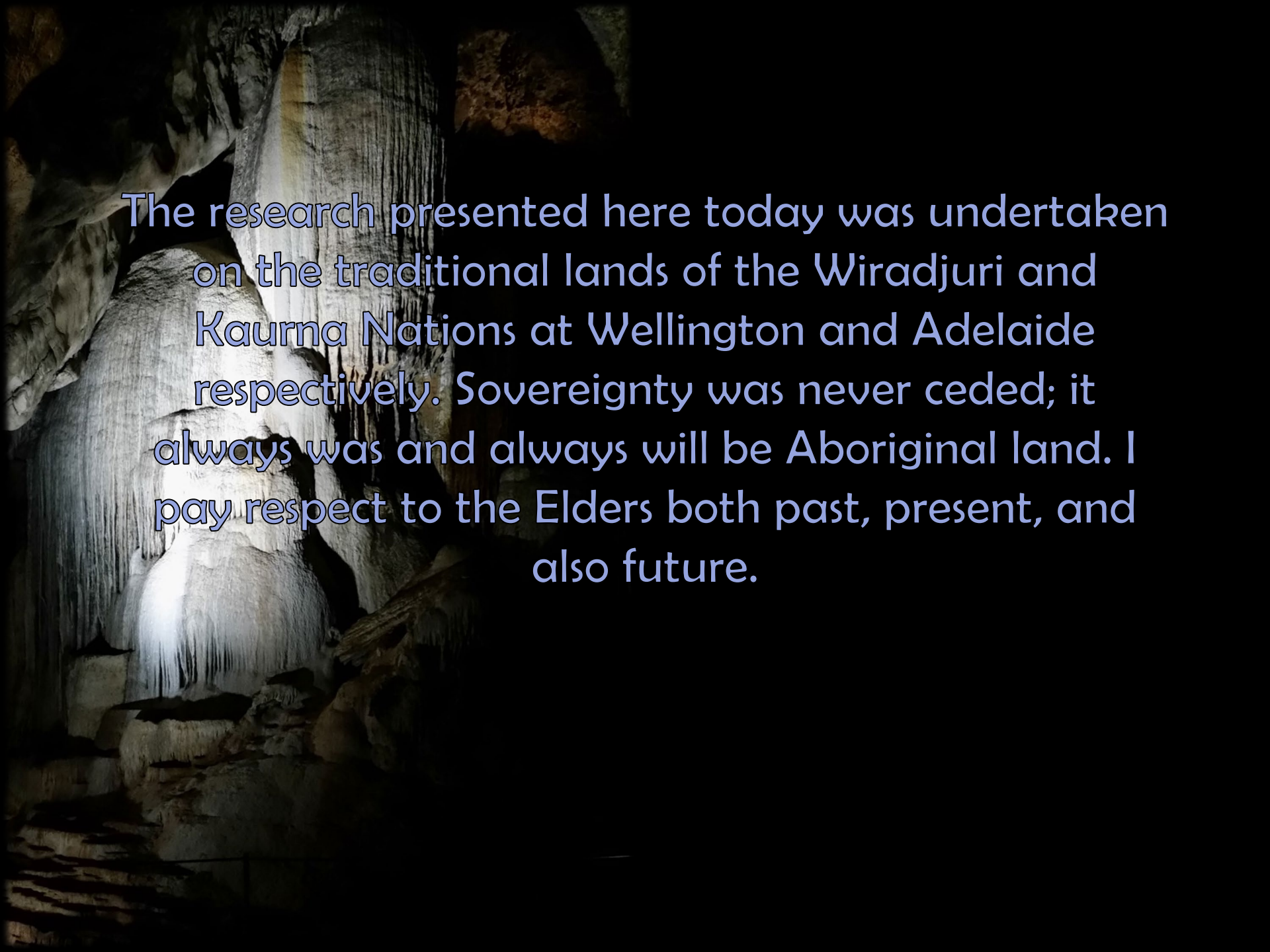


# The vertebrate palaeoecology of Cathedral Cave, Wellington Caves.

Diana A. Fusco, Lee J. Arnold, Grant A. Gully  
and Gavin J. Prideaux.



