Helictite, (2026) 51: 1-15

Gloucester Caves, NSW

Garry K. Smith

Newcastle and Hunter Valley Speleological Society Inc.
P.O. Box 15, Broadmeadow, N.S.W. 2292, Australia. gksmith29@icloud.com

Unless otherwise stated, all photographs and graphics are by the author.

Abstract

Gloucester Caves are located on private property approximately 130 km by road, north of Newcastle, NSW. There are two main caves located at the bottom of separate blind valleys that feed water from their catchments, into the caves. The water flowing through the two caves emerges at a common resurgence 640 m to the ESE, on the other side of a ridge. The limestone strata is approximately 23 metres thick and together the two main caves contain in excess of 600 m of surveyed active stream passage plus more than 720 m of unsurveyed dive passage. Included in this total is 650 metres of newly-discovered continuous dive passage, the longest in NSW. The two main caves contain several small cascades and numerous permanent pools scattered along their extent of easily negotiable passage, however each ends abruptly at a sump which has been dived. A diveable passage links GL1 and GL2, however so far no passage has been located to allow physical connection with the resurgence GL4.

The caves contain a wide and diverse range of fauna including: glowworms, trapdoor spiders, centipedes, cave crickets, bats and many incidentals that have been carried in by floodwaters. Two species have been identified as endemic to the area. There are few speleothems, however the caves arguably contain some of the best preserved early Carboniferous fossils to be found in Australia. These include solitary corals and intact crinoid stems up to 30 mm diameter x 300 mm long.

INTRODUCTION

Gloucester Caves are located near the headwaters of Bakers Creek approximately 15km ESE from the town of Gloucester. All the caves are on private property and prior permission must be obtained before entering the properties (Figure 1).

The two main caves in this karst area are relatively small compared to other caves in NSW

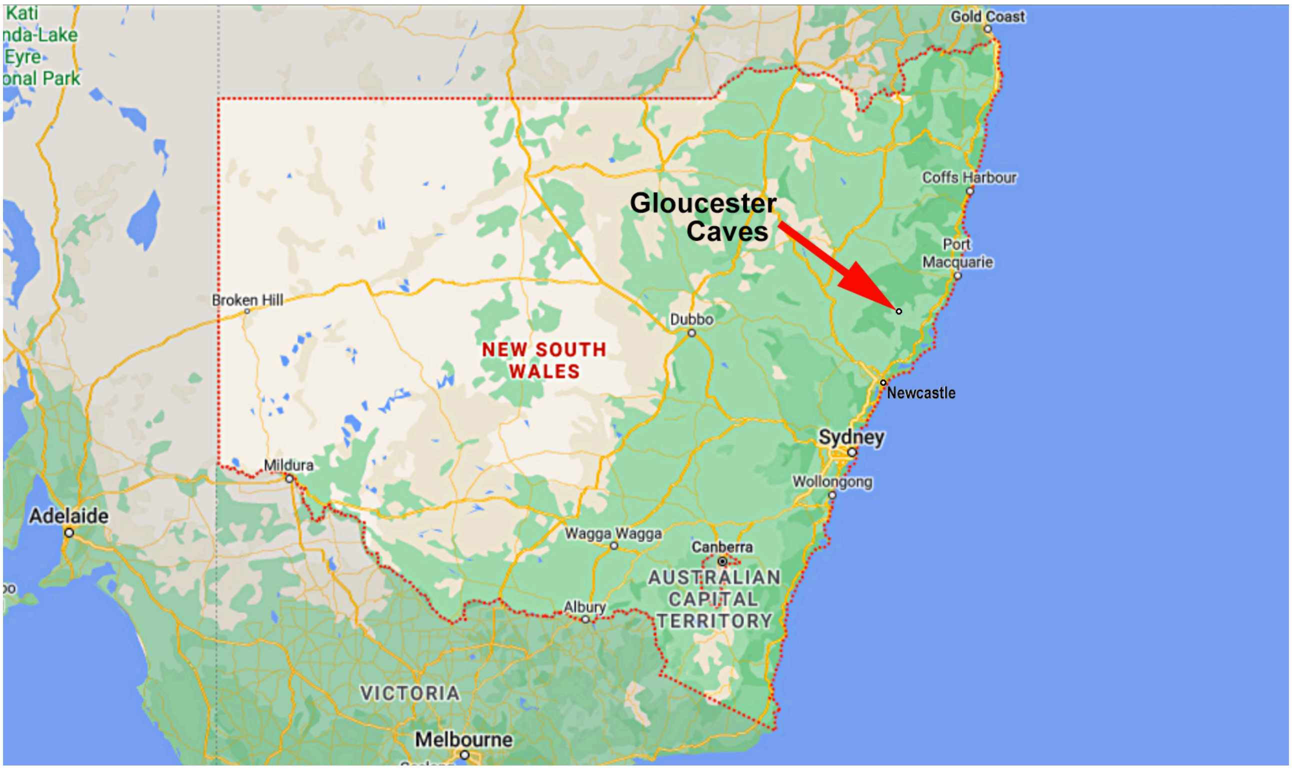
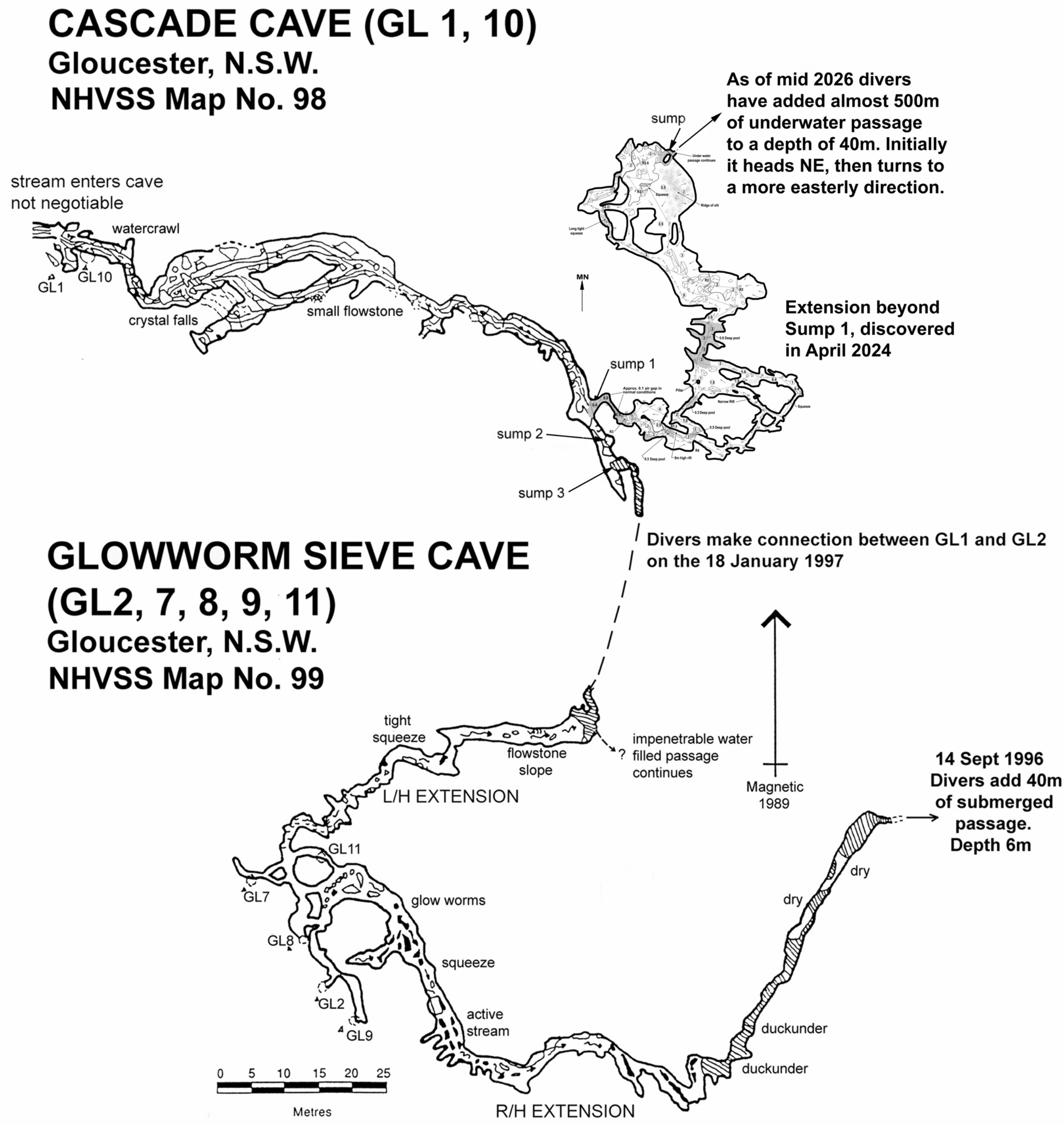


