## DISCUSSION

### Tasmanian Glow-worm

Key factors influencing the occurrence and distribution of animals in terrestrial caves are food availability and climate — particularly moisture (Barr 1968; Culver 1982). This study provides evidence that both factors influence the life cycle of *A. tasmaniensis*. Food availability was clearly associated with the main period of pupation and adult emergence of *A. tasmaniensis*. In both Mystery Creek Cave and Exit Cave, prey was most frequently recorded in the threads of glow-worm larvae during spring, summer and early autumn, which is consistent with the general pattern of insect emergence from streams in temperate latitudes (Hynes 1970). Prey began appearing in larval threads in late winter and increased in number during spring, coinciding with the appearance and increase in number of *A. tasmaniensis* pupae and adults. In *A. luminosa* it has been reported that larval body weight or size triggers pupation and that this depended on food availability (Richards 1964; Meyer-Rochow 1990).

*A. tasmaniensis* larvae were present all year round, but the number of larvae glowing varied seasonally and the pattern of variation was not the same in the two caves studied. In Mystery Creek Cave the number of larvae glowing was highest from late spring through to autumn and lowest in winter and early spring. In Exit Cave there was no consistent seasonal pattern in the number of larvae glowing, and overall there was less variation between monthly counts than at Mystery Creek Cave. Furthermore, at one monitoring site in Exit Cave (EC3) the seasonal pattern was the reverse of that observed in Mystery Creek Cave.

Variation in counts of larval lights can be due to changes in the absolute abundance of larvae, changes in the proportion of larvae glowing, or both; and further research is required to understand which of these factors causes the changes in the numbers of larval lights in the two caves. In Waitomo Cave, a major decline in the number of *A. luminosa* glowing was largely associated with a decline in the abundance of larvae, but there was also evidence of a decline in the percentage of larvae glowing (Pugsley 1984). In laboratory populations, *A. luminosa* has been observed becoming torpid in response to dry conditions, ceasing to glow and eventually shrivelling and dying (Pugsley 1984). Notwithstanding this lack of knowledge about the proximate causes of changes in the numbers of larval lights, it is clear that there was a stronger seasonal influence on the larval population in Mystery Creek Cave than in Exit Cave.

Food resources do not appear to account for the different seasonal patterns observed in the number of glow-worm lights between the two caves, primarily because the seasonal pattern of prey occurrence in glow-worm larvae threads was the same in both caves. Furthermore, the types and number of potential prey species recorded in the streams beneath the glow-worm colonies were broadly similar. Food availability also fails to explain the higher counts of glow-worm lights during winter at one of the monitoring sites in Exit Cave (EC3).

Humidity in caves is usually very high (>95%) and can frequently reach saturation point (Juberthie 2000). In adapting to the cave environment, many cave animals have lost many of the water conservation mechanisms of their surface relatives and are strongly stenohygrobic (ie they cannot adapt to a wide range of relative humidity)

(Howarth 1980). Thus, small changes in humidity can have significant impacts on cave animals. Seasonal variation in climate within caves is well-known (eg Barr 1968; Howrath 1980). In temperate regions during summer, it is usually warmer outside caves than inside, while during winter the reverse is true. During winter, cold air mostly flows into the lower entrances of multi-entrance caves, displacing the warmer, less dense cave air, which flows out of upper entrances. As the cold air warms up to the ambient cave temperature, it absorbs more moisture, drying parts of the cave (Barr 1968); this is often referred to as the ‘winter effect’ (Howarth 1980, 1982). In summer, the reverse occurs, with cold air draining out of the lower cave entrances while warm air is drawn in through chimneys. The warm air cools down to cave temperature causing water to condense on the cave walls. The influence of the winter effect will vary both within and between caves and depends on several factors including cave structure and the presence of streams (Cropley 1965; Turtle and Stevenson 1977; Howarth 1980, 1982). The winter effect is suspected to be the main cause of the variation in the number of larvae glowing in Mystery Creek Cave. During winter, larvae in parts of the cave that are most vulnerable to the winter effect presumably die, cease glowing or move into protected crevices. In spring, as climatic conditions in the cave become moister, there would be recruitment of larvae through reproduction, and any larvae that ceased glowing and survived the winter would re-commence glowing or move out of protected crevices. Thus, the number of larvae glowing increases during spring and reaches a maximum in summer and autumn.

There are several features of the caves that together suggest that the glow-worm sites in Mystery Creek Cave experience a greater winter effect than the sites in Exit Cave. First, Mystery Creek Cave slopes down from its entrance and during winter, because of its position in the landscape, it acts as a large sink for cold air drainage off the southern ranges. Caves with their greatest volume above the entrance can act as warm air traps and vice versa (Tuttle and Stevenson 1977). Mystery Creek Cave’s lower mean air temperature compared with Exit Cave (Fig. 7) lends support to this effect occurring although the difference could also be a function of the difference in altitude between the two cave entrances. The effect of the cold air drainage entering Mystery Creek Cave would be negligible on Exit Cave because of the distance between the caves (>2 km) and the lack of significant air connections.

Second, Mystery Creek Cave has a much larger entrance (approx. 25 $m^2$) than Exit Cave (<10 $m^2$), with fewer obstructions or twisting passageways before the glow-worm caves are reached (Figs 2–3). More cold air can enter caves that have large entrances and few twisting passageways (Mohr and Poulson 1966).

Finally, temperate caves that capture surface streams often have a dynamic temperature and relative humidity regime (Cropley, 1965). The presence of a stream flowing into Mystery Creek Cave increases the winter effect because the water temperature of surface streams also varies during the year and, as water has such a high specific heat, streams bring in and remove large amounts of heat (Howrath 1980). This would also contribute to the temperature differences recorded in the two caves.

At one site in Exit Cave, EC3, larval light counts showed a reverse pattern to that observed in Mystery Creek Cave, with counts higher in winter than in summer during both years of survey. This is difficult to explain in terms of food availability and the winter effect, but may reflect localised changes in cave climate. *A. tasmaniensis* larvae at EC3 occur on a flowstone formation. Flowstone forms where films of water flow over walls or floors depositing sheets of calcium carbonate (Mohr and Poulson 1966). The flowstone at EC3 was damp during winter and drier during summer (personal observation) most likely reflecting seasonal rainfall patterns. It is possible that the drier conditions on the flowstone during summer may have reduced the area of suitable habitat for larvae at this site. Presumably the increase observed in winter is due to larvae reactivating their lights or moving out from protected crevices in response to the locally improved conditions.

A similar variation in seasonal patterns of glow-worm displays within a cave system has also been reported for *A. luminosa* in Waitomo Cave. Pugsley (1984) demonstrated that cave climate varied both spatially and temporally in Waitomo Cave, and that this variation influenced the glow-worm displays in different parts of the cave. For example, during winter 1979, the glow-worm display was so poor, due to very dry conditions, that the cave was closed to tourism for 15 weeks. In other parts of Waitomo Cave, the glow-worm displays were completely unaffected during this winter closure, probably because of isolation from the drying effects of the main airflow (Pugsley 1984).

The life cycle of *A. tasmaniensis* differs to some extent from that reported for *A. luminosa* in New Zealand. In *A. luminosa*, most life stages are present throughout the year, although there is an underlying annual cycle (Richards 1960; Pugsley 1984; Meyer-Rochow 1990), particularly in parts of caves with a strong winter effect (Pugsley 1984). Pupae and adults are most common during winter, and larvae are most common during spring and summer. In *A. tasmaniensis* there is a stronger seasonal pattern to the life cycle, with most pupation and adult emergence occurring later in the year than in *A. luminosa*. Pupae and adults were most common in spring and summer, and were not observed during autumn and most of winter. *A. tasmaniensis* larvae were present throughout the year, but in Mystery Creek Cave the number glowing was most abundant from late spring through to autumn. The differences between the life cycles of the two species probably result from differences in latitude and climate between the two study locations. Waitomo Cave occurs at latitude 38°S in a warm temperate climate, whereas the Ida Bay caves occur at the higher latitude of 43°S in a cool temperate climate. This is reflected in the seasonal occurrence of prey in the Ida Bay caves compared with Waitomo Cave, where food availability showed limited seasonal variation (Pugsley 1984).

**Tasmanian Cave Cricket and Other Cave Fauna**

The monthly counts of cave crickets and the other cave fauna revealed few interpretable patterns. The only consistent pattern observed was in the wind tunnel in Exit Cave where cave cricket and cave beetle numbers were high during the warmer months and low during the cooler months. This is likely to be a response to the winter effect with the cave walls drying out (Fig. 9). The crickets and beetles presumably moved out of the wind tunnel or perhaps even died, although there was no evidence of the latter. It is not known where all the crickets and beetles moved to but it is reasonable to assume that some moved into side passages such as site F that were sheltered from the winter effect. Crickets that remained in the wind tunnel during winter were observed sheltering behind outcrops on the cave wall or ceilings or in cracks or crevices (pers. obs.). Sites A and D are side chambers off to the side of the wind tunnel and as a result they escape much of the winter effect. Because of the shape of the tunnel at site E, with a recessed ceiling, it is also largely protected from the winter effect despite being a conduit of air into and out of the wind tunnel.

## FUTURE MONITORING

This study established baseline monitoring data on Tasmanian Glow-worms in Exit Cave and Mystery Creek Cave that could be used to compare with any future monitoring that may be required. The monitoring sites established in Mystery Creek Cave represent an estimated 10% of the total glow-worm lights in the glow-worm chamber and provided a generally consistent seasonal pattern for all sites over the two years of monitoring. The monitoring sites in Exit Cave represent a much smaller proportion of the total glow-worm lights in the cave's two glow-worm chambers (<5%) and the trends in monthly counts were more variable between sites. A large increase in area of monitoring in Exit Cave may reveal a more reliable pattern in glow-worm light counts; however, this will be difficult as there are limited opportunities to find discrete colonies that could be easily counted by eye.

