Fossil deposits in Megamania Cave, Gunner River, South Island, New Zealand

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Published by
Department of Conservation
Head Office, PO Box 10-420
Wellington, New Zealand

This report was commissioned by Nelson/Marlborough Conservancy

ISSN 1171-9834

Reference to material in this report should be cited thus:

Worthy, T.H., 1998
Fossil deposits in Megamania Cave, Gunner River, South Island, New Zealand. *Conservation Advisory Science Notes No. 195.* Department of Conservation, Wellington.

Keywords: Megamania Cave, fossil birds, moa bones, *Aptornis defossor,* Gunner River

1. Introduction

Megamania Cave system was visited with Ian Gibson, Karamea (caving guide), Jacky White, Karamea (caving guide), Craig Miller, Hokitika (Department of Conservation), Ben Bunting, Hamilton (student interested in cave management), and Ian Millar, Nelson (DoC) on 17-19 October 1997. Our purpose was to provide a preliminary report on the significance of fossil deposits within the cave from a scientific and aesthetic viewpoint, as they had been reported to be as extensive as those are in Honeycomb Hill Cave, Karamea, which is considered to be of international significance (Worthy 1993).

2. Location

Megamania Cave is in the Heaphy River catchment and forms a tributary of the Gunner River. It occupies an area of about 1 km^2 between the Main Entrance at a point marked on the metric topographical map as a sinking stream, Grid reference L26 383257, and the Gunner River. It lies under land with an altitude of 40 -150 m.

3. Cave description

The cave system comprises about 14 km of passages arising from many entrances. Inlets flow down-dip roughly northwest to the watertable, whereupon drainage is northeast towards a resurgence on the Gunner River. An extensive and multi-stage development has led to several of these southwest to northeast routes having formed, which together with numerous connections with each of the inlet stream passages, has led to a complex cave (Figures 1, 2). Passages are present on at least three levels with many connections between them. Blockages by normal processes of cave speleogenesis such as rockfalls, speleothem growth, and sediment infills make impossible uninterrupted travel along the older passages.

Within the cave, passages have discrete floor characteristics that variously affect the potential for fossil deposits.

1. Vadose canyon passages with active streams in their base. If water volumes are low and such passages are derived from below pitfall traps provided by tomos from the land above, then bones are often present. Mainly moa bones are present in these situations because lighter and more fragile specimens are more easily destroyed. Such deposits provide a `time-averaged' set of specimens, that is, bones are derived from throughout a long span of time. In Megamania, bones of possums and

deer lying beside bones of species present in the region only during the last glacial period point to perhaps 20 000 years of deposition.

2. Ancient dry passages with soft sediments. Passages such as these provide a floor upon which fossils can accumulate, as there is no water flow to remove them. As the main sediment input to such sites is silt build-up as a result of sub-aerial weathering of the limestone walls and roof, or micro-crystalline calcite floor deposits, fossils will not necessarily be buried and are thus findable. Their source is isolated instances of animals entering the cave from a nearby entrance and then dying. Preservation is related to age and nearness of an entrance. The latter is important as weathering due to wetting and drying is the main cause of destruction of fossils, and climate stability increases with distance from the entrance. Fossils typically are isolated skeletons, and range from frog and small passerines to visually spectacular moas.

3. Ancient dry passages floored by rockfall debris. Rockfall passages are unstable in geological time so present surfaces probably did not exist thousands of years ago, hence time for fossils to accumulate is more limited than in (2) above. Also, the cracks and crevices allow smaller specimens to get out of sight, hence only bigger specimens such as moas and kiwis are commonly found.

4. Ancient passages with active speleothem growth. Active speleothem growth limits the time available in which fossils may remain and be findable, so most bones in such areas tend to be geologically young.

4. The fossil deposits

In the three days of examination of the cave, I was shown to many of the significant fossil deposits, but certainly not all that are known to the cave's explorers. However, while limited, this visit has allowed an initial assessment of the type of deposits present in the cave and the range of species represented. On this initial survey no fossils were collected, so all species determinations were done in situ in the absence of comparative material and therefore are preliminary. The following is a site-by-site description of significant areas. The letter prefixes locate these areas on the map.

