

Help Put Our Lakes on a Low-Salt Diet this Winter!

Presenters:

David Neils, NHDES Chief Aquatic Biologist

Stephen Landry, NHDES Watershed Assistance Section Supervisor



Presentation outline

Science meets Management....

- 1) Overview of salt use as a deicer and risk to aquatic life
- 2) Status of salt in New Hampshire surface waters
- 3) Climate change and salt use
- 4) New Hampshire salt use
- 5) Green SnowPro Program and commercial applicator certification

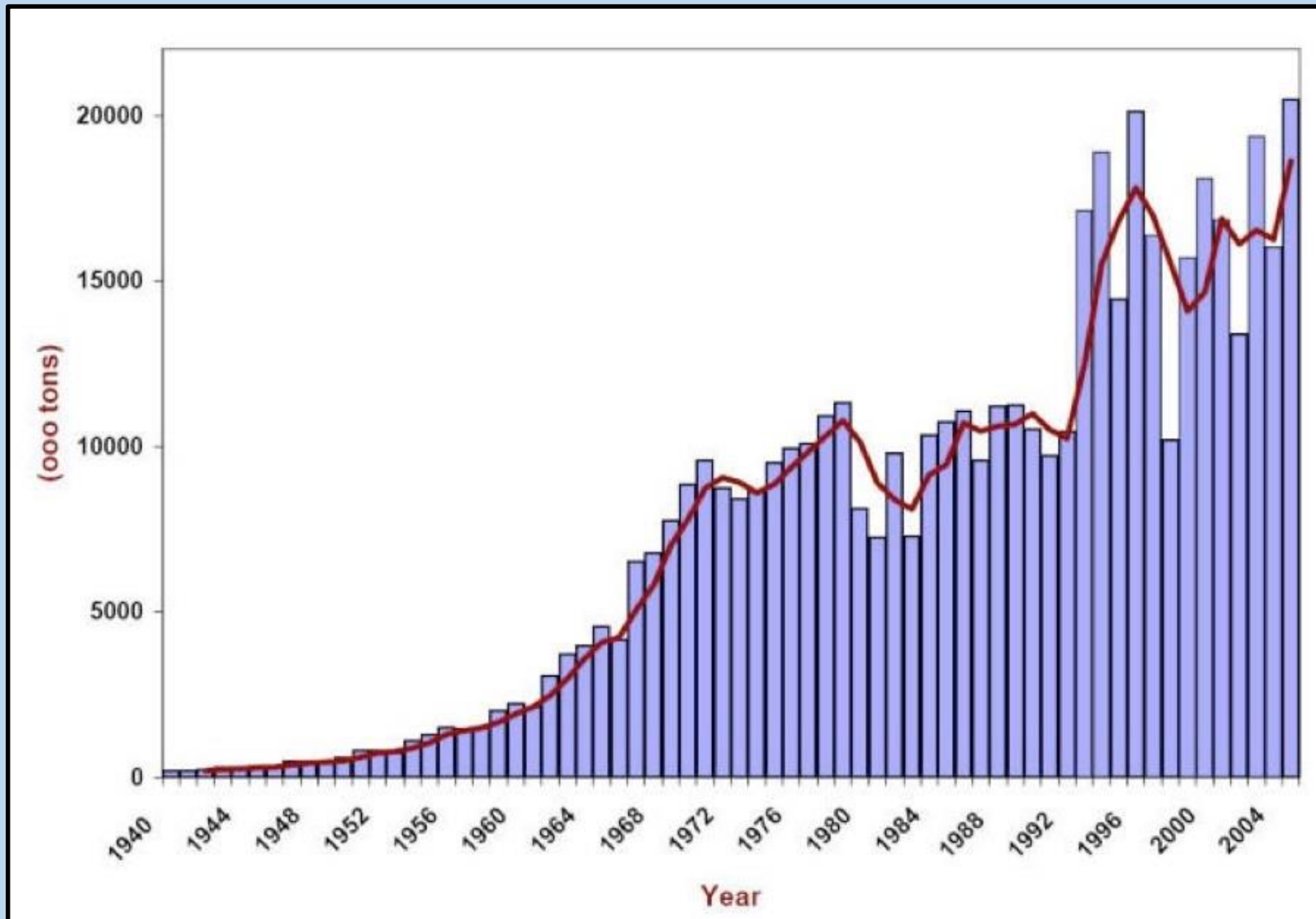
History of use of salt as a deicing compound



- New Hampshire “first in the nation” to use salt on roads - 1938
- Today, approximately 20 million tons used annually in U.S.



Use of salt on roads in U.S. by year



How salt works

- Salt molecules pull water molecules out of ice formations – to form a salt brine with a reduced freezing temperature.
- Once the brine is formed the melting process is greatly accelerated

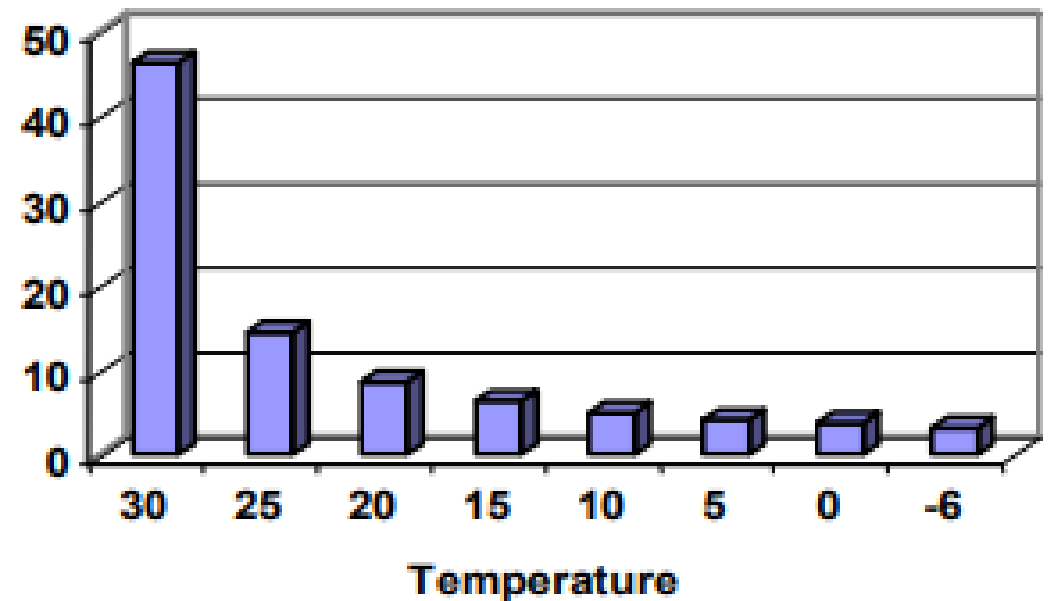


The effectiveness of salt changes with temperature!

POUNDS OF ICE MELTED PER POUND OF SALT

Temperature Degrees F	One Pound of Sodium Chloride (Salt)
30	46.3 lb of ice
20	8.6 lb of ice
15	6.3 lb of ice
10	4.9 lb of ice
5	4.1 lb of ice
0	3.7 lb of ice
-6	3.2 lb of ice

Pounds of Ice Melted per Pound of Salt



Graph obtained from The Salt Institute FY03 Snow & Ice Fact #20

Salt: $\text{Na}^+ + \text{Cl}^-$

Both are conservative ions: **they never go away and are very soluble in water**

Cl⁻ (Chloride)

