

Differential climate impacts to seals in Antarctica help clarify conservation choices.

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As we scramble to develop management alternatives resilient to the fast-evolving environments brought on by climate change, we face many complexities that highlight the need for additions to existing conservation tools to achieve long-term conservation targets. We illustrate this challenge with two ice-dependent predators in one of the most remote oceans in the planet – the Weddell Sea, an area expected to experience some of the strongest impacts.

We used a novel approach to collect data on habitat preferences of Weddell and crabeater seals. We engaged with thousands of citizen scientists to identify seals on high-resolution satellite images of the Weddell Sea. We used biological and geophysical variables to model the seals' distribution using three different machine-learning algorithms. All three models correctly depicted the known distributions of the species (results published [here](#)). To understand how climate change will impact the species, we assigned each variable an

“impact score” based on its known response to climate change. We used the impact score and importance of each variable in each model to create a “change importance product” for both seal species. Results show that in the Weddell Sea crabeater seals are more sensitive to climate change impacts than Weddell seals.

Crabeater seals breed on drifting, unstable and short-lived ice, called “pack-ice”, and feed almost exclusively on krill. As the oceans warm up and the habitats where they live are displaced, the unstable ice floes and specialized diet makes them more vulnerable to environmental changes. In contrast, the Weddell seals breed on the more stable “fast ice” (ice sheets attached to shores) and have a more diverse diet, making them more resilient to changes.

Our results suggest that the current set of Antarctic MPAs may not be sufficient to help Crabeater seals (and by proxy many other species) in the warmer future if they are

unable to encompass their future habitats. Our results support implementation of the proposed additional MPAs around the continent.

Main Points

Two ice-dependent seal species in the Weddell Sea are expected to experience different impacts as the planet warms up. The long-term conservation of the Antarctic food webs requires additional Antarctic MPAs to account for expected habitat displacements in the future.

Wege, M., LaRue, M., and Salas, L. 2021. [Ice matters: life-history strategies of two Antarctic seals dictate climate change eventualities in the Weddell Sea](#). *Global Change Biology*. Published September 7, 2021.