A. UPSTREAM MAIN ENTRANCE

Upstream of the Main Entrance the main stream flows over a waterfall above which is about two hundred metres of passage. I am told that at its end an entrance has many bones accumulated at its base. Time did not permit examination of this deposit, but we did look at the parallel dry passage that emanates from the same point. In the vicinity of the rockfall derived from the active entrance, moa bones *(Megalapteryx didinus)* and small birds *(Strigops*

habroptilus, Coenocorypha aucklandica, Euryanas finschi) are visible. Small specimens are at risk of trampling-damage here as evidenced by damage to a kakapo skeleton and snipe bones noted in the disturbed area where people have walked. The fossil deposit seen is not of high scientific value, but examination of the floor, taping of larger specimens, and salvage of bones of small specimens (e.g. *Coenocorypha aucklandica)* would be worthwhile.

B1. SHORTCUT TOMO AREA

Shortcut Tomo is in the same doline as the Main Entrance. It is about 15 m deep and provides the access to what is likely to become a main commuter route for cave visitors. At the end of the passage that extends southwest of the tomo are spectacular deposits of anthodites. These are probably aragonite, which is a very rare speleothem form and mineral in limestone caves in New Zealand. The presence of these speleothems will make this area one of the most visited sites in the cave.

On the slope descending from the tomo at least two skeletons of large kiwis *(Apteryx australis/haastii)* are present. In the chamber immediately south of Shortcut Tomo four moa skeletons were found, of which one, a *Dinornis novaezealandiae,* is well preserved and visually spectacular. Near this skeleton, in a low point of the chamber, several skeletons of small birds have accumulated. These include *Euryanas finschi, Anas chlorotis, Puffinus gavia/spelaeus, Porphyrio hochstetteri.* A shell of the locally extinct *Rhytida oconnori* was also seen. Near one of the moas, bones of an *Aptornis defossor* were found. While not examined in detail, the side of this chamber that is adjacent to the tomo probably has numerous small skeletons. While the moas should be taped off and left, collection of some of these small skeletons as voucher specimens for the species presence, and to determine the identity of the small shearwater, is desirable. In the trampled floor area leading from Shortcut Tomo past the above-described chamber towards the anthodites, two bones of a large petrel were found. These may be *Procellaria westlandica. It* would be desirable to scour this floor for more fossils and salvage them before they are trampled.

B2. SHORTCUT TOMO - LOWER SERIES

About 50 m from Shortcut Tomo towards the anthodites a 3 m drop gives access to a short series of passages. In the upstream part of this area, frog *(Leiopelma)* bones, *Nestor notabilis, Anas chlorotis, Apteryx,* and weathered bones of a large *Dinornis* and an *Aptornis defossor* are present. Taping of these remains is necessary. In the downstream part, isolated moa bones and, significantly, a well-preserved skeleton of an *Aptornis defossor* were found. It is buried under a veneer of sediment, but most of the skeleton is likely to be present, which would provide a valuable specimen of this species, which is seldom found except as isolated bones.

Near this skeleton is a sediment bank at least 2 m high that preserves a fine sequence of clays and finer silts and sands that may have value for sediment-based studies such as palynology.

B3. NEAR THE ANTHODITES

A hole in the floor here gives access to an ascending series of passages (not mapped) and in which at least two skeletons of *Strigops h abroptilus* were seen.

C. MEGABLAST BAT

Most of the extensive passage known as Megablast was not examined for fossils in detail, as entrances are not in the near vicinity. However, an articulated, fur-covered bat is present on wet flowstone near the Mudroom. Its preservation in such a wet environment suggests it is not old, and Ian Gibson told me he considered it had decomposed in the 3-4 years he has known of it. It appears to be *Mystacina tuberculata,* a species that has recently been rediscovered in the Heaphy.

D. BIG CHICKEN ENTRANCE

This is now the main access way to passages in the cave system. I did not search the area about this entrance in detail but noted the remains of at least five moas *(Anomalopteryx didiformis, Megalapteryx didinus, Pachyornis elephantopus, Dinornis novaezealandiae)* scattered around among boulders. A duck skeleton *(Anas chlorotis)* almost on the commuter path is taped but has already suffered severe damage and ought to be salvaged.

