

# Understanding Cyanobacteria in Marion County Lake

Hunter Hess, Ciara Hogsett, Thomas Hopkins, Molly Smith

## Introduction

Marion County Lake has experienced fluctuating algal blooms for the last fourteen years that have hampered lake managers and residents alike. Many NRES studies have taken place at the site to attempt to diagnose the cause of the blooms and provide a solution. The research team elected to analyze three potential causes of these blooms: weather, nutrient increases, and waterfowl presence.

## Research Question & Hypothesis

**Research Question:** What is causing cyanobacteria blooms to occur at Marion County Lake?

**Hypothesis:** (1) Weather factors, (2) more geese, and (3) increases in nutrients will cause cyanobacteria blooms.

## Objectives

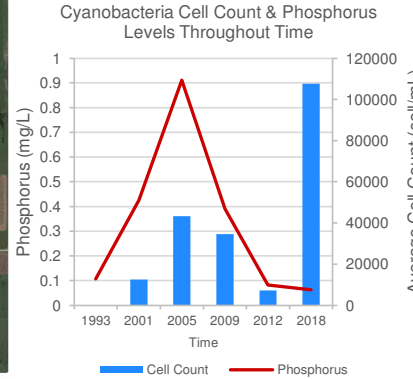
- Determine if there is a correlation between weather, geese, or nutrients and cyanobacteria
- Analyze results

## Methods

**Weather:** Temperature and precipitation data were gathered from the Marion County Reservoir. Cyanobacteria bloom dates was taken from the Kansas Department Health and Environment webpage. These were analyzed on a daily, week-of, monthly, and annual scale to determine short- and long- term effects of weather on cyanobacteria.

**Geese:** Rough estimates of geese populations were made, along with their estimated phosphorus contribution and their total yearly contribution to the ppm of phosphorus year-round.

**Nutrients:** Water samples were collected from different locations at Marion County Lake and then analyzed to determine nutrient concentrations. The average of the results was combined with data collected by KDHE, as well as previous NRES groups to show the nutrient concentrations over time.



## Results

Upon analysis, the team was unable to find conclusive data that the geese are in fact directly responsible, considering no geese were observed. Observations were made when the geese had migrated, giving no real data to work with.

Precipitation alone did not seem to have a strong correlation with cyanobacteria blooms. Cyanobacteria blooms seemed to primarily occur under a range of temperatures 60-85 degrees Fahrenheit. Long and short-term data showed similar trends for temperature and precipitation data.

Phosphorus appeared to initially correlate to cyanobacteria cell count up until the data from 2012. No absolute conclusion can be made on the role of phosphorus in algal blooms at Marion County Lake.

## Discussion

Historically, nutrients in water have always played the largest role in the formation of algal blooms. Excess phosphorus and nitrogen from anthropogenic sources stimulate the algae to reproduce out of control. According to anecdotal evidence, the massive goose population seems to be the reason for this influx of nutrients.

When it comes to weather, it is possible that precipitation could still promote cyanobacteria in tandem with other factors, but this was not investigated. Temperature results of this analysis were comparable to that of the 68-95 degree Fahrenheit range published by Martin Dokulil in 2016.

## Next Steps

- Marion County Lake should collect further geese, weather, nutrient and cyanobacteria status data
- Future research should investigate wind, light, and water temperature weather factors
- When more data is available, a similar analysis should be repeated

