Problem:

 What kind of ecological communities are found on campus?

Hypothesis:

The Heritage High school nature trail will primarily show an early stage of succession as a result of the disturbance to the ecosystem caused by the construction of Heritage High School.

Materials:

* Meter stick
* Data tables
* Map

Procedure:

1. Assign roles
	1. Cartographer- Julia
	2. Taxonomist- Allison
	3. Ecologist- Mallory
	4. Historian- Jernisha
2. Found and observed a site of early succession
3. Mapped and recorded data
4. Located a site of mid-succession, collected data, mapped the site
5. Located a site of late succession
6. One person stands in between 4 trees, the others measure from the person to each tree.

Observations:

 In the first site of early succession, there were mainly grasses and weeds. In the mid-succession, there were small trees, with some bugs and small animals. In the late succession site, there were many large, evergreen trees.

Data tables:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Point | # | Distance from point | Diameter | Species | Basal Area |
| 1 | A | 20ft | 12in | Water Oak | 113.1 in2 |
| 1 | B | 10ft | 4in |  | 12.57 in2 |
| 1 | C | 12ft | 10in |  | 78.54 in2 |
| 1 | D | 17ft | 8in |  | 50.27 in2 |

Non-species specific computations

|  |  |  |  |
| --- | --- | --- | --- |
| Sum of distances measured | 59 | feet | Sum of all distances |
| Total # of trees sampled | 4 |  | Total number of trees in sample |
| Mean distance | 14.75 | feet | Sum of distances divided by total # of trees sampled (avg. point to plant distance.) |
| Mean area | 217.56 | Sq. ft./tree | Mean distance squared (men area occupied by each tree) |
| Trees/acre | 200.22 | Trees/acre | 43,560 sq. ft. divided by mean area (total number of trees per acre) |
| Sum of all basal areas | 254.48 | Sq. inch | Sum of all basal areas |
| Mean basal area | 63.62 | Average sq. ft./tree | Sum of all basal areas divided by total # of trees sampled (average area for each tree) |
| Total basal area/acre | 12,738 | Basal area / acre | Mean basal area time trees per acre (basal area times trees per acre (basal area covered by trees per acre) |

|  |  |  |  |
| --- | --- | --- | --- |
| Animal Species/Morphospecies Description | Number oflndividuals | Habitat | Observations |
| Termites | 1 (probably more unseen) | Fallen Tree | A termite was seen on a fallen tree, in the stream. There is most likely more inside the hollow tree.  |
| Spider | 1 | Leaf Litter/ground | The spider was seen crawling around on the ground.  |
| Insect (flying) | 1 | Leaf Litter/ Unsure because the insect can fly | First seen while it was flying, it then landed on the ground. It was black with red spots and was similar in shape to a lightning bug. |
| Spider | 1 | Leaf litter/ ground, seen inside a tire | The spider is small and black. It was seen crawling on a leaf inside a tire, very similar to previously seen spider |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MeterMark | Plant Species/ Morphospecies Description | Number of individuals | Plant Form Additional  | Observations |
| 1 | Clover | Approximately 20 patches  | Weed | The clover is moist because of the rain and is clustered in small patches throughout |
| 1 | Grass | Too many to count, covers entire quadrant | Perennial | The grass is brownish and squashed from being walked on |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MeterMark | Plant Species/ Morphospecies Description | Number of individuals | Plant Form  | Additional Observations |
| 1 | River Birch | 1 | Deciduous tree | The tree is relatively small and thin and does not have leaves |
| 1 | Moss | 2 patches | Weed | Thee moss is very green; it is growing near a fallen tree by the stream |
| 2 | Trees  | 2 | Deciduous | They have lost their leaves, similar to River Birch |
| 5 | Small red flowers | 5 | Flowers, probably part of a tree | Blown off a tree into the stream |
| 10 | Yellow Flower--Unsure | 1 | Flower? | Looks like plastic, but is growing in a fallen tree branch |

Indirect Animal Observation:

a)      Part of a skull was found in the first site; it resembled a deer scull which suggests that dear live in this region. They probably interact with the stages of succession on the nature trail.

b)      A feather was seen in the second site, near the stream. This suggests that bird live or visit that area. They might live in the trees or find food of the ground around the stream.

c)      One termite was seen on a tree that had fallen into the stream in the second site. The tree sounded hollow which suggests that many of them live inside the tree.

