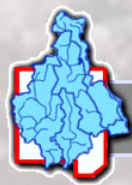


# Impacts of Chlorides on Aquatic Systems

Deanna Doohaluk & Stephen McCracken  
The Conservation Foundation/DuPage River Salt Creek Workgroup



DuPage River Salt Creek Workgroup



Lower DuPage River  
Watershed Coalition



# What and Why Chlorides?

- Chlorides is a group of compounds that contain chlorine
- Chloride levels are increasing in surface and ground water across Northeastern Illinois
- The major cause chloride violations in Northeastern Illinois are **road salt** and to a lesser extent, water softeners

**Chlorides = Salt**



# How did we get here?

- Bare pavement policies have been adopted by many communities
- The crunching sound of salt is equated with safe sidewalks
- People expect to be able to drive as normal in a snow storm
- Politicians are voted out of office based on how storms are handled
- Lack of knowledge of the impacts of salt

**More Salt**



**More Safe**



# SAFETY FIRST!

- Road salt is necessary to maintain safer road and pavement conditions during the winter
- There are many well accepted best management practices (BMPs) that communities can adopt that reduce the amount of salt used, while still maintaining levels of safety
- These BMPs are good for safety, infrastructure, budgets, the environment and even our pets





Infrastructure



J. Hammer

Vehicles



Wastewater Treatment Plant Upgrades



Daily Herald

# The True Cost of Salt

Environment



J. Hammer

Vegetation



Shreiner Tree Care

JAHG 2009

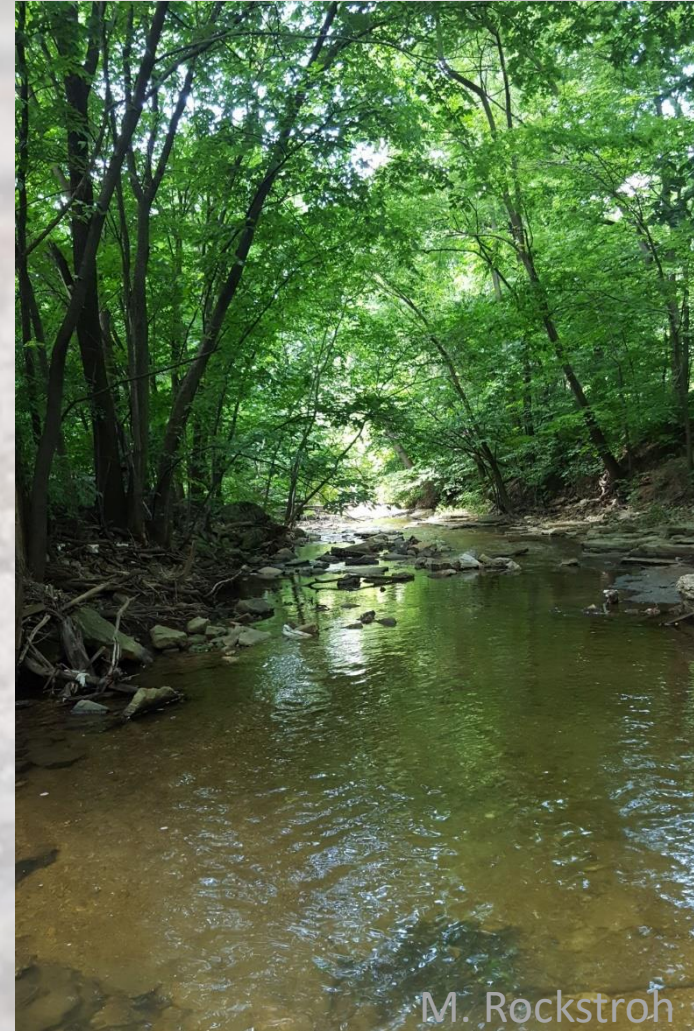
Pets





# Impacts of Chloride: Aquatic Systems

- Chloride impacts on fish, macroinvertebrates, amphibians, and insects
  - Interferes with reproduction cycles
  - Toxic to eggs and juvenile stages
  - Reduces species diversity
- Chlorides can also release toxic metals from sediment





# Impacts of Chlorides: Infrastructure

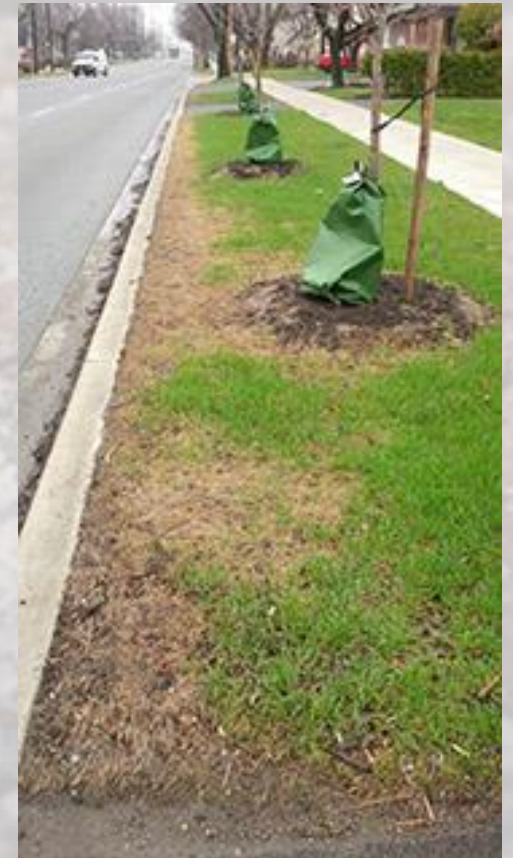
- Chloride is corrosive to infrastructure such as concrete roads, sidewalks and bridges, as well as to the steel in our vehicles and around local business entryways





