Agreement on the Conservation of Albatrosses and Petrels

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Environmental drivers of movement in a threatened seabird: insights from a mechanistic model and implications for conservation

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SUMMARY

Aim: Determining the drivers of movement of different life-history stages is crucial for understanding age-related changes in survival rates and, for marine top predators, the link between fisheries overlap and incidental mortality (bycatch), which is driving population declines in many taxa. Here, we combine individual tracking data and a movement model to investigate the environmental drivers and conservation implications of divergent movement patterns in juveniles (fledglings) and adults of a threatened seabird, the white-chinned petrel (*Procellaria aequinoctialis*).

Location: South-west Atlantic Ocean.

Methods: We compare the spatial distributions and movement characteristics of juvenile, breeding and non-breeding adult petrels, and apply a mechanistic movement model to investigate the extent to which chlorophyll a concentrations (a proxy for food resources) and ocean surface winds drive their divergent distribution patterns. We also consider the conservation implications by determining the relative overlap of each life-history stage with fishing intensity and reported fishing effort (proxies for bycatch risk).

Results: Naïve individuals fledged with similar flight capabilities (based on distances travelled, flight speeds and track sinuosity) to adults but differed in their trajectories. Comparison of simulations from the mechanistic model with real tracks showed that juvenile movements are best predicted by prevailing wind patterns, whereas adults are attracted to food resources on the Patagonian Shelf. The juveniles initially dispersed to less productive oceanic waters than those used by adults, and overlapped less with fishing

activity; however, as they moved westwards towards South America, bycatch risk increased substantially.

Main conclusions: The use of a mechanistic framework provided insights into the ontogeny of movement strategies within the context of learned versus innate behaviour and demonstrated that divergent movement patterns of adults and juveniles can have important implications for the conservation of threatened seabirds.