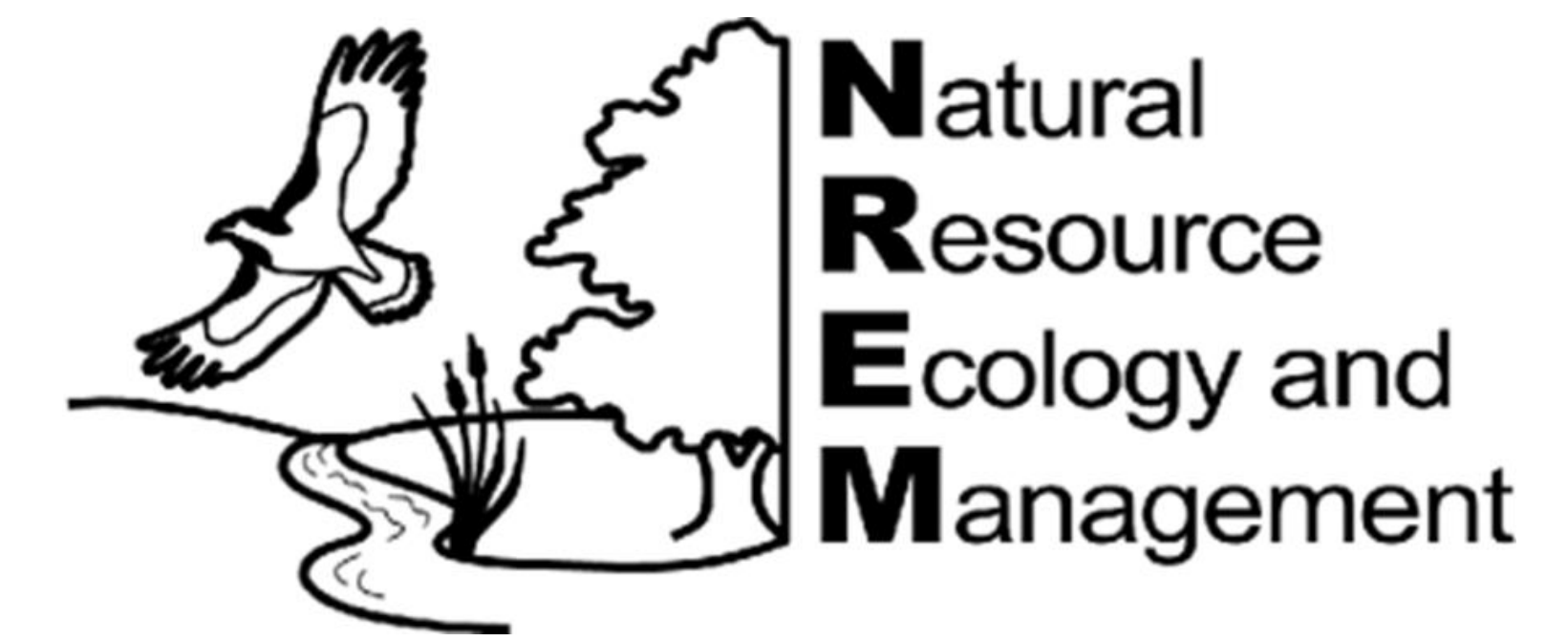


Stormwater Wetlands Fail to Improve Water Quality at Ada Hayden Heritage Park, Central Iowa



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Introduction

An ecological function of a stormwater wetland is to filter pollutants, including nutrients and sediment,¹ thereby reducing contaminant inputs to natural aquatic ecosystems.² Monitoring effectiveness of stormwater wetlands is necessary to improve these systems. In this study, we examined pollution-removal effectiveness of stormwater wetlands by measuring changes in water clarity from inflow to outflow locations. Our secondary objective was to measure relationship between water clarity and plant cover in these wetlands.

