

# Natural values assessment and environmental monitoring of Naracoorte Caves

Elizabeth Reed<sup>1,2</sup>

<sup>1</sup>*School of Biological Sciences, The University of Adelaide, Adelaide, SA, 5005.*

<sup>2</sup>*South Australian Museum, Adelaide, SA, 5000.*

## Background

Caves contain some of the most fragile terrestrial ecosystems on Earth and are inherently vulnerable to human impacts (Gillieson, 2021). The biodiversity of caves is intimately tied to the cave environment, with a vast diversity of unique organisms and habitats. Caves are also remarkable windows on the natural world, providing a glimpse into the past, present, and future. As archives of the past, caves accumulate long term records of ancient environments via sediments, fossils, and speleothems. These records can be used by scientists to inform modern and future patterns of biodiversity and climate change (Reed, 2021).

Today, caves face several key conservation challenges including increased tourism and global warming. In the 2020 World Heritage Outlook Report (Osipova et al., 2020), the International Union for Conservation of Nature (IUCN) identified climate change as the major future threat to World Heritage sites. However, the impact of this threat to cave and karst systems is still emerging as a topic of research. Effective management of cave sites relies on thorough knowledge of the distribution, variety, and conservation status of its natural values. Impacts to cave values (anthropogenic and natural) are cumulative and sometimes difficult to detect until significant; therefore, collection of scientific data is critical to understanding baseline conditions and managing change.

## A new project for Naracoorte Caves

Naracoorte Caves in the Limestone Coast of South Australia is World Heritage listed for its vertebrate fossil deposits (Figure 1) which tell the story of biodiversity in south-eastern Australia over the past 500,000 years (Reed, 2021). The Park has other significant natural (Figures 2 and 3) and cultural values and has been an important regional tourist attraction for over a century. Interpretation and education programs at the caves focus on the World Heritage fossil values and other natural heritage such as bats and geology. Scientific research has been ongoing at the caves for more than fifty years. Speleological exploration has been central to fossil site discoveries and documenting cave features.

It seems appropriate that in this International Year of Caves and Karst 2021 a new conservation project has commenced at the Naracoorte Caves. Earlier this year the University of Adelaide was awarded a grant under the *Australian Government's Australian Heritage Grant Scheme*. This project (*Natural values assessment and conservation monitoring of Naracoorte Caves*) is a collaborative venture with the National Parks and Wildlife service of South Australia and focusses on natural values assessment and science-based conservation monitoring to inform management of this globally significant site. The aim of this paper is to provide a broad overview of the project.

The key objectives of the project are:

- 1) conduct a detailed natural values assessment and inventory process to capture data on the known range of values, their condition and conservation issues.
- 2) establish ongoing science-based conservation monitoring to ensure baseline data are available to inform management and sustainable development.
- 3) encourage engagement and understanding of the park's natural values through targeted communication activities disseminated to a broad audience.

The project aligns with several key goals in the park management plan (Department for Environment and Heritage, 2001) namely:

*Fauna* - encourage research on cave fauna and produce an inventory of species.

*Caves* - establish schedule of cave values; establish a monitoring program around cave usage; maintain records of cave development and usage.

*Presentation and marketing* - incorporate research into interpretation; establish research on visitor impacts.

*Research and monitoring* - establish a program to monitor conditions and change; provide ongoing advice on scientific progress and management of the park.

It also aligns with the IUCN World Heritage Outlook assessment 2020 for the Australian Fossil Mammal Sites (Riversleigh/Naracoorte) which recommends that a sustained, collaborative scientific monitoring program should be established for Naracoorte Caves to “keep track of the conservation status of natural values” (IUCN 2020).

## Project plan

The project will run until September 2023 and involves a multidisciplinary team including researchers with expertise in palaeontology, sedimentology, entomology (specifically cave invertebrates), geology, microbiology, ecology, botany, physics, speleology, and karst management. The Naracoorte Caves management team and other staff will also be involved in the project management, fieldwork, and public outreach activities.

Core activities for the project will include detailed scientific assessment of the natural values of the caves via desktop data analysis, physical inspection, documentation and values mapping, and collection of baseline data to quantitatively inventory values. The aim is to first identify and then associate particular values with specific parts of the cave system. The first ongoing environmental monitoring program for Naracoorte Caves will be established with this project. The funding has allowed for the purchase of datalogging equipment to measure cave conditions including temperature, humidity, air flow, light, speleothem drip rate and

carbon dioxide. This equipment will remain the property of the park for future use and staff will be trained in its operation. Data obtained from this project will be used for a range of analyses that will be applied to questions around several key areas such as characterising the 'natural' environmental conditions in the cave system, determining the degree of anthropogenic impacts on the caves; determining conservation and condition status of the values, and assessing future conservation needs and management strategies.

