



Can passive acoustics identify the driving factors behind changes in marine mammal abundance and distribution?

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ABSTRACT

Quantitatively surveying the vast majority of marine mammal populations is problematic using traditional visual methods alone. However, many species frequently produce loud, characteristic, stereotyped, long-range calls. This unique acoustic signature, coupled with the efficient propagation of sound through the ocean, has resulted in acoustic techniques being used to estimate distribution, and more recently abundance, of marine mammal species. Passive-acoustic methods also offer enormous potential for improving estimates of site-occupancy change for marine mammal populations. The goal of this study is to evaluate whether passive-acoustic techniques can help identify driving factors behind changes in patterns of abundance and distribution. We use the leopard seal, *Hydrurga leptonyx*, an Antarctic pack-ice seal, to test this hypothesis. Their acoustic behaviour is highly stereotyped and the variability around the age-related, temporal and behavioural influences on their calling patterns have been well documented. This study uses a long-term passive acoustic dataset collected from the same location within the Bransfield Strait, Western Antarctic Peninsula between 2005 and 2010. The seasonal pattern in calling behaviour varied enormously during the 4-year recording period, potentially allowing us to identify which influences, behavioural and/or environmental, were driving these differences. By combining acoustic analysis, remote sensing, and GIS modelling, we examine whether physical-environmental data (sea ice and meteorological conditions etc.) and/or behavioural data (specifically age-cohort differences) are linked with the different patterns observed.