Flinders



The research presented here today was undertaken on the traditional lands of the Wiradjuri and Kaurna Nations at Wellington and Adelaide respectively. Sovereignty was never ceded; it always was and always will be Aboriginal land. I pay respect to the Elders both past, present, and also future.

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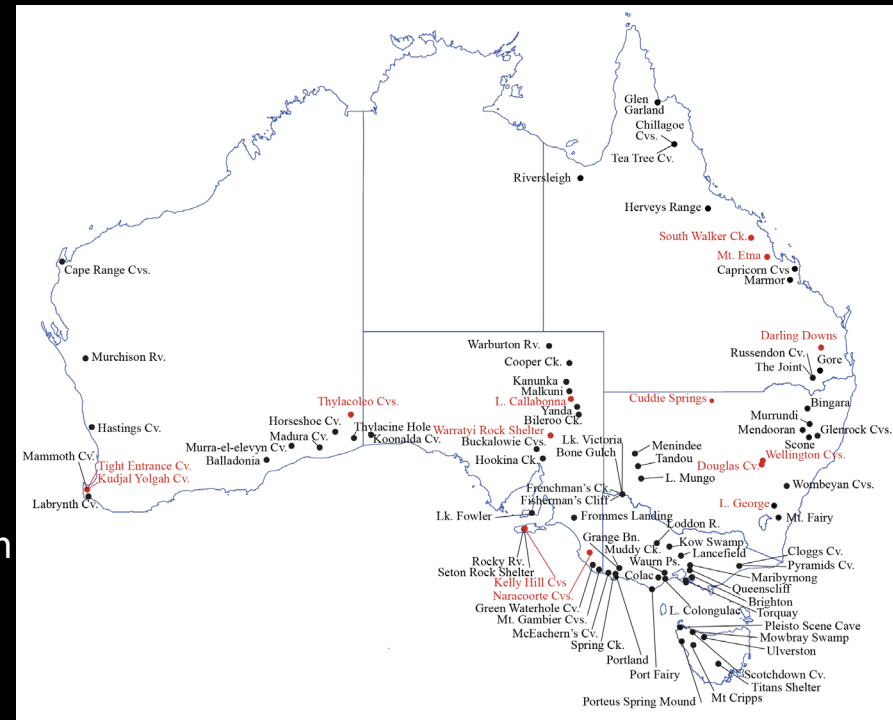
Slides marked with this symbol contained unpublished data that has been removed.

# How did vertebrate fauna in central eastern Australia respond to its changing environment during the late Quaternary?

QUATERNARY	HOLOCENE	0.012
	Late	0.126
PLEISTOCENE	M	0.781
	Early	2.588

late Quaternary sites are numerous in Australia but ...

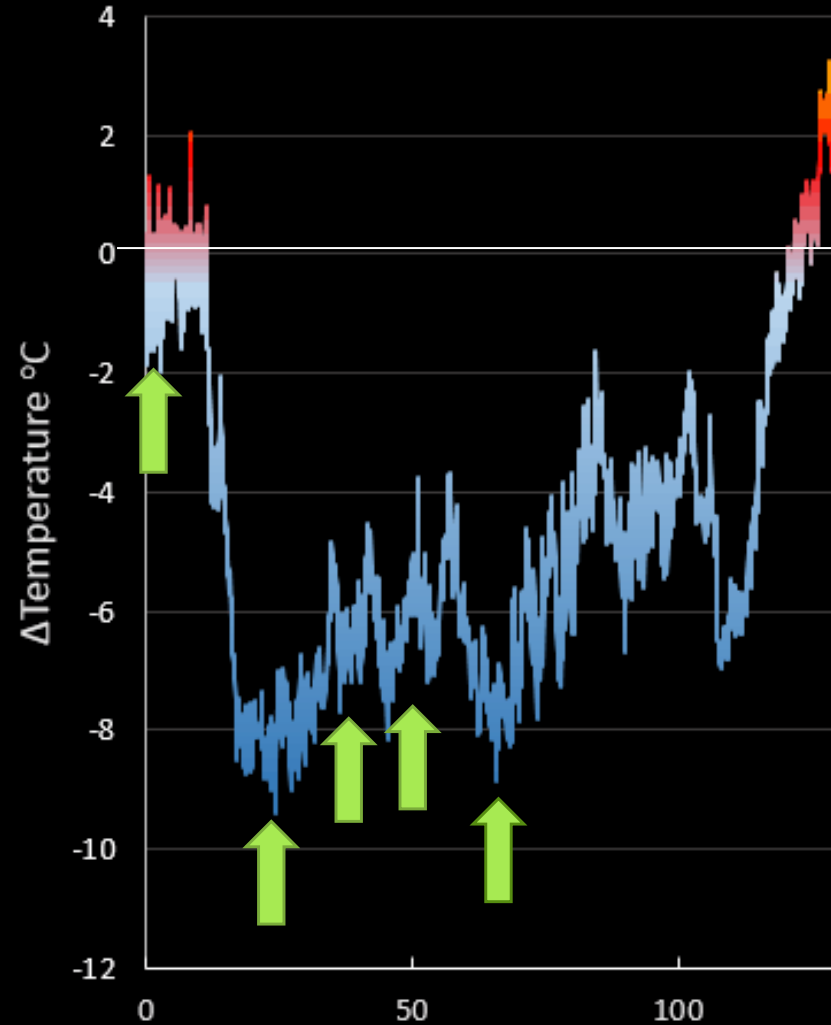
- Few are well dated
- Even fewer contain the resolution required to track how these faunal communities have changed through time
- Surprisingly few detailed palaeoecological studies of Australian late Quaternary vertebrate faunas have been published



