Tōtara Cave Exploration

The following is a good story on one of the caves that we will view from the outside during the conference.

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Since this was published exploration has been limited but it is around 10km at this stage. We will also have the opportunity to see a recently located stream sink into this system on the field trip to Tākaka Hill.

Tōtara Cave Update 2020

The 2019/2020 summer was a busy year with significant progress made on the exploration of the Tōtara system.

The season got off to a good start with NZ's first-ever cave-diving SAR exercise being held in November. 30 people from the diving and caving communities came from around NZ and were joined by cave diving legend Richard "Harry" Harris from Australia. The practical component of the weekend focused on the scenario of a caver trapped past Tōtara's main downstream sump.

Following the SAR exercise, several cavers worked on diving Tōtara's upstream passage with the aim of connecting to the nearby Cottage Cave. This was a connection which Martyn Farr hadn't quite made, though we knew must exist. Richard Harris and Bruce Clulow extended the upstream passage 130 metres. A few days later Bruce returned with Tom Crisp and pushed the passage a further 75m to connect with Cottage Cave. They returned proudly brandishing the marker and dive reel which Martyn had left at his far point in his exploration of Cottage.

Tom Crisp and Bruce Clulow with Martyn Farr's dive reel and marker. Photo: Rob Davies.

This was a significant achievement and puts the combined Tōtara / Cottage system in the top 10 longest caves in NZ at just under 10km.

Bruce and Tom were most impressed with the quality of the diving and looked forward to doing the first Cottage / Tōtara through trip, which will be the longest diving through-trip in the country. At the time of writing, this has not yet been done.

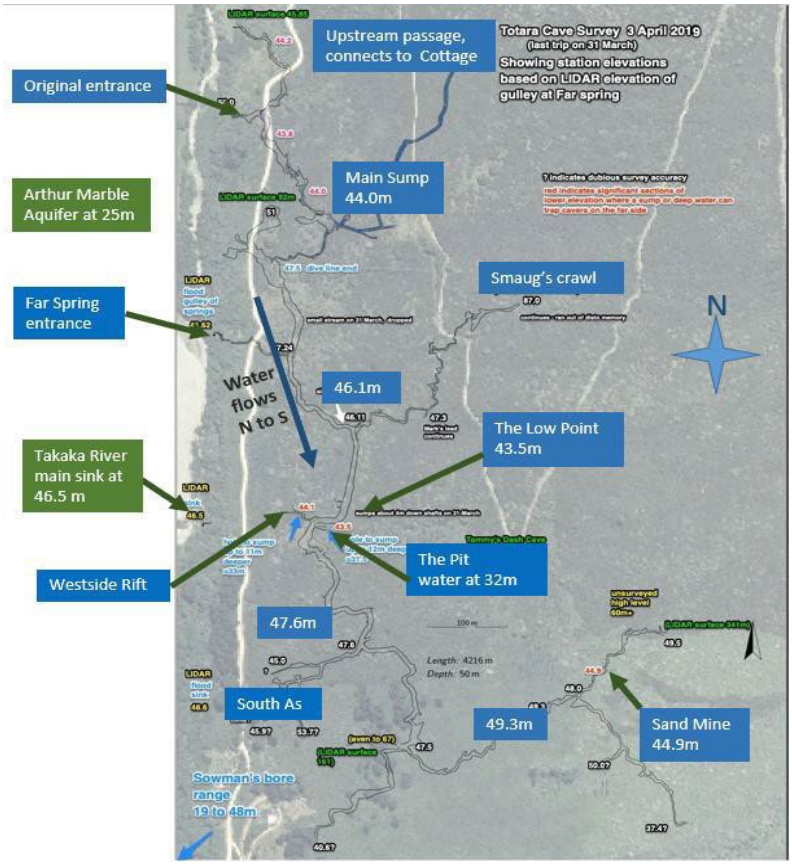
Water Levels Drop

It was another exceptionally dry summer, and by late January we were able to enter the cave via the Far Spring entrance discovered / dug the previous summer. Over the next couple of months there were 20 trips into the cave, primarily by Rob Davies, Michelle Allison, Mark McKenzie and myself, with a variety of other cavers.

There were three main focuses to the exploration:

- Hydrology. Tōtara Cave is close to the Tākaka River and is full of water for much of the year. We were keen to gain an understanding of the relationship between the cave and both the Tākaka River and the Arthur Marble Aquifer. Amongst other things, this will help us know when it is safe to enter the cave, and when it is not.
- Where does all the water go? While we enter the system when it is dry, the early explorers (Martyn Farr and Kieran McKay) reported considerable quantities of water pouring down towards the southern end of the cave. Where does this go? Clearly, there is a very effective drainage in that area. Could this feed into the Arthur Marble Aquifer which underlies the Tākaka Valley? If so, this would be of considerable interest.
- Towards Canaan. In several areas, upstream passages head east into the Tākaka Hill. Large amounts of granite sand in these passages indicate that they originate in Canaan. How far can we follow the cave inland and uphill in that direction?

Rob, Michelle and I make a good team. Rob, a highly motivated cave explorer with a huge knowledge of geology, is the brains behind the operation. And, let's face it, also the brawn. Michelle is a very strong caver and can laugh no matter how miserable it gets. She brings a real mood of levity to the day's caving. Together they make a very strong unit. What I bring to the team is that I have a watch. This helps us keep track of time and enables the team to be back at the Roots Bar before the kitchen closes. This is deemed to be one of the most important parts of the day's caving. Prior to this Rob sometimes didn't exit a cave until 2am, under the impression that it was "probably around 5pm".



Hydrology

Once we entered the cave in March 2019 our first priority was a detailed survey. This showed that Tōtara was mainly at the same level as the Tākaka River, with some parts lower and some parts higher.

The Low Point

One of the many intriguing parts of the cave is a low point in the passage we dubbed The Low Point. At low flows the stream running through the cave goes underground at this point via number of sinks. Beyond this, the (downstream) passage climbs 4 metres.

