

Gap Creek - Boulder Caves

Garry K. Smith

Newcastle and Hunter Valley Speleological Society

Abstract

The caves at Gap Creek have been created by many large boulders, which originated from the cliffs above and tumbled down the slope to congregate in a perennial stream gully near the end of Bangalow Road. The voids between these large boulders have formed a network of small caves which are now home to a wide variety of flora and fauna.

Gap Creek is located in the Watagan Mountains which form part of the Great Dividing Range to the west of Newcastle. The mountains in this vicinity are typically characterised by flat ridgelines, numerous sandstone cliffs, steep slopes and deeply fissured gullies. The steeply sloping valleys are eroded from sandstone and conglomerate bedrock. In many places 30 to 50 metre cliffs tower above, while other parts of the valleys have steep scree slopes covered in dense rain forest. Large boulders which have broken free of the cliffs over time are now scattered amongst the forest, with greater numbers found in the Gap Creek tributary gullies.

Introduction

This paper discusses the geology, vegetation and recent history of the Gap Creek catchment and details two of the boulder caves in the area. While the caves are relatively small compared to other known caves of this type around Australia, the Gap Creek caves are important as habitats for a variety of fauna which rely on the micro climate found beneath the rainforest canopy and within the caves.

Location

The caves are located approximately 5 kilometres north of Martinsville and approximately 31km West of Newcastle in NSW, at an elevation of 220 metres ASL. The two caves described in this paper are within the Watagans National Park in a tributary gully of Gap Creek, which feeds into Dora Creek and eventually Lake Macquarie. Other boulder caves are located along Gap Creek above the Gap Creek Falls (Figure 1). About 1 km to the south-west of the caves is the National Park boundary and an abrupt end of the rainforest. A fence line marks the transition to private pastoral properties now cleared of the natural vegetation.

Access and amenities

The caves can be accessed from Mount Faulk and Bangalow Roads which enter the Watagans National Park from the South-East (Figure 1). The roads are unsealed and can become very boggy in wet weather, hence National Parks and Wildlife Service (NPWS) sometime close the roads. For further details on access etc, contact the Newcastle and Hunter Valley Speleological Society. P.O. Box 15, Broadmeadow, N.S.W. 2292, Australia.

There is a free public camp ground within several hundred metres of the caves. Facilities include pit toilets, gas BBQs, rubbish bins and walking tracks with some interpretive signs along the way.

There are several lookouts with excellent views, within a short driving distance of the Gap Creek picnic area. These in-

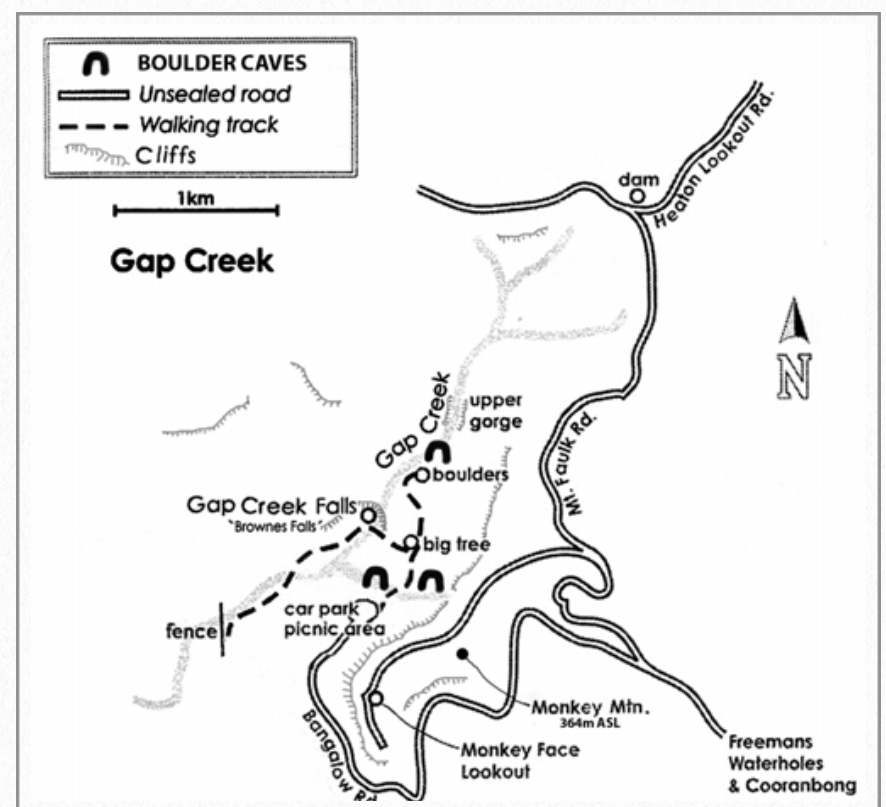


FIGURE 1 Location of Caves within Gap Creek Valley

clude the Monkey Face, Heaton and Hunter lookouts.

