Plant Ecology Laboratory: Quadrat Sampling (Non-thinned and Thinned Oak Forest)

Equipment

1. Tape Measure
2. Quadrat
3. Densiometer

Objectives

1. Determine the appropriate number of quadrats for sampling a 10-x-10 m^2 field site
2. Learn to randomly sample plant communities
3. Construct species-sample curves
4. Determine plant species richness and evenness of "small-stature" (herbaceous and woody) plants in a community
5. Calculate the Simpson's Index for a sampled area
6. Compare understorey vegetation between Thinned and Non-thinned Oak communities

Notebooks (Learn to keep your notebook correctly)

1. Date (including the year)
2. The time (many plant ecology methods are time sensitive – light, photosynthesis measures)
3. Your names
4. The methods you are using – size of quadrats, transects, locations, descriptions of the area, weather

Field Methods

1. Go to your two field sites: one in the non-thinned oak area (10-x-10 m^2 field site), and the other site in the thinned oak section (10-x-10 m^2 field site).
2. Record a description of the site (environment, slope, soils, and flora and fauna).
3. Determine how many quadrats you will need to randomly sample your site given your time constraint.
4. Determine what technique you will use to randomly place your quadrats.
5. Collect abundance data (% cover) for all taxa (understorey vegetation and trees) within each quadrat, for a total of at least 5 quadrats. % cover can be >100%. Record what percent has no vegetation.
6. As you collect data, collect voucher specimens in ziplock bags for internal consistency or later identification. It is less important to know what a species is (you can call is species A and species B or "shiny-leaf") than that you can distinguish between species.
7. Use the densiometer measure canopy cover at a subset of your quadrats (we only have three densiometer, so you must share among groups).
8. **Have each lab member copy the data into her/his notebook!!** You will each need to take the data home to complete the work.

Results for Wednesday (bring graphs to class – each person will turn one in):

1. Take your notebooks home and construct a **species-sample curve** for all your data (plot the cumulative number of species on the y-axis vs. the number of samples on the x-axis; you can just do it in the order that you sampled them). If your curve reaches a plateau very fast (in say two quadrats), then you used quadrats that were too big. If your curve never plateaus off, then the quadrats were too small. It also tells you how many samples you need with this size quadrat to sample the diversity in this community. In our case, the species-sample curve is also a type of species-area curve; if we had more samples, we could produce a more accurate species area curve, to help determine the relationship between species richness and area in this community. (If our "samples" were water samples in pond, the curve would not correspond to area)

2. Draw **rank abundance curves** for the thinned vs. non-thinned plots. What does this tell you about species richness and diversity in the two areas?

3. Calculate the **Simpson's Index** for your thinned and non-thinned plots.

4. Calculate a **mean canopy cover** for the thinned and non-thinned areas.

Rank Abundance Curves are plots of the frequency of species in a community from most frequent to least frequent. (You will use % cover of most abundant species to least abundant species).

Species composition = the types of species present in any given locale

Species richness = the number of species present in any given locale

Simpson's Index (**D**) measures the probability that two individuals randomly selected from a sample will belong to the same species (or some category other than species).

$$\mathbf{D = \sum (n/N)^2}$$

n = the total number of individuals of a particular species (<u>or the percentage cover</u>)
N = the total number of individuals of all species (<u>or the total percentage cover</u>)

The value of D **ranges between 0 and 1**

With this index, 0 represents infinite diversity and 1, no diversity. That is, the bigger the value of D, the lower the diversity. This is neither intuitive nor logical.