

# Maryland Department of Transportation State Highway Administration

WSSC Salt Summit

**December 18, 2018**

# Agenda for Today

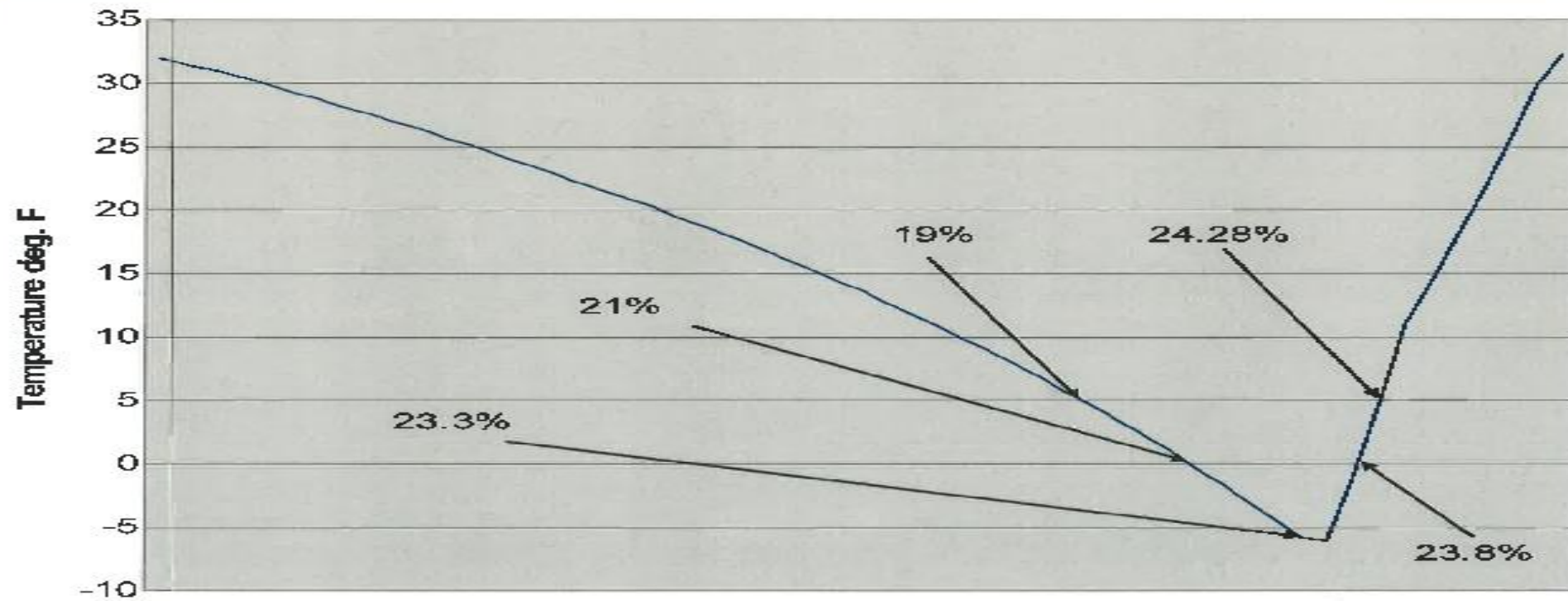
- Salt Statistics and Trends
- Salt Management Plan
- Resource Management Initiatives
- Salt Impacts on Infrastructure
- Pothole Expenditures vs Salt Expenditures
- DNR Monitoring Sites/MS 4 Permit
- Watershed Pilot Collaboration w/MDE
- Salt Usage Heat Map
- Minimizing our Impacts

