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Assessing downstream transport of Chloride from road salt usage with a hybrid statistical-mechanistic approach

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In regions that experience seasonal freezing, chemical de-icers are routinely spread on impervious surfaces to keep roads and walkways safe for travel. The most common de-icing agent is sodium chloride (NaCl), which releases chloride that readily moves through surface and subsurface pathways into aquatic systems. At elevated concentrations, chloride is toxic and can threaten freshwater ecosystems. Road salt is applied across a range of impervious surfaces—including roads, parking lots, sidewalks, and driveways—often at varying application rates, yet the relative contributions of these surfaces to downstream chloride (Cl) loading remain unclear. This presentation describes the application of Spatial Regressions on Watershed Attributes (SPARROW) to model the downstream transport of chloride from both impervious and pervious land covers to Lake Simcoe in Southern Ontario. The results demonstrate that SPARROW successfully represents downstream chloride transport and identifies key source areas and transport controls, supporting its use as a management tool for chloride in freshwater systems.