Modelling non-negative continuous data with discrete mass at zero with an application to garden bird survey data

B. Swallow[a]

[a] Centre for Research into Ecological and Environmental Modelling
School of Mathematics and Statistics
University of St Andrews
St Andrews, UK
bts3@st-andrews.ac.uk

Abstract: Models for analysing continuous data with a spike at zero have often received less attention than zero inflated count models. This type of data, however, is commonplace in the life sciences, particularly ecology. In this talk we outline mixed effects Tweedie models (Jørgensen (1987, 1997)) fitted in a Bayesian MCMC framework, which are flexible enough to account for the discrete mass at zero as well as allowing for over- and under-dispersion and apply them to long-term longitudinal data from winter garden bird surveys in the UK. In particular, we look at how an increase in numbers of an avian predator, the Eurasian sparrowhawk, *Accipiter Nisus*, has impacted on the numbers of multiple potential prey species visiting garden feeding stations across the winter, whilst controlling for additional environmental factors.
We will consider two approaches to the modelling process. The first approach models changes in prey numbers as a function of environmental covariates; the second models changes in prey numbers as a function of *change* in environmental covariates. Results will be presented as well as a comparison of the two methods.

References

Jørgensen, B. (1987) Exponential dispersion models (with discussion). *J. R. Stat. Soc. Ser. B Stat. Methodol*, 49:127-162

Jørgensen, B. (1997) *The Theory of Dispersion Models*, Chapman & Hall, London