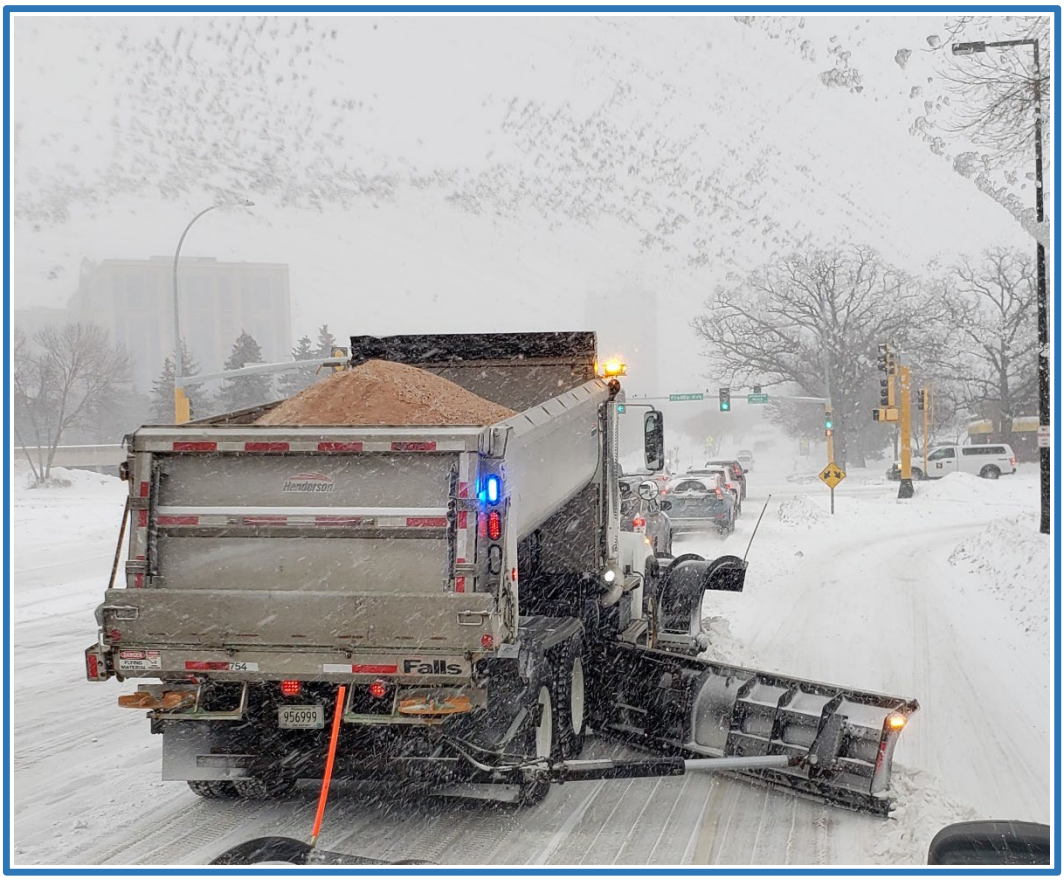
HENNEPIN COUNTY CHLORIDE INITIATIVE:

Developing a strategic plan to increase adoption of best management practices with private applicators



A Technical Report
prepared by

Amelia L. Kreiter
University of Minnesota
kreit044@umn.edu

for

The Hennepin County Chloride Initiative
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TABLE OF CONTENTS

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A big thanks is also owed to the interview and survey participants who gave their time and opinions so that this project could be successful.

LIST OF PARTNERS:

Bassett Creek Watershed Management Commission

City of Bloomington

City of Brooklyn Center

City of Minnetonka

City of Plymouth

Elm Creek Watershed Management Commission

Fortin Consulting

Hennepin County

Lower Minnesota River Watershed District

Minnehaha Creek Watershed District

Minnesota Board of Water and Soil Resources

Minnesota Pollution Control Agency

Mississippi Watershed Management Organization

Nine Mile Creek Watershed District

Richfield Bloomington Watershed Management Organization

Riley Purgatory Bluff Creek Watershed District

Shingle Creek Wateshed Management Commission

Stop Over Salting Citizen Group

West Mississippi River Watershed Management Organization

EXECUTIVE SUMMARY

The purpose of this study was to assess barriers, needs, and attitudes of private salt applicators around the Twin Cities, Minnesota Metropolitan Area in reducing chloride usage. This study was conducted by the Hennepin County Chloride Initiative (HCCI) in consultation with Amelia Kreiter, a PhD student in the Department of Forest Resources, University of Minnesota.

Qualitative interviews and quantitative survey data were collected from private salt applicators in the Summer and Fall of 2019. The study found that knowledge of, and education about chloride water contamination issues wasn't necessarily a barrier for salt applicators. Liability and client demand were most associated with salt application choices, and connected to that were financial costs and liability.

Discussion and recommendations are outlined in this report, and include reframing of current water pollution messaging, and educating the public about the consequences of their personal actions, rather than the impacts of chloride water pollution. Making water pollution a personal problem, rather than a collective one, can help to change the norms around personal behavior choices, and ultimately lead to long-term change.

1. PROJECT BACKGROUND AND OBJECTIVES

The Hennepin County Chloride Initiative was established to address chloride use in Hennepin County, Minnesota, with the main objective of reducing chloride use by private applicators, property managers, and property owners. By gaining a better understanding of private applicators' knowledge, attitudes, beliefs, and behaviors, the Initiative hopes to guide more targeted programs and messaging to reduce chloride use on private properties county-wide.

1.1 Chloride Use in Hennepin County

An estimated 365,000 tons of road salt is applied in the Twin Cities metro area each year to manage snow and ice on the roads, sidewalks, and parking lots (Minnesota Pollution Control Agency, 2019a). When snow and ice melt, chloride from the salt runs off into rivers, lakes, streams, and groundwater, and once it's in the water, there's no easy way to remove it.

