



Winter Maintenance and the Public Good

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Salt, ice and transportation....



The Public Good



THIS



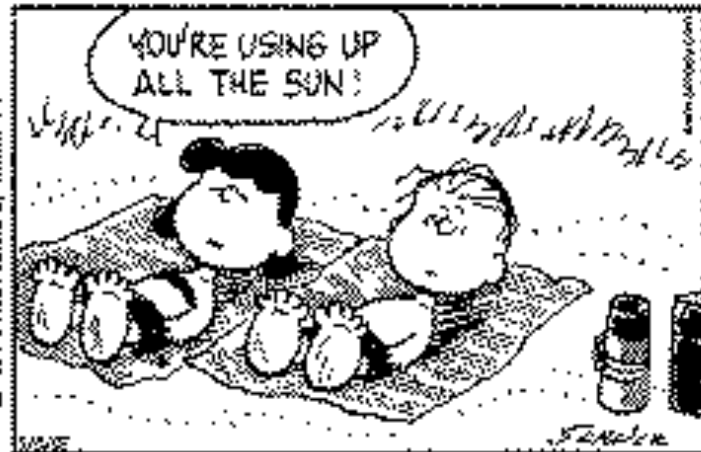
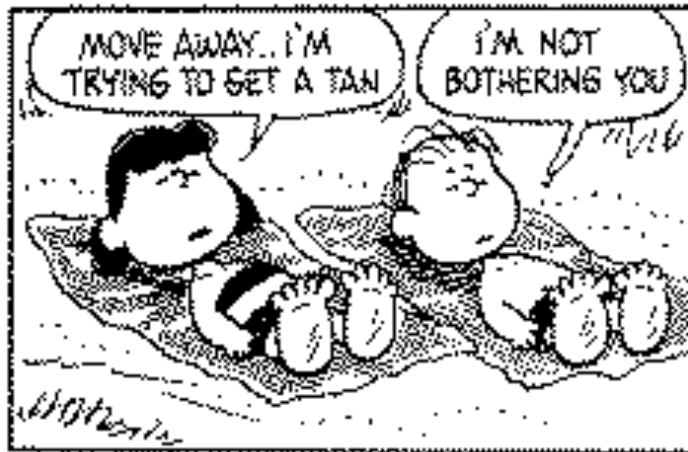
NOT THIS

a good that is both non-excludable and non-rivalrous

Does it fit the definition?

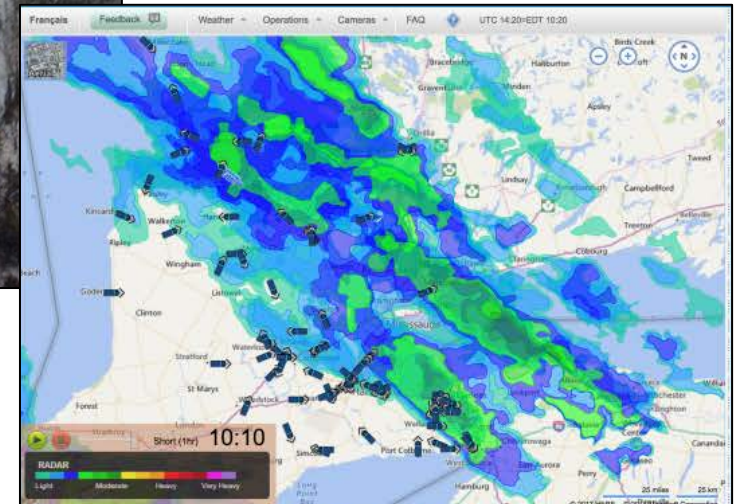
Peanuts

Charles M. Schultz



Common Good? Rival or Non-Rival?

