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Robert Clark photographs remnants of the Mesolithic people who once occupied northern Europe's Doggerland.

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Searching for Doggerland

For decades North Sea boatmen have been dragging up traces of a vanished world in their nets. Now archaeologists are asking a timely question: What happens to people as their homeland disappears beneath a rising tide?

By Laura Spinney

Art by Alexander Maleev

When signs of a lost world at the bottom of the North Sea first began to appear, no one wanted to believe them. The evidence started to surface a century and a half ago, when fishermen along the Dutch coast widely adopted a technique called beam trawling. They dragged weighted nets across the seafloor and hoisted them up full of sole, plaice, and other bottom fish. But sometimes an enormous tusk would spill out and clatter onto the deck, or the remains of an aurochs, woolly rhino, or other extinct beast. The fishermen were disturbed by these hints that things were not always as they are. What they could not explain, they threw back into the sea.

Generations later a resourceful amateur paleontologist named Dick Mol persuaded the fishermen to bring him the bones and note the coordinates of where they had found them. In 1985 one captain brought Mol a beautifully preserved human jawbone, complete with worn molars. With his friend, fellow amateur Jan Glimmerveen, Mol had the bone radiocarbon-dated. It turned out to be 9,500 years old, meaning the individual lived during the Mesolithic period, which in northern Europe began at the end of the last ice age some 12,000 years ago and lasted until the advent of farming 6,000 years later. "We think it comes from a burial," says Glimmerveen. "One that has lain undisturbed since that world vanished beneath the waves, about 8,000 years ago."

The story of that vanished land begins with the waning of the ice. Eighteen

thousand years ago, the seas around northern Europe were some 400 feet lower than today. Britain was not an island but the uninhabited northwest corner of Europe, and between it and the rest of the continent stretched frozen tundra. As the world warmed and the ice receded, deer, aurochs, and wild boar headed northward and westward. The hunters followed. Coming off the uplands of what is now continental Europe, they found themselves in a vast, low-lying plain.

Archaeologists call that vanished plain Doggerland, after the North Sea sandbank and occasional shipping hazard Dogger Bank. Once thought of as a largely uninhabited land bridge between modern-day continental Europe and Britain—a place on the way to somewhere else—Doggerland is now believed to have been settled by Mesolithic people, probably in large numbers, until they were forced out of it thousands of years later by the relentlessly rising sea. A period of climatic and social upheaval ensued until, by the end of the Mesolithic, Europe had lost a substantial portion of its landmass and looked much as it does today.

Many have come to see Doggerland as the key to understanding the Mesolithic in northern Europe, and the Mesolithic, in turn, as a period that holds lessons for us—living as we are through another period of climate change. Thanks to a team of landscape archaeologists at the University of Birmingham led by Vince Gaffney, we now have a good idea of what this lost country looked like. Based on seismic survey data gathered mostly by oil companies prospecting under the North Sea, Gaffney and his colleagues have digitally reconstructed nearly 18,000 square miles of the submerged landscape—an area larger than the Netherlands.

At the university's IBM Visual and Spatial Technology Centre, which he heads, Gaffney projects images of this terra incognita onto huge, full-color screens. Just off the map, the Rhine and the Thames met and flowed south into the Channel River. Gaffney sweeps a hand across other river systems, comparably large, that we have no names for. In the climate of the day—perhaps a couple of degrees warmer than today—the contours on his screen translate into gently rolling hills, wooded valleys, lush marshes, and lagoons. "It was a paradise for hunter-gatherers," he says.

The publication in 2007 of the initial section of this map allowed archaeologists for the first time to "see" the Mesolithic world, even identify likely locations for settlements, with a view to potentially excavating them. The expense of underwater archaeology and the poor visibility in the North Sea have kept those settlements tantalizingly out of reach, at least for now. But the archaeologists have other ways to reveal who the Doggerlanders were, and how they responded to the inexorable creep of the sea into their homeland.

First, there are the treasures brought up in the fishermen's nets. In addition to the human jawbone, Glimmerveen has accumulated more than a hundred other artifacts—animal bones showing signs of butchery and tools made from bone and antler, among them an ax decorated with a zigzag pattern. Because he has the coordinates of these finds, and because objects on the seabed tend not to move far from where erosion liberates them, he can be confident that many come from a specific area of the southern North Sea that the Dutch call De Stekels (the Spines), characterized by steep seabed ridges. "The site or sites must have been close to a river system," he says. "Maybe they lived on river dunes."

Another way to understand the Doggerlanders is to excavate shallow-water or intertidal sites of similar age nearby. In the 1970s and 1980s a site called Tybrind Vig, a few hundred yards off the coast of a Danish island in the Baltic Sea, yielded

evidence of a surprisingly advanced late Mesolithic fishing culture, including finely decorated canoe paddles and several long, thin canoes, one of them over 30 feet long. More recently, Harald Lübke, of the Centre for Baltic and Scandinavian Archaeology in Schleswig, Germany, and his colleagues have excavated a series of underwater settlements in Wismar Bay, on the German Baltic coast, dating between 8,800 and 5,500 years ago. The sites vividly document the people's shift in diet from freshwater fish to marine species, as the sea rise transformed their land over centuries from inland lakes surrounded by forests, to reedy marshes, to fjords, and eventually to the open bay there now.

A similar metamorphosis took place at Goldcliff on the Severn estuary in Wales, where archaeologist Martin Bell from the University of Reading and his team have been excavating for 21 years. In the Mesolithic, a narrow, incised valley initially contained the River Severn. As the sea rose, the river spilled over the valley's sides and spread out—perhaps within as little as a century—creating the outlines of the modern estuary. At some point the estuary would have been dotted with islands.

