

Climate Change Winners: Receding Ice Fields Facilitate Colony Expansion and Altered Dynamics in an Adélie Penguin Metapopulation.

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It is predicted there will be “winners and losers” in the context of global climate change. Species at the poles, adapted to cold environments, are among the first to have to contend with the effects of warming, but it is hard to imagine they will ultimately benefit, given the projected rarity of their habitat.

Recent rapid loss of sea ice habitat in the Antarctic Peninsula region has led to disappearing Adélie colonies. In sharp contrast, in the Ross Sea region, where sea ice remains extensive, Adélie populations are stable or increasing.

But warming summer temperatures are occurring in the Ross Sea region also, and some glaciers have been retreating noticeably. This could be good for Adélie penguins for some time, because they rely on ice-free terrain for nesting and might be able to use the newly available habitat.

The Adélie colony on Beaufort Island is of particular interest in

this context because it is the only colony we’ve studied that appeared to have no room to add more penguin nests due to a glacier covering much of the island.

To evaluate how penguins use newly available nesting habitat, we used aerial and satellite imagery from 1958-2010 to calculate the trend in population size and geographic area of the available nesting habitat. We assessed temperature data collected at nearby McMurdo Station over the same period. We also measured the rate of immigration to Beaufort Island of chicks hatched and banded at nearby colonies.

The available nesting habitat on Beaufort Island increased 71% during the study, while the population increased 84%, reflecting penguin expansion into the newly available habitat. Most of the increase in habitat occurred from 1983-2010, when the glacier retreated 543m. Average Oct-Dec temperatures increased by

3.22°C from 1958-2010, with most of the change happening from 1998-2010. Emigration rates of penguins from nearby colonies also increased substantially during this period.

Main Points

A receding glacier on Beaufort Island has recently freed up new nesting habitat for Adélie penguins.

Using aerial photographs beginning in 1958 and satellite imagery in more recent years, we showed that the population size on Beaufort has varied in accord with the amount of available nesting habitat.

Summer temperatures in the region have increased at 0.5°C per decade since the mid-1980s, making it likely that more ice free coastal habitats will become available for further population expansion.

LaRue, M.A., D.G. Ainley, M. Swanson, K.M. Dugger, P. O’B. Lyver, K. Barton, G. Ballard. 2013. [Climate change winners: receding ice fields facilitate colony expansion and altered dynamics in an Adélie penguin metapopulation](#). PLoS ONE 8(4): e60568. doi:10.1371/journal.pone.0060568.