Photographic monitoring may have potential to capture a greater proportion of the glow-worms within the glow-worm chambers, particularly on the chamber roof. Continued monitoring of glow-worms in Exit Cave is probably not a high priority at present as access to the cave is strictly controlled by a permitting system. The number of cave visitors is less than 50 per year (PWS, unpublished permit records) and no other threats to the glow-worm colony are currently known. Nevertheless, the extent of the glow-worm colony in Exit Cave should be mapped in both summer and winter to establish a baseline distribution.

In contrast to Exit Cave, Mystery Creek Cave is open to the public and commercial operators provide tours although visitation rates are relatively low. Some low level monitoring of the glow-worm population may be prudent in Mystery Creek Cave. Existing monitoring sites are likely to suffice, although photographic monitoring of the main colony on the ceiling should be investigated to determine whether it can be done more efficiently and if it is capable of monitoring a greater area of glow-worms. As for Exit Cave, the extent of the glow-worm colony should be mapped in both summer and winter.

The issue of whether changes in the number of glow-worm lights are due to changes in numbers of glow-worm larvae or changes in the proportion of glow-worms glowing remains unresolved. This would be difficult to investigate in the caves as there are only very limited areas where larvae can be directly counted. Because of the great height of the cave ceilings, access to the main population would present considerable logistical difficulties. Should these logistical difficulties be overcome, there remains the problem of counting both glow-worm larvae (performed with the aid of a light source) and glow-worm lights (performed in darkness) at the same time and location without influencing the other count. However, from a monitoring perspective, establishing whether changes in the number of glow-worm lights are due to changes in numbers of glow-worm larvae or changes in the proportion of glow-worms glowing is not particularly important. This is because a long-term decline in the number of glow-worm lights due to either cause is likely to be associated with a decline in suitable conditions for glow-worms.

Because of the low numbers of beetles, spiders and harvestman recorded during the present study, a more targeted monitoring program is required for these species to improve the detection of changes in abundance. This would require a significant increase in survey effort and is probably not justified at present given the current low level of threat to these species.

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## REFERENCES

Anon., (1895). The glow-worm caves of Tasmania. *Scientific American* 23: 332.

Anon., (1982). *Nomination of the Western Tasmania Wilderness National Parks by the Commonwealth of Australia for Inclusion in the World Heritage List*. Tasmanian Government and Australian Heritage Commission.

Anon., (1989). *Nomination of the Tasmanian Wilderness by the Government of Australia for Inclusion in the World Heritage List*. The Commonwealth Department of the Arts, Sport, the Environment, Tourism and Territories and The Government of the State of Tasmania.

Baker, C.H., (in press). A new subgenus and five new species of Australian glow-worm (Diptera: Keroplatidae: *Arachnocampa* spp.). *Memoirs of the Queensland Museum*.

Baker C. H. Graham G. C., Scott K. D., Cameron S. L., Yeates D.K., Merritt D. J. (2008) Distribution and phylogentic relationships of Australian glow-worms *Arachnocampa* (Diptera, Keroplatidae). *Molecular Phylogenetics and Evolution* 48:506-514.

Baker, C. H. and Merritt, D. J. (2003). Life cycle of an Australian glow-worm Arachnocampa flava Harrison (Diptera: Keroplatidae: Arachnocampinae). *Australian Entomologist* 30: 45-55.

Barr, T. C. Jr. (1968). Cave Ecology and the Evolution of Troglobites. *Evolutionary Biology* 2: 35-102.

Cropley, J. B. (1965). Influence of surface conditions on temperatures in large cave systems. *Bulletin of the National Speleological Society* 27: 1-10.

Culver, D. C. (1982). *Cave Life: Evolution and Ecology*. Harvard University Press, Massachusetts.
Doran, N. E., Eberhard, S. M., Richardson, A. M. M. & Swain, R. (1997). Invertebrate Biodiversity and Conservation in Tasmanian Caves. *Memoirs of the Museum of Victoria* 56: 649-653.
Eberhard, S. (1999). Cave fauna management and monitoring at Ida Bay, Tasmania. *Nature Conservation Report* 99/1. Parks and Wildlife Service, Tasmania.
Eberhard, S. (2001). Cave fauna monitoring and management at Ida Bay, Tasmania. *Records of the Western Australian Museum* Supplement No. 64: 97-104.
Eberhard, S. M., Richardson, A. M. M., and Swain, R. (1991). The invertebrate cave fauna of Tasmania. National Estate grants Program. 174pp.
Goede, A. (1969). Underground stream capture at Ida Bay, Tasmania, and the relevance of cold climatic conditions. *Australian Geography Studies* 7: 41-48.
Hamilton-Smith, E. and Eberhard, S. (2000). Conservation of cave communities in Australia. Pp 647-663 in *Ecosystems of the World 30 Subterranean Ecosystems* ed by H. Wilkens, D. C. Culver and W. F. Humphries. Elsevier, Amsterdam.
Houshold, I and Spate, A (1990). The Ida Bay Karst Study Geomorphology and Hydrology of the Ida Bay Karst Area. Volume 1 – Text and Appendices. A report to the world heritage planning team, Department of Parks, Wildlife and Heritage Tasmania.
Howarth F. G. (1980) The zoogeography of specialised cave animals: a bioclimatic model. *Evolution* 34:394-406.
Howarth F. G. (1982) Bioclimatic and geologic factors governing the evolution and distribution of Hawaiian cave insects. Entomologia Generalis 8:17-26.
Hynes, H. B. N. (1970). *The Ecology of Running Waters*. Liverpool University Press, Liverpool.
Juberthie, C (2000). Conservation of subterranean habitats and species. Pp 691-700 in *Ecosystems of the World 30 Subterranean Ecosystems* ed by H. Wilkens, D. C. Culver and W. F. Humphries. Elsevier, Amsterdam.
Mason, P. (2003). *Tourism Impacts, Planning and Management*. Butterworth Heinemann, Amsterdam.
McCune, B and Mefford, M. J. (1999). *Multvariate Analysis of Ecological Data Version 4.17*. MjM Software Gleneden Beach Oregan USA.
Merritt, D. (2001). *Glow-worm Tourism 1st Annual Report*. University of Queensland, Brisbane.
Meyer-Rochow, V. B. (1990). *The New Zealand Glow-worm*. Waitomo Caves Museum Society Inc., Waitomo Caves.
Mohr, C. E. and Poulson, T. L. (1966). *The Life of the Cave*. McGraw-Hill Book Company, New York.
Poulson, T. L. and White, W. B. (1969). The cave environment. *Science* 165: 971-981.
Pugsley, C. (1984). Ecology of the New Zealand glowworm, *Arachnocampa luminosa* (Diptera: Keroplatidae) in the glowworm cave Waitomo. *Journal of the Royal Society of New Zealand* 14: 387-407.
PWS (1994). Mystery Creek Cave Interim Management Plan (part of the Ida Bay Karst Area Management Plan). Parks and Wildlife Service, Department of Environment and Land Management.
Richards, A. M. (1960). Observations on the New Zealand Glow-worm Arachnocampa luminosa (Skuse) 1890. *Transactions of the Royal Society of New Zealand* 88: 559-574.

Richards, A. M. (1961). The life history of some species of Rhaphidophoridae (Orthoptera). *Transactions of the Royal Society of New Zealand* 88: 121-137.

Richards, A. M. (1962). Feeding behaviour and enemies of Rhaphidophoridae (Orthoptera) from Waitomo Caves, New Zealand. *Transactions of the Royal Society of New Zealand* 88: 121-129.

Richards, A. M. (1967). Notes on the biology of two species of Rhapidophoridae (Orthoptera) in Tasmania. *Proceedings of the Linnean Society of New South Wales* 92: 273-278.

Richards, A. M. and Ollier, C. D. (1976). Investigation and report of the ecological protection of Exit Cave near Ida Bay in Tasmania for National Parks and Wildlife Service – Tasmania. Unisearch Limited, Sydney, 73pp.

Sharples, C. E. (1979). The Ordovician System in the Ida Bay Area. Unpublished Honours Thesis, University of Tasmania, Hobart.

Vandel, A. (1965). *Biospeleology: The Biology of Cavernicolous Animals*. Pergamon Press, Oxford.

Tuttle MD, and Stevenson, DE (1977). Variation in the cave environment and its biological implications. In: Zuber R, Chester J, Gilbert S, Rhodes D (eds) Proceedings National Cave Management Symposium. Albuquerque, New Mexico, p 108–121.

## APPENDIX I – DESCRIPTION OF MONITORING SITES

### Glow-worm Monitoring Sites in Exit Cave (also refer to Fig. 2)

**Site: EC1**
*Informal Name*: wall above river.
*Location*: on western wall directly overhanging river as you enter the glow-worm chamber. A distinctive bulbous stalactite (see Photo) defines northern end of count area.
*Description*: 6m long by 1.5m wide band of glow-worms.
*Viewing Location*: on eastern side of glow-worm chamber, 15.5m north from where the wind tunnel ends and the glow-worm chamber starts. Location marked by a yellow tag on rock with "Site 8" written on it. It is at the point where there is a large (0.75m) step down into glow-worm chamber. Start counting at northern end of band defined by bulbous stalactite and count band of glow-worms to south.
*Subsite Location*: none.