Objectives

- Determine if stormwater wetlands are removing pollutants from surface water
- Determine if plant cover is related to water clarity

Hypotheses

- Water clarity will increase from the surface water inflow location to the wetland outflow
- Plant cover will be positively related to water clarity

Methods

Study Site

- Stormwater wetland located at Ada Hayden Heritage Park in Ames, Iowa (Fig. 1)

Study Design and Data Collection

Data were collected once per sample day (2 days, 1 week apart) at nine locations (inflow, middle, and outflow of three cells)

- Water clarity was measured (as secchi depth) using a water transparency tube
- Plant cover was measured within a 1m² by 1m² plot at distances of 1m, 2m, 3m, and 4m from the shoreline. Values from all depths at each location were averaged for data analysis

Plant cover and water clarity are reliable indicators of wetland water quality and pollutant filtration.⁵

Data Analysis

- Linear regression was used to model the relationships between plant cover and water clarity, and how water clarity varies by sampling location between the inflow of cell one and the outflow of cell three

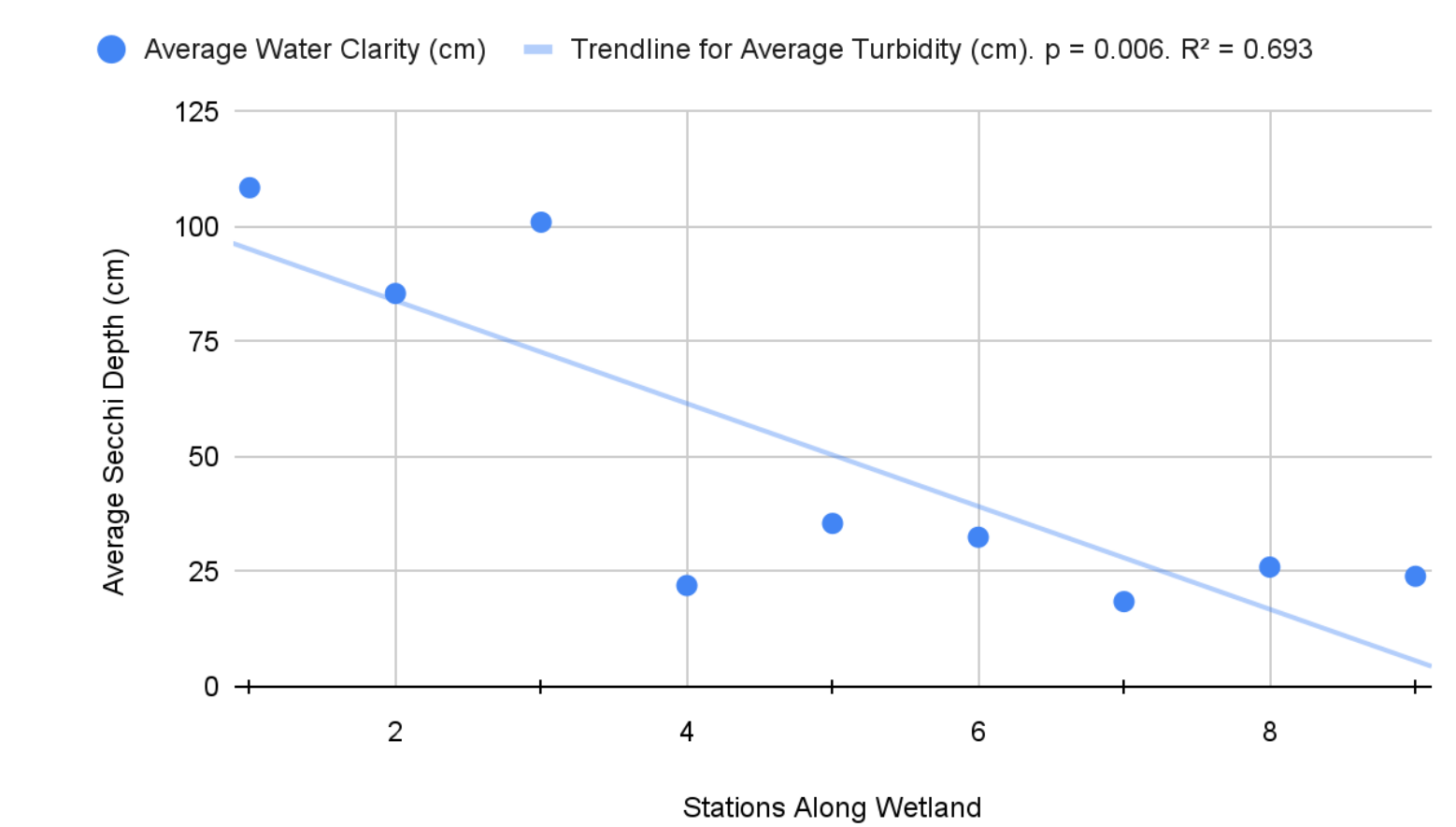


Figure 3. Relationship between water clarity and distance from surface water inflow location ($R^2=0.69$). Location 1 was situated closest to the surface water inflow, and location 9 was closest to the wetland outflow.