Geology

The Watagan Mountains make up a small portion of the Great Dividing Range which stretches for more than 3,500 kilometres down the length of Australia's east coast. The exposed sandstone and conglomerate rocks which make up the cliffs in the Watagan's Gap Creek area, were originally laid down as part of the Sydney Basin strata.

"Generally speaking the sedimentary history of the Sydney Basin is the result of a marine transgression at the end of the Late Palaeozoic glaciation, followed by a marine regression during the Late Permian and Triassic times. Major sedimentation ceased about the middle of the Triassic period." (8)

Subsequent tectonic events lifted the strata to form the Great Dividing Range about 50 million years ago. "More recently, volcanic flows covered large areas of the mountains in basalt. These have largely worn away, leaving only occasional outcrops on the high peaks" (9).

Erosion over millions of years has created the present topography of the Watagan Mountains, which is characterised by flat ridgelines, numerous sandstone cliffs, steep slopes and deeply fissured gullies. The soils are generally acidic sandy loams with low to moderate fertility, and are highly erodable.(4)

The Watagan Mountains consist of thickly bedded sandstone with lenses of conglomerate, dominated by the Hawkesbury and Narrabeen Group sandstones common within the Sydney Sedimentary Basin. (4)

These are Triassic sedimentary rocks formed between 208–245 million years ago.(3)

Hydrology

The unnamed tributary of Gap Creek where the caves are located, is fed from water runoff and seepage from Monkey Face cliffs. This tributary creek flows into Gap Creek downstream of the 40 metre high Gap Creek Falls (previously known as Browne's Falls), then into Dora Creek and Lake Macquarie. The water percolating through the boulder caves is typically crystal clear.

Origin of the caves

Over time many large chunks of the conglomerate and sandstone cliffs have broken away and the boulders rolled down the slopes to collect in the gullies (Figure 2). The caves are created by these large boulders resting in the perennial stream gully near the end of Bangalow Road. The largest of these boulders is approximately the size of a double-decker

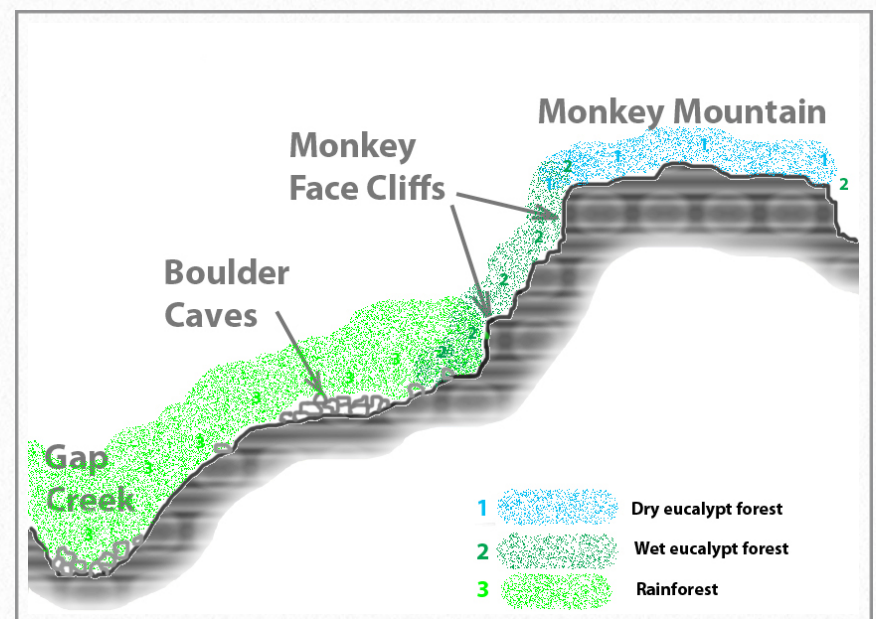


FIGURE 2 Section through Gap Creek and Monkey Mountain, showing location of caves and typical vegetation cover.