The resulting contamination has multiple impacts. Twenty-seven percent of Twin Cities metro area monitoring wells had chloride concentrations that exceeded drinking water guidelines, and 30% exceeded the water quality standard (Minnesota Pollution Control Agency, 2019a). Chloride also impacts plant and aquatic life. Just one teaspoon of road salt per every 5 gallons is enough to pollute water beyond the MPCA's standard for aquatic life, and once dissolved, there is no easy way to filter it out (Minnesota Pollution Control Agency, 2019a). A University of Minnesota study found that 78% of the salt applied each year in the Twin Cities for winter maintenance is either transported to groundwater or remains in local lakes and wetlands (Herb, Janke, & Stefan, 2017). Another study found that urban stormwater ponds are retaining salt from winter maintenance through the summer (Finlay, 2019). At the rate of application currently used, over 1 trillion gallons of water could be polluted every year (Minnesota Pollution Control Agency, 2019a), enough to fill Lake Minnetonka seven times.

High concentrations of chloride in surface water can negatively impact the growth, reproduction, and overall survival of fish, macroinvertabrates, insects, and amphibians both in the immediate area and downstream from the contamination (Siegel, 2007). Splash from road salt onto surrounding grass and trees can also harm the plant life. When a plant is exposed to saltwater, a variety of injuries can occur from leaf burn, to stunted root growth, to plant death (Goodrich, Koski, & Jacobi, 2009). In addition, road salt changes soil structure and increases compaction, further increasing stormwater runoff and impacts to plant growth (Provin & Pitt, n.d.). Lastly, chloride can lead to infrastructure damage. Road salt encourages corrosion which damages concrete structures like sidewalks and bridge decking. Chloride, a conductive element, is also capable of shorting out railroad crossing apparati. These damages cost cities between $290 million and $1.2 billion each year in maintenance and repairs (Minnesota Pollution Control Agency, 2016).

1.2 Smart Salting Training

Impairments in groundwater and surface water due to chloride are increasing each year. The Minnesota Pollution Control Agency developed Smart Salting training, a multi-level program designed to help salt applicators reduce chloride use during the winter months. Level 1 is a six-hour class aimed at educating individual applicators on reducing their salt use while still maintaining safety for their clients. The class covers a range of topics including the science behind road salt and application rate guidelines. The class ends with an optional test to earn the Smart Salting certification and join a list of certified applicators on

the MPCA's website. Level 2 training can be done completely online via the Smart Salt assessment tool which allows winter maintenance organizations to assess their current salt use and implement organizational changes to minimize use (Minnesota Pollution Control Agency, 2020).

The MPCA, collaborating with Fortin Consulting and other partners, recently created a Property Managers training which includes similar topics but focuses on how property managers can do their part in hiring Smart Salting certified applicators and better understand the need for Smart Salting practices. These trainings have been historically well attended and will continue in the future.

MPCA's Smart Salting practices have been widely adopted by state agencies with hundreds of applicators trained every year. These applicators report reductions of 30-60% in de-icer use after the first year of training. While these trainings are gaining popularity from private property managers as well, broad participation from local snow and ice management businesses is lacking. In identifying barriers to local businesses adopting Smart Salting practices, we hope to build programming to provide them with what they need to adopt best practices (Minnesota Pollution Control Agency, 2020).

1.3 Limited Liability Legislation

Lastly, an understanding of a proposed bill in the Minnesota legislature will provide some context to sections of this report. In 2019 Rep. Peter Fischer (DFL) of Maplewood, Minnesota, and Sen. Carrie Ruud (R) of Breezy Point, Minnesota, authored legislation aimed at reducing chloride application by salt applicators in the private sector. This legislation, based off of similar legislation passed in New Hampshire, proposes to allow salt applicators who receive certification in Smart Salting training and maintain records of their work to be subject to limited liability from slip-and-fall lawsuits. While public applicators have considerable immunity from these lawsuits, private applicators do not. This risk causes some applicators and property managers to over-apply chloride in order to protect themselves and their companies from potential lawsuits. The proposed legislation has not yet been approved despite being reintroduced each session over the last 2 years. The goal of the legislation is to lower risk of litigation for applicators and property owners while still maintaining safety (StopOverSalting.Org, 2019).

2. METHODS

This project used a mixed-methods approach, combining qualitative data gathered from stakeholder interviews and quantitative data gathered through an online survey. Interviews were conducted with 12 private salt applicators in and around Hennepin County. Quantitative data were collected through a self-administered online survey distributed initially to 369 winter maintenance professionals, and distributed further using snowball sampling.

2.1 Private Winter Maintenance Professional Interviews

Hennepin County Chloride Initiative stakeholder collaborated to develop an email contact script (Appendix A) and interview guide (Appendix B). Partners, as well as the Minnesota Nursery and Landscape Association (MNLA) website provided the project team with an initial list of prospective interview participants (Minnesota Nursery and Landscape Association, 2019). The list was comprised of MNLA members who reported "snow plowing" as one of their business activities, as well as winter maintenance contacts provided by Fortin Consulting, Inc.

Twelve semi-structured interviews were conducted with privately employed winter maintenance professionals. Operation sizes ranged from 2 to 120 winter employees. Interviews were conducted over the phone or at the participant's office. Participants were offered a $25 Amazon gift card as an incentive to participate.

The interviewer first answered any questions or concerns the interviewee had prior to beginning the interview, and emphasized that every reasonable effort would be made to ensure confidentiality, and that participation was voluntary. No identifying information is linked to the interview data. Qualitative data were transcribed and analyzed using open coding consistent with adapted grounded theory procedures (Creswell & Poth, 2018) and focused coding to highlight responses with direct bearing on project goals. QSR International's NVivo 12 Pro software was used to manage, code, and organize the data (QSR International, 2017).

The goal of the qualitative analysis was to highlight trends found across Twin Cities winter maintenance operation professionals and identify concepts related to decision-making in salt application to inform Hennepin County stakeholders in natural resource decisions. While the study findings represent the beliefs and opinions of the study participants only, wide-ranging and diverse perspectives were captured. Study participants have differing backgrounds, experiences, and business approaches.

