Smart Salt Solutions: Municipal Salt Management Planning for Lake Protection

2026 NH Lakes Congress

Aubrey Voelker, New Hampshire Department of Environmental Services

Scott Kinmond, University of New Hampshire Technology Transfer Center

Stu Greer, Lake Sunapee Protective Association

Mike Thomas, Lake Sunapee Protective Association

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University of New Hampshire T2 Center

LAKE SUNAPEE PROTECTIVE ASSOCIATION LSPA

The NH Green SnowPro Experience

Aubrey Voelker

NHDES Salt Reduction Specialist and
Green SnowPro Coordinator

New Hampshire's Salty History

- First in the nation to use salt for regular winter road maintenance
- Approximately 1 million tons of salt is applied in New Hampshire annually
- A million tons of salt would fill two-thirds of the Empire State Building
- Over-application of salt and improper storage contributes to chloride contamination in NH
- Chloride impairment trend is worsening (18 in 2008, 40 in 2010, and currently over 50 impaired waterbodies)
- Chloride contamination of water supply wells has increased by 150 percent over last 30 years

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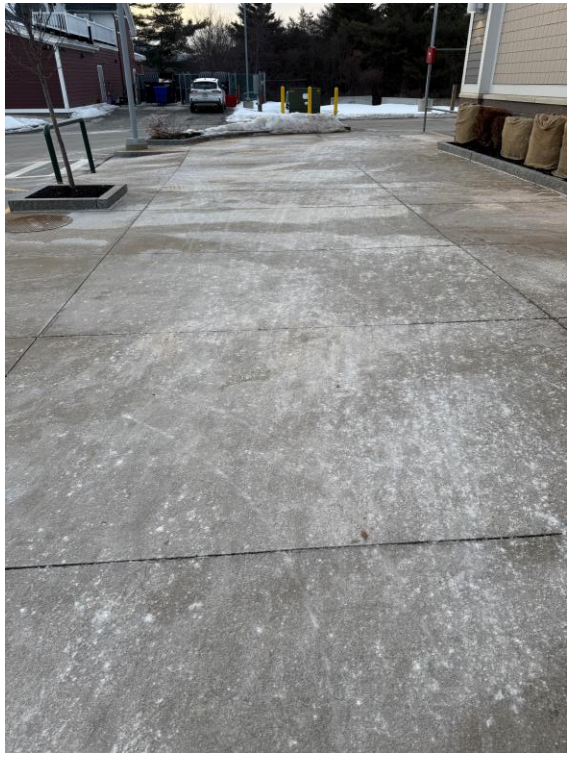
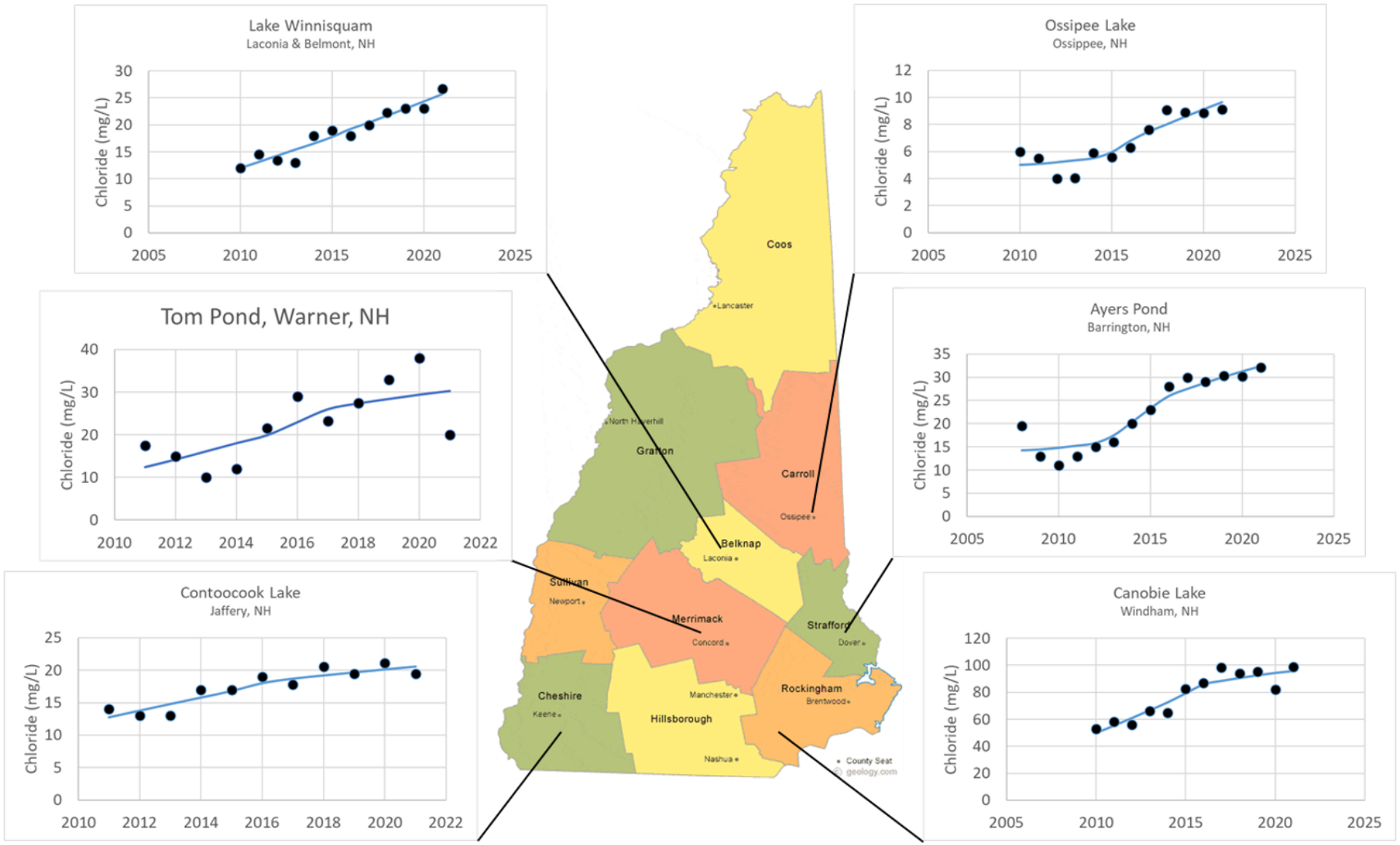
BOSS


APPLY NOW
R02



A Statewide Issue



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DID YOU KNOW?

It only takes 1 teaspoon of winter salt to pollute up to 5 gallons of water.

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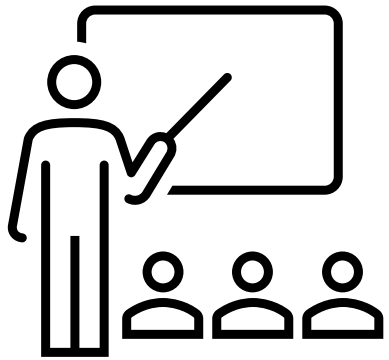
NHDES

Reasons for Oversalting?

