

# Road Salt and Cars Produce Extreme Water Contamination in Frenchman's Bay, Canadian Research Reveals

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(PhysOrg.com) -- The levels of contamination to water and sediment in Frenchman's Bay in Pickering, Ontario greatly exceed provincial water quality standards, in some cases by as much as 250 per cent, according to a new study by researchers at the University of Toronto Scarborough. This is largely due to large amounts of road salt applied in winter, especially to Highway 401, the study finds.

Roads, parking lots and railways are the primary source of contaminated water and sediment and a decline in aquatic life in the watershed and lagoon, according to a recent article in *Sedimentary Geology* written by geology professor Nick Eyles and recent PhD graduate Mandy Meriano.

The densely populated area along Highway 401 and its accompanying traffic volume have profoundly affected the geology and characteristics of water in the bay and nearby city, according to the article, "Road-impacted sediment and water in a Lake Ontario watershed and lagoon, City of Pickering, Ontario, Canada: An example of urban basin analysis." The growing city of 100,000 people is sprawled across a densely urbanized watershed that has been "hardened" by roads, rail lines, buildings and parking lots, the authors write.

"Our findings are pretty dramatic, and the effects are felt year round," says Eyles. "This is a really bad news story about the relentless chemical assault on a watershed, with bleak implications that go far beyond the

lagoon itself. We now know that 3,600 tonnes of road salt end up in that small lagoon every winter from direct runoff in creeks and effectively poison it for the rest of the year. The future of Frenchman's Bay is not bright, but this also affects the Great Lakes."

The researchers conducted an extensive study of streams and groundwater entering Frenchman's Bay over a five-year period using sophisticated field testing and groundwater modeling methods. Some 7,600 tonnes of de-icing salt are applied to nearby roads each year, with more than half of it accumulating in groundwater and returning as brackish (salinated) baseflow into creeks year round, they note. "The remainder is rapidly delivered by surface runoff to Frenchman's Bay, where chloride contents are more than double the average values in waters across the Great Lakes," the report states. "Highway 401 is the largest single source of salt contamination to the lagoon, which receives 26 per cent of all road salt applied to the watershed but covers just 1.3 per cent of its area."

The authors also found that levels of other urban contaminants such as metals, E. coli and coliform were all elevated well above Canadian [water quality](#) standards. A decline in ecosystem diversity in Frenchman's Bay is also noted in the report, reflected in the absence of fish in creeks, significant changes in the age structure of fish populations and a much lowered diversity of aquatic species. The report highlights the loss of wetlands by urban runoff.

The contaminated water from Frenchman's Bay flows directly into Lake Ontario and Eyles says it is typical of many urban watersheds across the Great Lakes basin. This basin is home to 36 million Canadians and Americans. The urban impact on the lakes is a major concern because these waters are used for drinking supplies. The water quality of the Great Lakes was identified as being at risk from urban development in the 2003 International Joint Commission's [Great Lakes](#) Water Quality

Board report, he notes.

The \$500,000 study by Eyles and Mariano is one of the most specific and detailed geological research projects on any watershed in Canada, and one of the most well financed studies of its kind, with thorough multi-year monitoring of conditions in both summer and winter. The authors hope the report will highlight the impact of urban development and infrastructure on water quality, not just in Frenchman's Bay but in all bodies of water near urban areas.

The research was conducted with the financial support and co-operation of the City of Pickering, Eyles said. The city has created a Waterfront Committee that is considering the implications of the report to decide on future steps.

Provided by University of Toronto

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