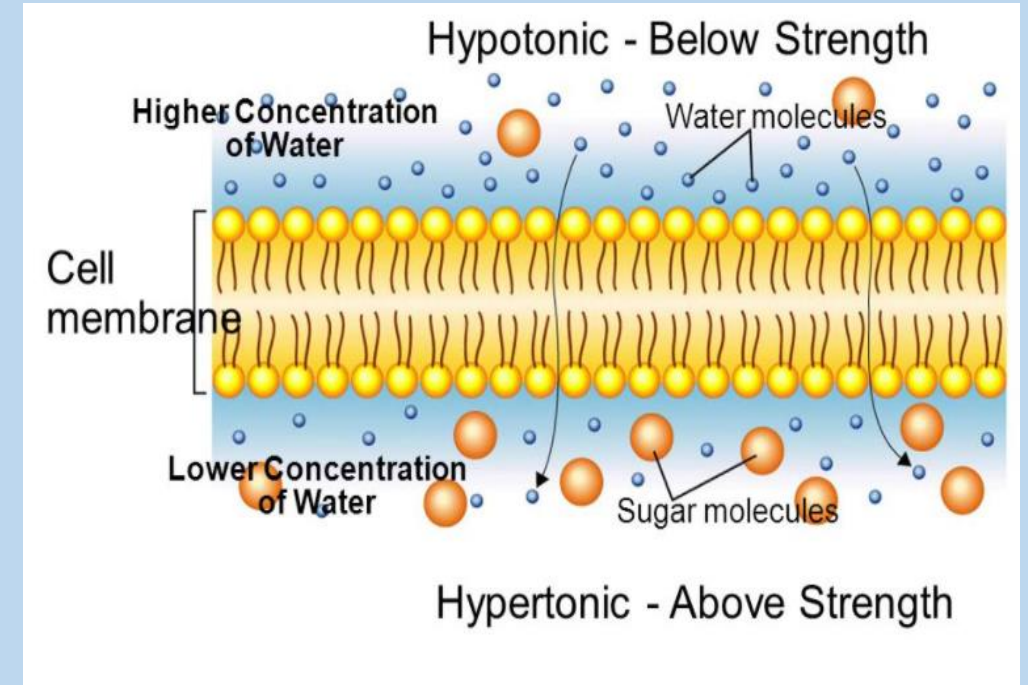
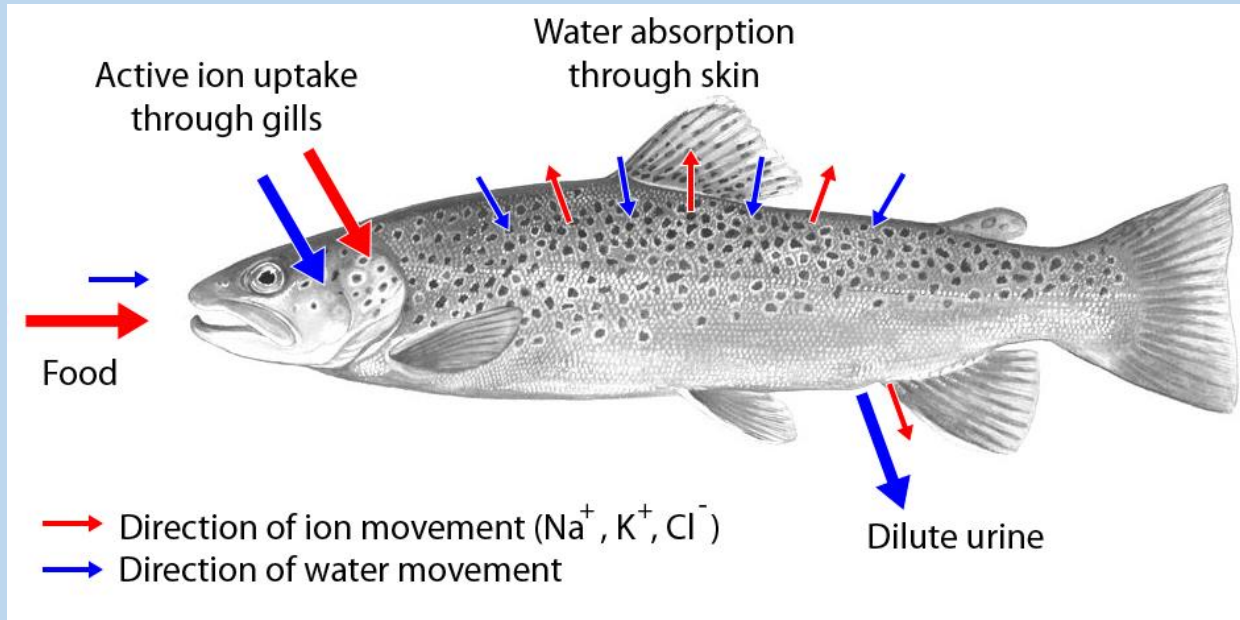
State Water Quality Criteria: acute (1-hr avg.) - 860mg/L; chronic (4-day avg.) – 230mg/L; Secondary drinking water criteria (aesthetic) – 250mg/L (salty taste).

Na⁺ (Sodium)

Secondary drinking water criteria (aesthetic): 250mg/L, 20mg/L for those on low sodium diet.

We are talking about CHLORIDE when
considering water quality impacts

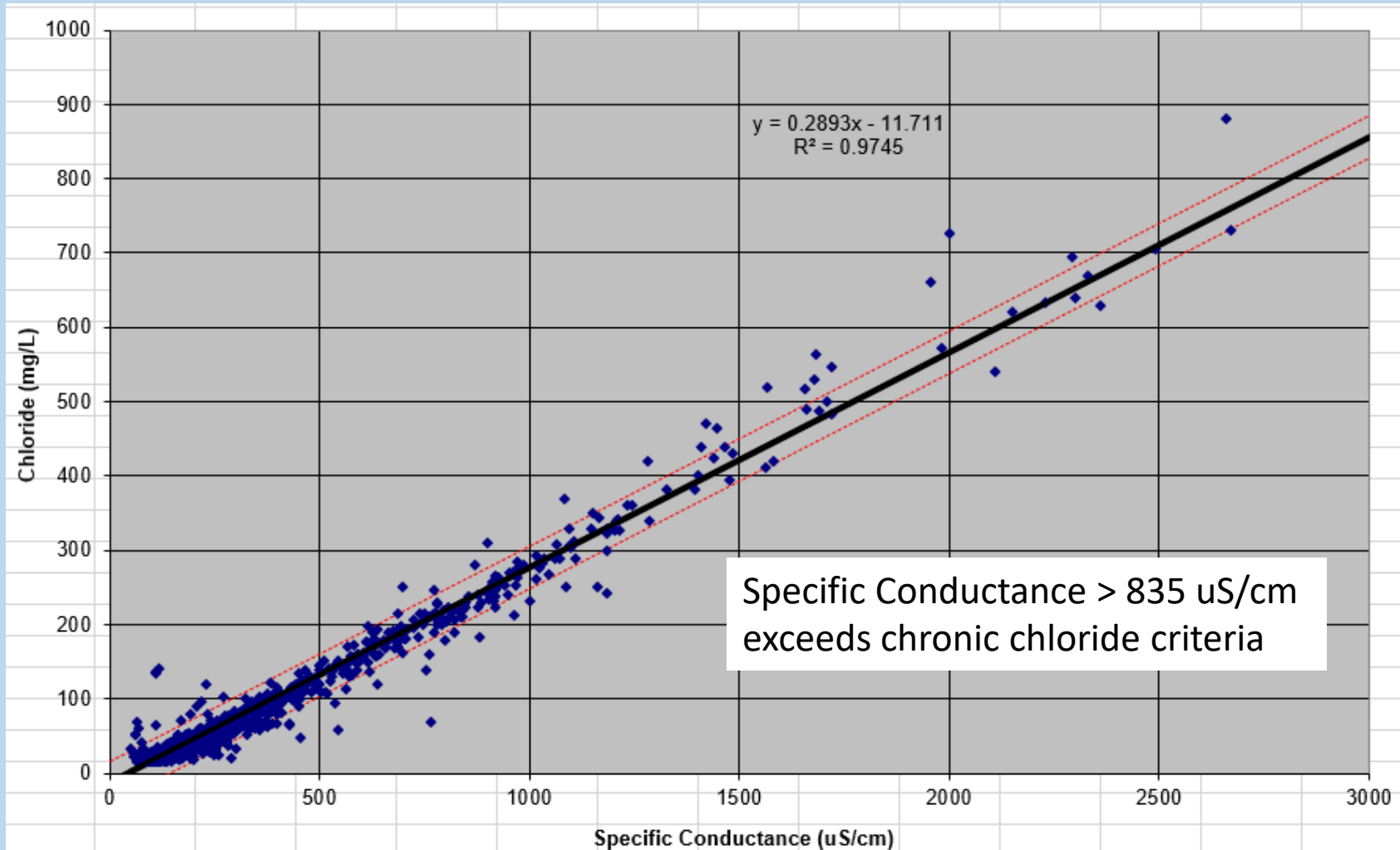
Impacts to aquatic life: Osmoregulation (water / ion balance)!



In general invertebrates are more sensitive than vertebrates and plants have wide range of tolerance

Chloride in New Hampshire surface waters

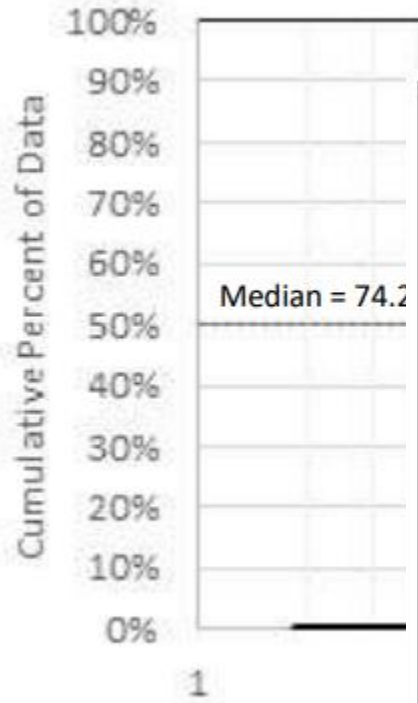
Measure directly or use surrogate measure (specific conductance)



