

A young boy in a dark shirt and shorts is running away from the camera on a long wooden pier that extends into a body of water. The pier has wooden railings on both sides. The water is calm with some ripples. In the background, there are other wooden structures, possibly docks or piers, and a person is visible on one of them. The lighting suggests it might be late afternoon or early morning.

Understanding Chloride in Watersheds

Brown's Creek Watershed District
October 11, 2023



- **In 2022, spring/fall chloride samples were collected in 20 waterbodies:**
 - All samples were below the chronic chloride standard
- **Trend analysis showed:**
 - Elevated chloride concentrations in the hypolimnion of Long Lake and intermittently in the tributary
 - There are increasing chloride loads at all monitoring stations
 - Evidence to suggest there is a spatial and temporal component to this issue



- Chloride persists and accumulates in the environment
- There are no economically feasible options to remove chloride from lakes and stream
- Removal of chloride from water is a worldwide issue in which **affordable desalination would relieve water supply shortages**
- In current news, a state of emergency is in effect due to a saltwater intrusion which is threatening the water supply of New Orleans

Chloride Concentration

(mg/L)

Chronic
Standard

230

Lake Max

321

Tributary
Max

588

Acute
Standard

860

Toxic stressor for the aquatic life at all trophic levels

▲ Lethal to zooplankton which is the base of the food chain

★ Causes stress to zooplankton at lower concentrations

- Cyanobacteria is less sensitive and can take advantage of less competition

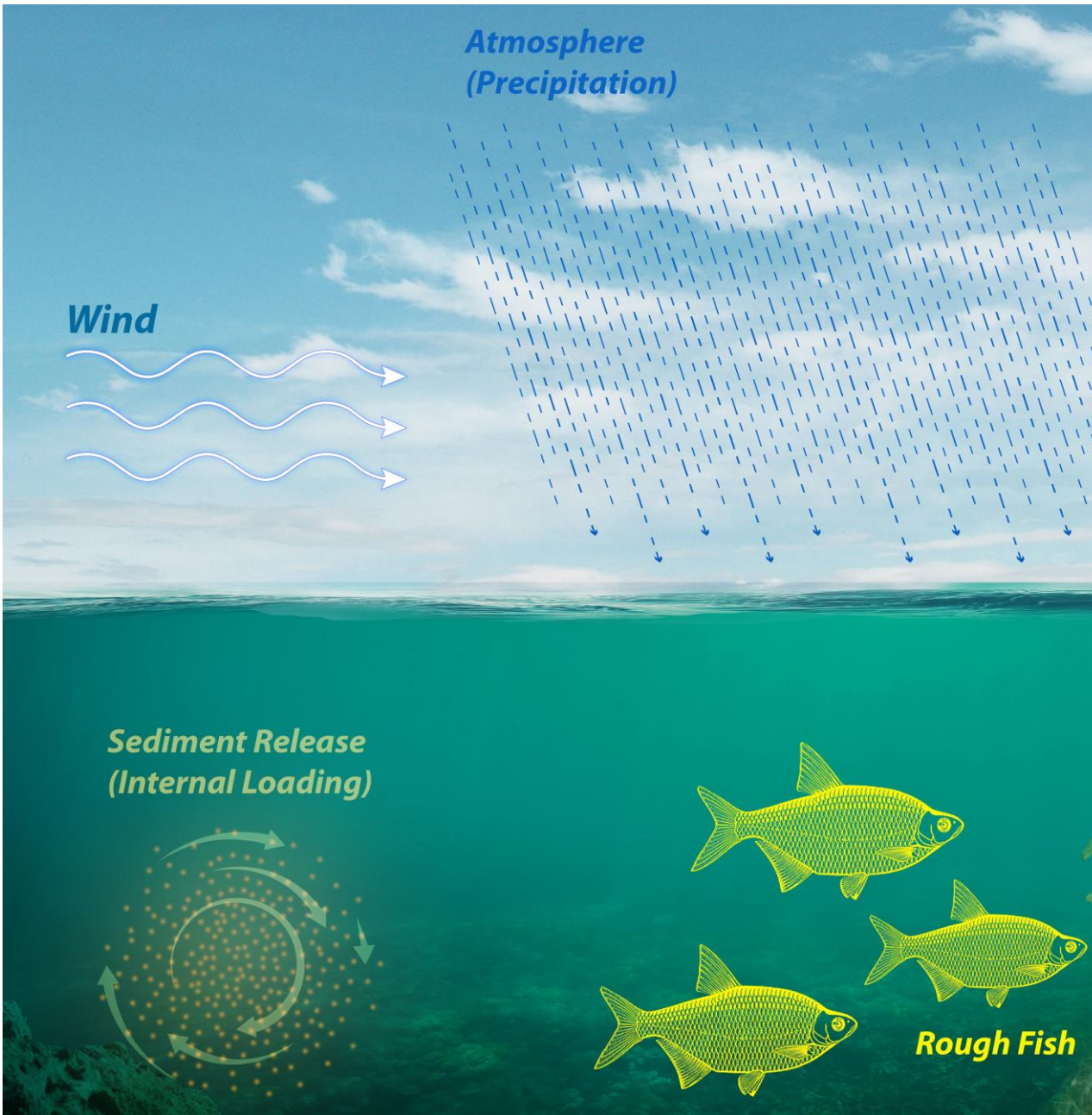
◑ Lethal to larvae mussels

● Decrease in survival of female wood frog larvae

■ Reduced the size of hatchling fish by 30% and reduced egg production



- **There are effects on the ecosystem in the watershed**
 - Salt spray kills roadside plants
 - Lethal to butterflies feeding on roadside vegetation
 - Attractant to deer and moose to roads which causes traffic risk
 - Birds eat salt granules which can be fatal
 - Pets drink saltwater which cause abdominal distress and walking on salt granules damages paw pads