Figure 1. Map of NSW showing location of Gloucester Caves. (Source: Google Maps)

and on the whole are devoid of speleothems. No ropes or ladders are required in this karst system. However, the caves contain some of Australia's finest examples of fossilised crinoids and solitary corals. Because of the active streams, these caves support a large population of glowworms, along with other fauna and aquatic life. Large numbers of Eastern Bent-wing bats and the occasional Eastern Horse Shoe bat, use the caves (particularly GL2) for roosting and hibernation.

The two main caves are Cascades (GL1) and Glowworm Sieve (GL2). Both caves are hydrologically connected to a common resurgence (GL4), which feeds into the Wallamba River. The rain that falls within the catchments of the two blind valleys is funnelled into their respective doline and caves (Figure 2), then the water re-emerges at GL4 on the other side of the ridge, approximately 35 m lower in elevation.



Redrawn from University of New South Wales Speleological Society map dated 27-5-74.
Redrawn 13-3-89 by Darren Armitage. Mapped by members of Newcastle and Hunter Valley Speleological Society (NHVSS). In 2017, Rod Obrien geographically placed the two caves so as to indicate dive connections between caves. In 2025 Garry K Smith added extension map to GL1.

Figure 2. Map of Gloucester Caves showing hydrological connections plus newly discovered extension.

There is very little exposure of limestone on the surface surrounding the cave entrances, which is deceiving as it masks the true extent of the cave system beneath.

GEOLOGY

The early Carboniferous limestone is exposed in small scattered outcrops in the hilly cattle grazing country. The exposed limestone is up to 30 metres wide and trends north-westerly for about 8 kilometres. The dip is approximately 22° to the NE. Crinoid and solitary coral fossils are abundant throughout the caves (Figure 3A-F). There are three separate exposures which are repetitions of a single bed in a north-westerly plunging anticline and syncline (Lishmund and others 1986, pp. 289-290). The limestone strata is about 23 metres thick

Figure 3. A. Solitary Coral fossil (Cyalthoclisia laxicolumnaris) in GL12 at Gloucester. B. Solitary Coral fossil in Glowworm Sieve (GL2). C. Crinoid fossil in GL1 at Gloucester Caves. D. Crinoid fossil which has eroded away leaving what looks like a mold or cast of the inner and outer stem GL2. E. Crinoid stem fossil measuring more than 300mm long and 20mm wide in GL1. F. Cross section of an eroded Crinoid stem. Note the stem centre and surrounding limestone are less soluble than the more pure limestone of the fossilized white stem which is eroding away more quickly.

and the unit is underlain by thin parallel limestone bands.

Both GL1 and GL2 caves have formed along joints in the limestone strata, following the dip of the layers.

In the vicinity of the caves there is very little outcropping of limestone. The hill between the two main caves (GL1 and GL2) and the resurgence (GL4) is mainly covered in grassy paddocks with no sign of underlying rock.

DESCRIPTIONS

Cascades Cave (GL1-10)

An active stream from a blind valley disappears into a small pile of limestone boulders where the GL1 cave entrance is located (Figure 4). There is an additional interconnecting entrance (GL10) which only became negotiable in more recent years after the land-slip in mid 1988. The GL10 entrance, is a small squeeze on the right about 2 metres above the stream sink. After scrambling through a rockpile, a pool of knee-deep water with low roof height requiring partial emersion is encountered, however a tight flat squeeze bypass, high on the right, avoids the water. The cave then opens up to a more spacious joint-controlled passage with a few small free climbs over cascades and then a roughly rectangular walk-through stream passage (Figure 5A, B, C, D). In various locations along its length there are groups of up to fifty glowworms (Figure 6).

This cave is an active river passage and contains the largest known chamber in the system, measuring approximately 15m (L) x 7m (W) x 3.5m (H). About half way down, the main passage divides into two for about 15 metres before merging back to one passage. The right passage is usually dry or has just a trickle of water flowing through it. The lefthand passage contains the main active stream. In the vicinity of where the two passages merge, there are some small areas containing flowstone (Figure 7A, B) and a few small poorly developed shawls and stalactites.

After floods, sticks, twigs and other debris may be found jammed precariously in alcoves and cracks along the passage roof, or piled in heaps where they were trapped.

