Evaluating Groundwater Quality and Behavior at UWEC Campus

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INTRODUCTION
To garner a better understanding of groundwater flow and water quality on the University of Wisconsin – Eau Claire campus, we collected monthly measurements in fourteen (13) monitoring wells across lower campus, including seven (7) wells installed over the summer of 2018. The parameters measured included temperature, pH, dissolved oxygen, oxidation-reduction potential, specific conductance, and nitrate, measured. Pressure transducers were also installed in two wells near the Chippewa River to continuously monitor hourly changes in water level.

This project was a directed study integrated with a field-based laboratory component in the Contaminant Hydrogeology course in the Geology Department.

METHODS

WATER QUALITY
- Low flow sampling was used to monitor the thirteen campus wells.
- Tubing was positioned near the well screen.
- The multi-parameter sonde (InSitu AquaTROLL 600) was used to measure all water quality parameters.
- Data was recorded and analyzed using Excel and ArcGIS.

WATER LEVELS
- Water levels were measured in each well monthly using a water level meter.
- Hourly water level measurements were recorded in two wells next to the Chippewa River using Solinst Levelogger pressure transducers.

ACKNOWLEDGEMENTS
We would like to thank Chris Hessel and UWEC Facilities for working with us to coordinate and carry out well drilling. We would also like to acknowledge the Fall 2018 and Spring 2019 Hydrogeology students for contributing to data collection.

RESULTS AND DISCUSSION

Temperature
Decreased with winter temperatures and increased with spring temperatures (graph below)

pH
Data ranged between 5.7 and 7.1, which is consistent with the sand and gravel aquifer present on lower campus

Specific Conductance
Specific conductance was higher in shallower wells, and increased during the late winter, likely associated with de-icing salt application on campus (graph and maps below)

ORP
Data are consistent with groundwater age and well depth, and provide evidence for nitrate removal (dropping a reduction level) in groundwater between WA 550 and WA 551

Nitrate
Slightly elevated levels were recorded over typical background levels (2 mg/L), and once exceeding the EPA standard of 10 mg/L (graph below)

Dissolved oxygen
Data are consistent with groundwater age and well depth, and provide evidence for nitrate reduction in groundwater between WA 550 and WA 551

WATER LEVELS AND HYDROLOGIC INFLUENCES

Shallow groundwater levels are influenced primarily by precipitation (rain) events exceeding 0.78 inches (2 cm). The deep aquifer is sensitive to precipitation, snow melt, and subsequent increases in river stage. While groundwater typically flows into the river, river water begins discharging into the groundwater system when river stage exceeds 769 feet AMSL.

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