

How Does Chloride Affect Minnesota's Lakes?



THE PROBLEM

Where does the salt go?

- Minnesota uses approximately 400,000 tons of salt on its roads each year ([CBS 2019](#))
- There is no current widespread way to remove chloride - it is a permanent pollutant to freshwater sources including our lakes, rivers, and wetlands
- 1tsp salt pollutes 5 gallons of water permanently
- “In extreme cases, salinization can generate density gradients within the lake water column that prevent vertical mixing. Permanent stratification can result in anoxia and internal nutrient and metal resuspension, which decreases lake habitability and water quality” ([PNAS 2017](#))
- The natural process of seasonal lake mixing in Minnesota's freshwater lakes may be threatened or impacted due to the increased input of salt ([Lake Champlain Basin Program 2008](#))
- With a changing climate including warming temps and increased precipitation, the salinization of our freshwater systems may increase and may inhibit the natural process of lake mixing. As a result, freshwater sources, including fish habitat, will be severely impacted.

BACKGROUND

Lake Mixing: Freshwater lakes naturally stratify each season, usually based on density and temperature. In the fall, the warmer, and less dense water at the upper regions begins to cool. This causes the density shift, and the upper region begins to “mix” with the lower regions. This is an important ecological event because it allows for distribution of oxygen and nutrients throughout the freshwater system. ([Pelican Lake MN](#)) ([EPA fact sheet](#))

“Thermal stratification is the most important physical event in a lake's annual cycle and is a direct result of heating by the sun” (USGS [1989](#))

MINNESOTA'S FRESHWATER SOURCES DESERVE PROTECTION

Action Items:

- Reduce and mitigate chloride pollution in our lakes by reducing the use of salt on roadways, reducing salty discharges from wastewater treatment plants, and mitigate impacts from water softeners and other commercial chloride products
- Educate the public and land managers through Smart Salting trainings and the Stop Over Salting campaign
- Mitigation efforts may also include the implementation of raingardens throughout urban areas to reduce the amount of impervious surface cover and runoff during storm events



SOURCES

https://www.researchgate.net/publication/273022422_Road_Salt_Impact_on_Lake_Stratification_and_Water_Quality

<https://commons.emich.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1456&context=honors>

[https://www.pnas.org/content/114/17/4453#:~:text=Elevated%20chloride%20concentrations%20in%20lakes%20can%20alter%20the%20composition%20and,%E2%87%93%E2%80%9312%2C%2035\).&text=In%20extreme%20cases%2C%20salinization%20can,column%20that%20prevent%20vertical%20mixing.](https://www.pnas.org/content/114/17/4453#:~:text=Elevated%20chloride%20concentrations%20in%20lakes%20can%20alter%20the%20composition%20and,%E2%87%93%E2%80%9312%2C%2035).&text=In%20extreme%20cases%2C%20salinization%20can,column%20that%20prevent%20vertical%20mixing.)

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