Effect of Road Salt on Local Water Quality

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Abstract:

Road salt is used every year to make snowy commutes safer. However, it is a major component of winter runoff into bodies of water. This experiment concludes the effects of road salt on local water quality. The measurements taken were pH, phosphate concentration, water temperature, and salinity in the Wabash River, West Lafayette, IN and Burnett Creek Battleground, IN. Experimental design consisted of taking these measurements before and after snowfall, where road salt was inevitably used somewhere upstream of the Wabash and Burnett testing locations. The data shows there was a noticeable difference in salinity in the water before and after snowfall. Moving forward, the effect of road salt on water quality should be tested more directly, rather than being based off of the assumption that road salt was used after snowfall, and included a more consistent testing timetable.

Research Question:

What is the effect of road salt on local water quality? The use of road salts can alter many different factors of an aquatic ecosystem; including salinity, phosphate concentration, and pH. These factors can affect the quality of drinking water being consumed and the health of aquatic habitats. Actions taken by cities close to bodies of water should be carefully monitored to ensure the well-being of both the terrestrial (including humans) and aquatic organisms occupying the area.

Introduction:

Water quality is the chemical, physical, and biological characteristics of water that determine the health of the environment. It is important to be aware of the water quality of an area because it affects local drinking water, health of aquatic species, and the overall wellness of an ecosystem. Some aspects of water quality include salinity, dissolved oxygen, phosphates, nitrates, pH, and temperature. These factors can dictate population size and diversity of aquatic organisms, potability (drinkability), and suitability for industrial and domestic purposes. When determining potability, contaminants and turbidity, as well as odor and taste are assessed.

Hypothesis:

Our hypothesis is that the salinity of the Wabash River and Burnett Creek will decrease as the time since snow increases.

Research Methods:

LaMotte water quality testing kits

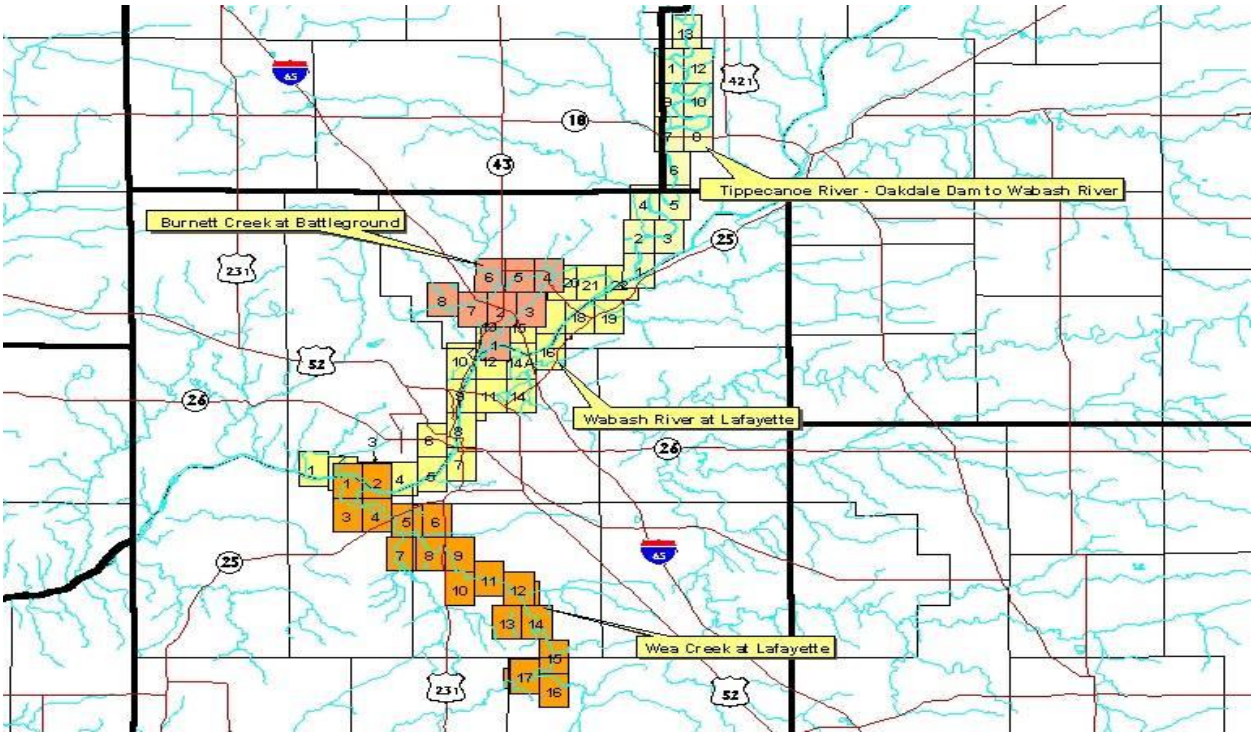
HACH water quality testing kits

1. Site definitions were taken for the Wabash River and Burnets creek
2. Steps of these kits were fully completed and measurements recorded for pH, temperature, and salinity of the Wabash River and Burnets Creek.

Field Photos and Site Map:

Wabash River, West Lafayette, IN

Burnett Creek, Battleground, IN



Site Map

GLOBE Badges:

•Collaboration

Amanda: Analyzed and interpreted the data to draw conclusions.

Hayley: Put together the poster from the sets of information provided by the data collector.

Emily: Collected data from sites and compiled report.

•Community Impact

The Wabash River and Burnett creek have experienced decreased water quality for years, this experiment explores one of the ways this is happening, and its impact.

•Exploring STEM Careers

The scientific method was used to perform an experiment that explored natural processes.

Results:

Wabash River Data

Wabash River	Average
Phosphates	10
pH	6.8
Water Temperature	24.9 C
Salinity	0.29 ppt
Latitude	40.41936
Longitude	-86.89722

Wabash River	Trial 1 3/15/19 Recent Snow	Trial 2 3/26/19 After Snow	Trial 3 3/28/19 After Snow
Salinity	0.31 ppt	0.33 ppt	0.32 ppt
Water Temperature	7 C	11.7 C	14.2 C

Burnett Creek Data

Burnett Creek	Average
Phosphates	9
pH	7.585
Water Temperature	16.6 C
Salinity	0.275 ppt
Latitude	40.5066
Longitude	-86.8458

Burnett Creek	Trial 1 3/15/19 Recent Snow	Trial 2 3/26/19 After Snow	Trial 3 3/28/19 After Snow
Salinity	0.28 ppt	0.30 ppt	0.31 ppt
Water Temperature	5 C	14.8 C	16.7 C

Discussion:

Wabash and Burnett show differences in water quality that demonstrate effects of road salt on water quality. Two brands of water quality testing kits were used. Differences between them could have led to possible errors. Another source of error could be the inconsistency in the dates that the data was collected. Effects of salt on water have been tested before, but this experiment draws conclusions from testing and comparing two different locations. The results do not support our hypothesis. The salinity of the testing locations increased as time since winter increased. One possible explanation is that it could've taken longer for the road salt to run off into the bodies of water than expected.

Conclusion:

Road salt does effect the salinity of local bodies of water. The direct relationship between road salt and the different aspects of water quality is unclear. Our results show that the salinity of local bodies of water increases as the time since snowfall increases as well.

References:

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