

University of Northern Iowa

UNI ScholarWorks

---

Summer Undergraduate Research Program  
(SURP) Symposium

2023 Summer Undergraduate Research  
Program (SURP) Symposium

---

Jul 28th, 11:00 AM - 1:30 PM

## A Tale of Two Rivers: Unveiling Water's Secrets Across Continents

Jace Bell

*University of Northern Iowa*

Mohammad Iqbal

*University of Northern Iowa*

*Let us know how access to this document benefits you*

Copyright ©2023 Jace Bell and Dr. Mohammad Iqbal

Follow this and additional works at: <https://scholarworks.uni.edu/surp>

---

### Recommended Citation

Bell, Jace and Iqbal, Mohammad, "A Tale of Two Rivers: Unveiling Water's Secrets Across Continents" (2023). *Summer Undergraduate Research Program (SURP) Symposium*. 5.  
<https://scholarworks.uni.edu/surp/2023/all/5>

This Open Access Poster Presentation is brought to you for free and open access by the CHAS Conferences/Events at UNI ScholarWorks. It has been accepted for inclusion in Summer Undergraduate Research Program (SURP) Symposium by an authorized administrator of UNI ScholarWorks. For more information, please contact [scholarworks@uni.edu](mailto:scholarworks@uni.edu).

**Offensive Materials Statement:** Materials located in UNI ScholarWorks come from a broad range of sources and time periods. Some of these materials may contain offensive stereotypes, ideas, visuals, or language.



# A Tale of Two Rivers: Unveiling Water's Secrets Across Continents

Jace Bell and Dr. Mohammad Iqbal

## Introduction

Dry Run Creek outside of Cedar Falls, Iowa in the United States and New Town Rivulet surrounding Hobart, Tasmania in Australia are two comparable hydrological water flows. From the natural sources of the water flows to the watershed impacts from industrial, municipal, and agricultural practices further downstream, the similarities and differences of the physical, chemical, and geomorphological properties of these two hydrological systems on separate continents will permit further understanding of Earth's comprehensive ecosystem on two continents.

Water from seven sites along the Cedar River and the Mississippi River and at Prairie Lake, Alice Wyth Lake, and Big Woods Lake were collected and analyzed to compare the differences between flowing and static water systems.

## Objectives

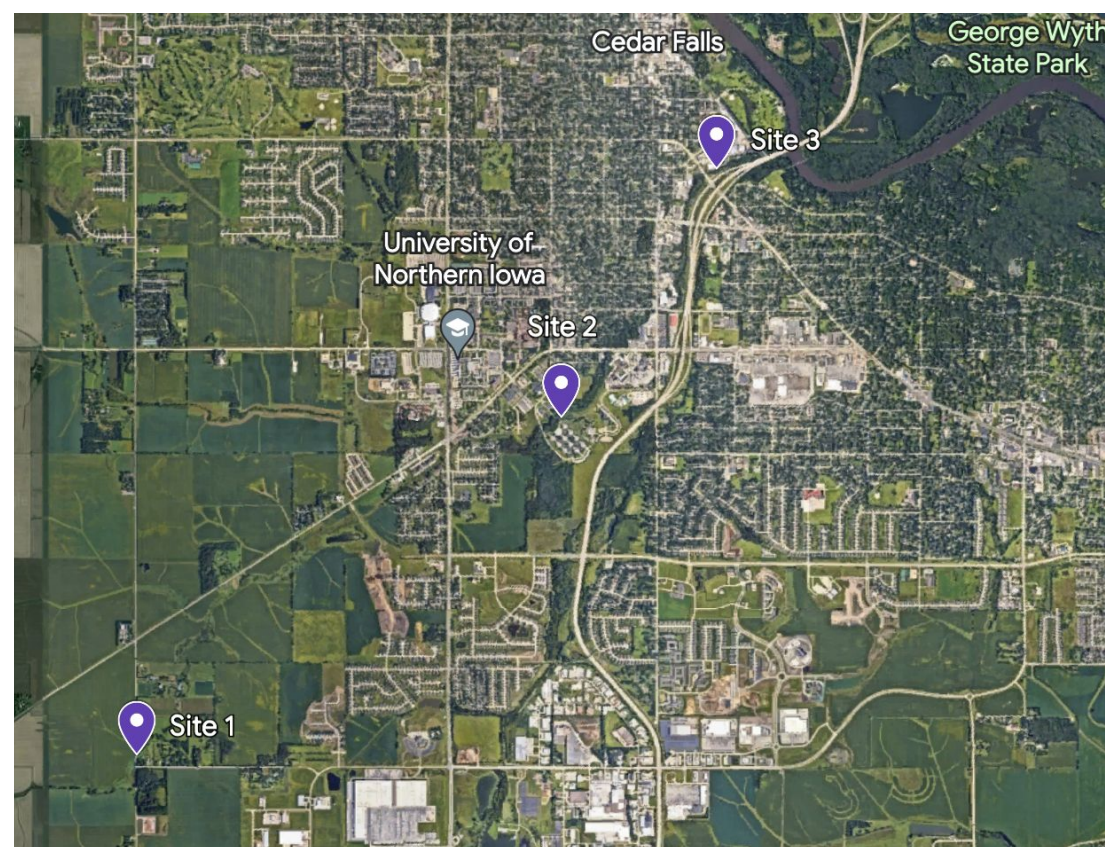
- Compare the physical and geomorphological properties of Dry Run Creek in the United States and New Town Rivulet in Australia.
- Compare the water quality attributes of these two hydrological systems.
- Compare water quality characteristics between river and lake water systems.

