

Purpose

- To determine the fen biodiversity;
- To compare the plant biodiversity to fen pH level.

Hypothesis

The pH (acidity) will vary throughout different segments of the Heath, changing the plant species that reside in each segment and decreasing the biodiversity further into the Heath’s center.

Background information

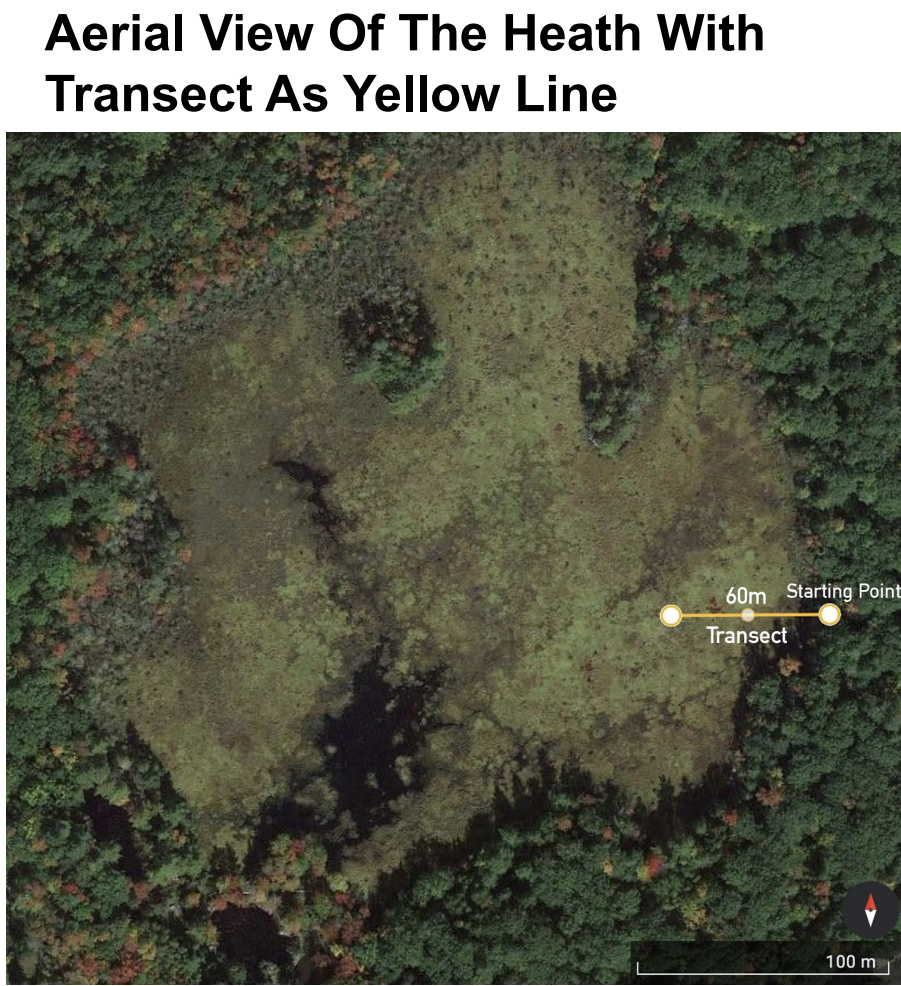
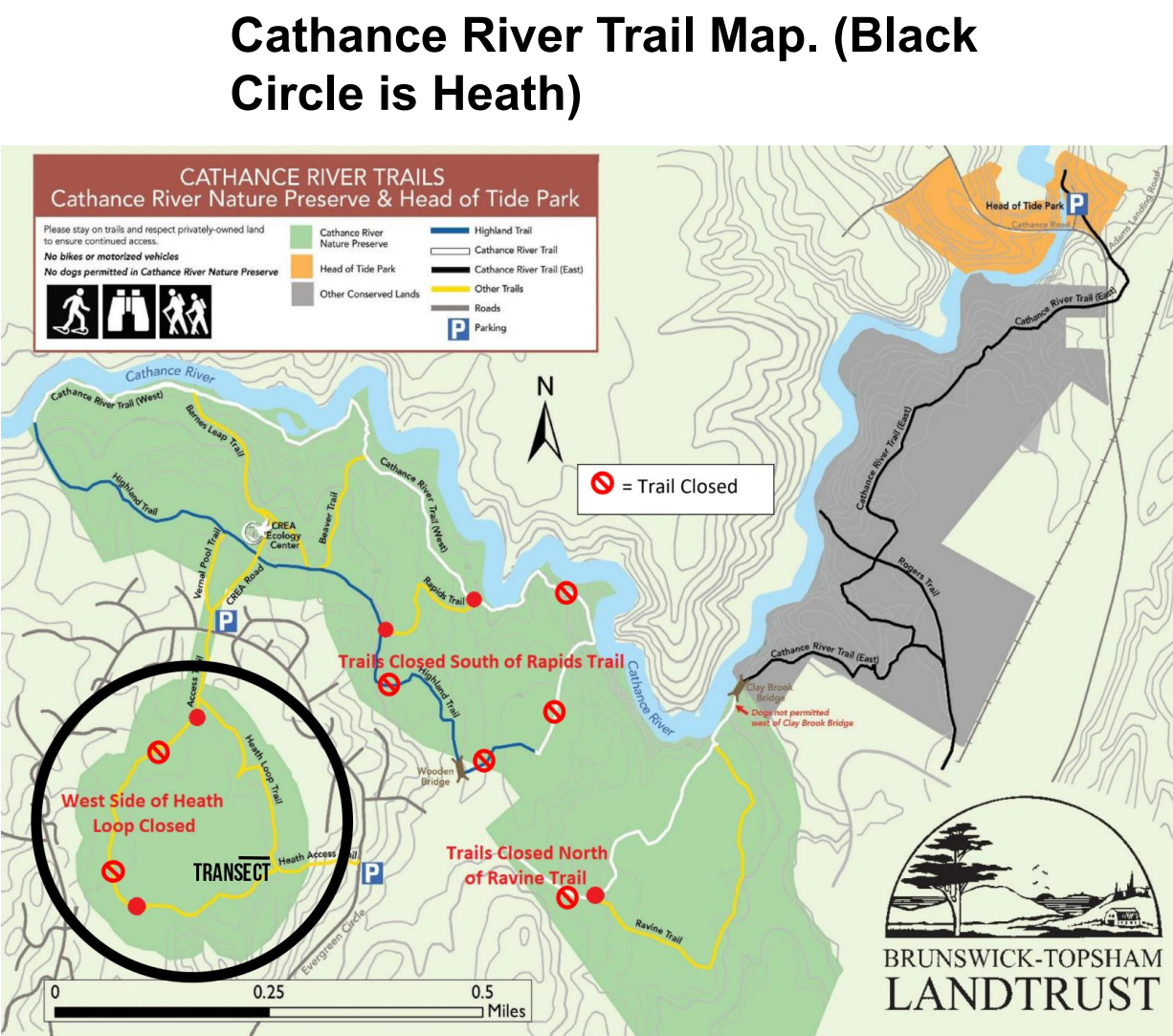
- Unlike what its local name suggests, the 12-acre Highlands Heath wetland is technically not a heath but is a fen.
- A fen is a peat (decayed vegetation or organic matter) accumulating wetlands fed by mineral-rich surface or groundwater.
- Peat is made up of thick mats of vegetation, the majority of which is moss (Sphagnum Moss at the Heath) and a small number of stemmed plants.
- pH stands for the Potential of Hydrogen. It measures the concentration of hydrogen ions in a substance such as water.
- pH affects the number of nutrients and chemicals that are soluble and available in soil/water. The more soluble and available the nutrients are, the better the plants grow to a point.