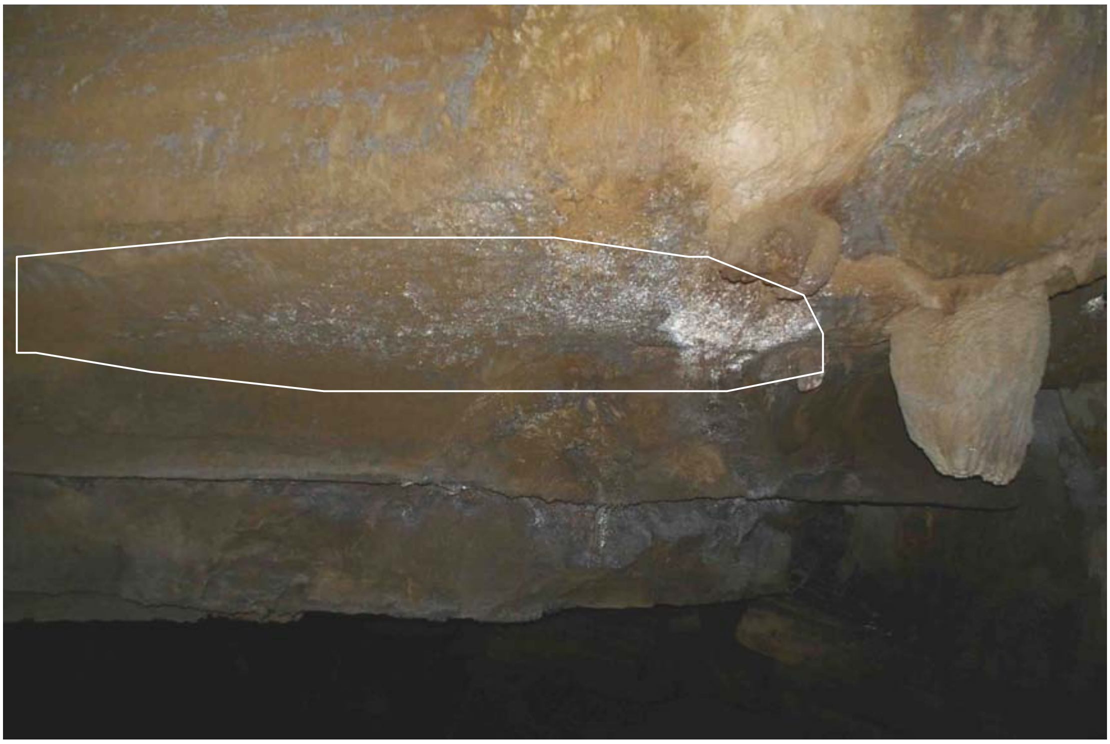

Photo: Site EC1

**Site: EC2**
*Informal Name*: ceiling
*Location*: glow-worm chamber ceiling 12.5m north of viewing location for EC1.
*Description*: a 6.5m by 5.5m flat part of ceiling.
*Viewing Location*: stand underneath at a point 5m west from entrance to alcove containing fauna sanctuary (established by Stefan Eberhard and Ian Houshold). A 20cm by 20cm rock marks the viewing point. Count all glow-worms on ceiling.
*Subsite Location*: none.

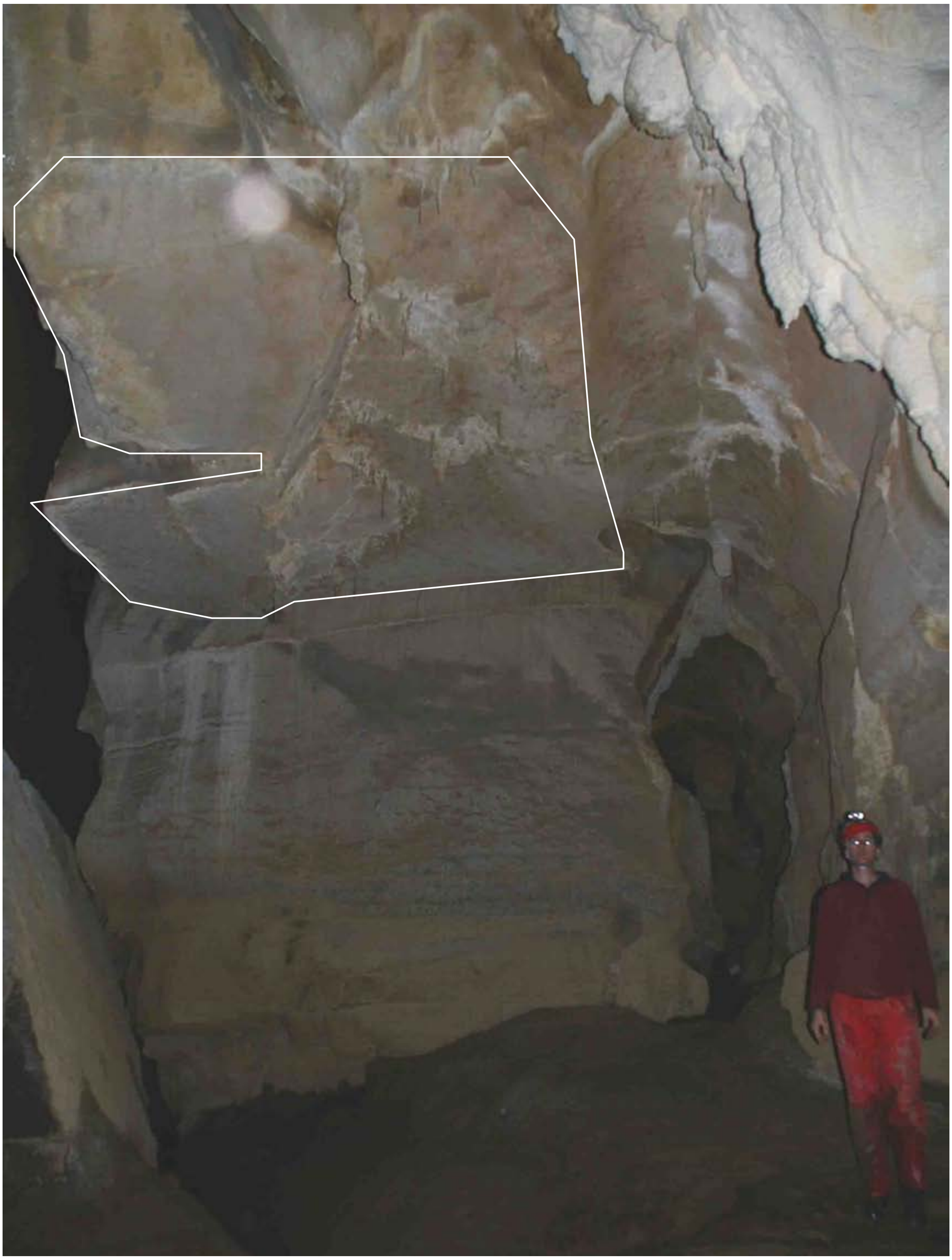

Photo: Site EC2

**Site: EC3**
*Informal Name*: pillar
*Location*: north-east corner of glow-worm chamber, 26m north of viewing location for EC1.
*Description*: a tall (6m), narrow (1m to 1.5m) distinctive feature.
*Viewing Location*: 3.6m west of large flat rock wall. Marked by a 20cm by 20cm rock on top of a smaller rock with label attached.
*Subsite Location*: 4.7m north of viewing location and directly below EC3. A flat rock facing west, 1.4m tall by 1.6m wide.

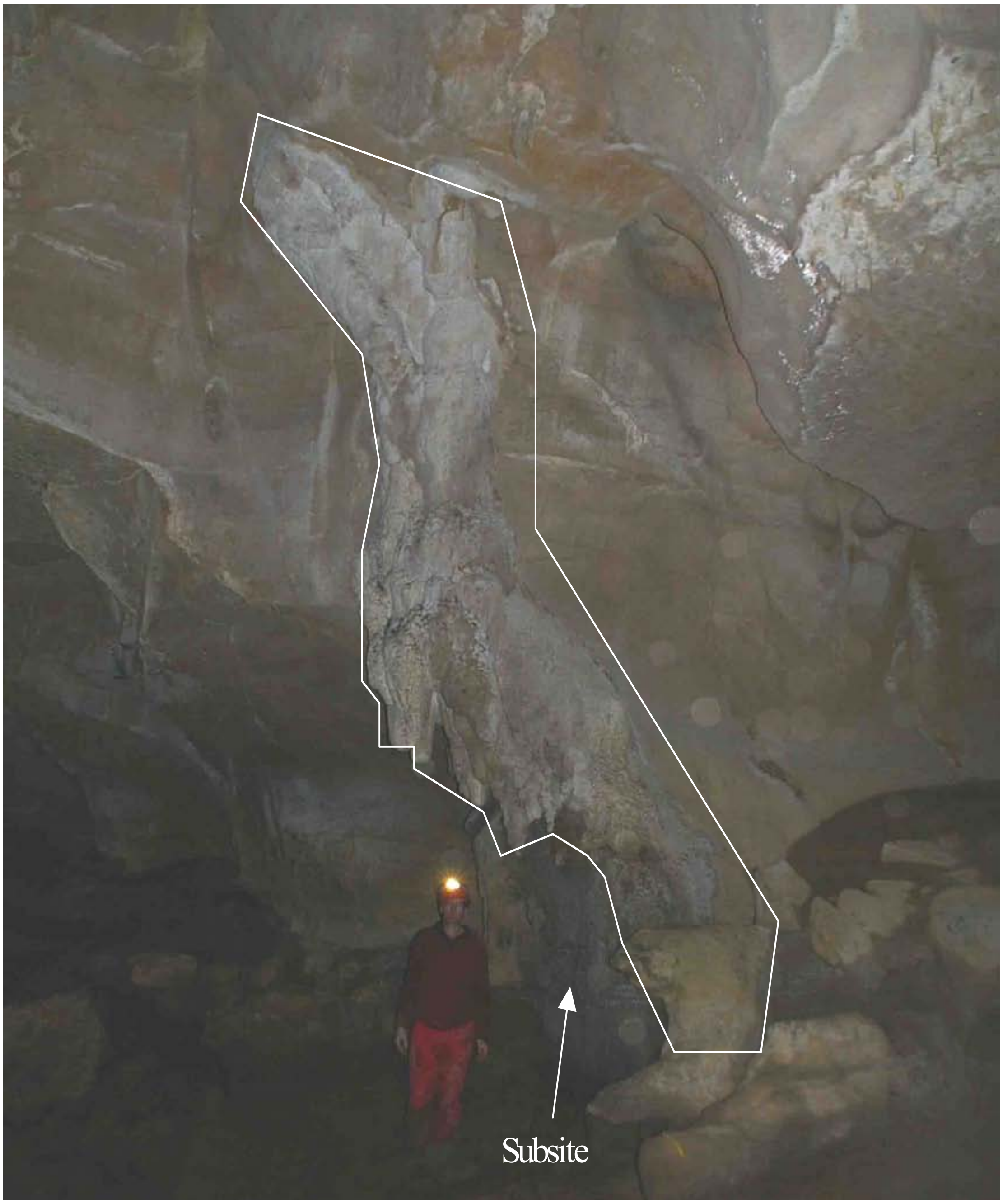

Photo: Site EC3 showing location of subsite.