FIGURE 3 Cave created by boulders in a perennial creek bed.

bus. The voids between the boulders have formed a network of small caves (Figure 3).

Many of the boulders contain substantial eroded concave surfaces which are consistent with the type of wind and moisture weathering caves occurring in nearby cliff faces (Figure 4). A number of the boulders containing significant weathered concave surfaces have come to rest with the weathered concave surface facing down so that there are now single chamber caves under the boulders. There are also several examples of these weathered surfaces on boulders which make up the two caves described in this paper.



FIGURE 4 Cave under a large boulder which was originally a weathered cliff cave before breaking free of the escarpment and tumbling down into the gully.

Photo G.K. Smith

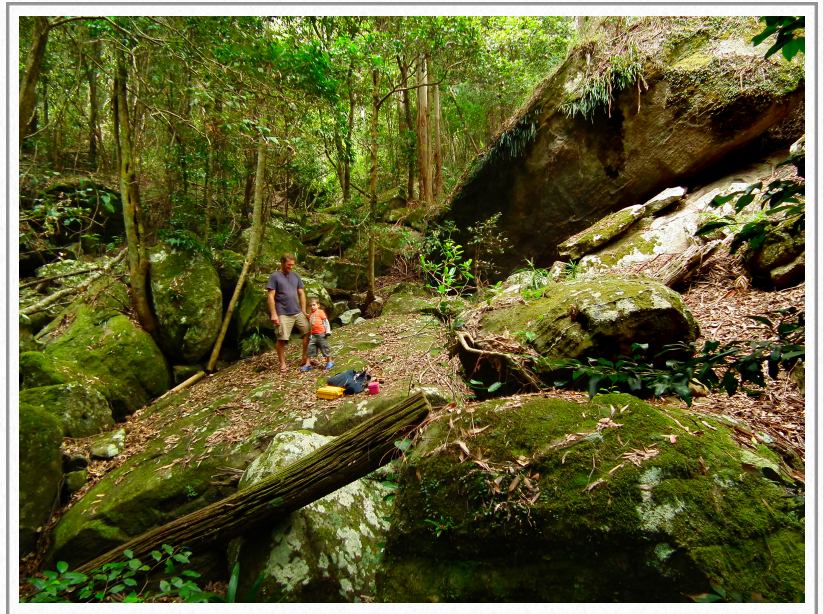


FIGURE 5 Boulders in gully which have created part of Bangalow Rock Pile Cave (I6E-68).

Photo G.K. Smith.

The caves

The largest known boulder caves in the area are near the end of Bangalow Road. They are the Bangalow Rock Pile Cave (I6E-68) and the Log Jam Cave (I6E-69). Cave maps are provided at the end of this paper (Figure 21, 22). Both of these caves and several others located on Gap Creek above the falls are at an elevation of ~260m ASL.(7) The caves contain several permanent pools fed by the perennial stream and water seepage from surrounding soils and bedrock. Hence a high humidity is maintained within the caves all year round.

Bangalow Rock Pile Cave (I6E-68)

This cave is the most significant of the two caves described in this paper (Figure 5). There are four known entrances and a total survey length of 60m. It consists of several chambers connected by low crawl-ways along a perennial stream bed. In many places throughout the cave, the boulders are resting on exposed bedrock, washed clean by turbulent water flow during times of flood (Figure 6).

Several small chambers branch off the main passages at different levels. The upper levels are generally dry and frequented by bats while the lower levels are very damp and favoured by Glow-Worms.

A perennial stream flows through this cave, however even during drought periods there are a number of small permanent pools which retain water. During extended periods of rain the stream increases to a substantial torrent making access to most of the cave near impossible.



FIGURE 6 Inside Bangalow Rock Pile Cave (I6E-68).

Photo G.K. Smith.

Entrance No.4 is the most obvious entry point, however this is the most difficult entrance due to the 3.5m vertical drop and smooth boulder surfaces. This entrance is directly above one of the larger chambers in the cave and allows some light to enter the cave, however direct sunlight rarely penetrates the high forest canopy.

Log Jam Cave (I6E-69)

This cave has five known entrances and the total survey length is 37m. The main entrance is quite spacious and easy to access. There is a large section of exposed bedrock leading from the main entrance down to a pool. From here several crawl-way passages with mud floors, can be followed to other exits from the rockpile (Figure 7). After floods the crawl-ways may be full of forest debris, however this can easily be re-



FIGURE 7 *Cavers exiting via No.4 entrance of Log Jam Cave (I6E-69).*

Photo by G.K. Smith

moved. Leeches have often been encountered near the exits of this cave.