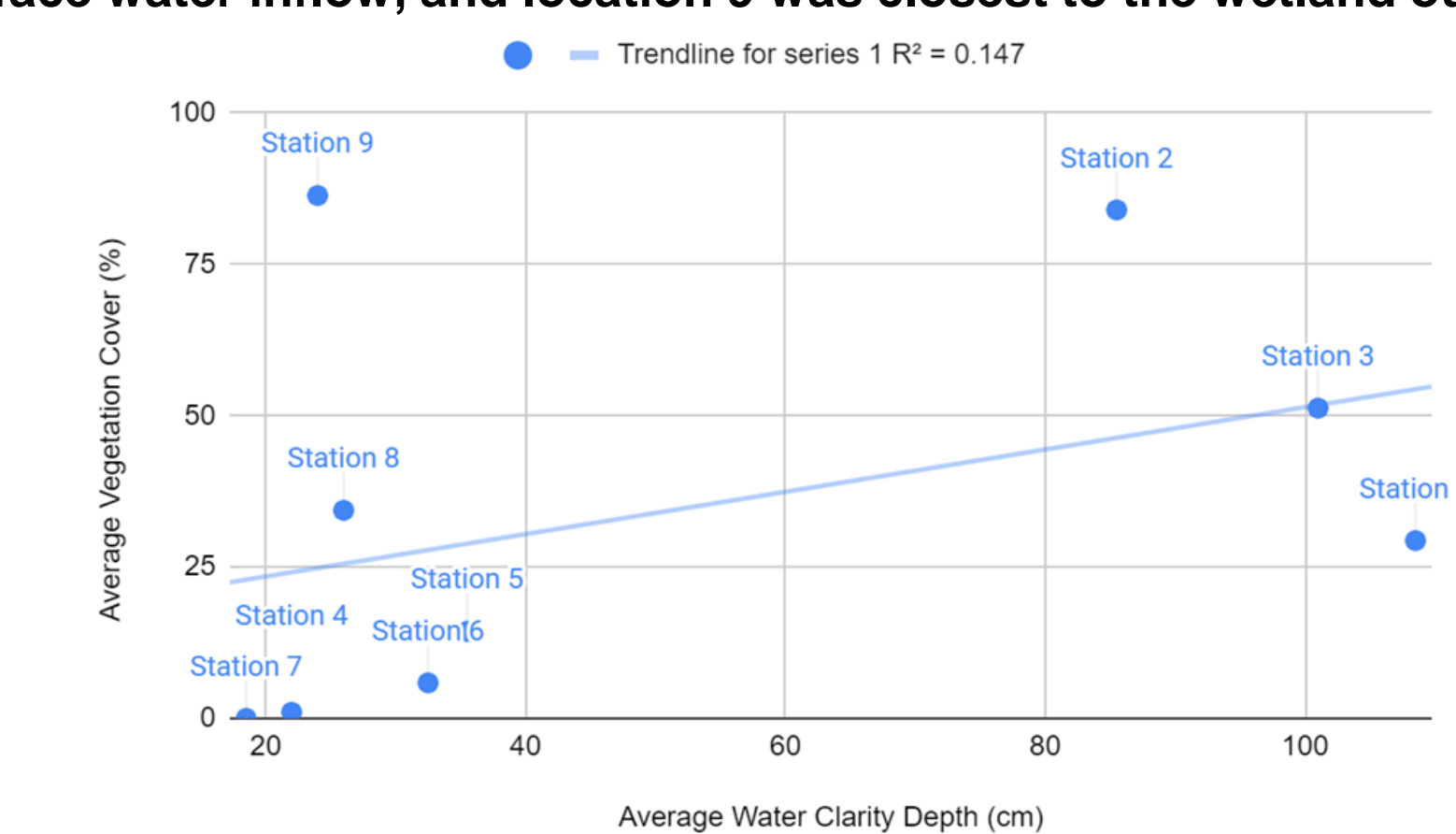


Figure 4. Relationship between average plant cover and average water clarity between sample days at each location ($R^2=0.15$).