NH Lakes Specific Conductance

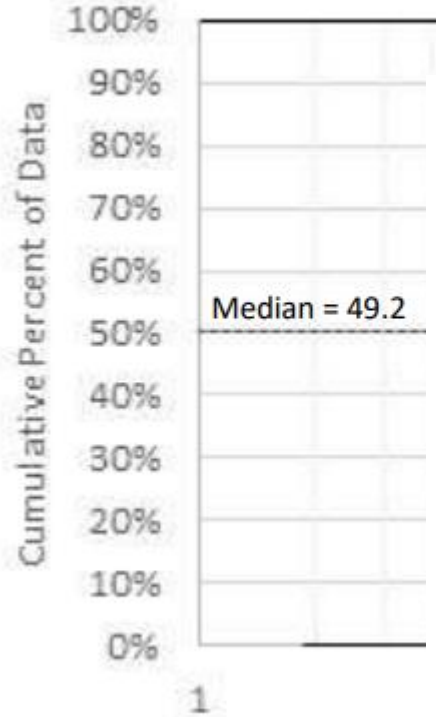
EUTROPHIC

Waterbodies = 109



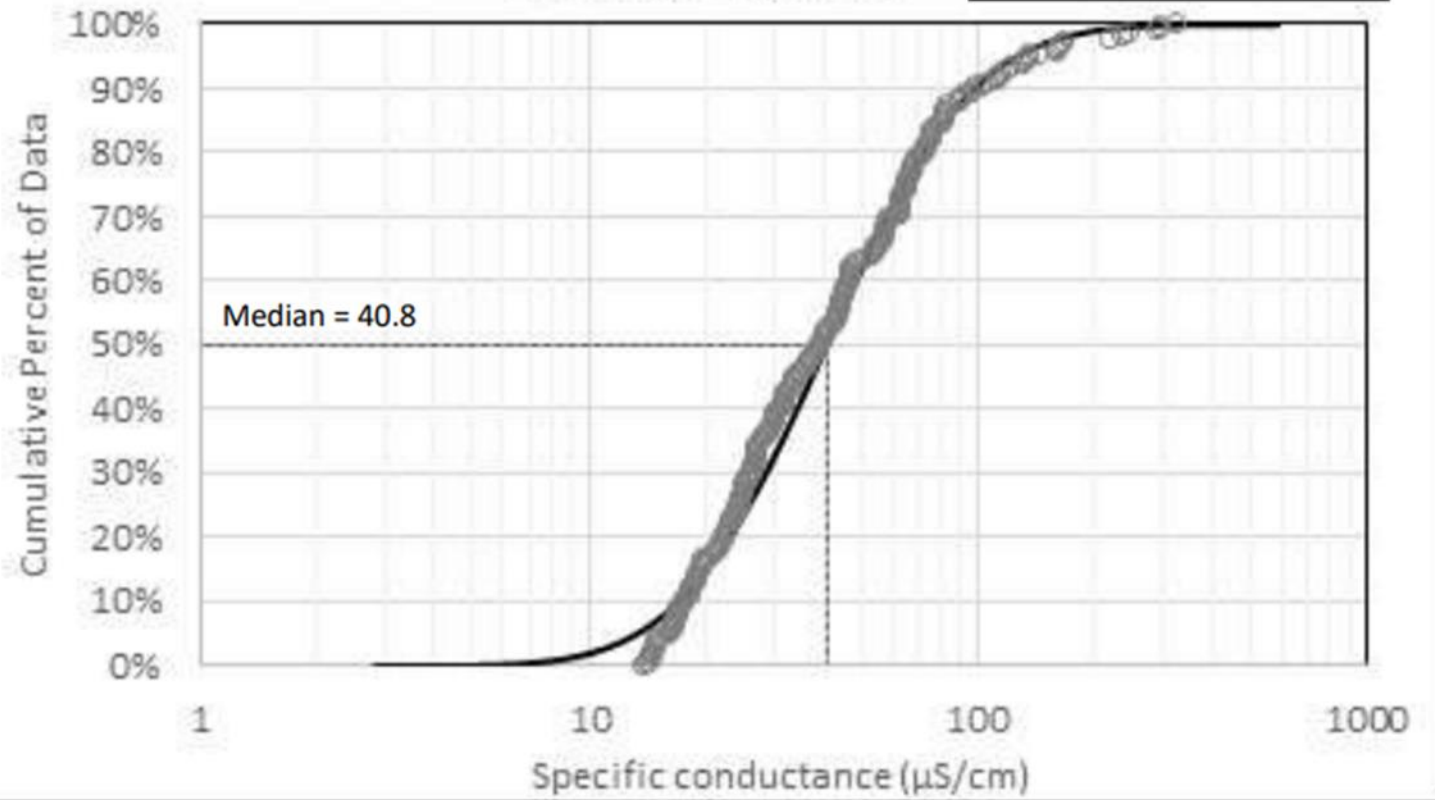
MESOTROPHIC

Waterbodies = 332



OLIGOTROPHIC

Waterbodies = 226



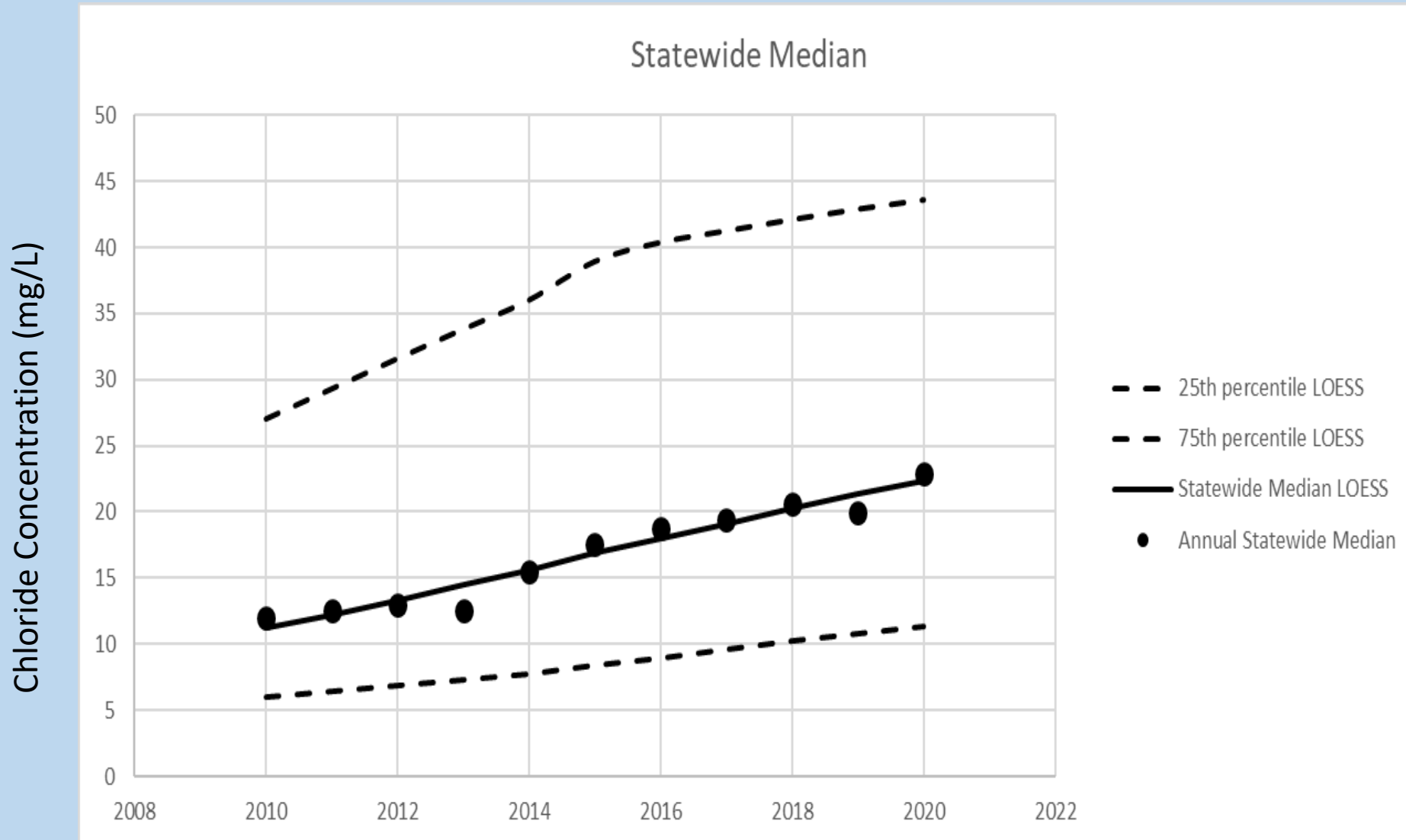
- Medians range from 41 – 74 depending on trophic class
- Anything over 100 is in upper 60th – 90th percentile

Specific Conductance trends in New Hampshire lakes

Table 8. Number of VLAP waterbodies with increasing, decreasing, or no trend in specific conductance levels.

