Analytical Methods for Ecologists - Exercises in analysing data - part 1

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1. Declining wildflower diversity has led to a decline in nectar provisioning for pollinator species. In order to investigate the extent of this impact a study was conducted in order to compare the nectar provisioning in two types of meadow areas;‘Managed’ and ‘Enhanced’. Managed meadows had been managed to provide optimal grazing for livestock, tending to have greater proportions of grass. Enhanced meadows were also grazed, but had received yearly additions of of wildflower seeds. All replicates of both types of meadow had received their respective treatment for at least five years, prior to the study.

Samples were taken from each meadow to estimate the abundance of plant species in each, and this was combined with data from a database of levels of nectar provisioning from each plant species to give an overall estimate of total nectar provisioning (kg) per hectar per year for each meadow.

The data are in the tab-delimited text file ‘nectar\_provisioning\_data.txt’. Analyse the data to see if the ‘Enhanced’’ treatment increased the level of nectar provisioning relative to the ‘Managed’ treatment.

1. Grazers have profound effects on the structure of shallow subtidal marine communities. An experiment was conducted in order to assess the relationship between sea urchin density and the extent of filamentous algal growth. Different densities of sea urchins (all approximately the same size) were placed in enclosures with mats of algae covering the ventral surface. Following an extended period of time, the percentage area of the ventral surface over which algae was still growing was recorded. There were three urchin density treatments: 50, 75 and 100% mean natural density. and 12 replicates of each treatment.

The data are in the tab-delimited text file ‘urchin\_grazing\_data.txt’. Analyse the data to see if there was an effect of urchin density on the percentage cover of filamentous algae.

1. Report your findings from the analysis in the previous question as you would in the results section of a research journal.
2. Researchers in a medical department are investigating the effect of sleep on well-being. Previous work has suggested that a target of a mean of eight hours sleep a night is conducive to increasing well-being. They are interested in how the sleeping patterns of students compare with this. They have obtained 36 volunteers who have kept a sleep diary over a two month period. The mean number of hours per day that each student slept has been calculated and these values are in the file ‘sleep\_study\_data.txt’ (tab-delimited). Use the data to test to see if the students were spending the suggested mean of eight hours of sleep a night.
3. An ecologist is studying a species of orb spiders. They are interested in what variables affect the way that they spin their webs. They have therefore done an experiment to investigate if the level of ambient light affects the shape of the web. To this end, they used 27 individual spiders. Each individual was allowed to develop a web in both ‘light’ and ‘dim’ conditions (once in each condition). In each case, the diameter of the web was measured.

The data is in the tab-delimited text file ‘orb\_web\_data.txt’. Analyse the data to determine if the light level affects the dimension of the orb spider web diameters. The ‘ID’ column identifies the individual spider.

1. Report your findings from the analysis in the previous question as you would in the results section of a research journal