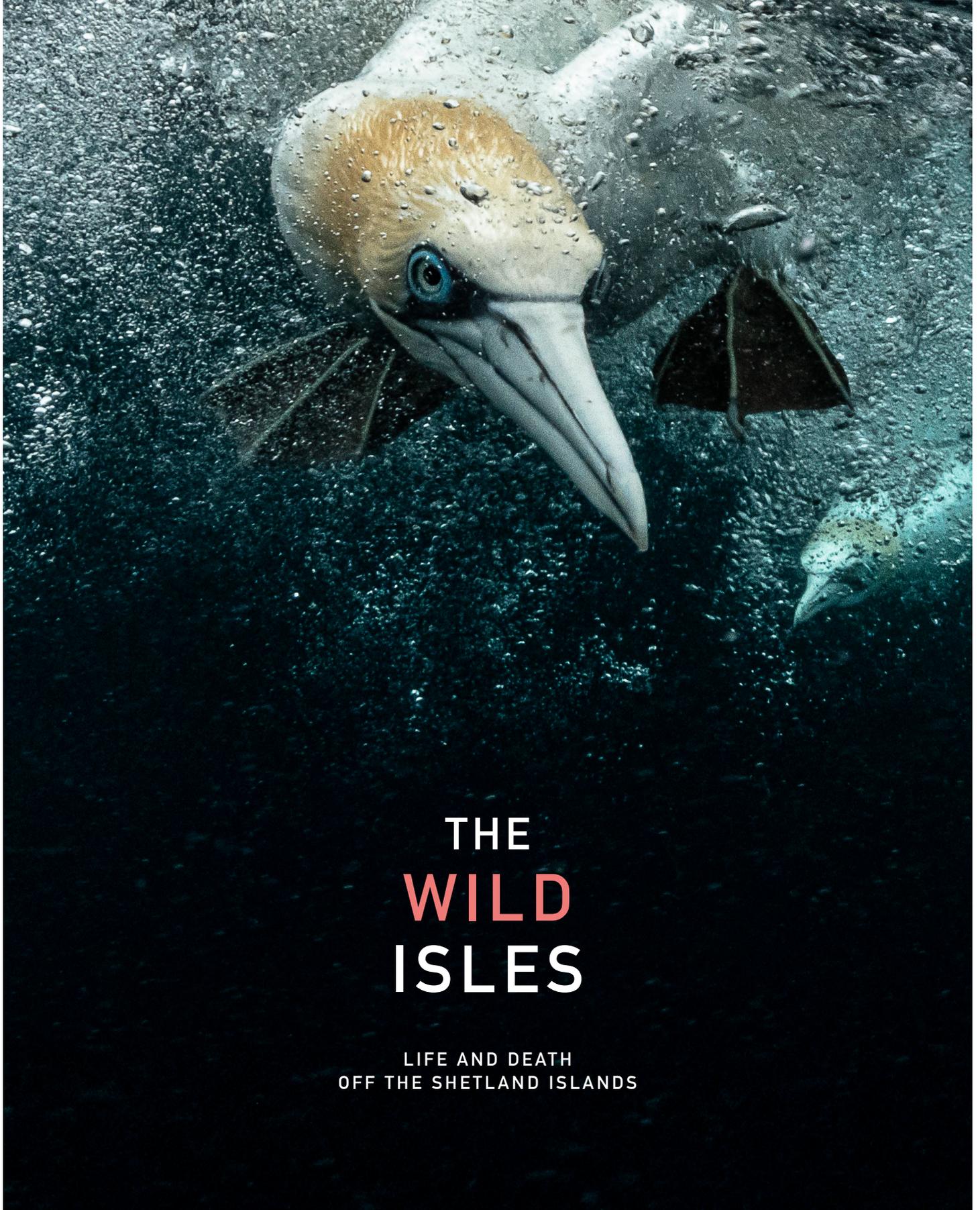


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THE WILD ISLES

LIFE AND DEATH
OFF THE SHETLAND ISLANDS





Against | THE | *wind*

A RESEARCH VOYAGE TO A REMOTE ARCTIC OUTPOST

One hundred years after explorers first summited the world's northernmost volcano, Mount Beerenberg, on a speck of land in the North Atlantic Ocean, a set of adventurers and scientists follow in their footsteps.

