

# 'OLD' CAVE, NEW STORIES: THE INTERPRETATIVE EVOLUTION of BLANCHE CAVE, NARACOORTE, SOUTH AUSTRALIA.

Liz Reed\* and Steve Bourne

\*School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide, SA, 5001, Australia.

*"What difference is there, do you think, between those in Plato's cave who can only marvel at the shadows and images of various objects, provided they are content and don't know what they miss, and the philosopher who has emerged from the cave and sees the real things?"*

Desiderius Erasmus (Dutch Renaissance scholar 1436 to 1536)

## Seeking answers in the dark

Plato's cave is a metaphor for freeing oneself from conventional thought or ignorance and looking beyond the bounds of accepted reality. In the modern vernacular the equivalent would be 'stepping out of your comfort zone' or 'broadening your horizons'. In his own erudite way Plato was espousing the values of philosophy and his theory of 'forms'. Interestingly, he was also proving that he was a masterful interpreter, using analogy, as many good interpreters do. What is intriguing is his use of a cave to symbolize being 'kept in the dark' and the outside world to represent freedom and enlightenment. Was he echoing the popular views of his time? Were caves seen as somewhat static and sinister, more suited to fantasy than serious endeavour?

Certainly the presence of fossil bones added to the mysterious allure of caves. In Ancient Greece, Quaternary aged mammal fossils from coastal caves were interpreted as the bones of mythological heroes and monsters (Mayor, 2000). Early European travellers to Crete were taken on guided tours of caves by monks and shown the bones of "giants from ages ago" (Mayor, 2000). Much later, bones were collected from caves for medicinal purposes, as they were believed to be the horns of unicorns (Gesner 1603 cited in Dawkins, 1874). In 17<sup>th</sup> Century Hungary the so-called "Dragon's Caves" were thought to contain the remains of dragons until these were later identified as bones of cave bears by Cuvier (Dawkins, 1874). It wasn't until the nineteenth century that fossils in caves were recognised as being bones of once-existing animals (eg. Buckland, 1823). Early interpretations of these were largely fettered by religious dogma; however, by the latter part of the nineteenth century cave deposits were receiving serious attention from scientists (Dawkins, 1874). Since then caves have formed the backbone of Quaternary palaeontological research.

Undoubtedly there are still people who view caves in a similar fashion to those in ancient times; their views influenced by portrayals of caves in popular media such as film. However, the modern cave visitor has the advantage of greater access to information and the opportunity to connect with a place via on-site interpretation. Caves are now accepted as an important

resource for a multitude of disciplines and significant components of natural and cultural heritage. At Naracoorte in South Australia one old cave is showing how the tables have turned and that caves provide a unique opportunity to explore some of today's hottest topics. Even Plato may have struggled with the idea of people going into a cave to expand their knowledge and views on the world. On the other hand, he may have been intrigued by the notion that fossil deposits (far older than he could have imagined), can shed light on the past, present and future.

The aim of this paper is to review how Blanche Cave (Naracoorte Caves World Heritage Area) has been used and interpreted by people in the past. An overview of the historical background of the cave, its visitors, interpretation and fossil discoveries will be presented. The impact of new fossil research on the interpretation of Blanche Cave and of the larger World Heritage area is discussed.

## A cave by any other name

Prior to its 'European' discovery, indigenous people living in the area would have known about Blanche Cave. Clark (2007) mentions a link to a cultural story relating to a cave near Naracoorte. There is anecdotal evidence that people may have used the cave in some way; however, no archaeological material has been formally recorded, leaving an unfortunate gap in the cave's history. In contrast, much is known of the history after European settlement.

In 1845, two pastoralists discovered a large cave in scrubland not far from the township of Naracoorte (known as Naracoorte since 1924). William Macintosh and Benjamin Sanders had been investigating the alleged theft of sheep from their flocks when they stumbled upon a cave (Hamilton-Smith, 2003). Soon, other caves were found in the vicinity and the "Mosquito Plains Caves", as they were collectively known, became popular places for people to visit and a source of great pride amongst locals (Hamilton-Smith, 1998).

Blanche Cave, the largest and most accessible of these caves, has been identified by several names over the years. It received the name Blanche in February 1856,

following a visit by the South Australian Governor Sir Richard Graves MacDonnell who named it in honour of his wife, Lady Blanche. Despite this, the cave was largely known as “Big Cave” until the name Blanche Cave was officially re-established in the 1980s. Other names include “Old Cave”, “Mosquito Plains Cave” and even the “Mummy Cave” (Tenison-Woods, 1879c). At one time the whole group of caves became known as the “Blanche Caves” (eg. Tenison-Woods, 1879a). It is not unusual for a cave to have several names, each one reflecting how various people have related to it. In the case of Blanche Cave, it is interesting that these names mirror its key interpretative aspects and also elements of its social, spiritual, aesthetic, scientific and historical significance.

Blanche Cave gained early fame (or infamy) for the presence of human remains in the far reaches of the cave. An early article reported that two visitors had encountered a preserved body in 1851 (“South Australia”, *Colonial times*, Tuesday 17 June, page 2). Later, Woods reported seeing the remains in 1857 (Woods, 1858). Thomas Craig stole the body in 1861 and a fair amount of drama ensued (see Hamilton-Smith, 2003 for the detailed story).

Ebenezer Ward wrote:

*“...I saw the Strangwayian gridiron, intended to be an iron-barred gate, which failed to protect the petrified remains of the blackfellow, who years ago crept into those dark recesses, away from his Christian hunters, and finally laid down to die in the nook where the Showman found him.”*

Ward (1868).

Tragically, it was discovered the deceased man had been shot during an altercation over livestock in the late 1840s. It appears his remains were last seen in London, at an exhibition in 1869 (Anonymous, 1869).

### Entertainment venue

In the absence of any formal monitoring on visitation, picnics, parties and specimen hunting were just a few of the activities that took place in Blanche Cave (Hamilton-Smith, 2003). William Milne (Commissioner of Public Works in the South Australian Cabinet) visited the cave with Mr. Seymour and party in 1863 and recorded his visit:

*“After moving about from one part to another, in order to get specimens and to admire the variegated forms and lines which were to be seen, we were glad to return to the first cave to rest, being tired and for my part perspiring profusely. The first cave, as I have already stated, was well lighted, being open from above at both ends. Here we found that ample provision had been made for our refreshment. A bucket of pure crystal water had been taken from a neighbouring cave and bottles of claret, whisky, brandy, sherry, ale and porter were at our service. A*

*fire was now lighted and the ladies vied with each other in assisting to get lunch ready.”*

William Milne (transcribed in Rymill, 2010).

