

Salts at the 9th Street Outfall

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UMaine Stormwater Research Program

- Professor Wilhelm
- UMaine Stormwater Management and Research Team Program
- Returning to Boise
 - Pasco Sensors to monitor the Boise River Watershed
 - Temperature, pH, and conductivity data
 - Maintaining contact with SMART advisors in Maine



Beginning Education of Elementary Students in Stormwater Research

▼ Summary

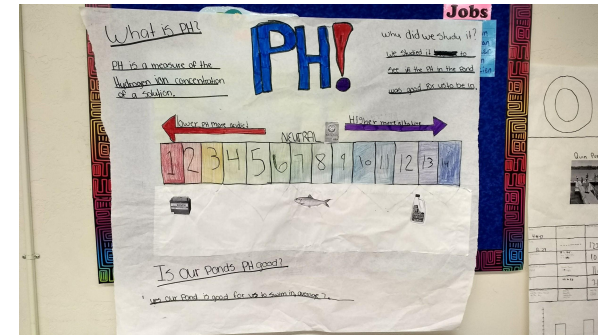
Students demonstrate how everyone contributes to the pollution of a river as it flows through a watershed and recognize that everyone's "contribution" can be reduced.

Objectives

Students will:

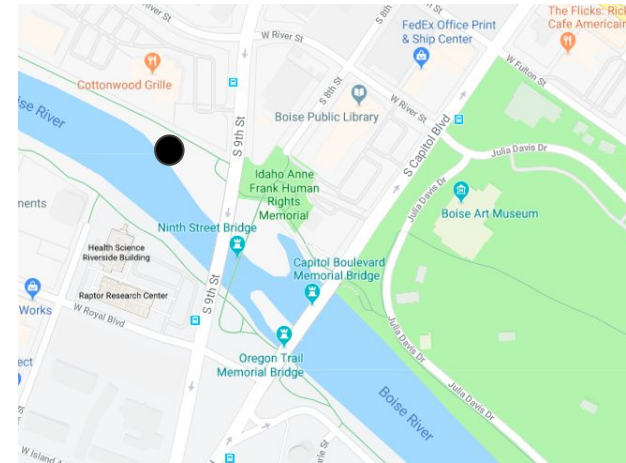
- distinguish between point and non-point source pollution.
- recognize that everyone contributes to and is responsible for a river or lake's water quality.
- identify Best Management Practices to reduce pollution.

- Kelly Brown, Mountain View Elementary
- Lesson plan:
 - Stormwater pollution
 - Walking tour
 - Technology (probes)
 - SMART research
 - Research questions
- River trip in early May
- Future prospects: continuing with new highschool students and reaching out to teachers at other schools



The 9th Street Outfall

- Stormwater drain
 - Drainage area of 220 acres downtown Boise
- Union Block Association Building
 - Discharges water used for temperature regulation



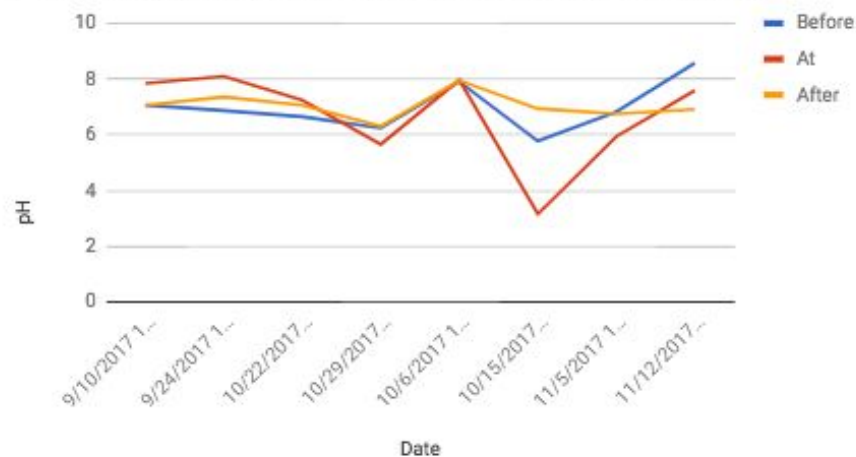


Data

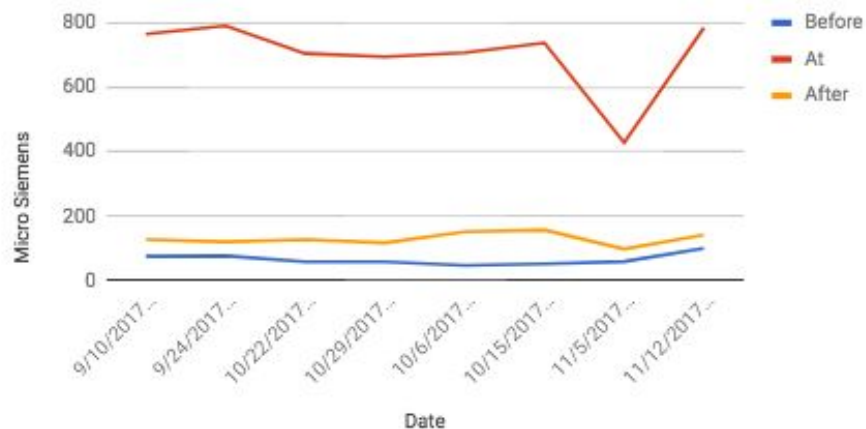
Temperature Before, At, and After 9th Street Outfall Over Time



