



Mapping of Spring Discharge into Lake Altoona

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ABSTRACT

Lake Altoona is located in the Northeast section of the city of Altoona. It is approximately 800 acres in area (~3.24Km²) and has its own community surrounding it. There is also a county park located on the south side of the lake that offers a boat landing, small playground, and a beach which hosts shows for Eau Claire's ski team. The purpose of this study is to better understand the sources of pollution into the lake.

Large algae blooms serve as evidence for excess nutrients entering the lake. Though the majority of the nutrient pollution is suspected from non-point source agriculture run off entering the lake from the Eau Claire River, a portion could be contributed to domestic sources; such as leaking septic systems. The septic systems would leak into the groundwater. This project focuses on the location of springs and mapping them using ArcGIS-ArcMap. Several springs have been detected and locations recorded using GPS (Trimble PRO XH). The presence of these springs going into Lake Altoona suggests that there is a connection to the groundwater.

Introduction

Lake Altoona is located in North Eau Claire County, in Wisconsin. Lake Altoona is a lake on the Eau Claire River with residential homes surrounding it on all sides except for a small section on the south side which is a small recreational park with a beach and playground area. The lake experiences large algae blooms in the summer months during periods of low flow, due to excess nutrients in the lake water. The main source of nutrients is agricultural runoff that flows into the lake from the Eau Claire River. However, it is also possible that some of the excess nutrients could be coming from domestic pollution caused by the individual septic systems that the surrounding homes use. To investigate this hypothesis; locations of springs were mapped and water samples were collected for geochemical analysis.

Methods

- The temperature of groundwater year round is close to the mean annual temperature of about 40 degrees Fahrenheit (Wisconsin State Climatology Office), which during winter months is higher than the lake water. Discharge of groundwater near the shore can therefore be inferred where the lake does not freeze over. During February 2008, springs discharging groundwater into Lake Altoona were located by going out on the ice and looking for areas without ice coverage. For each spring several GPS coordinates were collected using a Trimble PRO XH. Coordinates were collected at each end of the spring area and at water sampling locations.
- The coordinates collected with the GPS unit were converted into an ArcGIS shapefile. Using the shape file with the points for each spring a new shape file was created delineating the parts of the shoreline where groundwater is discharging into Lake Altoona.

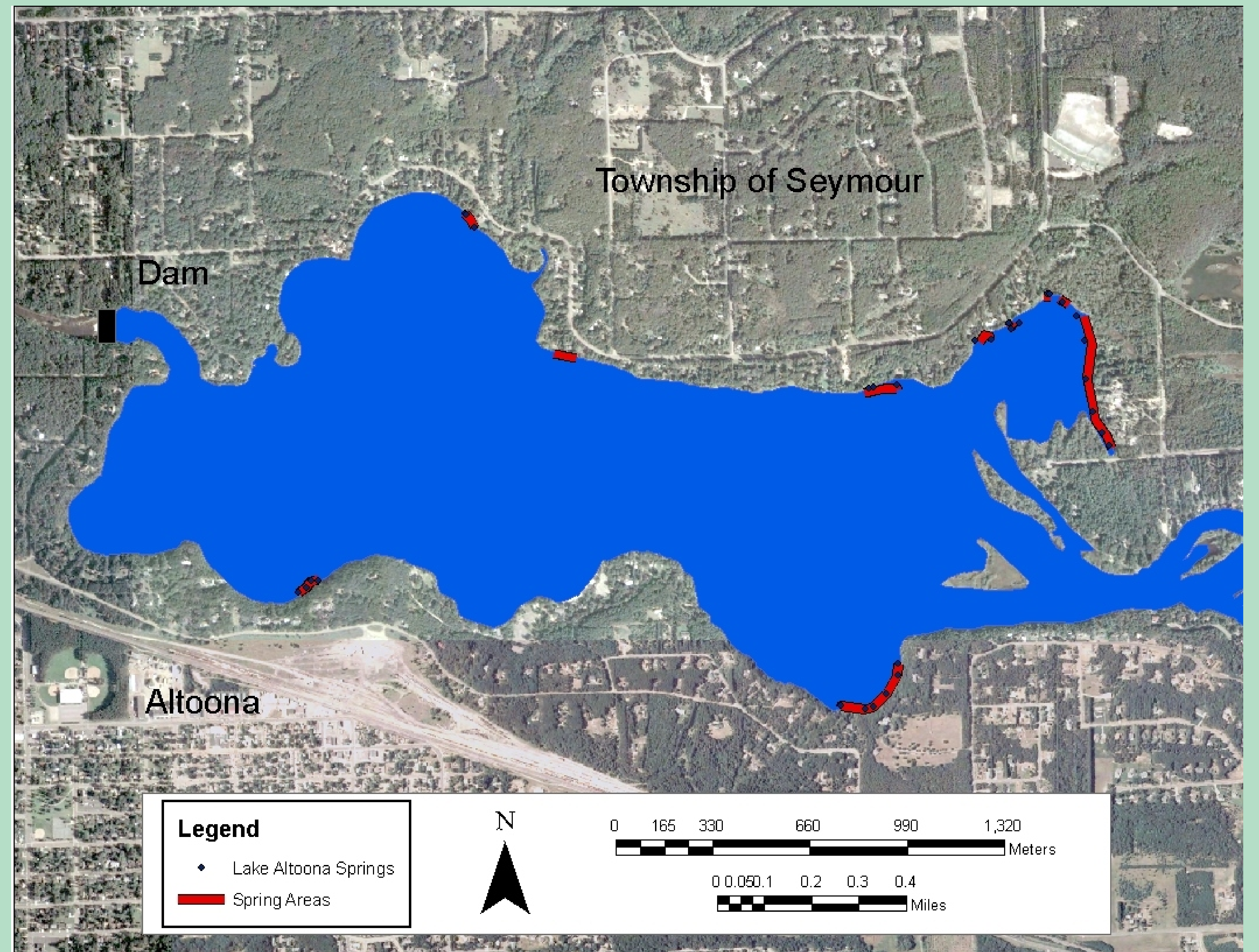


Figure 3. This map shows GPS data points, which were collected at each spring location. A shape file with polylines was constructed to show the spring areas.