Procedure

1. Use GPS to identify the coordinates of where to measure. The starting transect coordinate is 43°, 57 min., 1.3 sec., N. 69°, 56 min. 57.7 sec., W. See map and aerial photo below for transect location.
2. Map and create a 60-meter transect starting at the Heath’s edge, and going towards the center.
3. Use a random number generator to find 10 distances on the transect, making the segments for measurements. Flag each spot. The random number distances were, 4, 8, 31, 32, 39, 43, 48, 49, 52, 56 meters.
4. For each point, place sticks in the ground to form a 1x1m quadrat.
5. Identify each plant (and any other organisms) within each quadrat.
6. Measure the pH of soil and water using a pH probe for each quadrat.

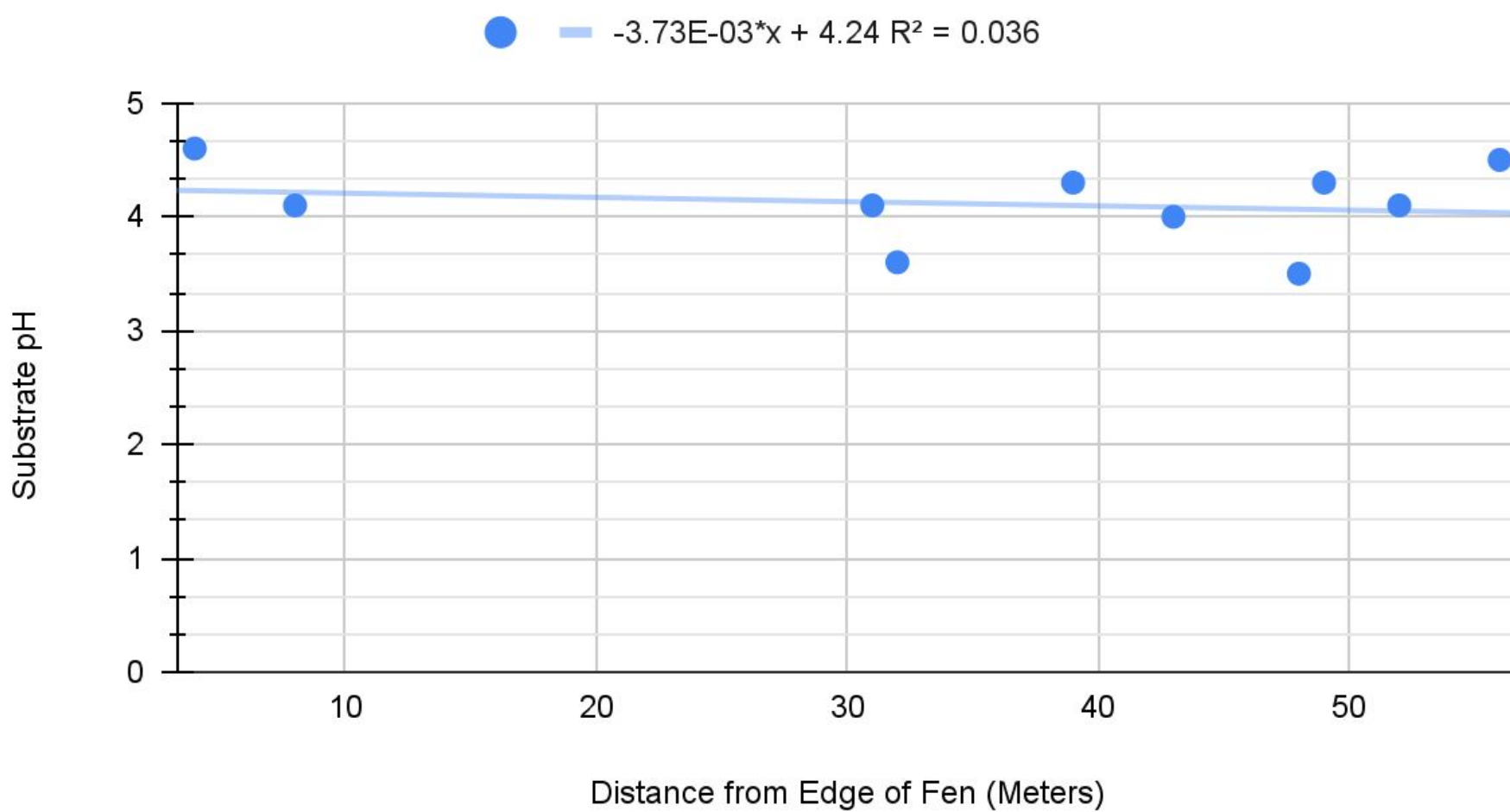
An Ecological Survey of the Heath, Topsham, Maine