- Level of service expectations/human behavior
- Lack of education/no required education to apply salt
- Liability – Slip and Fall Claims



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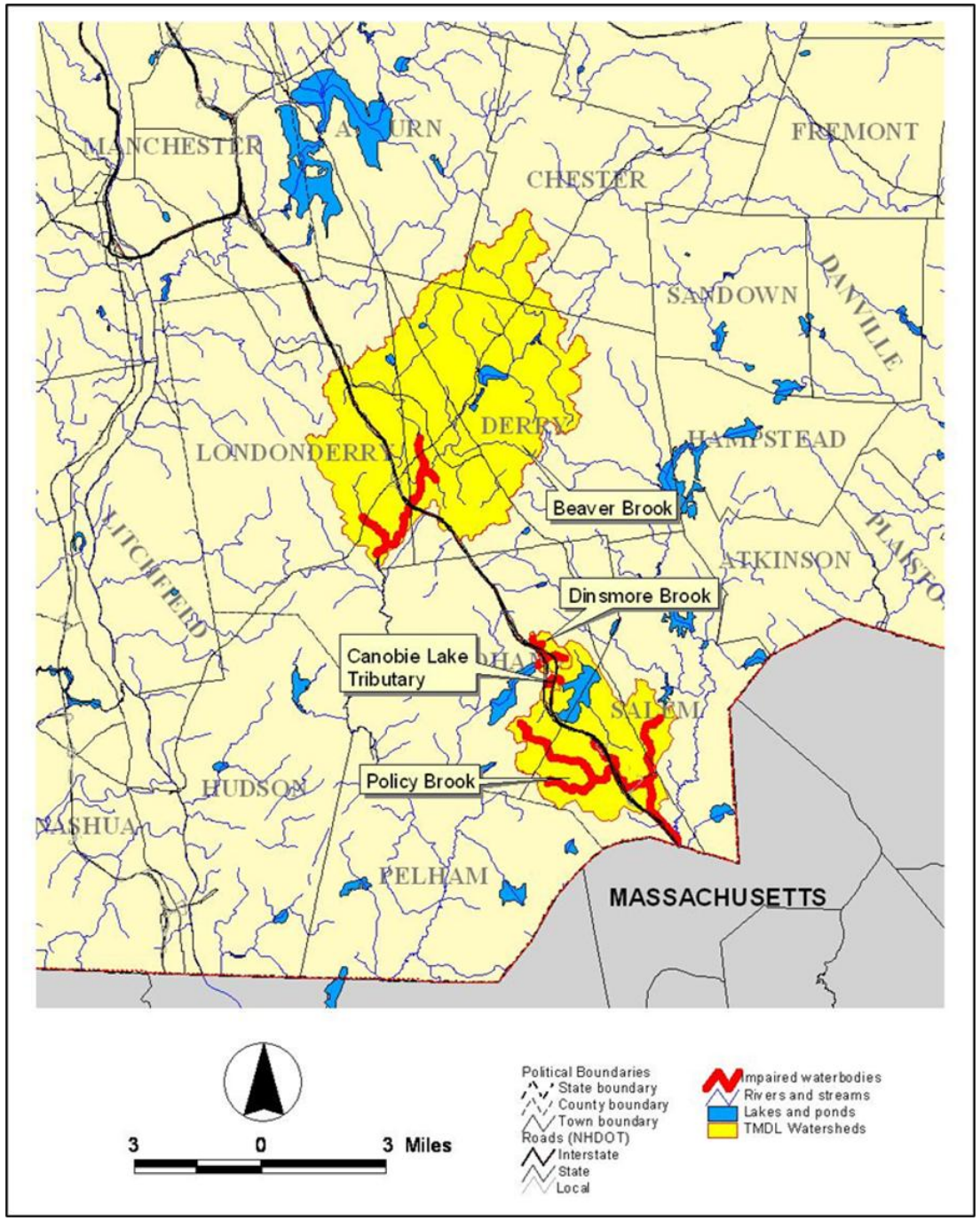
Science

meets

Management

I-93 Expansion

- Double the size of the highway.
- Bigger off and on-ramps.
- Park-n-rides.
- Drainage -- open to closed system.
- More plowing = more salt.



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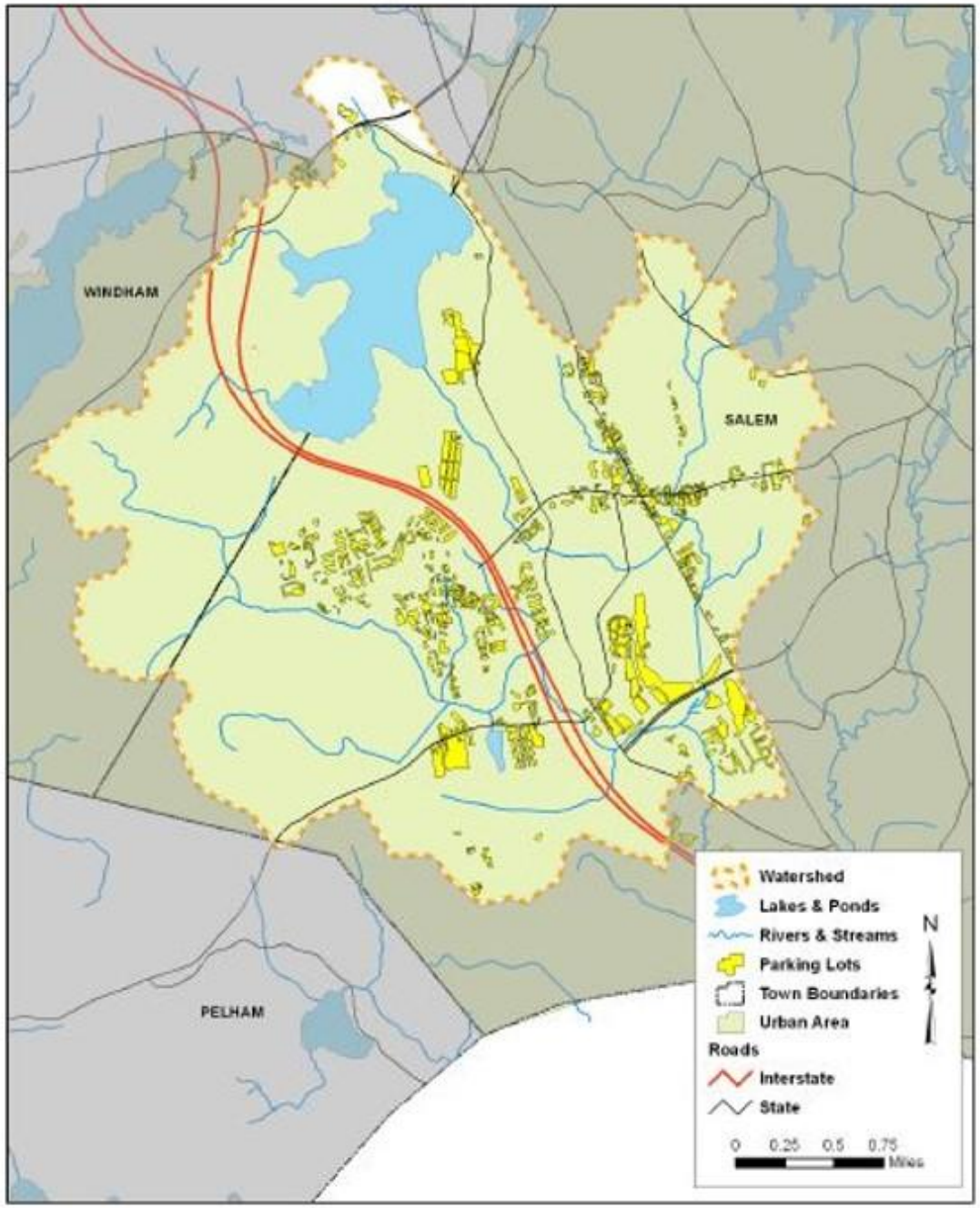
Parking Lot Areas within the Policy Brook Watershed