## Methods

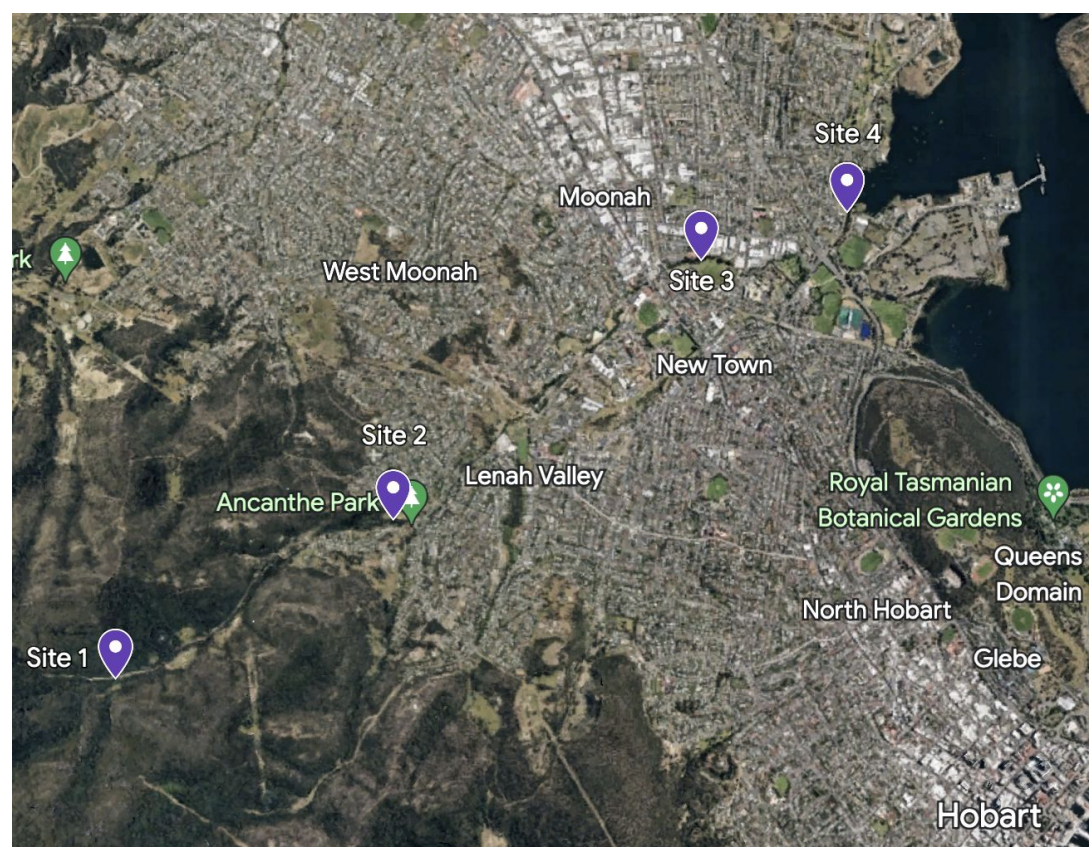
Water samples were taken at each site three separate periods. Temperature, pH, conductivity, total dissolved solids (TDS), and the concentrations of phosphate ( $\text{PO}_4^{3-}$ ), nitrate ( $\text{NO}_3^-$ ), and chloride ( $\text{Cl}^-$ ) were measured using field meters. Water samples from each site were taken to the University of Northern Iowa Hydrology Laboratory to measure the concentrations of nitrate ( $\text{NO}_3^-$ ), sulfate ( $\text{SO}_4^{2-}$ ), and chloride ( $\text{Cl}^-$ ).

Samples were collected at the Dry Run Creek site locations in June and July 2023 and at the New Town Rivulet site locations in March and April 2023.

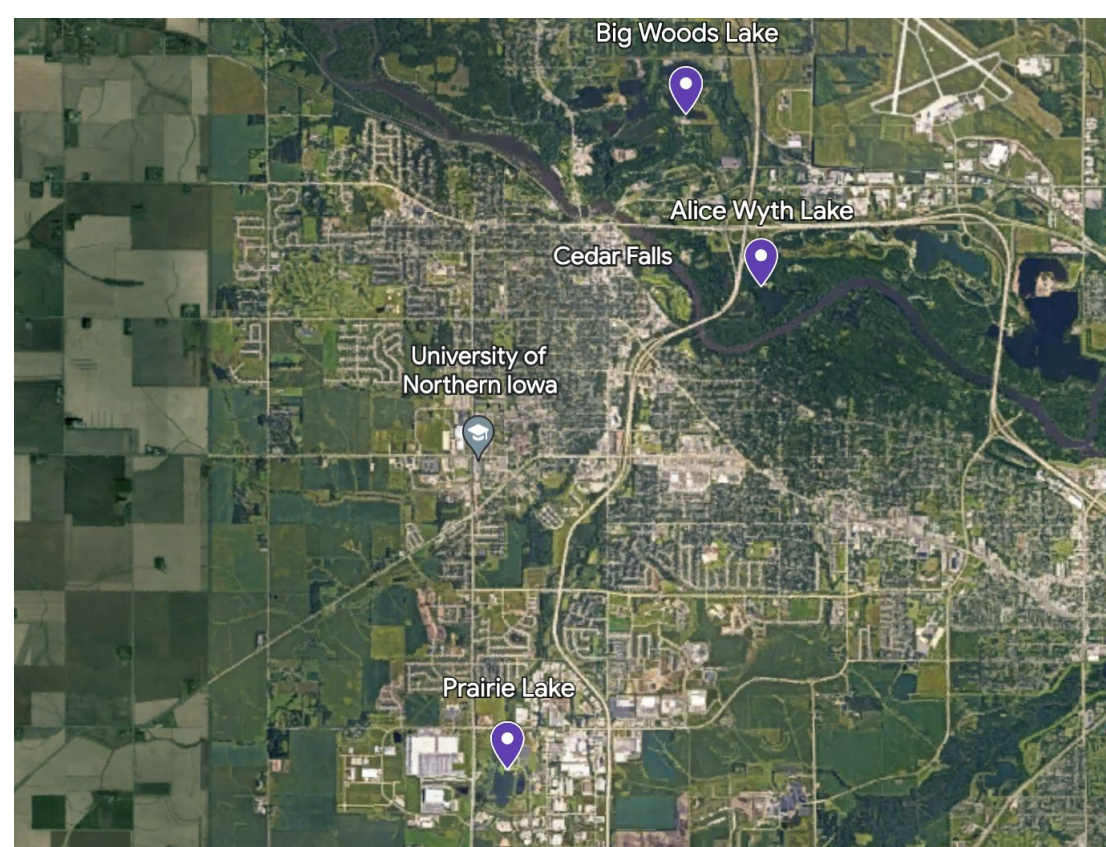
Samples were collected at the lake site locations in June and July 2023 and at the river locations in September and October 2021 and 2022.



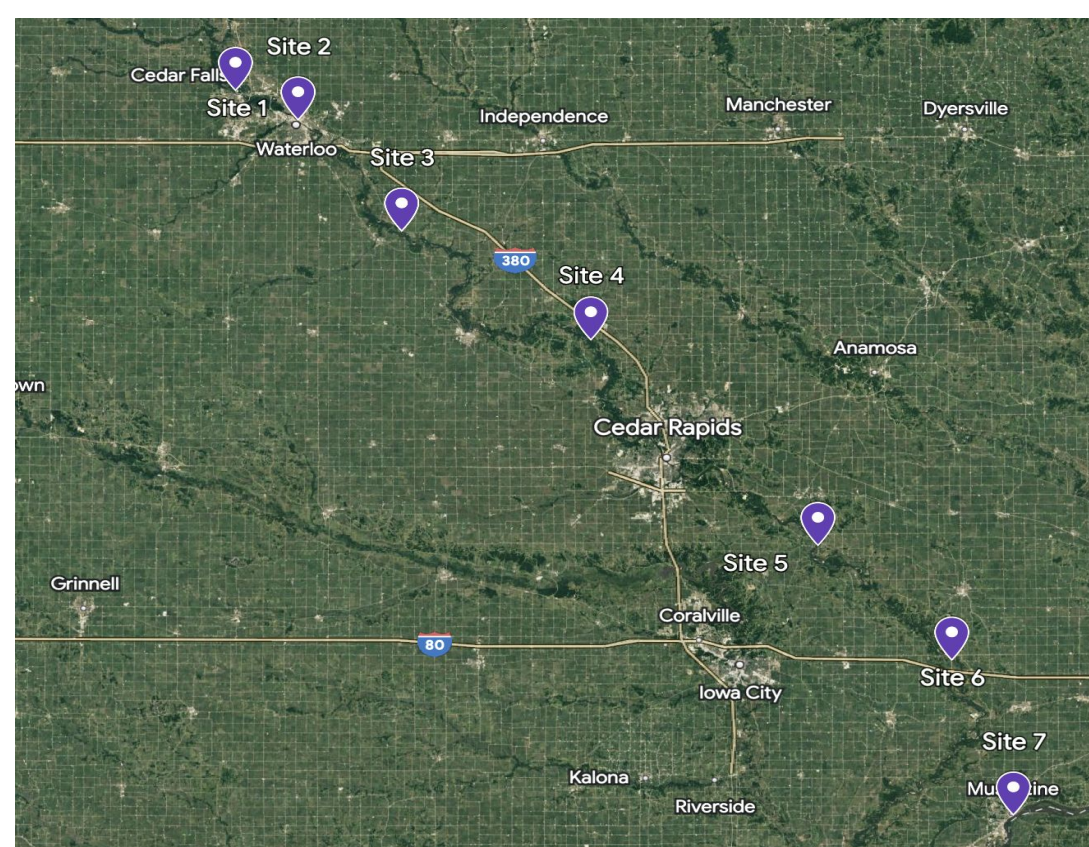
Dry Run Creek site locations  
Source: Google