Rivalry: Highway Users



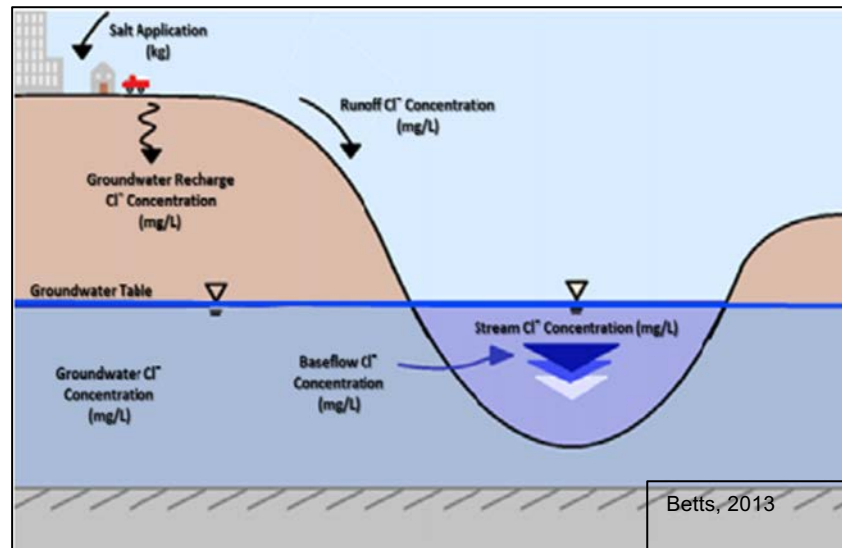
Fixed number of plows; who gets served first?

Rivalry: Stakeholders



Lambton farmers awarded \$106,000 for road salt damage

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January 23, 2015



Fact Sheet - Salt in Private Drinking Water Wells

Sodium and chloride in groundwater:

Sodium and Chloride occur naturally in groundwater. However, sources such as road salt, water softeners, natural underground salt deposits, pollution from septic systems as well as salt water intrusion due to proximity to the ocean are often causes of elevated levels in drinking water supplies. This could be a health concern for people on low sodium diets. Elevated levels of sodium and chloride can also interfere with taste, the water of certain plants and may increase the corrosivity of the water and damage household plumbing.

How do you know if you have elevated levels of Na & Cl in your drinking water?