E. SABRE-TOOTH DOLPHIN PASSAGE - TREVOR'S GARAGE

This is a low-energy stream way of several hundred metres length. The Sabre Tooth Dolphin passage starts below a couple of tomos under which are several deer skeletons. In the streambed downstream of this tomo are numerous moa bones (Glacial-sized *Megalapteryx didinus, Pacbyornis elepbantopus, Dinornis strutboides, Dinornis giganteus,* and rare small birds, e.g. *Gallirallus australis, Apteryx* sp., *Fulica prisca,* and *Puffinus gavia/spelaeus),* and deer bones. This, therefore, is a time-averaged deposit. While visually spectacular it is not of use for faunal reconstruction as Holocene and Glacial faunas are admixed.

However, below the tomo is an area protected from drip-water erosion by a low roof, and whose nearness to the tomo has allowed animal remains to concentrate. An inspection of this area (2 m by 4 m) suggests that it contains a wealth of small bones of frogs, lizards and birds. While odd bones of *Aptornis*

defossor and *Apteryx australis/haastii* were seen, excavation should provide information on the smaller passerines living in the cave's vicinity. The site is comparable to the Eagles Roost and AR144 in Honeycomb Hill Cave System.

In the area immediately upstream of this tomo a complex of passages has several moas *(Anomalopteryx didiformis, Pachyornis australis),* and small bird skeletons *(Strigops habroptilus, Apteryx australis/haastii, Puffinus gavia/spelaeus).* These should be adequately taped off to safeguard them. Their presence suggests that isolated skeletons of smaller passerines may be present, and as these have little visual value, should be searched for and collected before their inadvertent destruction.

Examination of the farther upstream regions of Trevor's Garage was not permitted by the time available, but I understand that the deposit is again one of numerous moa bones accumulated in the streambed below and downstream of an entrance tomo.

A small passage leads from the tomo at the head of the Sabre Tooth Dolphin passage towards the junction with Gypsy Way. In the dry sediments of hollows in its base, numerous skeletons of frogs *(Leiopelma hamiltoni, L. markhami)* are present. Also one specimen of *Mystacina tuberculata* was seen. These are at extreme risk of trampling damage and should be salvaged.

F. GYPSY WAY

Gypsy Way is a 2-3 m wide, flat, soft sediment-floored passage much of which is traversed by crawling. In the undisturbed sediments along the passage sides numerous frog bones were seen. At the end of the crawl-way, the entrance to walking-sized passages is marked by a small inlet from a passage blocked by rockfall. In the rockfall and along the tiny strearnway emanating from it a few moa *(Pachyornis australis, Megalapteryx didinus)* and other bones *(Apteryx australis/haastii, Gallirallus australis, Petroica australis)* were seen.

In a blind alcove near here a bat *(Mystacina tuberculata)* skeleton was found.

G. HONEY POT

Honey Pot is a chamber at the base of a pit in the Crimson and Clover Entrance. It is accessed most easily via Wriggles Passage. Discrete skeletons are scattered over the rockfall slope leading from the entrance and in the chamberbelow as follows: *Hemiphaga novaeseelandiae* 2, *Euryapteryx geranoides* 1, *Megalapteryx didinus* 6, *Pachyornis australis* 1, *Apteryx australis/haastii* 3, *Strigops habroptilus* 3, moa chick 1, *Mystacina tuberculata* 1. Most of these have good visual appeal and could safely remain in situ. The exceptions would be the bat and juvenile moa, which, being small, have little aesthetic appeal, are at risk from trampling, and would be useful specimens for research.

H. WRIGGLES STREAM

In the bed of Wriggles Streamway are numerous moa bones *(Megalapteryx didinus, Pachyornis australis, Dinornis* species) which appear to be mainly derived from a narrow tomo entrance just south of Crimson and Clover Entrance. Visually spectacular, this is again a time-averaged accumulation of fossils. Owing to the narrowness of the Streamway, cavers traversing this passage are likely to damage the specimens. In an alcove, just downstream of the upstream continuation of Wriggles past the access to Crimson and Clover Entrance, is a complete skeleton of a *Cyanoramphus* sp.

I. CRIMSON AND CLOVER - EAST

About 40 m from the entrance in this easterly trending passage, an area actively eroding by drip-water from an entrance above has numerous bones in it (1 *Pachyornis elephantopus,* 2 *Pachyornis australis,* 3-4 *Anomalopteryx didiformis,* and a *Falco novaezealandiae).* Downslope of this, a hollow contains the remains of at least four moas *(Anomalopteryx didiformis* 3, *Euryapteryx geranoides* 1) and a tuatara.