No bats have been observed in this cave despite there being a couple of avens up to 3.5 metres in height.

Fauna

Due to the perennial stream and a number of permanent underground pools located in the cave's dark and twilight zones, a diverse range of aquatic life can be found within the caves. These include: leeches, freshwater snails, fishing spider (*Dolomedes* sp.) freshwater shrimp, yabbies, tadpoles, diving beetles and mosquito larvae to name a few. The caves also supports a healthy population of glow-worms (*Arachnocampa richardsae*), Leaf Tailed Gecko (*Phyllurus platurus*), millipedes, spiders, harvestmen, weta (*Australotettix montanus*), Granny's Cloak Moth (*Speiredonia spectans*) and numerous other species of insects. (Figures 8-12)

At various times of the year, up to 20 Eastern Horseshoe Bats (*Rhinolophus megaphyllus*) have been observed in the Bangalow Rock Pile Cave (Figure 13).

Above ground there are over 150 native animals and 130 different species of birds recorded within Watagans National Park, some of which are listed as endangered or vulnerable species under the Threatened Species Conservation Act 1995. These include the following animals; brush-tailed rock wallaby, yellow-bellied glider, koala, spotted-tailed quoll and two bat species the large-eared pied bat and the yellow-bellied sheath-tail-bat. (2)



FIGURE 8 *Granny's Cloak Moth (Speiredonia spectans)*



FIGURE 9 *Glow-worm (Arachnocampa richardsae)*

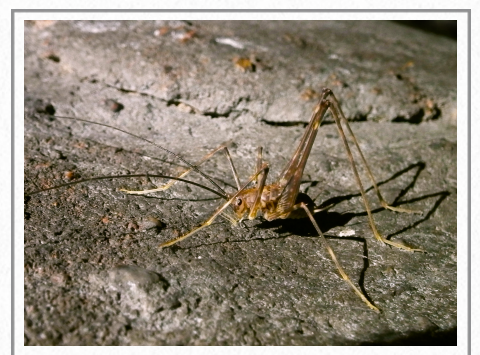


FIGURE 10 *Weta (Australotettix montanus)*



FIGURE 11 *Huntsman spider (Heteropoda jugulans)*



FIGURE 12 *Leaf Tailed Gecko (Phyllurus platurus)*



FIGURE 13 *Eastern Horseshoe Bats (Rhinolophus megaphyllu)*

All fauna photos above, were taken in the Gap Creek boulder caves by G.K. Smith.

Flora at Gap Creek

Within the Gap Creek catchment, there is a wide variety of vegetation ranging from Rainforest in the gullies through to 'Wet Eucalypt Forests' and 'Dry Eucalypt Forests' on top of the ridges (Figure 2). The transition between the vegetation types can be very abrupt and occur due to cliff lines and valleys causing micro climates, as well as soil depth. All three vegetation types occur within a several hundred metre radius of the caves.

Due to the vast number of plant species which comprise the forest types, it would be too large a list to add to this paper.

The NSW Government - National Parks website provides the following very good general description of the three forest types within the Watagans National Park. For more detail refer to

[\[www.environment.nsw.gov.au/NationalParks/parkVegetation.aspx?id=No133\]](http://www.environment.nsw.gov.au/NationalParks/parkVegetation.aspx?id=No133)

Rainforest

Smaller areas of warm-temperate sub-tropical rainforest and paperbark palm forests occur in sheltered gullies and creek-lines (Figure 14 & 15). Typical rainforest species include lilly pilly (*Acmena smithii*), sassafras (*Doryphora sassafras*), brush cherry (*Syzygium australe*), wild quince (*Guioa semiglauc*), coachwood (*Ceratopetalum apetalum*) with tree ferns (*Cyathea australis*, *C. leichhardtiana*, *C. cooperi*), climbing



FIGURE 14 *Rainforest vegetation in Gap Creek.*
Photo by G.K. Smith

vines and epiphytes common beneath the canopy. Isolated stands of red cedar (*Toona ciliata*) and Illawarra flame trees (*Brachychiton acerifolius*) remain in more remote areas. (2)

The paperbark palm forests contain a number of melaleuca species (*Melaleuca biconvexa* and *M. linariifolia*) with white bottlebrush (*Callistemon salignus*) and cabbage tree palms (*Livistona australis*). (2)

