Available projects with Ben Stevenson

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Please e-mail me at ben.stevenson@auckland.ac.nz if you are interested in any of the projects listed below.

A comparison of spatial capture-recapture and random encounter models for camera trap data

Camera-trap surveys are commonly used to estimate density of wildlife populations. Over the last decade, spatial capture-recapture (SCR) and random encounter models (REMs) have gained traction in their application to the resulting data. They each require slightly different information—for example, SCR usually needs individuals to be recognised when they are detected, while REMs usually require a priori knowledge of average animal speeds. The two methods also make different assumptions about the way animals move and behave. In this project, we will assess the performance of SCR and REM estimators in terms of properties such as bias, precision, and robustness to assumption violations.

Requirements: An interest in programming, with good grades in statistical computing papers.

Modelling reef manta ray movement in Raja Ampat, Indonesia

The reef manta ray is listed as a vulnerable species in the IUCN red list, but is economically important and drives tourism in the Raja Ampat region of Indonesia. Raja Ampat is the global epicentre of tropical marine biodiversity and harbours one of the largest manta ray populations in the world. Understanding the movement patterns of this species is important to assist effective manta tourism management and conservation of the species.

In this project we will develop statistical methods to understand reef manta ray movement in the Raja Ampat region. Acoustic tags were deployed on individual animals, which transmit pings that are detected by receivers.

An individuals location is only observed when it is detected. We will explore the use of hidden Markov models, and possibly other state-space models, to reconstruct unobserved trajectories between detection events.

Requirements: A solid understanding of statistical theory (a good grade in at least STATS 210, preferably STATS 310, or equivalent) and good programming skills.

Cosupervised by Edy Setyawan.
A Shiny interface for ascr

The R package ascr includes functions to estimate animal density from acoustic surveys that detect individuals' vocalisations. This project involves extending an existing Shiny interface for the package.

Requirements: Good programming skills. Experience with the Shiny R package is a bonus.

Cosupervised by Charlotte Jones-Todd

The fused lasso for spatial point patterns

The LASSO uses shrinkage to perform variable selection for linear regression problems. This project will investigate using the fused LASSO, an extension of the standard LASSO, to model spatial point patterns. One possible application is to species distribution models in population ecology, perhaps allowing classification of a landscape into suitable and non-suitable habitat.