Beyond a crawlway leading from here is an articulated skeleton of an *Anomalopteryx didiformis* and at least one skeleton of a *Xenicus* sp. The moa is aesthetically appealing and not at risk of inadvertent damage, but the wren should be collected as only the trained eye can see it. Its presence suggests favourable preservation conditions, so the floor of this area should be scoured carefully to see if others are present.

J. CRIMSON AND CLOVER - NORTH

A large northward trending passage goes from Crimson and Clover Entrance about 200 m to another entrance. At the junction of the passage leading to Busting Blues is a visually spectacular skeleton of *Pachyornis australis.* It is articulated but poorly preserved, as ribs and tibiotarsi have entirely decomposed, yet, strangely, the skull is well preserved. In the near vicinity are skeletons of *Cyanoramphus* sp., *Aegotheles novaezealandiae,* and scattered *Strigops habroptilus* bones.

About 10 m beyond the passage leading to Busting Blues, *Anomalopteryx didiformis* and *Dinornis novaezealandiae* bones lie in a hole against the wall, and in a pit in the passage centre are several skeletons *(Anomalopteryx didiformis, Cyanoramphus* sp., *Nestor meridionalis, Philesturnus carunculatus,* and at least one bone of *Euryapteryx geranoides).* The pit exposes stream sediments, but these do not appear to be fossiliferous.

About 40 m closer to the next entrance are two individual skeletons of *Anomalopteryx didiformis* which are well preserved and visually appealing.

Busting Blues was not examined in detail, but at least one *Apteryx australis/ haastii* skeleton is present at its northeast end.

K. GOLD RUSH - AREA I

In high-level passages that appear to have been once connected to Seagull Airways (Figure 2), are a mummified *Strigops habroptilus* and two *Strigops* skeletons. The mummified specimen is in a very dry area and is not so much a mummy as a layer of carbonaceous powder that preserves the shape of the wings and tail while covering the skeleton. Feathers have decomposed.

L. GOLD RUSH - AREA 2

This small blind side passage contains the isolated skeletons of at least 1 *Anas chlorotis,* 1 *Strigops habroptilus* that is partly mummified, 2 rats and a possum. At its end, well-stratified sediments are preserved in section, but they are not fossiliferous. Fossils in this area are derived from a passage in Seagull Airways (next) which terminates in a pitch to Gold Rush about 40 m from the entrance.

M. SEAGULL AIRWAYS

A large dry passage intersects the side of a large entrance tomo. The base of the tomo was not investigated but would be expected to have some moa bones at least. The wide passage downhill of the entrance has favourable preservation conditions for small skeletons though only one wren bone was seen in the brief time available. However, 1 *Callaeas cinerea,* 1 *Gallirallus australis*, and 4-5 *Strigops habroptilus* skeletons were seen. In the short upstream segment of passage that leads to the pitch into Gold Rush, bones of 2 *Phalacrocorax carbo*, and 1 *Aegotheles novaezealandiae* are present.

5. Significance of fossil deposits

The fossil deposits in Megamania fall roughly into two categories.

1. Bones accumulated in small streamways that lead from entrance tomos. The passages Sabre Tooth Dolphin, Trevor's Garage, and Wriggles are the main such sites. Accumulations in these by and large retain no skel etal associations and are mainly of various moa species. The presence of species typical of Glacial faunas in the region, others typical of the Holocene, and modern taxa indicate most of these are time-averaged accumulations. Unless extensive dating was carried out, such collections are of little use for palaeofaunal reconstructions and, at most, collection of voucher specimens to indicate the diversity of species present is all that is warranted. By this I mean 1-2 bones of each taxon from say Sabre Tooth Dolphin Passage and Wriggles. These accumulations in Megamania are more extensive than any in Honeycomb Hill Cave, Karamea, but each is similar to say the Madonna streamway in the

Punakaiki karst (Worthy and Holdaway 1993) or Hodge Ck, Mt Arthur (Worthy 1997).