From the entrance to the three small sumps there is approximately 140 m of cave passage which is generally devoid of speleothems. The cave appears to end at the three small interconnected sumps just metres apart and all are accessible on the left side of one narrow chamber (Figure 8A). The permanent pools are rich in marine life; freshwater shrimp, striped gudgeon fish, eels and dragon fly lava. From the third sump, divers have confirmed an underwater connection of approximately 35 m to the sump in the left hand (NE) extension of GL2.

Sump No.1 is very small and until recently was thought to not extend past about 1.5 m. However, in April 2024 during low water conditions, a tight bend revealed 6 m of additional narrow passage requiring one to lay on their back in water and roof sniff along the 10 cm and less of airgap. Past this roof sniff section the cave opens up to 200 m of walk-through passage, including active streamway and another three sumps (Figures 2, 18). This last sump in the new extension has now been dived for another 650 m to a depth of 40 m, making it the longest cave dive passage in NSW. Further dives are expected to extend the length of underwater passage.

Figure 4. Entrance to GL1 in blind valley.

Figure 5. A. The end of the entrance rockpile in Cascades Cave (GL1), where the cave begins to open out into joint controlled passage. B. The passage in GL1 following the dip of the limestone bedding planes. Note the slope of the ceiling along the passage. C. Small waterfalls along the active streamway in Cascades Cave (GL1). D. Rectangular shape passage below the cascades in GL1.

Glowworm Sieve (GL2-7-8-9-11)

GL2 has 5 tagged entrances (GL2-7-8-9-11) and one untagged daylight hole. The total survey length is 215 metres. From the GL8 entrance the cave splits into two main branches through a rockpile. The righthand branch (SE direction) requires a 3 metre free climb down over boulders to the active stream passage (Figure 9). The stream from this point to about halfway through the cave, is mainly flowing below the rocks covering the floor or through small non-negotiable voids.

There is some crawling requited but the majority of the main passage is spacious enough to negotiate by walking or stooping. Throughout the cave there are numerous bedrock columns as the cave has eroded along a network of intersecting joints (Figure 10A, B). About halfway down the cave's length a 4 metre long narrow passage through a chest deep pool is the most obvious route encountered. However, up to the right of this, a horizontal squeeze over a flat rock called the Kitchen Table, allows explorers to bypass the pool. The passage then opens up to become spacious with a scramble

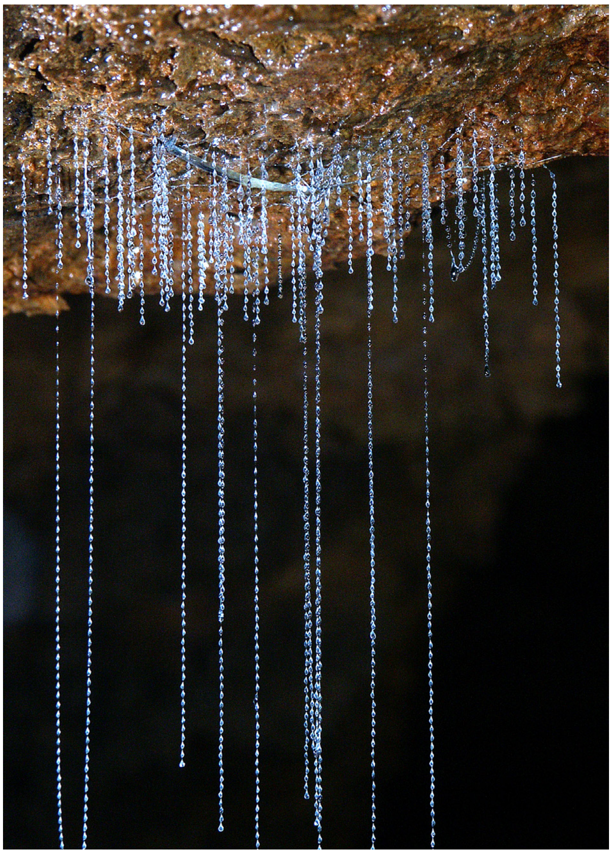


Figure 6. Glowworm with long droplet-covered fishing lines in GL1.

Figure 9. The rockpile climb-down near the beginning of GL2, which is also similar to the one in GL1.

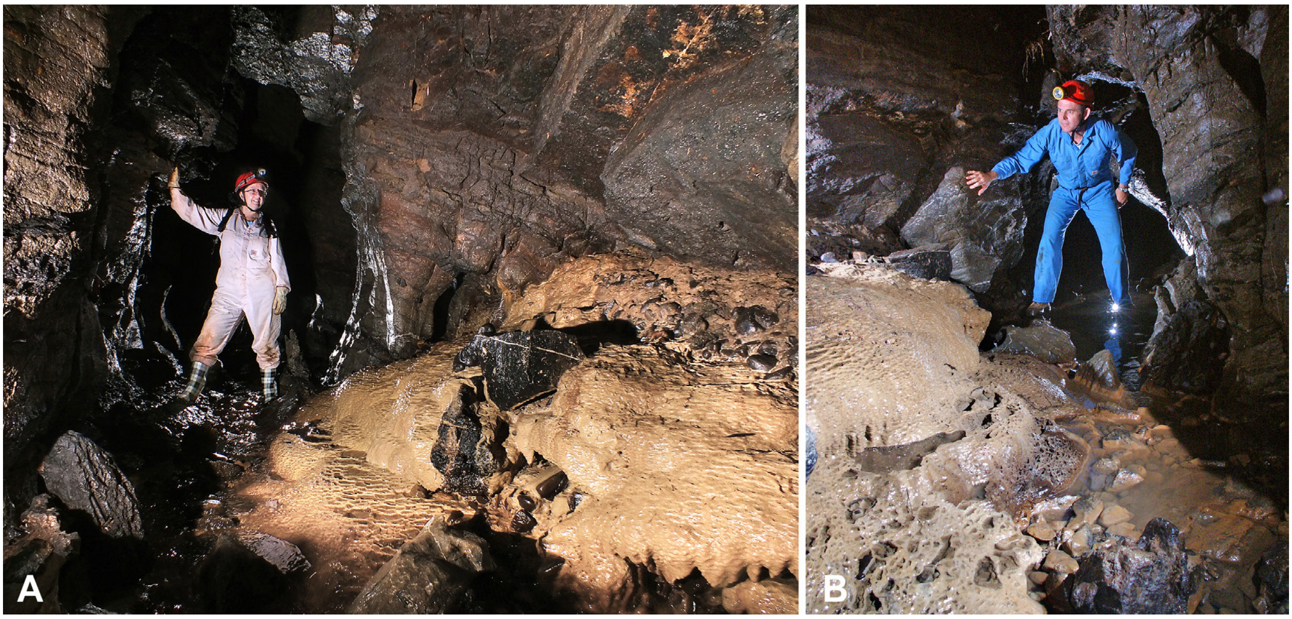


Figure 7. A. Active flowstone extends to the bed of the streamway in GL1. B. This small flowstone deposit in GL1 contains small rimstone dams and is one of the few locations of flowstone found at the Gloucester Caves.