Questions:
1. Is your plot undergoing primary or secondary succession?  Explain in complete sentences.  A complete answer will use the data that you collected in questions 1, 2, and 3.
The plot is undergoing primary succession. This is shown by the appearance of moss, grass, many species of trees and plant life. Based on the data collected the plots examined were in a mid to late successional stage. This can determined by the species observed and plant species found.

2. Using the field data that you collected, determine the successional stage of your plot. Which of the following is it? a) early b) mid  c.) late d.) climax
As succession moves on a continuum, the successional stage falls between a mid to late succession. The combination of some early colonizer species and beginning of more stable, climax species in the plots tells that the stage is beginning to advance to a later series of succession which will then turn to a stable community or climax community. Many of the trees observed in the lab were fully grown or nearly so. Also the quadrants were completely filled with weeds and perennials. The insects found were basic species found in many areas that have claimed this area as their homes. However, larger, more stable organisms were not present, thus leading the stage to be classified as mid to late.

3. Some ecologists do not subscribe to the theory of a climax community. What is a climax community? Why do some ecologists believe they do not exist?

 A climax community is a stable mature community in a successive series which has balanced after evolving through stages and adapting to its environment. Many ecologists consider this to be an unworkable theory due to the fact that equilibrium can never fully be reached because of variations in climate over periods of time.
4. Doing outside research, what would the final successional stage of your campus be? If your school was removed and allowed to go through succession, what native plants and animals would you find? How long do you think it would take your campus to reach the climax community?

 If the campus was no longer present the area would begin a series of successional stages, ending in the final, stable habitat, of dominant organisms, also known as the climax community. Larger, woodier plants would take over the improved soil and early colonizers (annual plants, shrubs, intolerant trees) would fade out. Since the campus would start out from secondary succession after removal of the school the process would be far faster than that had it been from primary succession due to better soil conditions

Analysis:

Evaluation of the hypothesis: The hypothesis stated above was partially correct. The Heritage campus is undergoing succession as a result of the construction of Heritage High School. However, the HHS Nature trail actually shows a variety of stages including early, middle and late stages of succession. Also, the stages have a large variety of plants and animal species that interact regularly.

Assessment of accuracy: This lab had several possible sources of error. One possible source of error could be caused by incorrect measurements. It was challenging to measure large distances accurately with only one meter stick. Finding the diameters of each tree was especially difficult. In addition, only one quadrant of late succession was tested because of time constraints. This resulted in only having data from four trees to use for the non-specific computations. The computation could have been more accurate if there had been more data. Compiling the class data would also have helped asses the succession of the Heritage High School Nature Trail. It was also difficult to determine the species of the trees. If the lab was to be repeated it would be beneficial to use measuring tapes or string to help with measurements.  Also, a chart of different tree species might be helpful.

Application: Ecological succession is a process by which the structure and species of ecosystems change in response to changing environmental conditions. There are two types of succession, primary and secondary, secondary succession results when an ecosystem has been disturbed, removed or destroyed, but the underlying soil still remains. By observing the Heritage High school nature trail for the stages of succession, it shows that the Heritage campus is undergoing secondary succession. The original disturbance was caused when the region had been cleared for the construction of Heritage High School. The results showed that the regions around the campus were undergoing different stages of succession. One site that was observed only contained perennial weeds and grasses which suggest an early stage of succession. The second site was undergoing a mid-late stage, shown by the small deciduous and small insects found there. The last site with larger deciduous trees showed a later stage of succession. Also, by finding a deer skull in a place of otherwise early succession it can be concluded that the different stages around the Heritage High campus regularly interact with one another. Observing succession is important in order to help understand and learn “from nature and then applying nature to management.”

Works Cited: Sullivan, Robert. "The Working Forest." The New York Times. The New York Times, 19 Apr. 2009. Web. 24 Feb. 2013.