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## Emperor penguins face extinction



Gentoo penguins (file photo)

Less ice could spell bad news for a great many species

Emperor penguins, whose long treks across Antarctic ice to mate have been immortalised by Hollywood, are heading towards extinction, scientists say.

Based on predictions of sea ice extent from climate change models, the penguins are likely to see their numbers plummet by 95% by 2100.

That corresponds to a decline to just 600 breeding pairs in the world.

The research is published in the journal Proceedings of the National Academy of Sciences.

Emperor penguins, the largest species, are unique in that they are the only penguins that breed during the harsh Antarctic winters.

Colonies gather far inland after long treks across sea ice, where the females lay just one egg that is tended by the male. That means that the ice plays a major role in their overall breeding success.

What is more, the extent of sea ice cover influences the abundance of krill and the fish species that eat them - both food sources for the penguins.

Hal Caswell of the Woods Hole Oceanographic Institute and his colleagues used projections of sea ice coverage from the Intergovernmental Panel on Climate

Change's (IPCC) last report.

In addition, they used a "population dynamics" model describing the mating patterns and breeding success of emperor penguins.

The model has been honed using 43 years' worth of observations of an emperor colony in Antarctica's Terre Adelie.

Slow learners

While there are a number of models and scenarios in the IPCC report, the team used only 10 of them - those that fit with existing satellite data on sea ice.

They then ran 1,000 simulations of penguin population growth or decline under each of those 10 climate scenarios.

They are to Antarctica what the polar bear is to the Arctic  
Joel Cohen, Rockefeller University

The results suggest that by the year 2100, emperor penguins in the region are likely to experience a reduction in their numbers by 95% or more.

The likelihood of this occurring, according to the researchers, is at least a one-in-three chance and possibly more than eight out of 10.

Though the penguins could avert disaster by shifting their breeding patterns with the climate, the study's lead author Stephanie Jenouvrier said that was unlikely.

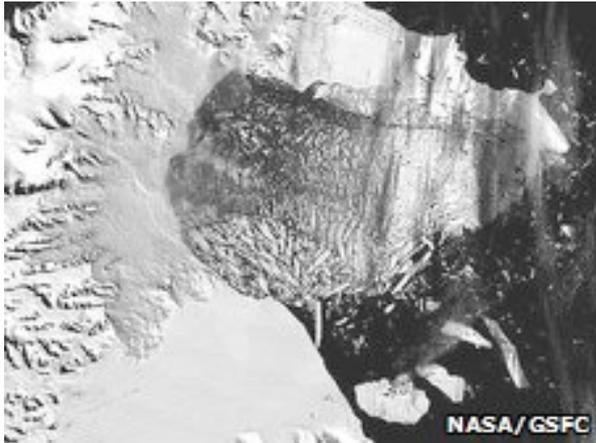
"Unlike some other Antarctic bird species that have altered their life cycles, penguins don't catch on so quickly," she said.

"They are long-lived organisms, so they adapt slowly. This is a problem because the climate is changing very fast."

'Conservative approach'

Several prior studies have shown that climate change can affect the reproduction and geographic distribution of species, but this is the first that makes predictions about the ultimate fate of a species as a whole.

"I don't see any reason not to take these predictions very seriously," said Dan Reuman, a population biologist at Imperial College London.



Larsen ice sheet (Nasa)

Particularly warm seasons cause Antarctic ice to break up early

"The study is based on a wide range of climate forecasts, it takes a conservative approach, it's based on a large amount of data on penguin demography, and the model accurately forecasts the data that already exist."

Dr Reuman suggests that more of this kind of work should be done to understand the species-by-species effects of climate change, and thereby the influence on whole communities.

It is an idea echoed by Joel Cohen, head of the Laboratory of Populations at Rockefeller University.

"The emperor penguin is an important species in its own right, but the whole communities in which it's embedded are also of importance," he told BBC News.

The penguins also serve as a species that particularly draws attention to the crisis in their region, he added.

"They are to Antarctica what the polar bear is to the Arctic.

"This study takes our knowledge, puts it together, gives us some insights, arouses concern and suggests that we ought to be understanding this situation a lot better."