All the sinks drop down to water, and our survey showed that the water was at the same level in all the sinks, including sinks some distance inland. This led us to believe there is a large body of water underlying the cave. Could this be the Arthur Marble Aquifer? The survey showed that it was not – the water was sitting at a higher level. This was confirmed when Kieran abseiled down to check the temperature – it was "warm". This pointed to the origin of this water being the Tākaka River, rather than the colder water of the aquifer or cave stream.

Just off the side of The Low Point is a pit, which we called The Pit. We really need to come up with more imaginative names for cave features! I found this a fascinating feature, as it bells out enticingly into a larger chamber. We often heard water running into the pool at the base of this, even at times when there was no water in the cave and the Tākaka River was dry.

An abseil inspection revealed a beautiful sump pool (Pit Pond), plus a passage heading SE (before becoming too tight). My reports of the sump pool were sufficiently enticing for Jonathan Davies and Dee Nagle to abseil in and dive it. Unfortunately, while being 5 metres deep, it didn't connect to anything more substantial.

Looking down to Pit Pond. Jonathan and Dee preparing to dive this.

The other interesting spot in this area is a rift on the west side of the passage which we called the West Side Rift. The moment we first saw this, Rob was really excited – "I reckon this goes through to the Tākaka River Main Sink!". When we later surveyed it, we found that he was completely right.

The Tākaka River Main Sink is a feature well known to locals living in the area. In this stretch of the river there are many places where water goes underground, presumably into the Arthur Marble Aquifer. Many of the sinks are in the riverbed and come and go as river gravels get moved around during floods. By contrast, the Main Sink is in a slot/rift in an outcrop at the side of the river and is always present. It can take a considerable amount of water

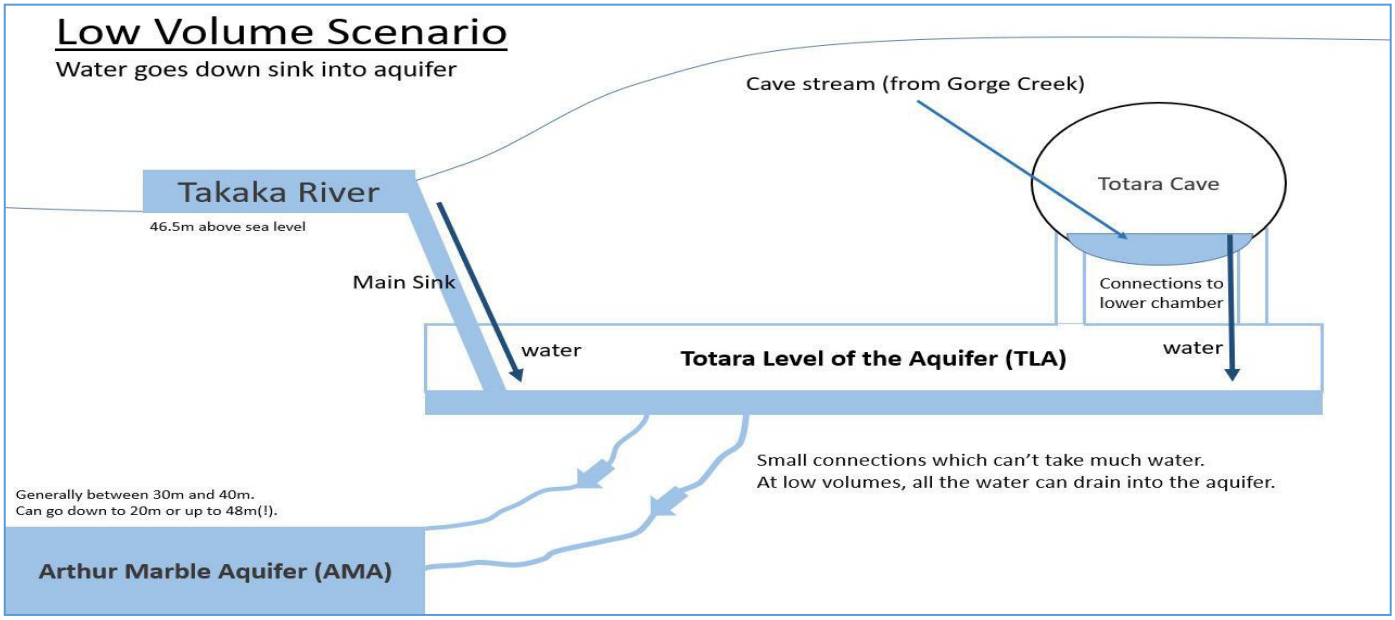
More interestingly ... while water generally goes down the sink, there are times when the water comes out. And times when the water goes through a cycle of going down the sink, stopping then coming out. What is going on here? It was a mystery, but one which we have now solved.

The connection between the Main Sink and Westside Rift was further confirmed during a later trip into the cave. 2 cumecs of very warm water were seen pouring into the cave through the rift – very clearly Tākaka River water.

It's worth pointing out, however, that we have never seen any river material in the cave – no river gravels, not so much as a single beech leaf. This points to the river water being driven under a sump, or some other feature, which traps all the debris.