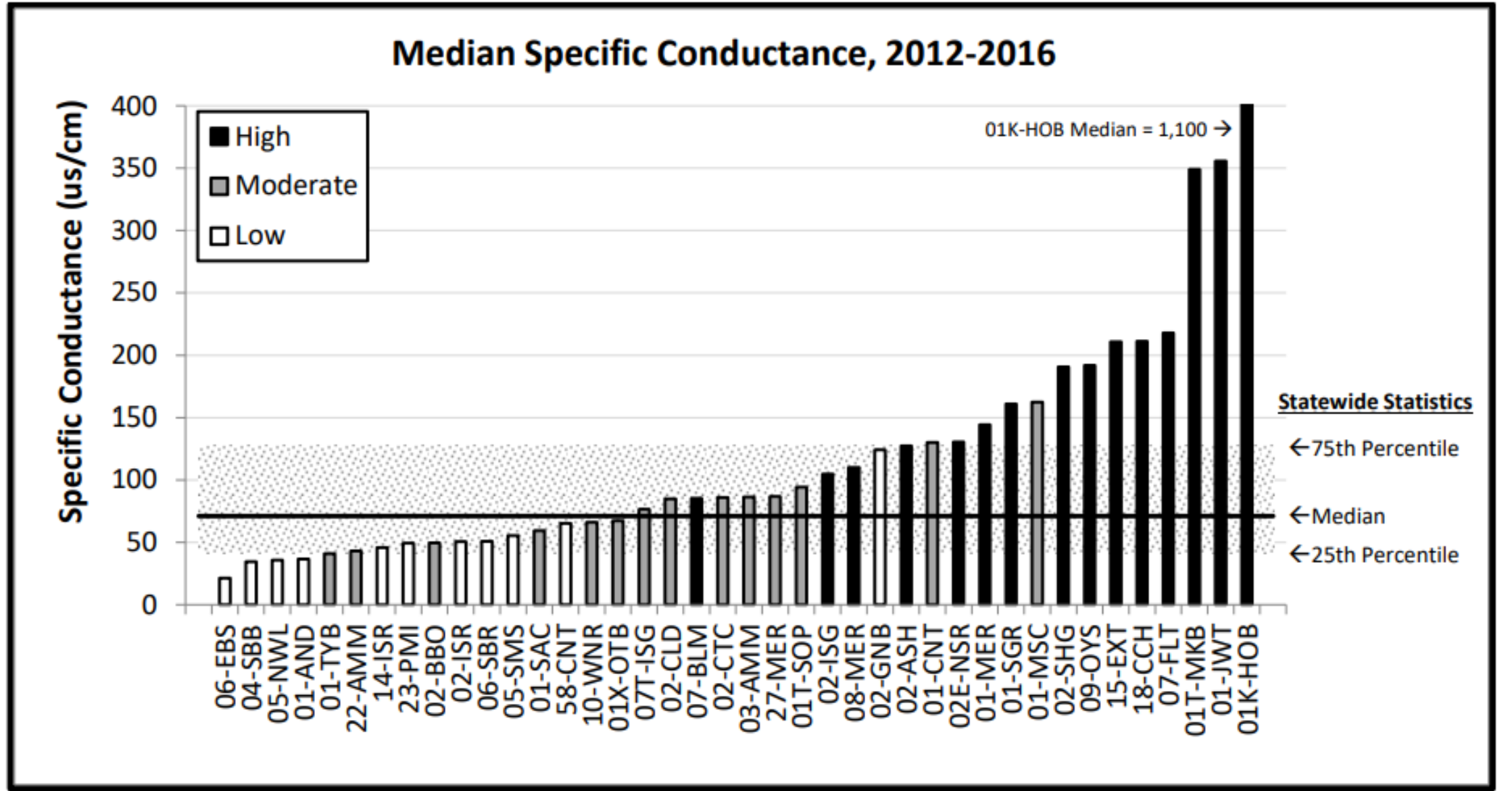
Trophic Class	Number of Waterbodies	Count			Percent		
		No trend	Increasing	Decreasing	No trend	Increasing	Decreasing
EUTROPHIC	10	5	5	0	50.0%	50.0%	0.0%
MESOTROPHIC	71	38	29	4	53.5%	40.8%	5.6%
OLIGOTROPHIC	69	33	28	8	47.8%	40.6%	11.6%
ALL	150	76	62	12	50.7%	41.3%	8.0%

Chloride trends in New Hampshire lakes



- Avg in 2010=12 mg/L; Avg in 2020=23 mg/L
- 60 out of 80 lakes with increasing trend
- On average, chloride concentrations have increased 71%
- Most lakes well below WQ criteria; 2-3 lakes above

River Trend Specific Conductance: Higher Specific Conductance in Rivers with More Development



Climate change and salt use / impacts

Projections: 1) Temperature increases year round. 2) Increased precipitation (frequency & severity) especially during winter and spring. 3) Summer and fall seasonal drought occurrence is more likely.

Source: 2018 National Climate Assessment.

Potential Salt-Related Outcomes:

- 1) More winter storm events, especially those when salt is most effective. => more salt use
- 2) More frequent groundwater “flushing” events during high precipitation events. => Salt export from groundwater increases
- 3) Extended periods of low flow when groundwater is the primary contributor to our surface waters. => No dilution of high salt sources by surface runoff

Stripe et al. 2017

How Will Climate Change Affect Road Salt Export from Watersheds?

⇒ Study of Hudson River tributary watershed

- Chloride concentrations peaked during winter precipitation events
- Overall, >80% of annual chloride load in streams came from baseflow
- Salt (chloride) concentrations increased in streams during dry summer/fall time periods

Science

meets

Management



Pass the Salt, Hold the Liability

*Addressing Chloride
Contamination in New
Hampshire with the Green
SnowPro Program*



Help Put Our Lakes on a Low-salt Diet this Winter
NH Lakes Webinar Series
November 3, 2021



The road to salt reduction in New Hampshire was paved with eight lanes





7 months



5 months





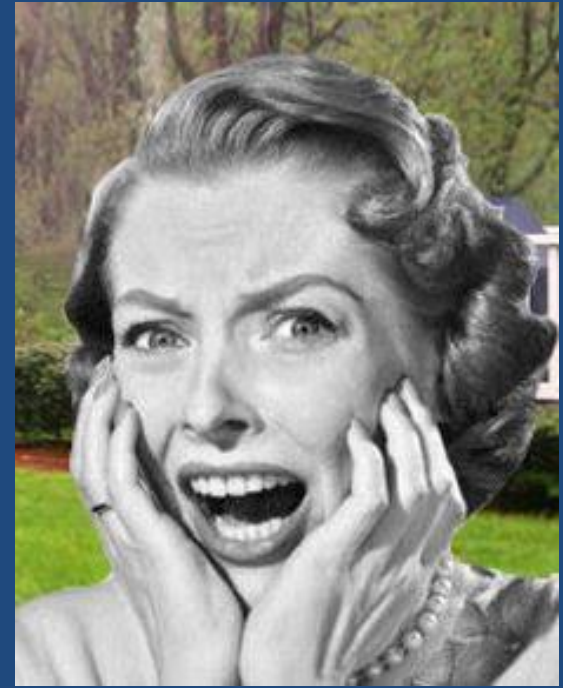
**Why do we
use salt?**





Wants vs Needs









Roughly 400,000 tons of salt applied in New Hampshire every year.





