Plotkin Plots, an Introduction to Biodiversity

Overview | Progression | Vocabulary | Line Transects | Data Table | Spreadsheet

Overview of what should be gained through this study

Goals	• To introduce the student to fundamental skills related to taking plant inventories. • To introduce students to GIS • To prepare to make measurements of biodiversity that are reliable and valid enough for outside agencies to use
Skills	• Creation of a plot of land and representation of that plot on a GIS map (plots will not be used in the next two studies, they are used here to allow pods to provide support for members new to field work) • Layout and use of a line transect • Identification of unique species in the field using plant keys • Use of spreadsheets with pre-loaded formulae to calculate biodiversity indices
Vocabulary	Students will need to construct working definitions of the following terms during this study: abundance, abundance rank, relative abundance, rank abundance curve, biodiversity index, species diversity, trophic level, as well as Capra's definitions of interdependence and diversity
Assessment	Each student will create four assessable (gradable) products during this study • A visual description of the pod's plot showing vegetation at three trophic levels • A data table showing individual and pod data for abundance calculations and for the four common indices of biodiversity • A map printed from GIS containing biodiversity index and abundance data from all plots. Each pod is responsible for providing its data. • Written commentary comparing the pod's data with biodiversity data from the entire birch woods area. How well do the indices represent the plot? What about the plot is not represented in the indices? What sources of human or design error may have produced questionable results in your plot?

Page layout version of online file at www.district196.org/ses/ in the senior house directory

Progression of work

1. Each pod lays out its plot being sure to have straight sides clearly marked
2. Each pod decides on a process for random placement of line transects. Process needs approval!
3. Each pod distributes two line transects to each pod member
4. Each student collects data for species counts and abundance in their two transects. Data is combined on a table similar to the one provided.
5. Each student collates their pod data in their journal. The provided table can be used again.
6. Each pod enters their data into the spreadsheet provided in academic/students/apps/. This spreadsheet can also be downloaded here for both Macs and Windows PC's. Save this spreadsheet as house_pod in the biodiversity_data folder. For example pod 3 in gold house work save the file as gold_3
7. Each student creates a map of the Birch Woods site which includes their pod's data. Print this map

Support and Details

Vocabulary

Abundance	This measure is simply a count of the number of individual plants of one species. This can be done without identification of the species. However, you must be sure to not confuse similar species such as some of the dogwoods, cherries, and European buckthorn. Abundance is reported for each species
Abundance rank	The species with the most individuals has a rank of 1. The species with the next highest count of individuals has a rank of 2.
Relative abundance	Calculate the relative abundance by dividing the number of individuals of one species by the total number of individuals from all species. Repeat the calculation using each species found in the plot. This value is reported as a decimal or a percent.
Rank abundance curve	This is a graph of the abundance rank of a species (x axis) plotted against the relative abundance of the species (y axis). This graph will be used to compare different plots.
Biodiversity indices	These indices are ways of comparing different spaces in light of biodiversity. Be aware of the dangers of using a single number to compare biodiversity. All of these are calculated for you when you use the spreadsheet.
Simpson index	This is the probability that any two individuals chosen at random belong to different species. It ranges from 1 (most diverse) to 0.
Shannon index	This measures the value of each species as a function of their frequency in the community. This ranges from 4 (most diverse) to 0.
Berger/ Parker index	This is a measure of how common the most common species is. It ranges from 0 (most diverse) to 1.
Brillouin index	This index is high if a community has many species and their abundances are evenly distributed; diversity is low if the species are few and their abundances are unevenly distributed.

Page layout version of online file at www.district196.org/ses/ in the senior house directory

Line Transect Basics

The first step is for the pod to decide on a process for finding random starting points for each transect. Both the starting location and direction should be randomly assigned (why?).

The second step is for each student to find their starting point and then to mark off the 10M by 2M transect.

Next- identify, count, and record all woody trees that have grown to a height of 4 feet or higher. A data table is provided for you to use. If a plant has many stalks growing from a single trunk count it as one. If you cannot positively identify a species you must at least know that it is unique from other species in your plot. Record its name descriptively (alternate simple leaf species A).

Tape the completed data table into your journal.

Data table (click here for a printer-friendly version)

Species Name	Count of Individual Plants	Rank by Count of Individuals	Relative Abundance

Biodiversity Calculation Spreadsheet

Page layout version of online file at www.district196.org/ses/ in the senior house directory

Click to download the Microsoft Excel spreadsheet that does the calculations for you. The spreadsheet should open on both Macs and PC's using a version of Excel that is at least version 5 or 95. This sheet may also be obtained from the Academic1 server at school.