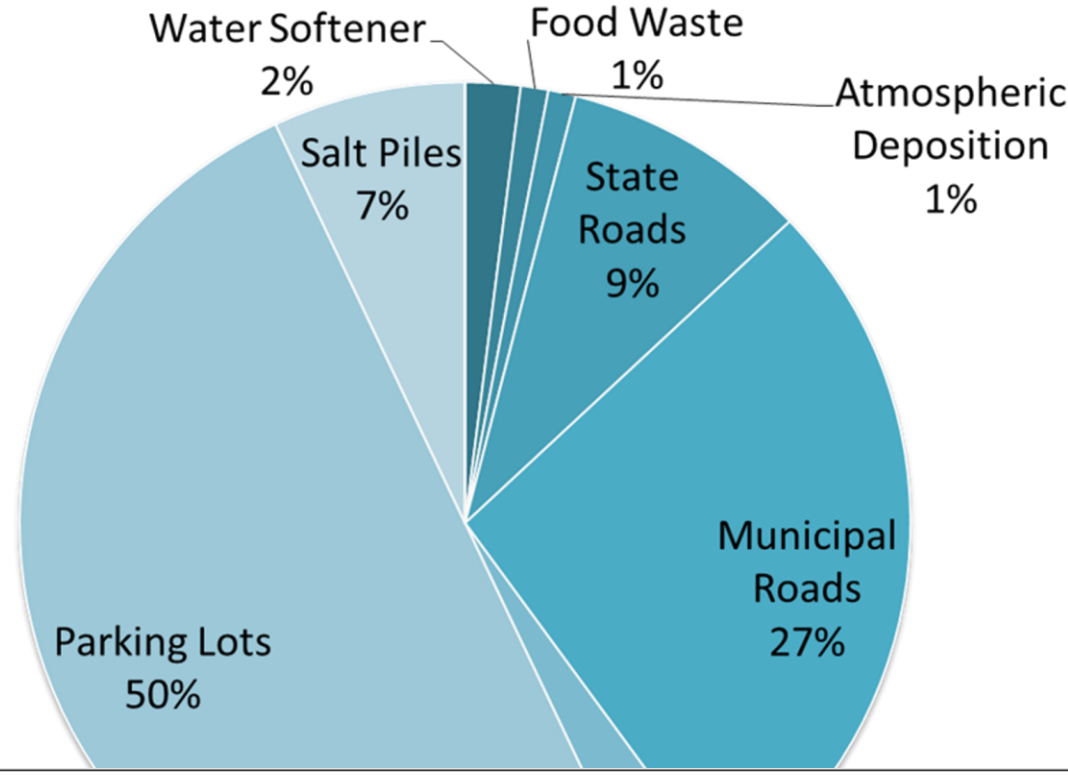


Table 2: Policy Brook Watershed Paved Surface Inventory

Sector	Unit
NH Department of Transportation	37.13 lane miles*
NH Department of Transportation	59.4 lane miles**
Municipal Roads	142.3 lane miles
Private Roads	7. 3 lane miles
Private Parking Lots	340.2 Acres (95.3 lane miles)

**Lane Miles maintained upon TMDL completion*

***Estimated lane miles to be maintained after I-93 expansion*

In 2013, House Bill 523 created the Voluntary Commercial Salt Applicator Certification Program:

Green SnowPro

NHDES Green SnowPro certified Commercial Salt Applicators and property owners who hire them, are granted limited liability protection against damages arising from snow and ice conditions.

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Application and Certification

Required Coursework

Application

Annual Renewal

- Salt Use Report
- Continuing Education

Snowfighters' Seminar

Commercial Salt Applicator Certification
Application for Initial or Renewal Certification
Watershed Management Bureau

RSA 489-C; Env-Wq 2200

NHDES Use Only
Cert #:
Processed Date:

I. Applicant Information

FIRST NAME: MIDDLE: LAST:
DAYTIME PHONE NO. (include area code): EMAIL:

Address
STREET:
TOWN/CITY:
STATE: ZIP CODE:

Mailing Address (if different)
STREET:
TOWN/CITY:
STATE: ZIP CODE:

II. Information for Affiliated Business (if none, enter "none" after Business Name.)

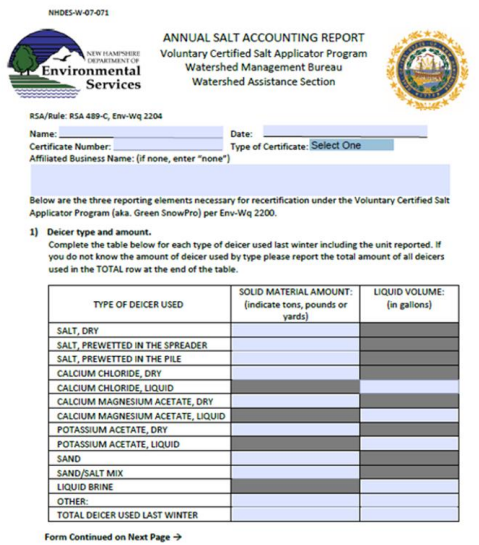
BUSINESS NAME:
DAYTIME PHONE NO. (include area code): EMAIL:

Address
STREET:
TOWN/CITY:
STATE: ZIP CODE:

Mailing Address (if different)
STREET:
TOWN/CITY:
STATE: ZIP CODE:

If the applicant or affiliated business address is not located in New Hampshire, provide the name and mailing address of a person whose domicile is in the state and who is authorized to receive and accept service of summons and legal notices of all kinds for the applicant as required by RSA 489-C:4, II.

FIRST NAME: LAST NAME:
STREET:
TOWN/CITY:
STATE: ZIP CODE:



NHDES-W-07-071

ANNUAL SALT ACCOUNTING REPORT
Voluntary Certified Salt Applicator Program
Watershed Management Bureau
Watershed Assistance Section

RSA/Rule: RSA 489-C, Env-Wq 2204

Name: Date:
Certificate Number: Type of Certificate: Select One
Affiliated Business Name: (if none, enter "none")

Below are the three reporting elements necessary for recertification under the Voluntary Certified Salt Applicator Program (aka. Green SnowPro) per Env-Wq 2200.

1) Deicer type and amount.
Complete the table below for each type of deicer used last winter including the unit reported. If you do not know the amount of deicer used by type please report the total amount of all deicers used in the TOTAL row at the end of the table.

