

Extreme Events Disrupt Adélie Penguins' Ability to Cope With a Variable Environment

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Flexibility in an animal's physiological and behavioral capabilities is critical for its survival, particularly in the context of climate change, which is bringing novel environmental conditions and episodic extreme alterations to habitats around the world.

As sea ice obligates, Adélie penguins have evolved to utilize the sea ice ecosystem for critical components of their life cycle, but this habitat is undergoing rapid change. We are interested in better understanding how well Adélies can cope with the range of sea ice conditions they are experiencing and are likely to experience in the future.

Using 13 years of data we collected at Cape Crozier, Ross Island, Point Blue teamed up with scientists from the French national research institute (CNRS) and H.T. Harvey & Associates

(California) to explore how Adélie penguin foraging efficiency relates to variable amounts of sea ice. We also considered the effects of extreme events, imposed in this case by the presence of enormous icebergs during part of the study. These icebergs completely altered the penguins' physical environment, in ways comparable to catastrophic wildfires and "super-storms" in other ecosystems.

We found that the penguins were able to maximize their foraging efficiency under a wide range of sea ice conditions, but that this flexibility was significantly limited when the icebergs were present. Even in the most challenging conditions, however, the penguins still managed to survive and many still raised their chicks.

In the absence of any additional anthropogenic disturbance (e.g., industrial

fishing, ocean acidification), the Ross Sea will remain a suitable habitat for a large proportion of the Adélie penguin world population for several decades, after which sea ice is projected to disappear in most of the Southern Ocean.

Main Points

Adélie penguins are flexible enough to cope with a wide range of sea ice conditions.

Extreme events limit the flexibility of the penguins' response to variable sea ice conditions.

Adélie penguin populations in the Ross Sea are likely to be healthy for the foreseeable future, unlike elsewhere in the Southern Ocean.

Lescroël, A., G. Ballard, D. Grémillet, M. Authier, D. G. Ainley. 2014. Antarctic climate change: extreme events disrupt plastic response in Adélie penguins. [PLoS ONE 9\(1\): e85291](https://doi.org/10.1371/journal.pone.0185291).

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