Noyes Project Final Report

Field Biology

This report is an individual assignment. It should be written in the PAST TENSE (because you are completing this report after your project is complete). When you are done, e-mail your work to dan.bregar@corvallis.k12.or.us with the subject line "per *X your name* noyes final".

Introduction:
This section of your report consists of a description of your original question and background information about your project.

In one paragraph, explain the "What is the Relationship Between" question that you originally came up with. Add some supporting details to clarify the purpose of your proposed question.

In another paragraph, do some research about the ecological importance of soil macroinvertebrates and summarize that research. In your research, think about questions such as the following:

a. What are the ideal soil conditions for soil macroinvertebrates? In other words, what do they prefer the soil texture, density, moisture, organic matter, etc. to be?

b. How do soil organisms eat and reproduce? What sorts of organisms eat soil organisms?

c. How do soil organisms affect plants?

In a third paragraph, do some research about your second factor and summarize that research. In your research, think about questions such as the following:

a. Where are the factors located in the environment? Where are the factors located in the Noyes property? What type of habitat do the factors require?

b. If it is an organism, what eats the factor? What does the factor eat?

c. How does the factor affect plants or animals?

d. How is the factor affected by non-living aspects of the environment such as rainfall, sunlight, water quality, or air pollution?

In a fourth paragraph, explain what you think the answer to your proposed question might be and describe why you think your hypothesis is correct.

Methods:

This section of your report will describe how you collected your data. Your methods should take the form of two step-by-step lists. The first list should describe how you measured the soil organisms and calculated the diversity; the second list should describe what you measured about your second factor and how you made those measurements and calculations.

Make sure that your instructions are clear, detailed, and describe the actual steps you took to make your measurements. (You will probably need to significantly revise the methods you described in your proposal.)

Results:
This section of your report will describe the information you found and should include data tables (NOT graphs!) that summarize the measurements and calculations you made.

This section should include at least two data tables – one for each day of data collection. If it is meaningful, you should also include a third data table that is a combination of both days of data collection (check with your instructor if you're not sure if your data should be combined or not). You may not need to show a third data table if it would be redundant; however, you may still need to create this data table in order to use it in your discussion. (In other words, this data table might not appear in your final report but a graph of the combined data will show up.)

This section of your report should also include a paragraph or two that verbally describes the data you've collected (see below for an example).

Discussion:
In this section of your report, you will use your data to answer your question. This section will include graphs that show the trends in your data along with your interpretation of those graphs and an overall critique of your study.

You will need to have at least two graphs showing your results. Depending on the project that you created, these may be x-y scatterplots or some other type of graph that visually represents your data and a possible correlation (check with your instructor if you're not sure if a scatterplot will work for your data). If you have two data tables in your results, you'll have two graphs. If you were able to make a combined data table, you should have a third graph for that data.

For your written analysis, answer the following questions (in paragraph form) for EACH graph*:

1. What was the correlation that your data shows – positive (up and to the right); negative (down and to the right); or none (horizontal line)?
2. What does this correlation tell you about the answer to your question?
3. What ecological factors do you think might have influenced the correlation (or lack thereof) that you see?

Your response to these questions should be about one paragraph in length for each graph in your report.

*If you did not make x-y scatterplots for your data, check with your instructor about how to interpret your graphs

Here is an example of what your final report should look like:

Noyes Project Final Report – Mr. Bregar

Introduction:
The question I asked for my study was "What is the relationship between the types of lichens on the ground and the diversity of soil macroinvertebrates?" My goal was to collect data to determine if different types of lichens on the soil surface tend to be associated with more or less diversity in soil organisms. I decided to focus on the seven different types of lichens that I can easily recognize.

Soil organisms prefer soils that are high in gralshce and have an incredibly low moisture – below 0.000000001%. The texture of the soil is not critical as long as it is as dense as lead. Soil organisms are allergic to organic material and will die if they come into contact with it. They are only found when soil temperatures are above 90 C and when the soil pH is so acidic it will melt glass. **(Please note that none of this information is real! I made it up so as to not influence your research.)**

There are certain lichen species that are sensitive to specific air quality parameters. For example, some species can survive with higher atmospheric nitrogen levels than others. I found that many species are affected by this and are unable to survive. Lichens are also influenced by rainfall patterns and sun intensity. Because of these interactions, I believe that there is a possibility that different tree heights might also have an impact on lichens.

My hypothesis is that I will see a greater diversity of soil organisms in areas where there are more different types of lichens. This might be because soil organisms eat material that is found on the soil surface, so there are more likely to be different types of organisms when there are more types of food for them to eat. If my hypothesis is correct, the diversity of soil organisms will be greater in areas where there are lots of different types of lichens on the ground.