TYPE OF DEICER USED	SOLID MATERIAL AMOUNT: (indicate tons, pounds or yards)	LIQUID VOLUME: (in gallons)
SALT, DRY		
SALT, PREWETTED IN THE SPREADER		
SALT, PREWETTED IN THE PILE		
CALCIUM CHLORIDE, DRY		
CALCIUM CHLORIDE, LIQUID		
CALCIUM MAGNESIUM ACETATE, DRY		
CALCIUM MAGNESIUM ACETATE, LIQUID		
POTASSIUM ACETATE, DRY		
POTASSIUM ACETATE, LIQUID		
SAND		
SAND/SALT MIX		
LIQUID BRINE		
OTHER:		
TOTAL DEICER USED LAST WINTER		

Form Continued on Next Page →

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The State of New Hampshire
Department of Environmental Services

certifies that

Shawn O'Keefe

having submitted satisfactory evidence of knowledge and training in accordance with the provisions of RSA 489-C has been awarded this certificate as a

Certified Salt Applicator -- Master

Certificate Number: 358

Date of issue: 09/22/2025
Date of Expiration: 06/30/2026

Administrator, Watershed Management Bureau

2013/2014 Winter Season

- 35 Green SnowPro certificates issued
- 22 companies

2025/2026 Winter Season

- Over 750 Green SnowPro certificates issued
- 171 companies
- 3 Municipal Green SnowPro certificates issued

Municipal Green SnowPro

- The Voluntary Municipal Winter Maintenance Certification administrative rules were adopted May 2024
- Allows municipalities to be recognized for their commitment to reducing salt usage in their communities
- Three levels of certification available: Standard, Advanced, Expert
  - Detailed documentation requirements
  - Advanced and Expert require implementing and documenting salt reduction BMPs
- Future program goal of funding to provide grants to assist with buying equipment and implementing BMPs

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Portsmouth

Dover

Hooksett

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Snowfighters Seminar

UNH T2 Liquids Field Day

NH Salt Symposium

Education is Essential

UNH T2 Liquids Field Day

NH Salt Symposium

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Winter Salt Week

- Last week of January
- Collaboration of organizations across the nation to raise awareness of the impacts of winter salt
- Daily livestream webinars
- Local events and outreach

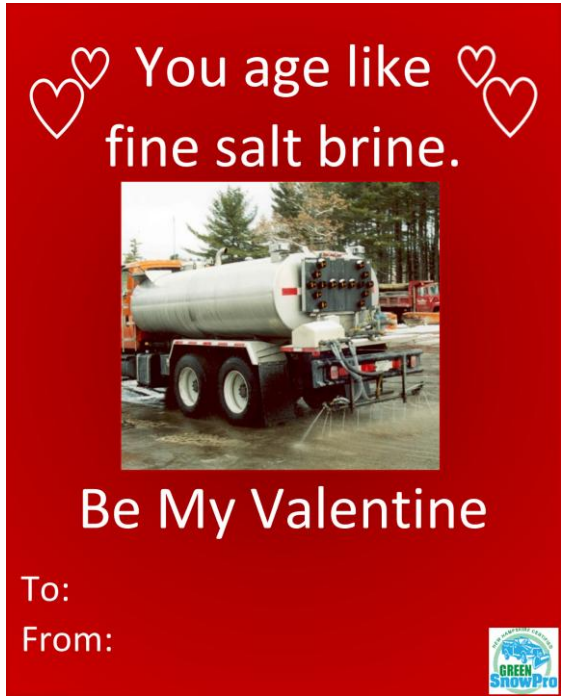
Wintersaltweek.org

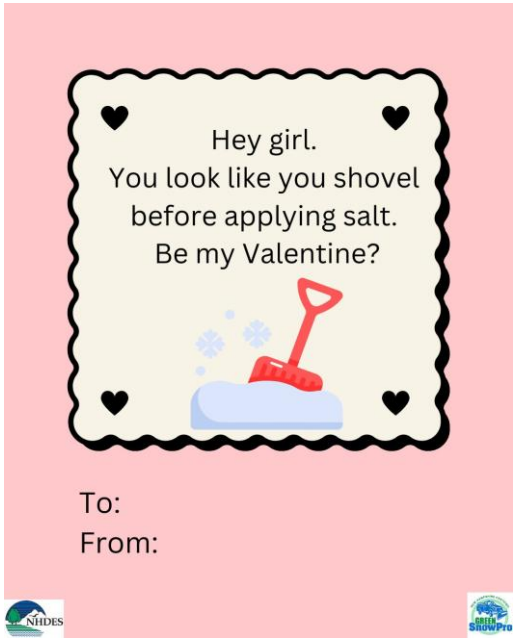
NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Aubrey Voelker

aubrey.r.voelker@des.nh.gov

(603) 271-5329





Smart Salt Solutions: Municipal Salt Management for Lake Protection

Scott Kinmond

UNH T2 | Technical Specialist and Green SnowPro Instructor

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University of New Hampshire
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The NH LTAP program is sponsored by:

New Hampshire DOT Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

Understanding Local PW Challenges

- Staffing constraints
- Change culture
  - Lack of confidence in materials and process
  - Need for education
- Budget pressures
- Limited space for material options
- Aging equipment and dated technology
- Public complaints and liability concerns
  - “Bare pavement”
- Storm uncertainty

Our Core Strategy Areas to Help Communities Move From *Awareness* to *Operational Change*

- Easy Access to Practical Training
- Access to Resources
- Calibration Support
- Technical Assistance
- Peer Learning
- Communication & Outreach
- Coming soon- customizable presentation and materials for DPWs to inform and educate their community

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Training & Education

Classroom & Demonstrations

Providing Training Throughout NH

- Winter Operations Strategy for Supervisors and Directors
- SaltTea- Gossips and Truths About Anti-Icing Materials
- Snow Fighters' Seminar (Contractor | Municipal | General)
- Road Managers' Meetings: Liquids, Materials Awareness, etc.
- New - Developing a Road Salt Reduction Plan
- New – Winter Ops for Sidewalks and Parking Lots

Instilling *Confidence*

- Level of service discussions
- Material selection and application rates
- Decision-making under changing conditions
- Anti-icing vs deicing
- Material storage and handling
- Documentation and tracking