Some Pleistocene fossil sites of Australia, map after Archer & Hand (1984).

# Exciting events of late Pleistocene Australia

- 65 ka - colder, drier climate
- 65 ka - First Nations people arrive northern Aus – 46 ka sw NSW
- 40 ka - 90% large bodied animals extinct
- 21 – 17 ka - Last Glacial Maximum
- 11.7 ka – present - Holocene interglacial
- Colonisation of Australia



## Burning questions of the late Pleistocene

How did the vertebrate fauna respond to the environmental changes of the late Pleistocene?

What can we learn from these responses that could inform modern conservation?

What factors drove the megafaunal extinctions?



# Why Wellington Caves?

## Historically significant.

- 1830 recovery of fossils from Michell Cave gave the western scientific world its first glimpse of extinct Australian marsupials

## Scientifically significant.

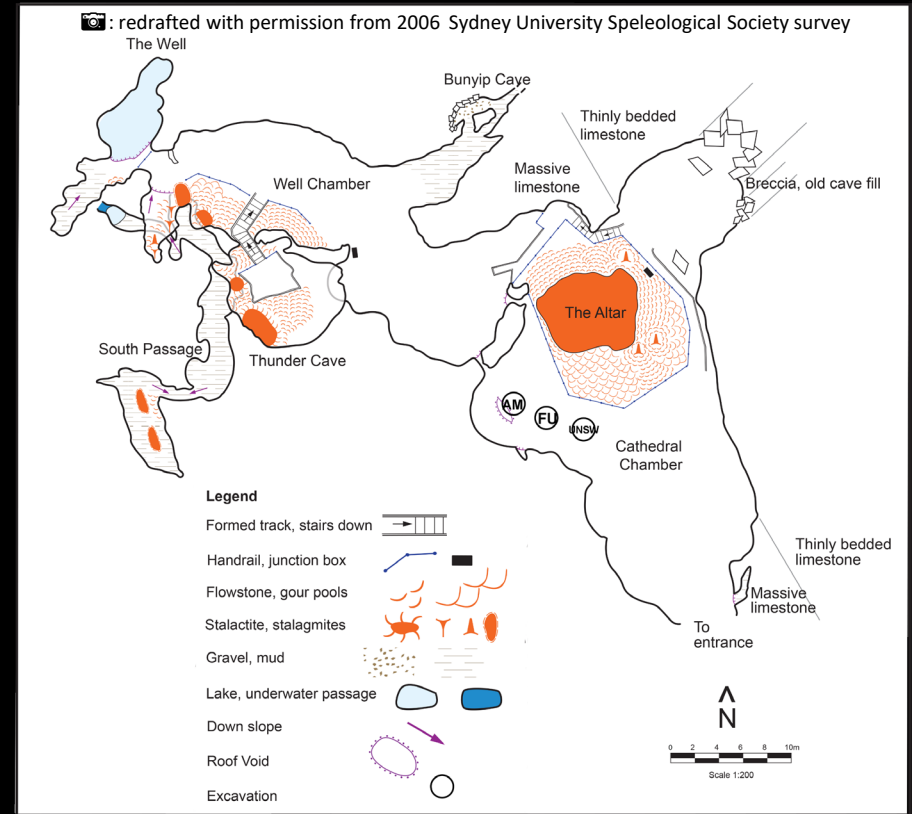
- Multiple fossil sites Pliocene to Holocene age - ~4 million record
- Diverse and dense fossil deposits
- Unique in central eastern Australia
- Proximity to three modern climate zones
- Despite 191 years of fossil collecting, still poorly understood