Words by Hugh Francis Anderson

Photographs by Hugh Pettit





- | LEFT: A fin whale surfaces at the mouth of Isfjorden, Svalbard. In total, the crew encountered 50 individuals.
- | ABOVE: Heide enjoying a rare moment of rest whilst awaiting a favourable weather window to land on Jan Mayen.
- | PREVIOUS PAGE: Anderson and Heide cross the now-drained South Lagoon of Jan Mayen.

“I write this now at the captain’s desk. It’s 5am. Andreas sleeps on the sofa in the saloon dressed in foul weather gear, ready to leap into action should Barba lose her anchor in the violent-storm-force 57-knot gusts. Red light warms the saloon as the boat tremors, as if shaken by the hand of Thor. The first light of day hints on the horizon. A vast half-moon illuminates the Arctic sky. Stars, the like I have never seen before, glimmer above our vessel as dark clouds spread either side. I peer out of the portside window and see the snow-capped summit of Mount Beerenberg glisten above the cliffs of Nordbukta. Clouds whirl atop the peak in the raging gale.”

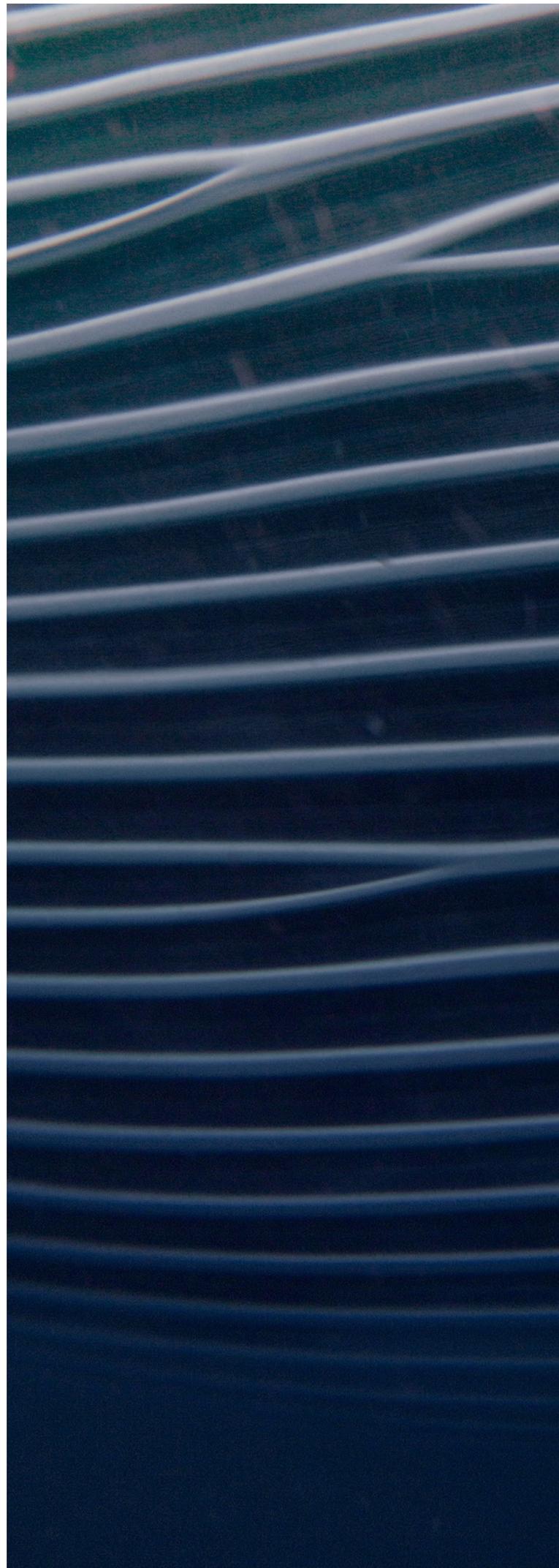
“Dark, foaming, white-capped waves soar across the bay. The light of dawn now delicately paints the vista of Jan Mayen and its domineering volcano Beerenberg. Later today, we sail south to Båtvika. In 24 hours, we will begin our ascent of Beerenberg. Nervous anticipation fills me. The time is nearing. The story about to unfold.”