By Eleanor Young, Aaron Paul, and Dylan Trockman

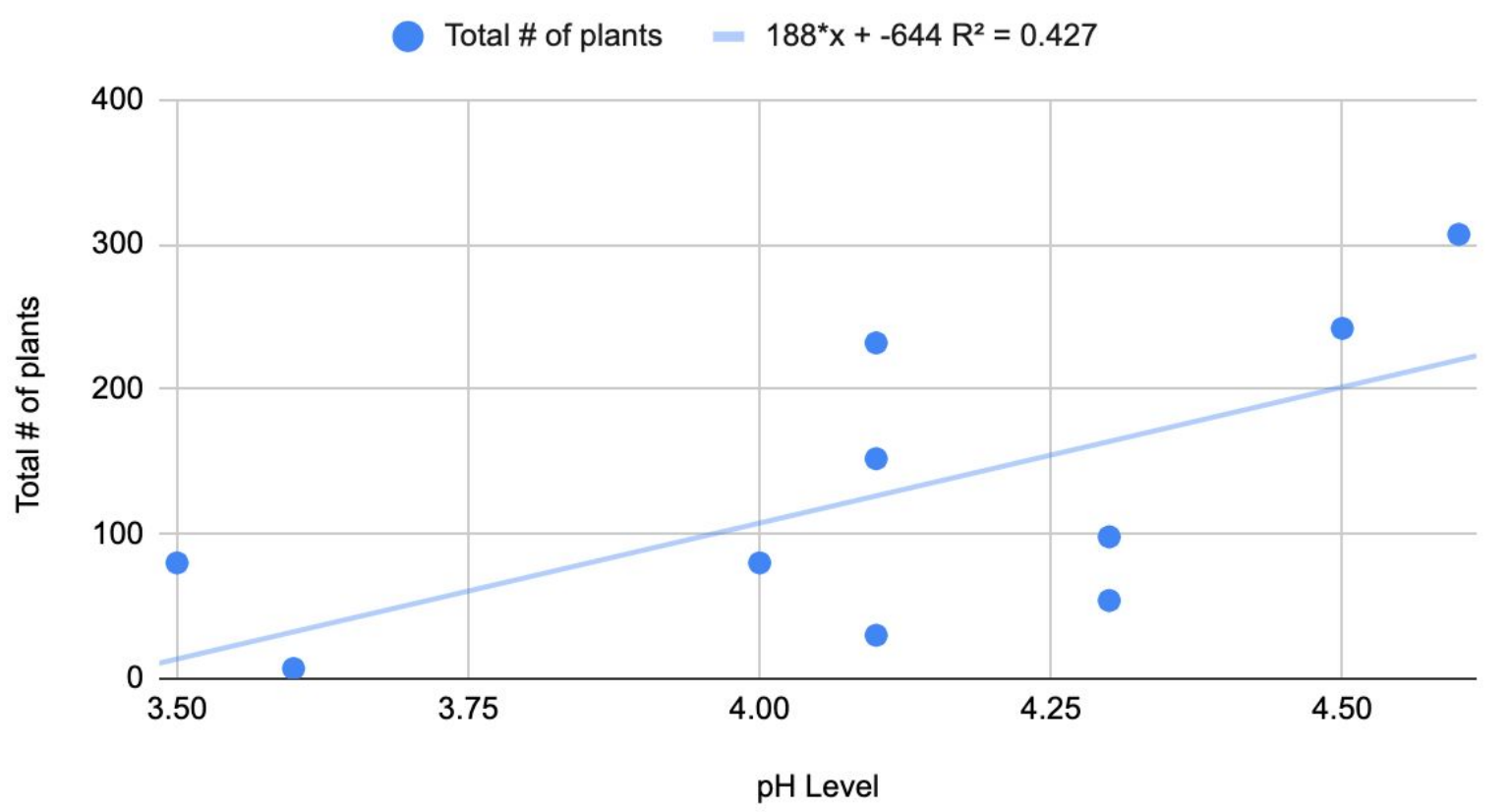


Graphs