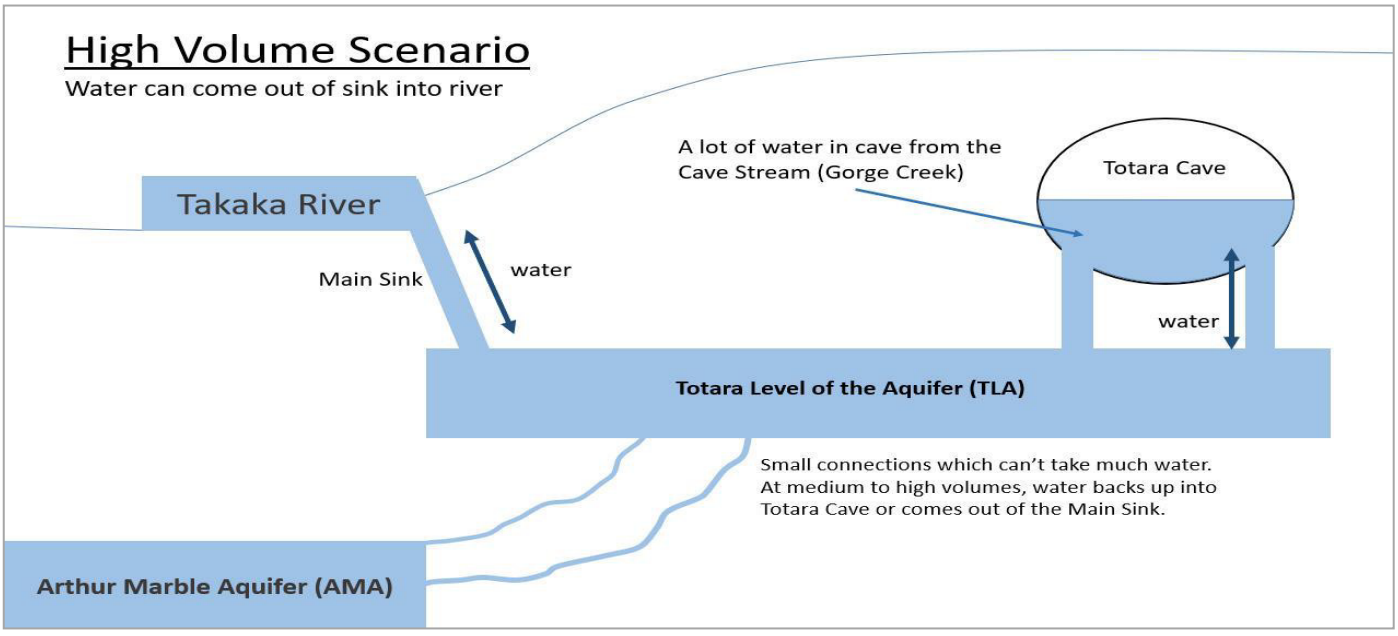
Tōtara Level of the Aquifer

We believe that the body of water underlying Tōtara Cave is a higher level of the aquifer, probably resulting from upward movement of the Pikikuruna Fault. We have called this the Tōtara Level of the Aquifer (TLA). This is fed by sinks in the Tākaka River plus, to a lesser extent, the stream running through Tōtara Cave.



TLA is connected to the Arthur Marble Aquifer (AMA) by small connections. At low flows the level of the TLA is low as all the water can drain down into the AMA. This explains why, at low flows, the Tākaka River doesn't flood into Tōtara Cave even though it is at roughly the same level.

It is a different story at high flows of either the Tākaka River or the stream running through the cave. In these cases, there is more water entering the TLA than can drain into the AMA. The level of the TLA will rise to the point where it either inundates Tōtara Cave or comes out the Main Sink. It will be a battle between the Tākaka River and the cave stream – a lot of water in the Tākaka River and water will flow into the cave. A lot of water in the cave stream and water will flow out the Main Sink. It's not hard to imagine a scenario where the two forces are battling each other and go through a cycle of one or the other winning out.



Based on our observations, we have developed the following guidelines for when it is safe to enter Tōtara. All three of these must be the case:

- Arthur Marble Aquifer (measured at Sowman's borehole) at 30m or less
- Tākaka River flow (measured at Harwoods) at 5 cumecs or less
- No recent rain at Canaan

Of these, the most important is the level of the Arthur Marble Aquifer. When this is high, water no longer drains from the TLA to the AMA, and the TLA soon becomes full. All sinks in the passage as far as The Low Point stop working. Water starts building up in the cave. We have been into the cave a number of times when it is in this state so are familiar with this situation!

Once in the cave we generally peer down our depth gauge, The Pit. This shows us the level of the TLA. If this is a long way down, we know the cave will not flood during our visit even in the advent of a release of the Cobb dam or a cloudburst at Canaan.

Origin of Tōtara Cave

The movement of the Pikikuruna Fault also explains the origin of the cave. Tōtara, plus the other caves on the east side of the Tākaka Valley (Green Bower and Little Harwoods), are old phreatic caves all sitting at roughly the same level. It is almost certain that these were previously under the valley floor as part of the Arthur Marble Aquifer system. Uplift has raised them to their current positions.

How long ago did this happen? Probably quite a long time ago. The higher, dry levels in Tōtara are heavily calcited, indicating that it has been in its current position for quite some time.

Tōtara shows signs of a long and varied history. The scalloping on the walls is ambiguous about the direction of the current that formed the passage. The passage heading south from The Low Point is the downstream passage, despite being slightly uphill. Rob has speculated that in the past the passage may have hosted the Tākaka River, flowing south to north; not an unreasonable suggestion. Certainly, there are many other clues that suggest the passage was formed by a south to north current.

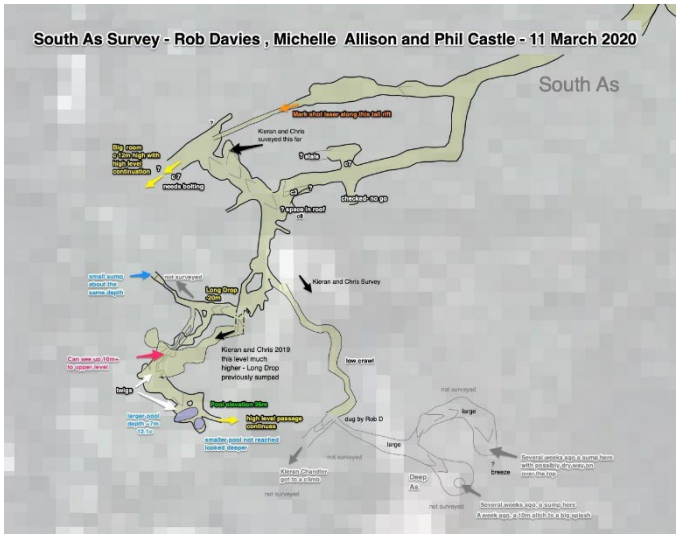
South As

We were keen to understand the main drainage system of the cave. The sinks in the vicinity of The Low Point operate only when water levels are low. When water levels get higher the TLA becomes full and can't take more water. The water will then top the 4m rise south of The Low Point then head down the passage to the area we call South As. During Kieran's first visit in 2014 the water was swimming-depth down this passage, and he reported a strong current. So, what was down South As for it to be able to take such a volume of water? Clearly it must drain into a different system than the TLA level which underlies much of the cave.