Unfortunately, these activities took their toll on the cave as Ebenezer Ward (1868) vividly conveyed:

*“Imagine an unfinished boring for a huge and lofty cellar, in a very slovenly condition of disorder and incompleteness, weeds here, and litter of all kinds there, but after all with a roof of rare but half obliterated beauty which you scarcely notice in the mess which prevails, and you will have some idea of the first of the caves, and perhaps agree with me in thinking that after all a pint of Bass won’t be a bad thing before we go any further... There is one circumstance in connection with these caves that is very much to be deplored. All of the choicest stalactites have been chipped to virtual destruction for the sake of specimens to be taken away, and there is scarcely a perfect petrification to be found. But as the process of exudation and congealing is constantly going on, the present defects would be largely remedied in time if further spoliation were prohibited. By-and-bye, as population increases around Narracoorte, and the attractions of the caves become more widely known, it may be worth while to declare a reserve and appoint a keeper who might supplement his income by levying a small charge as a guide to visitors.”*

Ward (1868).

Guano mining commenced at Naracoorte in 1871 (Hamilton-Smith, 1998) and this was seen by many to be detrimental to the caves. A visitor in 1879, since identified as the Rev. W. R. Fletcher, (Hamilton-Smith pers. comm.) wrote:

*“The floor of two of the caves has been rich in deposits of guano formed by the bats. But the guano is of a poor sort, and the Government has made a dear bargain in giving licenses to cart away this manure. The caves have been injured, and a valuable opportunity for scientific examination lost for the sake of a few pounds in license fees. We would urge that this mode of spoliation should be stopped were it not that the supply is nearly exhausted, when the caves will be once more left in peace.”*

Anonymous, (1879).

The land surrounding the caves came under the control of the Forest Board in October 1876 and was declared the Caves Range Forest Reserve. Although this provided an official body to oversee the reserve, it did not provide any real control of activities at the caves, with the exception of guano mining (Hamilton-Smith, 1998). Damage to the caves continued and was noted at a meeting of the Forest Board in 1879:

*“Considerable destruction on the stalactites has been done of late by visitors, and unless this be put a stop to*



Figure 1. Stanley Leighton. (1868) *Caves of Narracoorte, South Australia*, watercolour, National Library of Australia <http://nla.gov.au/nla.pic-an4623893>.

*at once the natural beauties of the place will soon be a thing of the past”.*

Border Watch, Wednesday 19 February 1879, page 4.

The condition of the cave and the damage that had been inflicted on it was by no means a reflection of disregard or contempt within the local community. Indeed, the link to community was strong and people were immensely proud of their caves, which were seen as a major asset and draw card for the district. During a visit by the Governor Sir William Jervois in 1880, local people expressed concern about the damage inflicted upon the caves (Hamilton-Smith, 1986), and there was increasing pressure to provide some sort of protection for them. In 1882 the Woods and Forests Department replaced the Forest Board, and in 1885/1886 50 acres surrounding the caves were set aside as a reserve to protect the caves. Daniel Battams was appointed as caretaker and commenced cleaning up Blanche Cave and others. William Reddan replaced him in 1887 and became a central figure in the development of the Naracoorte Caves as a tourist destination.

### Art, photography and literature

One can never discount the purely aesthetic values of a cave, nor the sheer wonder that visiting such a place can bring to a visitor. Indeed this is an important part of the visitor experience. The massive limestone columns and colourful formations of Blanche Cave inspired Stanley Leighton to capture their beauty in a watercolour painting in 1868 (Figure 1). The work titled “Caves of Narracoorte” appeared in his journal “*Sketches in Australia with journal abstracts*”. In 1869, two wood engravings of Blanche Cave by Robert Bruce (Hamilton-Smith, 1997) were published in *The Illustrated Australian*



Figure 2. *Caves on the Mosquito Plains (The Inner Cave and the Outer Cave)*, from *The Illustrated Australian News for Home Readers*, 10 July, 1869 page 140. Ebenezer and David Syme eds., print of wood engraving. Collection of the State Library of Victoria, accession number IAN17/07/69/140.



*News for Home Readers* and elsewhere (Figure 2). These images show two men carrying torches in the cave, which is thickly decorated with stalactites and stalagmites (perhaps somewhat exaggerated). Later, two illustrations based on photographs by Thomas Washbourne, were produced for articles in *Cassell's Picturesque Australasia* (Vol. IV, page 92, 1889) and *The Australian Town and Country Journal* (13 April, 1895) and reproduced in the *Narracoorte Herald* (21 May, 1895). Washbourne, a professional photographer from Melbourne, produced a series of five images of Blanche Cave in 1879. One of these is striking as it shows the natural shape of the sediment cone beneath the third roof window entrance (Figure 3). Another painting of the

cave by Rev. Alfred Sells is held in the collection of the Millicent Art Gallery and there are others not mentioned here (see Hamilton-Smith, 1997 for a review).

Blanche Cave was a popular place for photographers, with the earliest photos taken in 1860, one of which featured Julian Tenison-Woods reclining above the third entrance (Figure 4).



ENTRANCE TO THE CAVE.



Third Chamber of Big Cave, Looking West.



Left. Figure 3. **A.** Sediment cone beneath the third entrance in Blanche Cave. Photographer Thomas Washbourne, 1879. Collection of the State Library of Victoria, accession number H96.160/228; **B.** From *Cassell's Picturesque Australasia* (Vol. IV, page 92, 1889); **C.** From *The Australian Town and Country Journal* (13 April, 1895). Above. Figure 4. Blanche Cave, 1860 (photographer unknown). Tenison-Woods is visible on the surface in the first photo (State Library of South Australia, B36858 top, B36859 middle, B36860 bottom).





Figure 5. *Tenison-Woods at Blanche Cave. Woodcut by Alexander Burkitt (from Woods, 1862). Photographed from the original book: Steve Bourne*

Woods (1862) included a woodcut by Alexander Burkitt based on this photograph (Figure 5). Adelaide-based photographer Captain Samuel White Sweet photographed various landscapes in South Australia. With his horse-drawn dark room in tow, he visited Naracoorte in 1880 and took photos of Blanche Cave (State Library of South Australia collection – album of South Australian Views). He was regarded highly as a

photographer and was one of the first to use the dry-plate process (Sierp, 1976).

The most prolific photographer of Naracoorte Caves was William Augustus Francis, son of George William Francis, the first director of the Adelaide Botanic Gardens. Originally based in Adelaide, Francis later moved to Naracoorte and photographed Blanche Cave extensively (Figure 6). Local chemists sold his photographs as prints, stereoviews and postcards (Figure 7). The Tourist Bureau produced booklets of the photographs and some his images were reproduced on souvenirs (Figure 8). There were numerous other photographers over the years, with dozens of images of Blanche Cave to be found on postcards, brochures and booklets.

In 1901 Alfred Odgers published a novelette, “The squatter’s story: an adventure in the Naracoorte Caves”, telling the story of a young cattleman who was working near the caves in 1849 when he was tricked into descending into the ‘Big Cave’ to rescue someone who was trapped, only to find himself robbed and stranded in the darkness (Odgers, 1901). His friends, who encountered desiccated human remains in the cave, rescued the stockman before he succumbed to exhaustion and despair. The body mentioned in the story was no doubt a reference to the ‘famous’ remains noted previously. Odgers suggested that there was some truth to the tale. Regardless, it is an entertaining read!



Figure 6. *Stereoview of ‘Big Cave’, looking towards the entrance by William Augustus Francis (collection of the authors).*



Figure 7. Advertisement from State Tourist Bureau booklet, 1909/1910, *The Naracoorte Caves: "How to reach them"*. From page 30 (top) and 28 (bottom).