2. Discrete skeletons accumulated in passages adjacent to the base of tomo entrances. Most of these are various moa species, but kiwi and kakapo are common as well. None of these would need to be collected but more taping for protection is required. In this regard Megamania is similar to Honeycomb Hill Cave although, there, many more skeletons of small passerines (particularly wrens, saddleback, kokako) were present. Of all the discrete skeletons, the single *Aptornis defossor* near Short Cut tomo is the most desirable one to collect, as it is a valuable and rare specimen. Collection of the small bird species at B1 would enable identification of the small *Puffinus* sp., and provide good voucher specimens from a site that is not visually spectacular and that is relatively at risk from trampling. Salvage of skeletons of the smaller species from elsewhere in the cave is desirable in many instances, as they are likely to be trampled otherwise. These include the snipe bones at (A), duck bones at (B2, D), *Procellaria* (B1), bat skeletons (E, F, and G), owlet nightjar (J, M), shag (M), wrens (I, M).

Honeycomb Hill Cave system contains, among 50 discrete sites, two that are very significant for the presence of small passerines (Eagles Roost, AR 144). In all of Megamania, I saw only one potentially similar site, which was at the head of Sabre Tooth Dolphin Passage. Small birds, frog and lizard bones are certainly present, but their diversity can only be assessed by excavation. I recommend that 3 m^2 be excavated. This would involve taking the top 1-2 cm of sediment, wet-sieving it in the nearby stream, and removing this concentrate for later sorting in the laboratory.

Despite the presence of extensive sedimentary deposits in some passages (Busting Blues, Gold Rush) no stratified bone-bearing deposits were found. Honeycomb Hill's Graveyard remains unique in this regard.

6. Faunal composition

Thirty-one species of bird, one bat, at least two frogs and a tuatara were identified in this preliminary survey of the fossil deposits in Megamania Cave. More intensive examination specifically for small taxa is likely to extend this number. The cave system is like Honeycomb Hill Cave in that it has a similar amount of passage, multiple entrances, and many discrete fossil sites. However, it is at lower altitude 50-150 m compared to 300-400 m which seems to have been important for species representation. For example, Honeycomb Hill Cave has a much more important shrubland component to the fauna arising from its position during the last Glacial period in shrublands. In Honeycomb Hill Cave, kea, Finsch's duck, extinct geese, *Aptornis* and eagle are all common yet are rare or absent in Megamania. This suggests that even during the last Glacial period (when Megamania was accumulating fossils as indicated by the presence of e.g. large *Megalapteryx didinus* and *Pachyornis*

australis) shrubland was not an important component of the vegetation above the cave. Lowland components in Megamania include greater numbers of *Euryapteryx geranoides* and *Anas chlorotis*. Honeycomb Hill also preserved far greater numbers of small skeletons, such as wrens, which may in part be related to former shrubland vegetation. These factors combined result in Honeycomb having nearly twice the diversity that Megamania is so far known to have (Table 1). However, Honeycomb Hill Cave is exceptional and, elsewhere, for a single cave system to have more than 30 bird species is unusual. On the West Coast, only Metro Cave at Charleston provides a set of site 3 with similar diversity (Worthy and Holdaway 1993).

In summary, the cave has diverse and valuable deposits of fossil birds, none of which is individually outstanding. Together, they constitute a rich resource that illustrates the type of fossil deposits once present in many New Zealand cave systems. At present, considering the cave's remote location, it should be possible with minimal management to maintain these deposits. More extensive taping of specimens is urgently required to stop accidental damage by cavers. In terms of collections, only limited excavation and salvage of minimal numbers of some of the more at-risk smaller specimens is recommended. However, the potential for stratified, fossiliferous sediments to be found is still there, which would markedly increase the scientific value of the cave's fossil deposits.

7. A comment on the living biota

The cave spider *Spelungula cavernicola* is widespread, but seemingly uncommon, in the cave system. It is otherwise known from limestone areas at the Heaphy River Mouth, the Oparara Valley, and lower Takaka Valley. Only about a dozen were seen in the three days' caving. Cave wetas of undetermined species are widespread in the cave. Aquatic amphipods and white planaria were seen and some collected (IM) in small streams at A, E No attempt was made to find other aquatic species such as mollusca. Only a single cave beetle (cf *Pholeodytes townsendi,* which is known from the nearby Coppers cave in Ryans Creek and further north in caves of the Paturau limestone area) was found near F, suggesting that these are quite uncommon in the cave. A single adult female troglobitic spider of minute size (<1 mm body width) was collected at F. Small troglobitic spiders are essentially unstudied in New Zealand, but at least one different species is known from caves on each of Mt Owen, Mt Arthur, and Takaka Hill.