Snow and Ice Plan

Public Facing Commitment

WHAT and WHEN

Includes Level of Service

Adjustment Statements

Winter Operations Plan

Internal

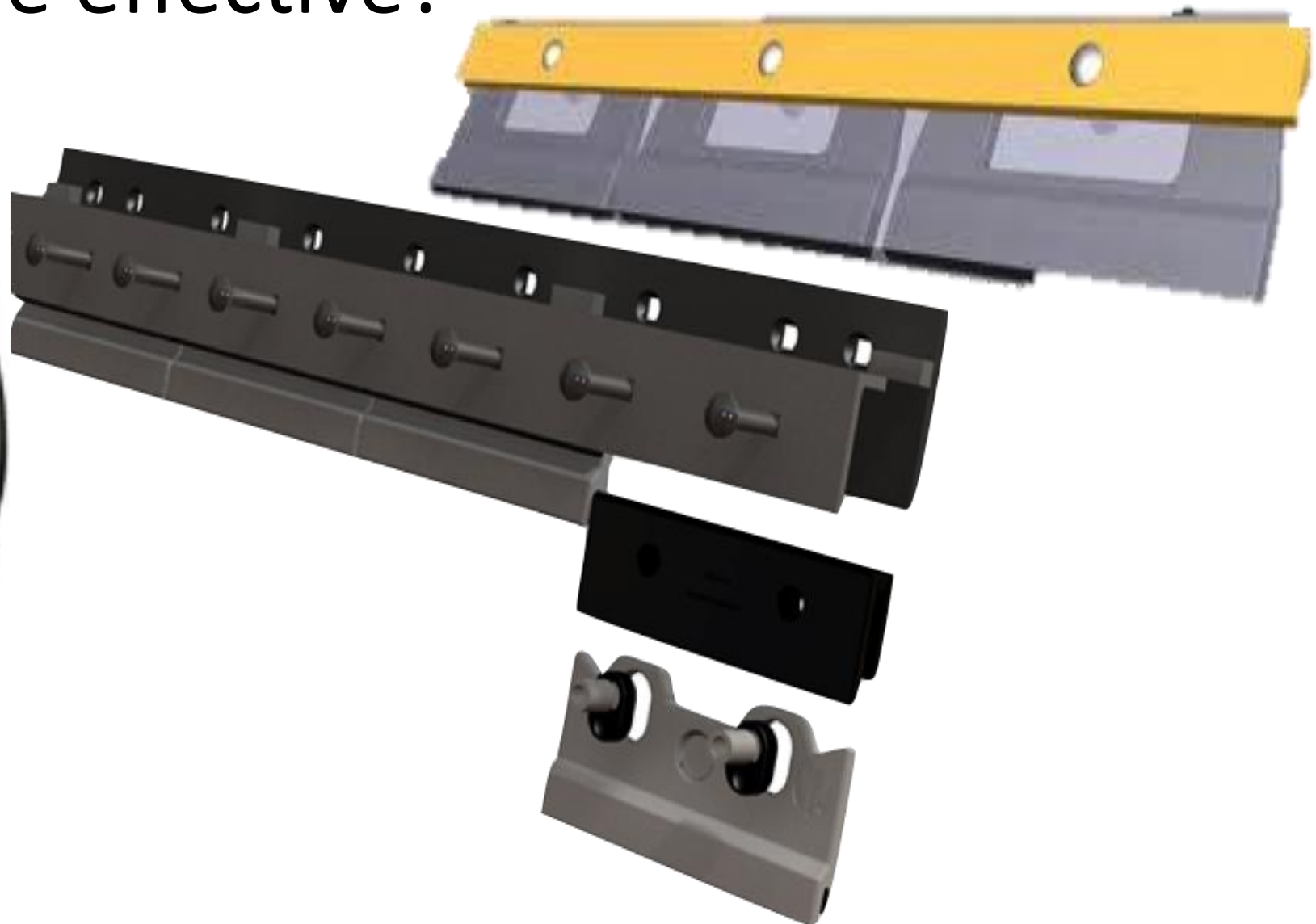
HOW

Plans and Procedures

- Equipment
- Staffing
- Materials
- Route Priority
- Storm Procedures

Tools & Technologies

What equipment investments have made your work more effective?



Group
Alton, NH

Search

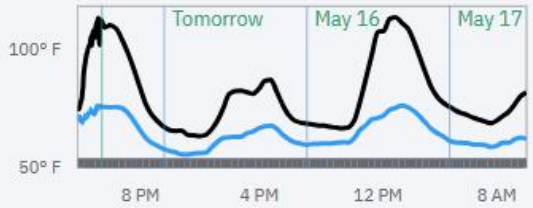
Forecast
72

Mini RWIS (2)

Alton Mtn @ Highpoint

Sunny Dry

PRECIP: **None forecasted**

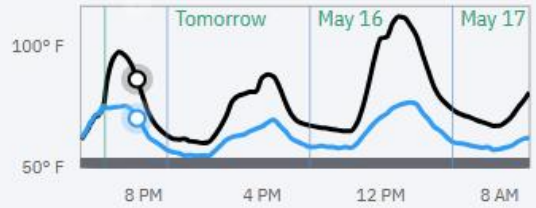


Time: --

Gilmans Corner, Quarry rd

Sunny Dry

PRECIP: **None forecasted**



Time: --

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CALIBRATION ALLOWS YOU TO…

- **Apply the right material, at the right rate, at the right time.**
- **Reduce total salt use while maintaining your focus on sa**
- **Efficiently manage material supply.**
- **Support environmental goals and compliance.**
- **Demonstrate responsible stewardship.**

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Calibration: A No-Cost Win

Gate Opening _____(inches) Truck # _____

Lane Mile - Manual Type Spreader Calibration Chart *(pounds/revolution)*

Use when counting revolutions of auger for discharge rate in lane miles

Conveyor or Auger Setting	Revolutions per Minute	Discharge Rate (lb./revolution)			Average Discharge Rate per Revolution	Average Pounds Discharged per Minute	Pounds of material discharged per mile					
		1	2	3			5 mph	10 mph	15 mph	20 mph	25 mph	30 mph
Ex: 2	B	C	D	E	(C+D+E)/3 = F	F x B= G	G x 12	G x 6	G x 4	G x 3	G x 2.4	G x 2
1					0	0	0	0	0	0	0	0
2					0	0	0	0	0	0	0	0
3					0	0	0	0	0	0	0	0
4					0	0	0	0	0	0	0	0
5					0	0	0	0	0	0	0	0
6					0	0	0	0	0	0	0	0
7					0	0	0	0	0	0	0	0
8					0	0	0	0	0	0	0	0
9					0	0	0	0	0	0	0	0
10					0	0	0	0	0	0	0	0

ZERO TARP AND BUCKET FROM SCALE!

Using the Application Rate Charts

- Salt
- Salt pre-wet with standard brine

*Talk to your vendor for premium application rates

NH Road Salt Application Rates for Deicing Parking Lots (Pounds per 1000 sq.ft.)

Pavement Temp. (°F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Application Rate (lbs/per 1000 sq.ft.)			
			Salt Prewet/ Pretreated with salt brine	Salt Prewet/ Pretreated with other blends	Dry salt	Winter sand
>30 ↑	Snow	Plow, treat			4.5	Not recommended
	Frz. Ra				6.5	Not recommended
30 ↓	Snow				6.5	Not recommended
	Frz. Rain	Apply chemical	6.5	5.75	7	Not recommended
25 - 30 ↑	Snow	Plow and apply chemical	5.75	5.25	6.5	Not recommended
	Frz. Rain	Apply chemical	6.5	5.75	7	Not recommended
25 - 30 ↓	Snow	Plow and apply chemical	5.75	5.25	6.5	
	Frz. Rain	Apply chemical			8.25	
20 - 25 ↑	Snow or frz. Rain	Plow and Apply chemical	7	6.5	8.25	Not recommended
20 - 25 ↓	Snow	Plow and apply chemical	5.75	7.5	9.5	Not recommended
	Frz. Rain	Apply chemical	7	7.5	10	10.5

29°F and dropping
Freezing Rain

8.25

The New Calibration Videos Provide Access to Calibration Support 24/7

Full initial training or step-by-step based refresher

Practical step-by-step guidance across equipment types

Updated calibration spreadsheet enabled with formulas

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Connect With Us and Access the Videos

https://linktr.ee/unht2center

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Lake Sunapee Watershed Salt Management Plan

June 5, 2026

Stu Greer

and

Mike Thomas, P.E.

LAKE SUNAPEE PROTECTIVE ASSOCIATION
LSPA

Quick Facts About Salt

- Nationally 25 to 30 million tons of road salt are used annually on roads and parking lots.
- New Hampshire is the 4th largest user of road salt by State at 25.1 tons per lane mile.
- Road salt is impacting the water quality of New Hampshire Lakes
    - In 2008, 19 lakes were considered impaired (Cl^- > 230 ppm)
    - In 2020, 50 lakes were considered impaired
- Nearly all of the salt applied to pavement will eventually end up in the nearby surface waters and groundwater. Once salt is spread on the ground, it doesn't go away. Over the next 20 years it will wash into roadside ditches, streams and lakes, as well as groundwater aquifers.
- The only way to prevent salt from reaching surface waters and groundwater is to use less.

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Salt Management Plan Goal: Reduce the amount of road salt that reaches our lakes, ponds, streams, and groundwater with an emphasis on public awareness and collaboration with homeowners, municipalities, property managers, and the State of New Hampshire.