# Impacts of Chlorides: Vegetation and Soil

- Chloride damages landscaping, from “salt burn” on foliage to increasing soil pH
- Chlorides reduce soil permeability and soil health





# Impacts of Chlorides: Pets

- Chloride can:
  - burn our pet's feet
  - dry and crack the pads
  - cause illness when licked off and ingested



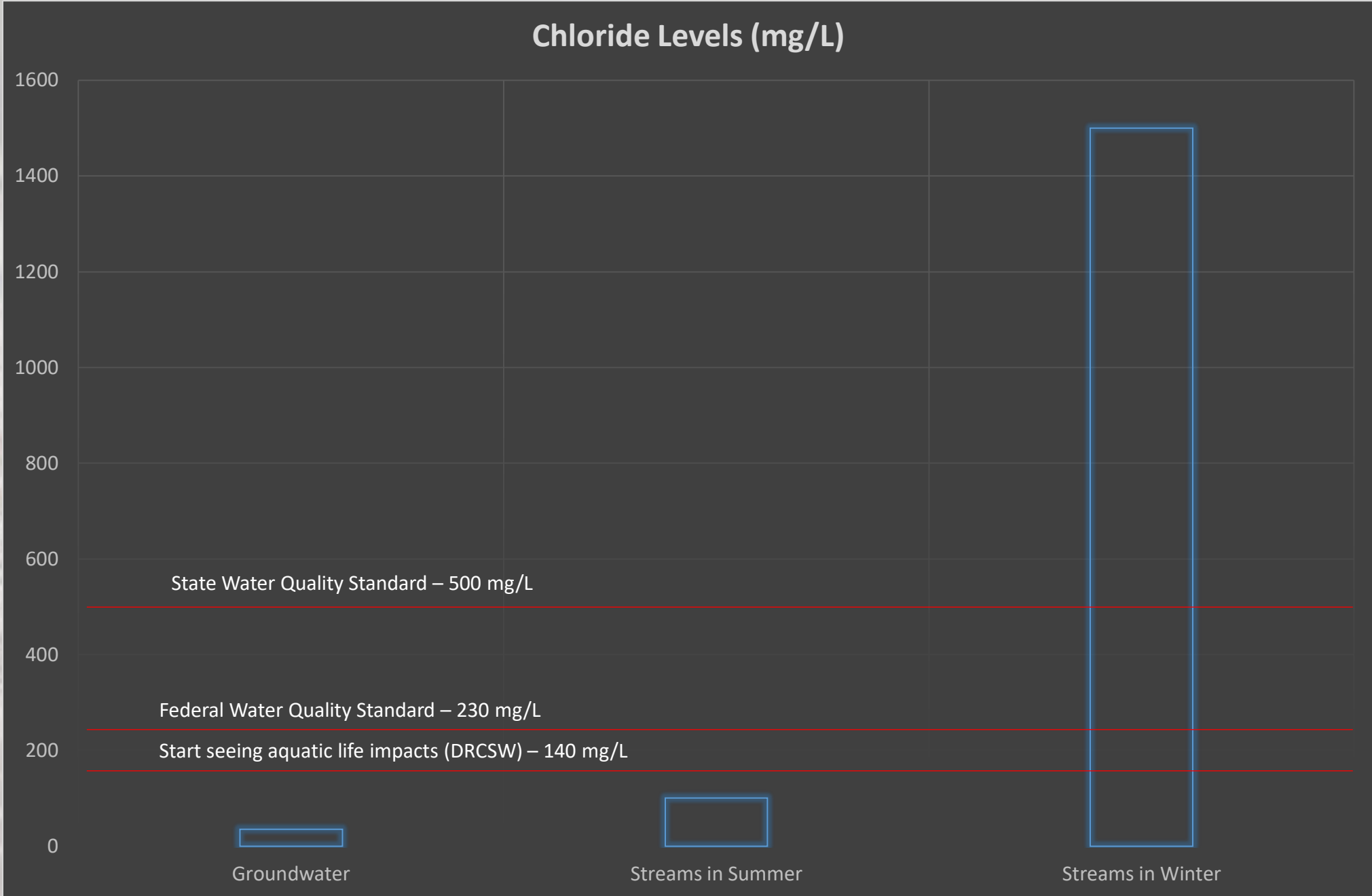


# Additional Costs of Chlorides

- Poor aquatic life scores dictate more stringent (and thus expensive) stormwater and wastewater regulations
- Once chloride is in the water it is very hard and expensive to remove
  - Reverse osmosis
  - Chemical separation
  - Distillation
- Easier & Cheaper to Reduce than Remove







