Road Salt Application and Its Impact on Water Quality of the Delaware River

Rider University

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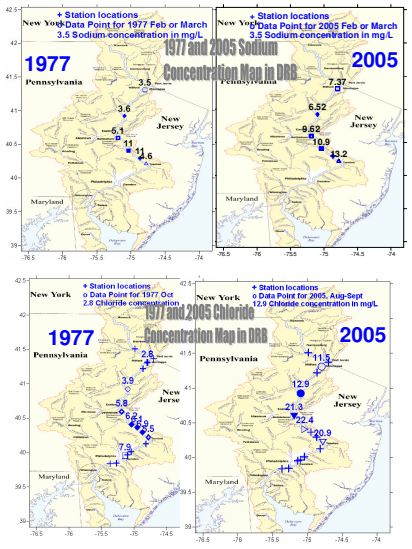
Sampling Crews

Abstract

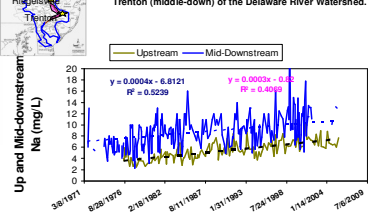
Our analyses of historical data of NaCl have shown that the NaCl concentration is increasing steadily in the Delaware River. Our analyses of NaCl level in the runoff water in the region after the salt application also have shown that road salt is probably the most significant source of NaCl in the river. Increase of NaCl in the river can be a serious problem for the public water supply plants that take water from the Delaware River, such as the Philadelphia Water Dept (PWD) where sodium in the intake water is not treated . Recently PWD has reported that the sodium level exceeded 20 mg/l in 2003 and 2005. 20 mg/L is the EPA and American Heart Association's sodium guidance level in the drinking water.

1. Comparison of summer sodium and Chloride concentrations in Delaware River in 1977 and 2005.

Data from USGS



2. Time series trends of Na concentrations of three non-tidal stations of the Delaware River

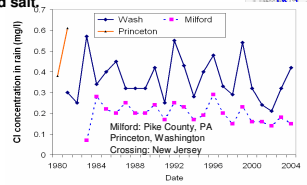


3. Where do the sodium and chloride come from?

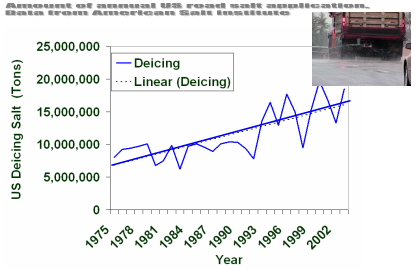
Do they come from the rain or Road Salt?

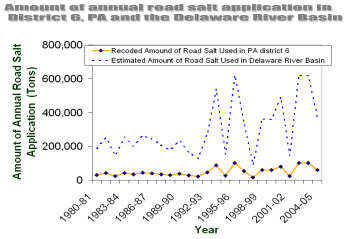
Likely, road salt

Sodium concentrations in the rain water from three precipitation stations in NJ have not changed in the last 30 years

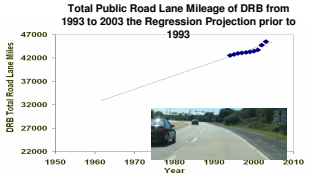


4. Increase of the deicing salt in US and Delaware River Basin

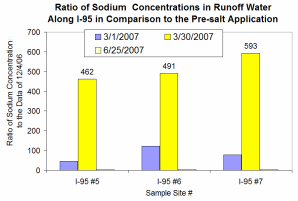


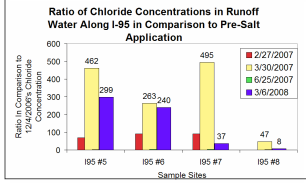


5. Road Mileage Increased by 6.94% between 1994 and 2003

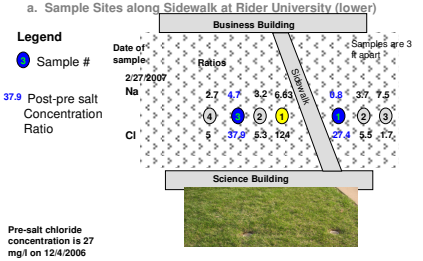


6. The concentrations of Na and Cl in the runoff water along the sides of highway increased more than a few hundred times following Salt Application. Pre-salt runoff water was collected on 12/4/2006. Data collected from 12/2006-3/2008

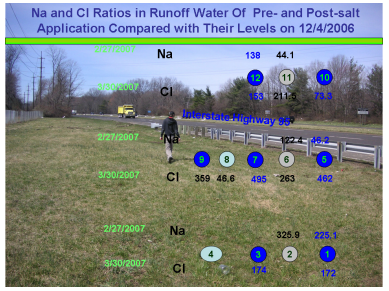




a. Sample Sites along Sidewalk at Rider University (lower)



b. Sample Sites along I-95 near Rider University



Conclusions

1. There is a significant increase in the concentrations of sodium and chloride in the Delaware River over the past 40 years due to road salt application. There are times that sodium concentration exceeds the EPA guidance level of 20 mg/l at Trenton station. The is not good for the public water intake plants.
2. Increase of sodium and chloride concentrations in the runoff water before and after the winter salt application collected between 12/2006 and 3/2008 is very large. We suspect that the road salt application is the largest contributor to the increase of the NaCl in the Delaware River.