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## ELUCIDATING THE DEMOGRAPHIC MECHANISMS DETERMINING ANTARCTIC VERTEBRATE ABUNDANCE PATTERNS IN RESPONSE TO CLIMATE SHIFT

C. R. McMahon[1], M. N. Bester[1], B. W. Brook[2], C. J. A. Bradshaw[2]

*[1]Mammal Research Institute, Department of Zoology & Entomology,University of Pretoria, Pretoria, South Africa, [2]School for Environmental Research, Charles Darwin University, Darwin, Northern Territory 0909, Australia*

It is now widely accepted that the Earth's climate is changing rapidly and there is mounting evidence that these changes are affecting species abundance, distributions and phenology. Indeed, much of the evidence for climate shift has been collated from well-studied Antarctic ecosystems. There is strong support from the Antarctic region using time series of abundance that points to a recent (1970s) regime shift. While these abundance time series are invaluable descriptors of a species' response to climate change, such responses do not describe the mechanisms determining or driving population numbers. To reveal these mechanisms it is necessary to quantify how the demographic and behavioural components measured from Antarctic populations change relative to food supply. Here we provide a comprehensive review of demographic and behavioural time series such as weaning mass, fecundity, foraging distances and times, female arrival masses, survival rates, parturition dates and age at first breeding for a large database of high-trophic-level Antarctic marine predators such a pinnipeds, seabirds and penguins. Our goal is to examine the evidence for deterministic, climate-driven shifts identified via abundance time series data and describe the proximate mechanisms driving population change. However, demographic and behaviour indices of population performance are confounded by endogenous processes, so these must be removed before inferences of exogenous control can be made. Therefore, we examine the relationship between the various parameters and population abundance (density) when contemporaneously available. We then compare the residual variation to indices of climate change expressed through changes in sea ice conditions, sea surface temperature anomalies and precipitation patterns. Our main objective is to determine whether these endogenously detrended residuals fluctuate in response to environmental variation deterministically, chaotically or categorically (i.e., the latter are indicative of 'regime-shift' type fluctuations).