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## CHANGE IN BIRD POPULATIONS IN THE AUSTRALIAN ARID ZONE OVER 25 YEARS

*Brett Melbourne<sup>1,2</sup>, Kendi Davies<sup>1,2</sup>, Craig James<sup>1\*</sup>, Ross Cunningham<sup>3</sup>, Graham Griffin<sup>1</sup>*

<sup>1</sup> CSIRO Sustainable Ecosystems, Alice Springs

<sup>2</sup> Current address: University of California, Davis, USA

<sup>3</sup> Australian National University, Canberra

Studies at paddock scale have revealed that some bird species may be negatively affected by even moderate levels of grazing, raising concern for their likelihood of persistence at regional scales if the trend continues to add water points so that comprehensive even grazing of the landscape is possible. We used data collected by volunteer observers in two periods (1977-1981 and 1996-2001) for the Australian Bird Atlas, comprising 9200 bird surveys after extracting matching surveys conducted in each time period at the same location, to compare changes in populations at the continental and bioregional scale with known responses at a paddock scale. We determined whether populations of 118 bird species increased or decreased over 25 years in response to intensity of land use (pastoralism) and natural environmental variation. We estimated the density of artificial water points (a surrogate for the intensity of grazing by cattle and sheep), change in rainfall, and change in vegetation condition (from time series of NDVI) for grid squares of one degree latitude and longitude. We modeled the change in the probability of sighting a species within one degree squares between the two time periods, in response to these variables. We used a general linear mixed model accounting for components of variance within and between grid squares, spatial autocorrelation of grid squares, and dependence of variance on survey effort, and adjusting for systematic differences in survey effort between times and locations. We detected a range of responses to landscape characteristics at several spatial scales, including that one third of the species examined changed in population (both increased or decreased) in relation to intensity of land use. The results suggest large scale responses do mirror the paddock scale results and that projects such as the Australian Bird Atlas can be used to create a meta-database for analysing large scale changes in biodiversity.