### Tourist attraction

Several local entrepreneurs took advantage of the opportunity to escort visitors to the caves. The landlord of the Commercial Hotel had a wagonette specially built for taking people to the caves (Ward, 1868). Some people established themselves as guides, for example Mark Read (Figure 9), Charles Beauchamp and Charles Davies. These men operated from hotels or livery stables in the town until at least 1917 or 1918 (Hamilton-Smith, 2003). Tours to Blanche Cave usually included a picnic lunch and were popular with groups (Figure 10). Consideration was given to improving the visual experience for visitors. Magnesium lights were used as early as 1866 (South Australian Advertiser, Friday 1 June 1866, page 3). Fletcher wrote in 1879:

*"In one deep recess, where the richness of ornamentation seemed to be at its best, our guide drew forth a ribbon of magnesium, and bidding us to go to the other end he flooded the place with mystic white light, which made the dark cavern like some hall of romance in the legends of the Arabian Nights."*

Anonymous (1879).



Figure 8. China plate with "fern grotto, Old Cave, Naracoorte" (collection of the authors).



Figure 9. Advertisement from State Tourist Bureau booklet, 1909/1910, *The Naracoorte Caves: "How to reach them"*. From page 24.

A much-improved version of this form of lighting was trialed in 1883 (*The South Australian Advertiser*, Tuesday 13 March 1883, page 6), and presumably used from that time on until electric lighting was installed decades later. When choosing a local guide, visitors were encouraged to seek out the services of those offering magnesium lamps:

*"Guides, who can be engaged in Narracoorte to show visitors through the caves, carry with them the magnesium lamp, and to visitors who wish to thoroughly explore the caves, and to see all the different spots of interest in them, it is recommended that the services of a guide with a magnesium lamp should be secured."*

Anonymous (1895).





Figure 10. Group of visitors, Blanche Cave, Naracoorte c. 1890, photographer unknown (collection of the authors).

The first official tours began in 1886, following the appointment of a caretaker by the Forest Board. William Reddan (the second caretaker) became famous for his lively and entertaining tours of the caves, many of which featured stories of faeries and fanciful interpretations of cave decorations (Hamilton-Smith, 2003). He extended plantings in the gardens within Blanche Cave, introducing plants such as ivy and bridal creeper. From the photographic record it appears much of the sediment cone beneath the third roof window was relatively undisturbed prior to Reddan's redevelopment of it as a garden area (Figure 11).

During the latter part of the nineteenth century Reddan installed pathways, handrails, stairs and tables for visitors, making access far easier (Figure 12). Better promotion of the caves as a tourist destination was called for even as early as 1895:

*"In conclusion it can only be said that want of proper publicity can be the only reason why the Naracoorte Caves are not to be found among the many sights (sic) of interest and curiosity to the tourist which are so widely written about and described in the hosts of periodicals of Australia"*

Anonymous (1895).

In 1917, the reserve was gazetted as a Public Pleasure Resort and placed under the control of the Tourist Bureau. Reddan remained as caretaker until his retirement in 1919. W.A. Carthy was caretaker until 1923 and by that time package tours incorporating train travel from Adelaide were popular promotions for the Tourist Bureau. Blanche Cave was not lit or offered as a guided tour at that stage; but was available as a self-guided option and a place to eat lunch. Robert Leitch assumed the role of caretaker in 1923 and was known for maintaining the gardens, planting trees and installing a wisteria covered pergola over the entrance to Blanche Cave.

On special occasions, Blanche Cave was lit with candles to enhance the visitor experience. During the official opening ceremony for Alexandra Cave in 1909, the cave was lit with 600 candles, providing a spectacular site for Governor Bosenquet and party (Hamilton-Smith, 2003). In 1924 it was lit with nearly three times that number of candles for the "Back to Naracoorte" celebrations. This event included dancing, music and even a ping-pong tournament in the Robertson chamber of the cave, which was lit with hundreds of paper lanterns. The tradition of lighting up Blanche Cave continues today. In 2000, candles were lit to welcome the Olympic torch as it was carried through the cave.

Leitch retired in 1948 and the Tourist Bureau had difficulty maintaining a long-term caretaker after that. Blanche Cave remained an open access cave, even after the park was declared a Conservation Park in 1972 and placed in the charge of the National Parks and Wildlife service. The formation of CEGSA (Cave Exploration Group of South Australia) in 1955 was instrumental in renewing activity at the caves and providing the first organized and systematic surveying and scientific interest in Blanche Cave and others within the park. The first map of Blanche Cave was produced by CEGSA in 1956. It is unclear when guided tours first recommenced in the cave, but it was probably in the 1970s. A wonderful set of images published as postcards by CEGSA show the cave illuminated by garish coloured lights, with reference to the "Devil's pit" in the last chamber. Clearly, the fantasy tour was still popular at that stage.

During the 1980s and early 1990s, Blanche Cave was offered as a guided tour and there was little change in the way tours were presented during that time (Bourne, 2000). Educational offerings within Blanche Cave included 'learn by activity' sessions (Bauer, 1989). As part of this activity students were encouraged to sift through fossil bearing sediments to find bones. Unfortunately this practice was damaging to significant fossil deposits and it ceased in the late 1990s (Reed, 2012). However, the logic behind the activity was excellent as it provided an interactive exercise that helped children understand how scientists do their work. At some stage during the 1980s, a simulated fossil excavation display was created adjacent to the third roof window entrance. After 2000, the cave was used as part of the 'fossil kids' program during which children were guided through the cave in a mini adventure tour which included imitation digs outside the cave. Since the opening of the Bat Television Centre in 1995, the cave has been used as part of the Bat Tour due to its importance as a wintering site for the resident bats.

### Heritage listing

Blanche Cave (together with Victoria Fossil Cave) was registered as a State Heritage place in the SA Heritage Register on 12 January 1984 in a joint listing with Victoria Fossil Cave. The justification was given as:



Figure 11. Canna garden beneath third roof window entrance. From Narracoorte, *Caves and Town. Back to Narracoorte Celebrations 1924*. Photographer unknown (collection of the authors).

*“Blanche Cave demonstrates the Victorian attitude of a recreational ‘grotto’, becoming a social venue complete with steps, tables and benches. In contrast, the rich fossil beds discovered in Victoria Cave illustrate later attitudes towards scientifically valuable sites of minimal disturbance, appreciation and education”.*

Given the rapidity of scientific advances and the massive paradigm shift in thinking about natural science during the mid to late nineteenth century, it is not surprising the Victorians took comfort in a more retrospective view of nature as a curiosity.

