RECCS Self-Assessment

Keep a detailed lab notebook

I kept both a physical and digital notebook on hand during the internship. While I did start to use the physical notebook more during the later days of the internship, I will link a copy of the digital notebook below.

The physical notebook is where I kept deadlines and rough drafts of my project. I also used that to practice how I wanted the flow of my whiteboard talk to go before I moved to using a digital screen. I used this notebook to jot down the main points that were spoken about during the Wednesday workshops as well.

Digital notebook: https://docs.google.com/document/d/1ohMY-LT6v-WLwo5fjNZ54-myND3tB7ZGL1C13gPFGYM/edit

Defend an argument when asked questions

I was speaking to an evaluator about my project board and they brought up why understory plants should be used when untreated and degraded prairie control areas already had more total organic matter than the orchard. I explained that while prairie dogs are known to increase the amount of total organic matter in the soil, it is still unclear how exactly they are able to produce these high levels of organic matter. The areas that specifically had higher total organic matter in the degraded prairie control were areas that had flooded prairie dog holes present.

With the continued soil analysis that will be done each year, we are hoping to see a moment of divergence between the orchard and degraded prairie control where the prairie control plateaus and the orchard soil will continue to climb in a positive slope. This will begin to show that the understory plants present are making a difference as well.

Use statistics to analyze data

The coding software that I used to analyze the data given by the water holding capacity and total organic matter was R studio. By uploading the finished data sheets of info, I was able to create a boxplot graph that also showed the areas where the data were located within that graph.

I also used R studio to find the mean, standard deviation, and ANOVA for the data that I had. Ultimately, I only went with the standard deviation and mean of these groups. The ANOVA testing that was found for both sets of data did not show any adequate change/difference, so they were not used in my presentation.

Develop a research question

My mentor had different areas that were being covered in the orchard during my time with them. The main area that I was interested in was the use of understory plants to

help the tree. I wanted to know more about how the use of these plants would affect the soil health since the orchard eventually did not want to use any type of pesticides in the future.

There were some understory plants that survived from last year that were significantly bigger than the understory plants that were planted just before I arrived at the orchard. So, I decided to base my research question on how these understory plants might have affected the overall health of the soil from the previous year. This is also a type of data that can be compiled for future comparison to both the same orchard and areas that are off the orchard.

Develop a research methodology

There are a few ways that my mentor and the people in the boulder apple tree project were finding the soil health of the orchard: water holding capacity, total organic matter, and biomass index.

The biomass index is usually a procedure that they do in the fall, so I wouldn't be able to do that during my time in the program. The total organic matter and water holding capacity were two areas that would be available for me to complete and analyze within the amount of time in the internship.

Conduct database or internet searches

To aid in my ability to identify plants, my mentor thought that it would be useful to find any medicinal purposes to the understory plant types that were in the orchard. I am currently interested in pharmacy, so my mentor thought it would be a good idea to try to combine my interest in botany and pharmacy.

I used google scholar and the library database in CU to read about the various uses of the understory plant types that were being used. These journals helped give me more insight on specific plants and made the process of identifying them a little easier.

Problem-solving

While working on the coding area of the project, I was using R studio to analyze the data. I have not worked with any type of coding software, so R was very new to me. My mentor Sarah Elizabeth helped me create my first graph and get a basic understanding of how to get my coding workspace more organized.

Upon receiving the file in my own computer, the coding that we had previously did was no longer working. So I decided to slowly go back through the coding to figure out where the switch had happened. It turns out, the error was in the graph area. There was an extra set of parentheses in the coding that didn't mean anything.

I also taught myself how to run standard deviation and mean values in R studio. I also learned how to create a table to export these values in R studio, however I opted for excel afterwards since I did not like how the data looked in the R studio format. It felt too busy with the excess decimal numbers and the layout of certain words felt too scientific to appeal to a basic audience.

Identify limitations of research methods & designs

While I was curious on the different types of elements in the soil for total organic matter, my lab simply did not have the funding to be able to run those types of experiments. I was mainly interested in how much nitrogen was found in certain areas compared to others. However, towards the end of my internship, they had just been approved funding that would lead to more detailed testing, such as that.

When getting the soil from the ground, I was normally trying to get a specific set amount of 10-17 cm of soil in the soil corer. There are areas in the orchard that were just too dense to be able to get that much of a sample.

Read & understand journal article

I read journal articles about the effect that global warming had on soil erosion to gain more background on how I wanted to introduce the importance of my project. From prior knowledge, I knew that reading the abstract, conclusion, and discussion were important areas to cover when reading a journal.

I would try to highlight the importance of soil diversity and how climate change is affecting the way/rate of soil erosion is affecting the topsoil. It's also come to mind at how little soil biodiversity is covered compared to above ground diversity.

Conduct observations in the lab or field

While doing fieldwork outside, different types of surveys were done to collect data on the orchard's plant life and the insect diversity that was in the orchard. Most of the surveys were done using a quadrat that allowed us to study a specific area in the orchard. There are 4 quadrats located around each tree. The first two types surveys is the understory area, where we record the plant species types within the quadrats. The other one is intersection row survey, where the middle section between the trees is measured and plant identification is done at specific areas.

We also water the plants once a week & the trees are watered once a week as well. One of these days we were watering, I was able to notice areas where the voles living in the orchard were attacking the new saplings that we had just planted a couple weeks prior. I was able to let my mentor know about the problem, and she was going to find a way to address the problem.