pH Before, At, and After 9th Street Outfall Over Time

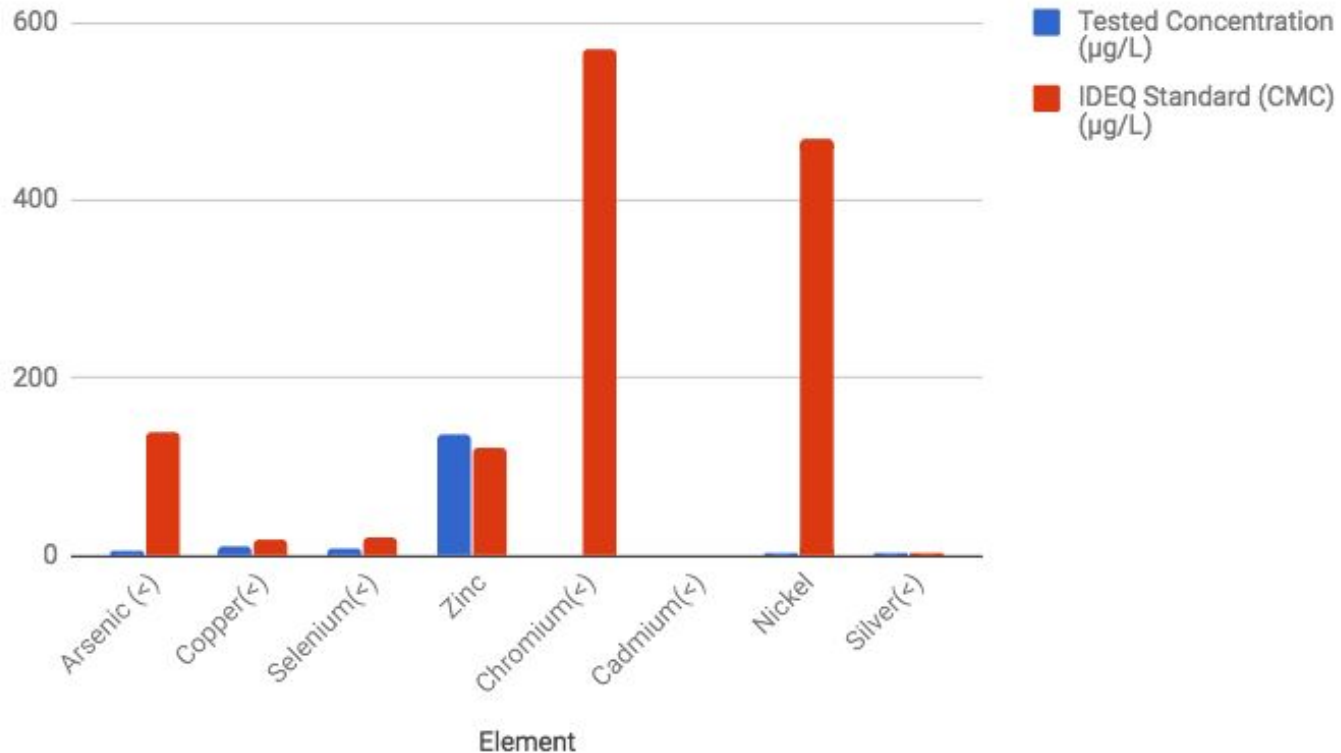


Conductivity Before, At, and After 9th Street Outfall Over Time



Comparison to Water Quality Standards

Tested Concentration ($\mu\text{g/L}$) and IDEQ Standard (CMC) ($\mu\text{g/L}$)


















Calcium and Magnesium

Element	Concentration	EPA Standard (CMC)
Calcium	273,000 µg/L	N/A
Magnesium	37,700 µg/L	N/A
Est. Chloride	592,925.2 µg/L	860,000 µg/L