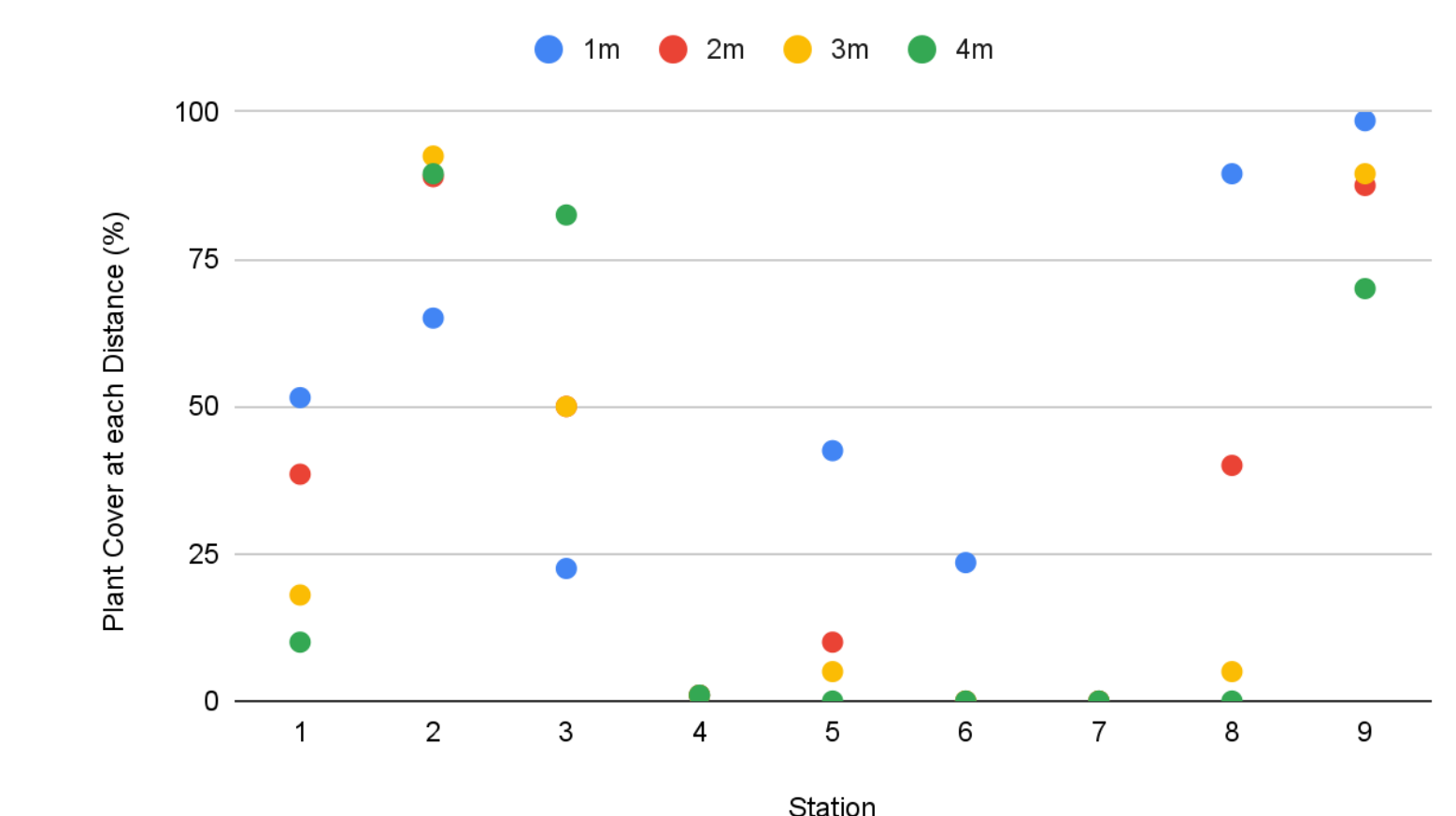


Figure 5. Percent plant cover at each wetland location and distance from shoreline