**JAN MAYEN
EXPEDITION
JOURNAL
DAY 11
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In early 2020, in the Members' Room of the Royal Geographical Society, I came across the March 1922 issue of *The Geographical Journal*. I flicked through the worn pages with intrigue until I came to a report titled Jan Mayen Island by JM Wordie. I had recently returned from the Arctic with captain Andreas B Heide aboard the research yacht *Barba*, where he first told me about this remote outpost, an island he had sailed to in 2012. I read the report with fervour and discovered that the first British expedition to Jan Mayen took place in August 1921. Led by Sir James Mann Wordie, who achieved renown as the geologist and chief of scientific staff aboard *Endurance* during Ernest Shackleton's Imperial Trans-Arctic Expedition, 1914-1917, the expedition's goal was twofold: to undertake the first geological study of the island and claim the first ascent of the unconquered peak of Mount Beerenberg. I called Heide. With the centenary in just 18 months, an anniversary expedition was born.

Look on a map and you'll likely miss the remote island of Jan Mayen. With a landmass of just 377 km², it lies on the southern edge of the Arctic Ocean, between the Greenland and Norwegian Seas. A volcanic growth sprouted from the Mid-Atlantic Ridge (MAR) as recently as 500,000 years ago, it sits alone in more than two million km² of open ocean. A short isthmus separates the low-lying south from the dominating north, where the world's northernmost volcano, Mount Beerenberg, rises more than two kilometres out of the ocean. Beerenberg itself is comprised of 20 glaciers and topped by a one-kilometre crater-rim. Today, it is a Norwegian military outpost with meteorological and satellite navigation stations. The island's north is a protected nature reserve with significant restrictions in place to maintain its fragile ecosystems. It is thus seldom visited.

As an inhospitable, unrelenting place, Jan Mayen's history is nonetheless varied and deeply intertwined with the ocean and its inhabitants. At the dawn of European Arctic whaling in the early 17th century, the battle between the British and the Dutch for territorial hunting grounds raged. While some believe Henry Hudson discovered Jan Mayen in 1607, the first verifiable account was in 1614 by Englishman John Clarke. At the same time, three Dutch whaling ships arrived, one of them captained by Jan Jacobsz May, after whom the island is named. "The market for whale products was large in Europe and once the Dutch discovered Jan Mayen with the numbers of whales nearby, it was natural for Dutch whaling companies to occupy the bays there with their train oil (bowhead blubber) boilers," says Dr Susan Barr, former cultural heritage advisor for Jan Mayen 1979-2016. "The whaling started very successfully, but occurrences around the island diminished and the Dutch whaling there petered out around 1642." Indeed, whaling logbooks of the time indicate the presence of thousands



The ventral grooves of a feeding fin whale at the mouth of the Norwegian Sea.

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Heide and Falch prepare the towed hydrophone array as the Barba approaches the Mid-Atlantic Ridge.

“I felt the onset of autumn in the air, but the winds were gentle and the water calm as we sailed out of Isfjorden and into the Norwegian Sea.”

of bowhead whales. Due to the abundance of phyto- and zooplankton caused by nutrient-rich meltwater from the Greenland Ice Sheet, alongside upwelling, the number of bowhead whales in the Arctic is thought to have once numbered 46,000. “The bowheads are slow swimming whales that could be caught with rowing boats,” says Professor Louwrens Hacquebord, former Director of the Arctic Centre of the University of Groningen and of the Willem Barentsz Polar Institute. “After being killed, the animals floated in the water because of the thick blubber layer and the decomposition gasses and could be relatively easily transported to the ships or to land.” According to Hacquebord and the whalers’ logbooks, approximately 1,000 bowheads, alongside a number of northern bottlenose whales, sperm whales, fin (or sei) whales, narwhals and belugas were hunted around Jan Mayen. In just 22 years, the bowhead stocks were so depleted that Jan Mayen became unprofitable for the Dutch, and by 1850 bowheads in the Arctic had been hunted to near extinction. While the subpopulation around Greenland remains endangered, according to the IUCN, the global population has rebounded to an estimated 10,000 individuals.