We still don't have a full understanding of this. It is a complex area with numerous large drainages. Some more work still needed!

The first significant drainage in South As is the Long Drop. This is a large slope off the side of the passage, and it goes down a long way. At the bottom, a slimy crawl leads horizontally to a beautiful sump pool – a great discovery by Rob and Jonathan Davies. We named it Spyglass Sump after the beautiful arc of marble above the pool.

Could we have finally made it down to the Arthur Marble Aquifer? A body of water celebrated as being one of the purest on the planet.



If so, then why was there such a bad smell? A really bad smell. We speculated that maybe a septic tank overflow led down into here, despite the nearest house being some distance away. On a later trip, Michelle found the cause of the smell – a dead eel in a nearby passage. Nice to have a simple explanation!

Spyglass Sump (left). The pool is about 6m across and 6.5m deep at the near edge.

The survey showed that the pool was at 26m, so we were 20m below the level of the Tākaka Valley, just east of East Tākaka Road. Were we down at the Arthur Marble Aquifer? We still aren't sure. On the day of the survey, the level of the aquifer was 21m. Could this 5m difference be explained by inaccuracies in either the surveyed levels or in the TDC measurement of the aquifer?

Rob measured the depth of the pool at 6.5 metres. Its temperature was 12.1 degrees, which is close to the temperature of the aquifer. It was looking plausible.

Continuing along then main passage south of the Long Drop area, the travel gets low and awkward. The passage climbs a couple of metres, so water will only go into this section once Long Drop is full and levels in the passage have risen higher. The passage ends in a steep slope down to another sump – the Deep As sump.

I abseiled the 20m down to this – another beautiful deep pool, discoloured from rocks I had cleared from the slope. It was a deep pool – measured at 9m deep before the plumb-line got stuck (it is still there). The surveyed level of the water was 27.7m. This is a couple of metres higher than Spyglass Sump. Were these pools connected? It seems fairly likely. The surveys were done 10 days apart, during which time the aquifer had risen 2 metres.

Kieran plus Bruce Clulow heard of our discoveries and were all set to come and dive them. That would have answered some of the questions this area posed. However, the Covid-19 lockdown intervened before they had a chance.

Deep As sump, at the bottom of a 20m pitch and at least 9m deep.

Smaug's Crawl

There are several passages which head eastwards into the hill. How far can these be taken in the direction of Canaan?

One such passage is a prominent side-passage not far downstream from Far Spring passage (our entrance passage). The first section of this is a pleasant sandy crawl for 15 minutes and gave the passage its name: Smaug's Crawl. Not far along this passage is a dissolving shawl, The Dissolution of Smaug.

In 2019, Kieran was the first person to go up this passage – he made it as far as a large chamber. We returned to survey it in late March 2019. Rob, Mark and I surveyed from the start of the passage to the chamber, while Kieran and Chris Whitehouse surveyed forward from the chamber.

Kieran and Chris returned with reports of an exciting passage that continued on. The passage got large and started climbing steeply. They only turned back because the disto storage was full.

In 2019 we didn't have a chance to return to this passage, so it was high on the agenda for 2020. A foray in early Feb 2020 showed that it was sumped past the large chamber, something we had not expected.

A few weeks later, Michael Brewer, Bruce Mutton and Mark headed in to continue the exploration. They discovered that, past the large chamber, the passage was dry but now completely filled with sand. This was very annoying, given that the previous year the passage was completely clear.

It turned out to be a big dig. Michael, Bruce and Mark started on the job, but without any digging tools they were only able to make a small amount of progress.

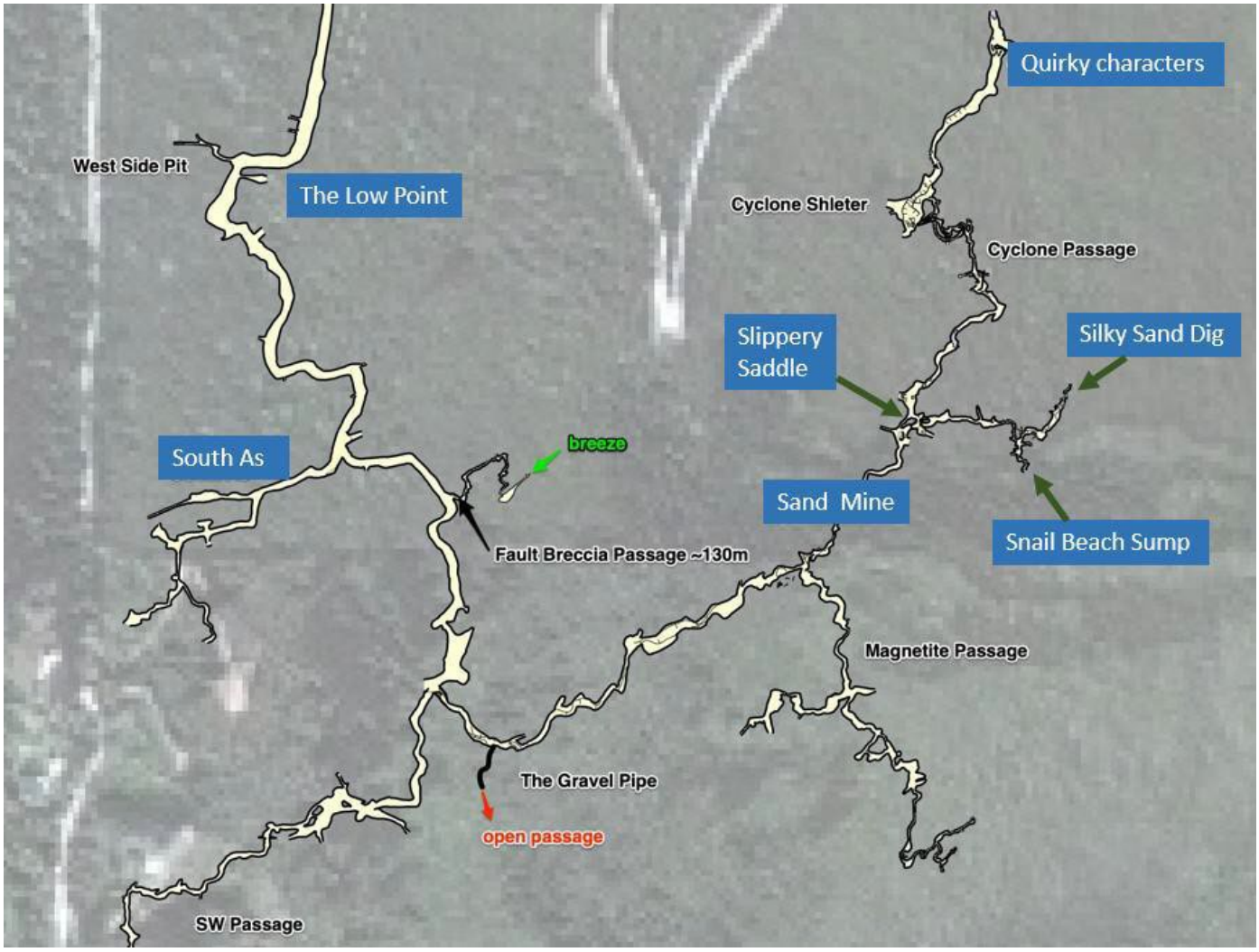
We returned a few weeks later. Rob, Michelle and Nicole Millar were joined later by Mark and me. Armed with tools and our digging machine, Rob, we were able to make good progress. It was our longest dig, and by the end of the day it was so long that it needed 4 of us positioned at various points down the passage to haul out the tray.