- The water quality of our lakes, ponds and streams is in decline. One of the contaminants that is contributing to this decline is the salt that we use to keep our roads, parking lots, walkways and driveways safe. The accumulation of salt in our water is adversely affecting the ecosystem in ways that can lead to a loss of water clarity, loss of many of the life forms that exist therein and eventually render current sources of drinking water undrinkable.

- The use of salt is almost completely driven by humans to provide safety and reduce liability. There are several ways that we can significantly reduce or modify our use of salt while still achieving these goals.

- Each of us can help by examining our own practices, learning from the success of others who are addressing the same problem, and influencing those around us to modify their behaviors.

- Inaction would be devastating, not only to our natural resources, but to our local economy, property values, and our cherished way of life.

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Salt Management Plan

- Protect our water resources (surface and groundwater) by reducing the quantity of chlorides used in winter road maintenance.
  - The use of anti-icing and de-icing agents will continue – the public demands that roads be clear of ice and snow. Remember SAFETY CANNOT BE COMPRIMISED.
  - The objective of the Plan should be to use these agents as effectively and environmentally friendly way as possible while still maintaining the safety of the public.

- By using the correct amounts of the right products, we expect to reduce overall costs while maintaining the safety of the public.

- No plan can be successful without buy-in from all involved.

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Development of a Salt Management Plan

Conduct Research

- Current Practices
- Others' Salt Reduction Experiences
- Innovative Best Practice Approaches

Engage Plan Stakeholders

- Listen to Concerns
- Present Benefits of Behavior Change, Provide Alternatives, Reinforce No Compromise in Safety
- Incentivize salt reduction through cost savings (materials and hours)

Measure - Track usage, weather, costs

- Current Use
- Ongoing Use Post-Adoption of Changes – Annually,
- VLAP results

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Development of a Salt Management Plan (cont.)

Outreach and Education

- This might be the single most important aspect of a salt management plan for state DOTs, municipalities, businesses and individuals!
- Until people realize there is an issue, there is no reason to act.

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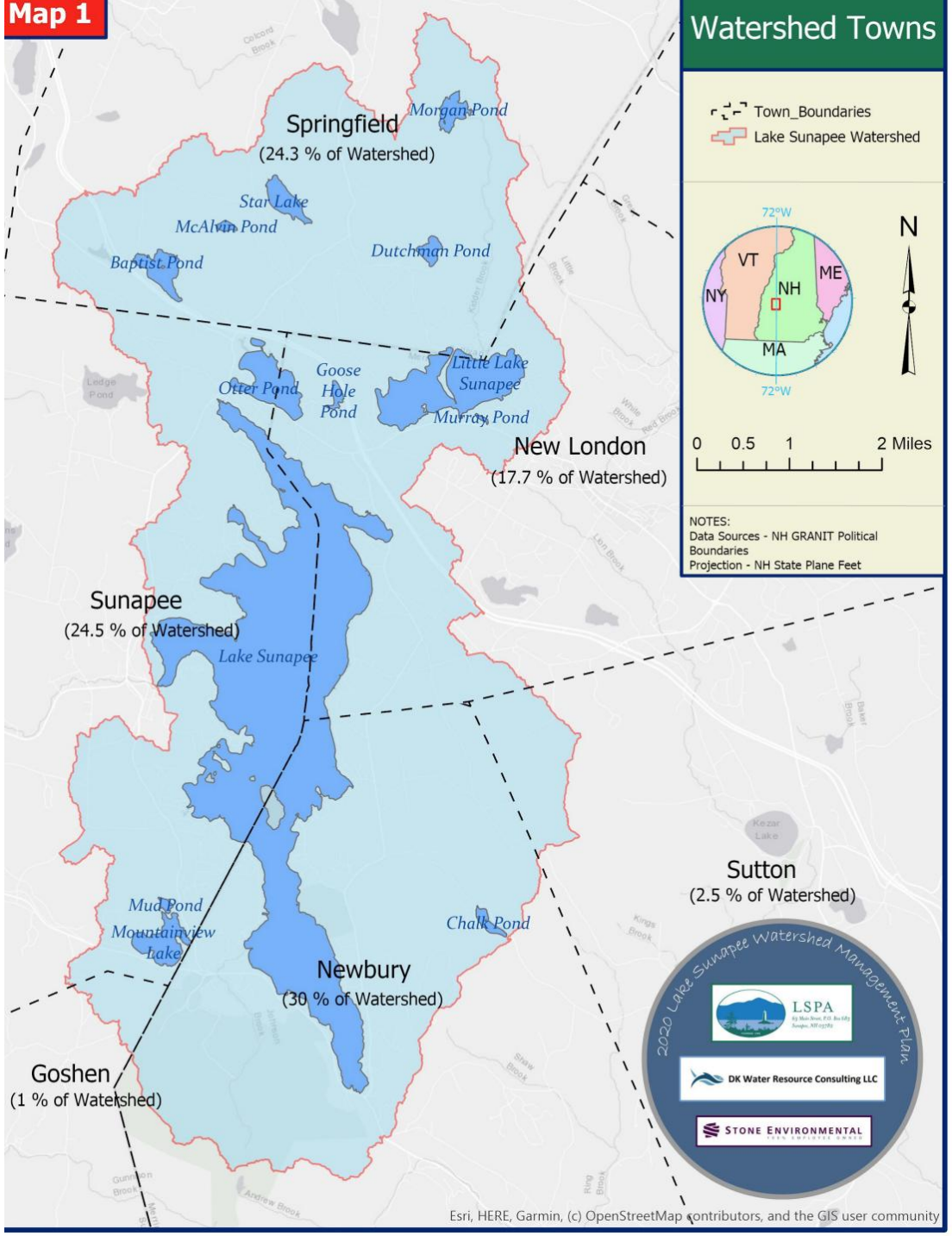
The Lake Sunapee Watershed

encompasses an area of 47 square miles and includes 13 lakes and ponds.

Sunapee, Springfield, New London and Newbury are the primary towns in the watershed.

Lakes and ponds elsewhere in these towns are included in the project due to municipal and state road salt use.