Heide uses *Barba* as a research and storytelling platform, with a message of conservation that utilises whales as ambassadors of the ocean. In 2019, I joined him as part of his Arctic Whale expedition to study the effects of microplastics on Atlantic whale species in the coastal waters of Iceland, which I wrote about in Issue 08. This year, 2021, marked the next evolution of the platform with the Arctic Sense expedition, a collaborative four-month, 3,000 nautical-mile scientific and communications voyage to the polar Atlantic with a rotating team of scientists and storytellers. “Marine research has a great importance for the general life support function of the ocean, and for using the ocean in a sustainable way to feed an ever-growing population,” says Heide. “Marine research in the Arctic is of special importance as the ecosystem is undergoing rapid change with retreating ice as a result of global warming. The retreating ice also brings with it an increased opportunity for commercial exploitation of the region, making it even more important to document what we are at risk to lose.” In partnership with the research group Whale Wise, and with the support of the University of Stavanger and the University of Iceland, a comprehensive and innovative research plan was established to gather as much information on Arctic and sub-Arctic cetaceans as possible. “Our aim was to monitor Arctic ecosystems, focusing on whales, in an unobtrusive way. In other words, we wanted to provide an Arctic Sense,” says Whale Wise cofounder Tom Grove. “Due to its innate hostility, Arctic ecosystems remain poorly characterised. Across large parts of the Arctic Sense route, the occurrence, distribution, and diversity of cetaceans is virtually unknown.” Jan Mayen would form an integral part of the wider project.

And so, photographer and filmmaker Hugo Pettit and I met Heide in Longyearbyen after his successful circumnavigation of Svalbard. Our five-person crew was completed by sailors Jaap van Rijckevorsel and Annik Saxegaard Falch, and we set off on the 1,200 nautical mile journey from Svalbard, across the Greenland and Norwegian seas to Jan Mayen, and onwards to Shetland. I felt the onset of autumn in the air, but the winds were gentle and the water calm as we sailed out of Isfjorden and into the Norwegian Sea.