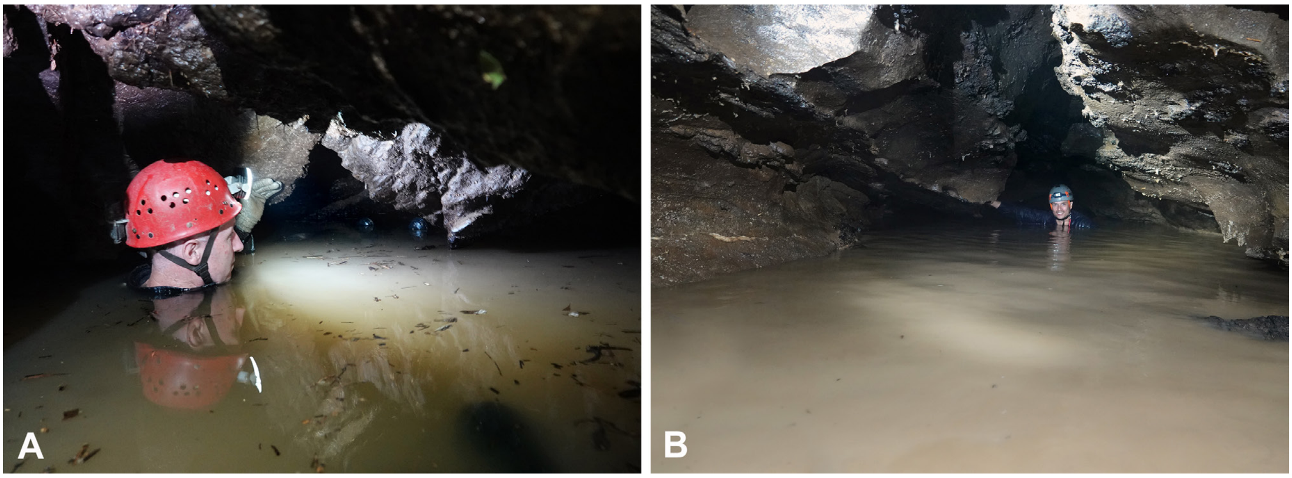


Figure 8. A. The small sump of GL1, the start of the diveable passage connecting with GL2. Note the small pieces of flood debris floating in the water. B. The Water passage leading to terminal sump in GL2.

Figure 10. A. Passage in Glowworm Sieve (GL2) with numerous bedrock columns which have been eroded along a network of intersecting joints. B. A bedrock column almost eroded away in Glowworm Sieve Cave (GL2).
C and D. Rectangular-shaped passage strewn with boulders once part of the cave bedrock in GL2. Note the solid bedrock column in the centre of Figure 10C.

down over boulders in a rectangular shaped passage (Figure 10C, D). A small stream then enters from the right side and a small area of white flowstone is encountered. Lower down the passage becomes narrow as it twists around several 90 degree fault plane controlled bends, before opening out to a 1 to 1.5 metre high water-filled passage. This pool is about 200 metres from the entrance and is between knee and waist deep.

There is often a high level of ‘foul air’ encountered in the small chamber at the start of the water-filled passage. Breathing may be very laboured and uncomfortable at this point. Oxygen concentration can be below 14%, which won’t support the naked flame of a butane cigarette lighter, and higher than 5% carbon dioxide. These conditions can cause cavers to get severe headaches and experience other affects associated with foul air. It is not wise to stay long in this part of the cave if foul air is encountered. See (Smith 1996a) for an in-depth article about testing for foul air and its affect on humans.

In normal water-level conditions the cave ceiling is just touching the water surface about 5 metres on from the start of the pool. Hence, requiring full emersion and holding one's breath to continue past the duck-under (Figure 8B). As it is common to encounter even higher concentrations of foul air in the chamber beyond the duck-under it is not advised to continue. The foul air and a near-drowning in the muddy water halted further exploration by members of NHVSS during many early exploration trips.

In drought conditions the water level was found to be lower, leaving a 10 cm air gap and mild foul air. NHVSS members have explored and surveyed a further 50 metres past the first of two duck-unders, to where the passage abruptly terminates at a solid rock wall above a small sump. From here divers have explored some 40 metres of underwater passage with a maximum depth of 5.7 metres (Hodgson 1997, Smith 1997). Exploration of the underwater passage was halted when the passage became too tight to navigate. Silting of the water causing zero visibility was also an issue.

From the GL8 entrance, the left branch (NE direction) of GL2 enters into a joint-plane maze with several tight squeezes and, further on, opens to a more spacious steeply-sloping passage. This passage generally does not have water flowing down it, but the floor and walls of the low section are covered in sloppy bat guano and mud. Up to several hundred or more Eastern Bent-wing bats (*Miniopterus schreibersii oceanensis*)(Figure 11A) and a few Eastern Horseshoe bats (*Rhinolophus megaphyllus*) (Figure 11B) are often found in this section of the cave. There were about 400 Eastern Bent-wing reported in July of 1994 (Smith 1995). The left branch descends about 20 metres and terminates in a sump similar to that of the right-hand extension. The sump water quickly becomes muddy when disturbed. Divers have connected the left branch sump to the third sump in GL1 (Figure 2). In this paper the small pools of water at the bottom of each cave are referred to as 'sumps' however some referenced literature refers to them as 'lakes'.

From the entrances, both GL1 and GL2 caves descend about 20 metres to permanently water-filled sumps. There is about 10 metres difference in height between these sumps and the resurgence (GL4) on the other side of the hill, a lateral distance between entrances of approximately 640 metres to the E.S.E. To the east of GL2 is a small cave, GL3 located at the end of a small blind valley, later turned into a dam. This cave was 2 metres deep, with a narrow impenetrable slot below that. Pavey (1974) suggested that GL3 is a feeder sink to the GL2 cave, due to its proximity.