MDOT SHA's Goal Last Season

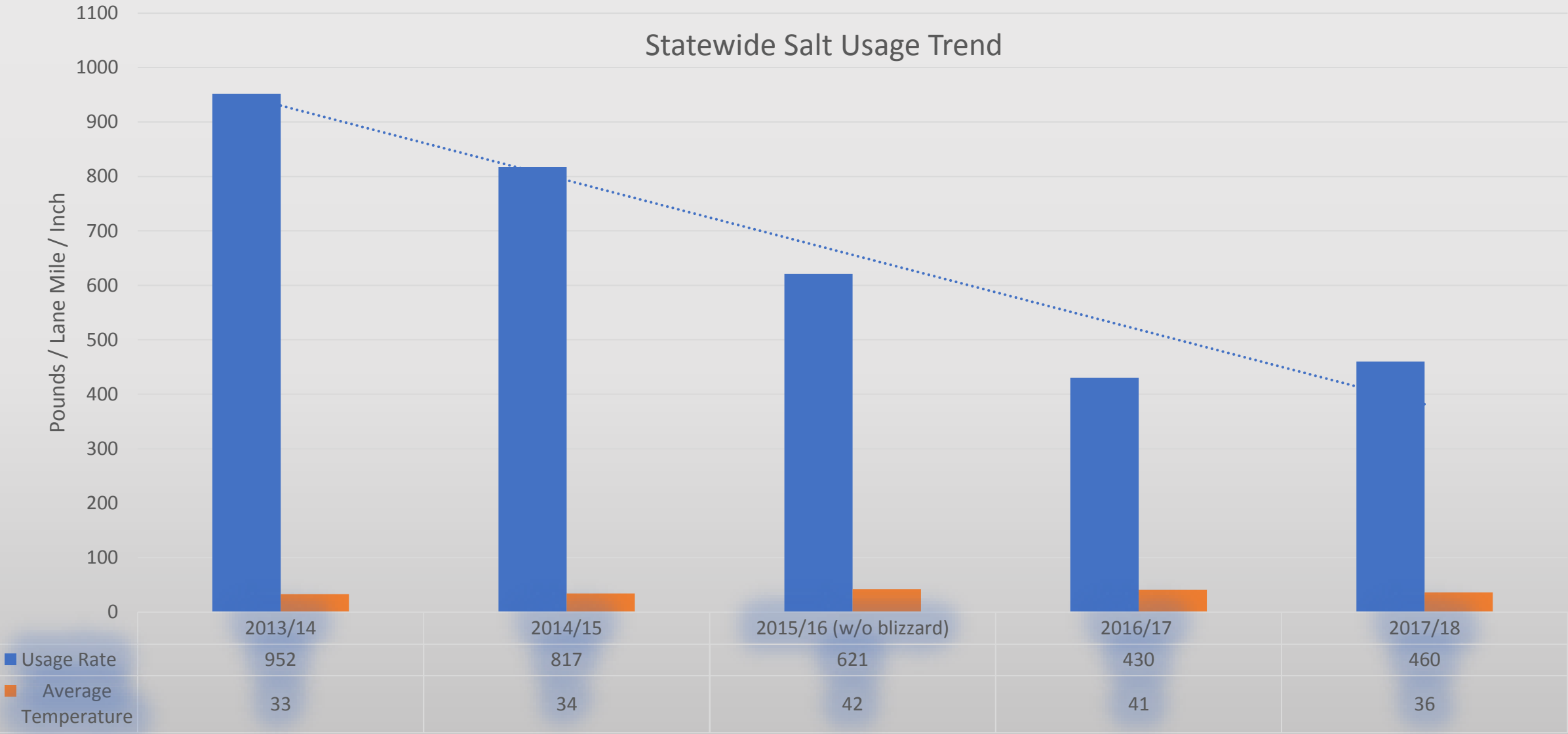
**“430”**

# Temperatures Effect on Salinity

## Why 23.3% Concentration?



Statewide Salt Usage Trend



# Salt Usage Statistics

Our organizational goal was for every shop to do their best and try to get below the usage rate of 430 pounds/ lane mile/inch

- Statewide - 9% increase in salt usage
- 14 shops – bested last seasons statewide average of 430 pounds/lane mile/inch (last season it was 25)

The top 3 performers were:

Princess Anne (252)

Leonardtown (255)

La Vale (266)

- 12 shops – reduced their usage rate when compared to the previous season (last season it was 19)
- 6 shops were greater than 20% and the top 3 performers were:

Laurel (-57 %)

Princess Anne (-35 %)

Denton (-34 %)

# Salt Management Plan

- A document that was created due to legislation passed in 2010
- Explains in detail MDOT SHA's best practices in regards to training, environmental impacts, equipment usage, storage/containment, and data analysis
- Has been updated as needed to reflect changes in trends and our environmental stewardship goals
- Available online and has 3 attached presentations used for training
- Link: <https://www.roads.maryland.gov/Index.aspx?PageId=352>

# Resource Management Initiatives

- Direct Liquid Application (DLA) Snow Routes
- Brine Storage/Automated Brine Makers
- Loader Scales
- Rubber Plow Blades w/Ceramic Inserts
- In House Training



# Direct Liquid Application (DLA) Snow Routes

What is a DLA snow route?

- A designated snow route that uses only a salt brine solution to prevent the snow and ice from bonding to the pavement
- This is done for the duration of an event

Why DLA snow routes?

- Out perform a granular salt application from a Level Of Service (LOS) perspective
- Average rate of 160 lbs. per lane mile per inch
- Costs about 14.8 cents per gallon to make

# Brine Tank Replacement



# Brine Tank Replacement

- MDOT SHA now has 1.5 million gallons of liquid storage (197 tanks)
  - FY 18 added 100,000 gallons by upsizing 23 tanks
  - FY 19 adding 80,000 gallons by upsizing 20 tanks
- FY 20 all deficient tanks replaced and no older than 5 years old
- Brine usage tripled this past winter season
  - 1.1 million in 2016/17
  - 3 million in 2017/18

# Automated Brine Makers



- 1 person operation
- Can be remotely controlled
- Blend on the fly

- 5 Brine Makers replaced in FY 19
- Fully automated
- 9000 gallons per hour
- Perfect salinity



# Loader Scales

- Capture the amount of salt being loaded for distribution onto roadways
- Allows for accurate control of receipt, storage, and re-supply
- Used in conjunction with AVL data for reporting in critically sensitive watersheds
- MDOT SHA has 26 scales in our inventory (116 loaders in our inventory)



# Rubber/Ceramic Plow Blades

- The rubber/ceramic blades are superior to a steel blade from both a performance and efficiency perspective
- Removes snow more efficiently which requires less salt needed to treat the road during plowing operations
- 3 of our facilities outfitted their entire fleet this past winter season with more changing over this winter
- Prolongs the life of you line striping and pavement markings

# Resource Management Training

- Snow College
  - Mandatory training for all maintenance staff on winter Operations
  - Discuss in depth all aspects of snow and ice control and environmental goals
- OOM Winter Town Meetings
  - Visit 28 maintenance facilities in the fall to present on salt management best practices
  - Informal training had a huge impact on our successes
- Hired Equipment Presentation
  - Used during the required pre-season meeting to discuss effective resource management
  - Re-written to include our environmental stewardship goals

# Impacts on Public Infrastructure





# Impact on Public Infrastructure

- Metal corrosion
  - Reinforced concrete supports, steel structural supports, bearings, joint devices
- Concrete degradation
  - Chloride ions penetrate concrete → cracking
- Road deterioration
  - Potholes