We finished at about 5pm. Rob, Michelle and Nicole had been working almost non-stop for 4 hours. Although late, we decided to do a quick trip along the passage. We squirmed along the long, steeply downhill sand dig. The first mystery of the passage immediately presented itself. Where had all the sand come from? There was no sand further upstream, as one would have expected if it had been washed downstream. Had it come out of small side passage just past the dig, or maybe it had risen up from below?

After a low muddy section, the passage opened up till we came to an obvious intersection. Kieran and Chris had gone right (true left) – Rob quickly checked out the left branch. He managed to get 80m before getting to a drop to an echoey space that would have needed a hand-line.

We followed Kieran and Chris's route. It opened up to a large heavily-calcited passage heading up steeply. I can certainly understand why they found this such an exciting prospect – it really felt like it was going somewhere. A short climb at the start of this needed a handline, which was left in place for future visits. At the top of the passage, we found Kieran and Chris's final survey point. It was in a beautiful chamber, however the passage stopped at this point. Another passage further to the right also stopped. We felt quite cheated as Kieran and Chris had indicated that the passage continued.

It was getting late, so we headed out, intending to return and fully explore the passage which Rob had gone up, plus check out a few other leads. However, the summer ended before we had a chance to do this. Will the sand return before our next visit? It seems very likely, and will it be worth the effort of excavating again?



The southern limit of Tōtara Cave showing key features. About 3km of passages shown.

Sand Mine

The main prospects for heading towards Canaan lie in the passages in the south-east part of the system. This area was first visited by Kieran in February 2015, both solo and with Josh Bratchley. We also visited this on our first trip into the system in March 2019.

Once past a prominent intersection (with Magnetite Passage) the passage drops 4 or 5 metres to a level only slightly higher than The Low Point. This area often sumps, and also fills with sand – the Sand Mine. While it is generally an easy dig, this marks the start of a long section of crawling through a low sandy passage. The quantity of sand through this section is truly astonishing. This coarse dark granite sand would have originated from Canaan, telling us that this was the best prospect for a route further inland. A strong breeze, which is sometimes present, gives further evidence of this.

Michelle on the long sand crawl through the Sand Mine area.

Past the Sand Mine crawl, one comes to the Slippery Saddle – a 4m climb up and over a very smooth piece of marble. I often struggle to get over this, even with a handline in place. One of the enduring mysteries of Tōtara is how we all managed to get back over this on our first visit without the use of a rope

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Quirky Characters

By going over Slippery Saddle we initially failed to see a major side-passage which heads off in the middle of the low sandy crawl underneath the saddle. On a survey trip in 2019, Rob, Michelle and Kieran found this passage. Kieran did the initial foray up the passage while Rob and Michelle were working on the survey. He reported a strong passage continuing.

A period of wet weather frustratingly shut down access through the Sand Mine, preventing further exploration in that area. It wasn't until February 2020 that the way was open again. Rob, Michelle and Jonathan Davies returned to the area and explored 170m of new passage until they were stopped by a 12m drop.

A few days later, Rob and Michelle returned with Tony Salmon. Armed with a drill and rope, they descended the pitch to enter a complex area with many prospects. Rob managed to find an onward route via a marginal climb. With their only rope in use, it was unclear how to protect the climb – until Tony went back and managed to hack off 4m from their rope using a sharp piece of marble. The group carried on to a large chamber – with ex-cyclone Uesi bearing down on the country, this was named Cyclone Shelter. Arguably there may be better places to wait out a big storm, given that a flooded Sand Mines could trap a party there for many months. While Rob and Michelle surveyed the

Shelter, Tony carried on and found a passage filled with impressive helictites. They called it the Passage of the Quirky Characters, as much as a reference to the three visitors as to these truly remarkable formations.

Rob returned a few days later with Mark, Bruce Mutton and Jonathan Davies. The rigging was improved, and a number of unexplored leads checked out.

We intended to return to get a good photographic record of the helictites. However, diverted with numerous other projects, we never returned to this area.

Snail Beach Sump

Past Slippery Saddle, it is a short distance to another sand dig. On our first visit to the cave in March 2019 we stopped at this point.

In late February 2020, Rob, Mark, Jonathan and Bruce took on the job of continuing along the passage. It was many hours of digging to get past a series of low points in the passage.