Wet eucalypt forests

Watagans National Park and adjacent Jilliby State Conservation Area contain similar vegetation types. Tall moist eucalypt forests are widespread in the reserves and predominately occur on the higher slopes below the ridge line down to the fringes of the rainforest. They commonly contain turpentine (*Syncarpia glomulifera*), mountain blue gum (*Eucalyptus deanei*), white mahogany (*E. acmenoides*), Sydney blue gum (*E. saligna*), blue-leaved stringybark (*E. agglomerata*), blackbutt (*E. pilularis*) and grey gum (*E. propinqua*) with warm temperate rainforest influences dominating the understorey of these communities. (2)

Dry eucalypt forests

This forest type is found predominately on the ridge top where soil depth is shallow. Forest oak (*Allocasuarina torulosa*), Sydney peppermint (*E. piperita*), broad-leaved white mahogany (*E. umbra*), large fruited red mahogany (*E. scias* subsp. *scias*), smooth-barked apple (*Angophora costata*) and red bloodwood (*Corymbia gummifera*) are common in the drier forest areas with understoreys varying from open dry and grassy, to dense shrubbery. (2)

Land surrounding the National Park is used predominantly for forestry, with grazing and smaller rural residential "hobby" farm lots in the foothills and valleys below. (1,1a)

History of the area

The original inhabitants of the Watagan Mountains are the Awabakal and Darkinjung Aboriginal peoples. Evidence of their occupation can be found throughout the area in the form of occupation and art sites, engravings and axe grinding grooves. (1,1a)

European use of the area began in the early 1820s, with the arrival of the cedar getters. Hardwood harvesting followed, bolstered by the construction of the nearby Newcastle rail link in the 1850s, the availability of a timber supply route to the coast via Dora Creek and the growing coal mining industry's need for timber. (2)

Timber was the backbone of the local economy and four large steam-driven timber mills were operating in the area in the 1870s.(6) The Cedar trees grew in abundance throughout the Watagan Mountains and was a very sort after timber for furniture. The early (colonial cedar) trade saw most of the cedar shipped off to England to supply an insatiable market for fine-Softwoods. (7, 7a)

The early roads in the mountains were developed from the original bullock tracks used to extract logs. Timber production from the mountains was increased through the construction of tramways, loading points and elaborate mechanical flying foxes to lift or drag logs to the sawmills.(2)

The demand for railway sleepers generated by the construction of the Sydney-Newcastle railway caused a boom up till its completion in the late 1880's.

In 1916 the creation of the Forestry Commission (now Forests NSW) saw much of the Watagan Mountains set aside as State Forest (2). By 1936 the Forestry Dept had resumed all of the land and declared the whole of the Watagan Mountains as a forest reserve for the growth of timber(7, 7a).

At this time, the newly created Olney State Forest encompassed 44,000 hectares and included the area where the caves are located. Large plantations of Blue-Leafed Stringy Bark and Blackbutt were planted in parts of the forest during the 1960s and 70s, to supplement selected timbers.(2)

During World War II the forests were almost entirely stripped of their softwoods, particularly coachwood, which was used for the Diggers' .303 rifle and for the construction of the Mosquito fighter plane. (6)



FIGURE 15 *Strangler Fig and vines growing over a boulder in the Gap Creek rainforest.*

Photo by G.K. Smith

Monkey Mountain and Monkey Face lookout which overlooks the Gap Creek valley containing the caves, is named after an old lead bullock from the timber-getting days. Monkey was owned by the Browne's family, who were among the early settlers, timber-getters and sawmillers in the area. There are two stories circulating about Monkey. One was that Monkey liked to hide, in its spare time, on a mountain shelf below the top of the cliff line(6) and the other is that it led the whole bullock team over the cliff to their death.(5) Hence the names Monkey Mountain and Monkey Face (Figure 1).

The 40 metre high Gap Creek Falls has only been known by that name since about the mid 1990's (Figure 1). Historically they were known as Browne's Falls (named after the aforesaid pioneering saw milling family in the Martinsville valley). After rain the water topples in wide sheets and veiled cascades over the falls into the broad plunge pool below. The grotto at the base of the falls is very similar to many found in the Blue Mountains.