Methods:
Soil Organism Diversity **(Please note that none of these steps are correct! I made them up so you can use your own words and ideas.)**–

1. We collected 16 pounds of soil in a garbage can.
2. We superheated the soil using a torch to about 1000 C, causing the soil organisms to shake violently with discomfort.
3. We used laser binocular spectacles to magnify the soil organisms and plucked them out of the soil with tweezers.
4. We identified each organism as a dingograph, palulaha, fichner, spatula, or "other".
5. To calculate soil organism diversity, we multiplied the number of organisms by the natural logarithm of the total number of samples we collected divided by the mean square root of the number of individual organisms in each category minus the fractional part. Numbers closer to 105 indicated greater diversity; numbers closer to 1000 indicated less diversity.

Lichen Sampling –

1. We selected 3 different areas in the Noyes property which seemed to have different species of lichens growing on trees.
2. At each site, we identified each type of lichen and counted each lichen species that we could find on soil surface. We counted the number of each species and the total number of species we found, but we only included the total number of species in our analysis.

On each day of data collection, we picked different areas to study. That way, we were able to combine our data for the two days in order to create a third data table. Since the weather and soil conditions were similar between the two days of data collection, we feel that our data is comparable between the two days.

Results:

The tables below show the results we found on the two days of data collection.

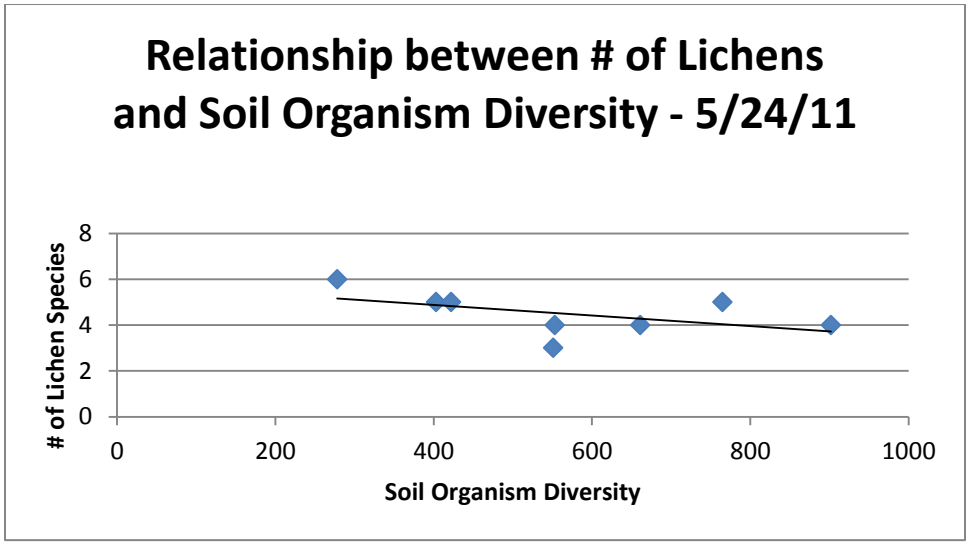
Date	Location	Soil Organism Diversity	# of Lichen Species
5/24/2011	Garry Oak forest	765	5
5/24/2011	Garry Oak forest	553	4
5/24/2011	Garry Oak forest	661	4
5/24/2011	Garry Oak forest	902	4
5/24/2011	Alder forest	403	5
5/24/2011	Alder forest	551	3
5/24/2011	Alder forest	422	5
5/24/2011	Alder forest	278	6

