

News in focus



Colourful rock layers deposited over millions of years are an excellent source of fossils in Utah's Grand Staircase–Escalante National Monument.

PALAEONTOLOGISTS HOPE BIDEN WILL RESTORE PROTECTIONS ON FOSSIL-RICH US LAND

Trump's shrinking of Utah's Bears Ears and Grand Staircase–Escalante reserves might be reversed – ensuring archaeological and fossil treasures are preserved for study.

By Freda Kreier

When former US president Donald Trump announced his decision to shrink protected areas loaded with important fossils and artefacts in the southwest United States, many palaeontologists were appalled – and even helped launch a court case to restore the lands. Now, incumbent President Joe Biden is taking steps to review the decision, which many scientists hope will lead to a restoration of the original reserves.

In April, Biden sent Deb Haaland, the US

Secretary of the Interior, to Utah to meet scientists, tribal leaders and officials. She is expected to make recommendations soon on whether to alter the reserves' current boundaries.

The Department of the Interior declined to comment on exactly when the results will be made public, but in a statement after the trip Haaland said: "I look forward to sharing what I heard and saw with President Biden so he has the benefit of these perspectives as we chart a path forward on the stewardship of these incredible culturally rich places."

Many, although not all, researchers are

hoping that Haaland will argue for the Bears Ears and Grand Staircase–Escalante national monuments to be fully restored or even enlarged, saying that this will protect fossils and archaeological artefacts from looters and commercial interests.

'Nowhere better on Earth'

"The Rocky Mountain West is one of the best places in the world to hunt for fossils," says Joe Sertich, the curator of dinosaurs at the Denver Museum of Nature & Science in Colorado. "Given the resources that are still unexplored, I think there's a really good case for restoring

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the original boundaries.”

He says that for the 90-million to 70-million-year-old ecosystems he studies from the Cretaceous period, “there’s nowhere else better on Earth” for fieldwork than Grand Staircase–Escalante. Fossils of relatives of *Tyrannosaurus rex* found here recently bolstered evidence that the animals hunted in packs (A. L. Titus *et al.* *PeerJ* 9, e11013; 2021), and around 20 new species of dinosaur in total have come from here and Bears Ears, Sertich says.

Bears Ears preserves swathes of “critically important” fossil history from the Triassic period (252 million to 201 million years ago) and Cretaceous period (145 million to 66 million years ago) that is exposed in rocks nowhere else, adds Jessica Theodor, president of the Society of Vertebrate Paleontology (SVP), which is based in McLean, Virginia, and represents some 2,000 palaeontologists globally.

This is why researchers were alarmed when Trump cleaved a total of more than 8,000 square kilometres from the monuments in late 2017, shrinking Bears Ears by 85% and Grand Staircase–Escalante by almost half. This led the SVP to join a coalition of Native American and conservation groups to sue the Trump administration. A judgment is yet to be made on the lawsuit, but might no longer be necessary if the cuts to the monuments are reversed.

Fossil poaching risk

Trump’s move opened up public land, which was previously protected by its national monument status, to ranching and resource extraction, including coal and uranium mining. The decision also removed certain protections that had been afforded to fossils, exposing invertebrate and plant fossils to the risk of ‘casual collection’, according to one report.

The rangers and resources afforded to national monuments make the sites better equipped than most public lands to safeguard fossil beds, and by removing land from the monuments, Trump made some sites vulnerable to looting. In 2018, *The Washington Post* reported that “extremely rare” vertebrate fossils from the Triassic period had been removed from a fossil bed now outside Bears Ears’ boundaries.

Kevin Madalena, an independent geologist who works on Indigenous land issues in the region, met with Haaland during her visit in April. He says that looting of cultural and fossil sites is an ongoing problem in the region, and that areas excised from the monuments are at greater risk than those still protected by national monument status. Given that fossils of dinosaurs such as *T. rex* routinely sell at auction for millions of dollars, scientists are concerned that, without adequate protection, important specimens could be lost to science.