# Impact on Public Infrastructure

- Average of \$3,341
  - Cost of damage per ton of salt used
- \$3 Billion nationwide
  - Cost of salt-related damage nationwide
  - 15x the cost of the salt and application

# Human health: $\text{Cl}^-$ in Flint, contributor?? to Pb

Chloride concentrations 8 – 9x higher in Flint River

May contribute to pipe corrosion and thus higher Pb levels (lead) in water

Pipe corrosion a growing concern in Baltimore (more for maintenance cost rather than water quality)



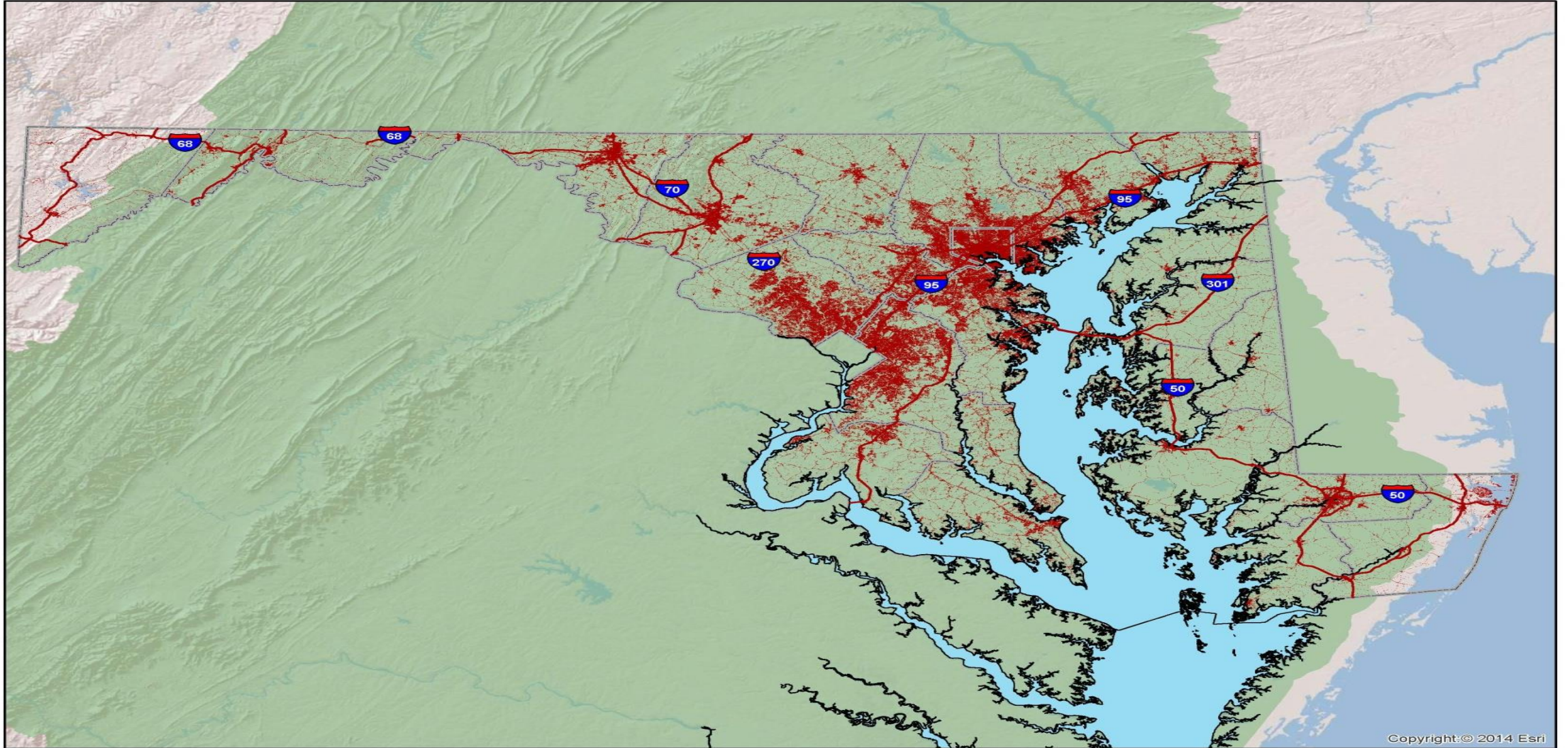
# Pothole Expenditures vs. Snow vs. Salt Usage

Fiscal Year	Expenditures	Usage Rate	Accumulation
• FY 2015	\$4.4 million	817	48"
• FY 2018	\$3.1 million	460	47"