New Town Rivulet site locations  
Source: Google



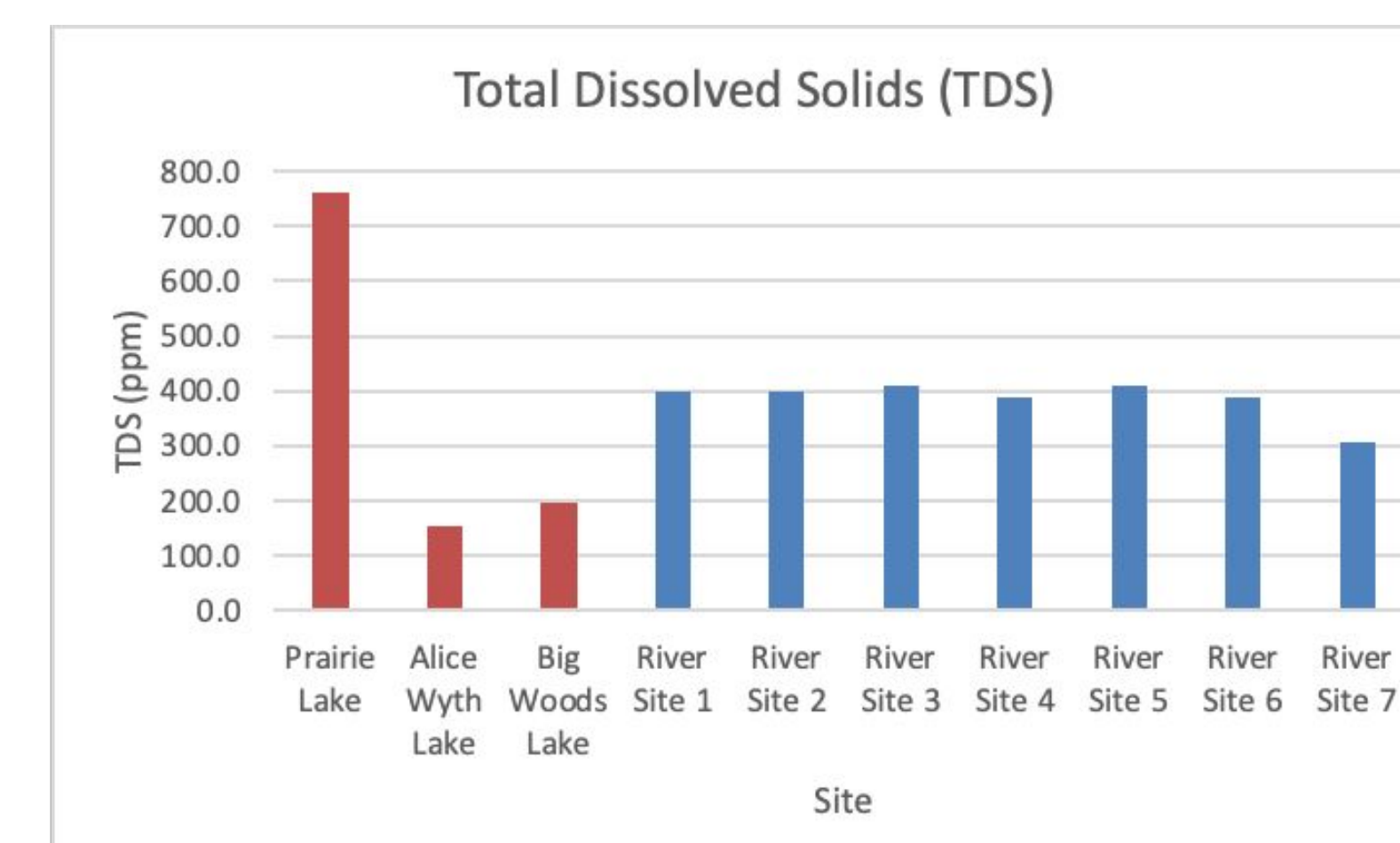