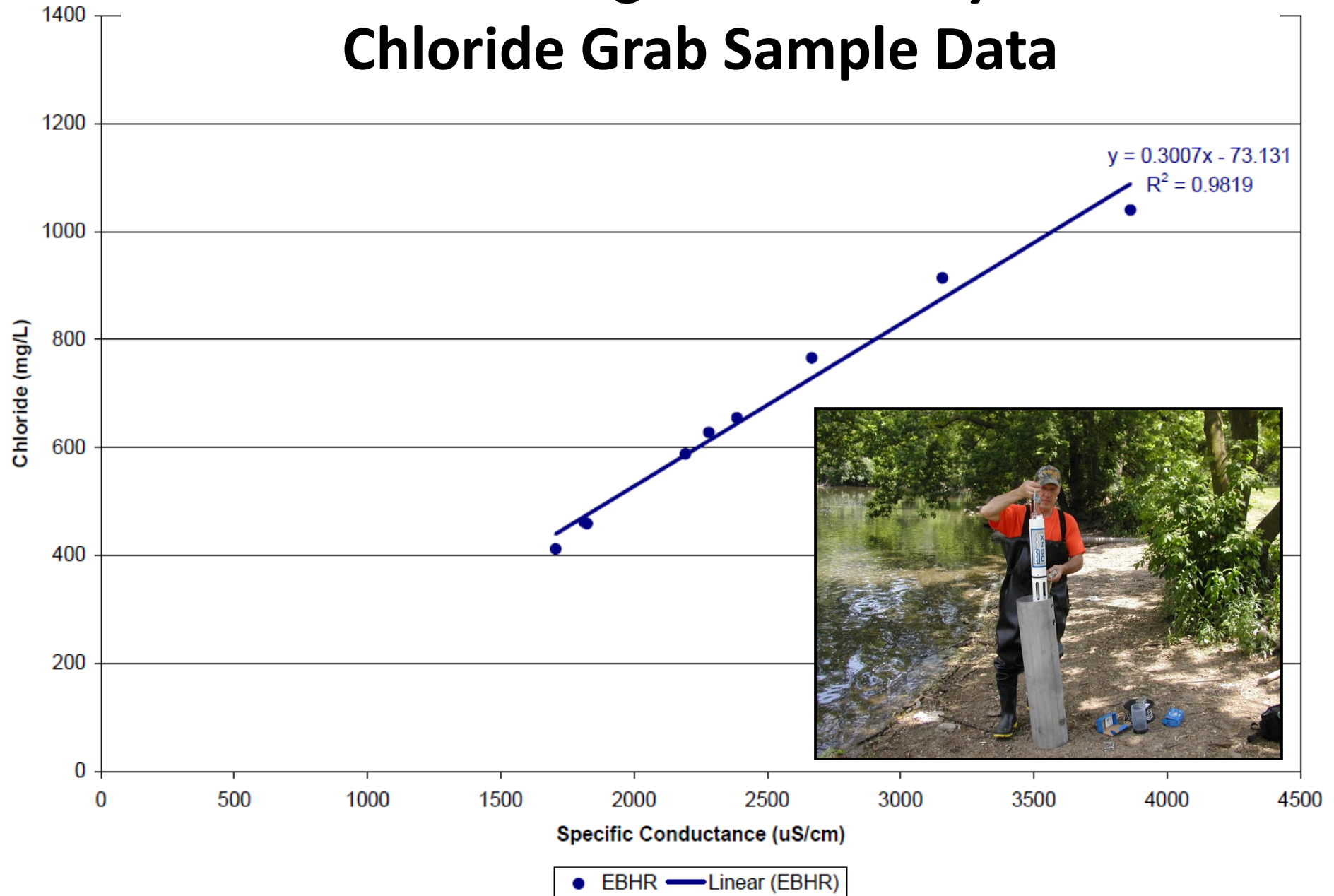


# Questions Posed on Chlorides

- Trends show increased concentrations in NE Illinois ?
- Transportation surfaces the principle driver ?