Recognition for the outstanding fossil values of the caves came in December 1994 when they were inscribed on the World Heritage list as a serial nomination with Riversleigh to form the Australian Fossil Mammal Sites (Riversleigh/Naracoorte). The selection criteria met by the nomination were eight and nine from a list of ten (prior to 2004 site selection was based on six cultural and four natural criteria, now one list of ten is used):

- to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;
- to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

Despite the World Heritage nomination for Naracoorte being centred on Victoria Fossil Cave, the boundary of the property was set so that it encompassed the major caves, including Blanche Cave. It has only been in recent years that the full extent of the fossil resource at Naracoorte has been understood (Reed, 2012). In 2001



Figure 12. Blanche Cave entrance chamber c. 1923. Photographer unknown (collection of the State Library of South Australia, Accession number B28781/4).

the park was made a National Park and in 2007 the Australian Fossil Mammal Sites were placed on the National Heritage list.

#### **The vertebrate fossils of Blanche Cave**

The Reverend Julian Edmond Tenison Woods visited Blanche Cave in 1857 and first reported the presence of vertebrate fossils at Naracoorte Caves in 1858 (Woods, 1858). In his report he mentioned that he had been alerted to the presence of bone material in the cave long before he visited. He was not surprised by this fact, but was quick to assert his views, on cave fossils:

*“In Germany, in Italy, and in many other places wherever bones were searched for, they were found more or less abundantly, in every case similar to animals at present existing, but of a much smaller size. This latter point is of much importance, and may be stated as having become almost a law in geology, as it is applicable to almost every instance known that the animals immediately preceding those at present existing on earth were identical in every particular with the present, only very much larger. Knowing these facts, and also knowing that our caverns were as ancient, according to appearance, as any mentioned above, there is nothing surprising in finding osseous deposits in them also.”*

Woods (1858).

The bone deposits he described in Blanche Cave were composed of an incredible number of small bones, concentrated together in a rather puzzling manner at the base of stalagmites and columns. He identified them as predominantly rodent bones, *“...perhaps, in the proportion of three to one of any other description”*... (Woods, 1858). He also concluded that these murids were larger than modern species reinforcing his previous assertion *“this little discovery, small as it is, makes another illustration of the truth of the law above stated, viz., that wherever bones are found in caves, they are*



always those of animals at present existing, but of a larger size" (Woods, 1858). He described remains that were likely bandicoots, dasyurids and bats, although his osteological skills were clearly limited which he admitted himself in the report.

Following this he presented his theory on how the bones had accumulated in the cave:

*"Had the mouse bones been smaller and near some Phoenician colony, we might suppose them to be relics of pagan religious worship, for these people used to sacrifice mice in caves and make a tumulus of the bones. Such a theory would hardly do here.... Some others agree that the bones (referring to caves in general) could only have collected during an extensive inundation, which would cause them to accumulate either by driving large numbers of animals into them by the restless agitation of the waters above. With this latter theory I agree, as the most consistent with the observed facts."*

Woods (1858).

Woods proposed that when the plains beneath the caves were inundated in the past, animals would have sought refuge on the hill, only to drown as the waters flooded the caves. He then went on to generalise that cave deposits worldwide were likely contemporaneous and reflected a "universal deluge", noting:

*"... the bone deposits afford striking evidence in corroboration of the Mosaic record which has been overlooked by geologists, more especially as according to that record the creation of gigantic creatures appears to have died out then."*

Woods (1858).

Later, he refined some of his views in a paper to the Geological Society of London in 1859 and his 1862 book:

*"The bones in question are mostly of extinct species, closely allied to those of animals at present inhabiting the locality, but many times larger."*

Woods (1859).

*"There was a time when I very tenaciously held an opinion, at one time promulgated by the late lamented Dr. Buckland, in his 'Reliquiae Diluvianae', to the effect that the bones in caves were relics of the Deluge. That opinion I believe to be quite untenable."*

Woods (1862)

Fletcher (Anonymous, 1879) praised the ingenuity of Woods' theories, but challenged his conclusions:

*"The animals evidently did not live where they had been buried, for their remains are agglomerated together in utter confusion. A specimen fragment of this bone deposit which I possess contains fragments of jaws, tibia, and femurs, massed together in such away that it is impossible to disentangle them and to say which ought to be classed together to form one skeleton. Mr Woods has an ingenious theory about the*

*rise of floods in the valley, which was formerly enclosed like a basin, sweeping these creatures into the caves through the openings in the surface, but I am afraid the theory will hardly account for all the facts of the case."*

The bone deposits in Blanche Cave represented a long-term fascination for Woods. More than 20 years after his initial visit to the caves he was still publishing articles describing the caves and his fossil discoveries (Tenison-Woods, 1879a, b, c). The difference with these later articles was he had a broader context of Australian fossil discoveries within which to place the Naracoorte fossils and he had obviously been following the literature closely. In addition he was far more seasoned as a scientist. In one of these articles he discussed fossil finds of megafauna species around Australia and speculated what the continent would have been like in the past (Tenison-Woods, 1879b). He even went so far as to talk about the age of these animals and by that time he clearly had no problem with the concept of extinction in its true sense:

*"The huge Diprotodon (it has no colonial title of domestic endearment) was as large as any elephant; the Nototherium was nearly as big, and twice as ugly.... There must have been a much greater variety in animal life in those days; in fact, it may be said that we only now see the remnant of what Australian zoology was formerly. The great mass of the species have died out.... But how long do these records extend back? Ah, that is what we have not the slightest clue about. Theory without some facts is simply a waste of thought and time. It was a very long time ago, we may say – only this, and nothing more."*

Woods (1879b).

In reference to the Naracoorte Caves, Woods wrote:

*"The bones of the Mosquito Plains are not large – that is to say, those on the surface are not large. There may be larger ones deeper down... I think it would take years to exhaust all the natural history of these caves. A patient study of their remains will reveal a world of wonders, but that patient study they will hardly receive for years to come."*

Woods (1879b).

Following Woods' efforts there was surprisingly little attention paid to the Blanche Cave bones and Naracoorte fossil deposits in general (Reed and Gillieson, 2003). Stirling and Zietz re-examined some of the Blanche Cave material when they visited in 1908 (Hamilton-Smith, 2006), although Stirling only reported on material from Specimen and Alexandra Caves. It wasn't until sixty years later that fossil material was collected from the first chamber (apparently during lighting installation and digging of tunnels by cavers) and lodged in the South Australian Museum. This included bones from *Sarcophilus* (Tasmanian Devil – Figure 13) and a giant bird *Genyornis newtoni* (Rich, 1979). These finds were important as they recorded the presence of Pleistocene aged fauna in the cave (Reed and Bourne, 2000).



Figure 13. *Sarcophilus dentary* collected from Blanche Cave in the 1960s (P17321 – South Australian Museum).

Additional collection of material was made in 1984 in the third chamber. This yielded several ‘megafauna’ species including *Protemnodon* and *Thylacoleo*. Unfortunately these collections, although lodged with some sparse location details, were not collected in a systematic way with attention to excavation of the material according to stratigraphy.

#### A new era of fossil research in Blanche Cave

Woods was correct in thinking it would be a long time until the Blanche Cave fossil deposits received serious study (more than 120 years!). Flinders University MSc student Steve Brown excavated a small site in the first chamber in 2001. Preliminary dating suggested a terminal Pleistocene to Holocene age (11,000 to 13,000 years BP; Brown, 2006). Geochemistry and sedimentology of the cave sediments from the section were studied and revealed the presence of phosphate minerals derived from bat guano in the lower layers (Forbes and Bestland, 2006, 2007).

