

Arctic shipwrecks face a new threat: Melting ice

Worsening storms could damage the wrecks of the HMS Erebus and HMS Terror, which were once protected by the ice that doomed them.



BY: **CHELSEA HARVEY** | 02/09/2024 06:03 AM EST



Parks Canada underwater archaeologist Marc-André Bernier carefully excavates a seamen's chest in the forecabin (crew living quarters) on the lower deck of HMS Erebus on Sept. 17, 2023. | Brett Seymour/Parks Canada

CLIMATEWIRE | Nearly two centuries ago, an ill-fated British expedition to the Canadian Arctic ended in tragedy.

The HMS Erebus and HMS Terror, which set sail from England in 1845 in search of the Northwest Passage, became trapped in heavy sea ice. The crew ultimately abandoned the ships — and all 129 perished.

Now, the same ice that doomed the vessels is thinning and melting as temperatures rise. And as the ice disappears, it exposes the fragile ships to stronger waves in stormy weather.

That means the region's ice cover could wreck the ships for the second time in history.

“We know that water movement has an effect on these sites,” said Jonathan Moore, manager of the underwater archaeology team at Parks Canada, the country's national parks service. “Is there going to be maybe a change in frequency and severity of those storm events? These are the kinds of things that we're interested in.”

Parks Canada is now investigating the effects of future climate change on the wrecks, with help from engineering and environmental services consulting firm Stantec. They're

particular, is in jeopardy from future climate impacts.

The findings will help Parks Canada decide how best to protect these historical sites and how to prioritize their archaeological work there — while they still can.

"Those forces of nature are going to be very difficult," Moore said. "You're not going to stop those forces."

Disappearance and discovery

The Erebus and the Terror set sail together from Britain under the leadership of Captain Sir John Franklin, a Royal Navy officer and a seasoned polar explorer.

The expedition aimed to uncover the famed Northwest Passage, a legendary Arctic sea route connecting the Atlantic and Pacific oceans. European explorers had dreamed for centuries of uncovering such a shortcut, which they knew would be a lucrative trade route between Europe and Asia.

By all accounts, the two ships were well built, well provisioned and equipped with special steam-powered heating systems to protect their crew from the harsh Arctic environment.

But neither vessel ever returned.

They were sighted briefly by whalers in Baffin Bay, which lies just east of the Canadian Arctic Archipelago, in July 1845. Then they vanished.

It wasn't until the 1950s that subsequent European expeditions and interviews with local Inuit communities began to reveal the expedition's fate. Their accounts suggested the two ships had become trapped in ice near King William Island in the Canadian Arctic Archipelago, where they drifted helplessly for at least a year. Franklin is believed to have died in 1847. Eventually, the ships were abandoned by the rest of the crew.

Inuit communities later reported finding groups of stragglers that had died of starvation. Some suggested there was evidence they'd resorted to cannibalism as they perished. Today, experts believe none of the expedition's crew members ultimately survived the ordeal.

The location of the shipwrecks was a more enduring mystery. It would take more than 150 years for experts to finally locate them.

Modern hunts began in earnest in the 1960s, according to Moore, and continued off and on for decades, informed by Inuit knowledge of the ships' last known locations. In 2008, the Canadian government kicked off a new search effort, including careful marine-based remote sensing surveys and both land-based and underwater archaeological techniques.

It would take years for the initiative to finally pay off.

In September 2014, the project's archaeologists — now deep into their search in the Arctic Archipelago — discovered a number of artifacts on one of the islands. The objects appeared to have originated on a naval ship.

"That discovery caused us to adjust our search activities closer to those finds," Moore said.

The next day, the team discovered the wreck of the Erebus resting under 30 feet of water in the Queen Maud Gulf in Canada's Nunavut territory.

Almost exactly two years later, in September 2016, they found the Terror.



Bernier holds a recovered medicinal vial in an artifact bag while excavating a seamen's chest on the lower deck of HMS Erebus on Sept. 14, 2023. | Brett Seymour/Parks Canada

Trouble brewing

Archaeologists have conducted dives nearly every year since the Erebus and Terror were discovered, bringing back a trove of priceless historical artifacts and new insights into the life and death of the expedition.

They also quickly realized that the wrecks may be in trouble.

In 2015, about a year after the Erebus was discovered, a severe storm rolled through the area. As soon as the winds and waves had subsided enough for a dive, Parks Canada archaeologists rushed to inspect the wreck.