2.2 Winter Maintenance Professional Online Survey

Quantitative data were collected using a self-administered online survey of winter maintenance professionals in the Twin Cities area. The survey was sent to contacts from the MNLA and Fortin Consulting lists that were not interviewed, as well as a list of winter maintenance professionals on the Minnesota Pollution Control Agency's website (Minnesota Pollution Control Agency, 2019b). Survey-takers were also encouraged to forward the survey link to other winter maintenance professionals. The surveys were administered from October 2019 to November 2019.

Survey items were designed based on information gathered in interviews, as well as feedback from project partners. The survey questionnaire included a variety of fixed-choice and scale questions.

Several questions were adapted from survey instruments used in previous studies of knowledge, attitudes, beliefs, and practices (Davenport et al., 2018; Pradhananga, 2017). An adapted Dillman's Tailored Design Method was used to increase response rates (Dillman, Smyth, & Christian, 2014). The survey was administered in two waves via the Qualtrics software (www.qualtrics.com, Provo, UT): (1) the questionnaire (Appendix D) with an email cover letter (Appendix C); and (2) a replacement questionnaire with an emailed cover letter (Appendix E). Participants were offered the chance to enter to win one of four $25 Amazon gift cards as an incentive.

Survey responses were automatically coded and saved into the Qualtrics respondent database. The database was downloaded and data were analyzed using Statistical Package for Social Sciences (SPSS release 24.0). Basic descriptive statistics were conducted to determine frequency distributions and central tendency of individual variables (Appendix F).

3. STUDY FINDINGS

Project findings are organized into two sections: winter maintenance professional interview findings and online survey findings. Interview findings are further organized into five sub-sections relating to research questions and larger themes found throughout the interviews (Table 1).

3.1 Interview Findings

In analyzing interview findings, five dominant narratives emerged from participant data.

3.1.1 Client demand

Client demand was the most commonly cited barrier to salt reduction. Many applicators felt that without the pressure to meet client requests, they would be able to implement more mindful salting practices.

> *They want it. They expect it. And the whole thing is – the issue of salt right now in the state is – it really just comes down to legislators. Because we're held liable from the clients, so if they want more, we have to give it. Otherwise, we're held liable. So the clients don't care how much they put down as long as they don't get sued.*

A common story across interviews was one where the company visited a property and was called back multiple times during the day for more salt, despite the conditions not calling for it.

> *We had one storm last year, in the middle of February, and I had three clients call me back. We salted them four times that day, which I thought was ridiculous. But they were so freaked out because it was freezing rain all day, and they don't comprehend that salt's not going to melt freezing rain. It's got to be ice, it can't be water. And you got water falling at freezing temperatures, salt's going to get dissipated more than anything. So, some of it is, you know, lack of knowledge on the client's part. The clients are so freaked out about the liability that they don't care.*

Client liability concerns were consistent across most operations and many applicators felt that, "until you change the liability and the client expectations, our hands are kind of tied."

However, a few applicators have noticed a different demand with a few of their clients. One applicator discussed clients that prefer less salt in order to avoid carpet damage in their businesses. Clients' concern for pets' paws was also mentioned throughout interviews. "Every year, somebody will ask me, 'we want the pet friendly salt.'"

3.1.2 Environmental concerns

Interviews revealed a wide range of salt application practices across operations. Companies that were working towards salt reduction expressed different motivations for reduction. A few participants expressed their concern for the impact of salt on the environment, but felt that they didn't have any other choice but to over-apply.

> *…one of the things that we keep running up against is, there's the environmental impact and trying to keep folks happy and be good stewards of the earth like we want to be, but we're also tasked with industry standards, where if you're not using enough product and keeping the ice cleared well enough, you end up hearing about it or you lose the job and it goes to somebody else.*

Other participants felt that reducing salt for environmental reasons was a win-win situation, because of the cost savings of using less salt. One participant, in discussing their switch to liquid stated, "not only do you have the environmental savings, but you will save money."

Only one company has almost completely eliminated salt from their operation (they have one client with a steep driveway that requires salt). When asked about their decision to not use salt, the participant stated that it was, "an active environmental decision."

Along related lines, many participants discussed salt damage to vegetation when transitioning to landscaping operations in the spring: "along the edges of sidewalks and parking lots, we see lots of sod that's been burned by the salt […] it's yellow and dead, it needs to be cut out and replaced." In one case, vegetation damage motivated a change in salt application practices. "As far as turf damage, we actually had one site where they have a dozen six-inch maple trees that were showing signs of salt damage. And so that was one of the sites we switched to liquid. […] it's kind of hard to tell in the first year, but the trees do look a little bit better. […] And on all of our sites, the amount of sod kill was a lot less."

3.1.3 Liability concerns

Legal concerns were a motivating factor for almost all participants. Fears over being sued over a slip-and-fall injury were motivation enough to continue with the status quo.

> *In regards to applying the deicing agents and the salt, there's a strong incentive to over-apply and apply more frequently than what's probably really necessary. From a liability standpoint, it's cheaper to over-apply the product than it is to fight slip-and-fall lawsuits. That's a big, big obstacle that we're up against.*

Several participants acknowledged that the Limited Liability Law proposed in the Minnesota legislature would "help out a lot in our nervousness," and "give us a lot more freedom to use [salt] a little bit more consciously and use what we think is right on a site."

Other participants were more cynical about the potential impacts of limited liability legislation, and felt that clients and end-users were ultimately the ones driving higher salt use, not the applicators.

> *That limited liability law will help a lot, but I still have a feeling, like a lot of laws, there's still going to be a bit of a gray area. I don't know whether somebody's going to win the lawsuit or not, but you still don't want to deal with one. So until some of the liability is taken off the actual applicators and until the end-users are educated enough and willing to try to make this across the board a fair game to play, and be understanding of the reduced usage and why, things really aren't going to change a whole heck of a lot unfortunately*.