In 2004 one of the authors (LR) identified a potential site in the third chamber and later supervised Flinders University Honours student Tegan Laslett who conducted a preliminary investigation of the site in 2006 (Laslett, 2006; Reed, 2012). This study revealed a finely stratified sediment deposit containing a diverse and abundant vertebrate fauna (Laslett, 2006; Reed and Bourne, 2009). The excavation was expanded in 2007, with detailed sedimentological and chronological study conducted since then (Darrénougué *et. al.*, 2009; St. Pierre *et. al.*, 2009, 2012; Reed, 2012; Macken *et. al.*, in press). A singular contribution of the site has been the first ancient pollen record for Naracoorte Caves (Darrénougué *et. al.*, 2009; Reed, 2012). In 2012 the authors extended the pit to a depth of two metres (Figure 14) and investigation of the site is continuing with research by a multi-disciplinary scientific team (Reed, 2012).

Small mammal remains are the dominant group of fossils from the third chamber site. These are predominantly composed of rodent species, a fact also noted by Woods regarding the bone breccias that he

found at the base of large columns (Woods, 1858). This is a reflection of the mode of accumulation, which was owl predation. Owls roosted in the cave in the past and pellets containing bones of prey items accumulated on the cave floor (Figure 15).

Owl pellet deposits can be recognised by several features including the sheer concentration of material, the dominance of species and size classes within the prey range of the owl, the presence (in varying degrees) of damage indicative of digestive modification of bone and the fossils of the owl itself (Andrews, 1990). The Blanche Cave deposit contains a number of fossils from the Masked Owl (*Tyto novaehollandiae*), which is well known to roost in caves. Boobook Owls (*Ninox novaeseelandiae*) still use the cave and are sometimes seen hunting bats, providing an entertaining sight for visitors. Other species within the deposit represent cave dwelling or frequenting species such as bats, quolls and possums. Larger species are present in low numbers relative to the small mammals and are attributable to pitfall entrapment. It is typical for large, roof window entrances at Naracoorte to facilitate multiple accumulating modes (Reed, 2012).

Given the enormous concentration of small mammal bones in the Blanche Cave deposits it is surprising that Woods and others never considered the activities of predators to be responsible. Woods’ theory of animals trapped by rising flood waters does not hold up in light of the excavated evidence; however, smaller scale ‘flooding’ during storm events did lead to sediment movement



Figure 14. Excavating in Blanche Cave 2012. Photo: Steve Bourne.



down the cone and the burial of fossil remains in successive layers.

### Presenting the past

*“One of the things Ford Prefect had always found hardest to understand about humans was their habit of continually stating and repeating the very very obvious.”*

Douglas Adams, *The Hitchhiker's Guide to the Galaxy* (1979)

It is widely accepted that caves present particular challenges for guides (Austin and Chaney, 1977; Bourne, 2000; Dunkley, 2001). There can be a tendency for tours to become ‘static’ and unchanging, information to be out of date or incorrect and interactivity to be minimal. On a cave tour, interactivity is usually restricted to asking people questions and waiting until someone gives the ‘right’ answer or handing around various props. Austin and Chaney (1977) attribute a lot of this to inadequate staff training, stemming largely from priority being given to other things such as marketing and operational issues. If the tours are running on time and there aren't too many negative comments in the visitor book then everything must be fine. This form of quality ‘benchmarking’ sets up a cave attraction to aspire only to ever increasing levels of mediocrity. It is not a suitable environment for growth and innovation. These things come from challenging the norm and being willing to look ‘outside the box’.

Today, there is a greater focus on the quality of interpretation at cave sites. Many sites have invested heavily in interpretative infrastructure and training activities for staff. Once these are in place, the temptation would be to rest on one's laurels and watch the visitors roll in. This would be analogous to sitting back in one's dressing gown and slippers, comfortable by the fire, accepting that all is well in the universe; heading straight back into Plato's cave. Dunkley (2001) rightly points out that the tradition has been to put more emphasis on what goes into the training process than what comes out of it. Often, training is too focused on injecting large amounts of information into guides. Interpretation should be continually monitored and evaluated to ensure it remains effective and dynamic. Fortunately, managers of Australian cave sites are generally aware of the importance of vitality in their interpretative offerings. A strong point for Naracoorte Caves has always been its diversity of product offerings, providing site interpreters with varied roles and opportunities.

Necessity is indeed the mother of invention and some of the most creative and innovative interpretation is done



Figure 15 (right). **A.** Boobook owl roosting in Blanche Cave. Photo: Steve Bourne; **B.** Fossil bones from the third chamber dig. Photo: Liz Reed; **C.** Digestive corrosion damage to a femur Photo: Amy Macken.

on a shoestring budget, relying on the skill and creativity of the person delivering it. After all, humans are interested in other humans and their whole impression of an experience can be shaped by the interactions they have had with the people involved. The masterful interpreter inspires visitors by opening the door to new possibilities, by challenging them to work things out for themselves and perhaps even step outside their comfort zone. The guide connects the dots between what is experienced in the cave and what is relevant to visitors once they leave. The visitor may leave a place with a new perspective and start to care about something, that prior to their visit, was only a passing interest or even completely foreign.

Visitors bring with them their own perceptions and expectations about what they will experience at a cave site. When the word fossil is mentioned, most people instantly think of dinosaurs or dusty old bones in a cabinet. Scientists are often perceived as people who wear white coats, hiding away in their lab staring down a microscope. Palaeontologists are often confused with archaeologists; but seen as somewhat more adventurous than the average scientist, thanks largely to Indiana Jones. Some years ago, one of us (LR) guided a three-hour World Heritage tour at Naracoorte Caves and after the tour one of the visitors remarked – “*We weren't quite sure when they said a scientist would take us through the caves, but you're just like a real person*”. The combination of science and fossils can be a ‘hard sell’ to a general audience, reinforcing the need for quality interpretation to tease out the stories.

### Science and interpretation at Naracoorte Caves

The discovery of the Fossil Chamber in Victoria Cave in 1969, by Grant Gartrell and Rod Wells heralded in a new era for Naracoorte Caves and placed it firmly on the world stage (Reed and Bourne, 2000). Wells was instrumental in setting up the fossil bed area as an underground museum and was quick to recognise its tourism potential (Wells *et. al*, 1980). Ern Maddock, Director of the National Pleasure Resorts, helped secure investment to develop the fossil story for tourism, which was innovative at the time (Wells *et. al*, 1980; Bourne, 2000, 2004). From 1971, visitors to the cave were able to view excavations in progress and receive explanations of the finds made by scientists and volunteers (Figure 16; Wells *et. al*, 1980). Collaboration between Flinders University, the South Australian Museum, CEGSA, the Tourist Bureau and National Parks and Wildlife led to further development of the Fossil Cave tour and the construction of an interpretative centre (Wells *et.al*, 1980).