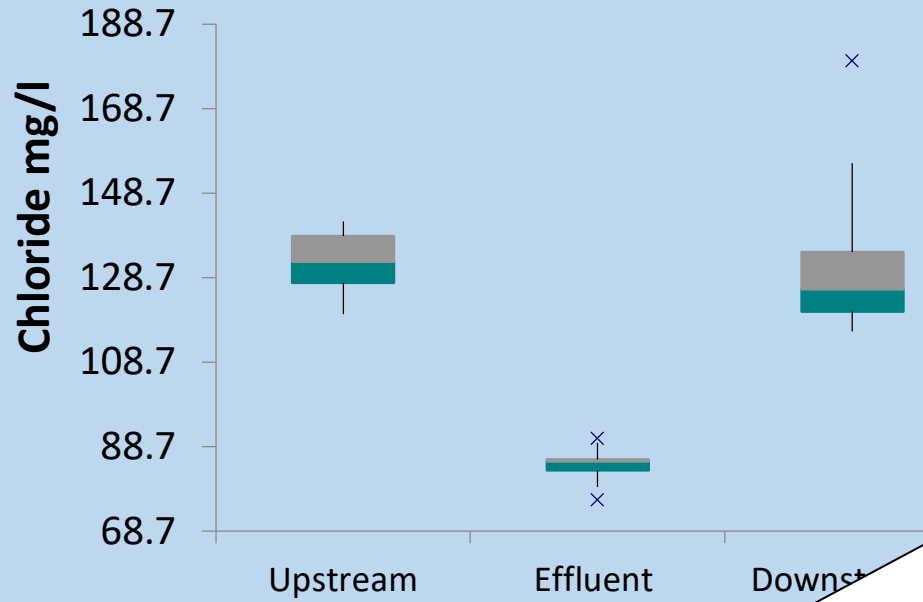


# Correlating Conductivity & Chloride Grab Sample Data

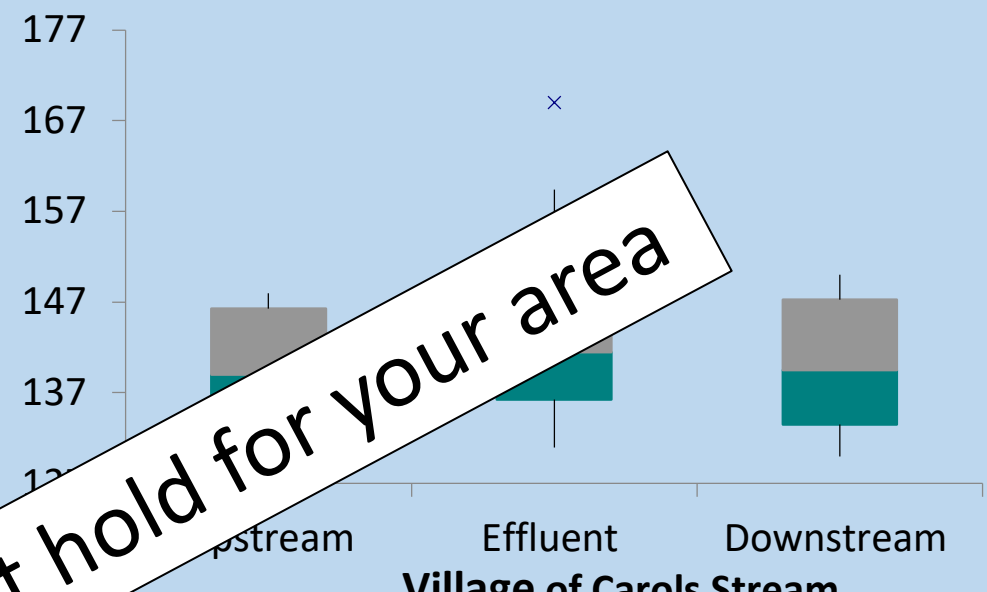




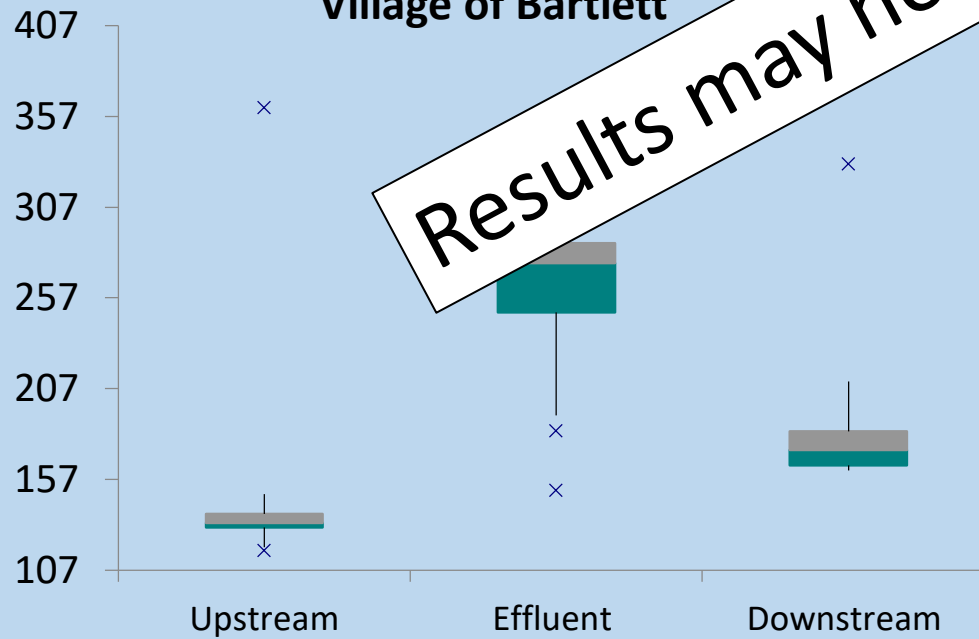