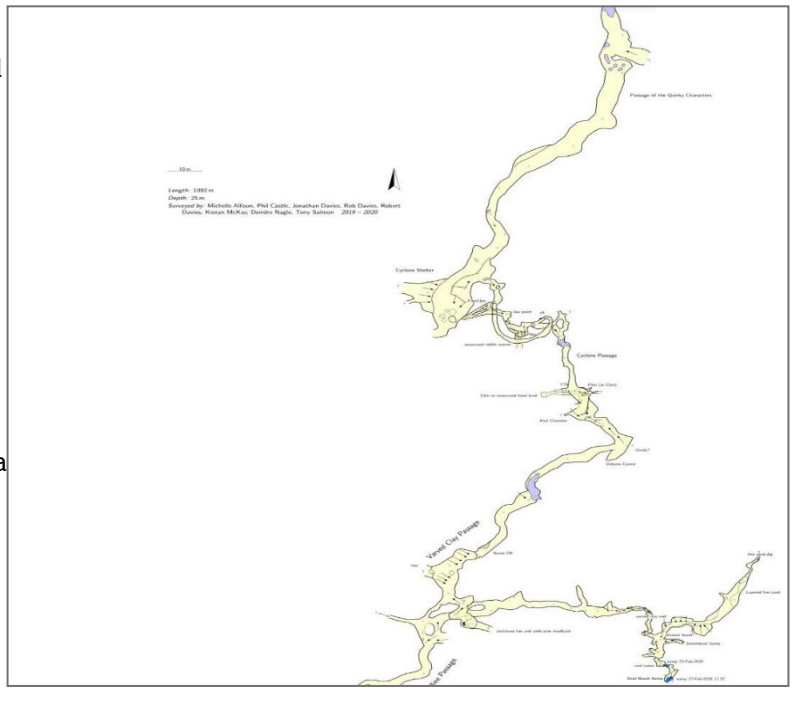
Once through this, they reached an interesting spot – a T intersection with several options.Straight ahead was a steep slope leading up to a small hanging sump. This was only 2cm high and 10cm wide so wasn't a good prospect for an onward route. The small air gap above the watersometimes had a breeze blowing through it making a regular pulsing noise. I was fascinated by it. I called it Steamboat Sump, after stories I had heard of Steamboat Springs in Colourado. This was similar to other areas we had come across in the cave – when the wind and water levels are just right it can sound like African drumming. This is an unnerving sound to hear when exploring a new passage in an otherwise silent cave. We speculated that hippies from the Tākaka Village Green had somehow beaten us into the cave and set up a drumming session ahead of us.

Not far from Steamboat Sump was a slot which had a low droning noise coming out of it. While the sound was quite distinct, we were baffled as to what might be causing it. We weren't even sure whether it was caused by water or wind. To me it sounded like a thin stream of water pouring into a deep pool, but who knows. It felt that the cave was taunting us with tantalizing but cryptic clues about what lies ahead.

Left from the T intersection was a short but tall passage leading to another dig. The sand here was fine-grained and soft, so we called it the Silky Sand dig. But, not being granite sand, it was unlikely to have originated from Canaan, so this was unlikely to be the onward route in the cave.

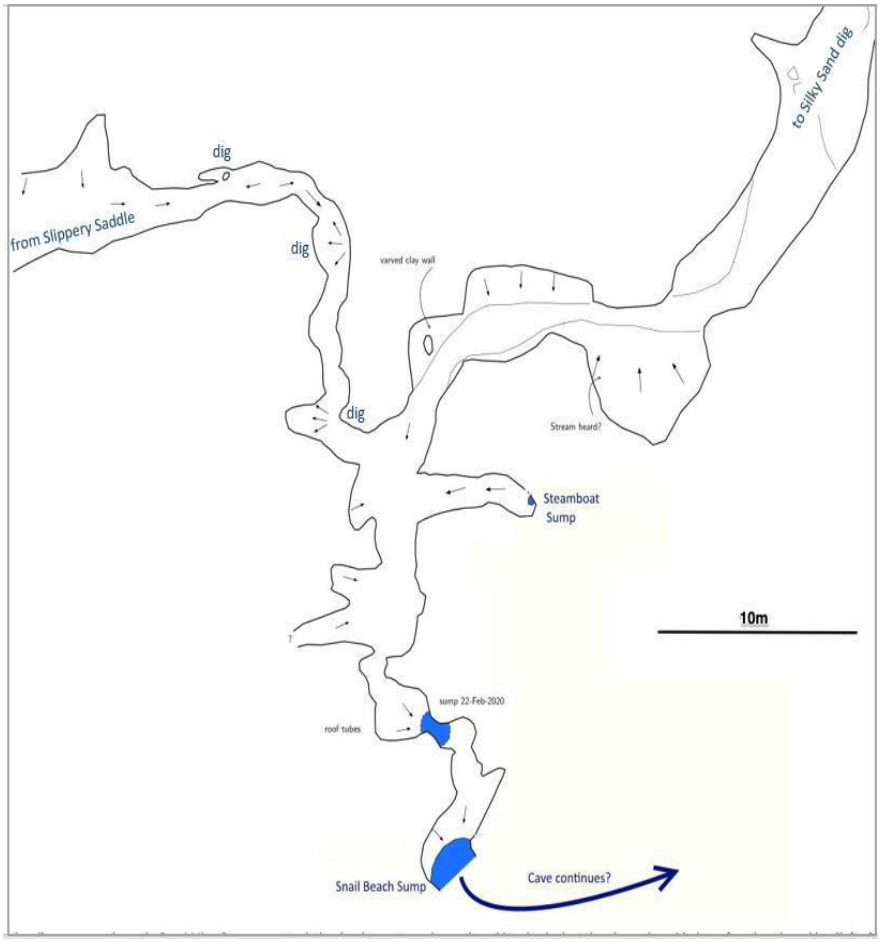
Right from the T intersection was the most likely onward route. A couple of small sumps soon dried, taking us to another more persistent sump. Over the next few weeks, we were to visit the sump over half a dozen times. While it wasn't a big sump, the water only very gradually lost height.

The small beach beside it was covered in hundreds of microscopic snails, almost invisible to the untrained eye. Rob gathered a lot of these for a snail expert he had been dealing with. Amongst other things, identification of these might provide a clue on the origin of the sand in the passage.



Silky Sand Dig

Early March – yet another trip through to check Snail Beach Sump. It had dropped 30cm, but still had some way to go before it would be passable. This was very frustrating. The sump was not much more than a puddle, but it refused to go away.



To fill in the rest of the day we decided to continue our Silky Sand dig at the end of the left passage. This would be our third session working on this dig. While it was unlikely to be an onward route, on one of our visits Rob thought he heard the sound of a distant stream, so there was some hope that it might go somewhere interesting.

