January 10, 2017
Contact: Corrina Parnapy
Winooski Natural Resources Conservation District
(802) 778-3178
corrina@winooskinrcd.org

The Impacts of Road Salt to our waterways, soils, and infrastructure.
Corrina Parnapy, Winooski NRCD

Living in the Northeast we depend on clear roads during winter to maintain our way of life. Organizations, agencies and municipalities throughout upstate NY and VT understand that there is an impact to the environment from road salt application practices. We must find the balance that protects the environment and still allows for safe roads.

Road salt (sodium chloride) was first utilized within the U.S. on roads in NH in 1938. By 1941 a total of 5,000 tons of salt were applied to highways nationwide. Today, between 10-20 million tons of salt are applied annually. This increase in road salt application is having a negative impact on our waterways, soils, cars, and infrastructure. Lake Champlain alone has seen a 30% increase within the past 10 years and many bodies of water within the Adirondack Park have levels high enough to impact native aquatic organisms including fish populations.

Road salt lowers the freezing point of ice and prevents icy roads to a certain temperature. 15 degrees is regarded as the magic number, below that sodium chloride does not work. On pavement sand is occasionally used as a deterrent to slippery roads and provides some traction. While sand costs less then salt, it has negative environmental impacts and is ineffective. Not only is sand easily blown away, it can cause sedimentation to local waterways and add phosphorus, which in turn can cause excessive algal growth and potential toxic algal blooms.

Road salt application within our waterways is generally measured in levels of chloride. Every body of water will differ as to what the background levels were historically and at what level the addition of chloride will have an impact. A low nutrient (phosphorus and nitrogen) body of water can experience impacts to algae (the base of the aquatic foodweb) at as little as between 2-10 mg/L of chloride, while other bodies of water with higher nutrient levels may not have an impact until chloride levels reach 70+ mg/L. An increase in chloride levels will shift algae dominance from chlorophyte (green algae) to cyanobacteria (blue-green algae), which can lead to toxic algal blooms. Native brook trout populations are impacted at 250 mg/l, and there is a shift in sensitive macroinvertebrate (what fish eat) populations at 220 mg/l. Many streams and lakes within the Adirondacks have already been identified as impacted by chloride through water quality monitoring efforts and exceed EPA standards and levels that would impact brook trout populations.

Soil bacteria nearby roadways are impacted at 90 mg/l. The sodium chloride will also strip the soils of calcium, magnesium and other import components needed for healthy soils. It is not hard to find damage to trees along roadways. Sodium chloride burns the needles and leaves of species within 15 feet of roads and can impact sensitive plant species as far away as 650 feet.

The addition of sodium chloride to waterways impacts the movement of metals, causing toxic accumulation. The addition of sodium chloride to our waterways can release sediment bound heavy metals back into the water column. The density of the water can be altered by sodium chloride, impacting how a lake turns over in the spring and fall.

In 2015 the U.S. National Highway Traffic Safety Administration noted salt corrosion as the cause of thousands of vehicle brake damage and failure. Sodium chloride can damage vehicles so bad they can have issues with steering, rust, and damage to any exposed metal; while technology is improving cars, the impacts from road salt can still be found. Estimates on vehicle depreciation due to de-icing salts is staggering, approximately $854 per car, per year in cold climates according to Transport Canada.

Our regions bridges, highways and infrastructure are heavily damaged by sodium chloride. It causes concrete to break and spread apart meaning costly fixes. In some areas this had led to the decreased lifespan of bridges and buildings. Sodium chloride contaminates drinking water, damaging wells and pipes. In Flint, Mich. Road salt was a contributing factor to the lead poisoning as it corroded pipes allowing toxins to enter the drinking water. Within our homes and businesses, sodium chloride damages floors, baseboards and can be harmful to our pets and yards.

Wildlife, like humans enjoy something salty to snack on and road salt will attract them to roads causing accidents with local drivers. There have been many reported bird kills from eating the road salt within the U.S. and Canada. Sodium Chloride that enters wetlands and vernal pools can alter sex ratios of species of frogs and decrease the development of eggs thereby pushing already threatened species to the brink.

With all the known impacts, and still a need for safe driving conditions, what can we do?

A key strategy for addressing impacts from road salt to our soil and water health is the monitoring of sodium chloride levels within waterways and groundwater in addition to the implementation of best management practices (BMP's) to reduce the application rates while maintaining a level of service expected. BMP's include equipment calibration, current technology, real-time road condition and weather monitoring, applying the product at the right time and speed, and pre-wetting the product.

We, the users of the road have a role to play as well. It's as simple as driving slower, putting studded winter tires on our vehicle and understanding the level of service that is provided by our road crews. The reduction in application of road salt can be achieved without impacting the level of service provided, if Best Management Practices are followed. We all would like to see a reduction in costs to our towns and the state, thus a reduction in costs to the public and the protection of our natural resources.