8. Ackowledgements

I thank Ian Gibson for sharing his knowledge of the cave. The draft map accompanying this report was made from surveys of the cave by many cavers

but, particularly, Stuart McGowan, Ian Gibson, Neil Silverwood, and Dave Harmer. I am very grateful that they permitted its use here.

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Table 1. Faunal composition of the Punakaiki fauna (Worthy and Holdaway 1993), the total species known from Honeycomb Hill (Appendix 1 - Worthy 1993) and Megamania.Y = presence. MNI = minimum number of individuals.

	Punakaiki	Honeycomb	Megamania
Emeidae	Total MNI	Presence	Presence
Anomalopteryx didiformis	81	Y	Y (common)
Megalapteryx didinus	38	Y	Y (common)
Pachyornis elephantopus	11	Y	Y
Pachyornis australis	3	Y	Y (common)
Euryapteryx geranoides	17	Y (1)	Y (rare)
Dinornithidae			
Dinornis struthoides	25	Y	Y
Dinornis novaezealandiae	24	Y	Y
Dinornis giganteus	2	Y	Y
Apterygidae			
Apteryx australis/haastii	22	Y	Y
Apteryx owenii	3	Y	
Apteryx sp.	9	Y	
Procellariidae			
Procellaria parkinsoni	3	Y	
Procellaria westlandica	2		?Y
Puffinus gavia/spelaeus	173	Y	Y
Pachyptila cf turtur	78	Y	
Fregetta tropica	4		
Pterodroma cookii	3	Y	
Pterodroma inexpectata		Y	
Pelecanoides urinatrix	2	Y	?Y
Anatidae			
Cnemiornis calcitrans	10	Y	
Hymenolaimus malacorhynchos	2	Y	
Anas chlorotis	2	Y	Y
Euryanas finschi	7	Y (many)	Y (rare)
Pelecaniformes			
Phalacrocorax carbo		Y	Y
Psittacidae			
Strigops habroptilus	52	Y	Y (common)
Nestor meridionalis	3	Y	Y
Nestor notabilis	3	Y (many)	Y (rare)
Cyanoramphus sp.	11	Y	Y
Strigidae			
Ninox novaeseelandiae	2		
Sceloglaux albifacies	Y	Y	
Aegothelidae			
Aegotheles novaezealandiae	17	Y	Y
Cuculidae			
Eudynamys taitensis		Y	
Columbidae			
Hemiphaga novaeseelandiae	8	Y	Y
Accipitridae			
Circus eylesi		Y	
Harpagornis moorei	Y	Y	
Falconidae			
Falco novaeseelandiae	1	Y	Y
Galliformes			
Coturnix novaezelandiae		Y	

Rallidae			
Gallirallus australis	21	Y	Y
Porphyrio hochstetteri	1	Y	Y
Fulica prisca	2	Y	Y
Gallinula hodgenorum		Y	
Rallus philippensis		Y	
Aptornithidae			
Aptornis defossor	Y	Y	Y
Scolopacidae			
Coenocorypha cf aucklandica	14	Y	Y
Acanthisittidae			
Acanthisitta chloris	4	Y	
Xenicus sp.	5	Y	Y
Pachyplichas yaldwyni	13	Y	
Traversia lyalli	3	Y	
Dendroscansor decurvirostris		Y	
Motacillidae			
Anthus novaeseelandiae	2	Y	
Pachycephalidae			
Mohoua ochrocephala	4	Y	
Mohoua novaeseelandiae		Y	
Muscicapidae			
Turdus merula	3	Y	
Turdus philomelos	1		
Zosteropidae			
Zosterops lateralis	1		
Acanthizidae			
Gerygone igata		Y	
Monarchidae			
Rhipidura fuliginosa		Y	
Eopsaltriidae			
Petroica australis	8	Y	Y
Petroica macrocephala	1	Y	
Meliphagidae			
Prosthemadera novaeseelandiae	3	Y	
Anthornis melanura	7	Y	
Callaeidae			
Callaeas cinerea	10	Y	Y
Philesturnus carunculatus	9	Y	Y
Turnagridae			
Turnagra capensis	3	Y	
Corvidae			
Corvus moriorum	2	Y	
Total Birds	**735**		
No. of species	**54**	**60**	**31**
Mammals			
Mystacina tuberculata	Y	Y	Y
Mystacina robusta	Y	Y	
Chalinolobus tuberculatus		Y	
Rattus exulans	Y	Y	Y
Herpetofauna			
Sphenodon sp.	Y	Y	Y
Leiopelma hamiltoni/hochstetteri	Y	Y	Y (many)
Leiopelma markhami	Y	Y	Y (many)

