Biodiversity in Microhabitats

Your assignment: Each student group will need to identify 2-4 cover boards for data collection. After a brief tour (where you should take notes!!), you will develop a question to be researched. This might be "What effect does the type of wood have on biodiversity?" or it might be "What effect does moisture (or sunlight or substrate) have on biodiversity under White Pine cover boards?" or it might be "What effect does surrounding vegetation have on biodiversity under Red Oak cover boards?" or it might be "Does sunlight or wood type have a greater impact on diversity?" Your question will determine which cover boards you should use for data collection. Once you have determined your question, you will develop a hypothesis predicting what you expect to find. Be sure to identify exactly which cover boards you will need to use to answer your question!

NOTE- Each pair of students will be assigned to collect data from one or two cover boards to minimize disturbance and ensure that organisms are not chased away. This data will be shared so the question determined by each group can be investigated.

Student pairs will collect data, including number and kinds of organisms under each cover board, as well as all appropriate environmental data (temperature, precipitation, etc.) Please use one data collection sheet for each cover board. Plan in advance so each team member knows what they need to do during the data collection process (counting recording, identifying, etc.) It is recommended that you take pictures of each different organism you find in order to ensure accurate identification (when cameras are available). This will also make it easier to count the total number that you find, since organisms will likely try to move elsewhere immediately upon your lifting the cover board! Collect or photograph a single specimen for identification and count how many you see as quickly as you can. You will need to plan your data collection in order to maximize both the number and the variety of organisms identified at each location, so make sure you allocate time and resources accordingly. Once collection, identification, and counting are finished, you will need to share all data with other group members so everyone has a complete set of data to work with for the lab report. When you have finished your field data collection, you may finish identifying organisms using field guides and keys inside.

Once you have finished counting and identifying all species, you will need to calculate the Biodiversity Index for each cover board using BOTH of the formulas below.

a.   A simple diversity index from American Museum of Natural History (AMNH):

 the number of species in the site (numerator)
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 the total number of individuals in the site (denominator)   = biodiversity index

For example, a 4 X 4 meter square area in a carrot patch has 300 carrot plants, all the same species. It has a very low biodiversity index of 1/300, or 0.003.

A 4 X 4 meter square area in the forest has 1 pine tree, 1 fern, 1 conifer tree, 1 moss, and 1lichen, for a total of 5 different species and 5 individuals. The biodiversity index here is high, 5/5 = 1.

b.   A more complex calculation (The Simpson Biodiversity Index)

To calculate this Simpson Index, we need to know the number of individuals for each particular species (n) and the sum of those numbers (N): $D = SUM (n/N)2$

For example, in a community of three species where one species has 6 members, a second has 12, and a third has 42:
$D = (6/60)2 + (12/60)2 + (42/60)2 = 0.54$

Summary Report Requirements:
-Results, including all appropriate charts, graphs and diagrams (see below) with labels and units identified! You should also include your biodiversity index calculations and results here.

-Discussion: What did you learn from your data analysis? Was your hypothesis supported? Why or why not? Were the biodiversity index results similar for each cover board? Why or Why not? How can you explain your results? Refer to the appropriate charts or graphs to support your conclusions. What were some sources of error? What additional questions were generated by your results?

For COMBINED cover board data, complete the following:
1. Combined graph showing the biodiversity index numbers from each cover board you used to determine whether your hypothesis was supported or not- This should show the variation that occurred in the different settings.

2. Chart showing data from ALL organisms, separated by cover board- This should list the total number of individual organisms of each species found under each different cover board. It should be easy to see at a glance the variation in numbers and types of organisms found at each location.

For EACH INDIVIDUAL cover board, complete the following:
1. Calculate the Biodiversity Index
The question of how many different species exist in a particular environment is central to the understanding of why it is important to promote and preserve species diversity. A uniform population of a single species of plants adapted to a particular environment is more at risk if environmental changes occur. A more diverse population consisting of many species of plants has a better chance of including individuals that might be able to adapt to changes in the environment. Scientists use different formulas called biodiversity indices to describe the amount of species diversity in a given area. Use the two formulas shown above to calculate a biodiversity index for each cover board you used. Include these results in a chart.