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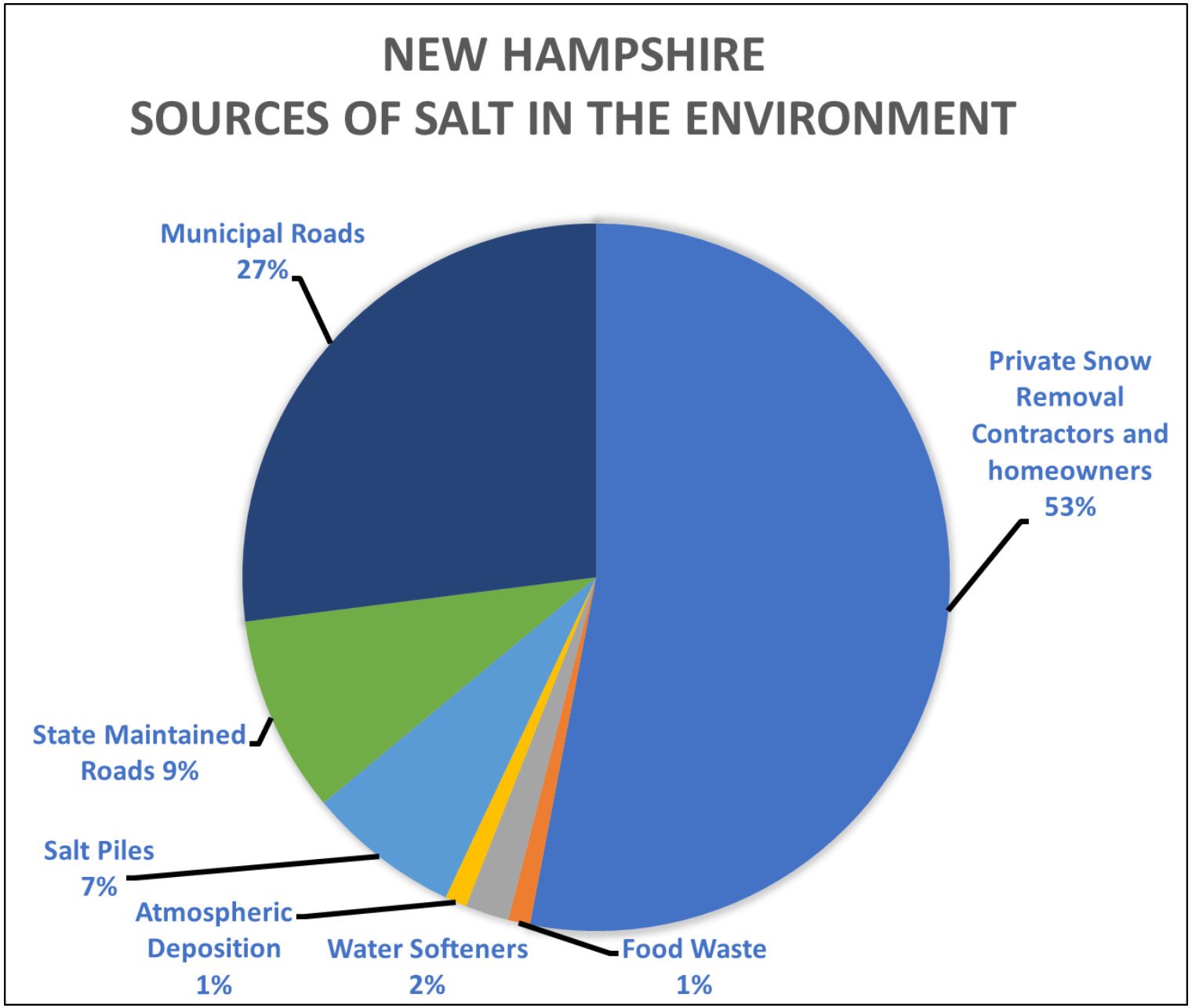

Each lake is affected by the development around it. Some lakes in very rural environments may not be affected by chlorides while lakes surrounded by development will have a more pronounced impact from chlorides.
Every lake is different.

Source: Presentation from the New Hampshire Department of Environmental Services, 2013

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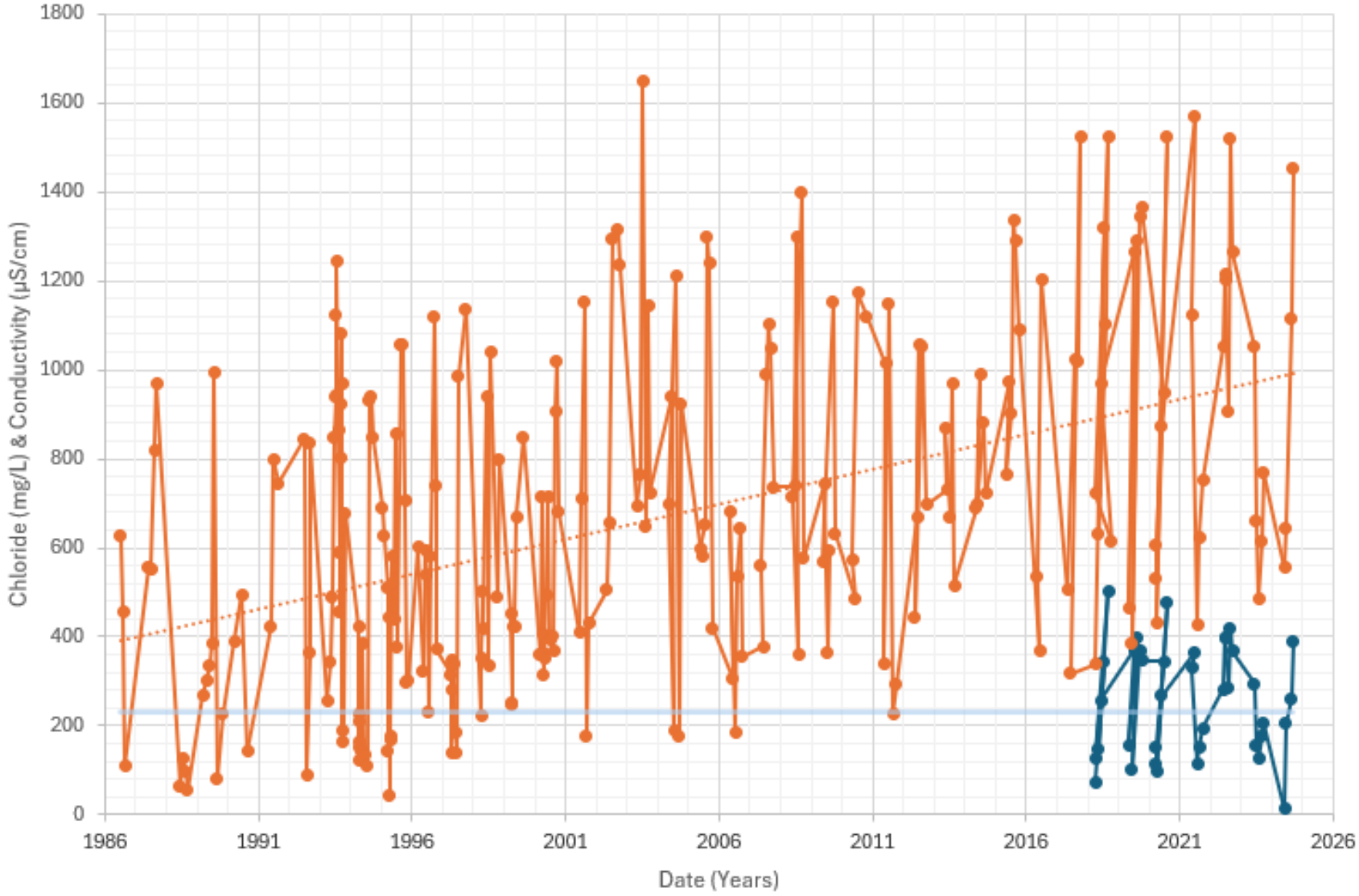
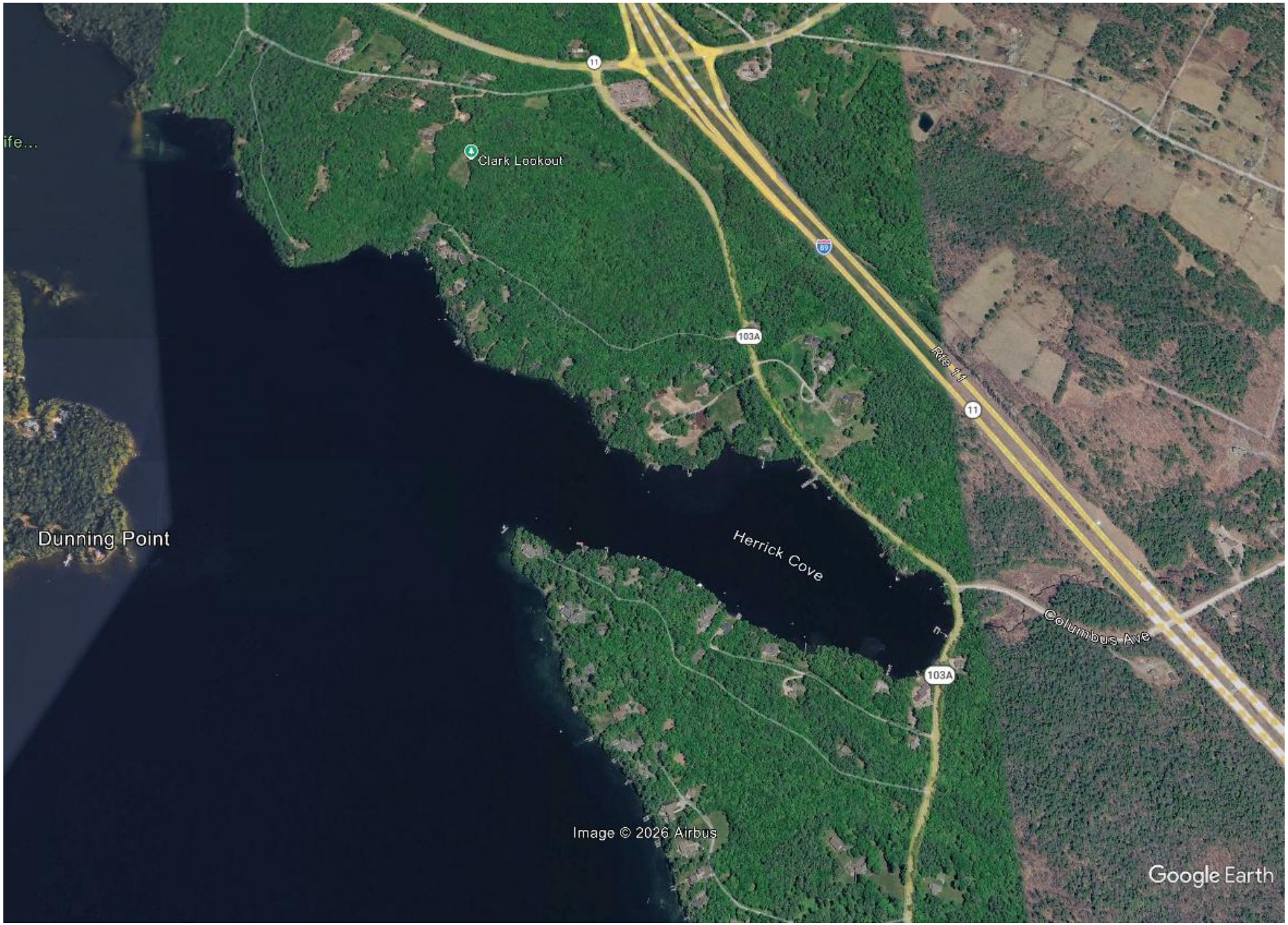
Chloride and Conductivity Trends at Site 835 Herrick Cove North Brook (1986–2024)