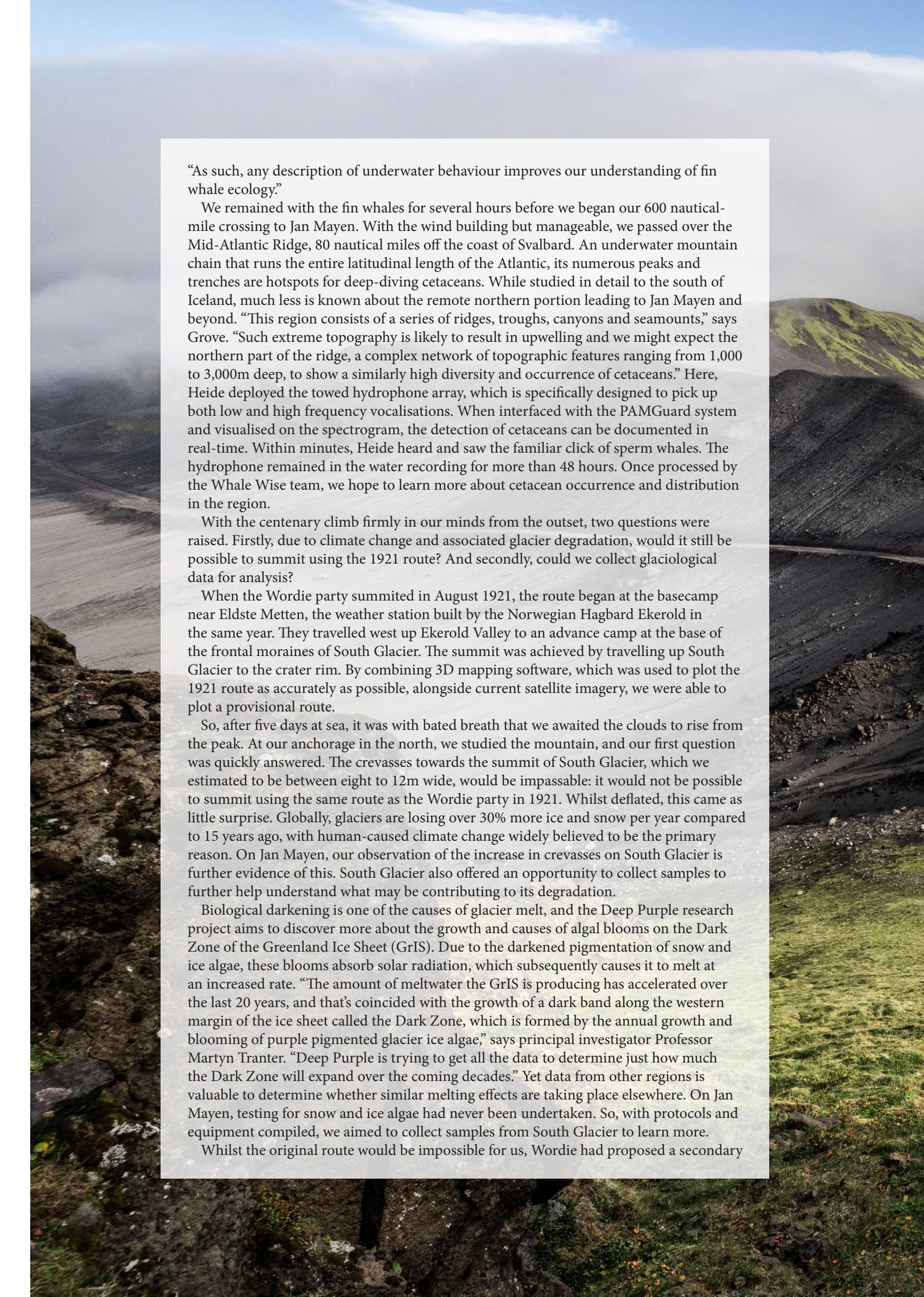
White-beaked dolphins soon appeared, and within just a few minutes began playing off the bow. A lone walrus approached the stern and spent five minutes investigating our small sailboat. And then Rijckevorsel spotted a large blow (whale breath) on the horizon. Estimated at up to five metres high, it was likely a fin whale. We changed course and sailed in its direction. More blows appeared. Groups of 10 to 20 fin whales surfaced beside us. The deep exhalation and inhalation resounded in the air like a symphony, and their movements at the surface were slow, betraying their great size. Heide and Pettit readied themselves and entered the water with the world’s second-largest whale. From the boat, I witnessed large pockets of bubbles rise to the surface around the bait ball on which the fin whales were feeding. “Fin whales are hard to observe underwater, as they are shy and fast moving, and I have not seen any underwater footage of feeding behaviour,” says Heide. “A combination of luck and experience gave us the opportunity to study one, and then two individuals, while they were feeding on a school of fish.” This encounter, recorded and later analysed by the Whale Wise team, offered invaluable data. “Whilst the use of bubbles during foraging has been documented for fin whales, few descriptions of feeding behaviours of this species exist in scientific literature, particularly those from underwater observations,” notes Alyssa Stoller, cofounder of Whale Wise.

A wide-angle photograph of a massive glacier flowing through a dark, rocky mountain range. The glacier is a mix of white and light blue, with visible crevasses and moraine material. It flows from the top of the frame towards a body of dark blue water in the foreground. The sky is overcast with grey clouds.

“With the centenary climb firmly in our minds from the outset, two questions were raised. Firstly, due to climate change and associated glacier degradation, would it still be possible to summit using the 1921 route? And secondly, could we collect glaciological data for analysis?”