Photo: EC3 subsite.

**Site: EC4**
*Informal Name*: overhang.
*Location*: above river, 12.5m south of large boulder below site EC5. Clearly marked at both ends by orange string.
*Description*: a long (3.4m) and very narrow (10-20cm) overhang.
*Viewing Location*: Stand directly underneath overhang, starting at higher end (about 1.8m) and moving slowly toward lower end (about 1m)
*Subsite Location*: same as site.

**Site: EC5**
*Informal Name*: above river
*Location*: approximately 38m south-east of intersection between cave stream and D'Entrecasteaux Anabranch. At time of survey, site was adjacent to where cave stream bends from travelling west to east to north to south (see Fig. 2). Marked by large triangular shaped rock on cave floor (see Fig. 2).
*Description*: a small indentation into cavern wall defined by jagged stalactite on ceiling to south and end of indentation about 7m to north of stalactite.
*Viewing Location*: Stand underneath about 2m from cave wall. Count all glow-worms on ceiling of the indentation from, and including, stalactite to 7m north of stalactite.
*Subsite Location*: none.

Photo: Site EC4.

Photo: Site EC5

**EC6**
*Informal Name*: inlet
*Location*: junction of cave stream and D'Entrecasteaux Anabranch.
*Description*: a wall 7m wide by 10m tall above D'Entrecasteaux Anabranch. Count glow-worms from south-east edge of wall to extreme south-west which is ultimately obscured by collapsed rock column in middle of river.
*Viewing Location*: sit on large flat rock opposite wall to be counted.
*Subsite Location*: 5.5m south-east of viewing location. Clearly marked by orange string. 1.7m wide by 1m tall.


Photo: Site EC6 and subsite.

**Cricket Monitoring Sites in Exit Cave (also refer to Fig. 2)**

**Site: A**

*Location*: small dead end cave, to the east of the gated entrance and Site E.
*Description*: approximately 5m by 5m chamber.
*Viewing Location*: Remain within stringline (2m by 0.5m) and count all crickets on roof, walls and rubble.

**Site: B**

*Location*: wind tunnel.
*Description*: 11m long and 3.5m tall, roughly triangular passage in cross section. Angled side walls are approximately 4.5 m tall.
*Viewing Location*: count all crickets on wall and ceiling from a standing position, do not count crickets under low 90° undercuts. Stay within stringlines. Start and end of transect is marked on stringlines. The start is at the intersection of east-west passage and ends 11m north-east where passage opens into larger passage.

**Site: C**

*Location*: wind tunnel.
*Description*: 16m long and 3m tall, roughly triangular passage in cross section. Angled side walls are approximately 3.5m tall.
*Viewing Location*: count all crickets on wall and ceiling from a standing position, do not count crickets under low 90° undercuts. Stay within stringlines. The start and end of the transect are marked on stringlines. Start at the beginning of the passage heading north and end after 16m where there is a distinctive stalactite with a knob on the end.

**Site: D**

*Location*: small dead end cave accessed to the south of the start of site C and accessed by crawling along a low tunnel.
*Description*: approximately 6m by 6m.
*Viewing Location*: count all crickets on wall, ceiling and rubble floor (excluding compacted standing area) from a standing position, not counting crickets under low 90° undercuts. Walk east-west looking into larger nooks.

**Site: E**

*Location*: wind tunnel.
*Description*: 4.5m long, 2.5m tall and 2m wide passage.
*Viewing Location*: Start counting immediately after standing up when first entering the cave through gate. Count all crickets on walls and ceiling excluding under low 90° undercuts. Ends 4.5 m from start, which is midpoint of intersection with passage heading north-east. Stay within stringlines. The start and end of transect are marked on stringlines.

**Site: F**

*Location*: small dead end passage almost perpendicular with wind tunnel just prior to entering main glow-worm chamber.
*Description*: 1.5m wide at start (triangular shaped opening with straws when viewed with back towards tunnel to be searched) tapering to 50 cm wide at end of tunnel and 6.4m long. Height variable mostly less than 2m.
*Viewing Location*: count all crickets on walls and ceiling of tunnel. Count cricket at end of tunnel where it opens up.

**Glow-worm Monitoring Sites in Mystery Creek Cave (also refer to Fig. 3)**

**Site: MC1**
*Informal Name*: Flag Site (display looks a little like a right handed flag on a pole)
*Location*: Situated 14m north-west of main glow-worm chamber, on the south-west side of the tunnel. Forms a corner of the main tunnel and a short side tunnel.
*Description*: A distinct 1.5m tall column of rock, 1.5m above the cave floor and clearly separated from wall by about 30cm. Base of column sits on an overhang of the cave wall. Top of column joins into the cave wall. Site extends 2m directly above column and extends across by 2m.
*Viewing Location*: 2m south-east of site.
*Subsite Location*: Base of column up to 50 cm.

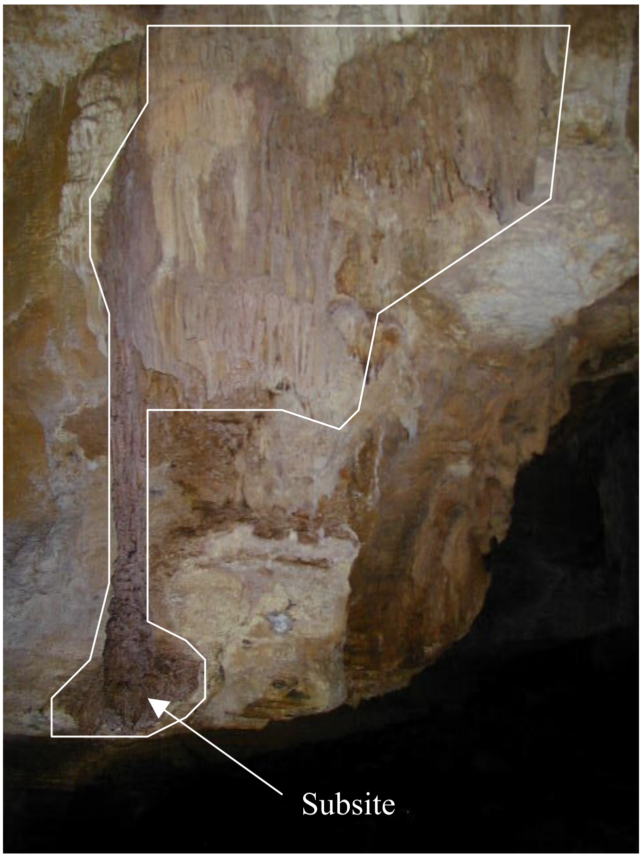


Photo: Site MC1 showing location of subsite.

