Quantifying the impact of human activity on seabird behaviour: a statistical perspective

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Abstract: Seabirds are a familiar but elusive part of our natural environment, and a vital part of the marine ecosystem. We need to be able to understand the key aspects of their behaviour - such as breeding and foraging - in order to assess the impacts of offshore wind farms, fishing, and other human activities upon their populations.

In this talk we will illustrate an approach by which empirical data from GPS tags and mechanistic stochastic models can together be used to evaluate the impact of human activities upon seabird foraging - and thereby upon breeding success and survival.

A key step in such assessments is the estimation of the spatial distribution of foraging birds, and we will begin by outlining some of the ways in which statistical models - including hidden Markov models and generalized linear mixed models – can be used to address this problem.

A stochastic mechanistic model of seabird behaviour has then been used to explore the consequences of modifications to the environment (such as the construction of a wind farm) upon the energy budgets and daily time expenditure of adult seabirds during chick rearing: and thereby upon adult and chick survival. We will discuss the ways in which this model can be used to evaluate the impacts of potential developments in a way that properly accounts for uncertainty, and will demonstrate some of the results that are obtained by applying this approach to real data.