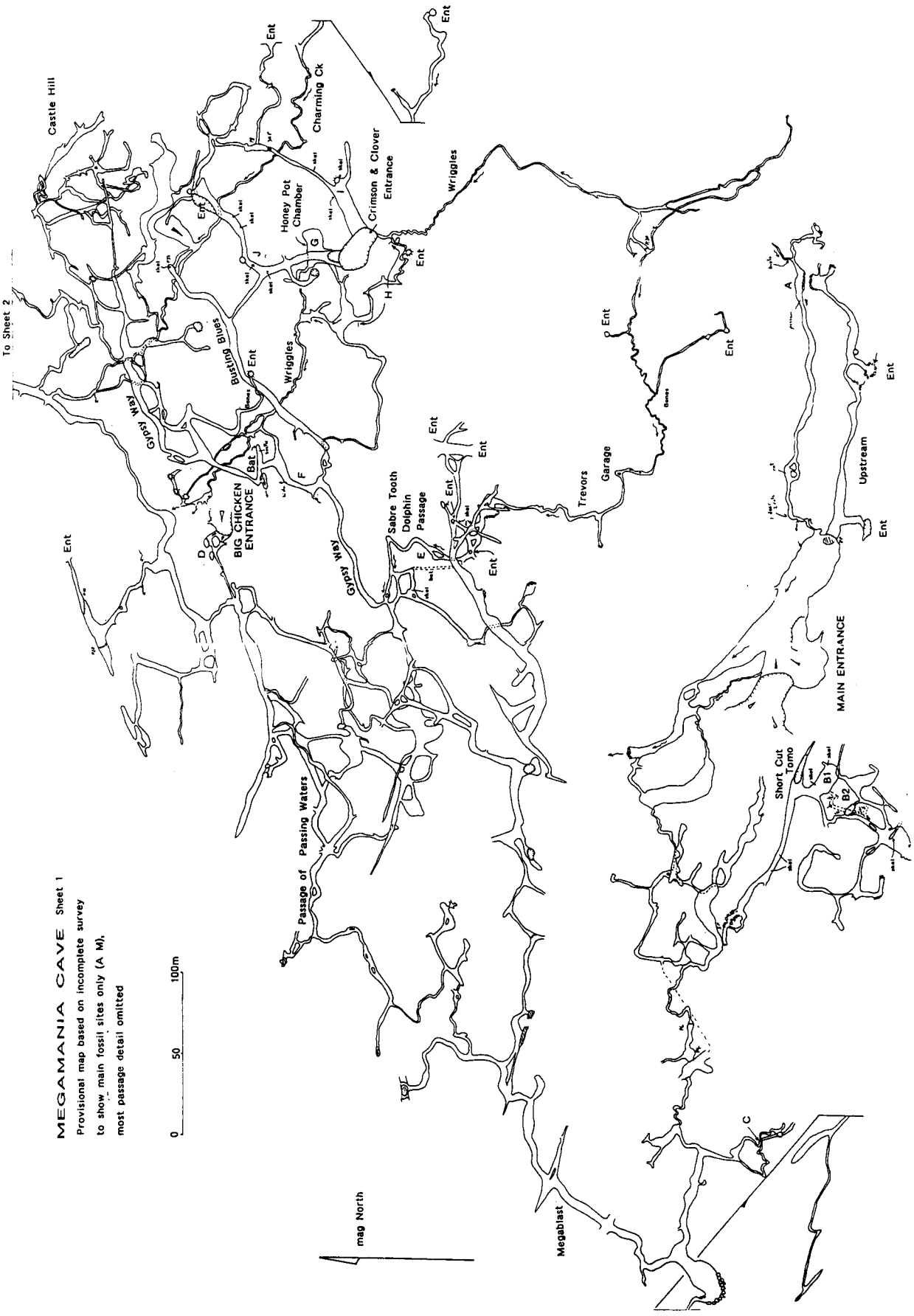

Figure 1. Megamania Cave main passages.