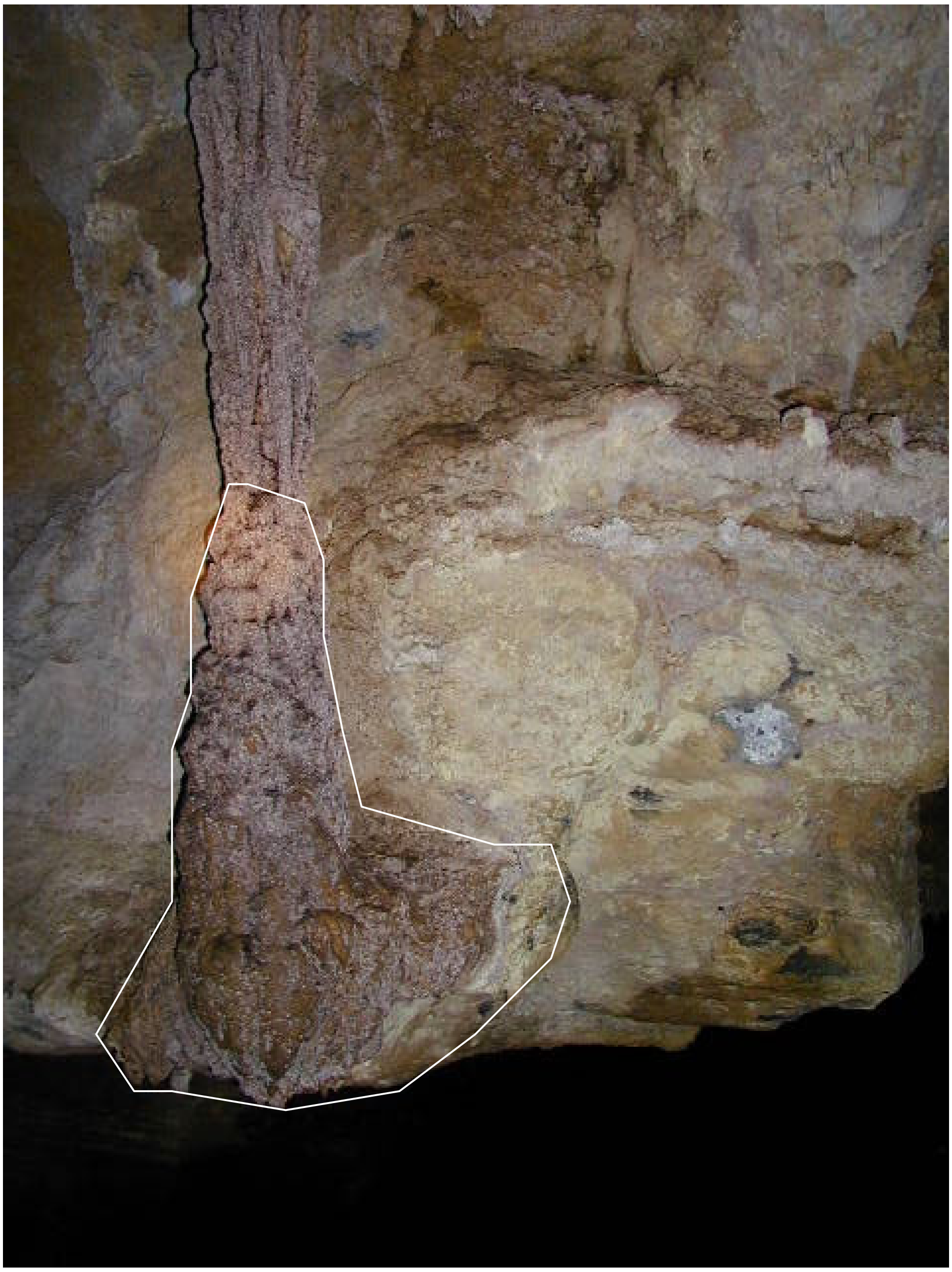

Photo: Subsite MC1.

**Site: MC2**
*Informal Name*: Pillar (display is narrow and tall)
*Location*: Immediately on western side of main glow-worm chamber from northern entrance, adjacent to the river, 13m south of MC3.
*Description*: Side of cave wall, identified by a distinct square, flat overhang, 5m above river. Base of site is 3m above the river and extends about 4m above this.
*Viewing Location*: 4.3m south of site against same wall as monitoring site, need to cross the river to get to it, almost like a purpose built viewing platform.
*Subsite Location*: None

Photo: Site MC2

**Site: MC3**
*Informal Name*: River (display is very close to surface of river)
*Location*: 7.6 m directly east of a 1m tall worn stalagmite (which is about 13m from southern entrance to glow-worm chamber and 5.1 m from a 1.4m tall stalagmite) in the main glow-worm chamber.
*Description*: Site juts out from base of cave wall, just above the river (can be submerged after heavy rain), and is 3.8m wide and 0.6m tall at the northern end and tapering towards the south.
*Viewing Location*: 2 m west of site, moving slowly from north to south.
*Subsite Location*: same as site, may need to enter water to get close enough to see larvae, adults, prey and predators.

Photo: Site MC3 and subsite.

**Site: MC4**
*Informal Name*: USA (display is roughly the shape of USA)
*Location*: south-west corner of the main glow-worm chamber.
*Description*: site juts out from part of cave wall, about 3m wide and 1.5m tall, and 1.5m above river. Shape of rock and display is quite distinct.
*Viewing Location*: 4.5m north of site on large flat rock.
*Subsite location*: Immediately below site, the only accessible glow-worms are within and near a small indent in the rock about 50 by 50 cm.

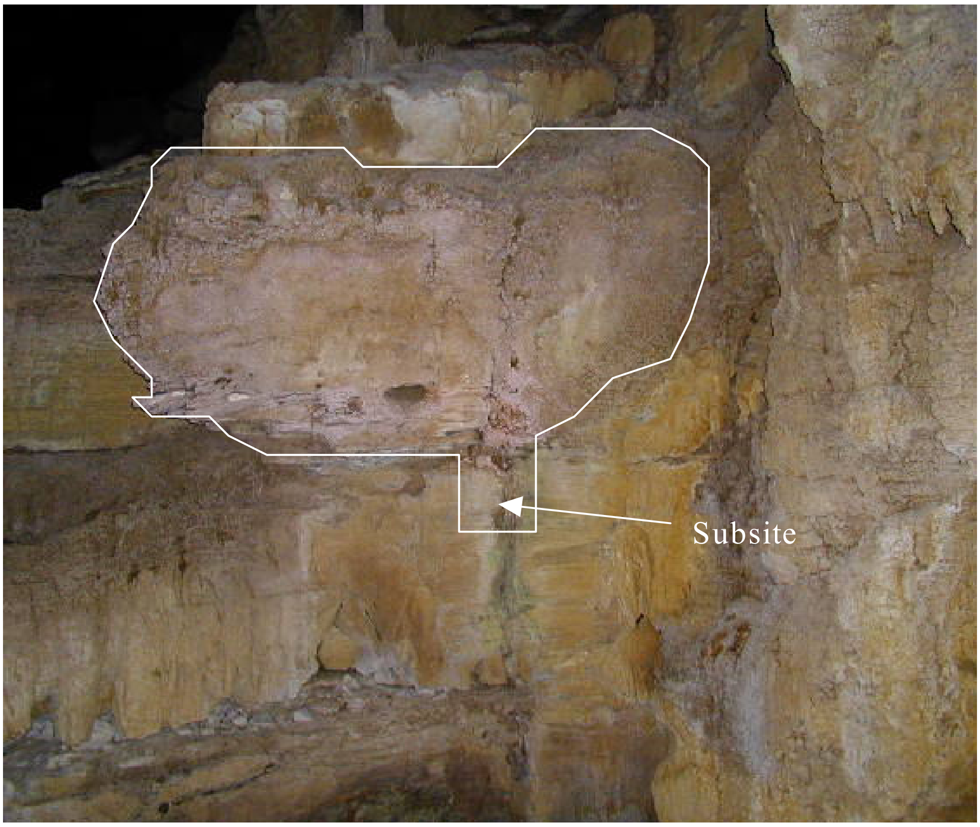

Photo: Site MC4 showing location of subsite.

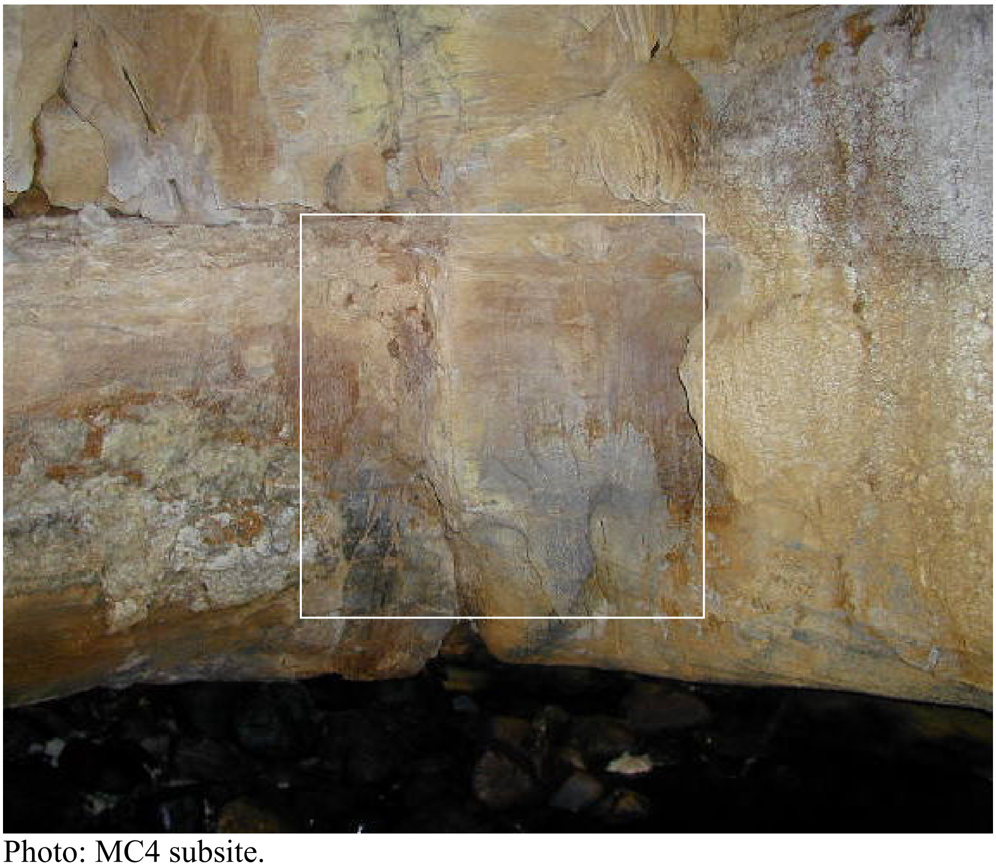
Photo: MC4 subsite.

**Site: MC5**
*Informal Name*: narrows (where passage narrows almost to a dead end)
*Location*: at head of passage, to right of narrow squeeze that leads to next chamber when heading downstream.
*Description*: When facing downstream the site is roughly triangular shaped, 1.5m above ground. 4m tall on left side, 2.5m across the top with hypotenuse extending from top right down to bottom left.
*Viewing Location*: 4.5m upstream of site.
*Subsite location*: At base of site, 50 by 50 cm, and 1.5m above river.