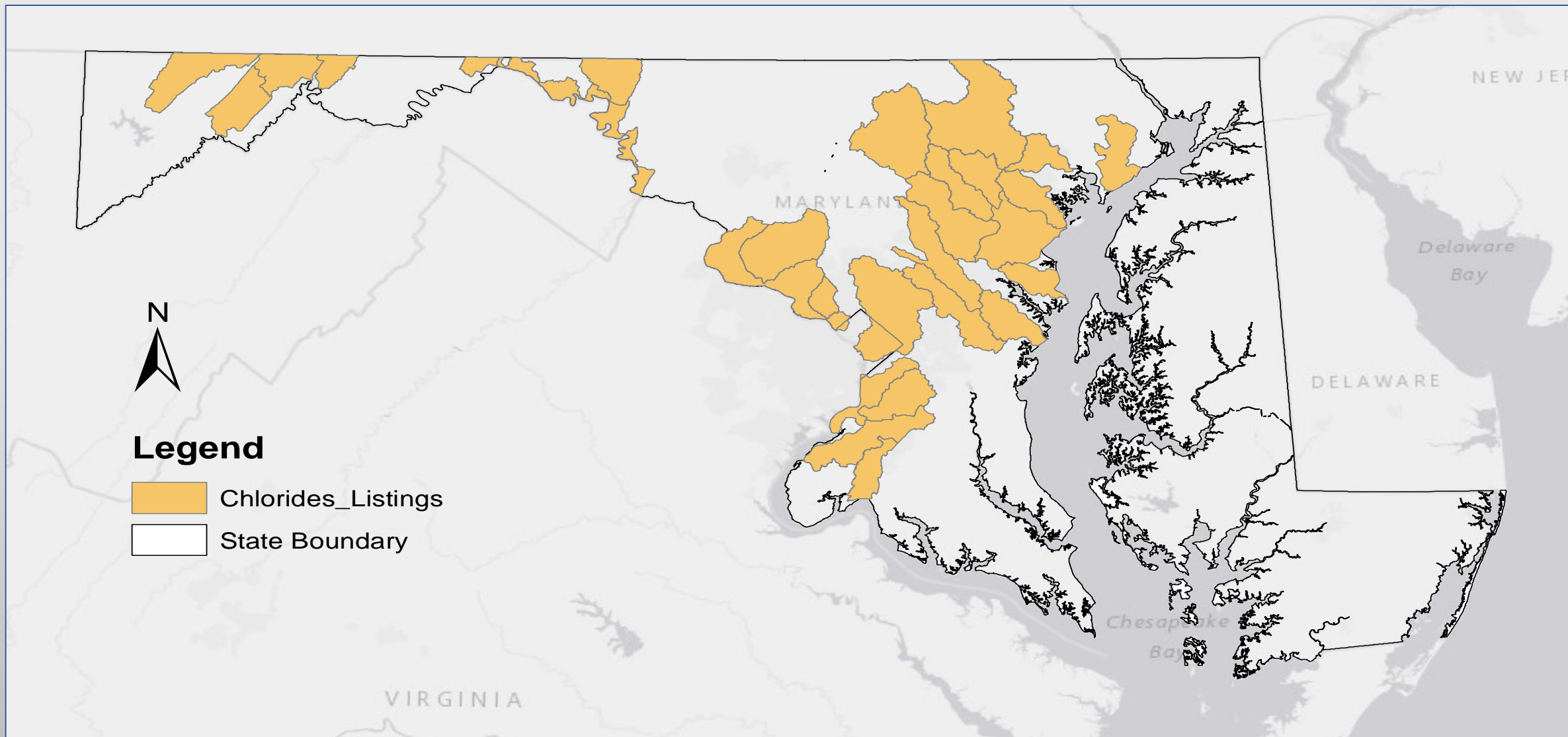
- Two very similar winters with different usage rates
- Salt usage was cut 43 % and the expenditures were cut by 31 %
- One of the many factors but every little bit helps
- Less money on winter = More money on paving



