

2021 LaRosa Partnership Program Chloride Monitoring

Big picture: Chloride concentrations have been on the rise in lakes, rivers and wetlands across New England and it has now seeped into groundwater. LaRosa Partnership Program partners can assist VT DEC by helping to determine the extent of chloride contamination across the landscape, as well as note any temporal changes. Cl results may be used for TMDL listing purposes or to help VT DEC determine reference or high-quality waters that may require additional biomonitoring.

Sources: The sources of chloride in Vermont are from de-icing compounds (e.g. road salt), irrigation, agricultural and wastewater discharges. In Vermont, it appears that chloride is primarily from stormwater-related sources, but liquid manure and liquid whey can have especially high concentrations. Vermont [streams impaired due to road salt](#) include those in urban areas such as: Sunnyside in Colchester, Potash in South Burlington, Centennial in Burlington, and Englesby in South Burlington. Many [other streams](#) are stressed for chloride in Vermont. [Lake Champlain has increasing concentrations of chloride](#), so even waterbodies with high dilution factors are impacted.

When to sample: Cl sampling can be done at any time of the year and during any flow condition, as this helps tell the story of Cl contamination. It is generally highest during the spring snowmelt period with the flush of road and parking lot runoff. However, some streams are showing year-round elevated chloride levels due to groundwater, wastewater, or agricultural discharges. Vermont's streams impaired by road salt show high concentrations throughout the year and can have a major impact during fall low flow levels. WSMD would like to know if less road-dense areas show a similar "saturated groundwater" impact during summer low flow or if it is mostly a winter melt issue.

Where: VT DEC suggests that partners sample above and below salt sheds, parking lots, and areas with a high concentration of roads or near a dirt road or project well-managed for dust control. Please contact your watershed planner for more information about specific salt sheds. VT DEC requests assistance sampling and locating additional Cl impaired or stressed streams and determining the extent of contamination, so it is also important to consider sites in less densely populated areas as well. You may consider purchasing a handheld conductivity probe, which can be a good indication of Cl contamination and whether there is a need for Cl monitoring. Meaghan and Jim can recommend meters/probes if you have an interest.

Why: Chloride was chosen because of its widespread use across Vermont's landscape as road salt and for dust control mitigation on municipal dirt roads and project developments. Salt sheds are better managed but still prone to "leak or drain" as Cl readily dissolves in water and wet soil becomes mobile and thus readily transports Cl to surface or groundwater. From VT DEC's water quality monitoring, a positive correlation has been demonstrated between impermeable surfaces and Cl concentrations found in streams. Vermont's urban watersheds are far more impacted by salt than other areas and this has resulted in such streams as Centennial (Burlington), Sunnyside (Colchester), and Potash (So. Burlington) to be listed as impaired in Chittenden County. Many LPP streams are being monitored for Cl, and some of these streams have shown Cl rising to the highest levels recorded to date. Past analysis of Cl results on Lake Champlain indicated that this parameter was rising on many sections of the lake, as



well as ponds and upland streams in Vermont where Cl should be near reference level (<5 mg/l). It has even been observed in two of Vermont's Long-Term Monitoring Acid Lakes. While this is an anomaly, there is also a good explanation. These ponds are not far from dirt roads that are managed with salt agents.

Regarding extent, VT DEC is aware of many of the most problematic areas, but is there a continuum of Cl concentrations moving away from the most road-dense areas, out through the suburbs and then into the country roads? In less road dense areas, are the most problematic areas just near road crossings or are Cl problems more reflective of the accumulative road density of the watershed? These are questions that LPP monitoring can potentially address.

Additionally, VT DEC wants to find specific sites where chloride is or may be a problem, as well as how far up and downstream from that area extends. Stream sampling above and below salt/sand sheds and heavily used roads are excellent places to collect chloride samples, especially if they lack data. This information could be used in permitting to determine if salt sheds routinely cause and impact to nearby waterbodies.

How data are used: Overall, we want to know the extent of streams with increasing chloride concentrations before they become stressed or impaired. Chloride data is also used for listing stressed or impaired streams to the EPA. If high or increasing chloride concentrations are discovered, VT DEC can follow up with intensive monitoring to verify impairment with in-situ probes.

Chloride monitoring results: Documentation of high chloride levels has led to municipalities covering their salt and sand piles to reduce runoff, development of remediation plans to reduce concentrations in impaired streams in Chittenden and Windsor County, and the improvement of the VTrans salt delivery system to reduce application rates on major roads. Towns are less likely to dump road salt contaminated snow piles along the rivers only to watch it rapidly flush to state waters with the first signs of spring. Progress has been made on the Cl front and the LPP partners have been instrumental through careful monitoring.