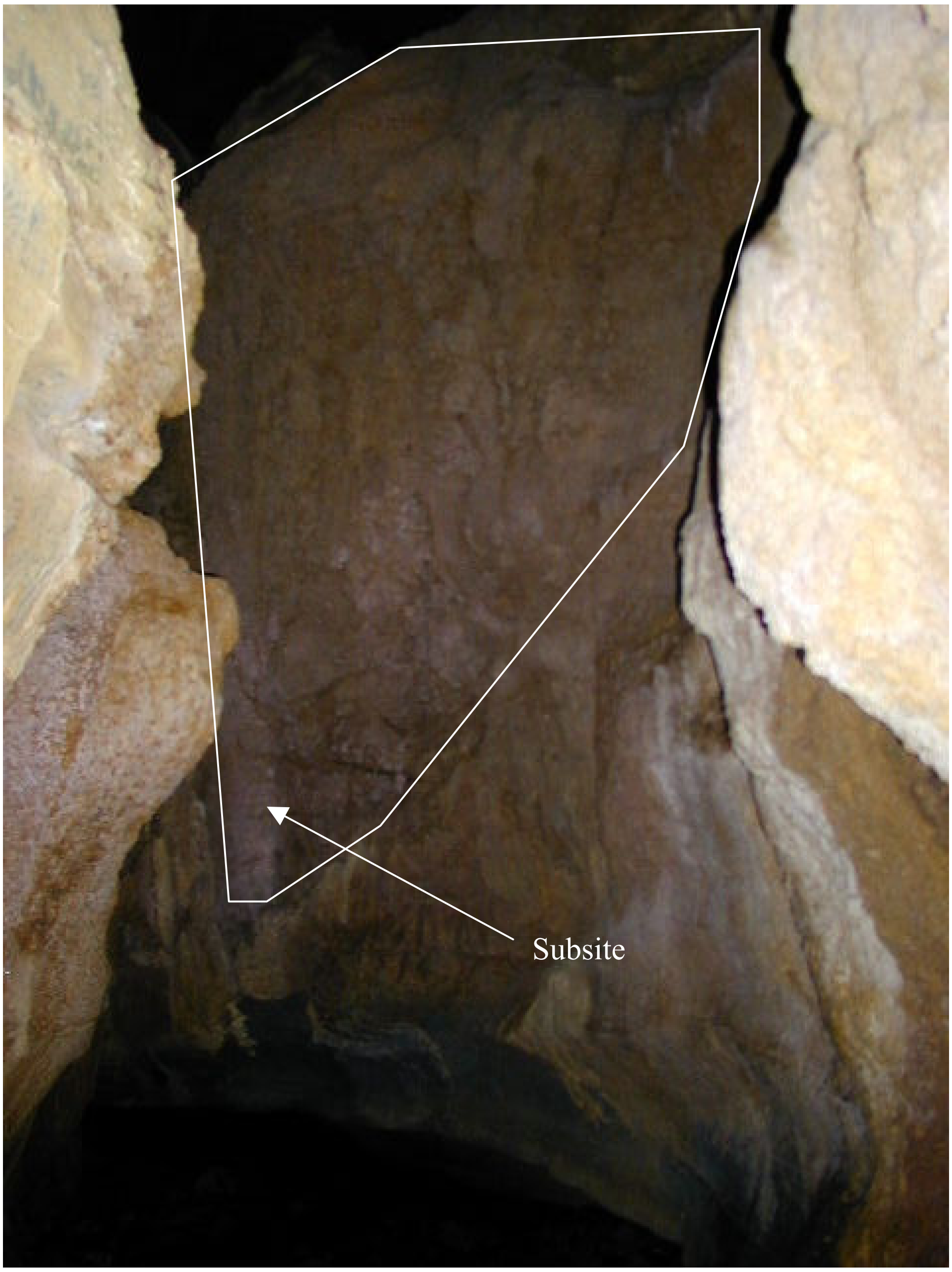

Photo: Site MC5 showing location of subsite.

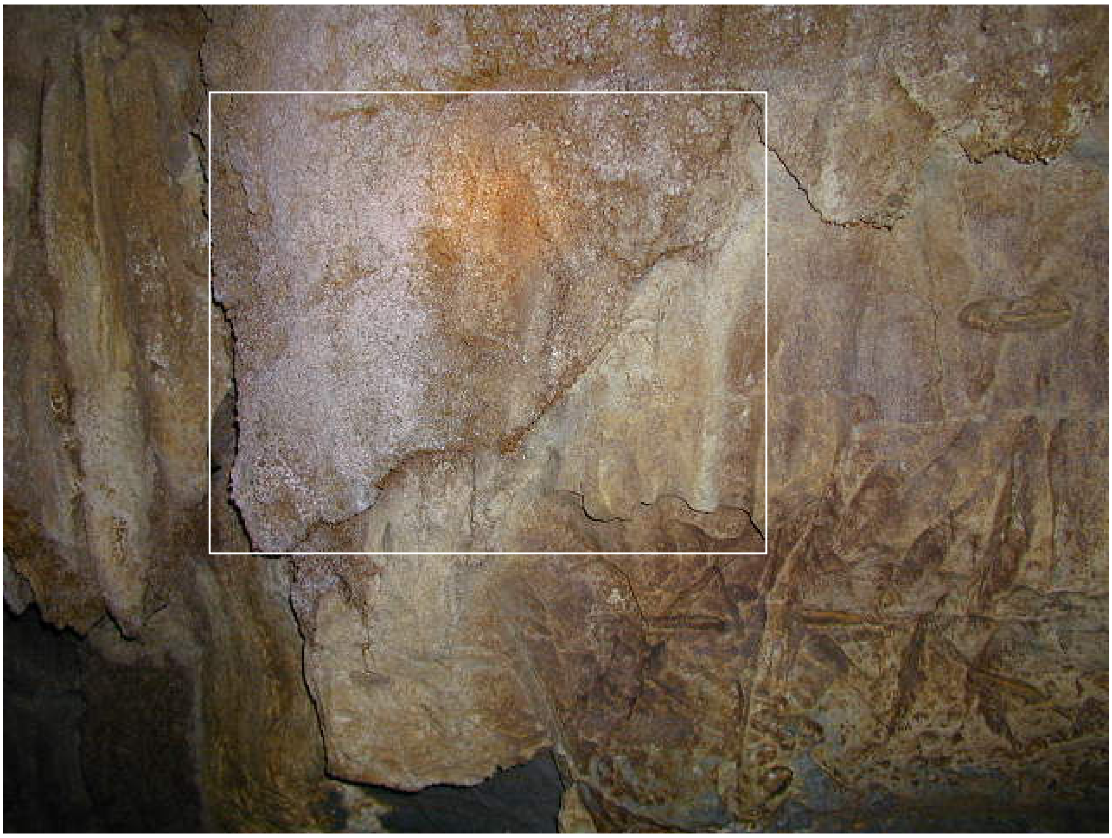
Photo: MC5 subsite:

**Site: MC6**
*Informal Name*: Overhang (small, flat ceiling of rock)
*Location*: 12m north-east of MC5 at corner of passage on eastern side.
*Description*: A 110cm by 180cm flat overhang.
*Viewing Location*: Stand underneath (approach with light off)
*Subsite Location*: Same as site plus two walls immediately below.

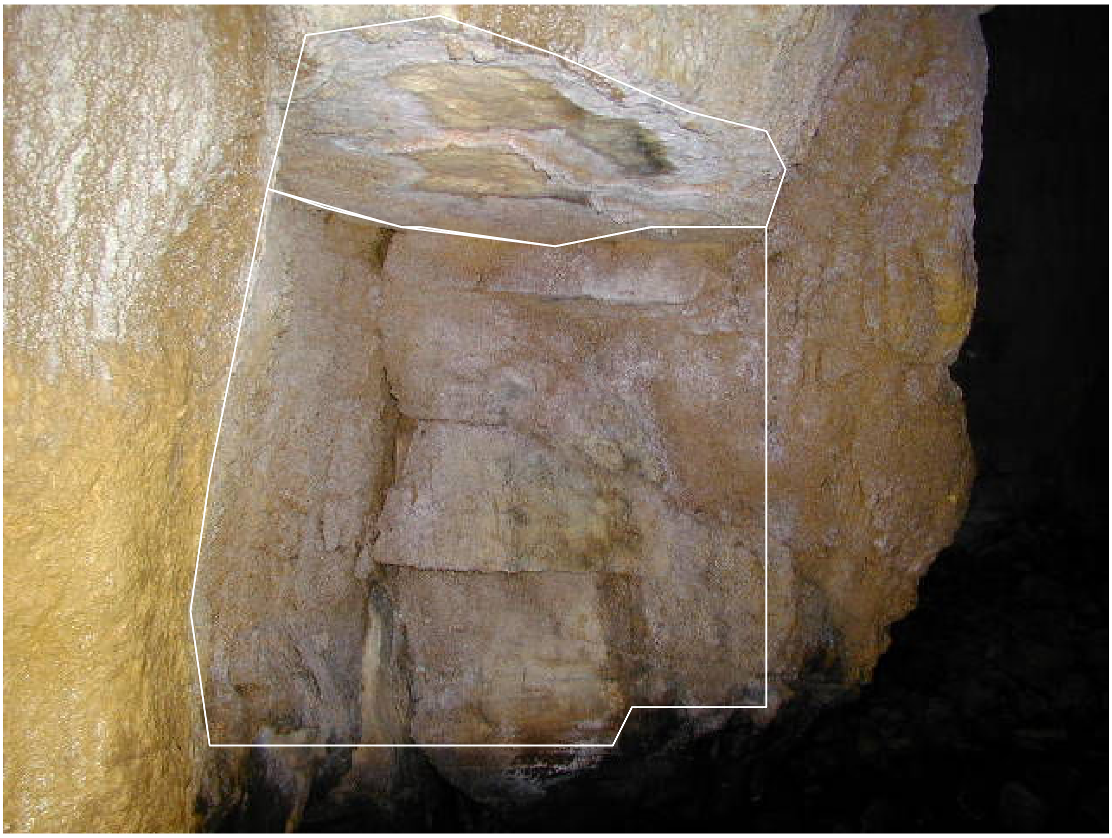
Photo: Site MC6 (small polygon) and subsite (both polygons).

