

Ecological Significance of Specific Conductance in Streams – Part 1

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Points to Remember

- Electrical Conductivity/Specific Conductance measures dissolved salt concentration
- SC does not tell you about specific salts (NaCl vs MgCl₂)
- > SC naturally varies 100 200 μ S/cm in response to precipitation, and 500 1000 μ S/cm with a region
- Natural <u>spatial</u> variation (geology) may be more important than natural <u>temporal</u> variation (dilution events)



























Salt concentration in urban streams is always elevated





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Salt concentration always elevated, and highly variable - <u>temporally</u>



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Salt concentration always elevated, and highly variable - temporally TTF Watershed Partnership Shoemaker Run, Tookany Cr. Peaks at 18,700 and 42,300 mg Cl/L Seawater 50-55,000 µS/cm





How much salt is too much salt?















Salt concentration always elevated, and temperature matters



Not all salts are equal

Acute toxicity (48 h)

	Ceriodaphnia dubia LC50 (mg Cl/L)	<i>Daphnia magna</i> LC50 (mg Cl/L)	<i>Pimephales promelas</i> LC50 (mg Cl/L)
NaCl	1,960	4,770	6,510
MgCl ₂	880	1,330	2,840
CaCl ₂	1,830	2,770	>6,560

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Not all salts are equal Rainbow trout – growth (25 d) Control Image: Control for the second sec

Salt Levels of Concern					
LC 50s for a few mayflies moderately hard water at 20°C					
	Chloride (mg/L)	Conductivity (uS/cm)			
Acute (96 h)	311-2894	1013-8603			
Chronic (30 d)	151-898	543-2738			













Stream degradation
and salinityImage: Constraint of the salinityUrbanization - 2000Urbanization - 2000Marcellus shale - 2012Mountaintop mining - 2011



Salt Illustrates Land/People Connection to Water:



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Toxins:	Storm Drains:	Sewer System:	
Oils	<u>"Chemical Cocktail"</u>		
Metals Sealants	<u>in storr</u>	<u>n water</u>	
Herbicides			
Soaps	<u>Freshwater</u>	<u>Salinization</u>	
Drugs Personal Care	<u>Syna</u> Kaushal e	<u>rome</u> et al. 2018	
Fertilizers	I all a star	A K K K M	

There are new pollutants of concern today



Winter deicing salts (2003)



PAHs in coal tar seal coats (2003)



6PPD-quinone from tires (2020)



Runoff of Coal-TarBased Seal Coat Fredericksburg TX











Points to Remember

- Salt in streams is increasing, especially urban streams
- Elevated salt can cause physiological stress or even be toxic for aquatic organisms. Brief salt spikes in winter are not well understood.
- Impact of elevated salt depends on concentration, stream hardness, exposure duration, type of salt, water temperature, and species
- There is more than just salt to worry about ...