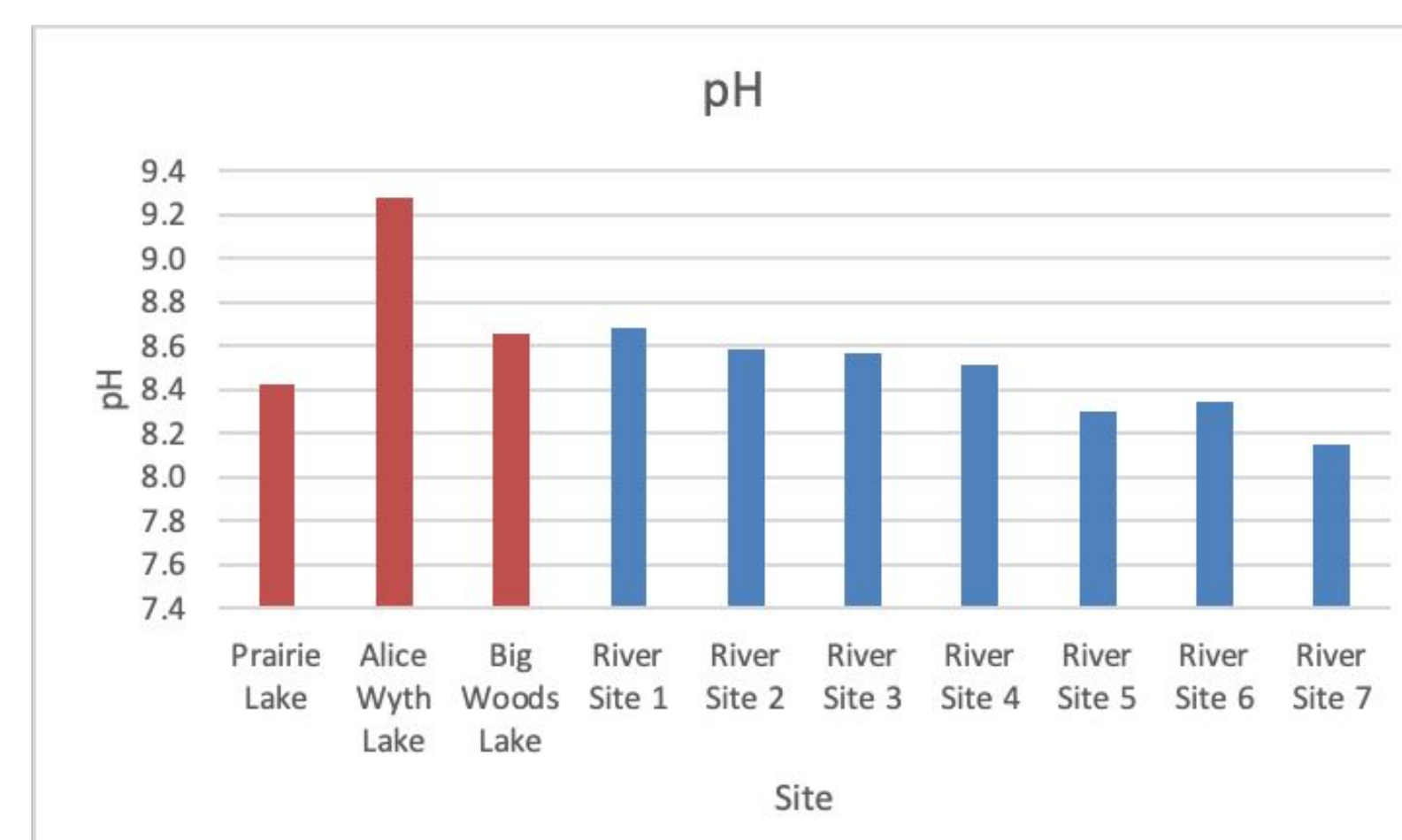
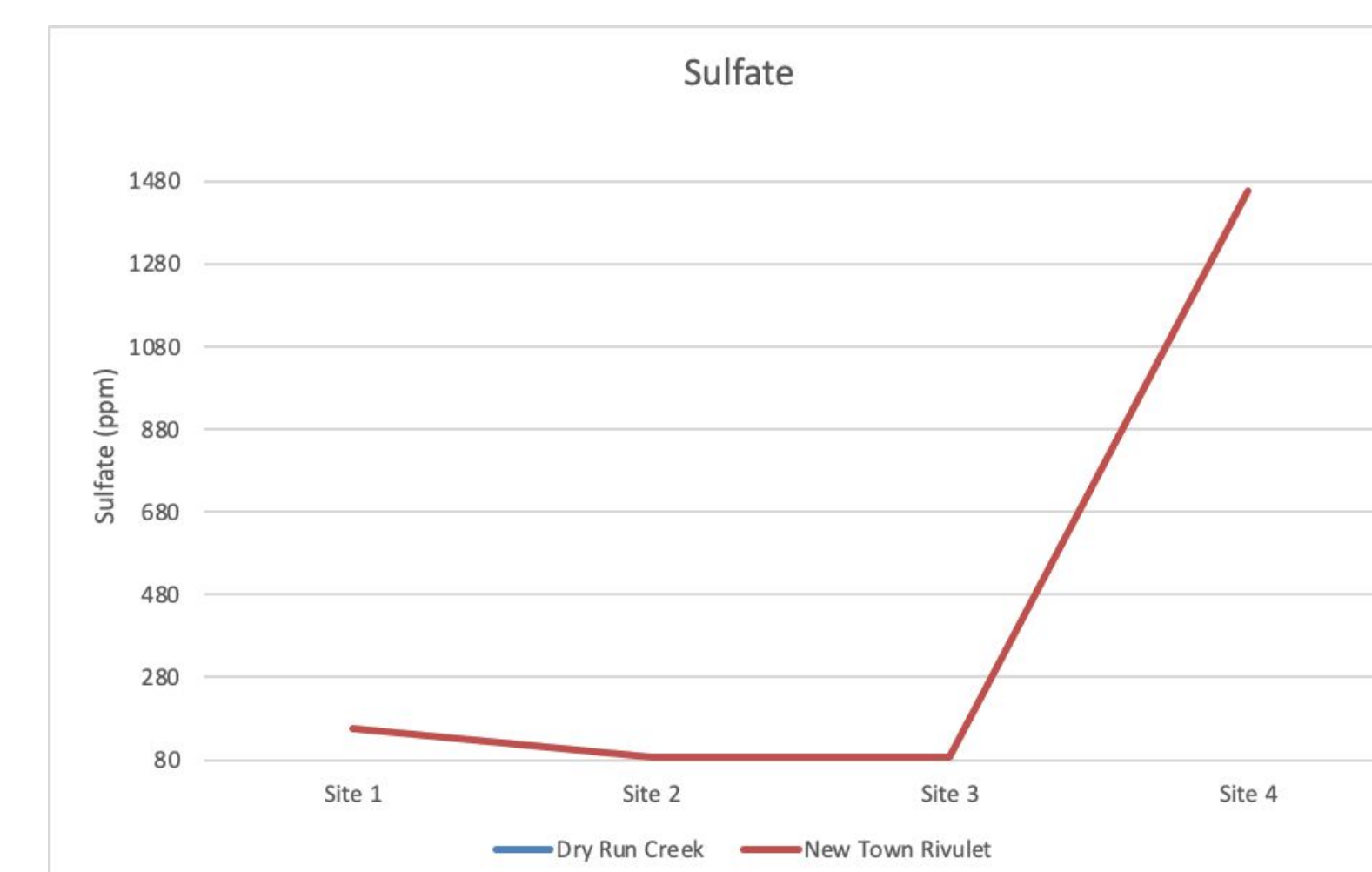
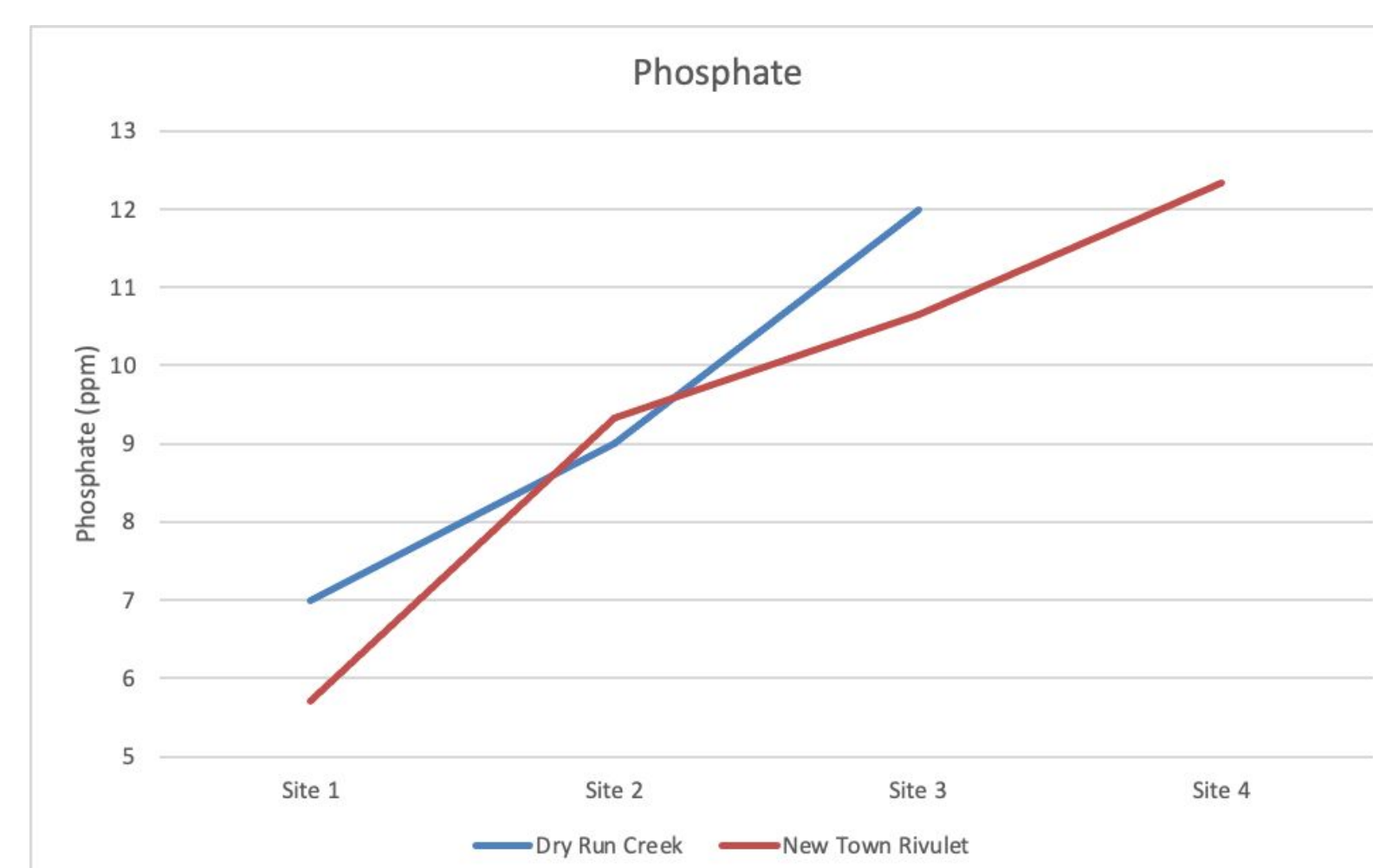