However, other applicators said that they state up front to their clients that they "can't be held liable for any kind of snow or ice build-up," and that that strategy mitigated any of their legal concerns, regardless of the passing of limited liability legislation. A few participants felt that if they took enough action up front with their clients, a liability law was unnecessary:

> *I think the key to liability is you outline the services you perform, you track that you did those services, you keep detailed records. […] I do think that the legal side of this has gotten much friendlier to people like me. So far, for me, as long as I proved that I have a contract, and I perform the services I committed to, I've never been asked, "Well, how much salt did you put down?" I've just been asked to provide documentation that we followed the agreed-upon approach*.

3.1.4 Financial motivations

Financial justifications were used in both directions, for both salt reduction, as well as maintaining higher salt levels. One participant stated, similar to the environmental motivations above, that salt reduction was a win-win: "we're always looking for reductions because it saves us money and it just cuts down on the dead zone in the water." For others, using more salt was also viewed as a win. One participant said of their operation, "[salt application] is actually a very profitable portion of it. It's a double-edged sword." Another participant agreed, stating that despite knowing that more salt wouldn't benefit the client, it would be financially beneficial to apply more.

> *There's times where it's super cold out, and the client calls back, and they want more salt. And we're kind of torn between either going and doing it and making the money, or telling the client, "Hey, it's 15 degrees below zero, more salt isn't going to do anything*."

To that end, salt availability was commonly discussed across all participants. One participant stated that the price salt in a given year impacts how much they put down on a property, acknowledging that "[it's] kind of ironic, that with that [small] amount of salt, we seemed to get along just fine."

3.1.5 The end user

Inherent in the liability and client demands are the end user. Winter maintenance operations are looking to avoid lawsuits from their clients, and their clients, in turn, are worried about slip-and-falls from the end users of their properties. While many applicators acknowledged the value of MPCA's Smart Salting training, they felt that the information was directed at the wrong audience. One applicator theorized that most people in the general public don't understand the impacts of over-salting.

> *If I were to make a suggestion it would be – it's not the businesses, it's not the salt contractors – it's the people that work there that need to be educated. They have to be educated on what salt is doing to their environment. It's as simple as showing dead fish. You know, because it all goes to lakes and rivers. That's my two cents. But I don't want to put this much salt on. But I have to in order to keep them calm and quiet. Otherwise I have no business*.

Many agreed, making suggestions such as, "the way to reduce usage in private businesses would be to educate prospective customers about the downside of using salt. And then encourage them to, you know, tell their provider that they don't want salt."

Others felt that the end users themselves are not doing everything they can to avoid a slip-and-fall, and are putting too much the onus on the applicators. "[We] need to be educating the general public about regular winter safety, you know, like, get your hands out of your pockets, walk like a penguin, proper footwear […]" "If we're not entirely responsible for the fact that Mrs. Jones decided to go out in the middle of an ice storm in high heels, yeah that would help us out a lot."

Table 1: Constraints and needs for winter maintenance professionals

Perceived social norms	Client demand	"Until you change the liability and the client expectations, our hands are kind of tied."
		"If the client's paying for it, they expect to see, they want to see some products right on their property."
		"I wish I could say that people were telling me, 'I want to reduce salt.' I can't say that."
	End-user expectations	"It needs to begin at that end user and educating them and teaching them the reasons why salt usage needs to be reduced and what its impact is, and when those people don't understand that, that pretty much ties our hands. We're still held up to the same standards, and we have to meet those to be in business."
	"Other businesses are worse"	"You'll see enough salt used on a sidewalk that could cover an entire parking lot."
Economic investment and risk	Cost of equipment	"If there's some kind of grant money or tax savings by purchasing more environmentally conscious ice management equipment, things like that would certainly make that more attractive to a company. It's a big investment and you actually end up losing money [...] you're losing customers now because your price is too high."
	Profits	"[Salting] is a very profitable portion"
	Time	"I can't afford to take a day off [for a training]"
	Liability for the operation	"Until some of the liability is taken off the actual applicators […] things really aren't gonna change a whole heck of a lot, unfortunately."
	Liability for properties	"The clients are so freaked out about the liability that they don't care"
Awareness of the problem	Applicators	"I think that training just more so made us all conscious of the damage that we're doing."
	General public	"It's the people that work there that need to be educated. They have to be educated on what salt is doing to their environment. It's as simple as showing dead fish. You know, because it all goes to lakes and rivers. That's my two cents. But I don't want to put this much salt on. But I have to in order to keep them calm and quiet. Otherwise I have no business."
Awareness and understanding of the solution	Nothing I can do/Hands are tied	"And it sounds like I'm running myself out of business. But it's like, if we don't stop this soon… I'm all for safety. I'm all for making money. But it's just not a good practice."
	Smart Salting training	"We went to the class and we see the benefits and the reasoning behind reducing our salt usage but our hands are somewhat tied, as far as industry standards and what other contractors do. "
	Need for institutional change	"[The Limited Liability Law] would give us a lot more freedom and being able to use a little bit more consciously and use what we think is right on a site."

3.2 Survey Findings

Overall, 107 winter maintenance professionals completed the survey. Complete statistics for all survey questions are presented in tabular form in Appendix F. An exact response rate is not available here due to the nature of sampling method. We allowed respondents to send the survey link to other winter maintenance professionals, and while we were able to see the number of responses, we were unable to discern how many links in total were distributed. However, using the number of survey links that we sent out, the response rate from the research team's distribution list was 29%.

Respondents were first asked if their company applied salt to private roads, parking lots, or sidewalks as a part of their winter maintenance practices. Those who answered "Not applicable; our company does not do winter maintenance," were redirected to the end of the survey. The rest were asked about the number of winter maintenance employees that their company employed during the winter. The largest number of respondents had 21 or more employees (42.7%), followed by 1-5 employees (34.4%) (Appendix F, Table 2).