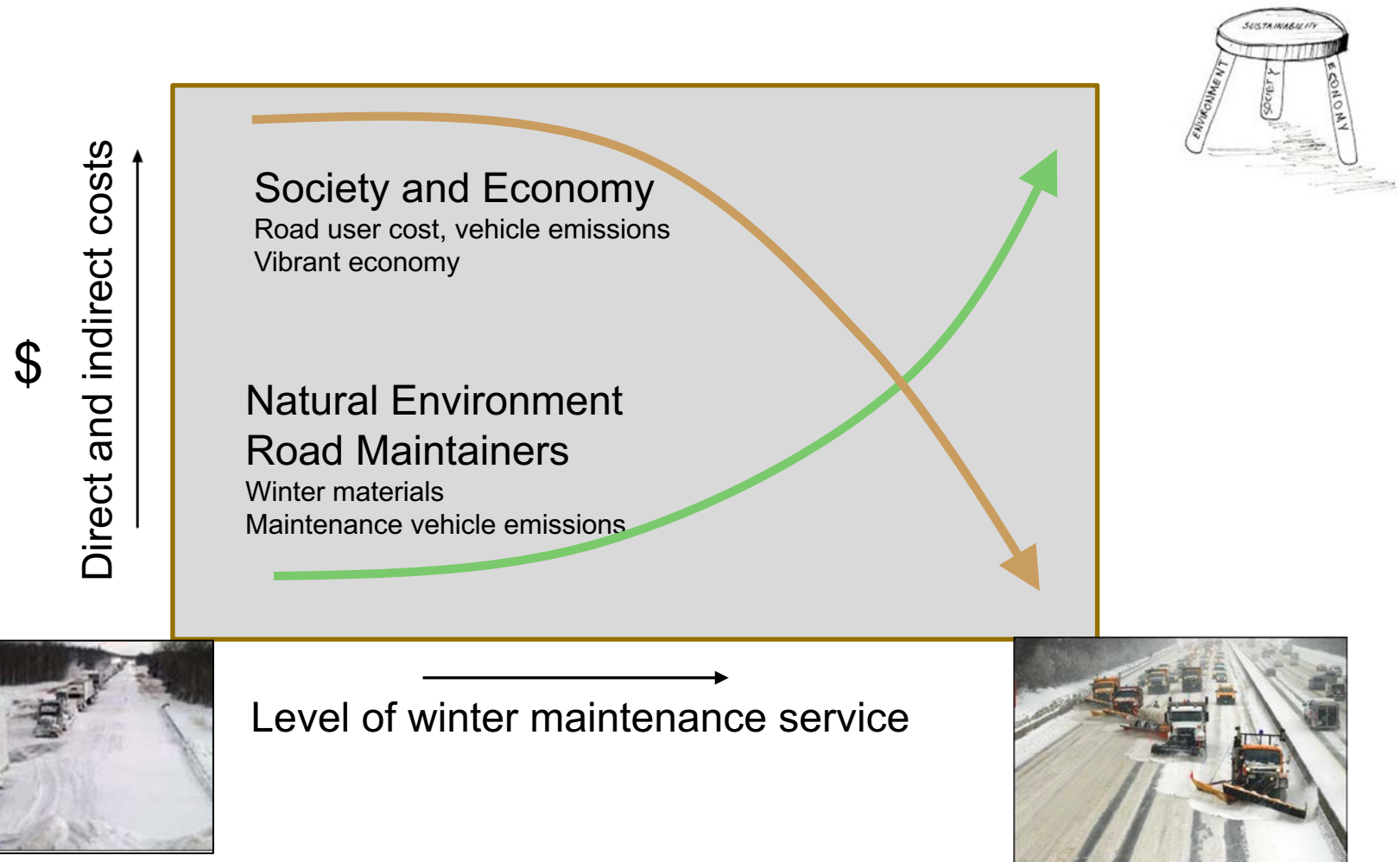
Higher than normal levels of sodium chloride would likely cause corrosion and shorten the life of plumbing, water heaters and any appliances that come in contact with the water. The aesthetic objection for chloride

Competing interests of road user, road owner, roadside neighbors.

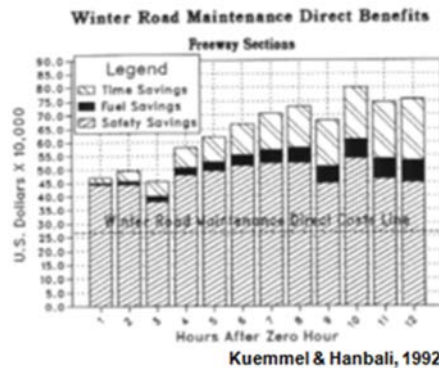
The Sustainability Framework



Sustainable Winter Maintenance



Society and Economy



Weather Conditions	Freeway Traffic Flow Reductions	
	Average Speed	Volume
Light Rain/Snow	3% - 13%	5% - 10%
Heavy Rain	3% - 16%	14%
Heavy Snow	5% - 40%	30% - 44%
Low Visibility	10% - 12%	—