# Cathedral Cave

## Australian Museum excavation 1881:

- Sediments 10.5 m deep (Ramsay 1882, Kreffft 1882).
- Deepest known late Quaternary vertebrate deposit in Australia.

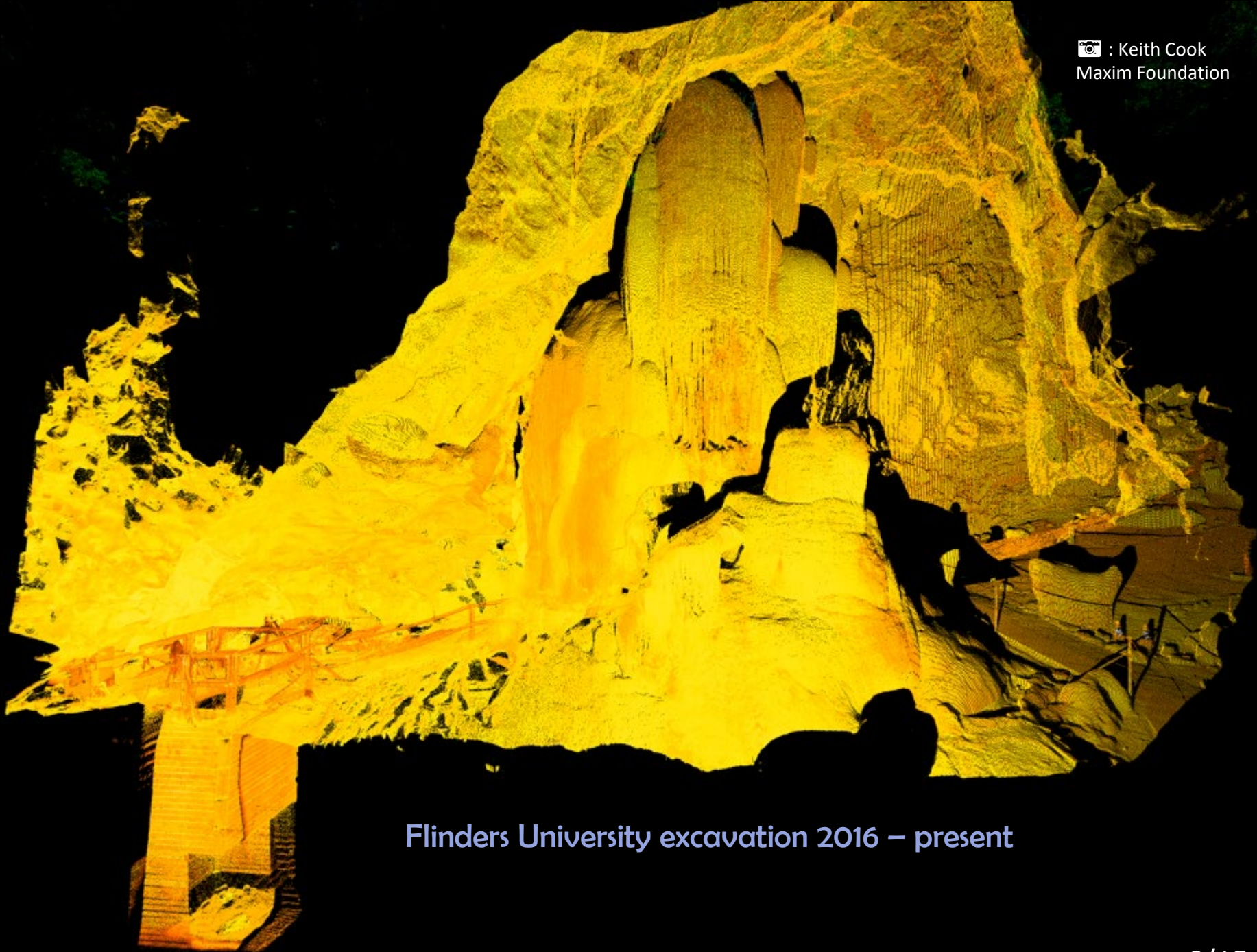


UNSW excavation ©: L. Dawson

## UNSW excavation 1982 - 1986:

- 7.5 m deep (Dawson & Augée 1997).
- Radiocarbon dates suggested late Pleistocene (33.8 ka) incorporating LGM.





