Cloistered Arctic whales face a bigger climate threat than polar bears

December 29 2022, by Ethan Bilby

Credit: AI-generated image (disclaimer)

The tracking of cold-water creatures offers insights into the worrisome effects of global warming.

They swim in icy waters off the coast of Greenland, dive to depths of nearly two kilometers and are so secluded that, once upon a time, their

long, straight tusks could be pawned off by Vikings on gullible Europeans as unicorn horns.

Narwhals, like other animals that live year-round in the Arctic Ocean, belong to an exclusive club that faces increasing numbers of gate-crashers.

Unwelcome arrivals

As global warming causes Arctic waters to heat up and sea ice to melt, marine animals adapted to a cloistered life are threatened by the arrival of other aquatic mammals and by increases in human activity.

The three whale species that live in the Arctic year-round—narwhals, belugas and bowheads—are particularly at risk.

"Narwhals have already been identified as being the most sensitive in changes to habitat driven by global warming, compared with all Arctic species—even polar bears," said Professor Mads Peter Heide-Jørgensen of the Greenland Institute of Natural Resources in Copenhagen, Denmark.

Along with Dr. Philippine Chambault of the same institute, Prof Heide-Jørgensen oversees the WARMM project to understand how climate change is altering the behavior and physiology of such cetaceans.

The researchers have found that conditions have already passed a tipping point, defined as a threshold beyond which big, often irreversible, climate disruptions will occur.

"In Southeast Greenland, there has been a change in the whole ecosystem," said Prof Heide-Jørgensen. "Some of the Arctic species have disappeared and a lot of the more temperate Atlantic species have

moved in."

Less cold, more trouble

The lack of pack ice in the summer months, coupled with warmer water temperatures around a cold current off the eastern coast of Greenland, has led to an influx of dolphins along with humpback, fin and killer whales.

That means around 700,000 tons less fish annually to be fed on by narwhals and walruses, whose numbers have declined.

The water temperature itself is a further source of trouble.

Because narwhals, belugas and bowheads are cold-water specialists, they have very thick layers of blubber (for narwhals, it is up to 40 centimeters). None likes water warmer than 2 degrees Celsius, according to Prof Heide-Jørgensen.

"If these whales are exposed to a disturbance and have to flee away, then it's like running a marathon with a parka coat on," he said.

There may be a physiological limit to how warm the water can be for such species to survive.

Whale pills

The project's findings come straight from the whale's mouth, so to speak.

Through the use of tagging, accelerometers and swallowed pill sensors, the researchers are gathering data about dietary changes as well as sea

temperature and salinity.

During trips to Greenland, the team attaches tags to bowheads to record their hunt for zooplankton, enabling the project to chart where their cold-water habitats are.

"We have been able to use the bowheads as a kind of oceanographic research platform to show where the cold water is in the Arctic," Prof Heide-Jørgensen said. "Bowhead whales are much better at finding zooplankton than we are."

As for narwhals, they are briefly cornered and fed a transmitter pill that can track temperature changes in the stomach.

When the narwhals ingest prey including halibut, cod and squid, the sensor registers a fall in temperature from their normal 35-degree body heat.

"Each time the temperature drops, the pill will send a signal to a satellite transmitter mounted on the back of the animal that we then receive in the office in Copenhagen," said Prof Heide-Jørgensen.

The researchers also record echolocation sounds known as buzzing that narwhals use to find prey, learning at what depths and temperatures the feeding takes place. The whole tracking process goes on for about eight days.

Human menaces

Numbering around 100,000, the narwhal population in Southeast Greenland is already heavily endangered from hunting, which is driven by demand for their tusks, meat and skin. The conservation status of the narwhal is "near threatened."

But new data from the project show another human-related peril: increases in shipping because less sea ice has led to more resource exploration.

The researchers have found that narwhals can detect sounds from ships up to 40 kilometers away and that the animals become agitated and dive rapidly if they are fewer than five kilometers from a vessel.

"That is one kind of surprising thing," Prof Heide-Jørgensen said. "We knew that they were skittish, but not to that extent."

This extra stress could lead to them becoming locally extinct—vanishing from traditional habitats in Greenland for good.

"They've been there since the last Ice Age and they have this little specific habitat," Prof Heide-Jørgensen said. "Once they're gone, we can't expect them to come back."

While it may be too late to prevent additional animal competitors in the habitat of narwhals, he urges stricter rules to ensure that hunting is sustainable and shipping doesn't become dangerously disruptive.

Squid squeeze

Marine species lower in the food chain are under pressure as well.

Dr. Alexey Golikov is studying how Arctic warming is changing the life cycle of cephalopods—squids, octopuses and cuttlefish—that he says represent an ideal indicator.

"They grow fast and achieve abundance of biomass very quickly," said Dr. Golikov of the ArCeph project. "Their accelerated change in generations also means they react to climate change fast."

Dr. Golikov estimates there are some 7.2 trillion squid, and even more cephalopods as a whole, in the seas around Norway and Greenland.

They belong to eleven species and he has just discovered a twelfth that, to him, underscores the importance of determining how cephalopods in the Arctic are faring.

"The changes are so fast and, in vulnerable environments, species can go extinct before we can find them," said Dr. Golikov, who is based in Kiel, Germany.

To establish baseline levels, he's using bycatch from Norwegian and Russian trawlers in the Barents Sea. Larger cephalopods are tracked by cameras towed from the vessels.

Animal populations can even be pieced together by searching the sea for so-called environmental DNA and analyzing it in a genetic laboratory.

"They leave pieces of skin and slime that stay in the water," said Dr. Golikov. "And they contain genetic material that can be used to reveal the identity of cephalopods in the region."

Beak secrets

To track how their diets have changed, he is using another unique feature of cephalopods: a chitinous beak, rather than teeth, for biting prey.

When the cephalopod grows, the newest beak part formed reflects what's being eaten. Its past diet is revealed farther back in the beak through stored isotopes of carbon and nitrogen.

Dr. Golikov is using beak samples from modern squids as well as

19th-20th century specimens from the Zoological Museum in Copenhagen.

"Are they different or are they the same?" he said. "We will see if there is an impact from climate change on the life history of squid."

The approach will also enable cephalopods to be used as a proxy for Arctic health.

"With their flexibility and adaptability, cephalopods can help us quickly see what is going on," Dr. Golikov said. "They will help us see which areas of the Arctic should be more protected."

More information:

- WARMM
- ArCeph

Provided by Horizon: The EU Research & Innovation Magazine

Citation: Cloistered Arctic whales face a bigger climate threat than polar bears (2022, December 29) retrieved 26 April 2024 from https://phys.org/news/2022-12-cloistered-arctic-whales-bigger-climate.html