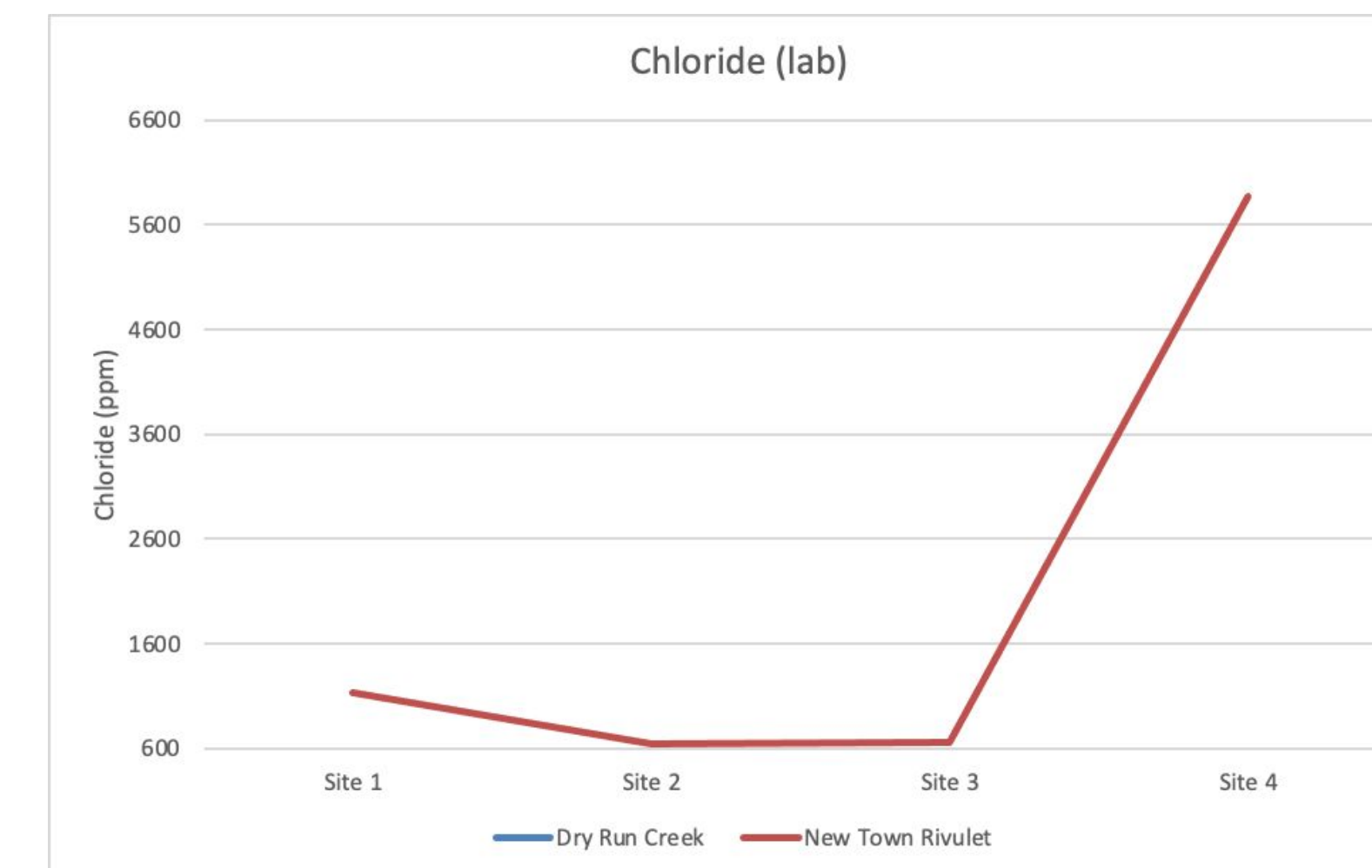
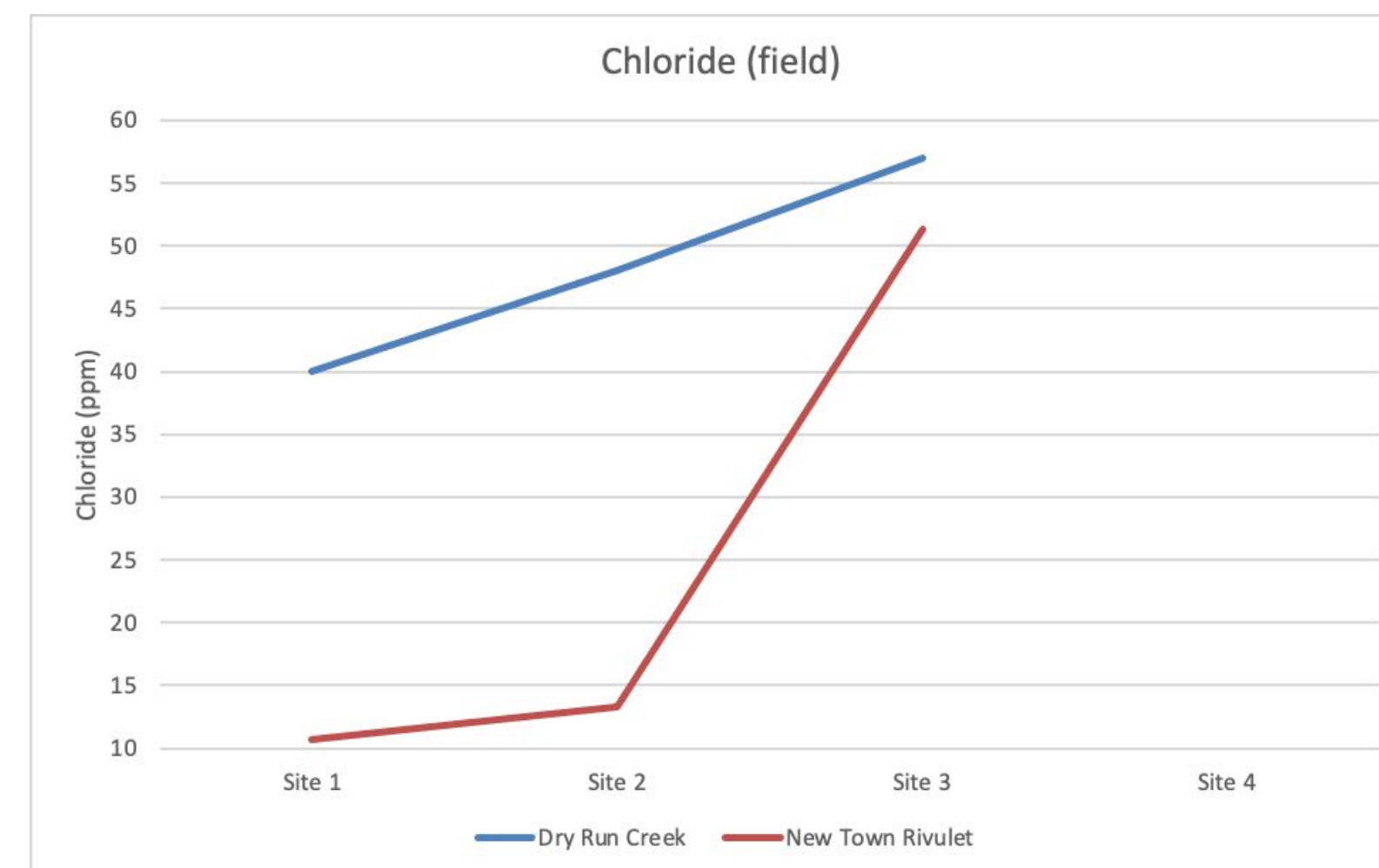