## APPENDIX II – LIST OF INVERTEBRATES IDENTIFIED FROM STREAM KICK SAMPLES

MC = Mystery Creek Cave, EC = Exit Cave, LC = Laurie Cook, JC = John Gooderham, refer to Figs 2 and 3 for chamber locations.

| | | | Cave | MC | MC | MC | EC | EC | EC | EC | EC | EC | MC | MC | MC | EC | EC | EC | EC | EC | EC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chamber | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 |
| | | | Month | Jan | Jan | Jan | Jan | Jan | Jan | Jan | Jan | Jan | Oct | Oct | Oct | Oct | Oct | Oct | Oct | Oct | Oct |
| | | | Identifier | LC | LC | LC | LC | LC | LC | LC | LC | LC | JG | JG | JG | JG | JG | JG | JG | JG | LC |
| Class | Order | Family | Subfamily/Species/Other | | | | | | | | | | | | | | | | | | |
| Oligochaeta | | | | 6 | 1 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Gastropoda | | Hydrobiidae | | 24 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Crustacea | Amphipoda | Paramelitidae | | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Crustacea | Anaspidacea | Anaspididae | Anaspides tasmaniae | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Diptera | Chironomidae | Chironominae | 1 | 1 | 1 | 5 | 0 | 1 | 0 | 0 | 1 | 1 | 3 | 4 | 4 | 8 | 4 | 10 | 10 | 9 |
| Insecta | Diptera | Chironomidae | Orthocladiinae | 2 | 0 | 1 | 7 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| Insecta | Diptera | Chironomidae | Podonominae | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Diptera | Chironomidae | Sub Tribe Tanytarsini? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 |
| Insecta | Diptera | Chironomidae | Tribe Tanypodinae | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Diptera | Chironomidae | Chironomidae Adult | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Diptera | Chironomidae | Chironomidae pupa | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| Insecta | Diptera | Chironomidae | Damaged | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Insecta | Diptera | Ceratopogonidae | Bezzia sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Insecta | Diptera | Empididae | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Diptera | Simuliidae | Austrosimulium victoriae | 0 | 0 | 0 | 7 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 2 | 1 |
| Insecta | Diptera | Simuliidae | Simuliidae Pupae | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Insecta | Diptera | Athericidae | Athericidae | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Insecta | Diptera | Tipulidae | | 0 | 0 | 0 | 3 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Diptera | Tipulidae | sp1 (golden appressed hairs) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| Insecta | Diptera | Tipulidae | sp2 (darkened spiracles) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Insecta | Ephemeroptera | Leptophlebiidae | Austrophlebioides sp. AV4 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Ephemeroptera | Leptophlebiidae | Austrophlebioides AV5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Ephemeroptera | Leptophlebiidae | Nousia sp. AV5/6 | 0 | 3 | 2 | 17 | 3 | 8 | 2 | 4 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| Insecta | Ephemeroptera | Leptophlebiidae | Nousia sp. AV7 | 9 | 1 | 2 | 1 | 3 | 7 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Insecta | Ephemeroptera | Leptophlebiidae | Nousia sp. AV8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Ephemeroptera | Leptophlebiidae | Nousia sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 4 | 4 | 3 | 5 | 12 | 8 | 6 | 0 |
| Insecta | Ephemeroptera | Leptophlebiidae | Leptophlebiidae Imm./damaged | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Insecta | Ephemeroptera | Leptophlebiidae | Tillyardophlebia sp | 0 | 0 | 4 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Plecoptera | Eustheniidae | Eusthenia costalis | 5 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Plecoptera | Eustheniidae | Eusthenia spectabilis grp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Plecoptera | Austroperlidae | Tasmanoperla thalia | 2 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Plecoptera | Gripopterygidae | Trinotoperla tasmanica | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Plecoptera | Gripopterygidae | Trinotoperla zwicki | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Plecoptera | Gripopterygidae | Newmanoperla prona | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Hydrobiosidae | Apsilochorema obliquum | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Insecta | Trichoptera | Hydrobiosidae | Ethochorema nesydrion | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Hydrobiosidae | Ethochorema hesperium | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Hydrobiosidae | Koetonga clivicola | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Hydrobiosidae | Taschorema apobamum | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Insecta | Trichoptera | Hydropsychidae | Asmicridea AV2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Hydropsychidae | Smicrophylax AV3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Leptoceridae | Oecetis sp | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Leptoceridae | Triplectides proximus | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Leptoceridae | Notalina ? (v. hairy chest) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Insecta | Trichoptera | Leptoceridae | Immature specimen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Philopotamidae | Hydrobiosella sp AV10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Calocidae/Helicophidae | Caenota plicata | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | Calocidae/Helicophidae | Immature specimen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Trichoptera | | Unidentified pupa | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Insecta | Coleoptera | Elmidae | Austrolimnius sp adult | 0 | 0 | 0 | 12 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 |
| Insecta | Coleoptera | Elmidae | Austrolimnius sp larvae | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 1 | 4 |
| Insecta | Coleoptera | Elmidae | Immature specimen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| Insecta | Coleoptera | Scirtidae | | 0 | 0 | 0 | 2 | 3 | 0 | 25 | 0 | 1 | 0 | 2 | 1 | 2 | 0 | 6 | 1 | 1 | 0 |
| Hydrachnida | Hydrachnida | Hydrachnida | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Odonata | Telephlebiidae | | Austroaeschna sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

## APPENDIX III – ENVIRONMENTAL VARIABLES DATA

MC = Mystery Creek Cave, EC = Exit Cave

| Date | Mean Min. Temp. Hastings Station | Mean Max Temp. Hastings Station | Mean Rainfall Hastings Station | Stream Stage A (cm) | Stream Stage B (number of bars) | Breathing EC (1 = in, -1 = out) | Breathing MC (1 = in, -1 = out) | Water Droplets (% cover) | Air Temp, Inside EC (°C) | Air Temp. Outside EC (°C) | Air Temp, Inside MC (°C) | Air Temp. Outside MC (°C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27-Aug-98 | 3.1 | 12.5 | 148.0 | | | 1 | -1 | 0 | 7.0 | | 6.7 | |
| 24-Sep-98 | 4.3 | 13.8 | 127.7 | -150 | | 1 | 0 | 5 | 7.4 | | 6.9 | |
| 27-Oct-98 | 5.7 | 15.9 | 137.8 | -210 | | -1 | -1 | 5 | 7.3 | | 7.6 | |
| 28-Nov-98 | 7.0 | 17.4 | 115.5 | -238 | | -1 | -1 | 50 | 9.4 | | 8.6 | |
| 21-Dec-98 | 8.4 | 18.7 | 108.4 | -360 | | 0 | -1 | 50 | 9.2 | | 8.5 | 16.5 |
| 28-Jan-99 | 9.1 | 20.4 | 73.5 | -390 | | -1 | -1 | 80 | 9.5 | 15.3 | 9.2 | 19.4 |
| 23-Feb-99 | 9.2 | 20.6 | 70.9 | -225 | -16.00 | -1 | -1 | 75 | 9.9 | 14.3 | 10.1 | 15.6 |
| 24-Mar-99 | 8.3 | 18.9 | 88.0 | -200 | -15.00 | -1 | -1 | 70 | 9.7 | 10.6 | 9.6 | 12.4 |
| 28-Apr-99 | 7.1 | 16.6 | 111.4 | -200 | -16.50 | 0 | 0 | 5 | 9.1 | 9.4 | 8.3 | 10.8 |
| 26-May-99 | 5.1 | 13.7 | 121.3 | -200 | -16.50 | 0 | 1 | 1 | 9.8 | 10.4 | 8.8 | 11.4 |
| 24-Jun-99 | 3.4 | 11.8 | 134.8 | -175 | -16.50 | 1 | 1 | 0 | 7.2 | 2.4 | 6.9 | 7.9 |
| 29-Jul-99 | 2.6 | 11.2 | 145.4 | -175 | -16.50 | 1 | 1 | 0 | 7.8 | 6.6 | 6.7 | 10.1 |
| 23-Aug-99 | 3.1 | 12.5 | 148.0 | -155 | -15.75 | 1 | 0 | 0 | 7.0 | 4.9 | 6.7 | 9.5 |
| 07-Oct-99 | 4.3 | 13.8 | 127.7 | -315 | -17.75 | -1 | 1 | 5 | 8.6 | 9.4 | 7.1 | 11.6 |
| 28-Oct-99 | 5.7 | 15.9 | 137.8 | -150 | -15.25 | 0 | -1 | 5 | 8.2 | 8.3 | 7.8 | 11.6 |
| 30-Nov-99 | 7.0 | 17.4 | 115.5 | -250 | -17.50 | -1 | -1 | 1 | 9.0 | 11.9 | 8.3 | 21.4 |
| 29-Dec-99 | 8.4 | 18.7 | 108.4 | -190 | -16.50 | 0 | 0 | 15 | 9.2 | 9.6 | 8.9 | 10.4 |
| 01-Feb-00 | 9.1 | 20.4 | 73.5 | -300 | -17.50 | -1 | -1 | 70 | 9.8 | 15.5 | 9.6 | 18.4 |
| 28-Feb-00 | 9.2 | 20.6 | 70.9 | -300 | -17.75 | -1 | -1 | 75 | 10.0 | 12.3 | 9.7 | 17.1 |
| 30-Mar-00 | 8.3 | 18.9 | 88.0 | -290 | -17.50 | -1 | -1 | 65 | 10.0 | 12.7 | 9.7 | 14 |
| 27-Apr-00 | 7.1 | 16.6 | 111.4 | -295 | -17.75 | -1 | -1 | 5 | 9.3 | 6.4 | 8.5 | 12.8 |
| 24-May-00 | 5.1 | 13.7 | 121.3 | -170 | -14.00 | -1 | -1 | 0 | 9.4 | 10.9 | 9.1 | 12.2 |
| 30-Jun-00 | 3.4 | 11.8 | 134.8 | -290 | -17.50 | 1 | 1 | 0 | 7.6 | 3.3 | 7.0 | 8.0 |
| 31-Jul-00 | 2.6 | 11.2 | 145.4 | -150 | -14.75 | 1 | 1 | 0 | 6.9 | 3.6 | 6.5 | 8.0 |