The problem is overuse of salt

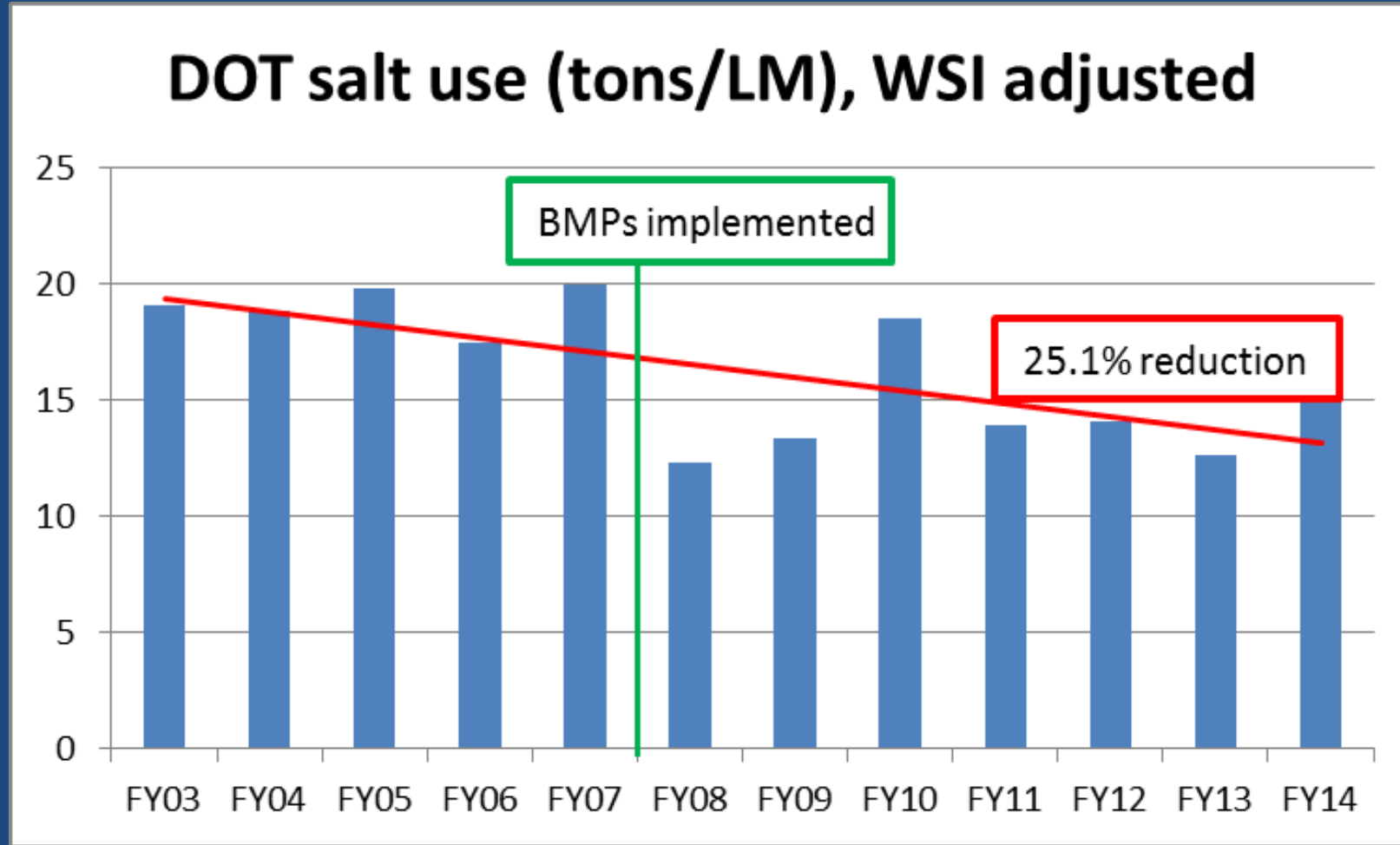


Research shows that people use 30-50% more salt than is needed to protect public safety

The goal is to use the right amount of salt at the right place, under the right conditions, at the right time

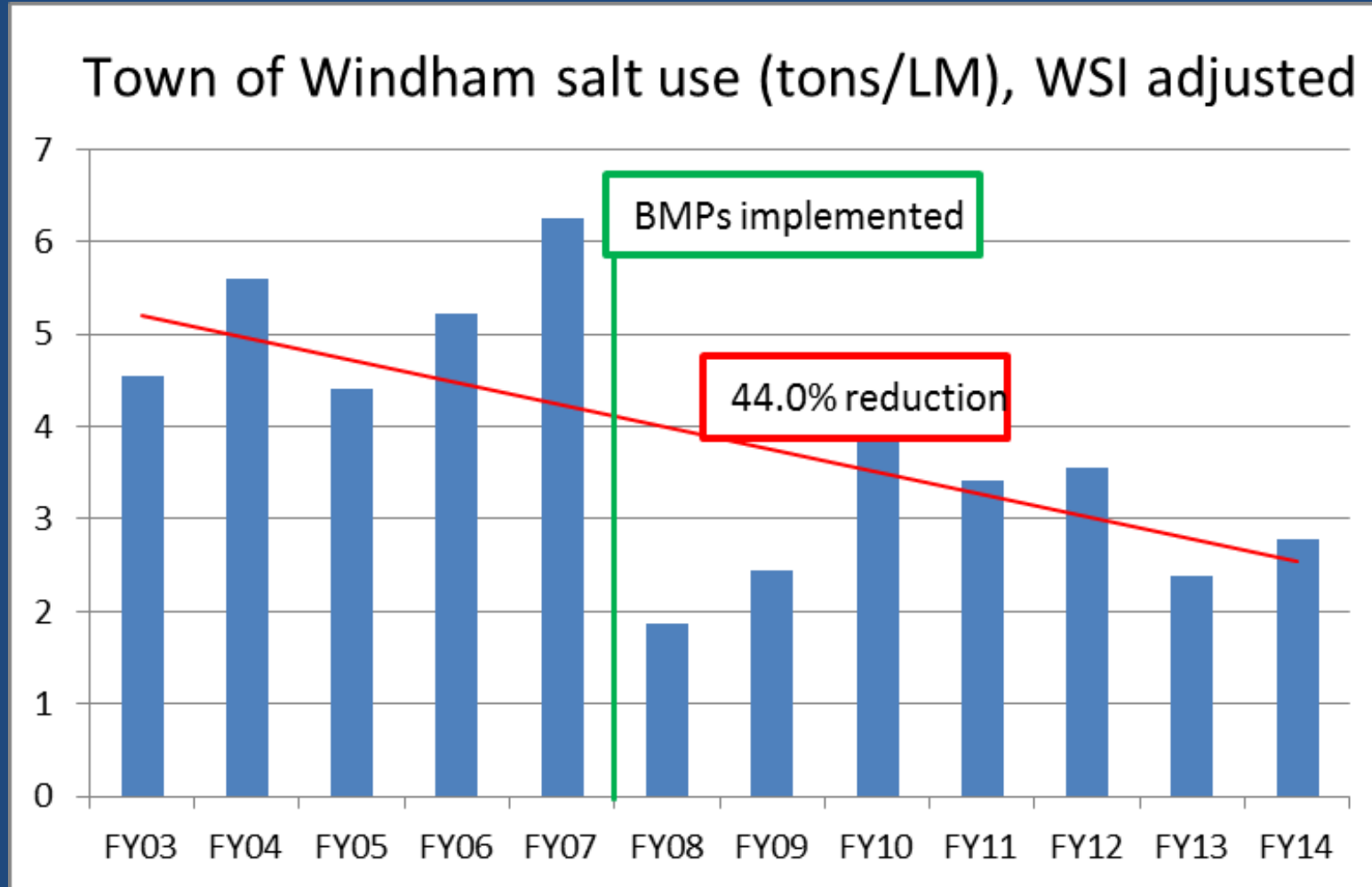


DOT salt reduction achieved



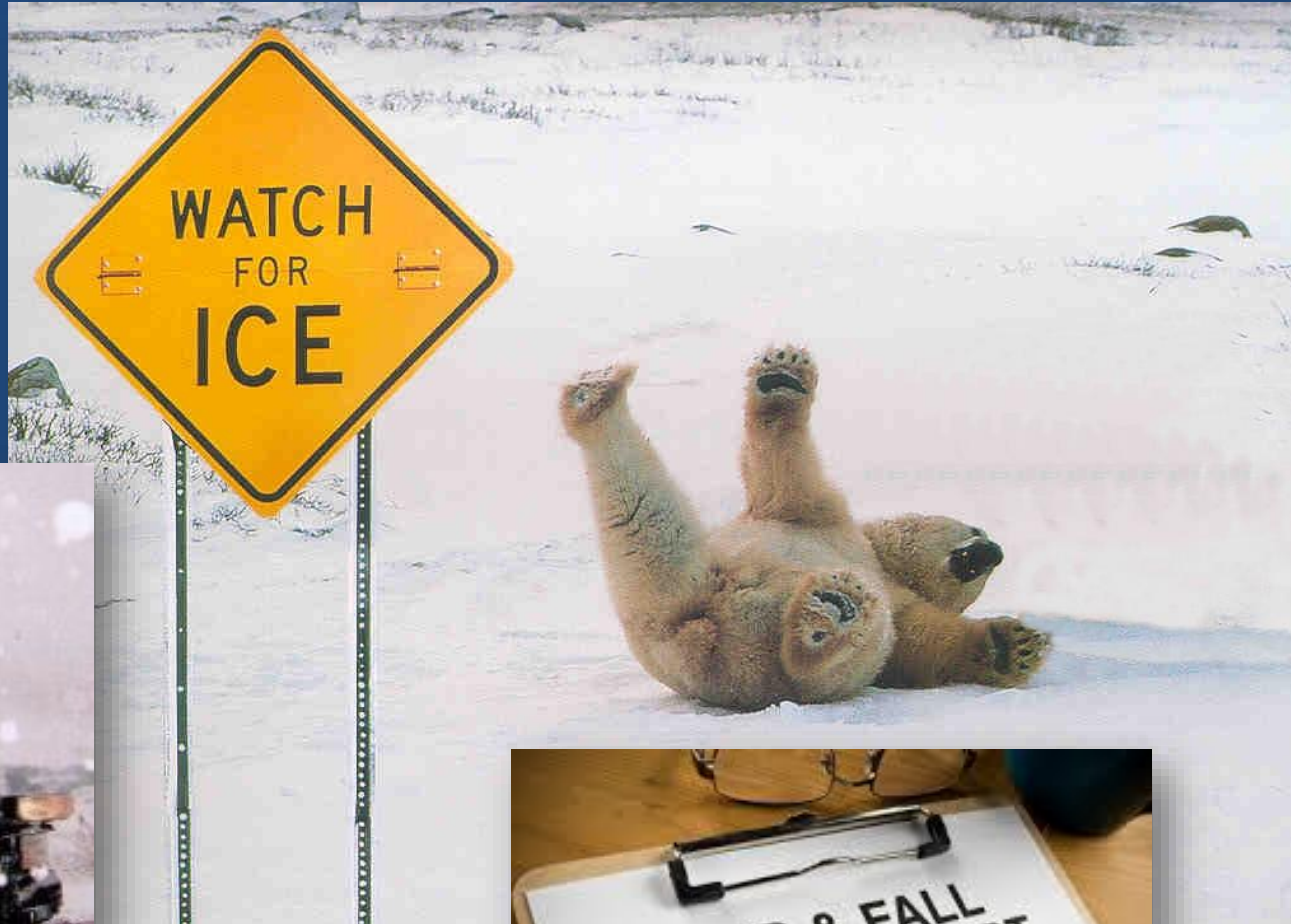


Windham salt reduction





What about commercial and private sector salt use?