Table 1 – Weather Impacts on Freeway Traffic Flow

Pisano et al, 2008

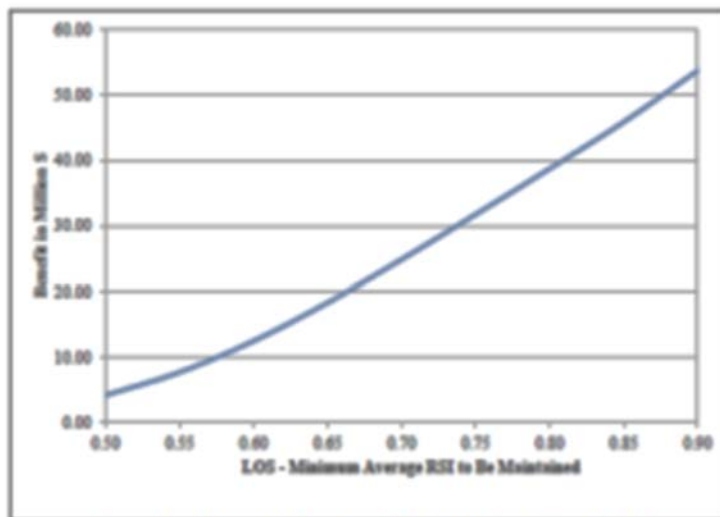


Figure 3: Additional Safety Benefit for Achieving a Given LOS Target

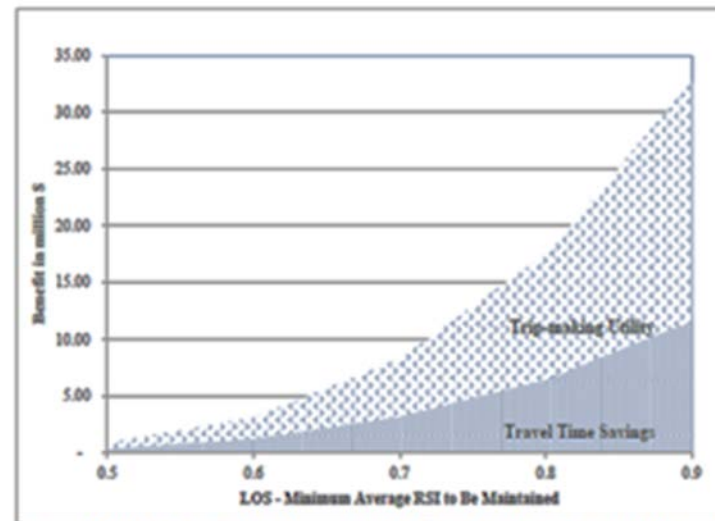


Figure 4: Mobility Benefit of WRM versus WRM LOS Standard (Ontario Provincial Network)