## APPENDIX IV – CAVE FAUNA COUNTS

MC = Mystery Creek Cave, EC = Exit Cave

Refer to Figs 2 and 3 and Appendix I for site location details.

| Month | Tasmanian Glow-worm | | | | | | | | | | | | Tasmanian Cave Cricket | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MC1 | MC2 | MC3 | MC4 | MC5 | MC6 | EC1 | EC2 | EC3 | EC4 | EC5 | EC6 | A | B | C | D | E | F |
| Aug-98 | 31 | 14 | 32 | 26 | 49 | | 44 | | 212 | 23 | | 154 | 89 | 55 | 24 | 184 | 57 | |
| Sep-98 | 85 | 64 | 94 | 120 | 49 | | 39 | | 198 | 28 | | 119 | 214 | 40 | 17 | 211 | 53 | |
| Oct-98 | 110 | 97 | 117 | 152 | 57 | | 36 | | 135 | 31 | | 154 | 185 | 19 | 9 | 285 | 20 | |
| Nov-98 | 164 | 128 | 124 | 232 | 147 | | 54 | | 155 | 26 | | 183 | 245 | 38 | 17 | 283 | 14 | |
| Dec-98 | 117 | 99 | 72 | 170 | 39 | | 48 | | 144 | 59 | | 139 | 195 | 72 | 23 | 205 | 14 | |
| Jan-99 | 131 | 98 | 116 | 159 | 35 | | 41 | | 118 | 93 | | 161 | 145 | 153 | 31 | 203 | 34 | |
| Feb-99 | 159 | 112 | 68 | 209 | 68 | | 43 | | 111 | 55 | | 84 | 154 | 165 | 23 | 240 | 25 | |
| Mar-99 | 141 | 106 | 54 | 243 | 77 | | 41 | | 138 | 59 | | 128 | 242 | 130 | 32 | 195 | 71 | |
| Apr-99 | 175 | 116 | 84 | 161 | 64 | | 61 | | 258 | 65 | | 124 | 204 | 91 | 22 | 297 | 48 | |
| May-99 | 162 | 117 | 80 | 183 | 91 | | 43 | | 207 | 51 | | 108 | 179 | 94 | 28 | 283 | 36 | |
| Jun-99 | 76 | 52 | 38 | 93 | 36 | 106 | 54 | | 221 | 56 | | 170 | 141 | 88 | 34 | 191 | 54 | |
| Jul-99 | 63 | 21 | 25 | 31 | 30 | 85 | 56 | 43 | 295 | 50 | 98 | 119 | 126 | 53 | 13 | 219 | 75 | 24 |
| Aug-99 | 78 | 50 | 42 | 103 | 76 | 121 | 50 | 33 | 245 | 51 | 110 | 166 | 204 | 55 | 19 | 286 | 47 | 22 |
| Sep-99 | 89 | 63 | 53 | 167 | 91 | 87 | 49 | 47 | 235 | 48 | 87 | 164 | 245 | 60 | 12 | 330 | 36 | 18 |
| Oct-99 | 114 | 66 | 27 | 186 | 123 | 118 | 43 | 43 | 227 | 42 | 58 | 115 | 163 | 73 | 20 | 307 | 39 | 22 |
| Nov-99 | 87 | 62 | 25 | 196 | 106 | 126 | 36 | 31 | 191 | 64 | 52 | 95 | 184 | 90 | 16 | 335 | 33 | 8 |
| Dec-99 | 107 | 78 | 49 | 196 | 106 | 142 | 36 | 38 | 134 | 153 | 96 | 117 | 194 | 146 | 15 | 254 | 50 | 9 |
| Jan-00 | 199 | 89 | 99 | 254 | 109 | 159 | 37 | 35 | 107 | 93 | 51 | 109 | 196 | 195 | 27 | 245 | 53 | 7 |
| Feb-00 | 158 | 60 | 105 | 206 | 90 | 243 | 32 | 54 | 136 | 119 | 57 | 138 | 196 | 209 | 29 | 179 | 42 | 2 |
| Mar-00 | 173 | 67 | 147 | 260 | 122 | 147 | 38 | 56 | 173 | 194 | 63 | 122 | 153 | 183 | 20 | 195 | 35 | 5 |
| Apr-00 | 130 | 40 | 100 | 175 | 65 | 117 | 37 | 45 | 180 | 111 | 52 | 94 | 214 | 120 | 27 | 195 | 48 | 9 |
| May-00 | 150 | 29 | 67 | 152 | 106 | 146 | 35 | 26 | 156 | 126 | 58 | 54 | 177 | 81 | 28 | 280 | 26 | 18 |
| Jun-00 | 118 | 35 | 69 | 104 | 104 | 132 | 39 | 35 | 200 | 118 | 80 | 169 | 128 | 76 | 18 | 195 | 41 | 68 |
| Jul-00 | 106 | 27 | 50 | 88 | 67 | 138 | 40 | 41 | 197 | 74 | 85 | 138 | 113 | 103 | 12 | 195 | 54 | 55 |

| Month | Ida Bay Cave Beetle | | | | | | Tasmanian Cave Spider | | | | | | Ida Bay Cave Harvestman | | | | | | | | | | | | | | ?Amourobiidae | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | A | B | C | D | E | F | A | B | C | D | E | F | EC3 | EC4 | EC6 | MC1 | MC3 | MC4 | MC5 | MC6 | A | B | C | D | E | F |
| Aug-98 | 0 | 2 | 0 | 0 | 8 | 0 | 4 | 0 | 0 | 9 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Sep-98 | 0 | 1 | 0 | 0 | 10 | 0 | 7 | 2 | 0 | 6 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oct-98 | 1 | 1 | 0 | 0 | 5 | 0 | 2 | 2 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-98 | 0 | 3 | 0 | 0 | 6 | 0 | 1 | 4 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec-98 | 0 | 2 | 1 | 0 | 8 | 0 | 3 | 2 | 0 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jan-99 | 0 | 2 | 0 | 1 | 3 | 0 | 5 | 1 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Feb-99 | 0 | 2 | 0 | 0 | 6 | 0 | 2 | 0 | 0 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mar-99 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 7 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-99 | 0 | 2 | 1 | 0 | 4 | 0 | 5 | 0 | 0 | 8 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| May-99 | 0 | 4 | 1 | 0 | 1 | 0 | 4 | 0 | 0 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jun-99 | 1 | 0 | 0 | 0 | 4 | 0 | 8 | 1 | 0 | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-99 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 2 | 0 | 13 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aug-99 | 0 | 0 | 0 | 0 | 4 | 0 | 9 | 11 | 0 | 18 | 6 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sep-99 | 0 | 0 | 0 | 0 | 7 | 0 | 6 | 3 | 2 | 9 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oct-99 | 0 | 1 | 1 | 0 | 6 | 0 | 4 | 6 | 2 | 6 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-99 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 5 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec-99 | 0 | 0 | 0 | 0 | 3 | 0 | 4 | 1 | 1 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Jan-00 | 0 | 2 | 5 | 0 | 6 | 0 | 4 | 3 | 2 | 9 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Feb-00 | 0 | 3 | 0 | 0 | 6 | 0 | 2 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Mar-00 | 0 | 1 | 3 | 0 | 2 | 0 | 1 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-00 | 0 | 2 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| May-00 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jun-00 | 1 | 1 | 0 | 0 | 3 | 0 | 1 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-00 | 0 | 1 | 1 | 0 | 9 | 0 | 2 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |

# APPENDIX V – COUNTS OF GLOW-WORM ADULTS, PUPAE AND PREY

| Month | Exit Cave | | | Mystery Creek Cave | | |
|---|---|---|---|---|---|---|
| | Adults | Prey | Pupae | Adults | Prey | Pupae |
| Aug-98 | 0 | | 3 | 0 | | 0 |
| Sep-98 | 0 | | 7 | 0 | | 4 |
| Oct-98 | 2 | | 14 | 6 | | 9 |
| Nov-98 | 1 | | 6 | 2 | | 3 |
| Dec-98 | 1 | 12 | 12 | 1 | 6 | 16 |
| Jan-99 | 3 | 7 | 14 | 5 | 16 | 10 |
| Feb-99 | 0 | 2 | 2 | 0 | 2 | 0 |
| Mar-99 | 0 | 2 | 0 | 0 | 4 | 0 |
| Apr-99 | 0 | 1 | 0 | 0 | 5 | 0 |
| May-99 | 0 | 1 | 0 | 0 | 3 | 0 |
| Jun-99 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-99 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aug-99 | 0 | 0 | 3 | 2 | 2 | 0 |
| Sep-99 | 1 | 2 | 7 | 1 | 1 | 2 |
| Oct-99 | 3 | 0 | 7 | 21 | 9 | 20 |
| Nov-99 | 1 | 7 | 6 | 10 | 2 | 24 |
| Dec-99 | 0 | 10 | 5 | 9 | 5 | 18 |
| Jan-00 | 3 | 3 | 4 | 4 | 8 | 3 |
| Feb-00 | 0 | 2 | 1 | 2 | 15 | 2 |
| Mar-00 | 0 | 4 | 0 | 0 | 9 | 0 |
| Apr-00 | 0 | 3 | 0 | 0 | 2 | 0 |
| May-00 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jun-00 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-00 | 0 | 0 | 1 | 0 | 0 | 0 |