Village of Roselle



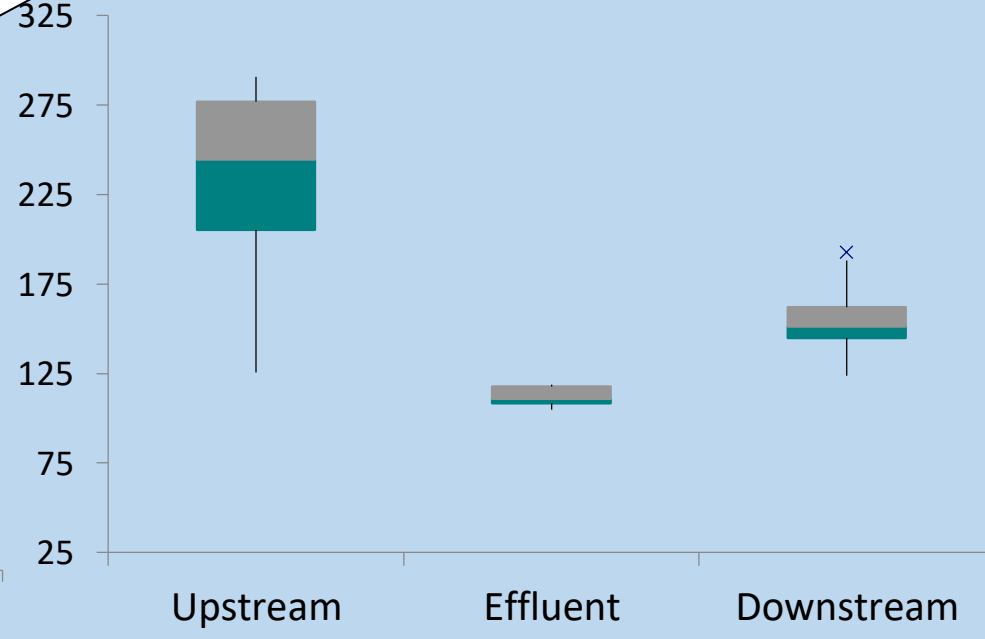
Village of Hanover Park



Village of Bartlett



Village of Carols Stream

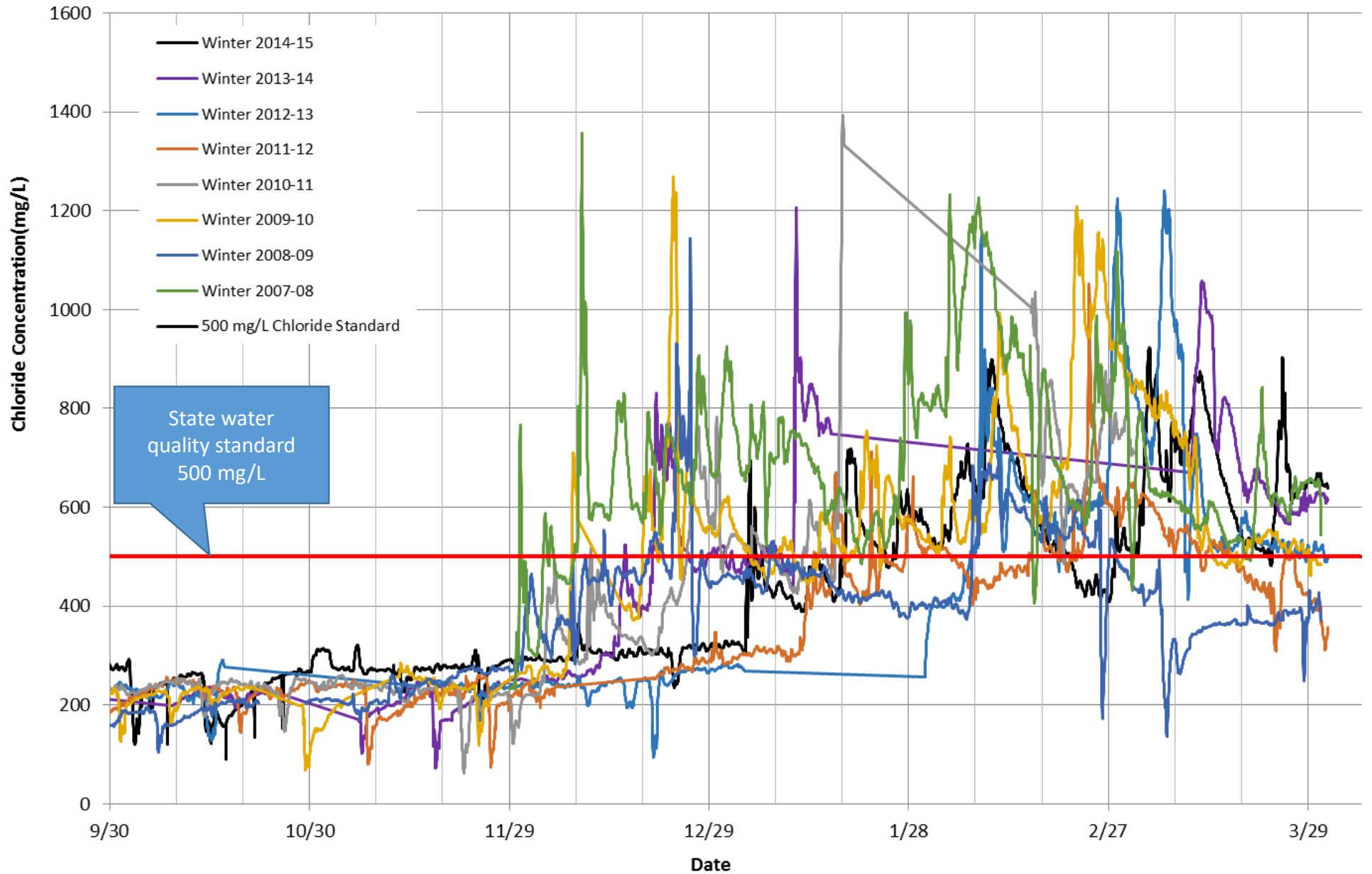


Results may not hold for your area