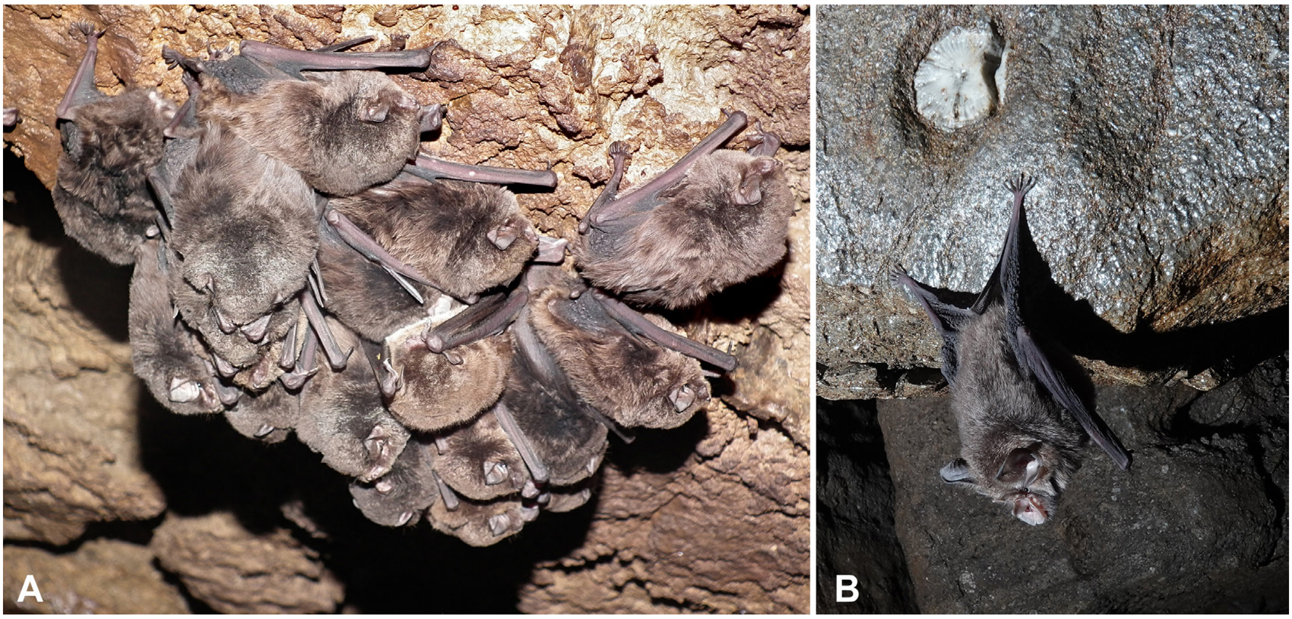


Figure 11. A. Eastern Bent-wing bat *(Miniopterus schreibersii oceanensis)* in GL2. B. Eastern Horseshoe bat *(Rhinolophus megaphyllus)* near a solitary coral fossil in GL2.

Other Caves

The resurgence (GL4) has small non-negotiable gaps between rocks from which water flows out. A little further up the gully (within 8 metres of GL4) are two attempted digs (GL5 and GL6), both of which penetrate just a couple of metres between boulders before reaching water between non-negotiable gaps in the rocks.

Several other small caves exist within the narrow band of limestone which outcrops at various locations over about 8 kilometres. These include caves GL12, GL13, GL14 and GL15, which have all been tagged (VandenBerg 1996, Smith 2016).

Gecko Cave (GL12) was named after the Leaf-tailed Gecko (*Phyllurus platurus*) found in the entrance (Smith 1995). This cave is 15 metres deep and has 60 metres of surveyed passage. It contains some excellent examples of solitary coral fossils (Figure 3A). The lower chamber is quite spacious at 12 m L x 5 m W x 7.5 m H and has a reasonably flat earth floor (Smith 1995). A well-preserved fossil of a solitary coral in GL12 was identified as belonging to the Rogose class and most likely a *Cyalthoclisia laxicolumnaris*. Fossilized crinoid stems commonly found at Gloucester Caves are most likely *Actinocrinites,* belonging to the subclass Camerata (Smith 1996b, c, d).

FAUNA

As mentioned previously, up to several hundred or more Eastern Bent-wing bats and a few Eastern Horseshoe bats, use the caves for roosting and hibernation (Figures 11A, B). However, a large variety of other fauna can also be found in the caves.

Troglobitic invertebrates include: trapdoor spiders (*Misgolas grayi*), cave crickets, glowworms *(Arachnocampa richardsae)*, centipedes and millipedes (Figures 12A-F). There are many invertebrates that are not troglobites, but are referred to as incidentals as they swim or are washed from surface streams into the caves. These include Riffle Shrimp, *Australatya striolata* (Figure 13A), crayfish (*Euastacus spinifer*) (Figure 13B) and the lavae of dragon-fly, mosquito and caddisfly, to name a few. The larvae washed into the cave eventually emerge as adults and remain trapped underground, eventually succumbing to the high cave humidity (Figure 14). Small fish, eels, frogs and other small vertebrates can be found in the sumps and pools in both caves (Figure 15A, B). Eastern Snake-necked turtles (*Chelodina longicollis)* also known as the Eastern Long-necked turtles (Figure 16), are commonly washed into the caves by flood waters and are often encountered at different locations in the caves, as far down as the terminal sumps (Figure 8A, B).

A number of mammals and reptiles are found living within the caves' twilight zones and within the first few tens of metres from the cave entrances. These include the brush-tail possum, native rat and leaf-tailed gecko lizard (*Phyllurus platurus*) (Figure 17A, B).

HISTORY

There appears to be no recorded information regarding discovery of the caves. However, they would have certainly been known about, after graziers settled in the area during the mid-1850s when the township of Gloucester was first established.

Up to about 1946-47 the grazing land surrounding the caves supported an economically viable dairy herd, however after this time the property-owner switched to beef cattle.

The first record of a caving club visiting the caves is the Newcastle Technical and University College Speleological Society (NTUCSS) in 1959 (Angel 1963). They visited the caves on several occasions between 1959 and 1960.

In August 1960, thirty-two members of the NTUCSS (later called NUSS) visited Gloucester Caves and while some of the group investigated the hydrology and possible link to the efflux over the ridge, Len Steel and several other members undertook a survey of the two caves. On the same weekend they held a meeting at the School Hall with most of the locals to explain their planned hydrology project. With the full co-operation of the locals they planned to return within a few weeks to ‘plant’ activated charcoal to ‘seed’ the two underground lakes (Paine 1960). No follow-up trip report could be found, however a postscript by Ronald Paine (1963) says that the Gloucester Caves “Riddle of the Waters” could not be solved after dying the lakes and testing the effluxes.