Flinders University excavation 2016 – present



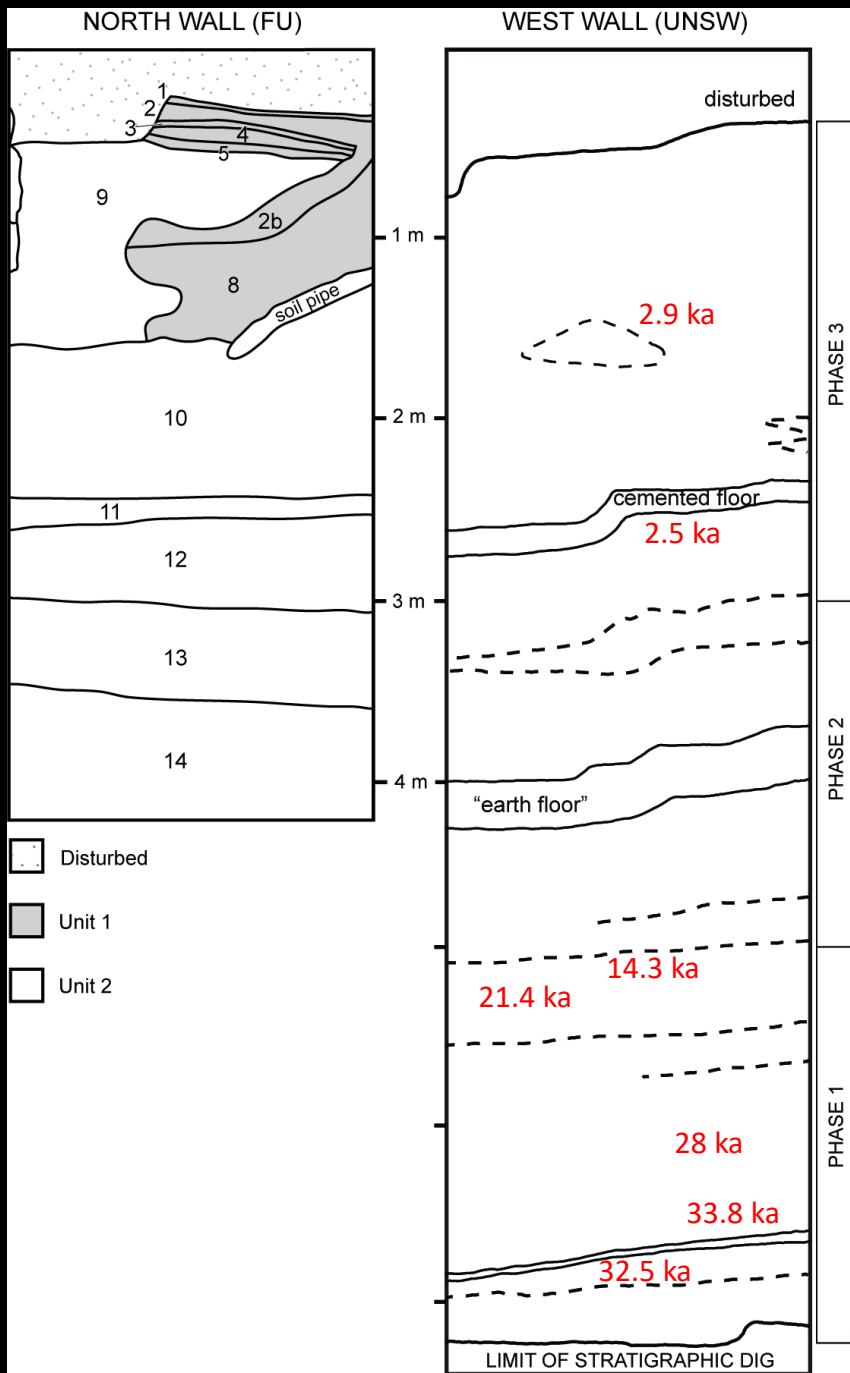
Excavation pit before shoring



Excavation pit after shoring



3 m deep



## Chronology

FU 2021:



- Text removed

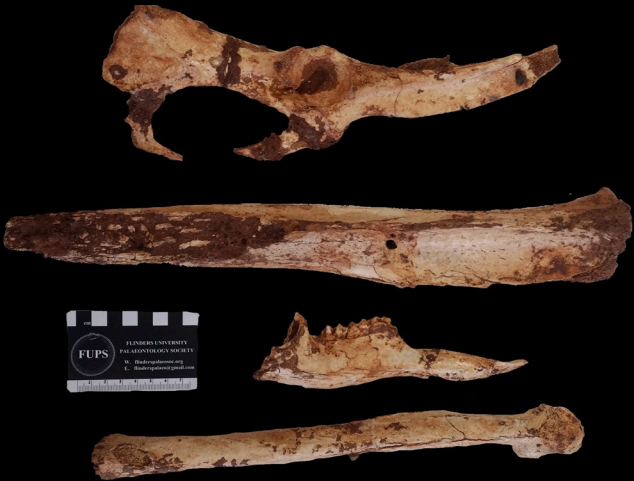
Former chronology (Dawson & Augee 1997):

- 33.8 – 2.9 ka over 7.5 m depth
- <sup>14</sup>C dates on charcoal

Charcoal extremely sensitive to contamination by younger carbon

# The Cathedral Cave fauna

Accumulation:  
Pitfall trapping (larger taxa)  
Owl prey (small fauna)



21,212 individual specimens identified so far.

Including mammals, birds, reptiles, frogs and fish.

At least 69 species of terrestrial mammals

Richest assemblage of late Pleistocene mammals collected from a single site.

11 species of extinct megafauna mammals

+ 2 species of non-mammalian megafauna



# The Cathedral Cave fauna

## Unit 2 Taxonomic Habitat Index:

- Tracks number of species associated with different climate zones

## General trend:

Temperate taxa dominate throughout but subtle shifts between these and semi-arid to arid biome taxa



Total Habitat Index (THI) for Unit 2 of Cathedral Cave showing relationships of fauna to climatic zones

# The Cathedral Cave fauna

## Unit 2 relative abundance trajectories:

- Relative abundance trends according to habitat type
- Classed by size to avoid taphonomic biases

## General trends:

- \*text removed