Chloride Concentrations in selected POTW's effluent 2012

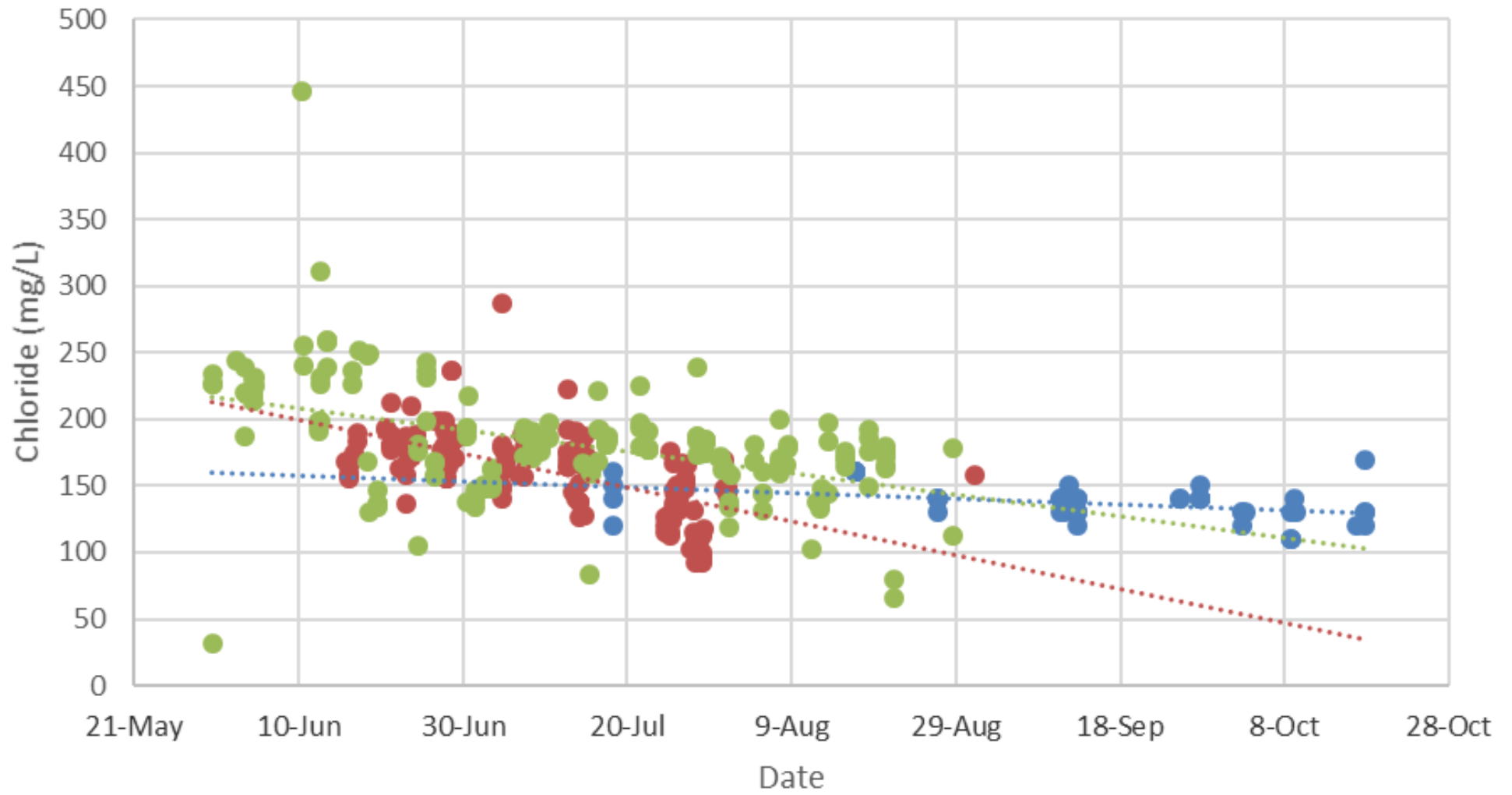


# SCWR Estimated Chloride Concentration Winter 2007-2014 Comparison





