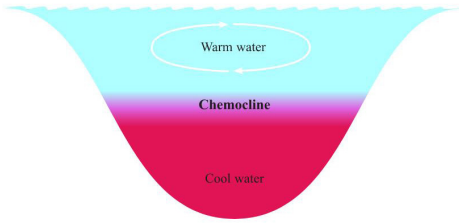
Road Salt:
Impacts on Lakes

Each year approximately two million tons of road salt is applied to Michigan's ice-covered roads by public agencies.[1] Individual use of salt on driveways, sidewalks, and parking lots would likely inflate this number considerably, if quantified. While the extent of the environmental effects associated with the use of road salt come into focus, Michigan's waterways appear to be facing a growing problem.

The most commonly used form of road deicer is Sodium chloride (NaCl), the same compound as table salt, but in larger granules called rock salt. Concerns over the use of rock salt have been met with somewhat safer but considerably more costly alternatives such as Magnesium chloride ($MgCl_2$) and Calcium chloride ($CaCl_2$). Chlorides can have detrimental ecological effects to freshwater systems at high concentrations. In August 2019, the Michigan Department of Environment, Great Lakes, and Energy (EGLE) established water quality values (WQV) for chloride to describe the impacts to aquatic life at different concentrations. EGLE set the final chronic value (FCV) for chloride at 150 milligrams per liter (mg/L), stating that long-term exposure above this concentration can be harmful to aquatic life such as fish and invertebrates.[2]

The adverse impacts to lakes as a result of road salt inputs extend beyond immediate biological concerns. Because water density increases with salinity, chloride can accumulate in a lake's bottom waters and increase to levels significantly higher than surface water concentrations. Lakes that receive higher inputs of chloride may form a chemocline, or chemical gradient, between the surface and deeper water. This strong barrier to mixing can prevent a lake from fully turning over in the spring and fall. In deeper lakes, mixing is essential for re-oxygenating the bottom waters prior to the thermal stratification that takes place in the summer and winter. If a lake is unable to turn over, the deep water will remain oxygen-depleted. As a result, phosphorus, the nutrient that most often regulates aquatic plant and algae growth, will be released from the sediments year-round. Further, cold water fish such as trout and whitefish are unable to survive without sufficiently oxygenated deep water.



High chloride inputs can result in a chemocline, preventing lake mixing.

Chloride levels can be monitored by collecting samples throughout the water column. If a lake's watershed contains roads that are regularly salted during the winter it is recommended to monitor chloride levels. Ask your lake management consultant about the threat chloride may pose to your lake.

For more information regarding Michigan's inland lakes, please visit michiganlakeinfo.com

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References:

1 Cornwell, M. 2011. Michigan Road Salt: What is it Costing Us? Michigan Science. 16.

2 EGLE. 2019. Chloride and Sulfate Water Quality Values Implemenation Plan.