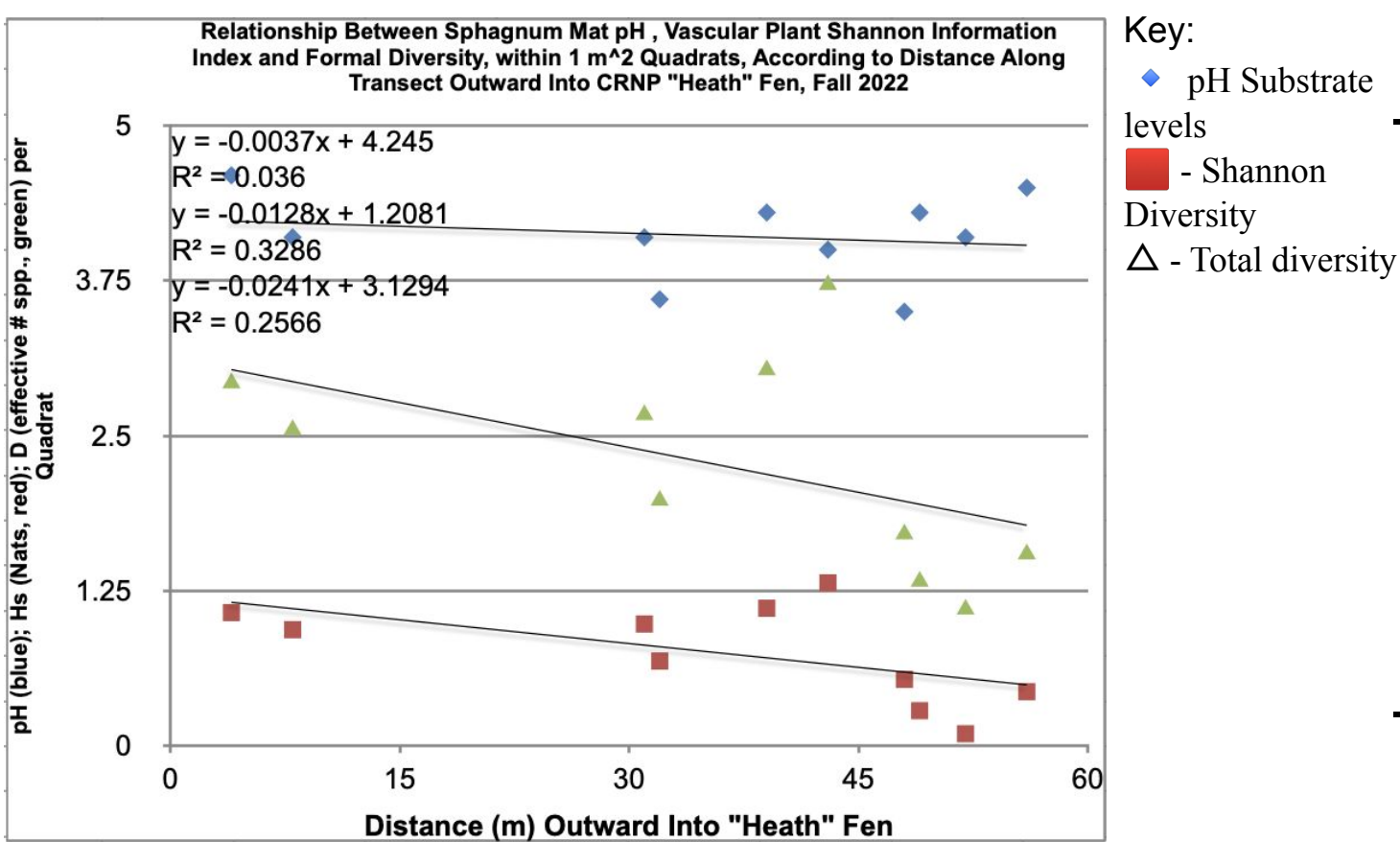
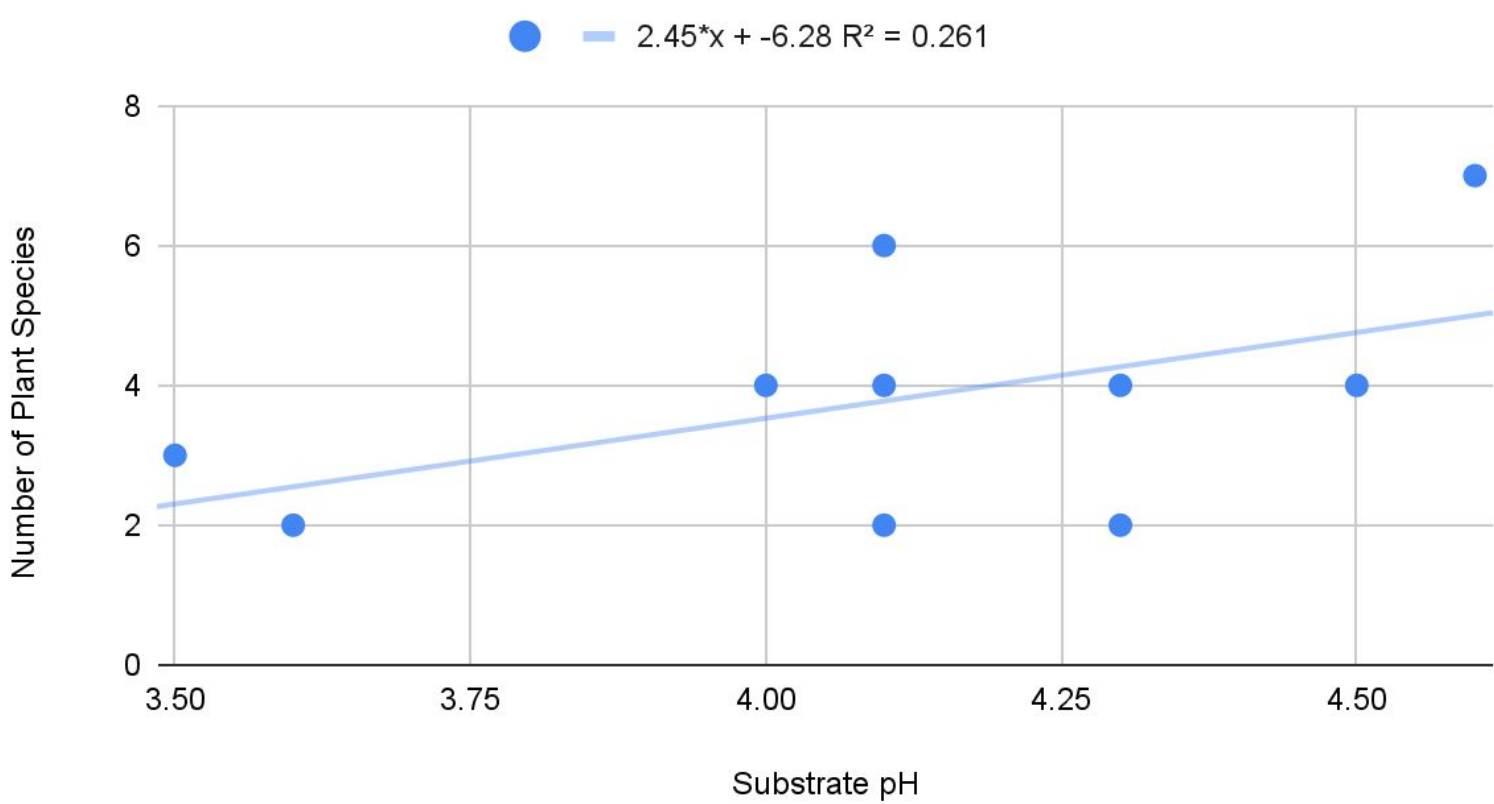
How Distance From Edge of Fen Impacts Substrate pH