- **Increased sediment erosion**
 - Sediment is more mobile
 - Sediment has less capacity for retaining nutrients
- **Increases internal loading**
 - Increased stability leads to longer terms of anoxia and phosphorus release
- **Reduction of fish habitat by increasing anoxia**
- **Salts trigger the mobilization of harmful chemicals like, radon, mercury, and lead**



- Road salt also corrodes vehicles and bridges, causing \$5 billion in annual repairs in the United States (EPA)
- Corrosion of pipes and roadsides can mobilize contaminants, like lead and other metals



Road Salt

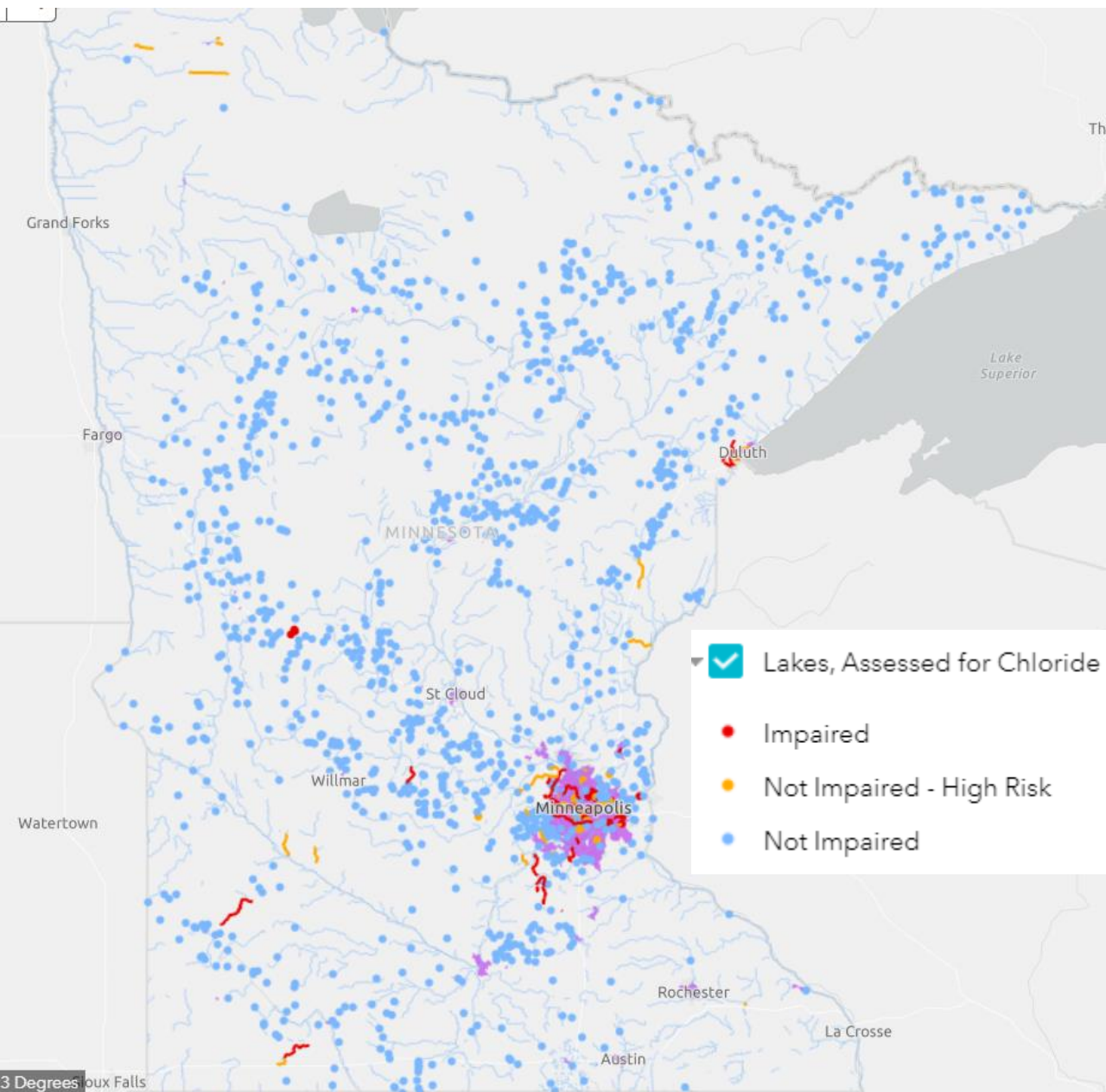
- Road salt runoff is high in developed areas where there are many roads and other paved surfaces.
- Up to 78% of salt applied for winter maintenance is transported to our waterways

Water Softeners/Septic Systems

- Water softener brine from septic systems can be released if those systems

Recommend a source assessment for road salt and review of water softeners and septic systems

What can we do?



- Challenging to find effective solutions for chloride reductions
- MPCA provides a framework for chloride reduction implementation plans
- Smart Salting Trainings and certified contractors
- Chloride Reduction Grants
- Volunteer chloride monitoring programs – Salt Watch program

Questions?



Thank you!





- **Where is the chloride accumulating in the lake?**
- **How long have high chlorides been in Long Lake and how fast is it accumulating?**
- **Can the chloride be flushed from the system and what is the risk to downstream waterbodies?**
- **What is the outlook for Long Lake ecosystem long term?**