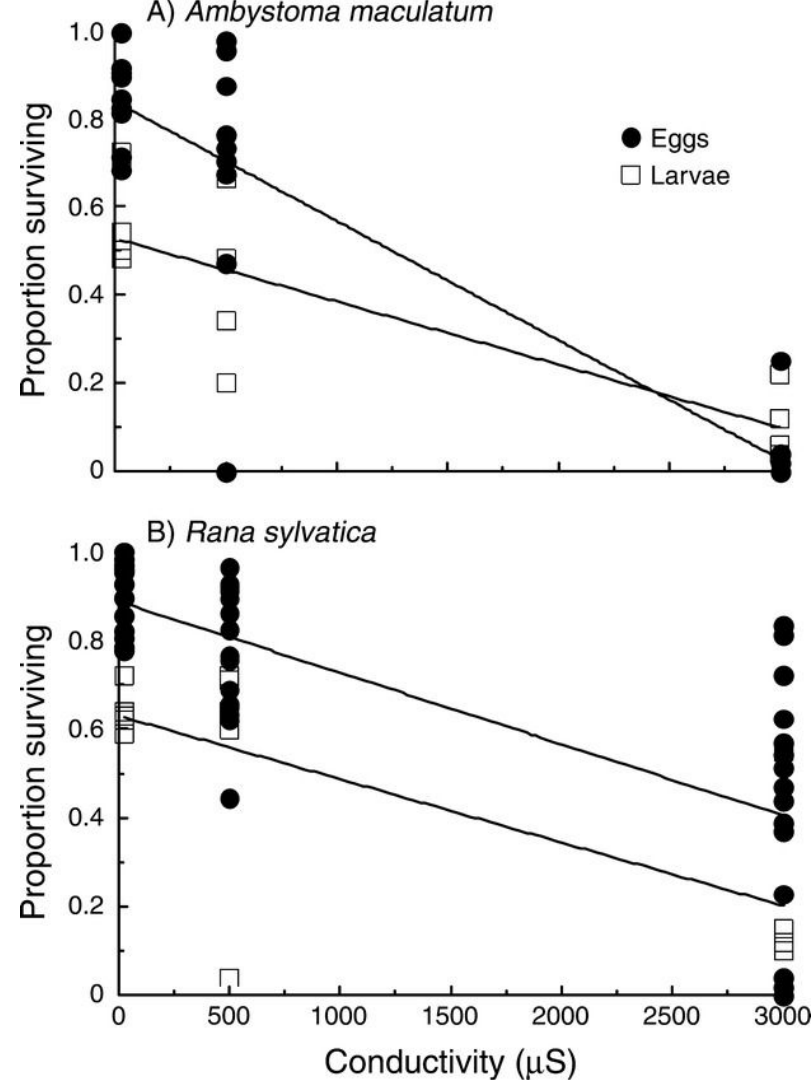
Effects of Road Salt on Aquatic Life

- High concentrations of road salts may cause
 - Zooplankton death
 - Algal blooms
 - Effects on food chain
 - Unnatural ratios of male to female frogs
 - Saline layers on bottom of lakes
 - Oxygen transfer
 - Frog larvae abnormalities
 - Stunted rainbow trout growth

Concentration (mg Cl ⁻ L ⁻¹)	Control		
	MgCl ₂	NaCl	CaCl ₂
230			
860			
1500			
3000			

Effects of Road Salt on Aquatic Life (continued)

- Increased concentrations of salt lead to a decrease in function of periphyton
- Embryonic and larval survival of two common kinds of amphibians were reduced when conductivity increased (graph)
- Equilibrium of the ecosystem may be shifted





Investigating Effects of Road Salts on Bacteria

- Sample was taken from river upstream of 9th Street Outfall
- Counted E. Coli and total coliforms in both control and salt prior to adding salt
- Added relative amounts of road salt chemicals to salt sample
- Counted E. Coli and total coliforms 48 hours after adding salt of both control and salt samples
- Data:

Sample	E.Coli Before Salt	E. Coli 24 Hours After Salt	E. Coli 48 Hours After Salt	Total Coliforms Before Salt	Total Coliforms 24 Hours After Salt	Total Coliforms 48 Hours After Salt
Control	42.0 MPN/100 mLs	27.2 MPN/100 mLs	28.1 MPN/100 mLs	1553.1 MPN/100 mLs	1986.3 MPN/100 mLs	1413.6 MPN/100 mLs
Salt	34.1 MPN/100 mLs	32.3 MPN/100 mLs	23.8 MPN/100 mLs	1119.9 MPN/100 mLs	1732.9 MPN/100 mLs	2419.6 MPN/100 mLs



Conclusions/Next Steps

- Road Salt
 - EPA guidelines applicable to Boise area
 - Acute or chronic
 - Effects on other organisms, not just E. Coli
 - If a problem: possible solutions
- Other pollutants
 - Zinc was higher than acceptable acute levels
 - Possible sources
 - Effects on ecosystem
 - Nutrients (phosphates and nitrates)
 - Other contaminants from Union Block Association Building



Works Cited

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- Kelly Brown - participating in the SMART summer institute with our team and working with Abby Robison to educate elementary school students about stormwater