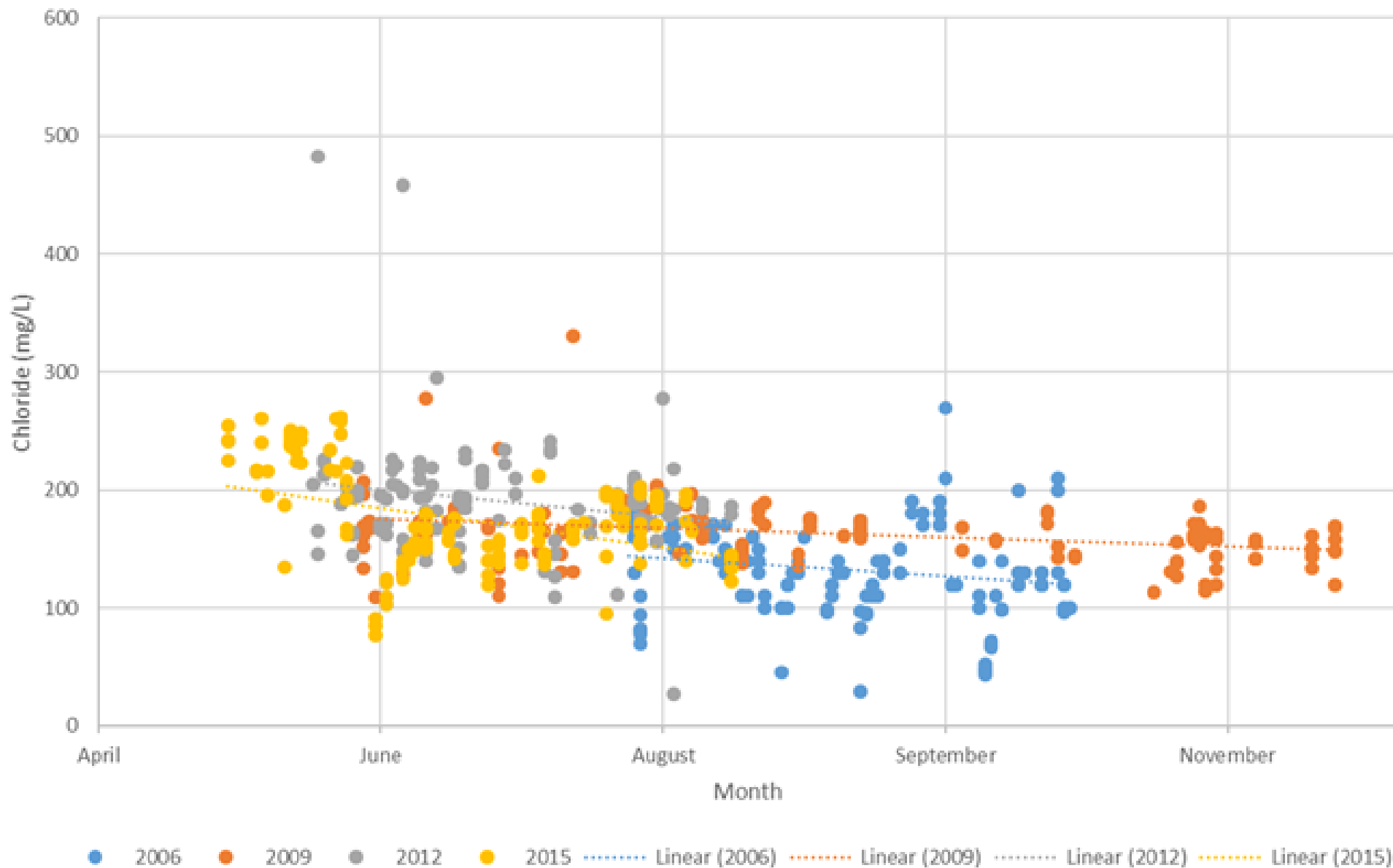
## E Branch DuPage River Chloride Concentrations in the Summer Months



● 2007 ● 2011 ● 2014 ..... Linear (2007) ..... Linear (2011) ..... Linear (2014)