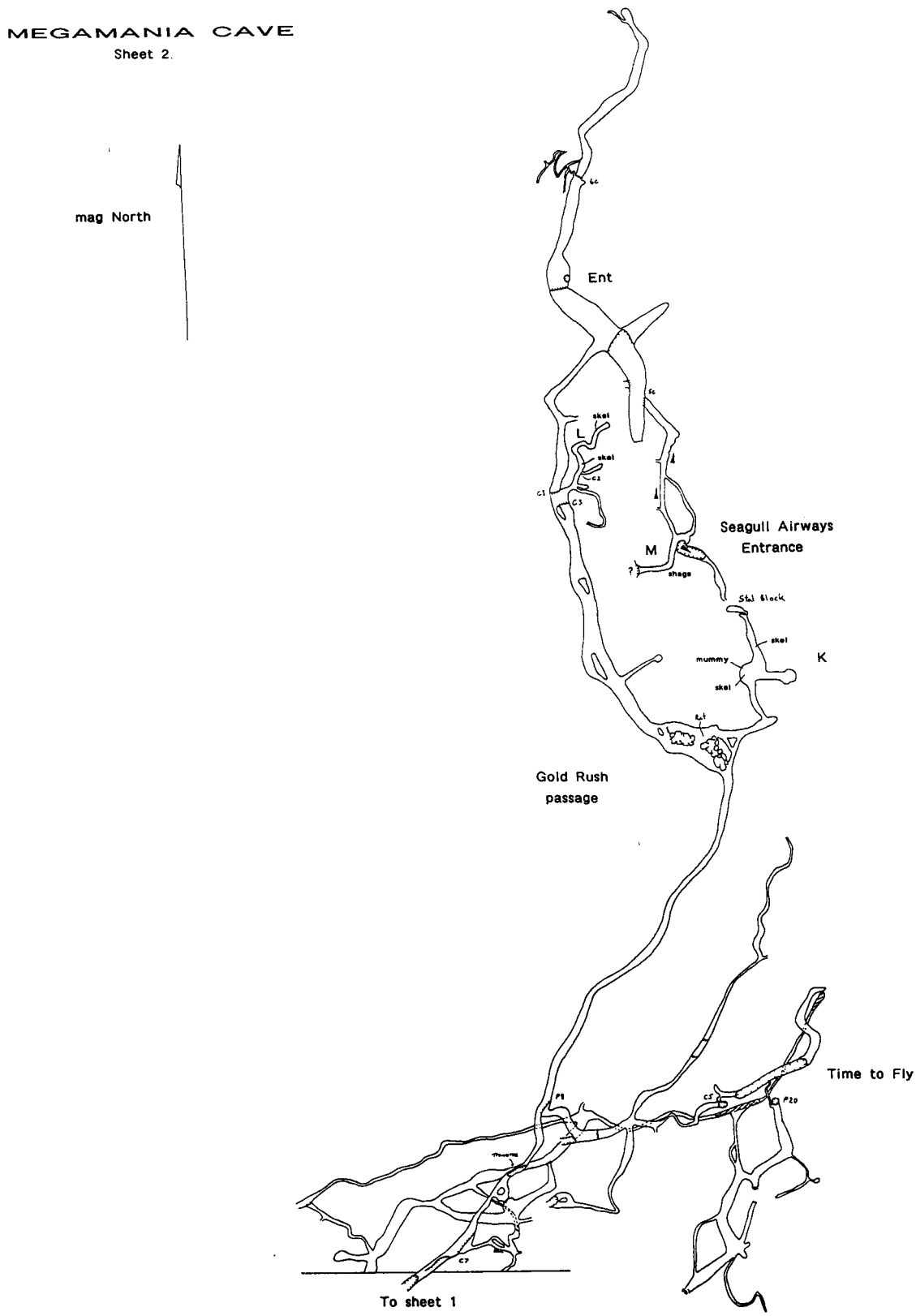

Figure 2. Megamania Cave, northern passages.