3-30-2016

Monitoring Groundwater Properties within a Wetland on the IPFW Campus

Ross Yeater

Follow this and additional works at: http://opus.ipfw.edu/stu_symp2016

Recommended Citation
http://opus.ipfw.edu/stu_symp2016/21

This Book is brought to you for free and open access by the IPFW Student Research and Creative Endeavor Symposium at Opus: Research & Creativity at IPFW. It has been accepted for inclusion in 2016 IPFW Student Research and Creative Endeavor Symposium by an authorized administrator of Opus: Research & Creativity at IPFW. For more information, please contact admin@lib.ipfw.edu.
Groundwater testing and monitoring is a crucial part of environmental management for urban and rural settings. This study examines the water chemistry in a well field located at Indiana University-Purdue University Fort Wayne (IPFW) campus in order to determine the contaminant and thus the water quality in the campus. The well field at the IPFW campus is located by a creek that drains into the St. Joseph River. Nitrate, nitrite pH, temperature, conductivity, total dissolved solids, dissolved oxygen and head elevation were measured over a 56 day testing period (late September – mid November) in 15 of the 20 installed wells. Soil samples were also collected from a burrow pit at the location to determine the hydraulic conductivity of the soil.

The nitrate and nitrite levels ranged from 0.0 – 20.9 and 0.0 – 0.029 mg/L, respectively. A few readings were above EPA regulated contaminant levels for drinking water (10 and 1.0 mg/L for nitrate and nitrite respectively). Trends of nitrate and nitrite often show an inverse relationship, suggesting that nitrate is being reduced to nitrite via iron content and/or organic activity. Most of the Nitrites are due to chemical reduction of Nitrate to Nitrite, which is typical of warm season weathering processes in all environments. Parameter variance appears to increase with higher temperatures. This study examines the water chemistry in a well field located at Indiana University-Purdue University Fort Wayne (IPFW) campus in order to determine the contaminant and thus the water quality in the campus. The well field at the IPFW campus is located by a creek that drains into the St. Joseph River.

METHODS
A multi-meter and dissolved oxygen probe was used for pH, temperature, conductivity, total dissolved solids and dissolved oxygen parameters. These readings were taken and recorded in-situ. The water levels of each well were also measured. The water samples collected were tested for nitrates, nitrites and phosphates in the lab with a Hach colorimeter and powder pillows. Data was plotted against time to identify correlations and trends. Selection of the wells in the field was based on an interest in spatial variations, therefore a 3 x 3 grid of wells labeled 1-9 were examined and a 12 foot deep, and geographically intermediate Near well supplemented the grid wells. Selections for water chemistry loosely alternated between the north and west side of the grid to attempt to obtain a directional trend, which was initially assumed to be toward the river.

DATA

CONCLUSIONS
- The 6 ft grid wells do not penetrate a confined aquifer, but the 12 ft well does and overflows throughout the warm season. The 12 ft well lost enough pressure to drop below the top of the well during week 6, marking a seasonal shift.
- The presence of Nitrates in the well field is due to fertilizer runoff and organic activity. Most of the Nitrites are due to chemical reduction of Nitrates by organic material along with an assumed presence of iron in the soil. Functional wetlands act like filters for groundwater.
- Fine grained sediments slow ion transport and head velocity. Although trends detected in this study have apparent increase or decrease, it is plausible that the presence of dissolved solids such as nitrate remains relatively constant in the wetland year round.
- 8-week time frame of data collection includes a seasonal transition (Fall-Winter) and the subsequent drop in temperature directly affects dissolved oxygen levels.
- Parameter variance appears to increase with higher temperatures. This is typical of warm season weathering processes in all environments. Therefore, weathering effects are much smaller in the winter.
- pH readings are usually different for each grid well, but the interval in which they fall is a nearly constant size. This interval alternates in a high-to-low fashion with an approximately weekly interval
- The well field is moderately vegetated and aids in reducing Nitrate levels. The maximum allowable Nitrate concentration for drinking water per the EPA is 10.0 mg/L. 3 measurements out of 25 in this experiment exceeded this value.

ACKNOWLEDGEMENTS
The author would like to thank Micheal Kalakay for help with data collection and water chemistry, the geosciences department for maintaining the well field and lending probes, tools and other equipment, and Shelby Johnston for keeping the lab clean and tidy.