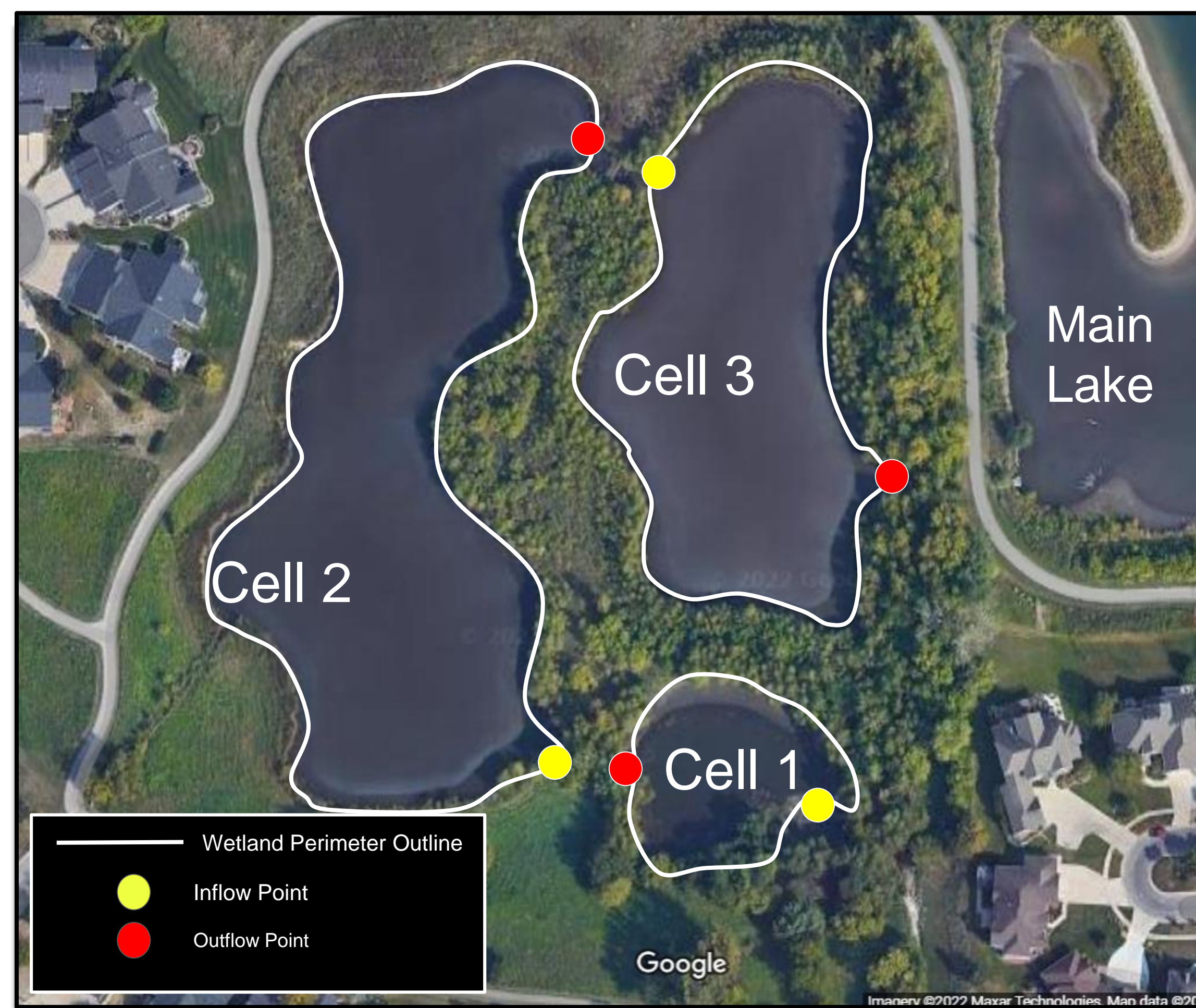


Figure 1. An aerial view of the study wetland.³ Water flow originates at the inflow point of cell 1 and exits at the outflow of cell 3.