The Watagans National Park covering an area of 7,798 hectares, was created through the enactment of the Forestry and National Park Estate Act 1998 on 1st January 1999, under which parts of three state forests were combined and transferred to the National Parks and Wildlife Service (NPWS).(1, 1a). This included the Gap Creek Valley previously under the control of the NSW Forestry.

Another 47 hectares was added to the National Park in 2007. (1a)

A draft plan of management for Watagans National Park was placed on public exhibition from 5th December 2008 until 30th March 2009. The final management plan was adopted by the Minister for 'Climate Change and the Environment' on 10th December 2010.

Caves discovery and visitation

No written account of the caves or their discovery was uncovered during the research for this paper, however the author has personally known of the caves since the mid 1970's and their existence was known by a few Scouting leaders at the time. The caves have been explored by groups of Venturer Scouts as part of their Initiative Course between the late 1970's through to the late 1990's.

Since 2000, the caves have been visited on several occasions by members of the Newcastle and Hunter Valley Speleological Society Inc (NHVSS) (Figures 17, 19, 20). However, the location of the caves is not widely known by the general public, thus visitation numbers are relatively low.

The general public frequently utilise the Gap Creek rainforest walking tracks within the Watagans National Park. The nearby cliff faces below Monkey Face are frequently utilised by rock climbers and abseilers as there is easy access tracks from top to bottom around the exposed rock faces (Figure 16). NPWS have also encouraged the general public to visit the forest, waterfalls and walking trails, by provided free camping sites and well equipped picnic areas in the vicinity of the attractions.

Climate

The official Bureau of Meteorology records show that the Olney State Forest has a yearly temperature range between 0°C and 37°C. However, the average temperature range is between 16°C and 30°C in summer and between 5°C and 16°C in winter. The area's highest recorded rainfall is 91.4mm during one day and the average annual rainfall is approximately 1.5m.

Due to the abrupt transition in elevation from the Eastern coastal lowlands at < 100 m, the Watagan Mountain ridges at > 400m receives a higher than average rainfall. Nestled between the mountains, the Gap Creek valley, also receives a high average rainfall as well as the runoff from the surround-

ing ridges. In addition, the high mountain ridges protect the valley from severe winds, which makes it ideal for growth of high canopy rainforest vegetation. These conditions have created a relatively moist micro climate beneath the rainforest canopy and within the caves.

Hazards

There are three hazards worthy of mention.

1. Leeches are very prevalent throughout the forest, particularly during and after wet weather.
2. Ticks are commonly found in the dryer parts of the forest, in particular where there is thick low level vegetation.
3. The unsealed gravel access road can become very slippery and even boggy after extended periods of rain. NPWS may close Bangalow Road to vehicles during extended periods of rain.

Acknowledgements

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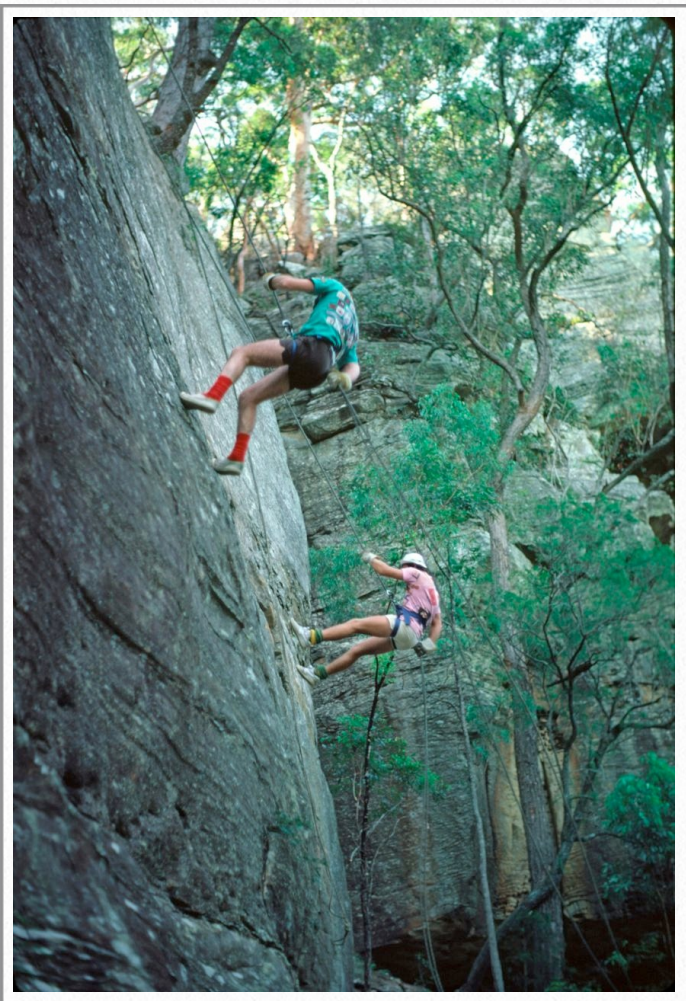