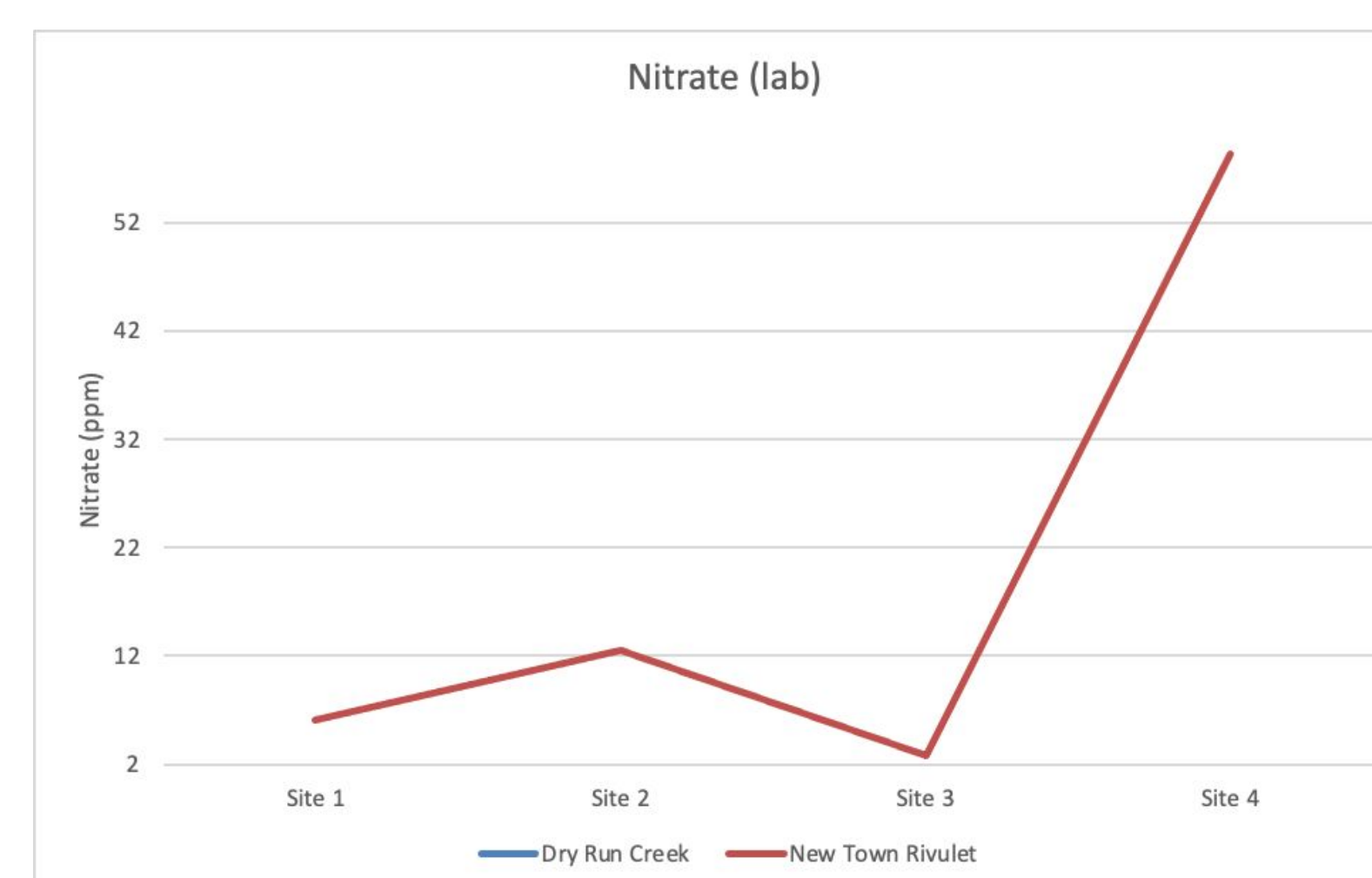
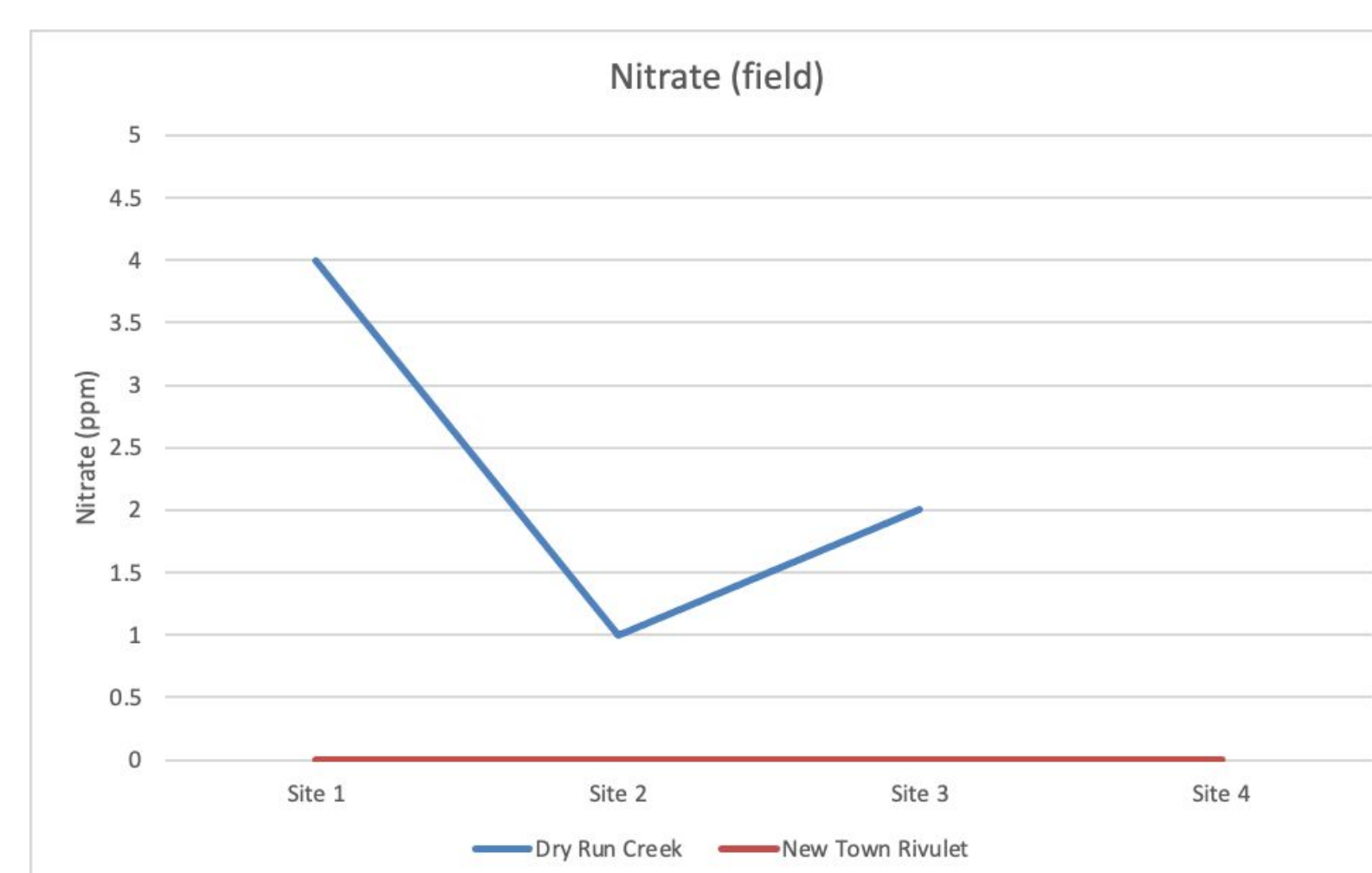
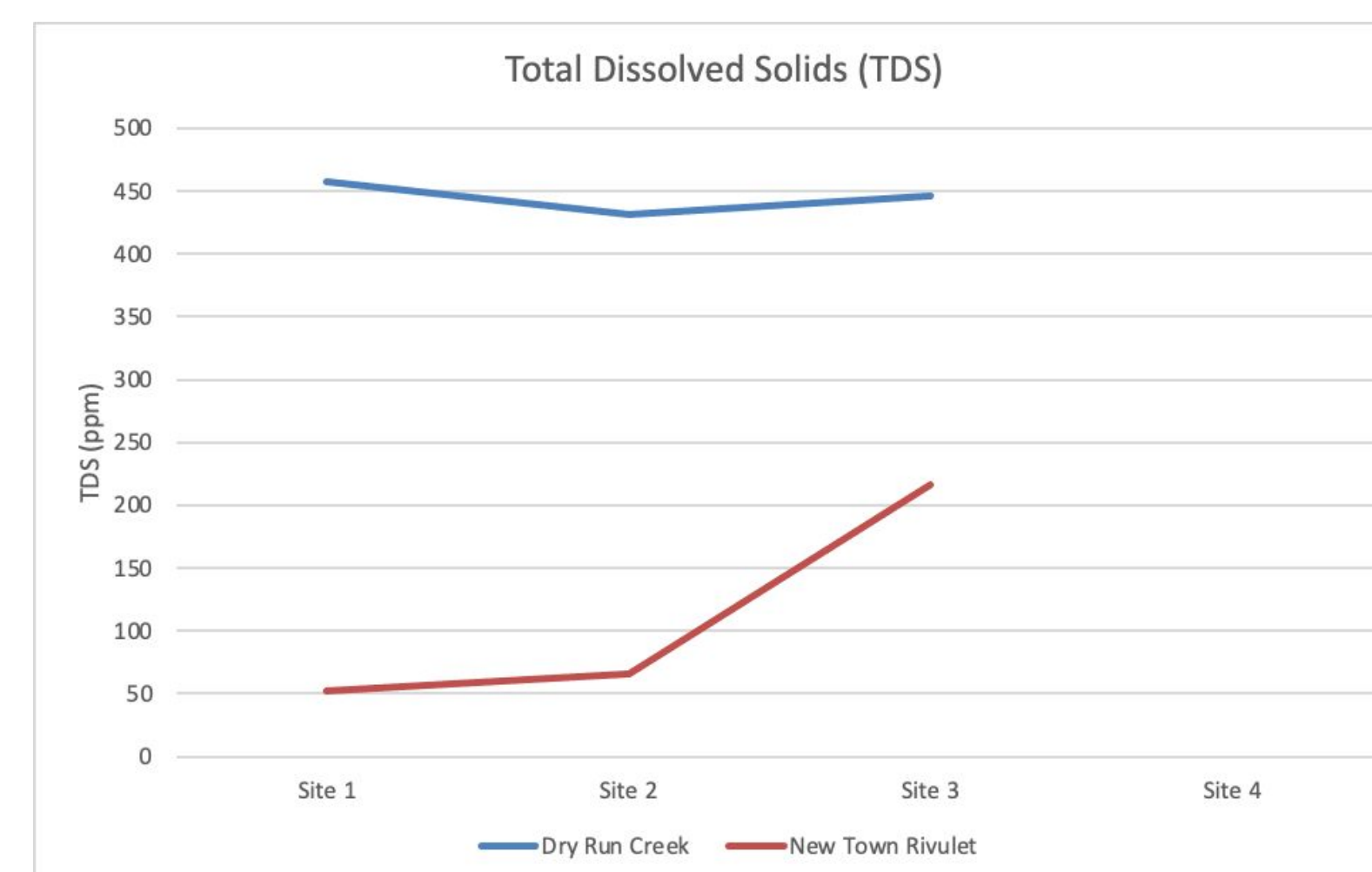