Respondents were then asked about their winter maintenance practices. A list of salt application best practices was provided and respondents were asked which practices were used in their operation, and to what degree (Appendix F, Table 3). Protected and enclosed salt storage practices, improved mechanical removal of snow and ice, and selection of appropriate deicers and abrasives were the top practices in place. Using scope of service contracts that don't charge by volume was the least adopted practice. Of the practices that they were not using and didn't plan to, respondents were asked what their reasons were for not adopting (Appendix F, Table 4)

Respondents were then asked if they have attended the Minnesota Pollution Control Agency's winter maintenance training (Smart Salting) in the past five years. 86% of respondents had attended one or more of the training levels, and 14.4% hadn't attended any of the training classes (Appendix F, Table 5). Based on their answers to this question, respondents were sent down one of two paths in the questionnaire.

The first path was for those who had attended one or more of the training sessions. This group of respondents were asked if the training was a mandatory part of their company's winter training, whether they would recommend the training to other applicators, and whether they had adopted any practices from the training (Appendix F, Tables 6, 7, 8).

The second path was for those who had not attended any Smart Salting classes. These respondents were asked if they had heard of the training, and if they had heard of the training, what their reasons were for not attending (Appendix F, Tables 9, 10). The top two reasons were that "trainings are held during busy times for my operation," and "I already do everything I can to minimize salt usage." Lastly, respondents were asked what would motivate them to attend the training (Appendix F, Table 11). The top answers were "long-term cost savings for my operation," and "changes in liability laws." Respondents were also given the option to provide contact information for more information about future trainings.

All participants were then asked about their concerns. First, they answered the question "do you have any concerns about the amount of salt that you use in your own operation?" About 29% answered yes (Appendix F, Table 12). Then, participants were asked if they had any concerns about the amount of salt

they saw being used by other operations, and the number of “yes” responses increased to 51% (Appendix F, Table 13).

Participants were also asked whether they saw impact from road salt on grass, trees, or other vegetation during landscaping season, to which 76% said they did see impacts (Appendix F, Table 14). Lastly, participants were asked how the Limited Liability Legislation would impact their winter operation (Appendix F, Table 15). 85% of respondents said that it would have some impact on their operation.

4. DISCUSSION AND RECOMMENDATIONS

Overall, winter maintenance professionals identified liability and client demand as their largest barriers to adopting salt reduction strategies. In discussing their concerns, many applicators looked outward when assigning blame for over-salting, looking instead to other applicators or citing customer and end-user demand as reasons that we see so much salt. Far fewer participants were concerned about their own practices. Client and end-user demand all relate to liability concerns at different points in the snow and ice removal process.

However, approaching the issue of client demand from a different angle than liability may have downstream impacts. We recommend a multi-strategy approach to public engagement that emphasizes the negative impacts of salting on local waterways, encourages better personal winter practices, addresses liability and resource constraints, and supports an overall reduction in the use of chlorides in snow and ice removal.

This approach may allow for the reframing of current initiatives to better inform the public about the impacts of over-salting on waterways and aquatic life. By emphasizing the downstream consequences of salted sidewalks, and framing proper footwear as a means to reduce chloride pollution, we can better connect the issue to the solution in the eyes of the public, while at the same time addressing the needs of private salt applicators. In reframing water problems, we can avoid the “tragedy of the commons” by making the problem personal, rather than “everyone’s problem.”

Road salt pollution could also be integrated into stormwater management campaigns. Helping the public to understand that stormwater does not get treated before being released directly into waterways can help address a concern brought forth by many of the participants of this study:

> *It all goes down the drain. People don't realize that. It disappears off their lot, it melts and so it's gone. And people honestly don't understand what's going on. They don't get it. It's not just you know, the business owners, every employee, people don't get what it’s doing.*

Lastly, we encourage the continued work at the statewide level to bring forth Limited Liability Legislation to limit the liability of applicators using Smart Salting best practices in the case of a slip-and-fall.

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APPENDICES

APPENDIX A. INITIAL EMAIL CONTACT SCRIPT - INTERVIEW

Hello _____,
My name is Emily Kreiter. I am a graduate student conducting research on road salt application with Hennepin County and Riley Purgatory Bluff Creek Watershed District. This study engages Twin Cities salt applicators to understand their views, knowledge, and behaviors related to winter maintenance and chloride use.

As part of the project, we will be conducting interviews with a variety of salt applicators in the Twin Cities. You have been recommended as someone with an important perspective on road salt application strategies and behaviors. I am hoping you would be able to assist me by participating in an interview. We're only talking to a limited number of stakeholders so documenting your perspective is important to get diverse views and a range of experiences. Your identity will remain confidential and we won't include any information that would make it possible to identify you any final reporting.

We realize that your time is valuable; if you are able to take the time to interview with me, you will receive a $25 Amazon gift card for participating.

Are you willing to participate? If so, I can set up an interview with you at your convenience.

I would be happy to answer any questions you might have about the study or interview, please don't hesitate to contact me at 319-541-7207 or by email at kreit044@umn.edu.

Thanks so much!
Emily Kreiter

APPENDIX B. INTERVIEW GUIDE

<u>Research Question</u>:
What knowledge, attitudes, and behaviors act as barriers to adopting smart salting best practices by private applicators?

Introduction:
Thanks for agreeing to talk to me. As I mentioned on the phone, this is a research project being led by Hennepin County and its partners to look at winter maintenance practices by private companies, and learn how we can reduce the use of salt but also maintain a good level of service for those who need snow and ice removal. The results of this study will be used to develop more effective salt reduction programs.

What we discuss today is confidential; your name and identifying information will not be associated with the data analysis for this project. Your participation in this research will have no bearing on your relationship me personally, or Hennepin County in general. This should take about 30 minutes. Do you have any questions before we begin?

Question Guide:

1. Please describe your company and your winter maintenance practices.
   Prompts: What issues or challenges affect what you do? How has it changed over the years? Does your company track the behaviors/practices of individual applicators? Does your company establish a scope of service contract with clients prior to the winter season? Does your company calibrate your equipment each season?