How Substrate pH Relates To Total Number Of Plants



How Substrate pH Relates to Number of Plant Species



Conclusions

- The findings support the hypothesis that the pH and biodiversity will decrease further into the Heath’s center.
- The levels of acidity slightly correlated with the distance into the fen. While the pH did change from quadrant to quadrant there was a slight decline further into the Heath. Plant biodiversity also decreased further into the fen, but in a stronger manner than pH did.
- These findings are similar to the 2021 study done on the Heath as that study concluded a slight correlation between distance and pH, finding that the further from the Heath’s/Fen’s edge, the lower the pH.
- The second hypothesis was confirmed by the results of the findings as higher levels of pH in the quadrants created both an increase in total plants and an increase in plant species.
- The lowest measure pH was 3.5 at 48 meters from the edge of the fen with 3 total plant species counting 80 plants, while the highest pH measure was 4.6 at 4 meter from the edge of the fen with a total of 7 plant species counting 307 plants, clearly showing a correlation with pH and total plant species.
- Most sources of error were made through counting and not necessarily double-checking or being exact. Human mistakes were often the cause of any error or miscalculation in the Heath; however, most counts were accurate and were able to convey solid data.
- One improvement for future heath studies is trying different instruments to measure pH such as using high precision pH test strips. The researchers only used an electronic scan-like device, and it may be more accurate with an additional paper pH testing method.

Our Thanks

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Dr. Fred counting in quadrant 1

Measuring lengths to quadrants -

Aaron, Dylan, Eleanor

Researchers investigating quadrant species







