

# Estimating species richness, predicting unseen species and comparing species similarity using various models

by

*Austina S S Clark*

*University of Otago*

*Dunedin*

*New Zealand*

`aclark@maths.otago.ac.nz`

## Abstract

A large data set of plant species has been collected in New Zealand from 1990 to 1993 on 10 different sites, where sampling was carried out using quadrates.

The 10 sites were categorized into three different area types according to their vegetation growth. Each site was also divided into three subsites according to the animals present/absent. Naturally, biologists are very interested in finding out species richness of each area, and also the similarity/diversity among areas and treatments. They also are interested in predicting unseen species if future surveys are applied.

We apply the homogenous model, homogenous MLE, Chao (2005) model and the ACE (Abundance- based Coverage Estimator) (Chao, Lee, 1992) to estimate species richness.

Next we use the multinomial model (Shen, Chao, and Lin, 2003) and the Poisson model (Chao and Shen, 2004) to predict the number of new species in a future survey.

Finally we use the multiple-community diversity measure to compare the similarity/diversity (Chao et al, 2008) among the areas as well as the three treatments.

The data was collected over four years. However the yearly factor could not be used as an independent factor because the sampling was taken over the same quadrate over each year.