\* scales on Y axis not same



Relative abundance trajectories of mammals in Unit 2 by habitat type and size, excluding *P. australis*

# The Cathedral Cave fauna

## Unit 2 rodent relative abundance trajectories:

- 9 rodent taxa overall
- Distinct shift in relative abundance of forest and woodland / arid and semi-arid rodents



Relative abundance trajectories of selected rodents in Unit 2.

Majority of rodent species (and small mammals overall) responded by changes in their relative abundances rather than local extinction

## Future directions:

- Establish a pollen record as an independent palaeoenvironmental proxy (Kale Sniderman, UofMelb)
- Dig deeper to push record back further (150 ka?)
- Investigate other local deposits that sit within the depositional hiatus to provide a continuous record
- Track trends of the non-mammalian fauna

## To conclude:

Cathedral Cave is an exceptional palaeontological site that offers faunal resolution that is so far unmatched in any published record in Australia



Partial associated *Thylacoleo carnifex* at 5 m deep awaiting our return





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Also, Lyndall Dawson, Mike Augee, Andy Baker, Trevor Worthy, past and present staff of the Wellington Caves (especially Michelle Tonkins, Ian Eddison and Jodie Anderson), UNSW, the entire Flinders Palaeo crew, ACKMA organisers and Pedro the thesis-support dog.