Rob adopted his traditional position at the sand-face, while Michelle hauled back our tray, then I pulled it out to the entrance and disposed of the sand.

The small tube continued downwards and, as we progressed, we moved our operation further into the tube. Sand was dumped in a hole we had earlier excavated in the passage. It was very small and awkward at the bottom and Rob resorted to lying feet-first and pulling sand out with his feet, a very slow process.

After a couple of hours of this, the tube started to get quite foggy and I noticed that Michelle was panting heavily as she worked, unusual for such a fit person. When I went further down the tube, I noticed that I was panting also, even when I wasn't moving. I knew that getting old was tough, but this was something else. I had a seedy feeling, reminiscent of being at 2000m or 3000m.

"Hey Michelle – I think we are getting short of air!".

After a while I managed to convince her (she must have been hypoxic). But then we had the difficult job of trying to get Rob to stop working. He was on the brink of success, having gotten through the end of the dig into a small room and was now working on another small dig.

Rob: "There's only a small amount left to dig. Just need to catch my breath".

Time past. No sign of anything happening up front.

"Rob, how's it going?".

"Still trying to catch my breath".

"There isn't much air! We need to get out right now!".

Starting on Silky Sand Dig.

Surprisingly, he didn't need convincing as he had been coming to the same conclusion. Michelle and I quickly got out and Rob followed slowly not long after. He had quite a headache and didn't feel so good but didn't take long to come right.

A lesson for us, and we felt lucky to have had gotten out when we did. If Rob had fainted, it would have been very, very difficult for us to have pulled him out.

Breakthrough at Snail Beach Sump

Unfortunately, our exploration of Tōtara was brought to an early end by the Covid-19 pandemic, which resulted in a lockdown throughout the country.

The day before lockdown, and with caving about to go on hold for some time, Rob and Michelle popped in to pull out some camera gear which Rob had left a short distant into the cave. At the entrance they noticed a strong breeze – could Snail Beach Sump have broken? After a quick call to their callout person (me) they changed their plan and headed through to Snail Beach. They found that the sump had indeed broken, and a gale was blowing through the gap, reminiscent of Ironstone or Nettlebed. The remaining puddle of water was being whipped into a froth. If there had been any doubt that this was the way on in the cave, this was now dispelled.

After clearing some sand away, they squeezed through the puddle to peer up into a large echoey space. What to do? With lockdown about to happen, and with only two in the party, they decided it would be unwise to proceed further. What a difficult decision this must have been!

It felt like a very long time until lockdown eased. While the weather had been mainly fine, a few short rain events had us wondering whether the sump was still open. As soon as lockdown level 3 was over, the three of us headed back in. The entrance seemed particularly windless, which was a bad sign. Sure enough, the sump was sumped again. The frothy water showed us that, until very recently, it had been whipped by a strong breeze blowing over it.

Rob inspecting the re-sumped Snail Beach Sump. Foam hints at wind blowing through a narrow air-gap recently.

This was definitely the low point of the summer's caving. We were a couple of meters away from getting through into the next part of the system, but we couldn't get through. Were we wasting our time even trying? If this sump was only ever passable for a couple of weeks every few years then was it even worth spending more effort on this cave? Morale was at rock bottom.

Before heading out we decided to have a look at the nearby Steamboat Sump. While this was a tiny passage, we had noticed that that floor was mud, rather than marble. How far could we dig down before we came to solid rock? Only one way to find out.....

What gave us pause, however, was that we could see very little of this sump. Maybe there was a large body of water behind the small bit we could see. In which case, as soon as we breached it, a torrent of water would be released and would flood our only exit from the cave. This would be rather embarrassing. We would be trapped in the cave for 10 months or, worse still, risk being nominated for the Arch Nana award.

Rob built a sand bund at the bottom of the slope to divert the flood and we got ourselves ready for a quick getaway. I carefully picked at the mud and slowly released the sump. It was nothing – maybe a litre. Phew.

The dig went well. As we enlarged the passage a breeze started up. We needed to take turns digging to keep warm. It was looking promising.

Once through the initial constriction, we could see an opening on the right. We broke through into a slope leading up into a small chamber. Rob wriggled into this and called back: "The breeze is coming out of a vertical tube which is too small to get through!" Damn! Rob decided to give it a shot and managed to squeeze through into another small chamber. Even I, the largest person in the group, managed to get through.

Rob digging the passage at the former Steamboat Sump.

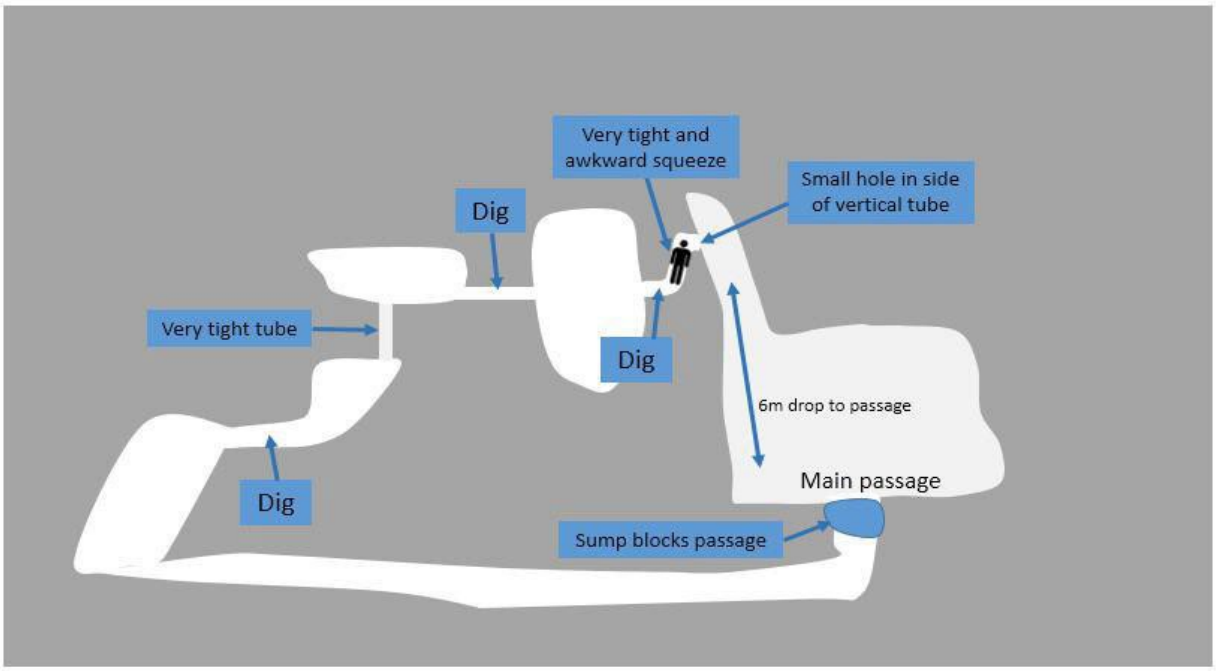
It was looking hopeful again. The way on was through another dig which looked relatively straightforward. Past this dig we could see it opening into a big space.

