The pHlower Chemists' flower chemistry

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Introduction- Nature Journaling Observations

📍Wheeler Lake, Gore Mountain Range, CO

Why is the soil so soft?

How does the soil vary in the lake, next to, and further?

Why aren't there flowers near the lake?

Introduction- Plants!

Rosy Paintbrush (Castilleja rhexifolia)

- Rosy paintbrush, a subalpine hemiparasite
- Prefer sandy acidic soil between 5.1 and 5.5 ph
- Colorado Fescue, host plant thrives in shaded, drier areas

Question

How does the soil chemistry impact the Rosy Paintbrush as the distance from Wheeler Lake increases?

Hypothesis

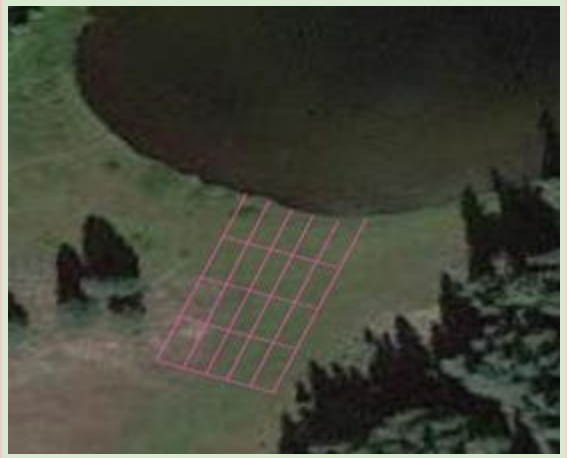
The Rosy Paintbrush will thrive the farther it is from the lake due to changes in soil chemistry

Materials

- Soil testing kit
- Flagging tape & sticks
- 20m measuring tape
- pH water testing kit
- Soil thermometer
- Notebook, pencil
- Filtered water

Methods

1. Made a 40x10 meter area, with 20 different plots
    a. Flags placed 10 meters apart starting from the lake (major plots)
2. At the center of each major plot we collected soil chemistry data
3. Gathered temperatures at each flag for 4 rounds
    a. Round 1: 4-6pm
    b. Round 2: 11:30am
    c. Round 3: 5:10pm
    d. Round 4: 9:41am



Methods

Followed soil testing kit, sampled the soil, and collected data (ensuring to clean tube before and after)

pH steps:

- Place soil, barium sulphate, and pH solution into test tube
- Shake tube, let sit, and compare to chart

Methods

Sampled the soil, and collected data
(ensuring to clean tube before and after)

N, P, K steps:

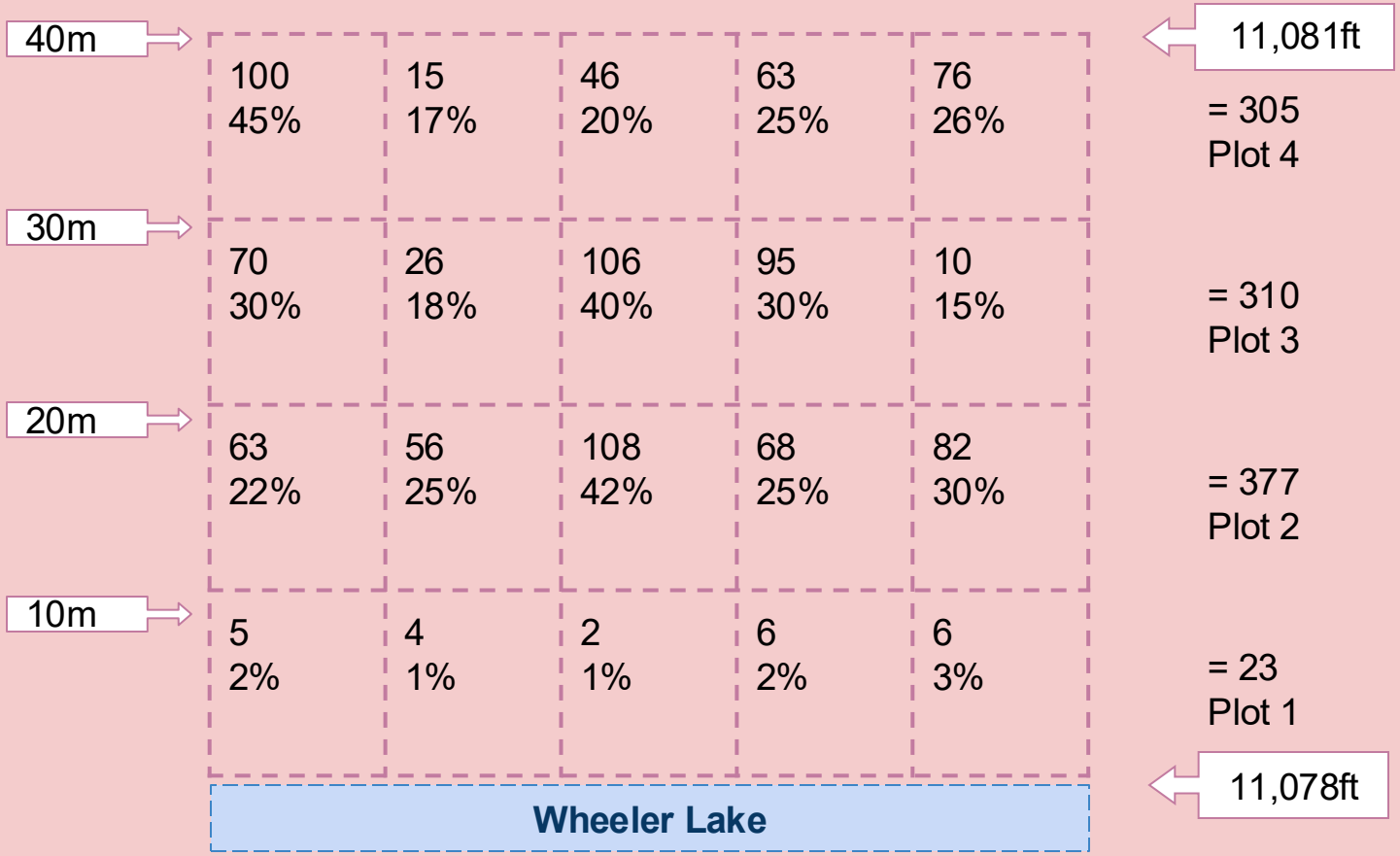
- Filtered soil, added required test solution & powders, and shook test tubes
- Let sit, and compared to chart

Methods

Flower Count:

- Kept a tally of the number of Rosy Paintbrush flowers per section
- Identified the percent coverage of the flower
- Counted all the Rosy Paintbrush flowers twice for accuracy
- Counted by stems not bunches

Data- Plots and flower count



Data- Temperature

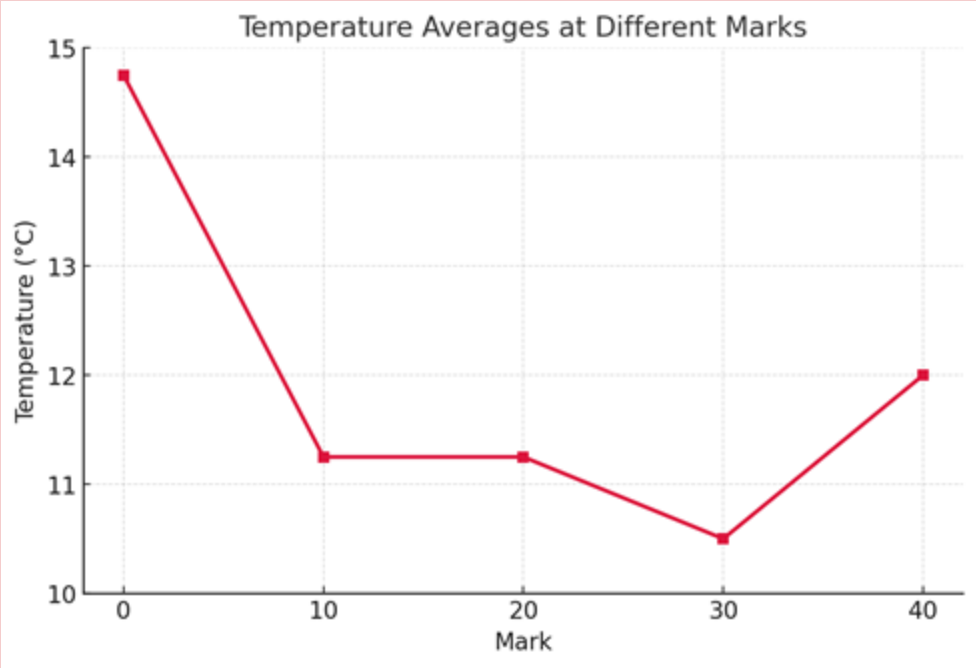
Mark	Temp. 1 4-6pm	Temp. 2 11:30am	Temp. 3 5:10pm	Temp. 4 9:41am
0	15°C	15°C	15°C	14°C
10	13°C	10°C	12°C	10°C
20	13°C	11°C	12°C	9°C
30	13°C	9°C	11°C	9°C
40	14°C	12°C	12°C	10°C