Green SnowPro Training

Est. 2010





History of the Green SnowPro Program

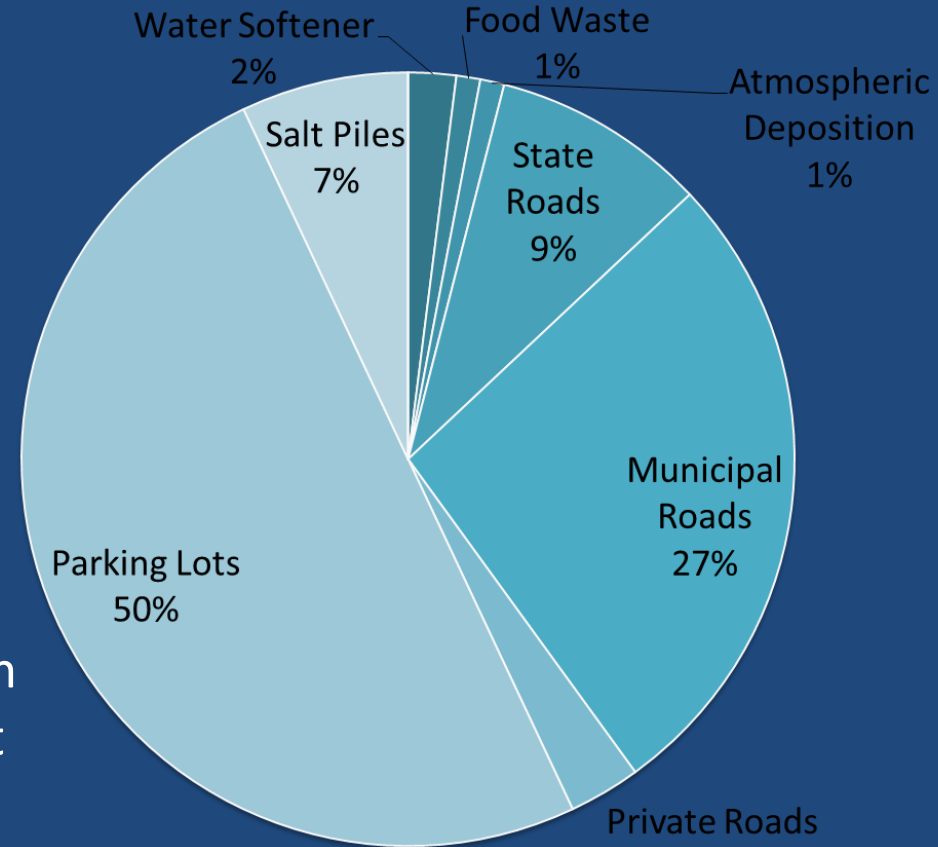
- ❑ Emerged out of chloride contamination issues in the I-93 corridor widening project
- ❑ Large chloride reductions are needed
- ❑ Private and commercial salt application are the largest sources in New Hampshire



SOURCE; NHDOT



Sources of salt in New Hampshire



- In urban and suburban areas, most of the salt comes from private parking lots, sidewalks and driveways



Liability issues

- Private salt applicators are concerned about liability if they reduce salt use
- Law passed to provide limited liability relief (based upon ski industry)
- Liability relief depends on Green SnowPro certification status
- Liability relief applies to contractors, their clients, and property owners alike



SOURCE: WMUR



Certification program

- Complete full course & exam (requirement for certification) – Master, Individual, Subordinate levels available - \$\$\$
- Apply for certification with NHDES and provide payment
- Renew certification annually (due June 15th EVERY year) - \$\$\$
- Report annual salt usage in tons applied per city or town
- Track your salt usage per storm
- What Certified Green SnowPro Professionals get:
 - liability protection and monetary savings for them and their clients
 - Competitive edge over other companies that are not GSP
 - Many clients and insurance companies required GSP



Two required tracks for certification

1.
Train



2.
Certify





Authorized Providers and Partners



University of New Hampshire

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Certifications, Awards, & Recognition > Green SnowPro & SALT Applicator Certification - Training

Certifications, Awards, & Recognition

- Certified Culvert Maintainer (CCM)
- Roads Scholar Program
- Flagger Training & Certification
- Green SnowPro & SALT Applicator Certification - Training
- Salt Reduction Resources
- Important Notice to Municipalities Regarding Green SnowPro Training
- Build a Better Mousetrap Innovation Competition

Green SnowPro & SALT Applicator Certification - Training

UNH T2 Green SnowPro cost for training:

- \$60 per person for municipalities (not applicable to certification)
- \$200 per person for private companies
- Upcoming Training
 - NEW IN 2020! **Virtual Green SnowPro training!** 10/28 & 10/29 (must attend both mornings)
 - Free for municipalities (see important note for local agencies regarding Salt Applicator RSA), \$150 for Private entities

NH Certified Green SnowPro

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NH Certified Green SnowPro

about 7 months ago

Please read the note below



Can I train my own employees?

Only if you hold a VALID Master Certification AND you have submitted an application for approved training program through NHDES. NHDES will provide you with the tools you need to effectively and appropriately train your employees.

[Green SnowPro Training Materials for Best Management Practices for Winter Road, Parking Lot, and Sidewalk Maintenance by UNH Technology Transfer](#); Training material used for the training programs.

Application Form

Certificates are valid July 1 through June 30 and must be renewed annually. New applicants will need to have taken and passed one of the approved courses.

[SALT APPLICATOR CERTIFICATION FORM >](#)

Salt Reporting

As part of the annual reporting required by the [voluntary salt certification program](#), certified applicators must [submit annual reports of salt use](#). Report your salt use online or download a mail-in form. For more program requirements info, contact the [Road Salt Reduction Coordinator](#).

[DOWNLOADABLE FORM >](#)

- [SASC Refresher](#)
- [SASC Full Course with Exam](#)
- [UNH T2 Refresher](#)
- [UNH T2 Full Course with Exam](#)
- [SIMA Refresher](#)





1,700 commercial certificates issued since 2013

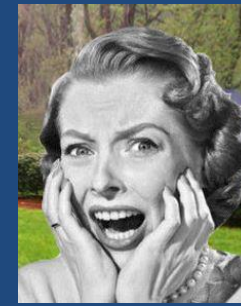


Municipalities are next!





But...what can we do???



Granite State De-Icing Supply Home De-Icing Products IceMaster Sprayers



Welcome to Granite State De-Icing Supply

Environmental Services List of Certified Green SnowPro Contractors Current as of 10/27/2021

Certification #	First Name	Middle Name	Last Name	Affiliation	Town
3	Jeremy	Scott	Keen	EIF's Landscaping, Inc.	Rochester
4	Ernest	Leonard	Foss III	EIF's Landscaping, Inc.	Rochester
15	RALPH	E	DUTTON III	Dreamworks Remodeling & Construction Services LLC	Hooksett
39	Craig	P	Jensen	FieldHouse Sports, Inc.	Bow
42	Gerald	J	DuBreuil	R&D Paving, Inc.	Franklin
62	Robert	W	Nelson	RWN Property Services	Conway
107	Joseph		Altmire	Loon Mountain Resort	
108	Thomas	E	Demers	Tom Demers Mowing and Landscaping, LLC	Lisbon
140	Michael	Richard	Lapoint	C&J Bus Lines	Rollinsford
143	Thomas	Andrew	Spencer	C&J Bus Lines	Rollinsford
144	Devin	Perry	Oliver	C&J Bus Lines	Rollinsford
154	Gregory	Russell	Boucher	Omni Mount Washington Resort LLC	Bretton Woods
156	Robert	Earl	Taylor	Green Magic Landscaping & Excavating, LLC	Derry
193	Rick		Gens	Manchester Plowing LLC	Manchester
216	John	A	Stephens	Stephens Landscaping Professionals, LLC	Moultonborough
217	Mark	S	Stephens	Stephens Landscaping Professionals, LLC	Moultonborough
233	Mark	E	Shearholdt	Certified Maintenance Services, Inc.	Manchester
234	Brian	T	Jean	Certified Maintenance Services, Inc.	Manchester
236	Erik	A	Bournival	Certified Maintenance Services, Inc.	Manchester
237	Stephen	J	Opett	Certified Maintenance Services, Inc.	Manchester
246	Ernest	Leonard	Foss IV	EIF's Landscaping, Inc.	Rochester
247	Ivan	E	Gagne	EIF's Landscaping, Inc.	Rochester
248	Emily	Lauren	Foss	EIF's Landscaping, Inc.	Rochester
262	David	J	Chamberlin	Piedmont Excavation & Septic, LLC - Jungle Jims	Epsom
323	Adolfo		Figueroa Aguilar	Akorn Landscape Inc.	Brookline

LIQUID MASTER W-SERIES

FEATURES

- RUST-ARRESTOR™ STAINLESS STEEL FRAME: No rust, no corrosion. This guarantees years of unobstructed service.
- HEAVY DUTY ADJUSTABLE SPRAY HAND WITH SPRAYERS: Comes with 1/2" hose. Ideal for steps and services.
- RECHARGEABLE 12 VOLT PUMP SYSTEM
- LARGE ACCESS LID
- ADJUSTABLE FRONT SPRAY NOZZLES: Comes with 1/2" hose for different width sidewalks.
- LARGE WHEELS

NEW PRODUCT

- 12 Gallon capacity
- Spray gun holding clips
- Comes complete with 2 x removable batteries, 1 x 110 volt charger and 1 x 12 volt car charger
- Removable batteries are important. You can place in your truck between jobs to keep out of weather. This increases the battery life.