Wells *et. al* (1980) wrote:

*“An interpretation centre should foster a spirit of natural enquiry, a willingness to challenge explanations, when new evidence arises. We do not offer any final answers instead we attempt to lead the public through our interpretation of the history of the caves, from their formation to the accumulation of the*

*fossils, to their discovery and the attempts to reconstruct these events”.*

Consideration was given to how the static displays would complement the guided interpretation. Background information was provided to guides, who were encouraged to develop their own tours from this information. Wells *et. al* (1980) note:

*“Unfortunately, this approach requires constant checking of the commentaries as they can, as time passes, gradually drift into greater and greater inaccuracies. Tape recorded commentaries at selected points within the cave were contemplated, but although they would give accuracy and consistency they were considered too impersonal and likely to lower the morale of the staff relegated to the role of usher”.*

Science has remained central to the presentation of the Naracoorte Caves story, not just relating to fossils but also bats, geology and cave biology.

Douglas (2006) wrote:

*“National Parks and Wildlife Services (NPWS) and scientists at the Naracoorte Caves World Heritage Fossil Site in south-eastern South Australia have worked fruitfully together to build ties with the South Australian Tourism Commission, better to integrate scientific and aesthetic values in marketing the site and to position the state as ‘a unique and diverse tourist destination”.*

The research undertaken at Naracoorte Caves has a wider function within the community as well. Cooperation with local landowners has led to research and protection of key fossils sites outside the World Heritage Area (Bourne, 2006). During the early years of the Victoria Fossil Cave dig, local people and school groups participated in activities to assist scientists in their work. This has continued into the present, with involvement of volunteer groups such as the Friends of Naracoorte Caves and countless interactive public science events. For the staff, an advantage of recent years has been more access to scientists (Bourne, 2000), with a palaeontologist being located at Naracoorte and visits from many others from a host of institutions and disciplines. This has enabled close interaction between site interpreters and those doing the research with the provision of training sessions, training materials and hands-on opportunities for participating in research activities.

### Linking research and communication

Currently, the Blanche Cave fossil site is part of a larger project investigating biodiversity and climate change across three contemporaneous Naracoorte cave sites (Reed, 2012). The project is funded under the Australian Government’s “Caring for our Country” (CfoC) initiative (“Investigating and Communicating Lessons of Past Climate Change” project OC11-00487, 2010-11 Business plan open call process). Research funding at Naracoorte



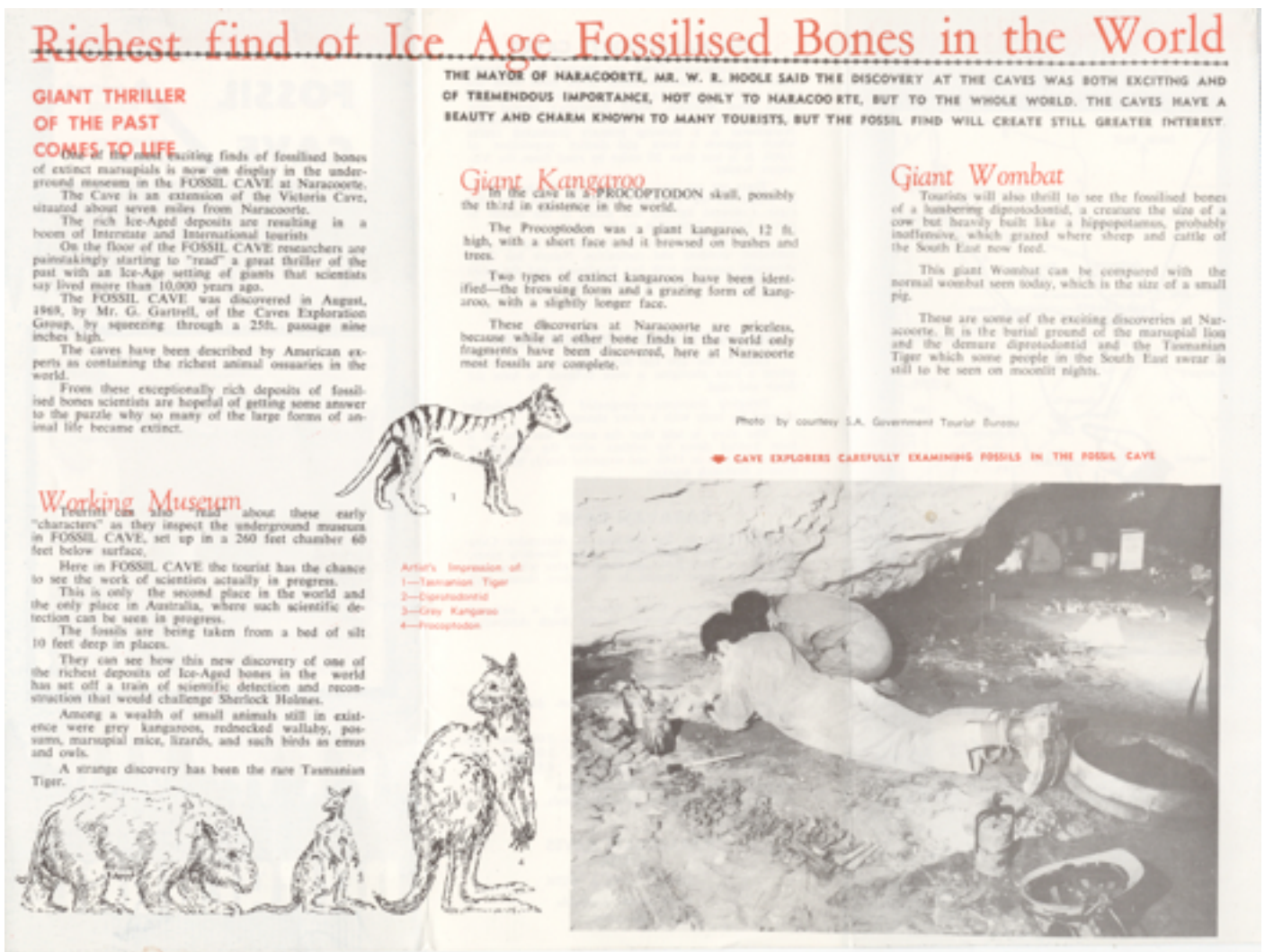


Figure 16. Tourist brochure from the 1970s (collection of the authors).

via the first two phases of National Heritage Trust grants (NHT) was relatively stable, with annual contributions enabling multi-year student PhD and Masters projects to be funded. The CfoC program is delivered under different guidelines, with the program threat-based, and outcome/output focused. MERI (monitoring, evaluation, reporting and improvement) plans became a requirement and while initially daunting, were relatively easy to develop for this project.

The Australian World Heritage Advisory Committee (AWHAC) was established in 2008 with one of us (SB) the South Australian representative on this committee. The committee presented several reports through to the Environment Protection and Heritage Committee (EPHC) with recommendations on how to address a number of issues within Australia's World Heritage properties. Included in these were reports on applied research (research directly addressing issues at a World Heritage site or contributing to the knowledge and understanding of the property) and on presentation, communication and tourism. The committee identified key issues and potential solutions for World Heritage properties and many of these recommendations found their way into the

annual Caring for our Country Business Plan as targets for Australia's World Heritage properties.

