

## Introduction to Natural Sciences Species Distribution and Diversity

### Introduction:

This lab involves a calculation of the index of diversity of soil invertebrates for your site at three different soil layers, the subsoil, the topsoil and the litter layer. You will also do a chi-squared test to determine if there is a significant difference between the species distribution at the subsoil layer of your site and the species distribution at the subsoil layer of two other sites.

### Procedure:

- In the chemistry and biology labs you compiled data counting the abundance of soil invertebrates of different types at your site. You should have three sets of data, one for subsoil, one for topsoil and one for the litter layer. In the handouts folder on Masu there is an Excel template file called Field\_Trip\_Data.xls which you should copy. Enter the data in the yellow cells and save it with the name: Group\_number\_data\_Lab\_2.xls, where 'number' refers to your group number from the field trip. In the Workspace folder is a folder called Field\_Trip. Save your file in this folder, so that other groups can have access to this data
- With all three data sets calculate Simpson's index of diversity  $D = 1 - \frac{\sum n(n-1)}{N(N-1)}$ , where  $n$  is the abundance of each species and  $N$  is the total number of organisms in your sample. Simpson's index of diversity measures the probability that of getting two different species if you randomly choose two organisms from your sample. Write the values of the three indices of diversity for your site on the spreadsheet at the front of the class next to your group.
- Now you will need to do a Chi-squared test to determine if there is a significant difference between the species distribution at your site and the species distribution at two other sites. You will do this only for the subsoil layer. To determine which sites you will use for comparison look at the field trip lab groups listed on our web page: [http://academic.evergreen.edu/curricular/ins/0708/lists\\_forms/field\\_trip\\_lab\\_groups.pdf](http://academic.evergreen.edu/curricular/ins/0708/lists_forms/field_trip_lab_groups.pdf)  
The first site you will do a Chi-square comparison test for is the data from the group that had the same site type as you. The second site is the data from the group directly below that group on the list. For example, group 1 took samples from the water bank near McLane creek. The other group to do this is group 15. So group one compares their data first to group 15's data and then they do a second comparison with group 16. Create two contingency tables, one for each comparison group. Make sure you group the data in such a way that the frequencies in each class are larger than or equal to 5. You may need to collapse some classes into larger classes using your dichotomous key. Calculate  $\chi^2$  for each table and decide if there is a significant difference in the distribution of species between the two sites.
- In a textbox in your excel file write a short summary of your  $\chi^2$  comparisons and conclusions. Also comment on the value of your index of diversity in comparison with those of the class as a whole as listed in the Field\_Trip\_Index\_of\_Diversity.xls file in the handouts folder of our CAL space. Copy and paste your file into the drop box.