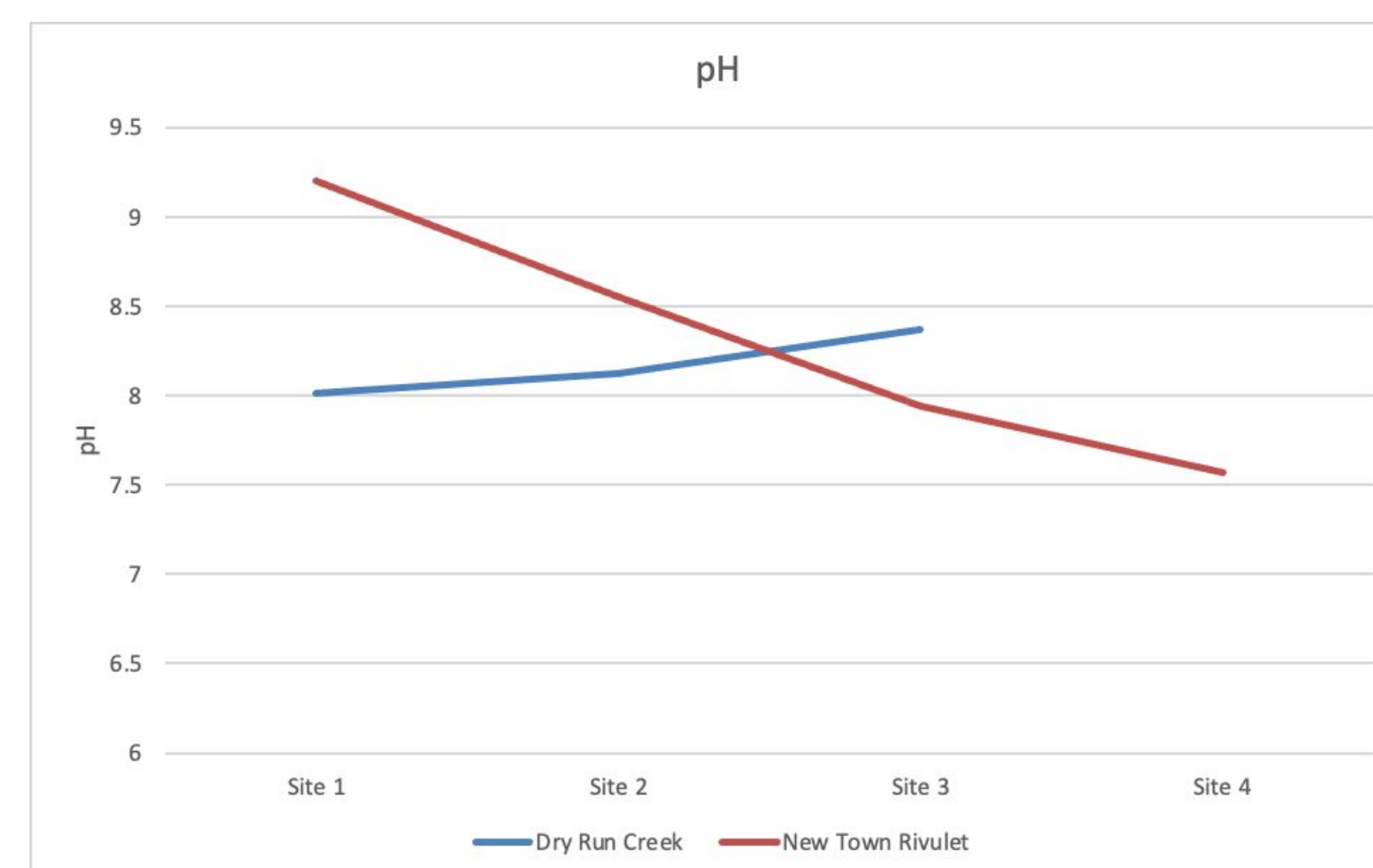
Lake site locations  
Source: Google