# Maryland's Impervious Areas

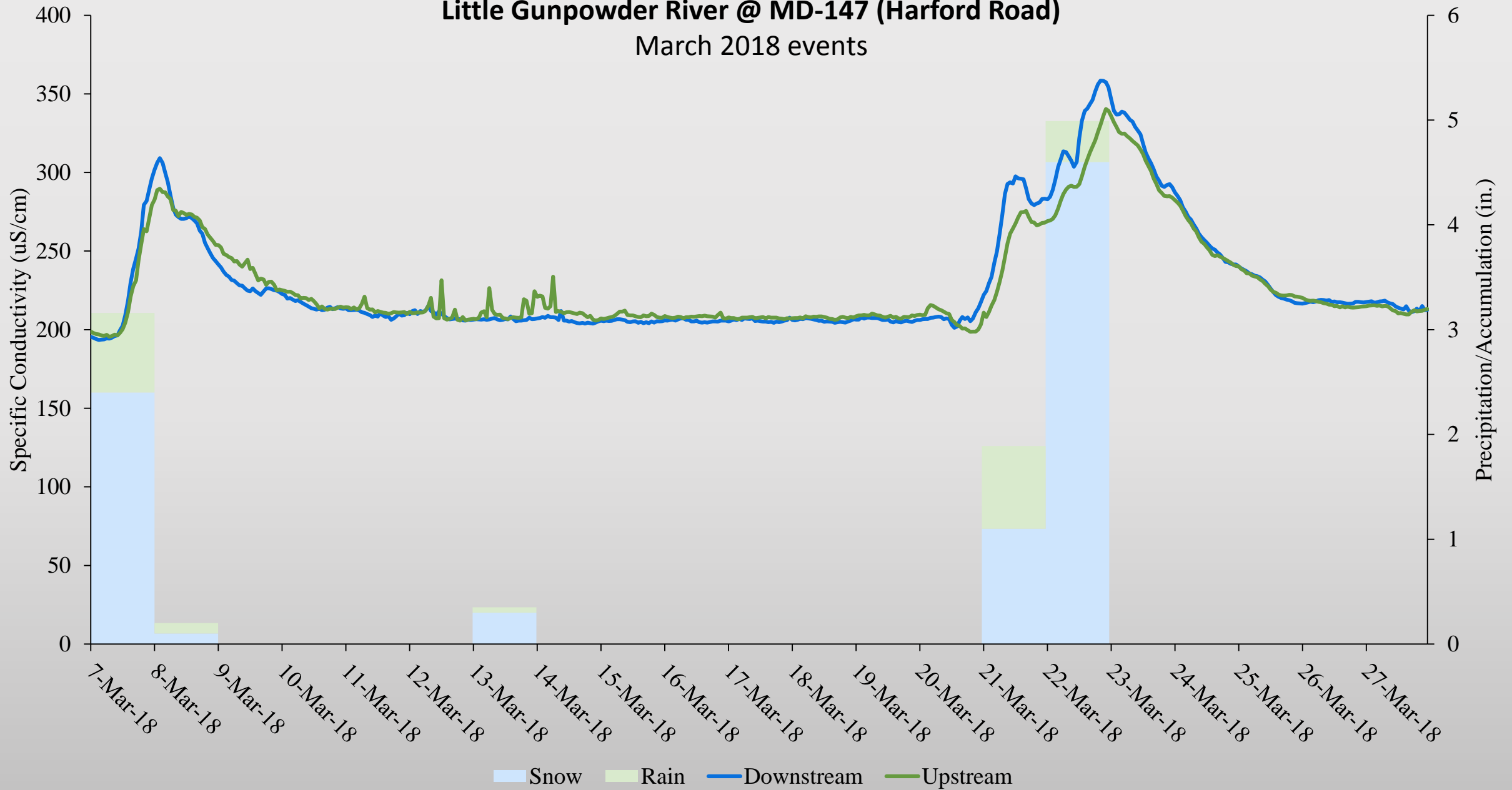


# 28 Watersheds Impaired by Chlorides



# Little Gunpowder River @ MD-147 (Harford Road)

## March 2018 events





# MS4 Permit

- What does MS4 mean?
- Municipal Separate Storm Sewer System
- This is a permit requiring the implementation of a storm water management program for minimizing impact from runoff
- 11 counties currently have a permit
- Updated every 5 years



# Proposed Phase II MS4 Permit

New Permits will build on lessons learned from previous permit requirements for salt management:

- County Salt Management Plan (3<sup>rd</sup> year of permit)
- Equipment Replacement Schedule
- Annual Salt Management Training - staff and contractors; property managers and homeowner training
- Tracking & Reporting (4<sup>th</sup> year)
  - Amount and location of deicing materials applied per snowfall event
  - Total amount per event; annual total per lane mile per inch of snowfall

# What's Next for the State?

## NPDES MS4 Permit

- Finalize the next generation permit with no chloride TMDL's
- **Expand SHA efforts to 10 local MS4 counties on salt management**
- Continue to monitor the MS4 efforts and identify and expand upon what works