In the 2010-11 Business Plan, criteria were outlined guiding proposals from the various World Heritage Areas (in the section "Managing Australia's World Heritage"). These were site specific and the Naracoorte section of the Australian Fossil Mammal Sites could apply for funding related to the criterion "Investigate and communicate lessons of past climate change occurrences for current climate change." Although rather clumsily worded, the criterion opened up the opportunity to develop a project that involved research (which would not directly be funded under the Caring for our Country program) integrated with interpretative and management outcomes, and also contribute to modern ecological conservation initiatives. The project was developed around investigating three sites, feeding this information directly into training programs for guides and with the aim to contribute to conservation within the region; based on immediate pre-European flora and fauna found in the cave sites. This was the first time a research project had been written with specific interpretation and conservation goals included.

## Stories in the strata

*“My universe is my eyes and my ears. Anything else is hearsay.”*

Douglas Adams, *The Restaurant at the End of the Universe* (1980)

The Naracoorte ‘story’ is multi-faceted and includes Quaternary biodiversity and palaeontology, geology and palaeoclimate, karst science, cave biology, heritage and biodiversity conservation, intrinsic and aesthetic values of caves, history and human use, and the work of scientists. These stories have always been there, waiting to be unearthed, dependent on what things people value as important stories at any given time. This is illustrated well by the history of human activities in Blanche Cave, with attitudes to the cave evolving in light of prevailing paradigms.

The Blanche Cave fossil story (indeed much of the Naracoorte story) is as much about what can’t be seen as it is about what can be. The work of scientists is largely ‘behind the scenes’ and there has always been confusion between the methods or processes of science (e.g. excavation) and the actual research (i.e. analysis, interpretation and publication of results). The latter is done in the lab, away from the cave. When excavation was in progress in Blanche Cave, visitors were able to clearly view the process and interact with those digging (Figure 17). This presented a wonderful opportunity for interactive interpretation. It would be easy to fall into the trap of assuming that if the scientists are not excavating every day, then nothing is happening. This is where the site interpreter steps in and conveys the ‘other 90%’ of the story.

There is also an important tale of heritage conservation to be told, where excavation for its own sake is not conducive to the long-term conservation of the resource (Reed, 2012). Scientific research projects must only be conducted if they have a strong plan and are well resourced to ensure successful completion. The World Heritage significance of the site demands that the benefits of activities on park be justified against potential impacts on the resource. An excellent addition to permitting requirements of recent years has been for researchers to complete a referral under the EBPC act (Environmental Protection and Biodiversity Conservation Act 1999).

Not only is much of the science ‘hidden’ from view, so too are many aspects of the deposits themselves. One thing recent research has highlighted is that there is a wealth of ‘micro’ evidence that yields important aspects of the story. Bones are one part of this and the multitude of small vertebrate remains, while not always immediately obvious at first glance, provide critical insight into Naracoorte’s past ecology (Reed, 2012). Sediments in Blanche Cave contain microscopic pollen grains, phytoliths, diatoms and tiny terrestrial gastropods. Charcoal particles provide records of ancient bush fires and important material for dating. Fragments of cave formations can be dated and their chemistry sheds light

on past climate. Each layer of sediment in the exposed section has a story to tell and one can literally “see” extinction in the strata (Figure 18). Visitors to Naracoorte have embraced the stories presented at the Blanche Cave excavation and it has challenged many of them to look at fossil deposits in a new way.

For many years Blanche Cave was ‘pigeon-holed’ as the historical tour and later the bat tour. There is nothing inherently wrong with this, unless interpretation becomes compartmentalised and each cave is treated as a separate entity rather than each conveying aspects of the broader Naracoorte story. There should be a persistent theme across all of the interpretative offerings, interconnecting the place as a unit. Musser (2012) provided a good example of how interpretative programs can be re-invented by interpreting a common theme across multiple features of a site.

As the new phase of interpretative planning unfolds at Naracoorte, consideration could be given to reinstating Blanche Cave as a standalone tour. The bat tour can be difficult to guide during winter when the bats are inactive or absent from Bat Cave. It would make an excellent seasonal offering from September to May. In many ways, Blanche Cave ‘communicates’ the whole Naracoorte story better than any other cave in the park. An opportunity exists to combine interpretation of the above and below ground features. Interpretative panels placed in key areas on the surface and in the cave would be useful props for the guided tours and provide interesting talking points for visitors enjoying the walking trails around the cave.

Complex stories require both knowledge and understanding. If understanding is the foundation rather than just the accumulation of factual information, then issues in cave guiding such as ‘mis-information creep’ and ‘myth perpetuation’ are reduced to virtually nothing. Training exercises embedded in the CfoC project delivery have provided up to date information and hands on fossil experiences for guides. These increase understanding of the science and builds a strong foundation for interpreting how the science is done. If a guide has participated in the science activities it adds another dimension to their tour. Community involvement has extended beyond public events to training a small group of Friends group members in fossil sorting, screening and preparation of fossil material excavated during the project. This has enabled them to pass on their knowledge and pride of place to visitors (Figure 19).

Despite being largely ‘unseen’, ongoing research is critical to maintaining the vitality and integrity of the visitor experience, as it is the most effective way to ‘inject’ new stories into the interpretation. As Wells *et. al* (1980) note, “*Scientific research is dynamic, not static like a museum display*”. In this light, the site interpreter should be seen as the crucial link between the science and the public. Visitors are likely to be more critical of being shown an ‘empty’ dig site if there are no new stories, than if the guide can relate details of the latest research using the dig site as a interpretative aid.





Figure 17. Visitors viewing the excavation site during a tour in 2012. Photo: Steve Bourne.

The CfoC project has yielded multiple outcomes for Naracoorte Caves. There are the scientific aspects that continue to yield interesting results and help address the “so what, who cares?” aspect of interpretation by showcasing climate change and other topical issues of relevance to visitors. It has also reinforced the value of ‘younger’ fossil deposits in the large roof window caves and highlighted the need for stronger recognition of these in the management plan (Reed, 2012). Methodologies employed during the project have reiterated the need for site conservation to be an integral part of research planning. Importantly, the results of the project have allowed new perspectives on interpretation of the Naracoorte Caves site. Given this, it would be appropriate to conclude this paper with perspectives on the new research in Blanche Cave and how it has changed the perception of the cave and the way it is interpreted. Who better to express these perceptions than those at the front line of interpretation at Naracoorte, the site interpreters themselves?

