

100. The scientists figured there are actually thousands, spewing fountains of the greenhouse gas directly from the seabed into the atmosphere. Already, the concentration of methane above the plumes is 100 times higher than normal.

“It’s amazing,” Igor Semiletov, of the International Arctic Research Centre at the University of Alaska Fairbanks, told Britain’s *The Independent*, which broke the story.

The implications are worrisome, if unclear. Semiletov and his colleague Natalia Shakhova are concerned that this might be just the beginning. Shakhova told *The Independent* that far more catastrophic methane burps might pierce through the ocean’s surface in mere decades.

The concentration of methane in the atmosphere is already on the rise. Over the past couple of centuries, it has leapfrogged from 0.7 parts per million by volume to 1.7 globally. In the Arctic as a whole, it’s 1.9.

All of this leads me to the Paleocene-Eocene Thermal Maximum (PETM) of 55 million years ago. That’s the nearest climate analog scientists have found to the vast carbon assault on the atmosphere that we humans are orchestrating today with our burning of the carbon stores of the past. During the PETM, a swift influx of carbon into the atmosphere and ocean caused a violent shift in the number and kinds of creatures that lived on the planet. Many died out. Many were born. We can read the horrific tale in fossils from that era. The catalyst may well have been a surge of methane from the sea.

Here’s the critical point. The carbon influx of the PETM was horrendously quick. But it was nowhere near as fast or as intense as what we’re doing to the atmosphere and ocean now, according to a paper by Richard Zeebe a couple of months ago in *Annual Review of Earth and Planetary Sciences* on the history of seawater carbonate chemistry.

So can we pull back from this brink? I think of a talk I heard in Washington, D.C., in January by David Orr, distinguished professor of environment studies and politics at Oberlin College, Ohio. Climate change, and how politicians respond to it, is the defining question of our time, he said, adding: “Humankind is coming up for its final exam.” 🌍



## What Did We Save?

Plains bison are held up as a great story of species recovery. But the genetic details raise fresh questions about the meaning of conservation

By Jay Ingram

### WHO ARE YOU?

*Most of the bison that remain today carry cattle genes from earlier efforts by ranchers to hybridize the species. Only a few populations today are full descendants of the original herds.*

**N**o animal alive today better captures the enormous influence humans have on wildlife than the American bison. The rough outlines of its story are well known: incredibly abundant at the beginning of the 19th century (numbering something like 40 million), then reduced by hunting to perhaps 200 individual animals by the beginning of the 20th century.

Then, a stunning comeback. Due to the efforts of a few well-intentioned conservationists and some canny ranchers, the bison returned. Today, more than 700,000 of them are scattered across North America, some on public lands, most in private herds.

It sounds like a conservation success story of the most cheering kind. After all, there are other creatures that suffered depredation of a similar scale at the hands of humans and never made it back. The passenger pigeon is a prime example: a bird whose flocks literally darkened the skies, wiped out in a few short decades. But the story of the bison’s perilous journey is much

deeper than the typical account, which focuses on the unique combination of technology, politics and environment that nearly did them in. In fact, it raises questions about what was actually saved.

Bison hides were in demand during the 19th century, as much for leather belts to use in heavy industrial machinery as for cold-weather robes. After the American Civil War, accurate, long-range, large-bore rifles replaced their unreliable, single-shot cousins and allowed the “still hunt.” Professionals would station themselves at dawn several hundred metres away from a herd, then kill the animals one by one. A still hunter could kill 50 bison in a morning. The motivation was more than just economics. In some U.S. political circles at the time, exterminating the bison was seen as the ideal method for pressuring First Nations people to abandon their nomadic lifestyle and settle in reservations.

That 200 or so bison clung to survival at the end of the 19th century represents what biologists call a bottleneck: an unnaturally small population from which have come the flourishing herds of today. That population represented much less genetic diversity than the enormous herds that preceded it. It’s true that bison had made it through previous bottlenecks. But there wasn’t much to work with in the bottleneck a hundred years ago.

What’s more critical is that many of those bison were sold or traded into herds maintained by entrepreneurial ranchers who were seized with the idea of hybridizing bison with cattle to produce an animal with the best qualities of both: the docile nature of the cow coupled with the higher-quality bison meat and the animal’s ability to survive cold weather.

These efforts to hybridize the two animals—mostly from the end of the 19th century until about the start of World War II—had mixed success. But one thing is certain: the combination of the introduction into bison of cattle genes, together with the tiny founding population of the animals to begin with, means that most bison today are not 100 per cent genetically *Bison bison*. The most recent studies suggest the vast majority of privately owned bison have cattle genes in them. There are government-managed herds, like those in Yellowstone National Park in the U.S. and Elk Island National Park west of Edmonton, that seem to be pure bison, but they represent a small percentage of the total number of animals now alive.

So here’s the question: is a bison carrying a few cattle genes actually a bison? Have we been a little too quick to congratulate ourselves on saving the animal that we nearly destroyed? Opinions are split among conservationists. James Derr of Texas A&M University argues we should be in the business of preserving genomes, not individuals. If you buy that argument, then you can see just how incredibly important it would be to protect those precious genetically pure animals from disease or any other threat to their survival.

Or is that view too rigid? There isn’t much evidence that traces of cow genome in a nominally wild bison have any dramatic effect on the animal. So even if we know that it is not the creature that dominated the plains two centuries ago, is it close enough? Let’s face it: anywhere there are humans, there will always be anthropogenic selection.

It might seem like an academic point, but if we don’t think about what actually constitutes a *species*, we’re not really in the conservation business. 🌍