## Strengthen partnerships

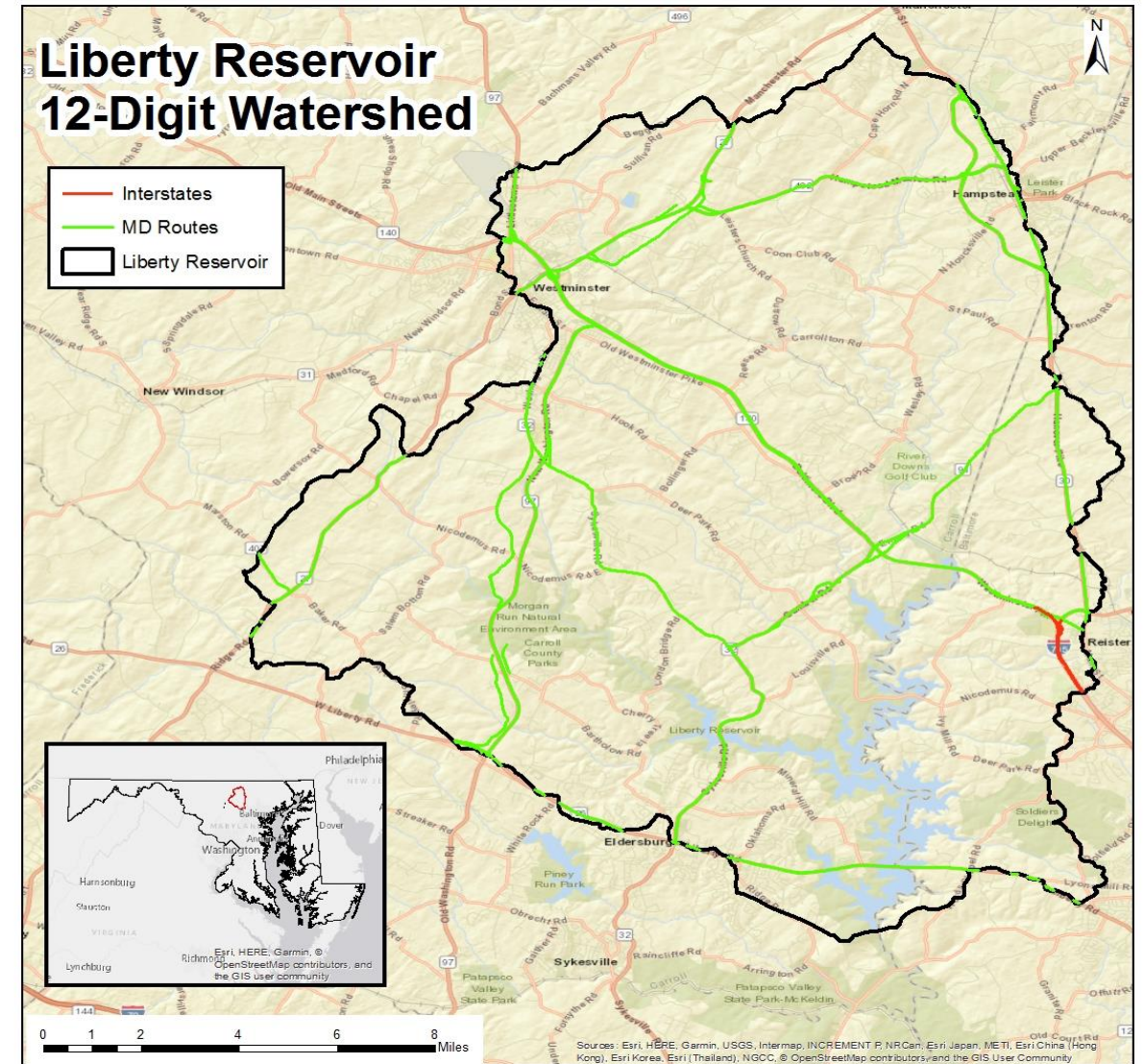
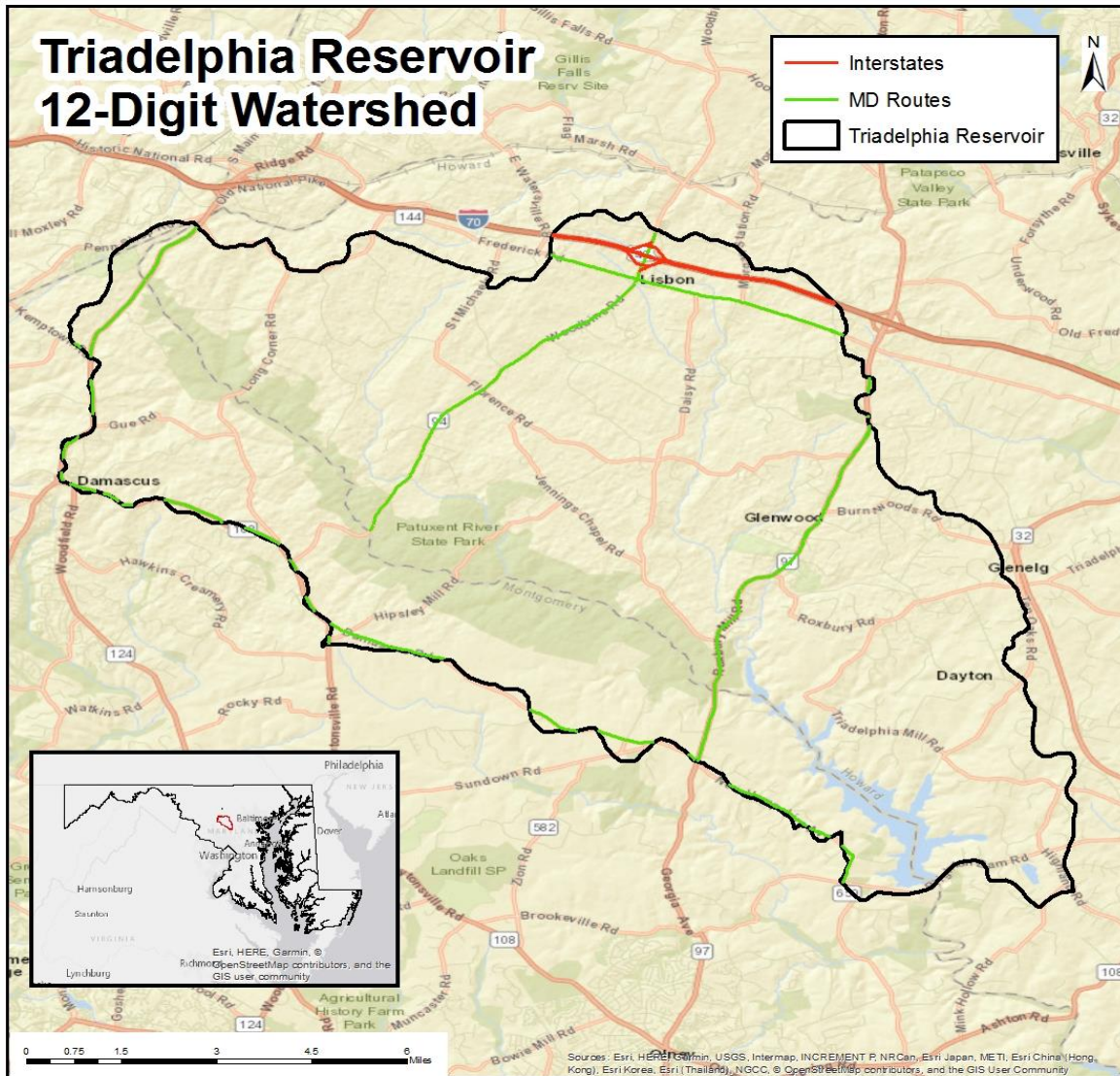
- Work with partners to create guidance and outreach material for:
  - Highway, Public Works and Road Maintenance
  - Commercial application
  - Individual citizen application

Research additional technologies that can help to reduce applications on paved surfaces