FIGURE 16 Abseilers on the cliff below Monkey Face lookout

Photo by G. K. Smith



FIGURE 17 Caver negotiates a squeeze in Bangalow Rockpile Cave

Photo by G. K. Smith

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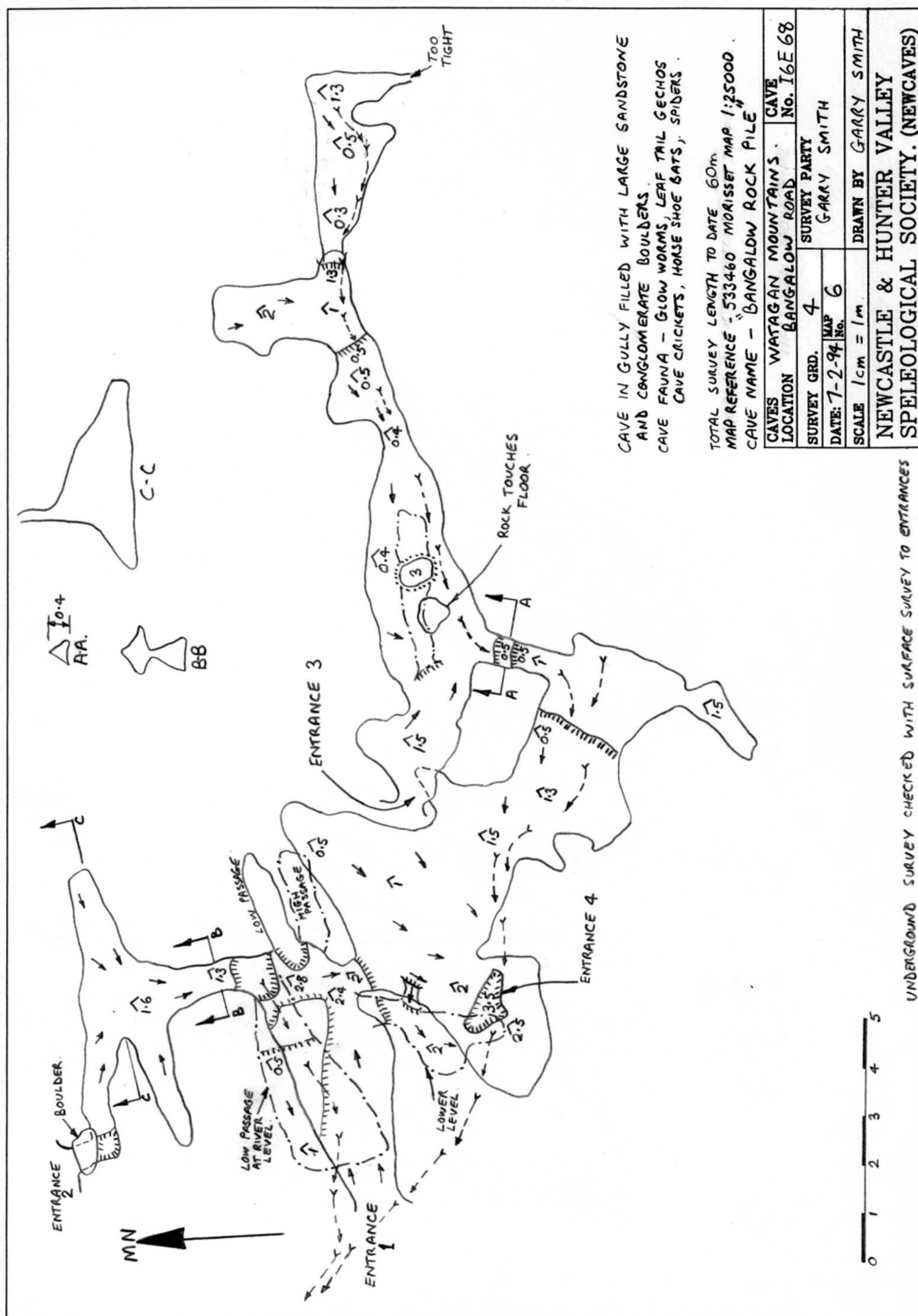
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FIGURE 19 *The author exploring a boulder caves at Gap Creek. Photo G.K. Smith*