“We noticed we could hear this pounding noise under the water,” Moore said.

They found that the storm's residual groundswell was causing the ship's upper deck to rock up and down in the water. It was a moment of sobering clarity for the divers, as they realized the wreck's vulnerability to the elements.

In 2018, they got another jolt.

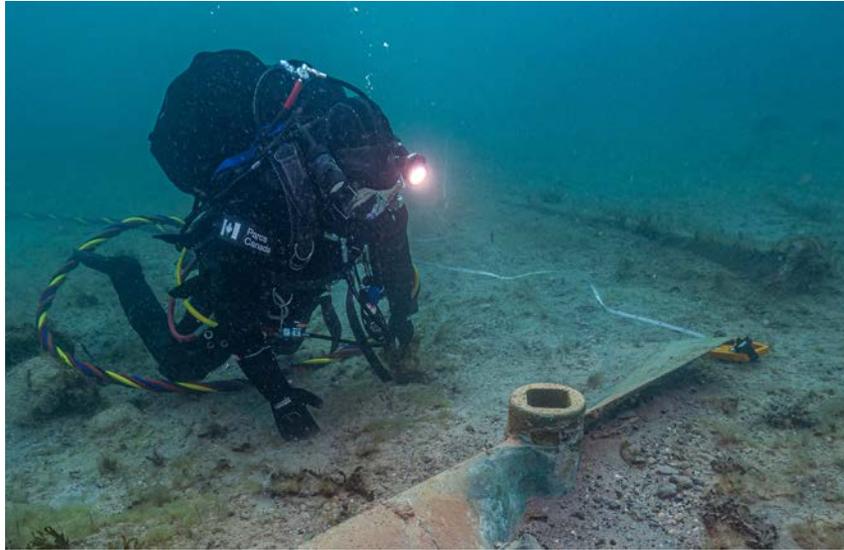
“When we returned to the wreck that year, we were quite surprised to find that a part of the upper deck had actually bodily separated from the supported deck beams and had flipped over and moved towards the stern,” Moore said. “And so that got us thinking, OK, we've got to start to understand what's going on.”

Meanwhile, experts at Stantec had become interested in the wrecks. Eventually, the company approached Parks Canada to offer its consulting services.

It was fortuitous timing, said Stantec archaeologist Darren Kipping.

“They were really interested in the potential for modeling forces that are impacting the wrecks,” he said.

The company worked up a proposal through Nunami Stantec, a majority Inuit-owned consulting company that is a partnership between the Sakku Investments Corp., Kitikmeot Corp. and Stantec. The idea: a model to explore how Arctic storms could impact the wrecks as the planet warms.



Parks Canada underwater archaeology technician Joe Boucher documents one of HMS Erebus' propellers discovered in 2015 within the debris field surrounding the hull Sept. 13, 2023. | Brett Seymour/Parks Canada

Preliminary findings

It's an ongoing project, but the team has already produced some preliminary findings.

First, they used the 2015 storm — which rocked the wreck of the Erebus — as a kind of modeling case study. By incorporating data on factors like wind speed, water level and wave action, the Stantec team was able to evaluate the difference between the impacts of passing storms on the Erebus versus the Terror.

The Terror, they found, lies in a slightly more protected area than the Erebus and is a bit more shielded from the battering impacts of winds and waves. But the Erebus rests in more open water and is more susceptible to the influence of passing storms.

Next, the team evaluated the potential effects of future climate change, including continued warming and sea level rise. Again, they found that conditions at the Erebus are likely to worsen more than conditions at the Terror.

There's still a lot more work to be done. Modelers hope to incorporate more detailed data on water level, wave conditions, sea ice, sediments and even the topography of the ocean floor in future model runs.

But the findings broadly suggest that the Erebus may need some special attention in the coming years.

What that might look like is still an open question.

It's sometimes possible to bolster shipwrecks and other underwater historical sites using human-made structures to protect them from waves, Kipping said.

But physical interventions can also be costly and time-consuming to construct, Moore said. And whether they would work for the Erebus will depend on the climate impacts it's most vulnerable to — which researchers hope more modeling and data will help answer.

Indigenous knowledge will also continue to be a valuable source of input on the project, Moore added, as climate change becomes a more pressing concern.

"People who live in the region and the area, they have been witnessing this change," Moore said. "They know the past, they know the environmental regime — and so that is an important element of this work as well."