Data- Soil testing

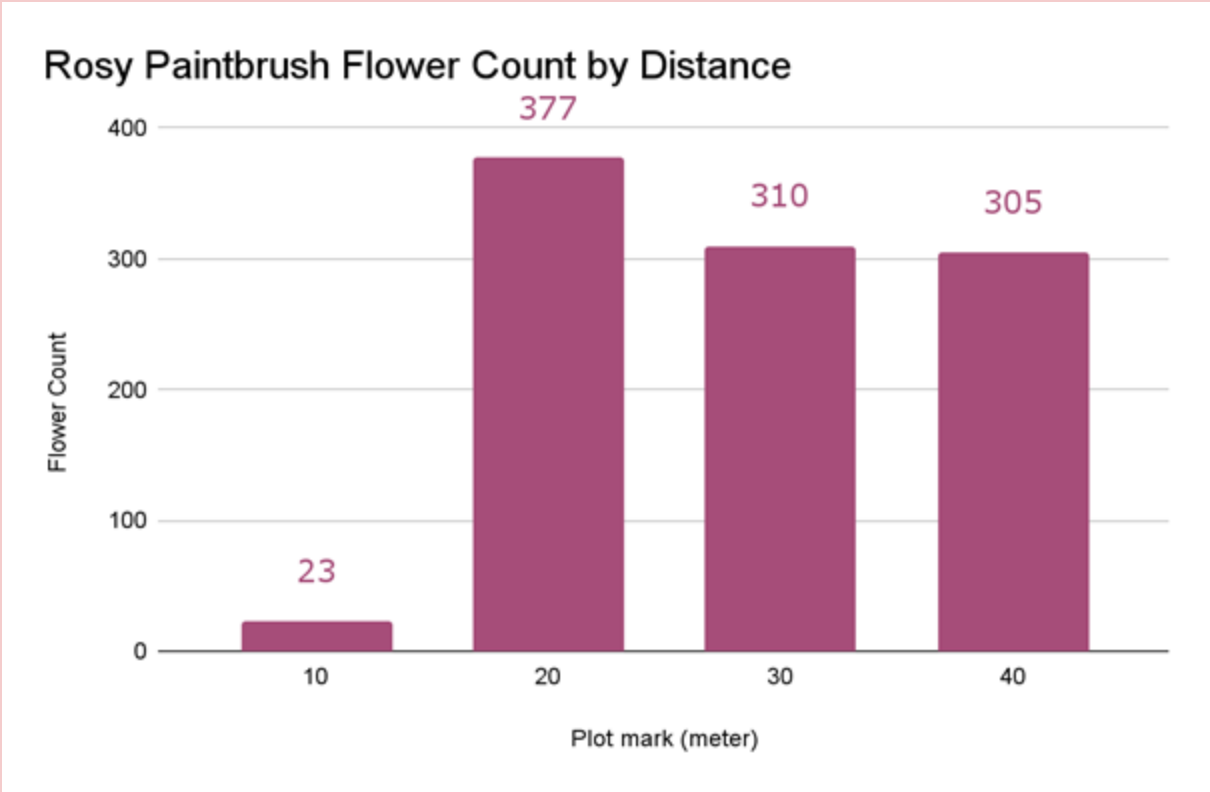
Mark	pH	Nitrogen	Phosphorous	Potassium
5	5.0	N0	P0	K1
15	5.5	N0	P1	K0
25	5.5	N1	P0	K0
35	6.0	N0	P0	K0
Water	6.2			

