# Hierarchical Generalized Additive Models in ecology

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**Abstract**

Generalized Additive Models have become one of the workhorses for estimating nonlinear functional relationships in ecological statistics. Large-scale studies in ecology and evolution often involve fitting functional relationships for multiple different species or regions simultaneously, but common approaches for modelling these relationships generally treat each relationship as a separate function to estimate, ignoring shared information between species. In this talk, I will discuss how the standard Generalized Additive Model can be simply extended to model hierarchically structured sets of functional relationships. This method, called an HGAM, is capable of modelling sets of functional relationships that are related by sharing a common trend, common smoothness of individual trends, or both. I will discuss some of the modelling and computational issues with this approach and its application in modelling rapid ecological change in spatially structured marine fish communities. I will also discuss ongoing work in extending this approach to incorporate information on species taxonomic relatedness or trait similarity when estimating common trends, using Markov Random Fields.