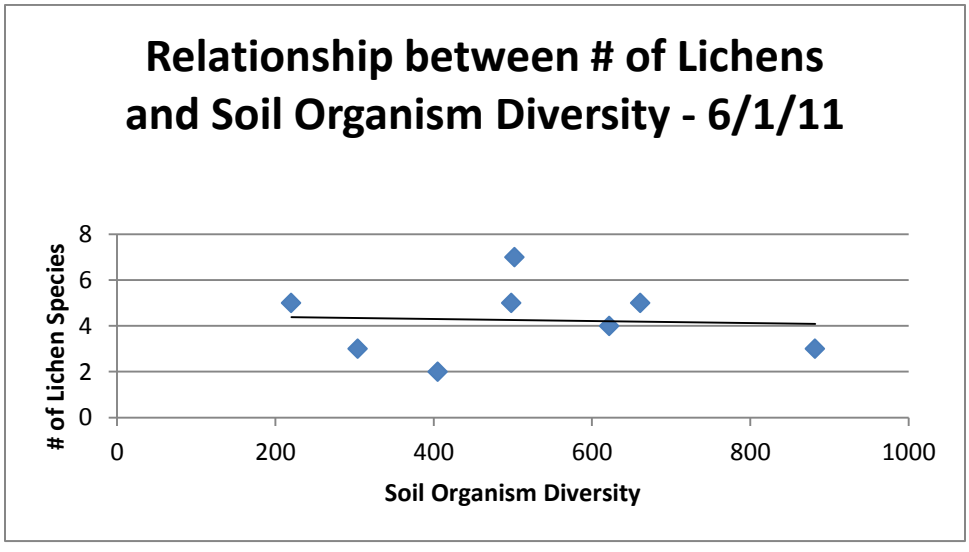
Date	Location	Soil Organism Diversity	# of Lichen Species
6/1/2011	Garry Oak forest	882	3
6/1/2011	Garry Oak forest	661	5
6/1/2011	Garry Oak forest	498	5
6/1/2011	Garry Oak forest	622	4
6/1/2011	Alder forest	304	3
6/1/2011	Alder forest	405	2
6/1/2011	Alder forest	220	5
6/1/2011	Alder forest	502	7

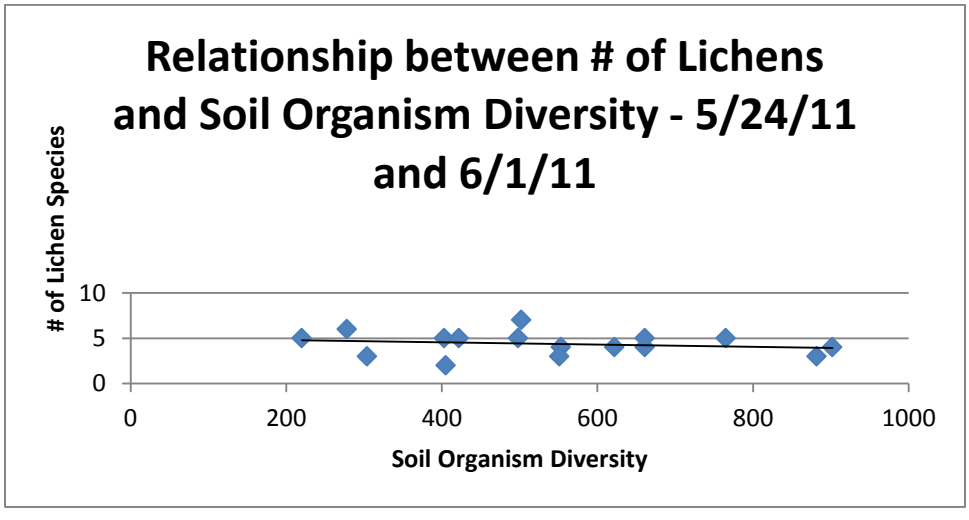
We actually collected our data from four locations – two were relatively similar Garry Oak forest plots and two were similar Alder forest plots. We believe that this increases the significance of our data. We used a third data table as well that was simply a combination of both of the above tables.

Discussion:

We graphed our data using x-y scatterplots. We created three graphs – one for each day of data collection and one for both days combined. The graphs are shown below.


Relationship between # of Lichens and Soil Organism Diversity - 5/24/11
# of Lichen Species
0
2
4
6
8
0
200
400
600
800
1000
Soil Organism Diversity


Relationship between # of Lichens and Soil Organism Diversity - 6/1/11
# of Lichen Species
0
2
4
6
8
0
200
400
600
800
1000
Soil Organism Diversity


Relationship between # of Lichens and Soil Organism Diversity - 5/24/11 and 6/1/11
# of Lichen Species
0
5
10
0
200
400
600
800
1000
Soil Organism Diversity

All three of our graphs show a negative correlation, telling us that as the the number of lichen species we found increased, the diversity of soil organisms increased as well (remember, numbers closer to a thousand indicate decreased soil organism diversity). We believe that this supports our hypothesis and we think that the increased number of lichens on the soil surface that are available for soil organisms to eat allows more different types of soil organisms to thrive. However, more research and testing would be necessary in order to be sure. For future study, we could set up an experiment where under otherwise identical conditions, different numbers of types of lichens are placed at the soil surface in two different locations. Each location would need to start with the same species composition and diversity of soil organisms. We would then monitor each area to see how the diversity of soil organisms changed over time.