**In their own words** (Comments unedited- Ed.)

Decima McTernan (Senior Guide):

*“The current research and ensuing training in the same has allowed us as staff at the Naracoorte Caves to*

*present a much more holistic view of the site. No longer is the focus on ‘What killed the Megafauna’ but more on how were they living and how does the fossil record give us a picture of the more recent past. Visitors find the small mammal story fascinating - how it presents an insight into biodiversity and climate change over time. They are always amazed that other evidence such as pollen, plant material, charcoal and scats is helping to put pieces of the jigsaw in place and may in fact help with our present conservation management. People love to know how a story may play a part in their future or the WIFM factor (what’s in it for me!!)”.*

Gavin Kluske (Site Interpreter):

*“The Blanche Cave fossil deposit is a popular part of the cave tours at Naracoorte Caves. Most visitors are impressed by the amount of detailed information sourced from the clearly visible layers within the deposit. I often describe each layer, its age, the fossil remains within the layer and what they infer about the climatic conditions at the time of accumulation. The training sessions with Dr. Liz Reed are a great source of information that I use daily on the tours. They have allowed me as a tour guide to answer any question from the visitors with up to date and relevant responses. I am able to tie together the multiple fossil*

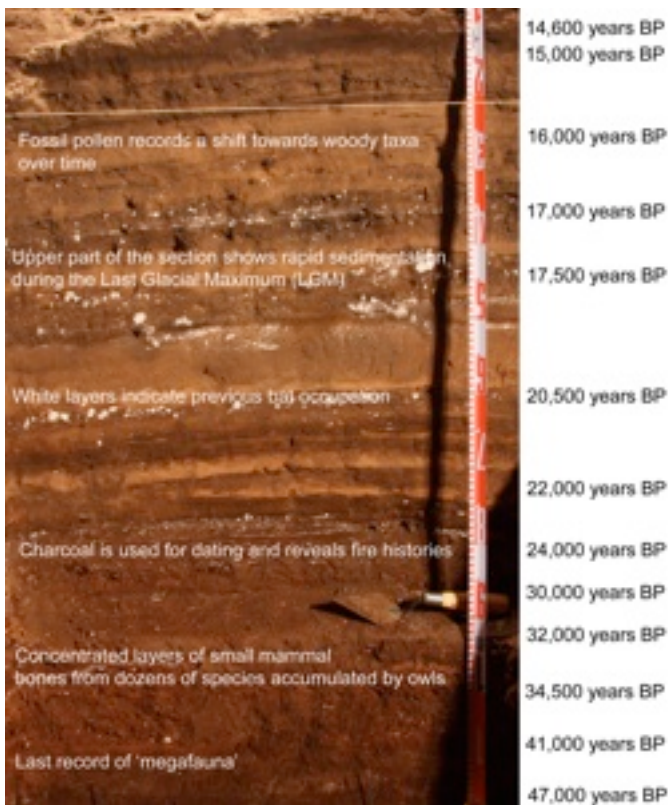


Figure 18. Stratigraphic section from the third chamber excavation, showing ages of various layers obtained from radiocarbon dates of charcoal (BP = before present) and topics for discussion of the section. The ages have been rounded for simplicity (see St. Pierre et. al, 2012 for complete dataset).

bed “stories” of many caves, into one complete history of the caves and the climatic and biological changes preserved within them. Most visitors then quite naturally draw their own conclusions as to how the past relates to the present in terms of climatic change and the environmental changes it will bring.”

Jinhwa Lee (Site Interpreter):

“I normally give bit of information about fossils in VFC Site ( 213,000~ 500,000 years old) then talk about this site. What fossils Liz’s been found: Thylacoleo, Thylacine and leaf eating Kangaroo. Ages of fossils around 47,000 years old which is more recent than the ones in VFC. Sediments: last ice age 18,000 to 20,000 years ago, vegetation, pollen. What we can find out about from sediments! Bat guano accumulation: try to guess when bats started using the cave and how many of them were here in the past. This year about 37,000 of bats, 200,000 only about 50 years ago, what about back in 1845 and even before that! Remind people our bats are endangered and what’s causing the no.s to drop. I want Blanche cave tour to relate to the bats! it depends the group if they’ve done VFC tour or going to.”

Yarrow Lee (Site Interpreter):

“I found the practical aspects of the training with the

hands on approach, more insightful than I first thought it would be. It is strange how a pile of bones can be transformed into a pile of interesting bits, when you know a little of what you are looking at. Paleontologists certainly look at the world very differently. If anything this fact was highlighted with every exclamation of wow! Learning what was the wow bits, led to more exclamations of wow and the cycle continues. I’m still learning. Perhaps a highlight was not just the discovery side, but an overwhelming sense of how painstakingly time consuming sorting fossil material can be. I’ve mentioned this fact on tours, but it never really hit home how much time can easily be spent sorting fossils and identifying bones. You can’t just quit either half way through. It is about being more than patient. It’s also about being consistent and keeping to your main aim, though you can get easily sidetracked. Being able to use the knowledge I gained that day, to give other people a better sense of understanding fossil sorting has I hope helped them see the pile of treasure, as opposed to just a pile of bones.”

Frank Bromley (Site Interpreter):

“The Blanche Cave is an addition to the Bat Tour and as such, much of the interpretation is based on the Bat use of Blanche in winter and the points where Bats roost and drink.

The Fossil dig adds another dimension to the tour especially as many of the visitors have already done the Victoria Fossil Cave tour just prior to the Bats. The obvious stratigraphy and mineralised guano within the walls of the deposit enable us to discuss the sequential accumulation of sediment and the fossils within. The presence of pollen within the deposit can demonstrate vegetation change through time and prompt discussions about responses to climate changes. The story of the digs origins as Tegan’s Honours studies and the further development by Liz are often brought up in discussions at the dig site.

We can also tell the story of how the area had been used in the past to examine the avens above the dig.

While the Bat/Blanche tour is not focussed on fossils particularly, the presence of the dig and its graphic stratigraphy have become an integral part of the tour and gives us another opportunity to discuss World Heritage and the opportunities that palaeontology presents to help us understand the present by examining the past.”

Barb Lobban (Site Interpreter):

“The Blanche Cave deposit is an amazing interpretive tool to use when showing and explaining the changes in the environment over thousands of years but at a very recent time in the eyes of a scientist. The deposit shows definite changes in the sediment layers leading us to believe that there may have been many vegetation changes and maybe this impacted on the





Figure 19. Friends of Naracoorte Caves members instructing Friends of Parks forum delegates in fossil sorting in the lab at Naracoorte Caves.  
Photo: Steve Bourne.

fauna found in the layers. The most amazing part I think is the possibility of two events happening and being recorded in the same deposit with the third cave opening being a series of solution pipes and larger animals being the victims along with smaller animals then a larger cave opening developing as we see the cave today and allowing owls to prey outside then leaving their pellets behind that can be a very important part of a palaeontologists research."

Dannielle Thomas (Site Interpreter):

"The fossil site in Blanche Cave has an extra element we as Site Interpreters can use. The site shows us the

recent climate change and tells us the history of the cave as well. It's this element that visitors find fascinating."

Thomas Shortt (Site Interpreter):

"The dig in Blanche cave has allowed us guides to interpret the cave in a different way. It has added another element to interpreting not only Blanche cave but also helping to explain what has happened in terms of the World Heritage area. The new research is also quite interesting as it covers a period that is quite recent compared to other deposits around the park and involves a wider range of fossil materials and has a greater relevance to a lot of current issues in the area. I have found people on the tour have a great appreciation of these issues as it is something that will have an impact on people in the area today. It certainly has changed our understanding of the cave, which is always helpful when talking to groups."

So it would appear you can teach an old cave new tricks!

### Acknowledgements

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