2. You may or may not know that the use of salt in winter maintenance has a negative impact on water quality in our lakes and streams. What concerns do you have about the amount of salt you use in your own operations? What keeps you from using less salt?
   Prompts: competitors, cost savings, environment, client needs, equipment ($), chemicals ($), calibration, liability, salt availability, upfront equipment cost, salt/landscape impacts

3. Have you heard about any of the winter maintenance trainings around the Twin Cities? If so, have you attended one in the past five years?
   a. If YES:
      i. Are there any best practices you have adopted from the training? Why?
      ii. What practices haven't you adopted and why?
      iii. Would you recommend the training to other applicators?
      iv. Is the training a mandatory part of your company's training?
      v. *Prompts:* liability law, Level 2 Smart Salting
   b. If NO:
      i. Have you heard of it? Have you been invited?
      ii. What kept you from attending?
      iii. What would motivate/help you to attend in the future?

4. Is there anything else you would like to add?

Thank you for your willingness to participate for this interview. The results will be used to develop salt reduction programming for private applicators throughout the metro area.

Offer contact info if they seem interested in training

APPENDIX C. EMAIL CONTACT SCRIPT – SURVEY

Hello,
I am writing to you because of your role in winter maintenance in the Twin Cities, and to invite you to participate in an **online survey** to help us understand your experiences and practices during the winter season. The survey is part of a research project led by the Hennepin County Chloride Initiative, a partnership between local government units. This project is aimed at better understanding how we can reduce the use of salt in the Twin Cities, but still maintain a good level of service and safety for those who need snow and ice removal. The results of the study will be used to develop more effective salt reduction programs.
The survey should only take 7-10 minutes to complete, and is completely confidential. If you are interested in completing our survey, please click on the link below.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

At the end of the survey you will have the opportunity to enter to win one of four **$25 Amazon gift cards**. Your survey response will remain anonymous and your email will not be associated with your responses.
In addition, if you are able, we encourage you to **forward this survey** along to other winter maintenance professionals in the Twin Cities.
If you are interested in learning more about the project, or if you have specific questions please contact me.

Sincerely,

Claire Bleser, Ph.D.
District Administrator
Riley-Purgatory-Bluff Creek Watershed District
18681 Lake Drive East, Chanhassen, MN 55317
952-607-6512
cbleser@rpbcwd.org

Amelia Kreiter, M.S.
Research Assistant
University of Minnesota
319-541-7207
kreit044@umn.edu

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

APPENDIX D. SURVEY QUESTIONNAIRE

Hennepin County Road Salt

Before you begin:

This survey is part of the Hennepin County Chloride Initiative, a partnership of Local Government Units. We are conducting this survey to better understand how we can reduce the use of salt in the Twin Cities, but still maintain a good level of service and safety for those who need snow and ice removal.

The results of this study will be used to develop more effective salt reduction programs. This survey is voluntary and confidential. It should take about 5 minutes to complete this questionnaire. Please answer the questions as completely as possible

At the end of the survey, you will have the opportunity to enter your email for a chance to win one of four $25 Amazon gift cards. Your email will not be associated with your survey response.

For more information about the Hennepin County Chloride Initiative, please contact Claire Bleser at cbleser@rpbcwd.org

Thank you for your help!

Does your company apply salt to private roads, parking lots, or sidewalks as a part of its winter maintenance practices?

☐ Yes

☐ No

☐ Not applicable; our company does not do winter maintenance

How many winter maintenance employees does your company employ during the winter?

☐ 1-5

☐ 6-10

☐ 11-20

☐ 21 or more

Listed below are salt application best practices that winter maintenance companies can implement to reduce salt and chloride pollution. Please check the box on each row that best describes your operation's current and future actions.

	Not doing and don't plan to	Not doing but might in the future	Doing to some degree	Doing whenever and wherever possible
Equipment calibration	☐	☐	☐	☐
Using liquid deicers	☐	☐	☐	☐
Protected and enclosed salt storage practices	☐	☐	☐	☐
Improved mechanical removal of snow and ice before salt application	☐	☐	☐	☐
Selection of appropriate de-icers/abrasives for specific weather/situations	☐	☐	☐	☐
Pre-storm anti-icing (pre-wetting)	☐	☐	☐	☐
Monitoring pavement temperatures	☐	☐	☐	☐
Using scope of service contracts that don't charge by the ton/gallon	☐	☐	☐	☐
Using application rate tables	☐	☐	☐	☐
Create/update a snow and ice policy	☐	☐	☐	☐
Documenting practices	☐	☐	☐	☐
After-storm meetings	☐	☐	☐	☐
Winter maintenance certification of winter crew	☐	☐	☐	☐
Education of staff and customers on lower salt strategies	☐	☐	☐	☐

What are your reasons for not adopting the following practices? ***(please check all that apply)***

	Too expensive	Too time-consuming	Doesn't apply to the size of our operation	Liability concerns	I don't feel I have the expertise/ training to implement it	Client demand (e.g. more salt)	End-user education is more important than changing our practices
Equipment calibration	☐	☐	☐	☐	☐	☐	☐
Using liquid deicers	☐	☐	☐	☐	☐	☐	☐
Protected and enclosed salt storage practices	☐	☐	☐	☐	☐	☐	☐
Improved mechanical removal of snow and ice before salt application	☐	☐	☐	☐	☐	☐	☐
Selection of appropriate de-icers/abrasives for specific weather/situations	☐	☐	☐	☐	☐	☐	☐
Pre-storm anti-icing (pre-wetting)	☐	☐	☐	☐	☐	☐	☐
Monitoring pavement temperatures	☐	☐	☐	☐	☐	☐	☐
Using scope of service contracts that don't charge by the ton/gallon	☐	☐	☐	☐	☐	☐	☐
Using application rate tables	☐	☐	☐	☐	☐	☐	☐
Create/update a snow and ice policy	☐	☐	☐	☐	☐	☐	☐
Documenting practices	☐	☐	☐	☐	☐	☐	☐
After-storm meetings	☐	☐	☐	☐	☐	☐	☐
Winter maintenance certification of winter crew	☐	☐	☐	☐	☐	☐	☐
Education of staff and customers on lower salt strategies	☐	☐	☐	☐	☐	☐	☐

Have you attended the Minnesota Pollution Control Agency's winter maintenance training (Smart Salting) in the past five years?

