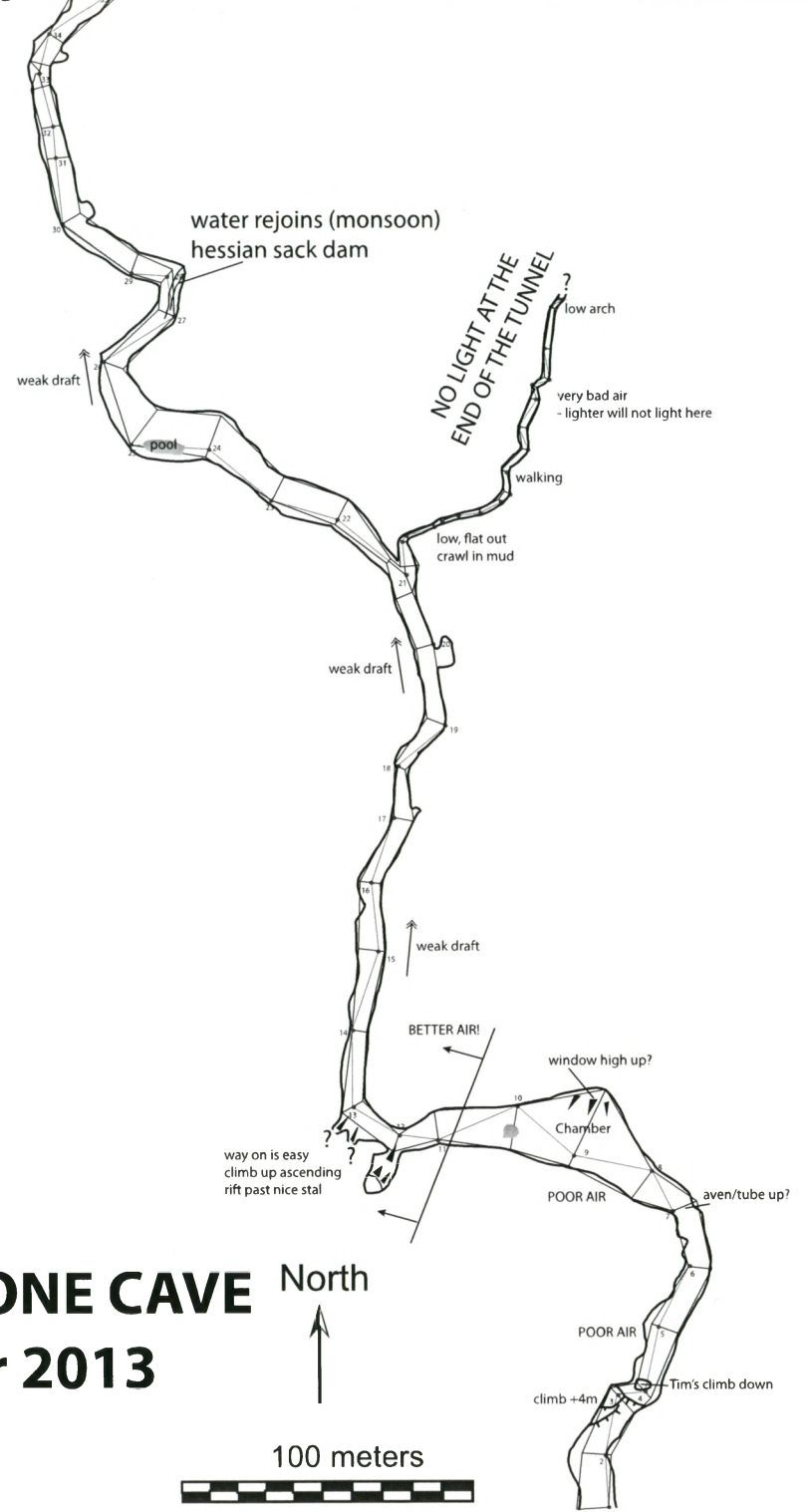
Dragon Cave

water emerges at pool
lower down hill









SPRING STONE CAVE

December 2013

North



100 meters



Myanmar Shan Plateau Expedition 2014 Expedition Accounts

Excluding international travel

Expenditure

Item	Amount	Comments
Internal Flights	£ 810.00	
Excess Luggage	£ 24.00	
Driver & Guide for 22 days	£ 2,640.00	
Yangon Accommodation	£ 165.00	
Local Accommodation & Subsistence (22 days)	£ 442.80	
Tips for Staff	£ 120.00	
Bank Charges	£ 30.00	For international transfer
Foreign Exchange Losses	£ 85.46	
Equipment - Rigging Gear	£ 193.75	Top up to equipment in Myanmar gear store
Equipment - Lightweight Drill	£ 130.00	Not left in Myanmar
	<u>£ 4,641.01</u>	

Income

Item	Amount	Comments
Ghar Parau Foundation	£ 600.00	
Mount Everest Foundation	£ 1,000.00	
Personal Contributions	£ 3,041.01	
	<u>£ 4,641.01</u>	

Approx per person cost	£ 608.20	(excluding international travel, insurance & personal equipment)
	£ 1,600.00	(including allowance for international flights from Europe; these varied depending on precise starting location.)

Compiled by F Loveridge, January 2014