Figure 1. Picture showing Lake Altoona ice covered. This was used as an advantage to see where the springs were located. Springs don't freeze because warmer ground water flowing into the lake prevents the formation of ice.



Figure 2. Picture showing one spring within the cattails. This spring is located on the Northeast shore of Lake Altoona.

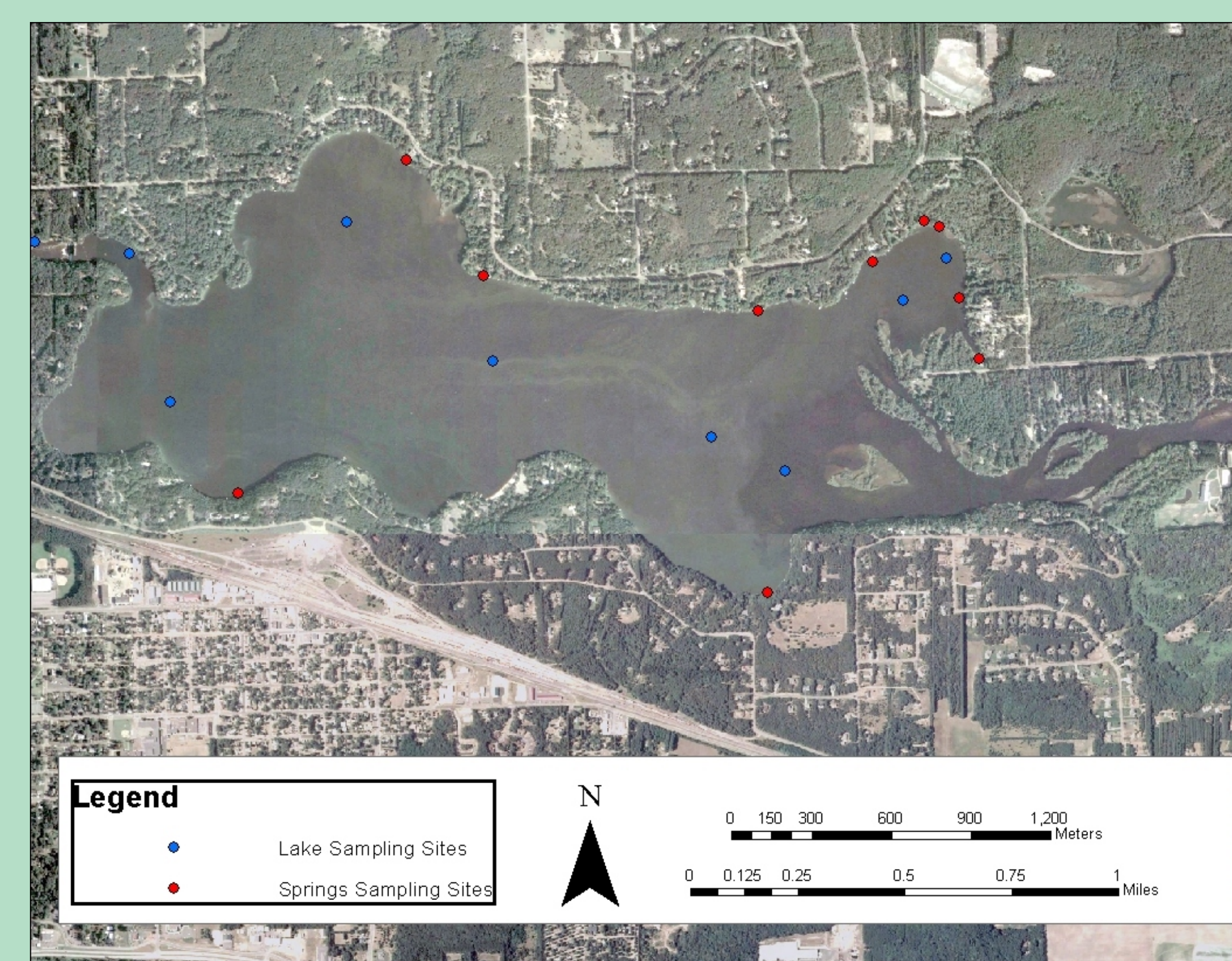


Figure 4. This map shows the GPS locations of all the sites where water was sampled. The blue dots show sites where spring water was sampled and the green dots show sites where lake water was sampled. These samples were used to determine the geochemical composition of lake and spring water (Fairbairn et al., 2008).

Conclusions

The fact that several springs were located along the shores of Lake Altoona suggests that groundwater is flowing into the lake. This opens the possibility that this groundwater could potentially be bringing in pollutants from leaking septic tanks or other contaminants that are leaking into the ground.

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References

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