Cedar River and Mississippi River site locations  
Source: Google



## Results



## Discussion

The current data supports considerable differences between the water quality data from Dry Run Creek and New Town Rivulet. The data showed similar progressions increasing or decreasing downstream except for pH data. The change in pH and nutrient concentrations of the two rivers depend on various factors such as the geology of the area, the sources of water inputs, human activities, and natural processes. Dry Run Creek is largely supplied with water from agriculturally influenced tributaries while New Town Rivulet is supplied from alpine tributaries.

The current data shows greater variations in pH and TDS measurements from the lake water systems at Prairie Lake, Alice Wyth Lake, and Big Woods Lake than the river water systems at the Cedar River and the Mississippi River. Lakes generally tend to exhibit larger variations in water quality data measurements compared to flowing rivers due to several factors including residence time, stratification, input sources, and the characteristics of the water catchment.

This project and its findings are on-going and will continue through the year to completely understand the unique characteristics of these hydrologic systems. By correlating the gathered data with the surrounding land use, models can be developed to anticipate future environmental deterioration in these areas.

## Conclusion

- The concentrations of chloride and phosphate increased downstream.
- The change in pH of the rivers downstream was not consistent in one direction.
- Site 4 of the New Town Rivulet sites had distinguishably high concentrations of nitrate, chloride, and sulfate.
- Greater variations in water quality characteristics of the static water systems over the flowing water systems.
- The complete data information is needed to allow for a complete interpretation of the results.

## Acknowledgements

This work was supported in large part by Jim and Diane Sass, the Department of Earth and Environmental Sciences at the University of Northern Iowa, the School of Geography, Planning, and Spatial Sciences at the University of Tasmania, and funding from the Black Hawk County Solid Waste Commission. Special thanks to Steve Smith for his assistance with equipment used for this project at the University of Northern Iowa Hydrology Laboratory as well as Ava Smith and Jack Dawson for their aid collecting data for this project.

## Citations

- Bellos, D. and Sawidis, T., 2005. Chemical pollution monitoring of the river pinios. *Journal of environmental management*, 76(4), pp.282-292.
- Hamid, A., Bhat, S.U. and Jehangir, A., 2020. Local determinants influencing stream water quality. *Applied Water Science*, 10(1), pp.1-16.
- Hoorman, J., Hone, T., Sudman Jr, T., Dirksen, T., Iles, J. and Islam, K.R., 2008. Agricultural impacts on lake and stream water quality in Grand Lake St. Marys, Western Ohio. *Water, Air, and Soil Pollution*, 193(1-4), pp.309-322.
- Schilling, K.E. and Jacobson, P., 2012. Spatial relations of topography, lithology and water quality in a large river floodplain. *River research and applications*, 28(9), pp.1417-1427.