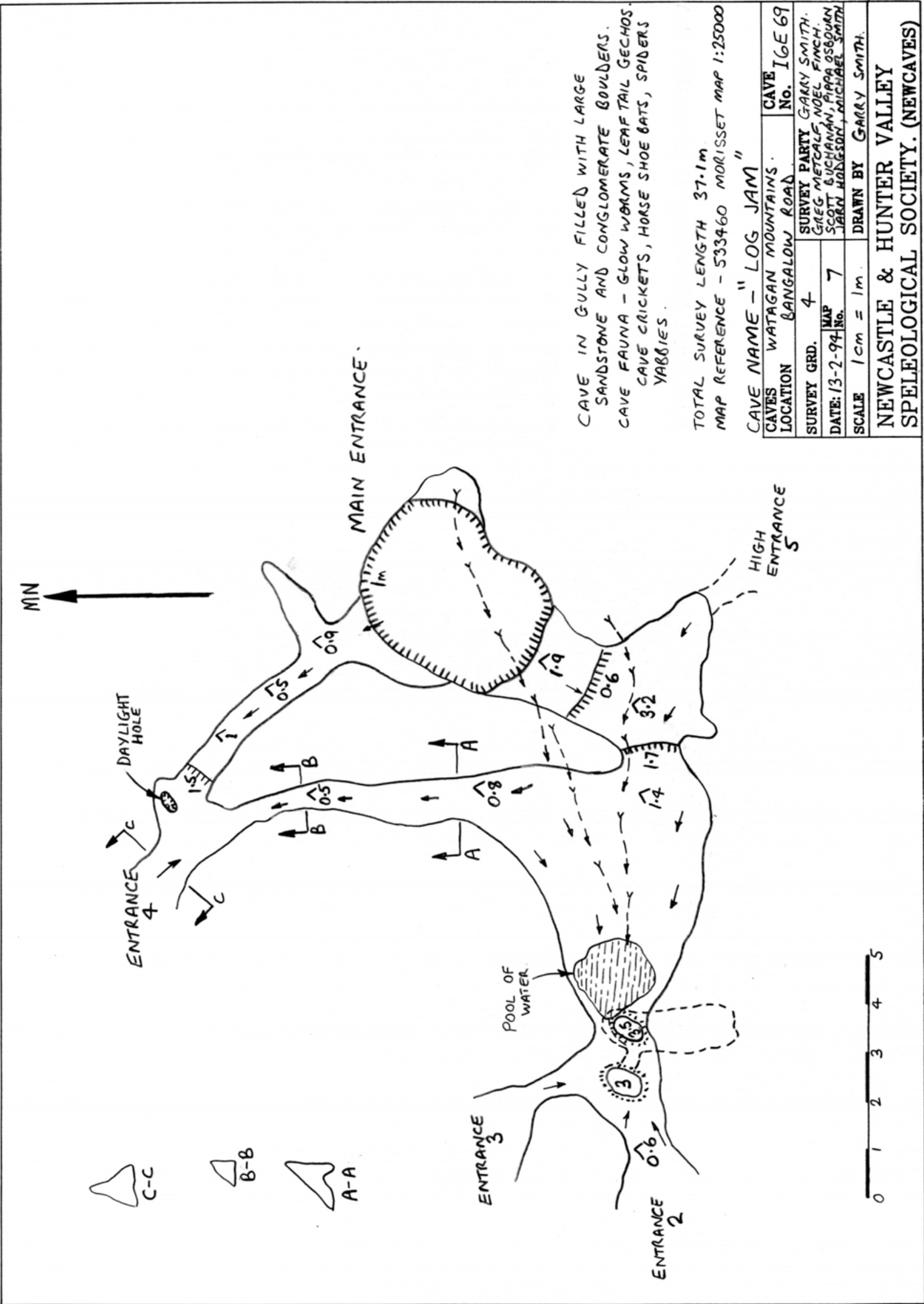


FIGURE 20 *Looking out the entrance of a boulder cave on Gap Creek.* Photo by G.K. Smith



Bangalow Rock Pile Cave (I6E-68)

FIGURE 21



Log Jam Cave (I6E-69)

FIGURE 22