COMPATIBLE LIQUIDS

CALCIUM CHLORIDE BRINE SALT BRINE PREMIUM BRANDED LIQUIDS

W-Series Walkway

12 gallon walkway sprayer with hose and poly tank. Adjustable nozzle al

De-icing & Anti-Icing Products:



Super Brine:

LS25 Super Brine is an *All Natural* clear to slightly yellow liquid chloride brine that consists of sodium, calcium, potassium and magnesium chlorides that is effective to -18 degrees available for bulk pick/delivery, 5 gallon pails, 55 gallon drums and 250 gallon totes.



Chapin Pro Backpack Spayer 4gal

Share this: [f](#) [p](#) [t](#)

UPC: 023883618001

SKU: 10208826

Backpack Professional 4 gallon poly sprayer with carrying straps. 4 position spray valve for control of pressure from 15-60 PSI. Right or left pump handle, adjustable nozzle and reinforced hose.

Please contact us for current pricing and availability.

Give Us A Call To Set Up A Demonstration

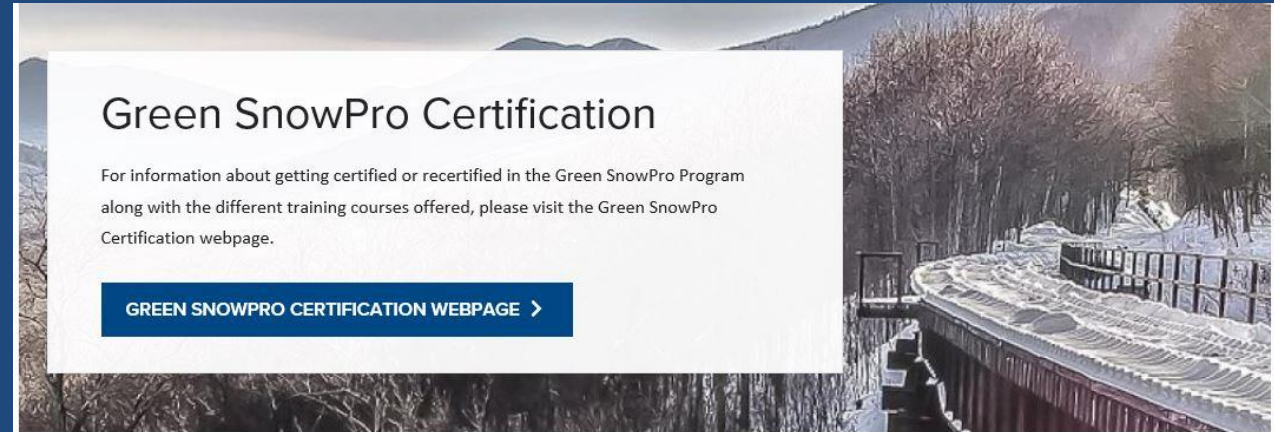
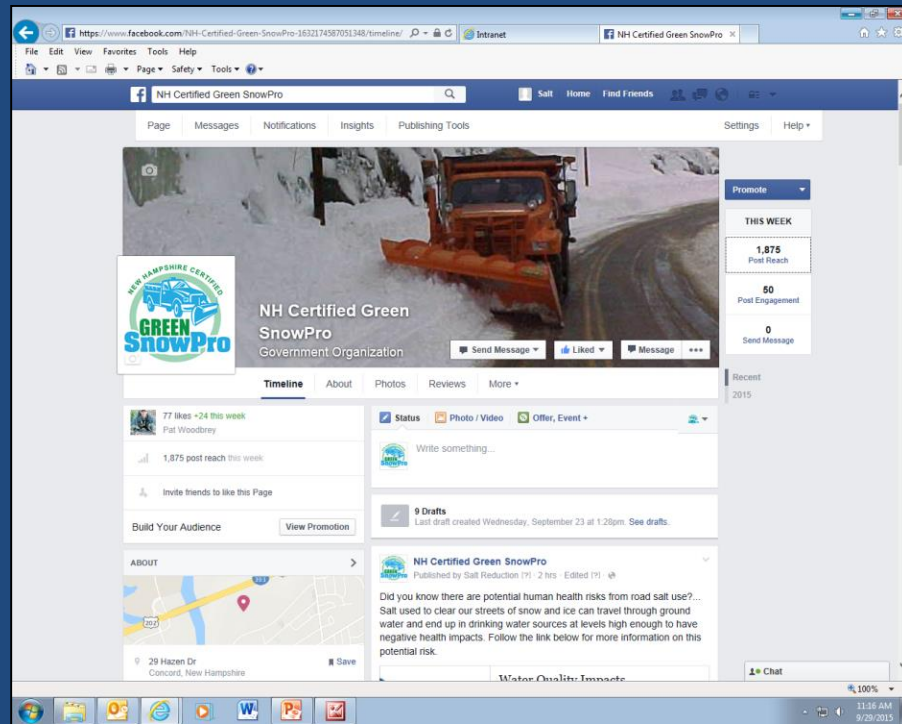
833-635-8423 * 83-Melt-Ice





Is Green SnowPro working?

www.des.nh.gov and search for
"Road Salt Reduction"



Road Salt Reduction-Related Resources

- [Technologies and Best Management Practices for Salt Reduction](#)
These documents include technologies and best management practices (BMPs) for Salt Reduction: how salt works, calibration, pre-wetting, brine making, anti-icing and good housekeeping. These BMPs were developed by the University of New Hampshire Technology Transfer Center for New Hampshire snow and ice management professionals. NHDES, NHDOT, Federal Highway Administration, EPA, several private snow and ice management companies and several New Hampshire communities have reviewed these BMPs. Please feel free to reproduce and distribute.
- [NHDES Snow & Salt Resources](#)

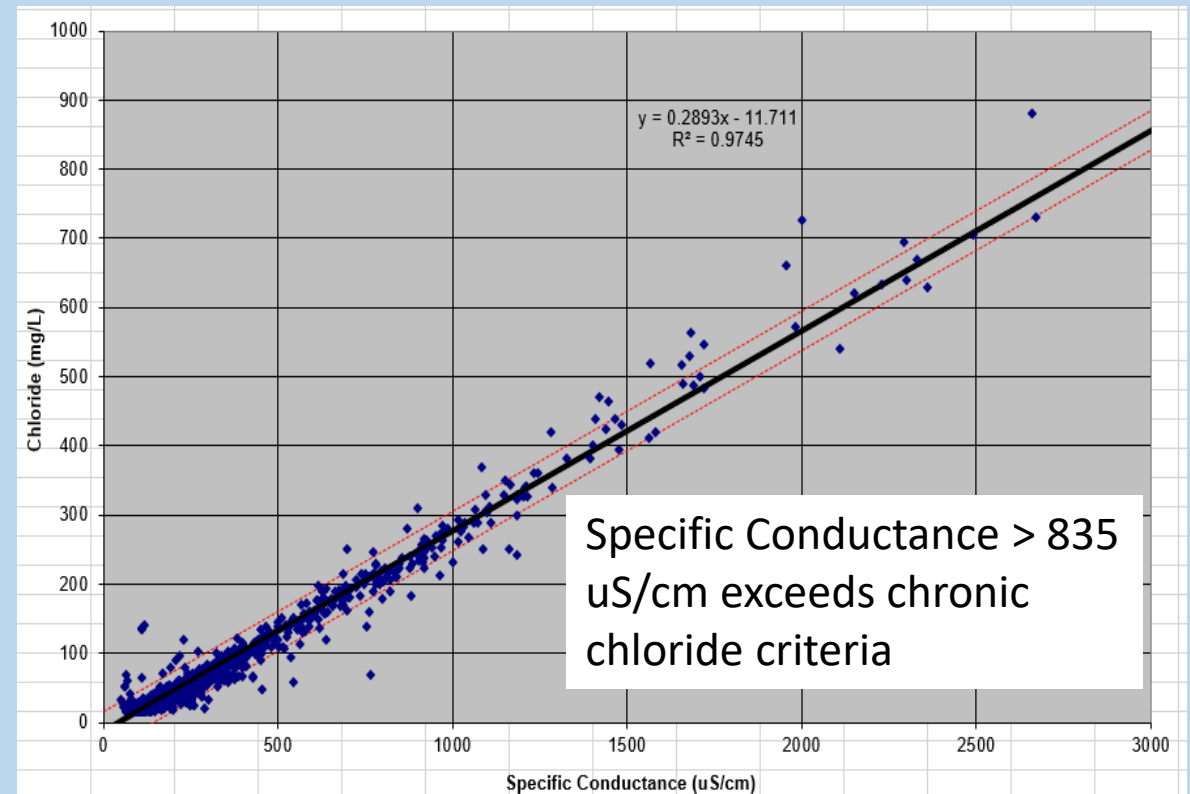
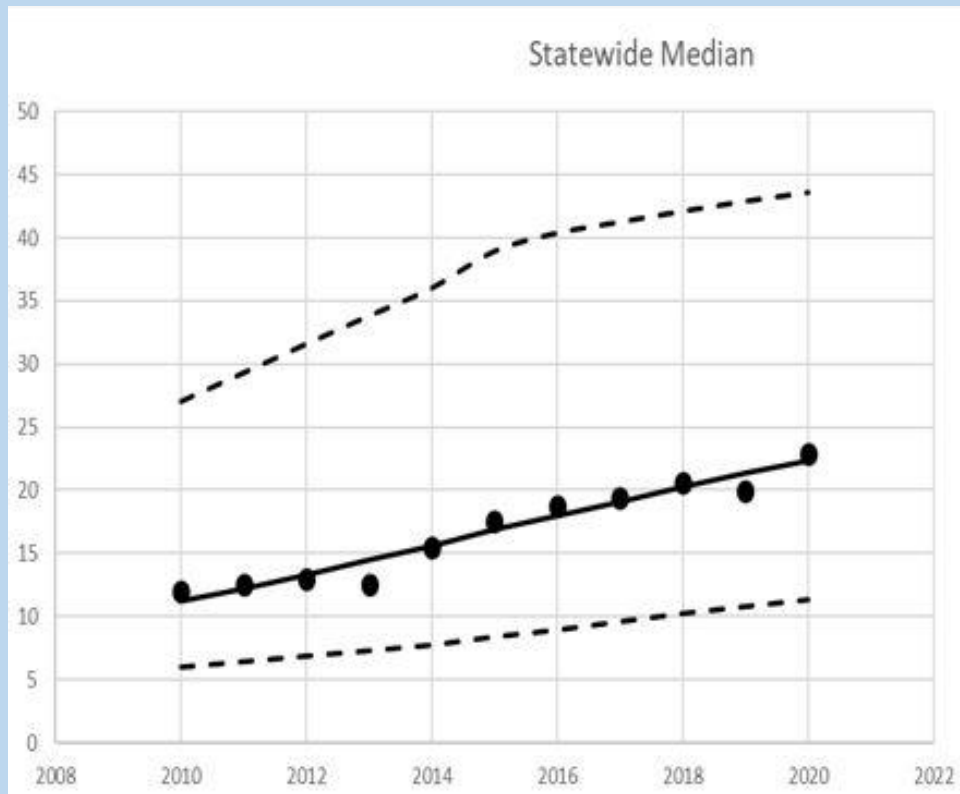


