



18 May 2020

EMBARGO: 10am AEST Monday 18 May 2020

New paper unlocks mysteries of megafauna extinction

Queensland Museum palaeontologists have today announced the discovery of new extinct Australian megafauna that lived until 40,000 years ago in tropical northern Australia.

The research team, led by Queensland Museum and included experts from Australian universities, concluded in this new study that extreme environmental change was the most likely cause of their extinction, and that humans could not be blamed.

The findings published in the open access scientific journal, *Nature Communications* outlines how the successive loss of water flow, intensified drying, increased burning and vegetation change created the conditions to drive the extinction of at least 13 species of super-sized megafauna species, including four reptilian megapredators, a marsupial 'lion' and the world's largest wombats and kangaroos.

The paper is the culmination of more than a decade of work for Queensland Museum palaeontologist, Dr Scott Hocknull who worked with scientists from the University of Adelaide, Griffith University, Southern Cross University, University of Queensland, Australian National University and University of Wollongong.

Dr Hocknull said there is still more research to come out of an area near Mackay called South Walker Creek, which is the youngest megafauna site in northern Australia and was once home to at least 16 species of megafauna.

"The megafauna at South Walker Creek were uniquely tropical, dominated by huge reptilian carnivores and mega-herbivores that went extinct around 40,000 years ago, well after humans arrived onto mainland Australia," Dr Hocknull said.

"We cannot place humans at this 40,000-year-old crime scene, we have no firm evidence. Therefore, we find no role for humans in the extinction of these species of megafauna," Dr Hocknull said.

"Instead, we do find that their extinction is coincident with major climatic and environmental deterioration both locally and regionally, including increased fire, reduction in grasslands and loss of freshwater. Together, these sustained changes were simply too much for the largest of Australia's animals to cope with.

"Not since the time of the dinosaurs has Australia been home to such magnificent giants, and yet within a geological instant they were gone forever. There is a message in that for everyone.

"This research has significant bearing on how we see our current landscape and the impacts of climate change, fire, vegetation change and availability of water on the survival of our existing modern megafauna – both native and domestic."

The South Walker Creek site was the stomping ground for a diverse range of megafauna including several new species, which are yet to be formally described.



Dr Hocknull said some of the highlights from the site included the discovery of the remains of the world's largest kangaroo at 2.5 metres tall and an estimated mass of 274kg, this makes it the largest kangaroo of all time.

"While the rest of the world had giant carnivores like sabre-toothed cats, bears and hyenas, Australia's predators were mostly giant reptiles, including an extinct freshwater croc around 7-metres long, a relation to the modern salt water crocodile and a land-dwelling crocodile," Dr Hocknull said.

"There were also two giant lizards including a 6-metre long lizard called Megalania and another giant lizard, similar in size to the Komodo Dragon."

Minister for Science and Minister for the Arts Leeanne Enoch said the research highlights the historical effects of climate change on not only our environment, but native species.

"After more than a decade, Queensland Museum's research into megafauna and fossil collections continues to lead the way in uncovering more about our planet.

"We can learn so much from our prehistoric past through valuable research such as the work performed by scientists, like Dr Hocknull," Ms Enoch said.

The fossils were discovered in 2008 by the Barada Barna people during a cultural heritage clearance at the South Walker Creek site which is operated by BHP Billiton Mitsui Coal (BMC). This site is located 40 kilometres west of Nebo and through a partnership with Queensland Museum Network, there has been a systematic excavation of the site since 2008 that has revealed spectacular never-before-seen megafauna fossils ranging from minute fish scales to colossal limb bones.

"The Board of Directors from the Barada Barna Aboriginal Corporation are extremely excited that we have found the Megafauna within our traditional country," a Barada Barna Aboriginal Corporation spokesperson for the Board of Directors said.

"We are also excited as to what the future holds with our ongoing relationship with Queensland Museum and BHP. The Barada Barna people have an immensely proud history dating back to our first encounters with Ludwig Leichhardt in 1845 on the banks of Cherwell Creek and having discovered Megafauna only enriches our history within this region.

"The team that discovered these finds back in 2008 had no idea of how great a discovery it was, with the help of Queensland Museum we have discovered more and more animals from that time."

South Walker Creek has formed the baseline for a project called Project DIG, a new partnership between Queensland Museum Network and BHP that allows the museum to digitise and visualise the information collected there using cutting-edge 3D interactive technologies to unlock collection for researchers and visitors.

Queensland Museum Network CEO, Dr Jim Thompson said Project DIG would help unlock Queensland's collection and reveal fascinating new insights into our ancient past.

"South Walker Creek is one of the most unique and richly diverse megafauna sites in Australia; not only does it have bones, but seeds and leaves from plants, freshwater molluscs, insects and pollen,



that will allow our palaeontologists to build a detailed picture of what the environment looked like 40,000 years ago,” Dr Thompson said.

“The fossils found at South Walker Creek will be among the first to be digitised by Project DIG, allowing us to share this collection and research with people across the globe.”

Elsabe Muller, Asset President BHP Mitsui Coal said BHP was proud of our partnership with Queensland Museum Network which will build on the state’s eResearch capabilities sharing significant research that will help the scientists of today and tomorrow unlock solutions to global problems.

“BHP is proud of our partnership with Queensland Museum Network which means we can share these amazing discoveries from our backyard in Central Queensland with the world,” Ms Muller said.

The Queensland Museum Network holds one of the largest and most significant fossil collections in the southern hemisphere. Scientists use the collection to record the history of life on the planet and understand how creatures from our ancient past adapted to geological events, particularly climate change. This research is invaluable in developing conservation strategies for Queensland’s fragile ecosystems and threatened species.

Project DIG is a partnership between Queensland Museum and BHP to digitally unlock and share museum collections and research across the globe.

Dr Hocknull worked with scientists from the University of Melbourne, University of Adelaide, Griffith University, Southern Cross University, University of Queensland, Australian National University and University of Wollongong.

The paper can be viewed here <http://dx.doi.org/> by searching the DOI **10.1038/s41467-020-15785-w**.

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About Project DIG

BHP and Queensland Museum have entered into a unique five-year partnership not seen before in Australia. It’s a \$7.6 million partnership that enables Queensland Museum to transform how it stores, explores and share its globally significant research and information with students and scientists no matter where they are in the world.

Through Project DIG, Queensland Museum and BHP are working together to give the world access to the Museum’s invaluable data – access that will see new discoveries and unimaginable collaborations of scientific significance, benefiting innovators, researchers and students and helping to solve complex problems of international relevance.



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About Queensland Museum Network

Queensland Museum is part of the Queensland Museum Network and the keeping place for the State Collection of 1.2 million objects and specimens, valued at more than \$546 million, and approximately 14 million research collection items. For more than 150 years Queensland Museum has grown alongside Queensland to inspire, enrich and empower communities.