# MDE Watershed Pilot

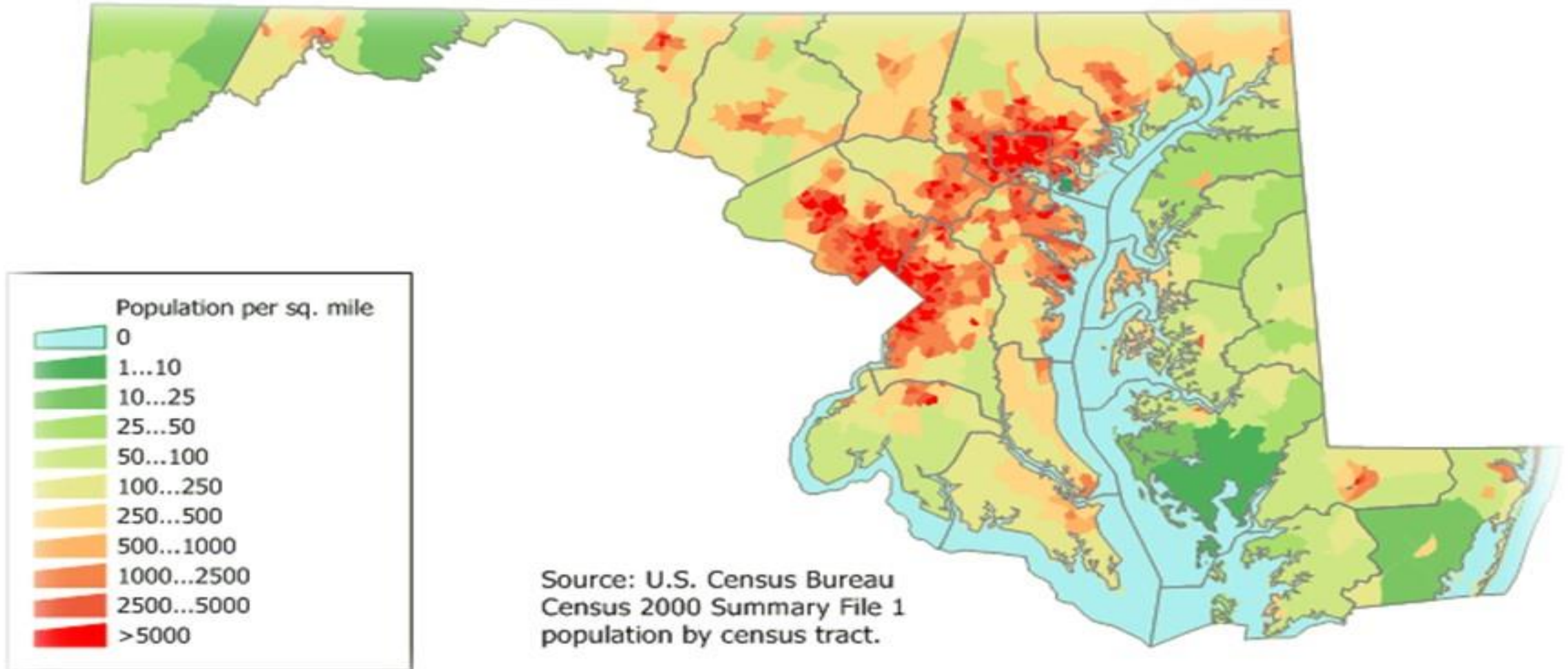
- Inter Agency Collaboration between MDE and MDOT SHA
- Effort to better capture amounts of salt used in a specific watershed
- Still in development phase and should be deployed this season at five facilities

