Winter Road Salt (Chloride) in Lake Simcoe Tributaries

David Lembcke
Manager, Environmental Science and Monitoring

Bill Thompson
Acting Subwatershed Plan Coordinator
Winter Salt impacts on the Environment

- Most commonly used is Sodium Chloride (NaCl)
- Vast majority of salt will end up in surface / groundwater
  - days to decades
- Highly soluble and concentrations in water are unaffected by chemical reactions
- Affects osmoregulation of freshwater species
- 2011 CCME Guideline
  - Chronic (long term) = 120 mg/L
  - Acute (short term) = 640 mg/L
Chloride Concentrations

• Ocean salt concentration = 35,000mg/L
  • 55% Cl = 19,250mg/L
  • 45% Na = 15,750mg/L
• Unimpacted lakes on Canadian Shield = <1 – 7mg/L
• Cooksville Creek Mississauga = 20,000 Cl mg/L
• Max Lake Simcoe Tributary Cl = 6,120 mg/L at Hotchkiss Creek, February 2013
Chloride in Simcoe Tributaries

- High Chloride concentrations in tributaries linked to urban areas and seasonality

Ave. Cl Concentrations

Winter
Spring, Summer, Fall

Hotchkiss
857mg/l Winter
247mg/l Spring, Summer, Fall

Bluffs
12mg/l Winter
11mg/l Spring, Summer, Fall

Beaver
30mg/l Winter
26mg/l Spring, Summer, Fall

Holland Landing
339mg/l Winter
140mg/l Spring, Summer, Fall
Chloride Trends – Lovers and Pefferlaw

Annual Average Cl

- Lovers
- Pefferlaw
Lake Simcoe Chloride Trends

- Concentrations have been increasing at a rate of 0.7 mg/l/year (2013 = 45.24 mg/l)
- By 2120 Cl will exceed 120 mg/l guideline
Parking Lot Salt Application

- Flow and conductivity monitoring (Cl load) on 3 types of parking lots
- Winter 2014/15 commercial lot (142,000m²)
- 75 applications over 4 months @58g/m²
- 66 in January and February alone

Month  | Cl Load (ton) | Max Concentration (mg/L)
-------|--------------|--------------------------
December| 40.9         | 44,443                   
January | 310.6        | 71,740                   
February| 238.9        | 85,673                   
March   | 33.3         | 83,484                   

TOTAL  | 623.9        | 

Is Sand a better option?

- Minimal improvement in friction / traction at speed
- When mixed with salt it can delay anti-icing
- Eliminating sand has been seen to lower overall salt application rates
- Significant clean up costs
- Water quality / aquatic habitat impacts
- Best use is parking lots and slower speed section of road or in colder temperatures (below -12°C)
We’ve got a big challenge

“Implement a salt reduction strategy to reverse the trend in chloride concentrations in watershed tributaries within 5 years”
Already a lot of focus on salt management ...

- Voluntary best practices to balance environmental protection and roadway safety
  - All road organizations in the watershed participate
But we can add value too

- Municipal salt working group
- ‘Best Practice’ Salt Management Plans
- Mapping areas particularly vulnerable to road salt
- Increase public awareness
- Smart About Salt certification
- Parking lot design guidelines
- Alternatives to salt
- Application rates
- Salt and LID
- Resource and information sharing with neighbouring CAs
Predicted stream chloride concentration
What is the source of the chloride?

- Total of 90,000 T in 2012
- Equivalent to 225 kg of salt per capita
Private sector training and certification

- Salt science
- Proper storage and application
- Equipment calibration
- Self-assessment, tracking, and reporting
Salt Working Group

- Municipal and provincial roads managers, transportation planners, LSRCA, academics
- Venue for sharing information, generating new ideas
- We have some shared questions
  - What’s the best type and amount of material to apply?
  - How does this relate to LID?
  - How can we design future sites to reduce the need for salt?
  - How do we manage public expectations?
  - How do we improve municipal Salt Management Plans?
  - How do we increase use of certified contractors?
Changes in how we build

• Site planning recommendations
  ▫ Snow storage
  ▫ Sidewalks and entrances

• Template policies for municipal OPs to support guidelines

• MOECC funding pending
Other partnerships

• Ongoing collaboration with CVC and TRCA
  ▫ Examining alternatives to salt
  ▫ Exploring application rates
  ▫ Promoting calibration of equipment
  ▫ Template snow removal contract
  ▫ Examining benefits of snow tires
  ▫ Engage insurance industry
  ▫ Salt use and Low Impact Development

• Environment Canada’s Road Salt Working Group
• OGRA, ORSWG
• Ryerson U, U. Guelph, U. Waterloo
We’ve got a big challenge

“Implement a salt reduction strategy to reverse the trend in chloride concentrations in watershed tributaries within 5 years”

But we’re building a big tool box:

- Municipal salt working group
- ‘Best Practice’ Salt Management Plans
- Mapping areas particularly vulnerable to road salt
- Increasing public awareness
- Smart About Salt certification
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- Alternatives to salt
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- Resource and information sharing
Questions?