*Barba passes the foot of
the Weyprecht glacier,
Jan Mayen.*





“As such, any description of underwater behaviour improves our understanding of fin whale ecology.”

We remained with the fin whales for several hours before we began our 600 nautical-mile crossing to Jan Mayen. With the wind building but manageable, we passed over the Mid-Atlantic Ridge, 80 nautical miles off the coast of Svalbard. An underwater mountain chain that runs the entire latitudinal length of the Atlantic, its numerous peaks and trenches are hotspots for deep-diving cetaceans. While studied in detail to the south of Iceland, much less is known about the remote northern portion leading to Jan Mayen and beyond. “This region consists of a series of ridges, troughs, canyons and seamounts,” says Grove. “Such extreme topography is likely to result in upwelling and we might expect the northern part of the ridge, a complex network of topographic features ranging from 1,000 to 3,000m deep, to show a similarly high diversity and occurrence of cetaceans.” Here, Heide deployed the towed hydrophone array, which is specifically designed to pick up both low and high frequency vocalisations. When interfaced with the PAMGuard system and visualised on the spectrogram, the detection of cetaceans can be documented in real-time. Within minutes, Heide heard and saw the familiar click of sperm whales. The hydrophone remained in the water recording for more than 48 hours. Once processed by the Whale Wise team, we hope to learn more about cetacean occurrence and distribution in the region.

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When the Wordie party summited in August 1921, the route began at the basecamp near Eldste Metten, the weather station built by the Norwegian Hagbard Ekerold in the same year. They travelled west up Ekerold Valley to an advance camp at the base of the frontal moraines of South Glacier. The summit was achieved by travelling up South Glacier to the crater rim. By combining 3D mapping software, which was used to plot the 1921 route as accurately as possible, alongside current satellite imagery, we were able to plot a provisional route.

So, after five days at sea, it was with bated breath that we awaited the clouds to rise from the peak. At our anchorage in the north, we studied the mountain, and our first question was quickly answered. The crevasses towards the summit of South Glacier, which we estimated to be between eight to 12m wide, would be impassable: it would not be possible to summit using the same route as the Wordie party in 1921. Whilst deflated, this came as little surprise. Globally, glaciers are losing over 30% more ice and snow per year compared to 15 years ago, with human-caused climate change widely believed to be the primary reason. On Jan Mayen, our observation of the increase in crevasses on South Glacier is further evidence of this. South Glacier also offered an opportunity to collect samples to further help understand what may be contributing to its degradation.

Biological darkening is one of the causes of glacier melt, and the Deep Purple research project aims to discover more about the growth and causes of algal blooms on the Dark Zone of the Greenland Ice Sheet (GrIS). Due to the darkened pigmentation of snow and ice algae, these blooms absorb solar radiation, which subsequently causes it to melt at an increased rate. “The amount of meltwater the GrIS is producing has accelerated over the last 20 years, and that’s coincided with the growth of a dark band along the western margin of the ice sheet called the Dark Zone, which is formed by the annual growth and blooming of purple pigmented glacier ice algae,” says principal investigator Professor Martyn Tranter. “Deep Purple is trying to get all the data to determine just how much the Dark Zone will expand over the coming decades.” Yet data from other regions is valuable to determine whether similar melting effects are taking place elsewhere. On Jan Mayen, testing for snow and ice algae had never been undertaken. So, with protocols and equipment compiled, we aimed to collect samples from South Glacier to learn more.

Whilst the original route would be impossible for us, Wordie had proposed a secondary



A view over Haugenstranda (left) and Kvalrossbutka (right). The volcanic island of Jan Mayen is just 500,000 years old.



