

Fit parents and fat chicks? Linking foraging and breeding success in Adélie penguins

Given its ability to generate large datasets that are often plagued by issues such as auto-correlation and high observation error, movement ecology has provided a generous setting for applied statistics. This has created a huge suite of models in the field that can be applied to address investigations ranging from path reconstruction to the identification and description of different foraging behaviours. However, our understanding of what impact any differences in movement characteristics has upon individuals or groups is often based on correlation or is inferred based on previous research. What is largely lacking are movement models that mechanistically link animal movement to demographic outcomes such as breeding success and survival. We have been given a unique opportunity to design and implement such models using the Adélie penguin (*Pygoscelis adeliae*) as a model species. Adélies are one of the most widely spread and abundant penguin species in the world, with a circumpolar distribution. While clumsy on land, they are agile marine predators, with their diet primarily consisting of small fish and krill. Because of this strong reliance on the lower trophic levels and a well-documented relationship between the condition of the Antarctic pack-ice and their population viability, Adélie penguins are also considered an indicator species for the health of the Antarctic marine environment. Across two breeding seasons the at-sea locations (using GPS), foraging success, breeding success, and chick survival of 43 breeding Adélies from Cape Bird, in the Ross Sea, was collected. This presentation will discuss current work describing the at-sea foraging behaviour through established movement modelling, the modelling of survival and body-condition of chicks through the breeding season, and our attempt to unify these two models mechanistically through adult foraging success (or food load). This research is not only meaningful for the management of an important indicator species, but also may assist in the development of movement models that allow more robust inferences into what impact variations in movement behaviour has upon individuals and wider populations.