Shrinking the monuments has also had other effects. Sertich, who has worked on fossil digs at Grand Staircase–Escalante

for 17 years, says that he hasn’t seen direct evidence of increased looting or vandalism, but has noticed more four-wheel-drive traffic.

Madalena, who is Jemez Pueblo, one of the tribes with cultural ties to the region, says the biggest threat could be from resource extraction. Mining and oil-drilling leases were expedited during the Trump administration, he says. “I was kind of staggered. It seemed like flame stacks doubled overnight.”

Irreplaceable data on prehistory

But not all researchers agree that monument status is essential for protecting or advancing scientific research on public land. “We already have laws protecting fossils on federal lands,” says Brooks Britt, a palaeontologist at Brigham Young University in Provo, Utah, and a member of the Bears Ears National Monument Advisory Committee. “If things get too locked down, it can be difficult to do science,” he notes.

Speaking outside his capacity as a council

member, Britt says that research on public lands can be hindered by onerous restrictions and requirements for government permits, and that national monument status is not always necessary to safeguard fossil resources.

However, Theodor argues that the number of palaeontologists not in favour of restoring Bears Ears and Grand Staircase–Escalante to Obama-era boundaries are “vanishingly small”.

Researchers aren’t sure what the recommendations from Haaland – who is Laguna Pueblo, another tribe with ties here – will look like, but most expect that the review will call for at least a partial enlargement of the monument boundaries.

Former SVP president David Polly, a palaeontologist at Indiana University Bloomington, says he thinks it’s a “logical conclusion” for Grand Staircase–Escalante. Madalena is also hopeful, adding “there’s irreplaceable data from past environments that needs to be preserved”.

A COMPLETE HUMAN GENOME IS CLOSE: HOW THE GAPS WERE FILLED

Researchers added 200 million DNA base pairs and 115 genes – but they’ve yet to finish the Y chromosome.

By Sara Reardon

When the sequencing of the human genome was announced two decades ago by the Human Genome Project and biotech firm Celera Genomics, the sequence was not truly complete. About 15% was missing; technological limitations left researchers unable to work out how certain stretches of DNA fitted together, especially those where there were many repeating letters (or base pairs). Scientists solved some of the puzzle over time, but the most recent human genome, which geneticists have used as a reference since 2013, still lacks 8% of the full sequence (see ‘Completing the human genome’).

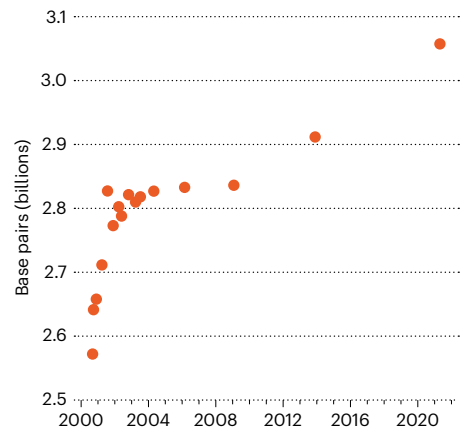
Now, researchers in the Telomere-to-Telomere (T2T) Consortium, comprising 30 institutions, have filled in the gaps. In a 27 May preprint entitled ‘The complete sequence of a human genome’, genomics researcher Karen Miga at the University of California, Santa Cruz, and her colleagues report that they’ve sequenced the remainder, discovering about 115 new genes that code for proteins, for a total of 19,969 (S. Nurk *et al.* Preprint at bioRxiv <https://doi.org/gj8jk3>; 2021).

“It’s exciting to have some resolution to the problem areas,” says Kim Pruitt, a bioinformatician at the US National Center for Biotechnology Information in Bethesda, Maryland, who calls the result a “significant milestone”.

The newly sequenced genome – dubbed

COMPLETING THE HUMAN GENOME

Researchers have been filling in incompletely sequenced parts of the human reference genome for 20 years, and have now almost finished it, with 3.05 billion DNA base pairs.



0.3% of sequence might still have errors. Includes X but not Y chromosome. Count excludes mitochondrial DNA.

SOURCE: ADAM PHILLIPPY