During a particularly dry period in the early 1960s the property owner, Mr Peter Green, saw a good opportunity to utilise the small creek and doline of Cascades Cave (GL1-10) as a dam. He used vehicle tyres, thick plastic and earth to block

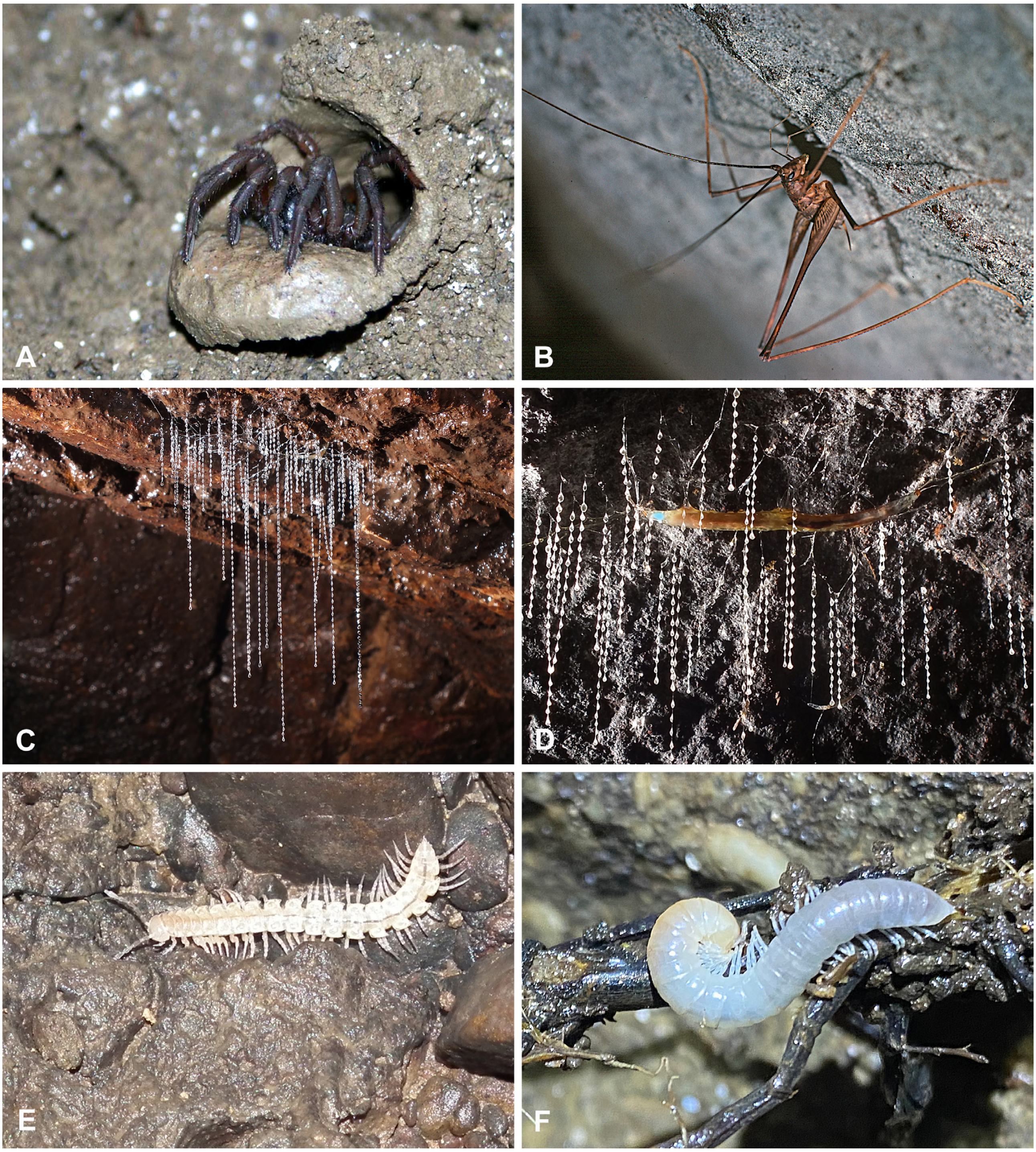


Figure 12. A. Trapdoor spider *(Misgolas grayi)*, endemic to Gloucester Caves. B. Cave Cricket possibly *(Australotettix montanus)*, found in all the Gloucester caves. C. Glowworm *(Arachnocampa richardsae)* with 'fishing lines' containing sticky droplets to catch its pray. D. Closeup of a glowworm. E. Blind centipede. F. Blind millipede. Both centipede and millipede are found in both GL1 and GL2 caves at Gloucester.

off the cave entrance. After rain the dam filled to a depth of approximately 10 metres above the cave entrance (Pavey 1974b). In the middle of the night Mr Green received a phone call from another property owner who said, “I think your dam is over my side of the mountain” (Green 1996 pers comm). The dam had broken through to the cave and the subsequent flood of water was issuing from the resurgence (GL4) like a large fountain and flowing down the creek. Pavey (1974b) suggested that, “With this type of testing, fluorescein tracing seems somewhat unnecessary”.

Towards the end of the 1960s, Keith Oliver (Highland Caving Group (HCG), University of NSW Speleological Society (UNSWSS)) after several visits with HCG, introduced members of UNSWSS to the area.

Figure 13. A. Riffle Shrimp, *(Australatya striolata)* in GL1. This one is approximately 65 mm in body length. B. Crayfish *(Euastacus spinifer)* in GL1. This one is approximately 120 mm in body length.

Figure 14. Dragon fly covered in condensation droplets in Cascades Cave (GL1).

Figure 16. Eastern Snake-Necked Turtle *(Chelodina longicollis)* (Subfamily - Macrochelodina).

Figure 15. A. Striped Gudgeon fish *(Gobiomorphus australis)* in Cascades Cave (GL1). B. Eastern Stony Creek Frog *(Litoria wilcoxii)* in GL2.

Between 1964 and 1966 the limestone was mined for 18 months during a drought period. It was a one-man mining and crushing operation. The closure of the unprofitable mine appears to have been due to the extreme hardness of the limestone.

During 1966 glowworm specimens were collected from the Gloucester Caves and R.A. Harrison described and identified then as a new species, *Arachnocampa richardsae.* The species was named after Dr. Aola M. Richards of Sydney, who collected most of the specimens (Harrison 1966).

The species was placed into a separate sub-species from the two other species of *Arachnocampa*

Figure 17. A. Brush-tail Possum in GL12. B. Australian bush rat *(Rattus fuscipes)* in Cascades Cave (GL1).

then described, these being *Arachnocampa luminosa* (from New Zealand) and *Arachnocampa tasmaniensis* (from Tasmania). The new sub-species was called *Campara*.