This new project is timely as there is an urgent need for assessment of the extent and condition of the park's natural values. The management plan is now 20 years old (2001) and will likely be updated within the next few years. Currently there are insufficient scientific data related to the current status of the park's natural values to inform this process; part of which includes and reviewing cave classifications and access zoning. This project will provide the foundation data to inform these review processes. Recent advances in scientific knowledge, and the acquisition of new (unclassified) caves, further exacerbate the information gaps in the existing plan.

Ongoing environmental monitoring established during this project is needed to monitor change, which will be critical considering the potential impacts of climate change. Managing and understanding visitor impacts is vital for long-term conservation of the site. Decision making regarding cave access and sustainable business growth will be informed by this research. Communication activities associated with the project will focus on promoting an understanding and appreciation of all natural values at the park. Visitor enjoyment and understanding of the site's values will be improved when results are integrated into on-site interpretation and promotion.

Provision of this funding by the Australian Government will enable critical conservation management research to be undertaken at the caves and deliver a framework for monitoring and assessing the natural values of this globally significant World Heritage Area into the future.

#### References

Department for Environment and Heritage (2001): Naracoorte Caves National Park Management Plan. Department for Environment and Heritage, Adelaide.

Gillieson, D. (2021) Caves: processes, development and management. John Wiley and Sons.

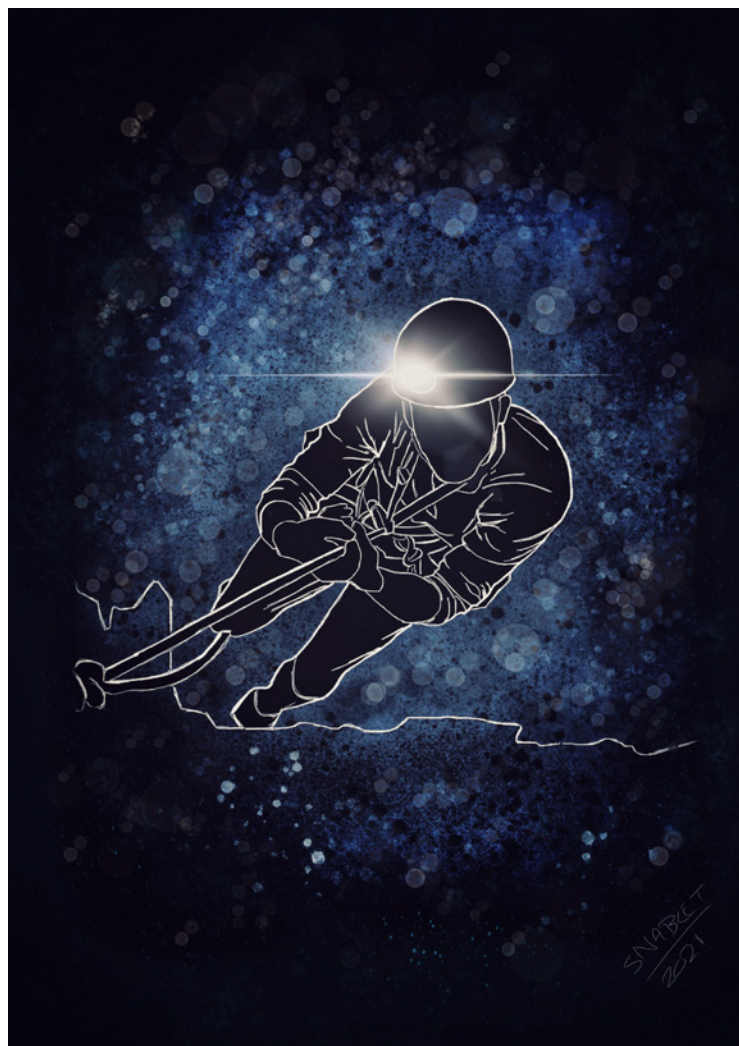
IUCN (2020) Conservation Outlook Assessment, Australian Fossil Mammal Sites (Riversleigh/Naracoorte). (<https://worldheritageoutlook.iucn.org/explore-sites/wdpaid/61604>).

Osipova, E., Emslie-Smith, M., Osti, M., Murai, M., Åberg, U., Shadie, P. (2020). IUCN World Heritage Outlook 3: A conservation assessment of all natural World Heritage sites, November 2020. Gland, Switzerland: IUCN.

Reed, E. (2021) World Heritage values and conservation status of the Australian Fossil Mammal Sites (Riversleigh / Naracoorte). Zeitschrift für Geomorphologie, Supplementary Issues, 62(3), 213-233.

## An entry into the International Year of Caves and Karst Art Competition

### Title - Ability to Swing



Created by -  
Peter "Snablet" MacNab - NSG NZSS

Statement - inspired by swinging into action above a spray lashed misty void in Middle Earth.

Medium - Digital Art using Procreate & Apple Pencil  
Date - 4th November 2021

**DEADLINE** >>>>>

#### DEADLINE FOR MARCH JOURNAL

Could you please send through any articles for the **March edition** of the journal by the second Friday of February. **Friday 11th February 2022.**