

The world's second-largest emperor penguin colony has nearly disappeared

By Bard Wilkinson, CNN

Updated 1814 GMT (0214 HKT) April 25, 2019



Emperor penguin adults and chicks on Snow Hill Island in Antarctica's Weddell Sea.

(CNN) The world's second-largest emperor penguin colony has almost disappeared, according to a new report, raising fears about the effects of climate change on the species.

Researchers from the British Antarctic Survey (BAS) say in the [report](#) that thousands of emperor penguin chicks drowned when sea ice in Antarctica's Weddell Sea, on the edge of the Brunt Ice Shelf, was destroyed by storms in 2016.

"Emperor penguins at the Halley Bay colony in the Weddell Sea have failed to raise chicks for the last three years," said Peter Fretwell, co-author of the report. "The colony has now all but disappeared."

Emperor penguins need stable sea ice on which to breed and this icy platform must last from April, when the birds arrive, until December, when their chicks fledge.

The storms recurred in 2017 and again in 2018 and led to the death of almost all the chicks at the site each season, according to the report, which was published on Thursday.

The BAS study reports that for the last 60 years, the sea ice conditions in the Halley Bay site had been stable and reliable. Until recently, the colony's breeding pairs numbered each year between 14,000 and 25,000, around 5-9% of the global emperor penguin population.

"It is impossible to say whether the changes in sea-ice conditions at Halley Bay are specifically related to climate change, but such a complete failure to breed successfully is unprecedented at this site," penguin expert and co-author Phil Trathan said in a [BAS statement](#).

"Even taking into account levels of ecological uncertainty, published models suggest that emperor penguins numbers are set to fall dramatically, losing 50-70% of their numbers before the end of this century as sea-ice conditions change as a result of climate change."

Good news?

The BAS team, which has tracked the population of this and other colonies in the region for the last decade, used high-resolution satellite imagery to estimate the group's numbers after the 2016 storm, which Fretwell said was associated with the worst El Niño event witnessed in the area.

"Why the sea ice regime has not gone back to the way it was before is more difficult to understand," he added. "It could be that the storm changed a delicate balance of sea ice in the region, or the shape of the ice shelf could have changed, or it could be that the local conditions could have flipped to a new normal."

But the scientists also discovered some good news. While the Halley Bay colony has almost disappeared, the nearby Dawson Lambton colony has increased more than tenfold, from around 2,000 to almost 15,000 breeding pairs, indicating that many of the adult emperors

have moved there, seeking better breeding grounds as environmental conditions have changed.

"It shows two things, firstly that when faced with long-term poor conditions emperors will move, rather than try to tough it out at the old location," said Fretwell. "This gives them some resilience in the face of future change, secondly, it shows how little we know about what drives sea ice dynamics, which is worrying for all species that require that habitat."



Antarctica's Brunt Ice Shelf pictured by NASA in January 2019.

Fretwell added that another concern was that scientists had thought that the area in which Halley is located would be immune to sea ice changes because it is colder. "We thought therefore this would be one place where emperors would be safe, but this is not the case," he said.

In addition, he said, the remnants of the colony may be doomed because the Brunt Ice Shelf is riven by a chasm, "a purely natural, cyclical process," that may transform the site to being on the edge of a vast iceberg, which may break up.

Combination of warming and damaging storms

Peter Convey, a BAS scientist who was not involved with the study, said this is the first time that such a drastic colony loss has been seen. "Over the longer term Antarctic sea ice extent is predicted to both decrease and show more variability, thus one can expect similar threats to colonies to exist across large parts of the species' range," he said.

He added that a combination of warming and more damaging storms is what is likely to be behind the changes in sea ice seen in this area. "The emperor is a unique penguin species in that virtually all known colonies nest on sea ice, so it is particularly vulnerable to this sort of change," he said.

Tom Hart, penguinologist at the University of Oxford, said: "This adds to concern about sea ice and populations of emperor penguins. However, sea ice is ephemeral. We know that sea ice features come and go and emperors are to some degree adapted to deal with this. The concern in Antarctica is the rate of change, which is beyond what they have experienced in the past."

Heather Lynch, associate professor of ecology and evolution from Stony Brook University in New York, said that the report showed that emperor penguins are vulnerable to extreme events but that they can relocate when needed, "which speaks to some of their resilience." She added that "one of the key take home messages here is the value of satellite imagery for understanding the movement of animals, without which we wouldn't have any chance of tracking an event like this."

Antarctica: Thousands of emperor penguin chicks wiped out

By Jonathan Amos
BBC Science Correspondent
25 April 2019
195 comments



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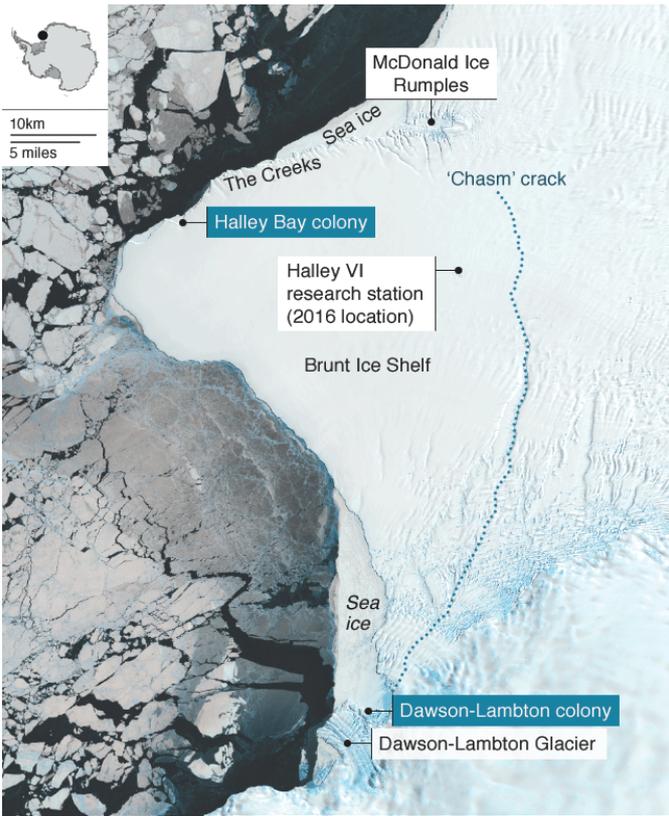
CHRISTOPHER WALTON