Results - Temperature

Mark	Temperature Averages (°C)
0	14.75°C
10	11.25°C
20	11.25°C
30	10.5°C
40	12°C

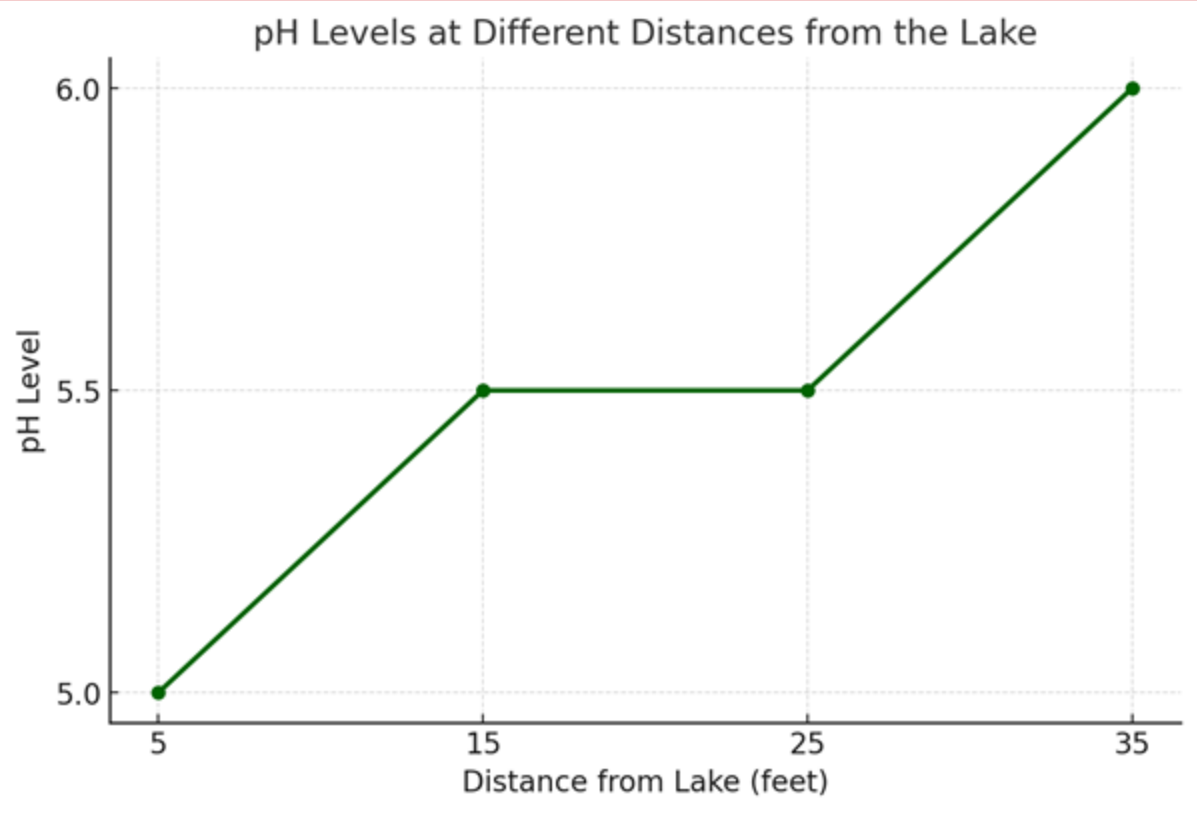


Results - Flowers



As distance from the lake increases, number of flowers increases

Results- Soil Chemistry (pH)



Analysis/ Discussion

What does this mean for the environment/ flower healthiness?

- Lower pH levels mean higher acidity, which causes a decrease in plant nutrients
- The absence of the flower near the lake suggests that soil chemistry (pH and moisture) and environmental factors (sun and temperature) correlates with healthy growth in that area

Analysis/ Discussion

Limitations-

- Used water pH strips by mixing soil + water (method for testing pH)
- Weather
- Topography
- Toolkit had a missing spoon
- Human disturbance/error

Conclusion

What do the results support?

- Rosy Paintbrushes prefer shaded, slightly acidic soil (near the hill, away from the lake)
- Can’t thrive near soggy, warm areas (near lake)

Implications?

- Supports hypothesis that soil acidity and shade drive Rosy Paintbrush distribution
- Suggests lake proximity inhibits growth
- Changes, like climate shifts or runoff, in soil chemistry could further limit suitable Rosy Paintbrush habitats

QUESTIONS???

References

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