In April 1974 a group from UNSWSS resurveyed both GL1 and GL2. They started surveying in GL2 with a forestry compass and found it kept fogging up due to the high humidity; also the restricted sections of passage made the forestry compass impractical. They soon reverted to using Suuntos and fibreglass tape (Oliver 1974). Then in May 1974, UNSWSS members held a return trip and attached tags to the GL4-5-6 entrances (Pavey 1974a).

Between 1978 and 1980 Darren Armitage and members of NHVSS observed that after heavy rain Cascades Cave (GL1) doline continually filled to near the top. However, more recently the stream has continued unimpeded through the mountain to the resurgence. The remains of plastic sheet and vehicle tyres have since been removed from around the entrance.

Three members of Sydney Speleological Society visited the caves in August 1961 (Lane and Nurse 1961). By the description in their trip report, it appears that they only ventured into GL1. They reported on the wide range of fauna in the cave, including the trapdoor spiders. “It is rather a disconcerting experience to be confronted in a low-roofed passage, by a trap-door spider glaring at you from the lip of its drill-hole, then to have it back down the hole and slam the trap-door in your face.”

Between that time and the present, there appears to have only been a few visits a year to the caves, often by groups of locals.

The doline which contained the impenetrable soak had been assigned the cave number GL3, but this feature was made into a farm dam in mid 1988. A small natural blind valley provides the catchment area for this dam.

Between February 1986 and 1990 members of NHVSS regularly monitored the air quality and sump levels in both caves. Sump levels were found to vary only between -10 mm to +15 mm either side of the datum point. The air on the whole was found to be good to fair on the entrance side of the first duck-under sump of GL2 and good in GL1 (Armitage 1992).

During drought conditions in July 1994, calcite rafts formed on many of the pools in GL1. “Because of the almost drought conditions which had occurred over the last few months, it was noted that most of the stream passages where the water was still trickling had a white layer of calcite over the rocks. Calcite rafts covered many of the pools and small fragile rimstone dams up to a centimetre high had formed around many of the pools” (Smith 1995).

During 1996 divers from NHVSS and Sydney University Speleological Society (SUSS) undertook a number of dives into the sump in GL2 right extension. This culminated in a total of 40 metres of underwater passage being explored to a depth of 5.7 metres. Water temperature was 18°C. Silting during the dives and the tight restricted water passage with no tie-off points for the dive line, were issues of great concern (Vincent 1997, Smith 1997, Hodgson 1997).

On 18 January 1997, divers Merv Maher (SUSS) and Dave Apperley (NHVSS), with the assistance of other NHVSS members, were able to complete a dive between the sump in GL1 and GL2 left extension sump. This confirmed for the first time that the two caves were definitely connected (Vickery 1997).

Having visited Gloucester on many occasions over the years since 1979, Garry Smith (NHVSS) had long suspected that the caves contained a yet-to be-described species of troglobitic trapdoor spider. After communication with Dr. Mike Gray, Senior Research Scientist at the Arachnology Section of the Australian Museum Sydney, a trip was organized to collect samples on 15 July 2003. A number of specimens were collected and photographed during the visit (Smith 2003). It certainly was a new species endemic to the area and was subsequently named *Misgolas grayi* (Figure 12A)(Wishart and Rowell 2008, p.76).

In October 2023, Professor David Merritt and honours student Sam Malone, along with members of NHVSS, visited Gloucester Caves to collect glowworm samples. This was part of a research project to undertake molecular analysis of the species found from Queensland and down though NSW, to determine genetic variations between isolated populations of the glowworm *Arachnocampa girraweenensis* (Smith 2023, Merritt 2023).

In November 2023, cave divers Tam Durney and Brendan Moore completed a dive between the sump in GL1 and GL2 left extension sump. They had to lay new dive line as there were breaks in the original 1997 dive line. Then in April 2024 during another dive trip, Brendan discovered that the very small sump No. 1 in GL1 continued with a roof sniff passage, around a corner for 6 m and then opened up to walk-through open passage. They both then explored the 200 m of stream passage which led to two small sumps that were connected by 3 metres of underwater passage and a third sump that had the potential for further exploration (Figure 18). Dive trips in this sump during 2024-25, added approximately 150 m of dive line in the underwater passage to a depth of 31 m, which as yet has not been fully surveyed. In July 2025 the air-filled extension was surveyed up to the start of the dive sump (Figure 18). Further exploratory dives in January and May 2026 extended the continuous underwater passage to almost 500 m, with the deepest section reaching 40 m (Durney 2026, Moore 2026). Brendan Moore (2026) states that in 2024, they “started the extension project with basic sump equipment and tiny cylinders, debating whether to take buoyancy control devices or fins, so it seems absurd that exploration in Cascades now requires rebreathers, trimix, multiple bailouts and decompression.” Given the underwater passage length of current exploration and to depths requiring decompression, dive times are exceeding 2 hours. On Saturday 25 July 2026 a further 150 m of dive line was laid which extended the known length of water-filled passage to approximately 650 m. At this point Tam Durney was forced to retreat due to becoming too cold, despite the passage continuing (Durney, pers. comm). The water temperature during this winter dive was measured at between 14 to 15 degrees C. No doubt there will be further dives undertaken to survey and push the underwater exploration into the several leads which show promising signs of continuation. The current underwater discoveries makes GL1 by far the longest cave dive passage in NSW.

ACKNOWLEDGEMENT

Thank you to Katerina Fulton for proofreading this paper.

REFERENCES

Angel, K. 1963 History of the N.T.U.C.S.S., *Cave Annual* (NTUCSS), 1: 3-8.

Armitage, D. 1992 Gloucester Caves, *NHVSS Occasional paper*, 1.

Durney, T. 2026 Gloucester Caves dive trip: 9 - 11 January 2026. *Newcaves Chronicles,* 66: 5-7.

Harrison, R.A. 1966 Australian glow-worms of the genus *Arachnocampa* Edwards (Diptera: Mycetophilidae). *Pacific Insects,* 8(4): 877-883.

Hodgson, J. 1997 Gloucester Cave - Diving report for July and September 1996. *Newcaves Chronicles,* 8: 16-17.

Lane, T, & Nurse, B. (eds.) 1961 Trip to Gloucester Cave – August 19-20, *Communications* (Sydney Speleological Society), 5(9): 52.

Lishmund, S.R., Dawood, A.D. & Langley, W.V. 1986 The Limestone Deposits of NSW, *Geological Survey of New South Wales Mineral Resources* 25, 2nd edition. (Dept. of Mineral Resources).

Merritt, D. 2023 A short note from David about the aims of the glow-worm research to be undertaken by Samuel, *Newcaves Chronicles,* 61: 19.