- | TOP: Heide and Anderson stand on the summit of Mount Beerenberg, 100 years after its first ascent.
- | MIDDLE: Anderson and Heide begin the climb up South Glacier shortly after dawn.
- | BOTTOM: Anderson removes a fishing net. The volcanic beaches are littered with plastic debris.

route in 1921 which followed the southwest buttress to the crater rim, and one that we observed as being achievable. Due to its status as a nature reserve, our approach began from the south, across the isthmus, some 20km away from Eldste Metten. Even here, on this remote Arctic outpost, the onyx sand is littered with plastic and fishing debris. And such is the remoteness of the island that we came across the skeletal remains of a bowhead whale hunted more than 400 years ago. The ruins of Eldste Metten appeared between the volcanic outcrops, its structure a shell of the building erected exactly 100 years ago. We began our ascent during the encroaching night and by daybreak, we had reached the base of South Glacier and broken above the low-lying cloud. Our favourable weather window shifted rapidly and a blizzard with winds of more than 40 knots hammered us as we approached the final ascent to the crater. The conditions were so poor that we only knew we had reached the summit thanks to our GPS.

As the blizzard eased and the clouds lifted, the late afternoon light shone off South Glacier. Large, darkened patches of snow appeared. Some pink, some red, some green. They were what we thought to be patches of snow algae, which we collected on our descent. These have since been examined by Professor Alexandre Anesio, a principal investigator of the Deep Purple team. With samples put under the microscope, Anesio discovered a large amount of red snow algae, alongside green snow algae, cryoconite material, cyanobacteria and flagellates. But what surprised him most was the lack of ice algae. “Very interestingly, I could not see any ice algae in any of the samples,” he says. “But, because of the biomass of snow algae that you have in some of the samples, that is going to melt some of the snow, expose the bare ice, which will then be colonised by the ice algae, and which is then going to generate the further darkening of the ice. These samples are important because it just shows how widespread the colonisation of snow algae is across different glaciers worldwide.” Evidence of cryoconite material, which is commonly where carbon deposits are found, means that the samples will be sent to Potsdam University where Professor Liane G. Benning can analyse them under an electron microscope. This will determine whether black carbon (soot) is present on the glaciers of Jan Mayen. According to a report published by the Centre for Climate and Energy Solutions, black carbon could be second only to CO₂ as the major contributor to climate change.

In total, the gruelling approach and ascent took 37 hours, in which we travelled almost 70km. Such is the hostility of this Arctic outpost that just hours after returning to *Barba*, an incoming weather front forced us to set sail or risk being stranded at anchor for the coming week. But first we travelled towards the unexplored underwater canyon at the north of the island.

As the northernmost island on the MAR, the underwater topography around Jan Mayen indicates the likelihood of deep-diving cetaceans. “The bathymetry of the waters surrounding Jan Mayen is stunning in its variety,” says Stoller. “A vicious canyon, more than 3,500m deep in places, passes just a few kilometres from the island’s northern edge. To the west, a chain of seamounts stretches still unexplored towards Greenland. The south is dominated by a very shallow shelf, breaking suddenly into abyssal plain.” Upwelling here increases phytoplankton blooms and subsequently prey and cetaceans. Yet Jan Mayen is an area of little research. Some contemporary investigation into northern bottlenose whales, one of the deepest-diving beaked whales, has taken place in the waters surrounding the island, but due to its remoteness, little other data exists. And it is here that the acoustic monitoring and recordings will help determine the presence of deep-diving whales once analysed in the months to come.

With the weather changing rapidly, we began the long journey to Shetland. Seven days later, we sailed into Lerwick harbour, exhausted from the unrelenting seas and headwinds that pushed us so far off course we almost reached mainland Norway. Yet it offered a time for reflection and a discussion on the nature of contemporary exploration.

In a modern interpretation of a 100-year-old expedition, our journey collected data to help better understand the state of Arctic ecosystems, but it also highlighted our personal search for adventure, alongside the motivators that unites our expedition with the Wordie party 100 years ago. It is curiosity and the pursuit of knowledge that drives us to seek adventure. And while the context has certainly changed, these elements bond us across time.

Our own desire for adventure was the catalyst for this journey. The greater purpose behind it, in our case, was fuelled by citizen science and storytelling. The ability and desire to access incredibly remote locations, the opportunity to collect scientific data, share an unknown tale of polar exploration and communicate all to a global audience was the foundation of our voyage. In fuelling our desire for adventure, we can help share stories and research that can better inform scientists and the public about our rapidly changing world.