POINT-QUARTER SAMPLING

Dr. Craig 12/20

PURPOSE

Now that we have developed the ability to identify the native trees of the flood plain, we will make use of this knowledge in characterizing the structure of the flood plain forest. We will examine the density, frequency of occurrence and dominance of each tree species present, and draw conclusions about the nature of this forest habitat.

DESCRIPTION

Point-quarter sampling is a plotless method (a method that does not involve laying out a measured grid) for gaining information about the nature of a forest. It assumes that trees are randomly dispersed in the forest. From point-quarter sampling, you may learn facts like the density of individual tree species, how dominant tree species are, and how important particular tree species are in the forest ecosystem. We will learn to gather the data to make these determinations:

METHODS

1. Establish a straight line transect through the forest. Choose a compass bearing and head along it in a straight line.
2. Establish sample points. At intervals along the transect (say, 20 paces), establish sample points to gather data about trees. Each point should be statistically independent. That is, trees at one sample point should not be the same ones measured at the next point. Mark each sample point with a stick or colored flagging.
3. Establish four quadrants at each sample point. Draw on the ground a line perpendicular to the transect line to establish four sample quadrants. Quadrant one is in front of you (as you look down the transect line) and to the right, two is behind you and to the right, three is behind you and to the left, and four is in front of you and to the left.
4. Starting at quadrant one, measure the distance in meters to the nearest canopy tree (tree that reaches to the top of the forest). Also measure in centimeters the diameter (**not the circumference**) of this tree. Repeat the procedure with quadrant 2,3,4.
5. Sample 10 total points. Move 20 paces or so down the transect line and establish a second sample point. Set up four quadrants and proceed as above. Do this for 10 total sample points. By the end of your sampling, you will have made measurements on 40 trees. The data on distances and diameters are what you will analyze in the laboratory part of this investigation.

ANALYSIS

1. **Make sure all your data are recorded in the same units** (centimeters, for example). Then calculate the following:

2. **Mean distance (D):** Add all the distances you measured for all trees at your 10 sample points. This is the **total distance.** Divide this total by the number of quarters you sampled (4 quarters each at 10 sample points = 40 quarters).

$$\mathbf{D = Total\ distance/\ 40}$$

3. **Absolute density (AD):** Calculate this for one hectare, by dividing 10000 by the square of Mean Distance calculated in (2):

$$\mathbf{AD = 10000/\ D^2}$$

4. **Total trees per species:** Add the number of individuals you encountered for each tree species

5. **Relative density (RD):** Take **total trees per species** and divide it by 40. Do this for each species:

RD = Total trees/ species / 40

6. **Number of trees/ species/ ha:** Multiply **RD** by **AD** to find the number of trees/ 100 m^2. Do this for each species:

Number of trees/ species/ ha = RD x AD

7. **Basal area (BA):** Convert the diameters you measured for each tree into **basal areas** by finding the area of a circle:

$$BA = 3.1416 \times (diameter/ 2)^2$$

8. **Average basal area (ABA):** Add **BA** calculated in (6). Divide this by **total trees per species** calculated in (4). Do this for each species:

ABA = BA/ tree/ species

9. **Absolute dominance (ADO):** Take the **ABA** you calculated in (8) and multiply them by **number of trees /species/ ha** calculated in (6). Do this for each species:

ADO = ABA x trees/ species/ ha

10. **Dominance sum (DS):** Add all the ADO calculated in (9).

11. **Relative dominance (RDO):** Divide the **ADO** calculated in (9) by the **DS** calculated in (10). Do this for each species:

RDO = ADO/ DS

12. **Total frequency (TF): A**dd the number of **points** (not the number of quarters) out of 10 at which the species occurred. Do this for each species:

13. **Absolute frequency (AF):** Divide **TF** by the number of points you surveyed (10). Do this for each species:

AF = TF/ 10

14. **Frequency sum (FS):** Add the **AF** for all species.

15. **Relative frequency (RF):** Take the **AF** you calculated for each tree species in (13), divide them by **FS** calculated in 14. Do this for each species:

RF = AF/ FS

16. **Importance value (IV):** Add **RD**, **RDO**, and **RF**. Do this for each species:

IV = RD + RDO + RF

17. Rank the tree species you sampled from highest to lowest **IV.**

INTERPRETATION

Once you compile and analyze your data (see separate sheets for computation methods), you must determine what your data mean. Consider the following as you write your lab report:

1. What is the overall density (number of tree trunks/hectare) and basal area (area actually covered by trees) of trees in the forest studied?
2. What are the most important tree species in the forest? By looking at literature on tree habitat requirements (e.g. from books, on the internet), why do you think that these species are the most important?
3. What problems did you encounter while conducting this investigation that may have affected your results?
4. How did your findings compare with the findings from other lab groups? Were the same tree species most important on their transects? How would you account for the similarities and differences in both of your results?