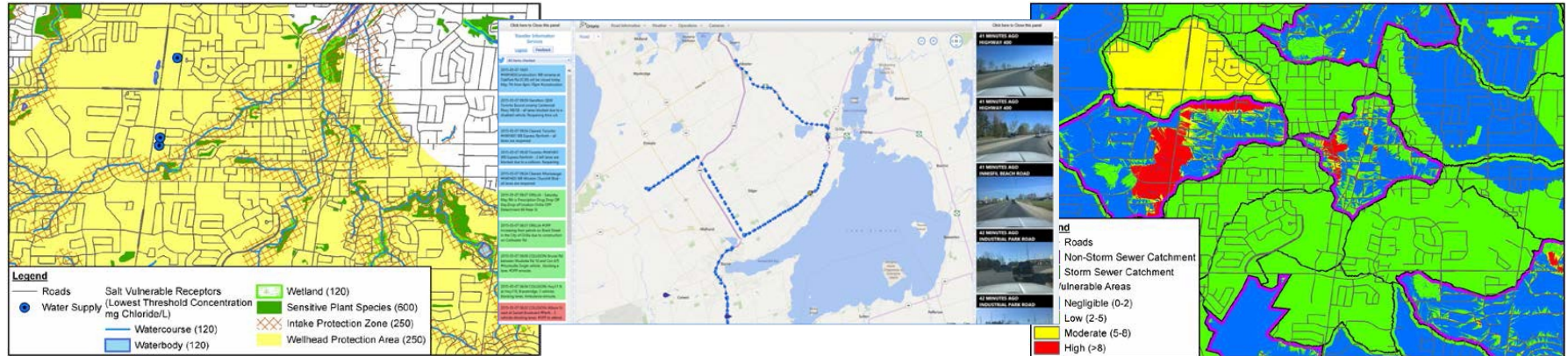
Fu et al, 2012

Savings from accident reduction

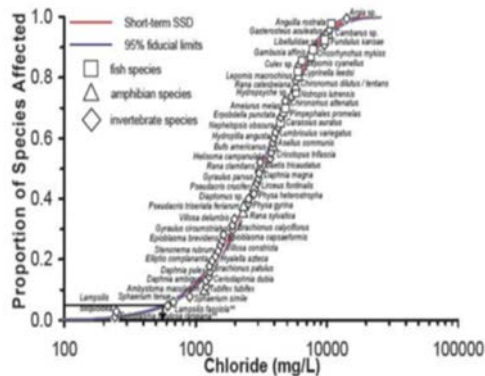
Savings from travel time improvement

Natural Environment

Susceptibility x Exposure = Risk

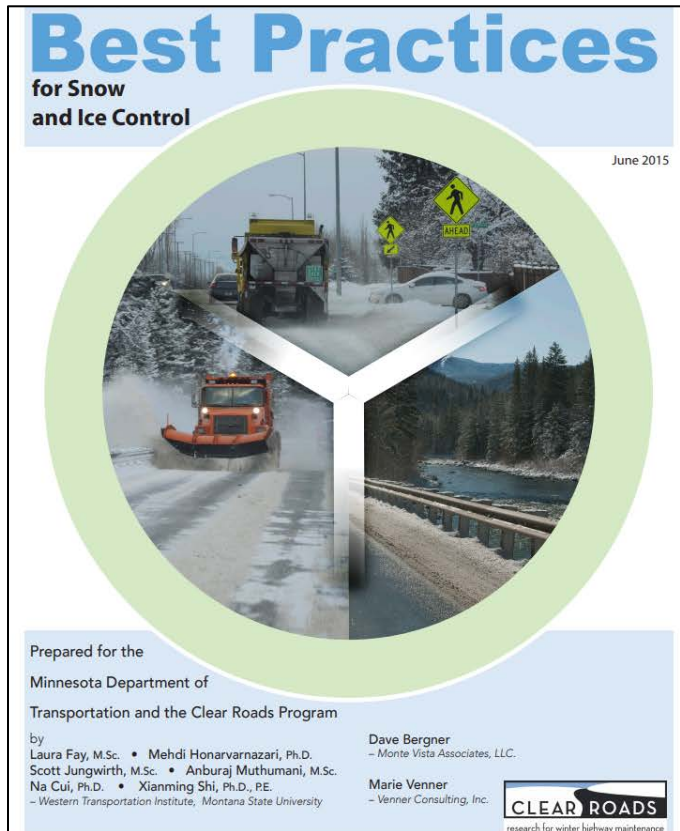


GHD North America, 2018



Canadian Aquatic Species Susceptibility, CCME, 2011

Maintenance Practices



Syntheses of Best Practices Road Salt Management

TAC
Transportation Association of Canada

10.0 – SALT USE ON PRIVATE ROADS, PARKING LOTS AND WALKWAYS

This is one in a series of Syntheses of Best Practices related to the effective management of road salt in winter maintenance operations. This Synthesis is provided as advice for preparing Salt Management Plans. The Synthesis is not intended to be used prescriptively but is to be used in concert with the legislation, manuals, directives and procedures of relevant jurisdictions and individual organizations. Syntheses of Best Practices have been produced on:

- | | |
|--|--|
| 1. Salt Management Plans | 8. Snow Storage and Disposal |
| 2. Training | 9. Winter Maintenance Equipment and Technologies |
| 3. Road, Bridge and Facility Design | 10. Salt Use on Private Roads, Parking Lots and Walkways |
| 4. Drainage | 11. Successes in Road Salt Management: Case Studies |
| 5. Pavements and Salt Management | For more detailed information, please refer to TAC's Salt Management Guide - 2013. |
| 6. Vegetation Management | |
| 7. Design and Operation of Maintenance Yards | |

In Conclusion:

