

Many urban streams harmful to aquatic life following winter pavement deicing

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The use of salt to deice pavement can leave urban streams toxic to aquatic life, according to a new U.S. Geological Survey study on the influence of winter runoff in northern US cities, with a special focus on eastern Wisconsin and Milwaukee.

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More than half of the Milwaukee streams included in this study had samples that were toxic during winter deicing. In eastern and southern Wisconsin, all streams studied had potentially toxic chloride concentrations during winter, with lingering effects into the summer at some streams. Nationally, samples from fifty-five percent of streams studied in 13 northern cities were potentially toxic; twenty-five percent of the streams had samples that exceeded acute [water quality](#) criteria.

Toxicity was measured by direct testing of organisms in samples during the local study component; in the regional and the national study components, observed chloride levels were used to assess potential toxicity.

"While winter driving and walking safety are the priority in treating pavements, this study suggests the need for advancements that will reduce salt loads to surface waters without compromising safety," said Matthew C. Larsen, USGS Associate Director for Water.

"We expected to see elevated chloride levels in streams near northern cities during the winter months," said Steve Corsi of the USGS Wisconsin Water Science Center. "The surprise was the number of streams exceeding toxic levels and how high the concentrations were," said Corsi, who led the study.

"This study shows that chloride contamination of urban streams is a problem in many places; it's not just a Milwaukee problem," said Corsi.

While road deicing accounts for a significant portion of salt applications, it is not the only source. Salt is also used by many public and private organizations and individuals to deice parking lots, walkways and driveways.

Key Findings:

Nationally: During the winter, samples from fifty-five percent of northern streams in this study had chloride levels that exceeded USEPA chronic water-quality criteria, indicating potential toxicity. Samples from twenty-five percent of the streams exceeded acute water-quality criteria.

Regionally: In eastern and south-central Wisconsin, potential toxicity was found during winter at all [urban streams](#) studied, with lingering effects at some streams in the summer.

- During winter, 100 percent of the streams monitored had

chloride levels that exceeded the USEPA chronic water quality criteria with fifty-five percent of samples exceeding acute water quality criteria.

- Chloride levels higher than 10,000 milligrams per liter were observed at times during winter deicing periods—much greater than the chronic water-quality criteria of 230 milligrams per liter and the acute criteria of 860 milligrams per liter.
- Chloride levels increased as urbanization percentage in the watershed increased.
Locally: In Milwaukee, more than half of the samples collected from streams during winter deicing periods were toxic.
- Samples from seven of 13 streams collected during 2007 deicing periods were toxic in bioassay tests.
- Chloride levels in 12 out of these 13 streams exceeded USEPA chronic water quality criteria; eight of 13 exceeded acute criteria.
- In long-term testing of one Milwaukee stream between 1997 and 2008, seventy-two percent of 38 samples collected during the winter were toxic in bioassay tests.

More information: <http://pubs.acs.org/doi/abs/10.1021/es101333u>

Provided by United States Geological Survey

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