One August day, during an exceptionally low tide at Goldcliff, I followed Bell and his co-workers out across the sucking, streaming mudflats, past huge black trunks of prehistoric oaks lying preserved in the mud. We had less than two hours to work before the tide would pour back in. We arrived at an unremarkable ridge that, 8,000 years ago, formed the edge of an island. A team member blasted it with water from a high-pressure hose, and suddenly a sequence of ancient footprints was thrown into relief—39 in all, made by three or four individuals and heading in both directions along the ridge. “They may have been heading out from their campsite to check their fish traps in a nearby channel,” says Bell.

There were numerous camps in the estuary at any one time, Bell believes, each of which was inhabited by an extended family group of perhaps ten individuals. The camps were not permanently occupied. The oldest one would have been submerged at very high tides, so it's clear the visitors were seasonal, and that each time they returned they built their camp a little higher up the slope. The remarkable thing is that they kept coming back, over centuries and possibly millennia, finding their way through a landscape that was changing beyond all recognition. They would have witnessed the engulfing and death of the oak forest. “There would have been a time when colossal oak trees were sticking up, dead, through the salt marsh,” says Bell. “It would have been a weird sort of landscape.”

Summer and autumn would have been times of plenty at the coast, with grazing on the marsh attracting wild animals to hunt. There would be good fishing, and hazelnuts and berries in abundance. At other times the groups moved up to higher country, probably following the valleys of the Severn's tributaries. With only an oral culture, older individuals would have been vital repositories of environmental knowledge, able to read the migration patterns of birds, for example, and so tell their group when the season had come to leave for the coast or head for the highlands—decisions on which their survival depended.

Finds of much larger concentrations of artifacts suggest that Mesolithic people, like later North American hunter-gatherers, came together for annual social events—possibly in the early autumn, when the seals came in and the salmon were running. In western Britain, these gatherings took place on cliff tops, overlooking sealing grounds. They would have allowed young men and women from localized groups to find mates, and information to be exchanged about other river systems beyond each

group's territory—knowledge that became crucial as the sea continued to disrupt the landscape.

The most rapid rises of sea level were on the order of three to six feet a century, but because of the variable topography of the land, the flooding would not have been even. In areas as flat as modern-day East Anglia, a six-foot rise could have shifted the coast inland by miles; in hillier places, less. Down in low-lying Doggerland, the rising sea turned inland lakes into estuaries. Gaffney's digital reconstruction shows that one in particular, the Outer Silver Pit, contains massive sandbanks that could only have been created by fierce tidal currents. At some point the currents would have made it dangerous to cross in a log boat, and eventually, created a permanent barrier to once familiar hunting grounds.

How did Mesolithic hunters, so attuned to the rhythm of the seasons, adapt as their world began to dissolve around them? Jim Leary, an archaeologist with English Heritage, has mined the ethnographic literature for parallels with Inuit and other modern hunter-gatherers confronting climate change. For those who learned to exploit the rising sea, becoming skilled boatbuilders and fishermen, the new resource would have been a boon—for a while. But eventually there would come a tipping point, when the loss of territory offset those rich pickings. Older Mesolithic people, those “storehouses of knowledge,” as Leary calls them, would no longer have been able to read subtle seasonal variations in the landscape and help the group plan accordingly. Cut off from ancestral hunting, fishing, or burial grounds, the people would have felt a profound sense of placelessness, says Leary—“like Inuit whose way back is barred by melting ice floes.”

“There would have been huge population shifts,” says Clive Waddington of Derbyshire-based Archaeological Research Services Ltd. “People who were living out in what is now the North Sea would have been displaced very quickly.” Some headed for Britain. At Howick in Northumberland, on the cliffs that run along Britain's northeast coast and would therefore have been the first hills they saw, his team has found the remains of a dwelling that had been rebuilt three times in a span of 150 years. Among the earliest evidence of a settled lifestyle in Britain, the hut dates from around 7900 B.C. Waddington interprets its repeated habitation as a sign of increasing territoriality: the resident people defending their patch against waves of displaced Doggerlanders.

“We know how important the fishing grounds were for the subsistence of these people,” says Anders Fischer, an archaeologist at the Danish Agency for Culture in Copenhagen. “If each generation saw its best fishing grounds disappear, they would have to find new ones, and that would often be in competition with neighboring groups. In societies of low social complexity, where you have no authorities to handle conflicts, it would probably have ended with violence.”

Migration, territoriality, conflict: stressful ways of adapting to new circumstances, but adaptations nonetheless. There came a time, however, when the sea exhausted the Doggerlanders' capacity for survival. Some 8,200 years ago, after millennia of incrementally rising seas, a massive release of meltwater from a giant glacial lake in North America, called Lake Agassiz, caused sea levels to jump by more than two feet. By slowing the circulation of warm water in the North Atlantic, this influx of frigid water triggered a sudden plunge in temperature, causing Doggerland's coasts—if any remained—to be battered by frigid winds. If that were not enough, around the same time, a landslide on the seafloor off the coast of

Norway, called the Storegga slide, triggered a tsunami that flooded the coastlines of northern Europe.

Was the Storegga tsunami the coup de grâce, or had Doggerland already disappeared beneath the sea? Scientists can't yet be sure. But they do know that sea-level rise slowed down after that. Then, around 6,000 years ago, a new people from the south arrived on the thickly forested shores of the British Isles. They came in boats, with sheep, cattle, and cereals. Today the living descendants of these early Neolithic farmers, equipped with vastly more sophisticated technology than their Mesolithic counterparts, once again look to a future contending with a rising sea.

This is science writer Laura Spinney's first story for *National Geographic*. Robert Clark's photographs of Roman walls appeared in the September 2012 issue.



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