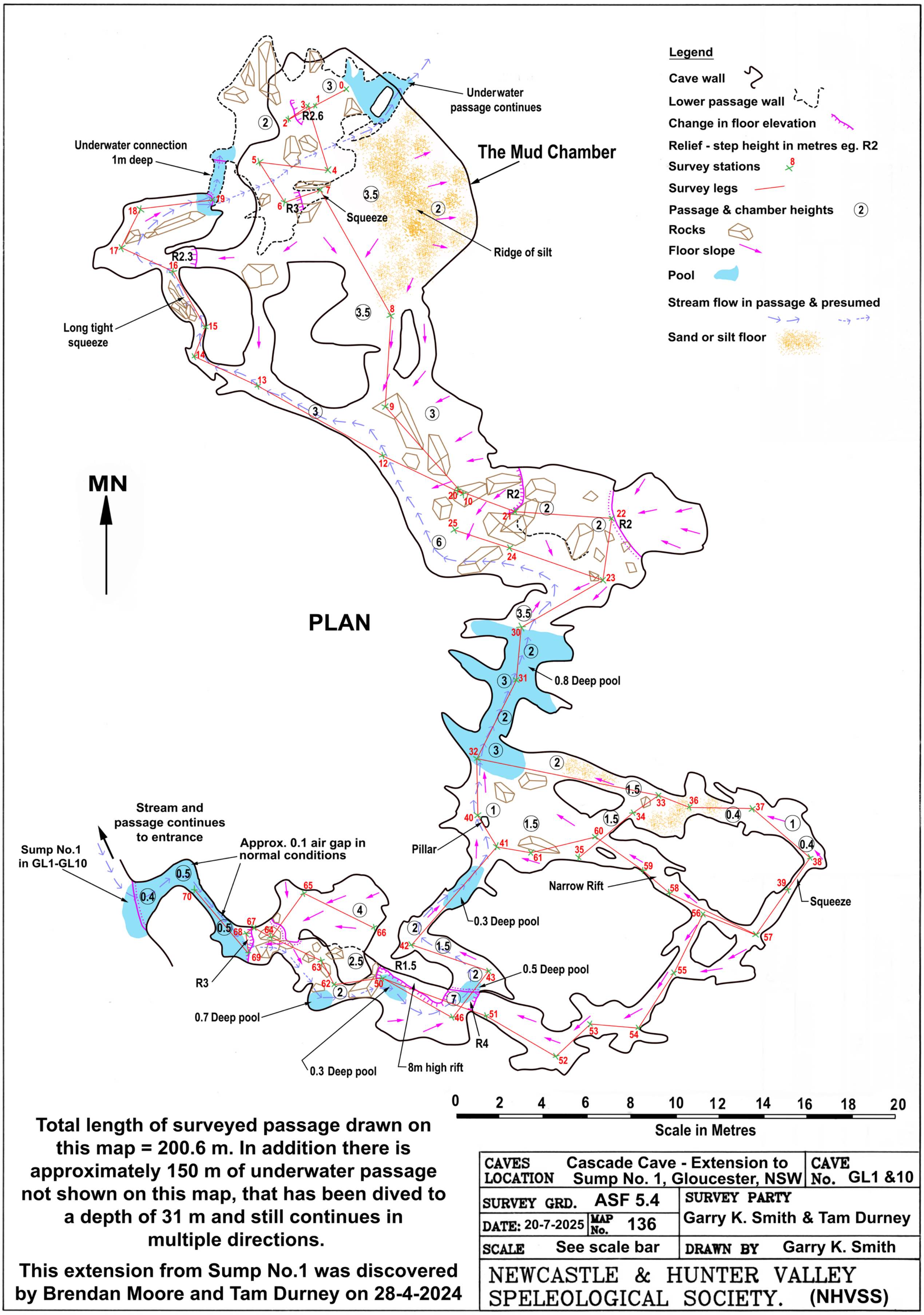


Figure 18. Detailed survey map of extension to GL1, discovered on 28th April 2024.

Moore, B. 2026 Cascades Cave dive trip – Gloucester; 2nd - 3rd May 2026. *Newcaves Chronicles,* 66: 31-33.

Oliver, K. 1974 An interesting little area with a couple of wet caves. *Spar*, 35: 8.

Paine, R. 1960 Trip Report. *Cave* (Official Newssheet of NTUCSS), Sept 1960.

Paine, R.L. 1963 History of the N.T.U.C.S.S., *Cave Annual* (Newcastle Technical & University College Speleological Society), 1: 8-11.

Pavey, A. 1974a Speleotours visits the Hunter. *Spar*, 35: 11.

Pavey, A. 1974b Gloucester Cave descriptions. *Spar*, 36: 15-19.

Smith, G.K. 1995 Gloucester Cave – Trip Report. 10th July 1994. *Newcaves Chronicles,* 4: 4-5, 30.

Smith, G.K. 1996a Naked flame tests for, and human tolerance to, foul air in caves. *Helictite*, 34(2): 39-47.

Smith, G.K. 1996b Gloucester Cave – Trip Report. 7th August 1995. *Newcaves Chronicles,* 6: 6-7.

Smith, G.K. 1996c Gloucester Cave – Fossil identification. *Newcaves Chronicles,* 7: 7.

Smith, G.K. 1996d Crinoids. *Newcaves Chronicles,* 7: 33-36.

Smith, G.K. 1997 Gloucester Caves 14-9-96, *Newcaves Chronicles,* 8: 14-15.

Smith, G.K. 2003 Pilchers Mountain and Gloucester Caves. *Newcaves Chronicles,* 20: 38-39.

Smith, G.K. 2016 Maps of Gloucester Caves GL14 and GL15. *Newcaves Chronicles,* 45: 37.

Smith, G.K. 2023 Gloucester Caves, glow-worm research, 21st October 2023. *Newcaves Chronicles,* 61: 17-19.

VandenBerg, K. 1996 Gloucester Cave, Sunday 4th February 1996. *Newcaves Chronicles,* 7: 5-6.

Vickery, I. 1997 Gloucester Caves - Diving. *Newcaves Chronicles,* 9: 12.

Vincent, G. 1997 Gloucester Caves. *Newcaves Chronicles,* 8: 21-22.

Wishart, G. & Rowell, D.M. 2008 Trapdoor spiders of the genus *Misgolas* (Mygalomorphae: Idiopidae) from Eastern New South Wales, with notes on genetic variation. *Records of the Australian Museum,* 60: 45-86.

Note: An earlier version of this paper was presented at the 32nd ASF Biennial Conference at Ceduna, South Australia in 2023. This version includes updated details of major extensions to GL1, discovered since 2024.