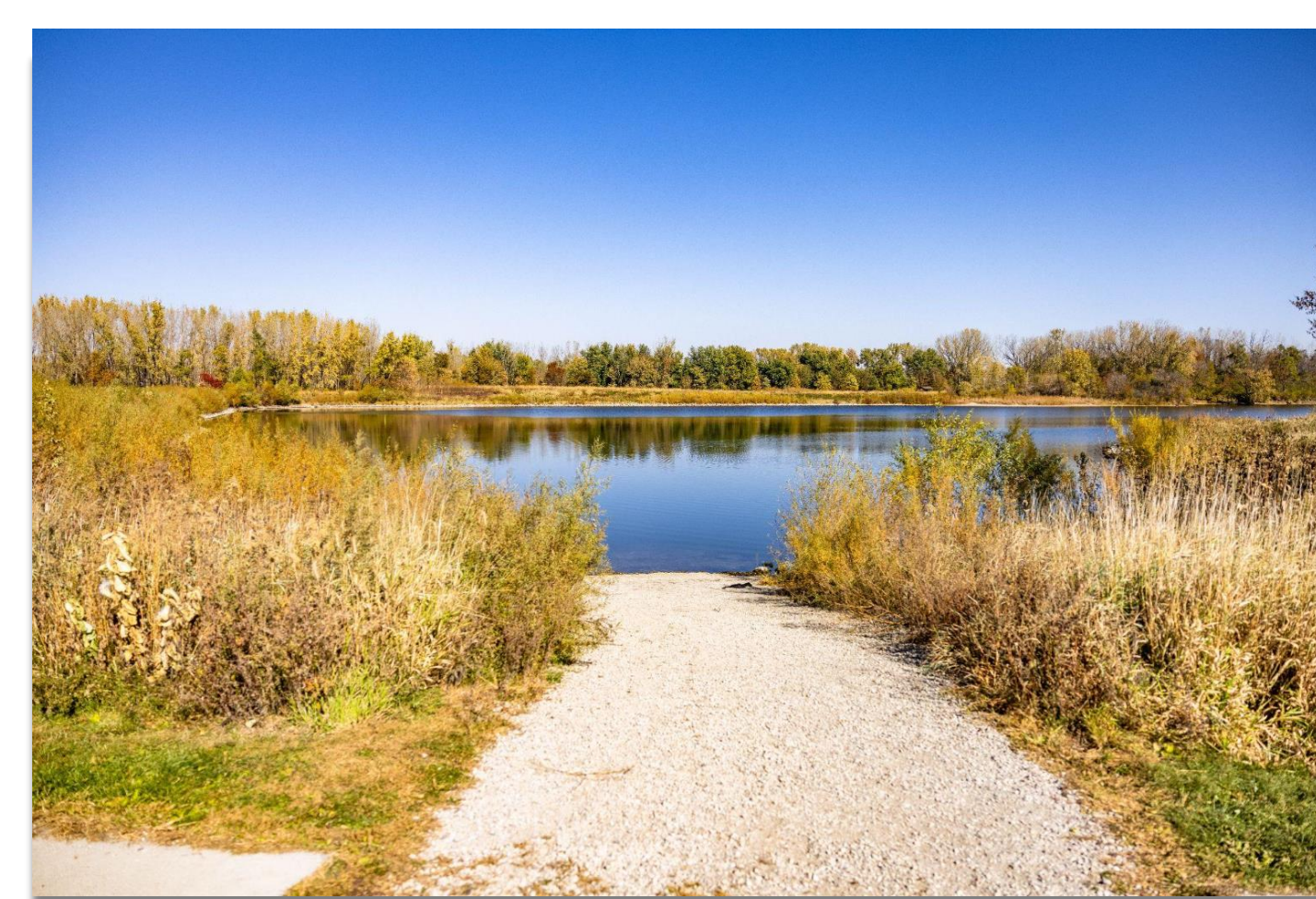


Figure 2. The lake in Ada Hayden Heritage Park that receives water from the wetlands.⁴

Results

- In contrast to our hypothesis, water clarity declined from inflow to outflow locations in our wetland system (Fig. 3; $p = 0.006$)
- There was a slightly positive trend when comparing plant cover to water clarity, but not a significant relationship (Fig. 4; $p = 0.31$)
- Five of the transects we measured showed a decrease in plant cover between meter 1 and meter 4, two showed an increase, and two showed no change due to an absence of vegetation (Fig. 5)

References

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Discussion

- In contrast to our hypotheses, water clarity increased from inflow to outflow and there was no relationship between water clarity and plant cover at a distance of up to 4 m from the shoreline
- Based on previous research conducted in Ada Hayden Heritage Park, the observed decline in water clarity from surface water inflow to wetland outflow is likely due to bioturbation, specifically disturbance of sediment by fishes⁶
- Results indicate that these wetlands are not filtering pollutants, including sediment and associated nutrients from surface water