# MDE Watershed Pilot

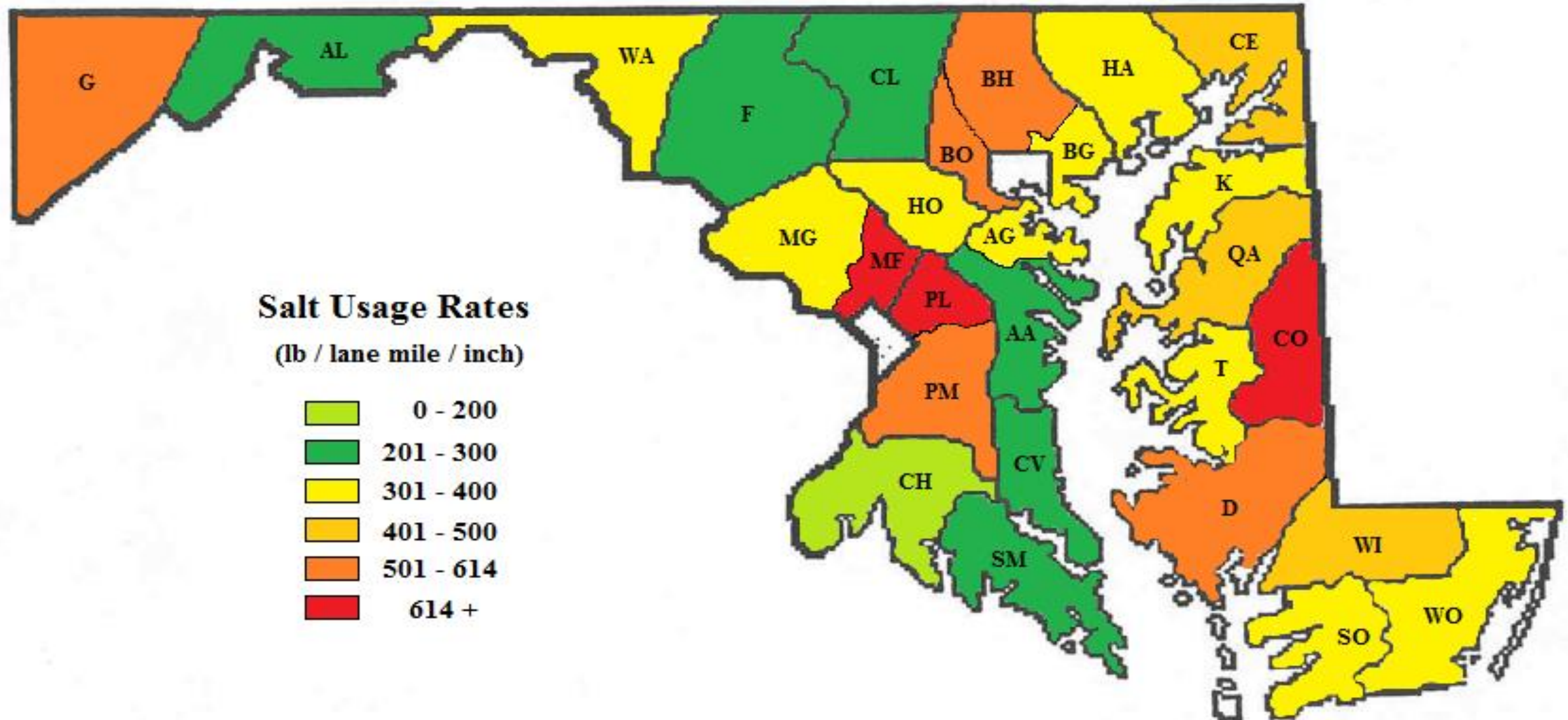




# Heat Map for Population Density

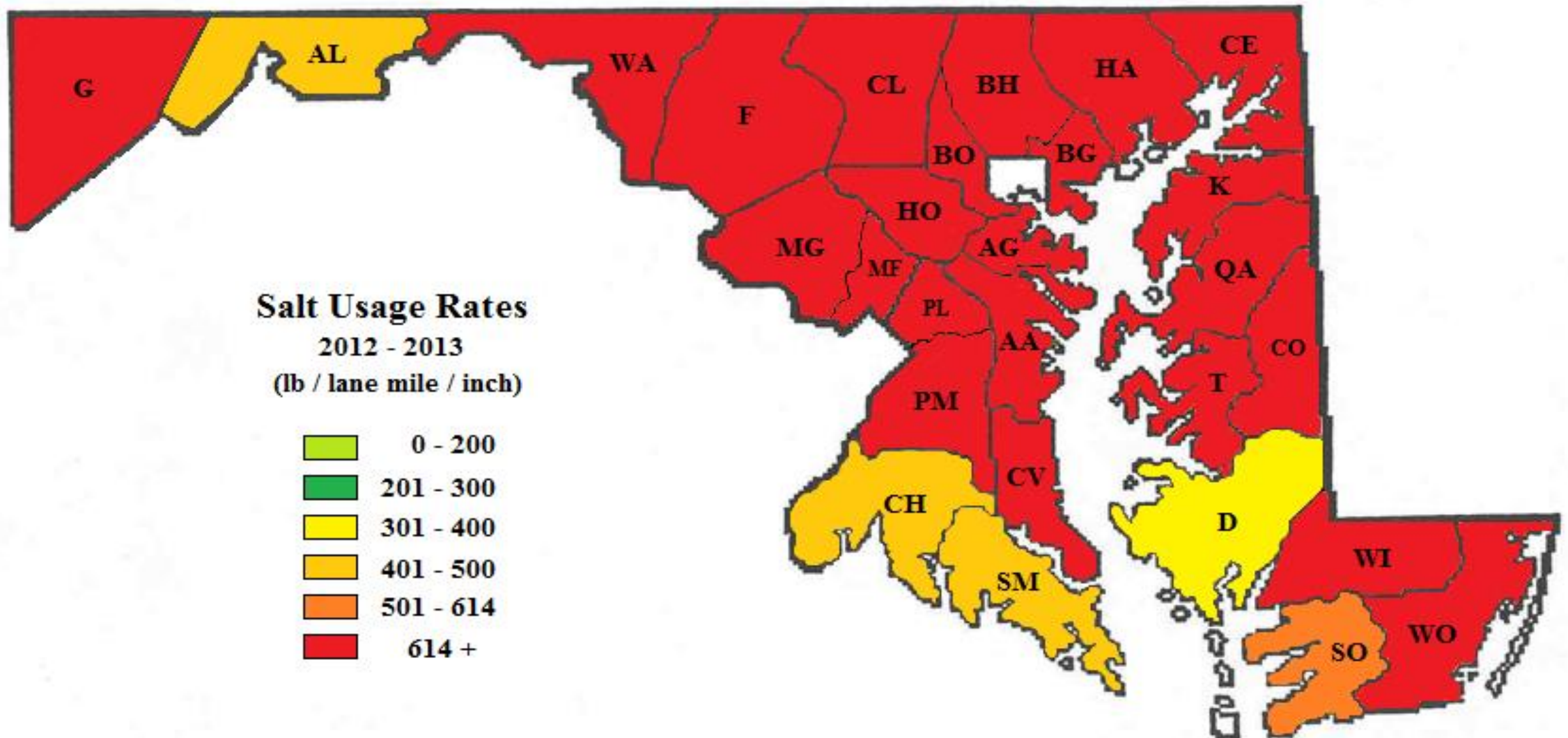


# Heat Map of Usage Rates 16/17





# Heat Map of Usage Rates 12/13



New Target

**“400”**



# Minimizing Our Impacts

- Establish a clear understanding of our LOS measurement and temper the expectations of our customers
- Expand on the success of our DLA snow routes
- Accurate measure, use, and storage of our resources
- Pay attention to the forecast not only from the beginning but during the storm to pick the right application timing
- Proper calibration of **ALL** equipment (owned and contracted)
- A COMMON SENSE approach to the specific scenario that each winter event presents

The image features a motivational quote in white, bold, uppercase letters against a blurred background of a person running. The text is arranged in four lines, with the first three lines being larger and the fourth line in parentheses and slightly smaller.

LIFE WITHOUT GOALS IS  
LIKE A RACE WITHOUT A  
FINISH LINE  
(YOU'RE RUNNING NO WHERE)

The point of life is not to merely exist, but the want to thrive

The point of life is not to simply live, but to feel much alive

The point of life is not to barely glow, but to brightly shine

The point of life is not to hardly grow, but to grow like a vine

Author - S.K.S.