

Determining Phosphorus in Soils at Marion County Lake

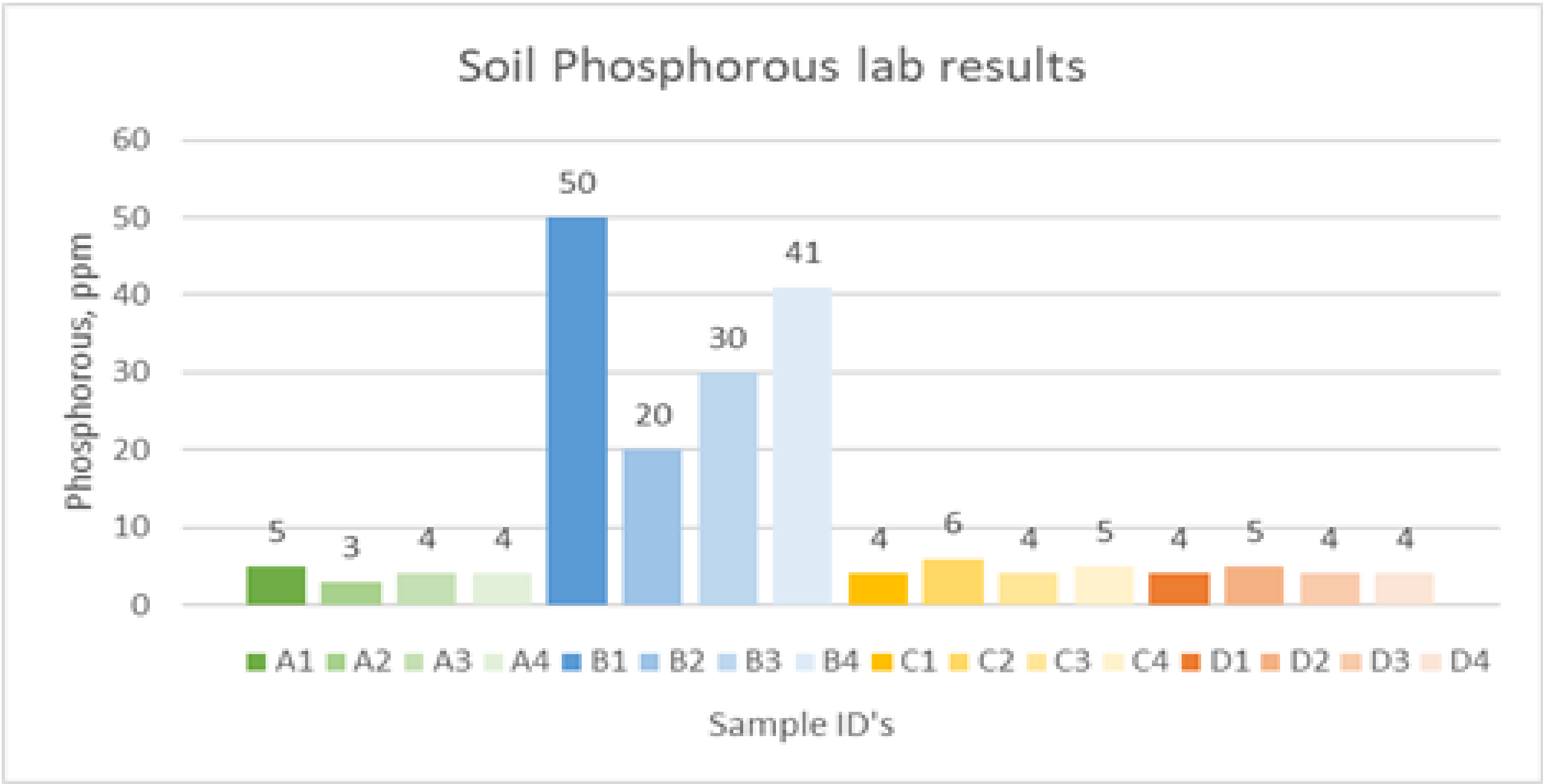
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Problem & Purpose

Marion County Lake and Park does not have any established management goals. One of several issues at the park is the recurrence of harmful algal blooms. Soil quality data, among other information, is needed to determine the best method to remedy algal blooms at Marion County Lake.