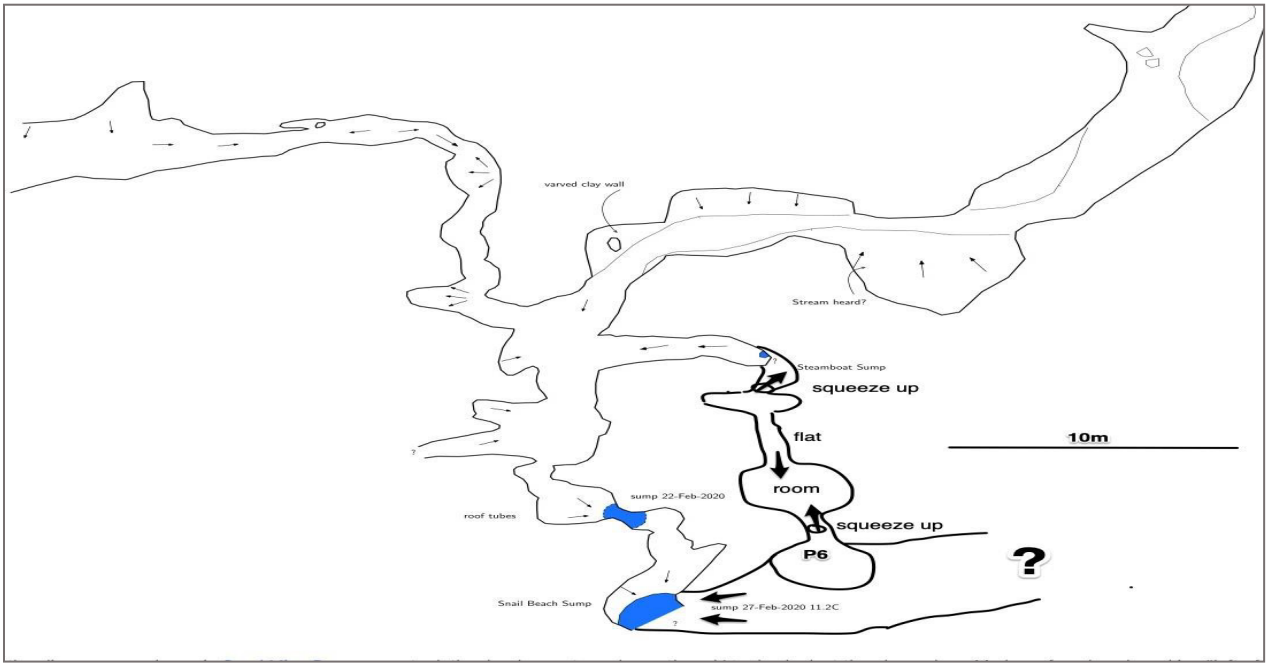
Two days later we were back to work on the second dig. There wasn't much space to deposit the soil, so we hauled out the dirt in a caving pack, lowered it down through the tube and dragged it out of the first dig. Actually, this worked surprisingly well, and 13 loads later we were through the dig. In our excitement at getting through the dig we forgot to empty the last partial load – this explained why Michelle found her pack unexpectedly heavy on the trip out. The last load was dumped on the lawn back at their house!

We had thought that this dig would take us into the passage inland of Snail Beach Sump, however we found ourselves in yet another chamber. The breeze was coming out of a small hole in the opposite wall. It wasn't looking good – the hole was about the size of a football, hard to imagine it could be a viable way on. Rob started picking away at it with a trowel. It started to look a bit bigger. A fin of rock blocked the tube – Rob called for a rock to whack this with. However, we were in the Cave Without Any Rocks. We had a think – the last loose rock we saw was probably about 20 minutes caving back. Luckily Rob found a small rock in the mud. This was a key find – he used this to bash off a larger piece of rock, which he then used to bash off an even larger one, which he then used to bash off the fin. Finally, the tube was looking like it might be big enough to get through.

Michelle squeezed through with difficulty and around a 90-degree bend to stand up. Despite being in a very confined spot, she had just enough space to be able to scrape the mud off the walls. Finally, she was able to climb up a couple of moves to see where we were. Wow. We never imagined that the tube might take us to a place like this. Michelle was peering out of a hole in the side of an aven, like looking out of a small window in the side of a building. Rob and I took turns following, about as tight and awkward a squeeze as I am prepared to do (it will be easier once we remove another large fin). But what a place it took us to. I was peering down into a large chamber. I could see the very large sand bank leading down to Snail Beach Sump. The chamber felt spacious and airy, it really did feel like we had broken though to a completely different part of the cave.

We were rapt. Celebration all around. We had cracked the secret to gaining the passage past the sump, and the strong breeze told us that the route was clear to somewhere distant. What's more this route will be possible most years, not just in a once-in-a-decade drought.





Well, that's the end of the story. We were burstlingly keen to get back in, rig the pitch, then jog up the passage. However, we were running out of time – water levels were gradually rising in the cave and a big rain event was due in a couple of days' time. Any injury in the cave would give no time for a rescue. We reluctantly called an end to caving for the summer. Can't wait for the next.