☐ Yes, Level 2 Smart Salting (Organizational)

☐ Yes, Level 1 Smart Salting Winter Roads (Individual)

☐ Yes, Level 1 Smart Salting Parking Lots and Sidewalks (Individual)

☐ Yes, Smart Salting Property Manager Certification (New)

☐ No

Is the MPCA smart salting certification training a mandatory part of your company's winter training?

☐ Yes

☐ No; if no, why not? _____

Would you recommend the MPCA smart salting certification training to other applicators?

☐ Yes

☐ No; if no, why not? _____

Have you adopted any practices from the MPCA smart salting training?

☐ Yes

☐ No; if no, why not? _____

Have you heard of the MPCA's Smart Salting training?

☐ Yes

☐ No

What are your reasons for not attending? ***(please check all that apply)***

☐Not interested

☐I don't have enough time

☐Trainings are held during busy times for my operation

☐No incentive for me to go

☐I don't feel the need to reduce my salt usage

☐My salt usage is determined by my clients

☐I already do everything I can to minimize salt usage

☐Other (please specify) _____

What would motivate you to attend the training? ***(please check all that apply)***

☐A financial incentive to attend

☐Long-term cost savings for my operation

☐Changes in liability laws

☐Keeping up with the competition

☐Personal concerns about the impacts of salt use

☐Requests from clients for salt reduction

☐Nothing; I have no interest in attending

☐Other (please specify)_____

Would you like to be contacted about attending the next training?

☐Yes (if so, please enter phone or email information. This information will not be associated with the rest of your survey responses) _____

☐No

Do you have any concerns about the amount of salt that you use in <u>your own operation?</u>

☐Yes (please specify) _____

☐No

Do you have any concerns about the amount of salt that you see being used <u>by other operations?</u>

☐Yes (please specify) _____

☐No

During landscaping season, do you see impacts from road salt on grass, trees, or other vegetation?

☐Yes

☐No

☐Not applicable

A proposed bill at the Minnesota Capitol would limit the liability of the salt applicator when they are certified in the Minnesota Pollution Control Agency's Smart Salting training, and document their practices on properties. The goal of the bill is to decrease the potential for slip-and-fall lawsuits for private salt applicators who engage in salting best practices.
If this law were to pass, how would it impact your operation? *(please select all that apply)*

☐It wouldn't; I already use minimal or no salt

☐It would greatly impact my operation; my salt application is all based on liability

☐It would slightly impact my operation; it would protect me from clients who ask for more salt

☐I would attend the Smart Salting training

☐I would adopt more practices from the Smart Salting training

Do you have any comments about salt application in the Twin Cities, or comments about this survey?

_____

Thank you for participating in this survey!

On the next page you will be redirected to a page to enter to win one of four $25 Amazon gift cards.

APPENDIX E. REPLACEMENT EMAIL CONTACT SCRIPT

Hello,

A couple of weeks ago, we sent you a link to a survey that asked about your winter maintenance experiences and practices. If you have already filled out the survey, thank you for your help!

We are writing again because of the importance of your participation. Your opinons will help Hennepin County and other local government units to improve salt application and reduction practices around the Twin Cities. We want to ensure that your opinions are represented as well.

The survey should only take 7-10 minutes to complete, and is completely confidential. If you are interested in completing our survey, please click on the link below.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

At the end of the survey you will have the opportunity to enter to win one of four **$25 Amazon gift cards**. Your survey response will remain anonymous and your email will not be associated with your responses.

In addition, if you are able, we encourage you to **forward this survey** along to other winter maintenance professionals in the Twin Cities.

If you are interested in learning more about the project, or if you have specific questions please contact me.

Sincerely,

Claire Bleser, Ph.D.
District Administrator
Riley-Purgatory-Bluff Creek Watershed District
18681 Lake Drive East, Chanhassen, MN 55317
952-607-6512
cbleser@rpbcwd.org

Amelia Kreiter, M.S.
Research Assistant
University of Minnesota
319-541-7207
kreit044@umn.edu

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

APPENDIX F. SURVEY FINDINGS

Table 1: Does your company apply salt to private roads, parking lots, or sidewalks as a part of its winter maintenance practices?

Response	N	Percent
Yes	82	78.1
No	14	13.3
Not applicable; our company does not do winter maintenance	9	8.6

Source: Hennepin County Chloride Initiative Survey

Table 2: How many winter maintenance employees does your company employ during the winter?

Response	N	Percent
1-5	33	34.4
6-10	15	15.6
11-20	7	7.3
21 or more	41	42.7

Source: Hennepin County Chloride Initiative Survey

Table 3: Listed below are salt application best practices that winter maintenance companies can implement to reduce salt and chloride pollution. Please check the box on each row that best describes your operation's current and future actions.