Image caption

Emperor penguins need a reliable and stable platform of sea-ice

Thousands of emperor penguin chicks drowned when the sea-ice on which they were being raised was destroyed in severe weather. The catastrophe occurred in 2016 in Antarctica's Weddell Sea. Scientists say the colony at the edge of the Brunt Ice Shelf has collapsed with adult birds showing no sign of trying to re-establish the population. And it would probably be pointless for them to try as a giant iceberg is about to disrupt the site. The dramatic loss of the young emperor birds is reported by a team from the British Antarctic Survey (BAS).

The Brunt Ice Shelf's emperor penguins



Source: Copernicus Data/Sentinel-2/Esa/P.Fretwell

BBC

Image caption

The developing chasm in the Brunt Ice Shelf may have doomed the colony anyway

Drs Peter Fretwell and Phil Trathan noticed the disappearance of the so-called Halley Bay colony in satellite pictures. It is possible even from 800km up to spot the animals' excrement, or guano, on the white ice and then to estimate the likely size of any gathering. But the Brunt population, which had sustained an average of 14,000 to 25,000 breeding pairs for several decades (5-9% of the global population), essentially disappeared overnight.



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image caption

2015: The guano stains at Halley colony are visible from space

Emperors are the tallest and heaviest of the penguin species and need reliable patches of sea-ice on which to breed, and this icy platform must persist from April, when the birds arrive, until December, when their chicks fledge.

If the sea-ice breaks up too early, the young birds will not have the right feathers to start swimming.

This appears to have been what happened in 2016.



Media caption

Curious emperor penguins take a selfie video in Antarctica

Strong winds hollowed out the sea-ice that had stuck hard to the side of the thicker Brunt shelf in its creeks, and never properly reformed. Not in 2017, nor in 2018.

Dr Fretwell said: "The sea-ice that's formed since 2016 hasn't been as strong. Storm events that occur in October and November will now blow it out early. So there's been some sort of regime change. Sea-ice that was previously stable and reliable is now just untenable."

The BAS team believes many adults have either avoided breeding in these later years or moved to new breeding sites across the Weddell Sea. A colony some 50km away, close to the Dawson-Lambton Glacier, has seen a big rise in its numbers.



Media caption

Peter Fretwell: "Storms can now hollow out the emperors' sea-ice in October and November"

Quite why the sea-ice platform on the edge of the Brunt shelf has failed to regenerate is unclear. There is no obvious climate signal to point to in this case; atmospheric and ocean observations in the vicinity of the Brunt reveal little in the way of change.

But the sensitivity of this colony to shifting sea-ice trends does illustrate, says the team, the impact that future warming in Antarctica could have on emperor penguins in particular.

Research suggests the species might lose anywhere between 50% and 70% of its global population by the end of this century, if sea-ice is reduced to the extent that computer models envisage.

This would have consequences beyond just the emperors themselves, commented Dr Michelle LaRue, an ecologist at the University of Canterbury, New Zealand.

"They're an important part of the food web; they're what we call a mesopredator. They're both prey for animals like leopard seals but they also prey themselves on fish and krill species. So, they do play an important role in the ecosystem," she told BBC News.

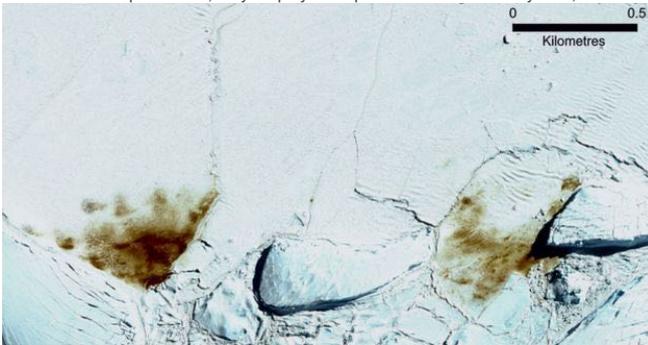


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Image caption

2018: The Dawson-Lambton colony has increased its numbers

Dr Trathan said: "What's interesting for me is not that colonies move or that we can have major breeding failures - we know that. It's that we are talking here about the deep embayment of the Weddell Sea, which is potentially one of the climate change refugia for those cold-adapted species like emperor penguins. "And so if we see major disturbances in these refugia - where we haven't previously seen changes in 60 years - that's an important signal."

Whether the Halley Bay colony specifically really had a future is a moot point.



Media caption

Scientists have called for special status to protect coral, penguins and other wildlife in Antarctica.

The Brunt Ice Shelf is being split apart by a developing crack.

This chasm will eventually calve an iceberg the size of Greater London into the Weddell Sea, and any sea-ice stuck to the berg's edge may break up in the process.

The colony could have been doomed regardless of what happened in 2016.

Drs Peter Fretwell and Phil Trathan report their investigation in the journal **Antarctic Science**.



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Image caption

Emperors are the tallest and heaviest of the penguin species