The goal of this study is three-fold:

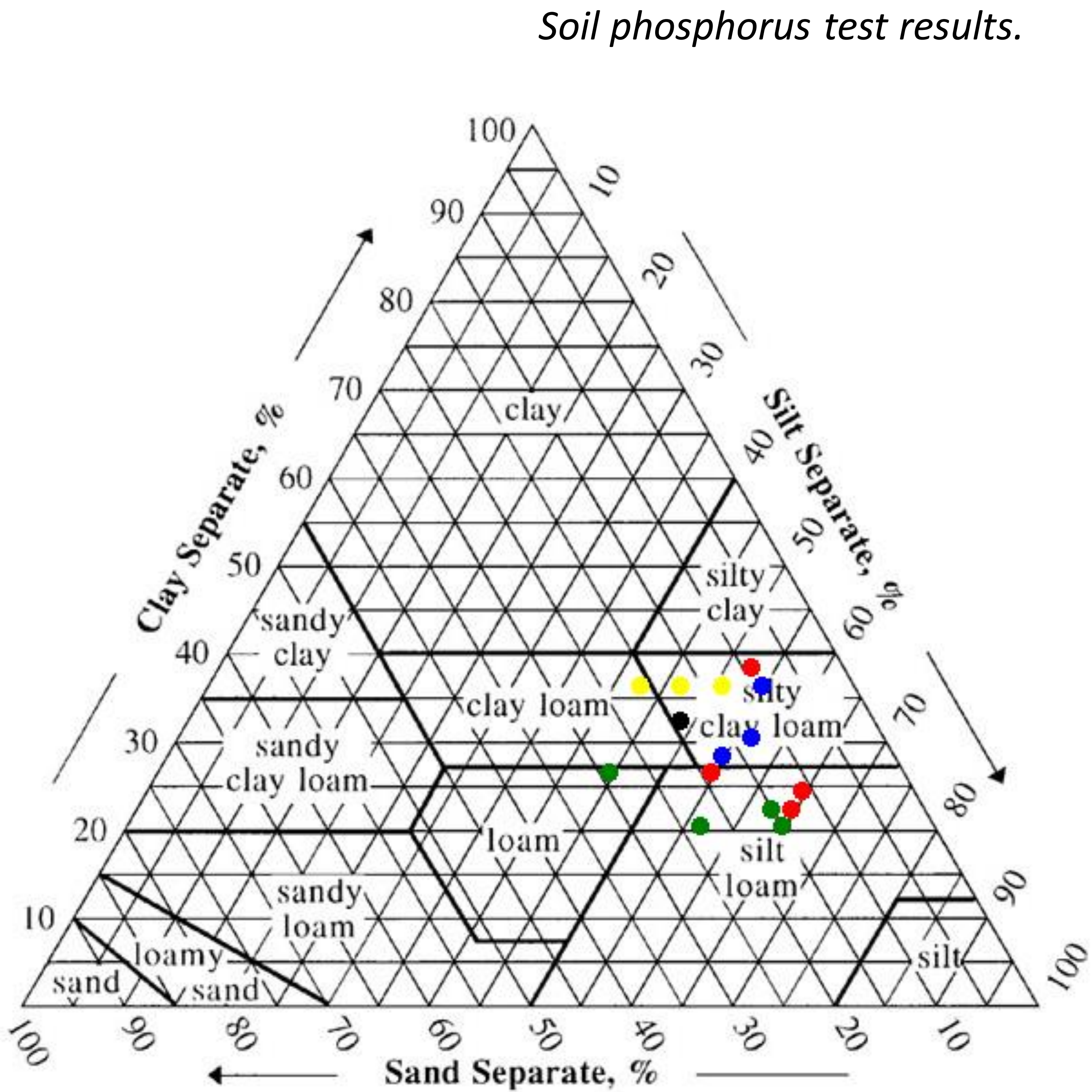
1. Determine the phosphorus content in soils near the lake’s edge.
2. Investigate relationships between phosphorus content, soil series, slope, and other environmental factors.
3. Delineate trends between distance from the lake’s edge and soil phosphorus content.



Above: Marion County Lake with sample transects and points labelled in red.

Methods

- Soil from four transects around the lake were analyzed. Four soil samples were taken from each transect using an auger. Field observations regarding soil color, effervescence, presence/absence of redoximorphic features were noted for each sample.
- Soil samples were sent to the Kansas State University Soil Testing Lab for chemical analysis. pH, organic matter, phosphorus, ion concentrations, CEC, texture, and particle size distribution were measured.
- The observed and measured soil properties were compared to expected soil characteristics based on soils maps from Web Soil Survey.



Soil texture triangle with plotted sample texture. Transects A, B, C, and D are represented by green, blue, yellow, and red, respectively. B3 and C2 are represented by black, as they have the same texture.

Results & Discussion

Results from the laboratory were received and analyzed using several methods. An Anova test was applied to the data in various configurations. This statistical test answers the question, "Is this factor making a significant difference between transects?" The Anova tests showed a correlation between flat slope and high phosphorus. Contrary to expectations, the Anova tests showed an inverse correlation in the data between organic matter and phosphorus. Further findings from the Anova test showed no correlation between distance from the lake's edge and phosphorus concentration. Finally, using a log-10 scatter plot, a positive correlation in the data was observed between phosphorus and CEC.

The phosphorus levels measured in transect B are significantly higher than the others. Land use in that area is more residential than other samples. Thus, residential land use might be an important contributor to phosphorus inputs to the lake.

The average CEC, organic matter, and soil texture all varied from what Web Soil Survey predicted for this area. Measured organic matter far exceeds mapped values for all samples. The textures of the samples were also all coarser than what is indicated by soil maps.

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