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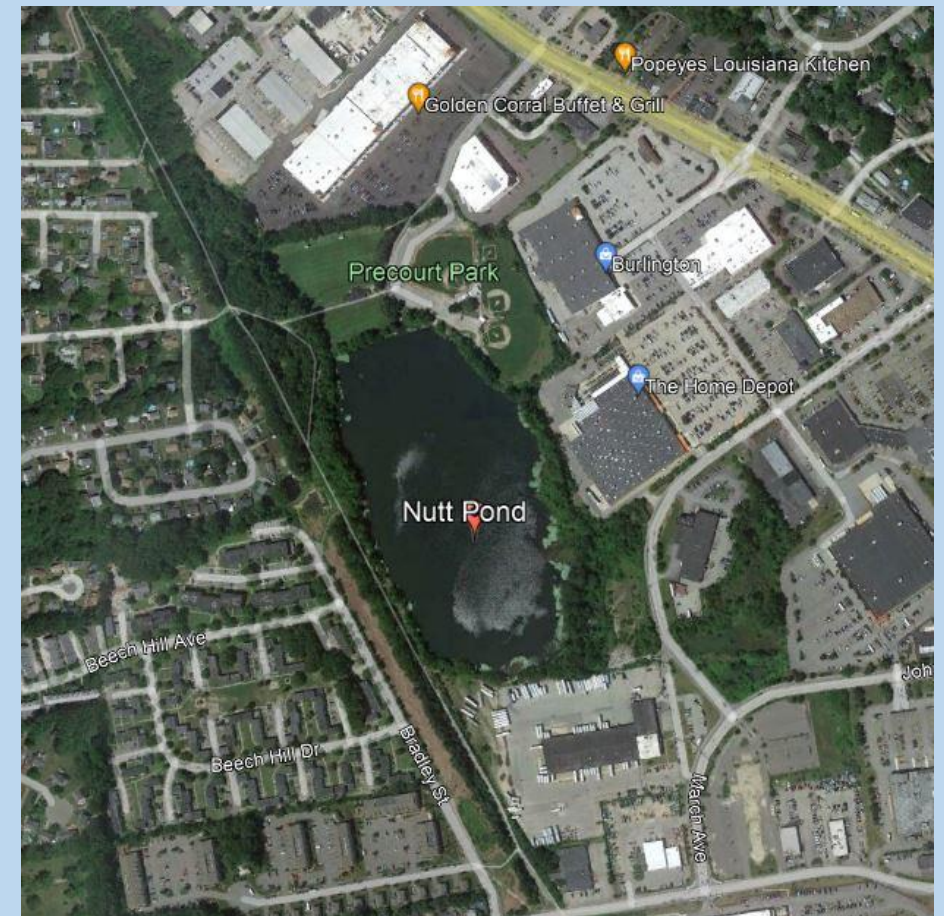
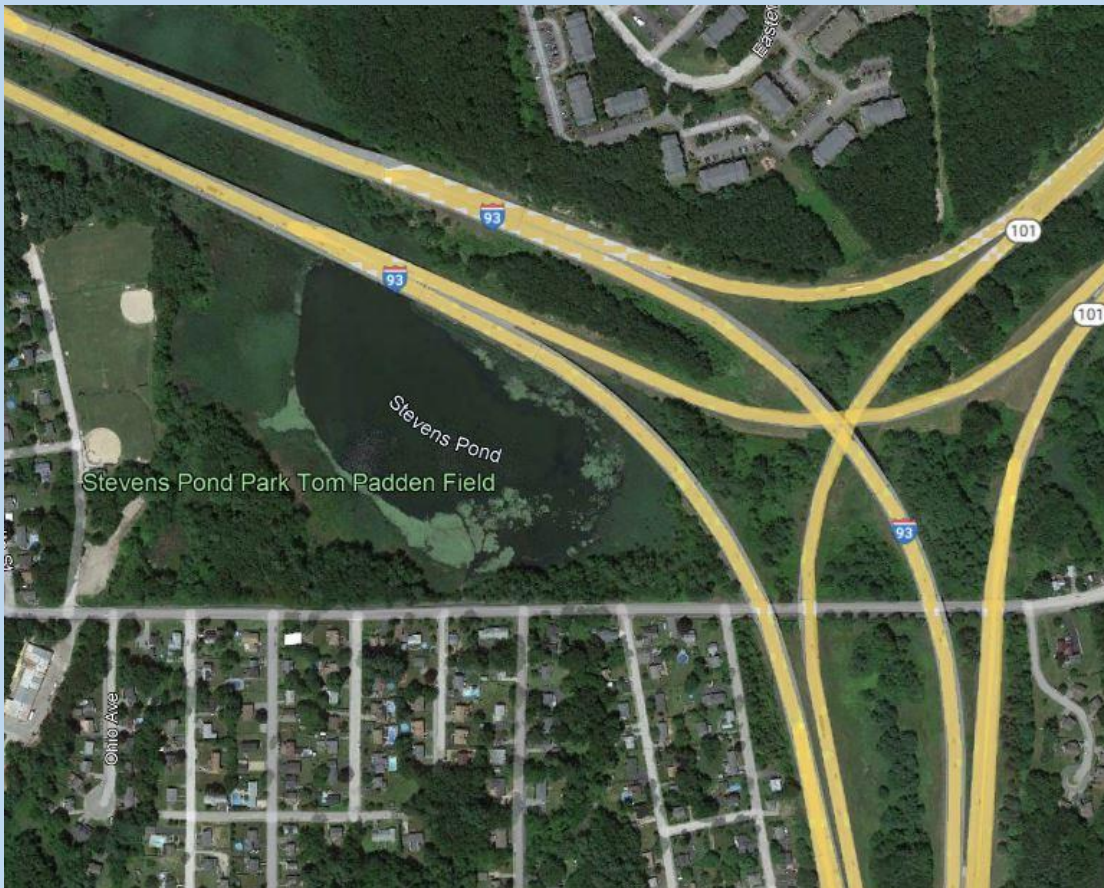
Summary and discussion

- Specific conductance and chlorides are increasing in lakes statewide



Summary and discussion

- Surface waters with higher chlorides and specific conductance tend to be in areas of high development



Summary and discussion

- Too much salt is applied in the winter throughout New Hampshire



Summary and discussion

- We need to apply the right amount of salt, the right type (brine), and at the right temperature to reduce salt use
- We have to change people's expectations of what "safe" looks like