This chart shows how conductivity (orange) and chloride (blue) levels have changed over time at Site 835, located on Herrick Cove North Brook at Lake Sunapee. Conductivity has been measured since 1986, while chloride monitoring began in 2018. Looking at both parameters together provides a clearer picture of how salt-related inputs have shifted at this stream site over the past several decades. Chloride showed *no statistically significant trend* ($p = 0.91$), whereas conductivity shows a *strong, statistically significant trend* ($p < 0.0001$) and has increased steadily.



Herrick Cove on Lake Sunapee

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The Salt Management Plan Audience

Lake Associations

- Provide a unified voice to membership and the general public in the effort reduce chloride pollution
  - Deliver consistent messages
  - Educate residents on the benefits and harms of road salt, and safe alternatives
  - Encourage plowing contractors to obtain Green SnowPro Certification: Chloride use reduction while limiting risk
  - Work together on a unified, coordinated, collaborative and consistent approach with municipalities
  - Harness the power of all of us working together.

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The Salt Management Plan Audience

Municipalities

- Collaborate with Municipal Highway Departments in the watershed (New London, Newbury, Sunapee and Springfield).
  - Lake Associations working together - a unified, coordinated voice for common concerns and solutions
  - Each town treats winter road maintenance differently
  - We want to collaborate with Towns in achieving change.
- Meeting Goals
  - Communicate the goal: Reduce their salt footprint while maintaining safety and saving money
  - Learn how they currently handle snow/ice events, their costs and products used/purchased
  - Encourage adoption of best practices, including participation in Green SnowPro
  - Commence data tracking
  - Gain commitment.

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The Salt Management Plan Audience

Homeowners & HOA's

- Provide materials that outline what each homeowner can do
- Host "Let's Be Clear" presentations on salt
- Educate on where and what to buy for snow/ice treatment, and how and when to use
- Ask them to talk with their plow professionals.

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The Salt Management Plan Audience

Plowing Contractors and Businesses

- Discuss the scope of their winter maintenance for homeowners, HOA's and businesses – sanding, salting, and plowing.
- Discuss the reasons for reducing salt
  - Environmental concerns & local economy
  - Financial advantages of using salt alternatives or the appropriate amount of salt
  - No sacrifice of safety
- Discuss and promote the benefits of Green SnowPro including liability mitigation.

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The Salt Management Plan Audience

State of New Hampshire DOT

- Future Collaboration – after gaining support and change from other stakeholders
- Big Opportunity
- Need to overcome legacy practices
- Much to learn
- Discuss with the DES the most effective way to reduce salt used on State roads
- Strategize the approach.

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You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make.

Jane Goodall

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Salts Typically Used For Snow/Ice Management

Here is a list of some of the most common anti-icing/deicers. Many of the products sold to the public are a mixture of these basic materials. You need to read the SDS sheets to know what is in the product sold.

- Sodium Chloride (NaCl) – typical rock salt
  - Effective to about 15 degrees
  - Less Expensive – 50 pounds = $13
  - Corrosive to metals
  - Usually easily obtainable – this year there is an extreme shortage
  - Can cause paw irritation for pets

- Magnesium Chloride ($MgCl_2$) – often referred to as Mag
  - Produces heat as is dissolves into the water
  - Effective to about -13 degrees
  - Often blended with NaCl to kick start the melting process
  - Corrosive to metals and chemically damaging to concrete
  - Easier on the feet of pets
  - Can leave a slippery residue
  - Often used for summer dust control on dirt roads

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Salts Typically Used For Snow/Ice Management (cont.)

- Calcium Chloride ($CaCl_2$)
  - Effective to about -25 degrees
  - Requires less material to keep ice from bonding to pavement
  - Highly corrosive to metals
  - Should not be used around animals – causes skin and paw irritation
  - Slippery residue

- Calcium Magnesium Acetate (CMA)
  - Made from limestone and acetic acid
  - Most effective above 20 degrees but can be used down to 0 degrees
  - More expensive than salts
  - Does not corrode metal or concrete
  - Pet friendly and low risk to vegetation and water

- Sodium Formate – Jet Way
  - High performance, eco-friendly, non-corrosive deicer used for airport runways, bridges and sensitive infrastructure
  - Effective to -20 degrees
  - Non chloride
  - Expensive – 50 pound box = $125

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Questions?

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