	N	Mean*	SD[a]	Not doing and don't plan to[b]	Not doing but might in the future	Doing to some degree	Doing whenever and wherever possible
Protected and enclosed salt storage practices	87	3.67	0.69	2.3	5.8	14.9	77.0
Improved mechanical removal of snow and ice before salt application	86	3.60	0.69	2.3	4.7	23.3	69.8
Selection of appropriate deicers/abrasives for specific weather/situations	87	3.33	0.80	2.3	13.8	32.2	51.7
Equipment calibration	84	3.32	0.86	4.8	11.9	29.8	53.6
Education of staff and customers on lower salt strategies	83	3.29	0.80	1.2	18.1	31.3	49.4
Documenting practices	84	3.12	0.84	2.4	22.6	35.7	39.3
Create/update a snow and ice policy	84	3.01	0.89	4.8	25.0	34.5	35.7
Monitoring pavement temperatures	83	2.89	1.02	10.8	25.3	27.7	36.1
Winter maintenance certification of winter crew	83	2.89	1.01	8.4	31.3	22.9	37.4
Using application rate tables	83	2.77	0.99	9.6	33.7	26.5	30.1
Pre-storm anti-icing (pre-wetting)	87	2.76	0.92	8.1	33.3	33.3	25.3
Using liquid deicers	86	2.72	1.02	14.0	27.9	30.2	27.9
After-storm meetings	85	2.68	1.00	16.5	21.2	40.0	22.4
Using scope of service contracts that don't charge by the ton/gallon	80	2.56	1.17	28.8	13.8	30.0	27.5

Source: Hennepin County Chloride Initiative Survey

*Responses based on a 4 point scale from not doing and don't plan to (1) to doing whenever and wherever possible (4)

[a] SD=Standard deviation

[b] Percent

Table 4: What are your reasons for not adopting the following practices? (please check all that apply)

	N	Too expensive	Too time-consuming	Doesn't apply to the size of our operation	Liability concerns	I don't feel I have the expertise/ training to implement it	Client demand (e.g. more salt)	End-user education is more important than changing our practices
Using scope of service contracts that don't charge by the ton/gallon	23	2	2	12	2	2	3	0
Monitoring pavement temperatures	21	2	2	7	3	5	1	1
Using liquid deicers	18	3	2	6	2	1	3	1
Pre-storm anti-icing (pre-wetting)	14	2	1	5	2	2	1	1
After-storm meetings	14	0	6	6	0	2	0	0
Winter maintenance certification of winter crew	7	0	3	3	0	1	0	0
Using application rate tables	6	0	1	0	1	4	0	0
Equipment calibration	4	0	0	3	0	1	0	0
Create/update a snow and ice policy	4	0	1	1	1	1	0	0
Improved mechanical removal of snow and ice before salt application	3	2	0	0	0	0	1	0
Protected and enclosed salt storage practices	2	0	0	0	0	1	1	0
Selection of appropriate deicers/abrasives for specific weather/situations	2	0	0	2	0	0	0	0
Documenting practices	2	0	1	0	0	1	0	0
Education of staff and customers on lower salt strategies	1	0	0	0	0	0	1	0

Source: Hennepin County Chloride Initiative Survey

Table 5: Have you attended the Minnesota Pollution Control Agency's winter maintenance training (Smart Salting) in the past five years?

Response	N	Percent
Yes, Level 2 Smart Salting (Organizational)	16	14.4
Yes, Level 1 Smart Salting Winter Roads (Individual)	25	22.5
Yes, Level 1 Smart Salting Parking Lots and Sidewalks (Individual)	42	37.8
Yes, Smart Salting Property Manager Certification (New)	12	10.8
No	16	14.4

Source: Hennepin County Chloride Initiative Survey

Table 6: Is the MPCA smart salting certification training a mandatory part of your company's winter training?

Response	N	Percent
Yes	33	47.8
No	36	52.2

Source: Hennepin County Chloride Initiative Survey

Table 7: Would you recommend the MPCA smart salting certification training to other applicators?

Response	N	Percent
Yes	68	98.6
No	1	1.4

Source: Hennepin County Chloride Initiative Survey

Table 8: Have you adopted any practices from the MPCA smart salting training?

Response	N	Percent
Yes	64	92.8
No	5	7.2

Source: Hennepin County Chloride Initiative Survey

Table 9: Have you heard of the MPCA's Smart Salting training?

Response	N	Percent
Yes	7	41.2
No	10	58.8

Source: Hennepin County Chloride Initiative Survey

Table 10: What are your reasons for not attending? (please check all that apply)

Response	N	Percent
Not interested	0	0.0
I don't have enough time	1	10.0
Trainings are held during busy times for my operation	3	30.0
No incentive for me to go	0	0.0
I don't feel the need to reduce my salt usage	0	0.0
My salt usage is determined by my clients	1	10.0
I already do everything I can to minimize salt usage	3	30.0
Other (please specify)	2	20.0

Source: Hennepin County Chloride Initiative Survey

Table 11: What would motivate you to attend the training? (please check all that apply)

Response	N	Percent
A financial incentive to attend	1	10.0
Long-term cost savings for my operation	2	20.0
Changes in liability laws	2	20.0
Keeping up with the competition	1	10.0
Personal concerns about the impacts of salt use	1	10.0
Requests from clients for salt reduction	0	0.0
Nothing; I have no interest in attending	1	10.0
Other (please specify)	2	20.0

Source: Hennepin County Chloride Initiative Survey

Table 12: Do you have any concerns about the amount of salt that you use in your own operation?

Response	N	Percent
Yes	24	28.9
No	59	71.1

Source: Hennepin County Chloride Initiative Survey

Table 13: Do you have any concerns about the amount of salt that you see being used by other operations?

Response	N	Percent
Yes	42	51.2
No	40	48.8

Source: Hennepin County Chloride Initiative Survey

Table 14: During landscaping season, do you see impacts from road salt on grass, trees, or other vegetation?

Response	N	Percent
Yes	60	76.0
No	19	24.0

Source: Hennepin County Chloride Initiative Survey

Table 15: A proposed bill at the Minnesota Capitol would limit the liability of the salt applicator when they are certified in the Minnesota Pollution Control Agency's Smart Salting training, and document their practices on properties. The goal of the bill is to decrease the potential for slip-and-fall lawsuits for private salt applicators who engage in salting best practices. If this law were to pass, how would it impact your operation? (please select all that apply)

Response	N	Percent
It wouldn't; I already use minimal or no salt	18	15.0
It would greatly impact my operation; my salt application is all based on liability	21	17.5
It would slightly impact my operation; it would protect me from clients who ask for more salt	35	29.2
I would attend the Smart Salting training	19	15.8
I would adopt more practices from the Smart Salting training	27	22.5

Source: Hennepin County Chloride Initiative Survey