# West Branch Dupage River Chloride Concentration in the Summer Months

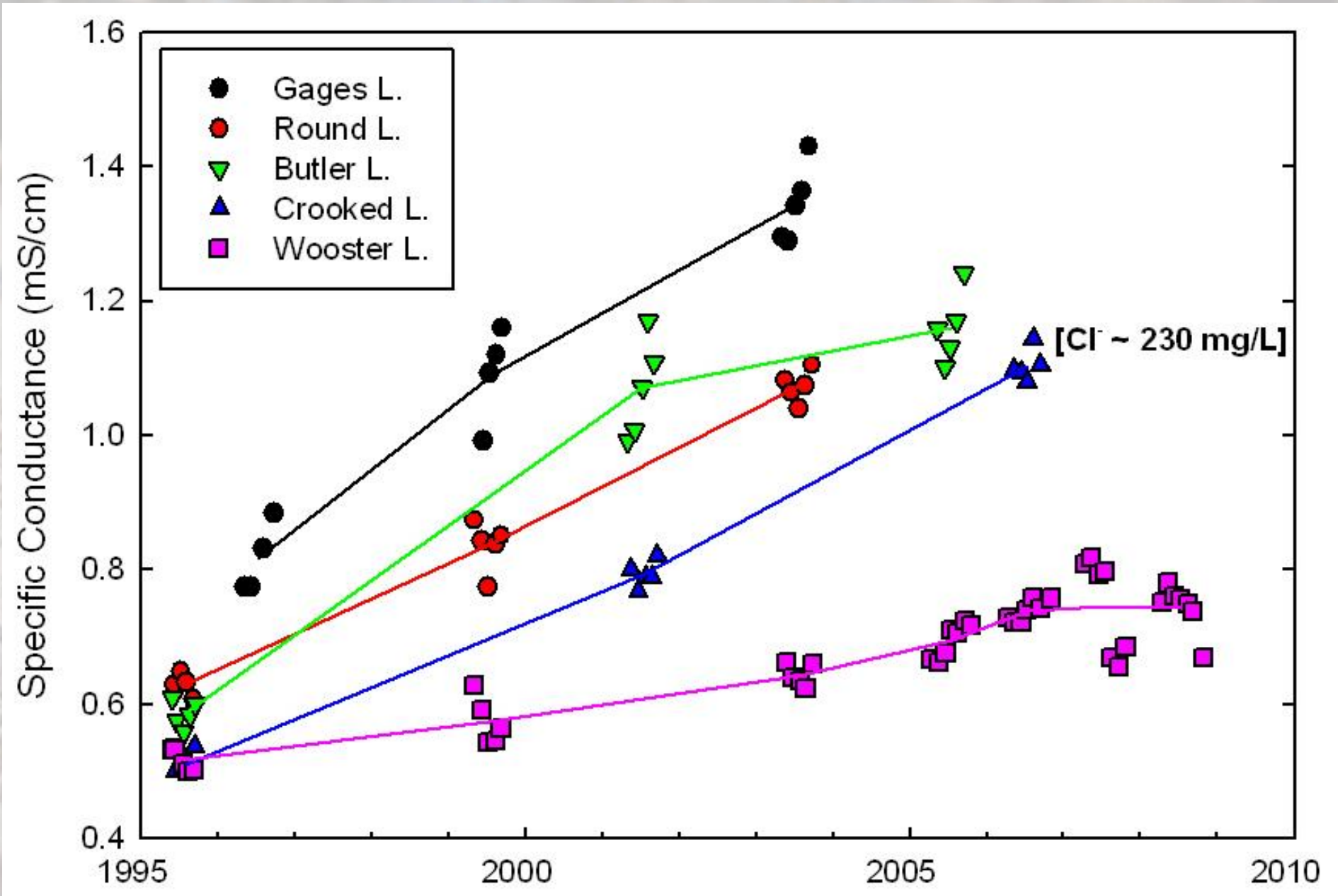






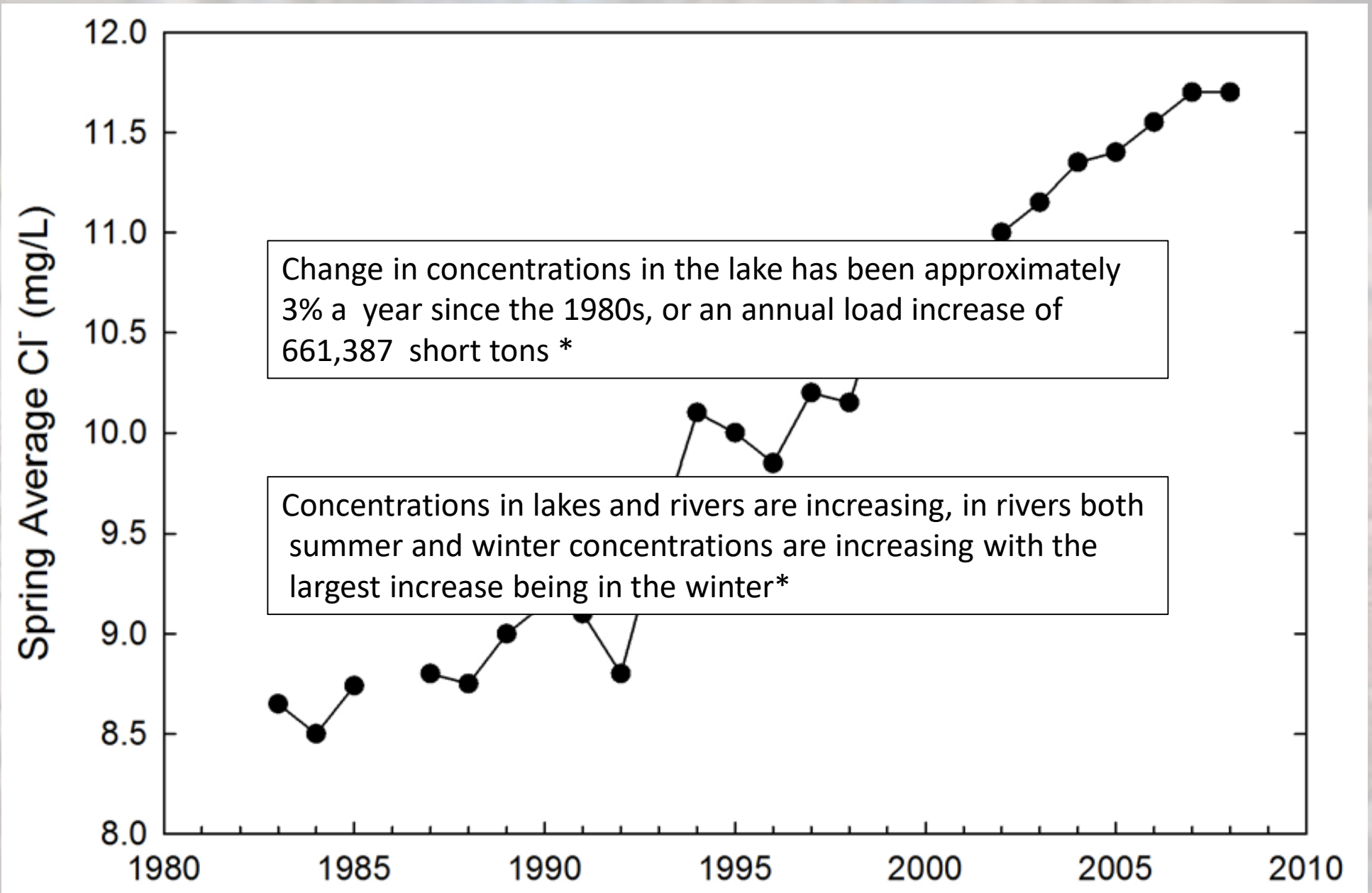


# Inland Lakes in Lake County



Data courtesy M. Adam, Lake Co. PHD

# Chloride concentrations in Lake Michigan ( USEPA, 2011.)

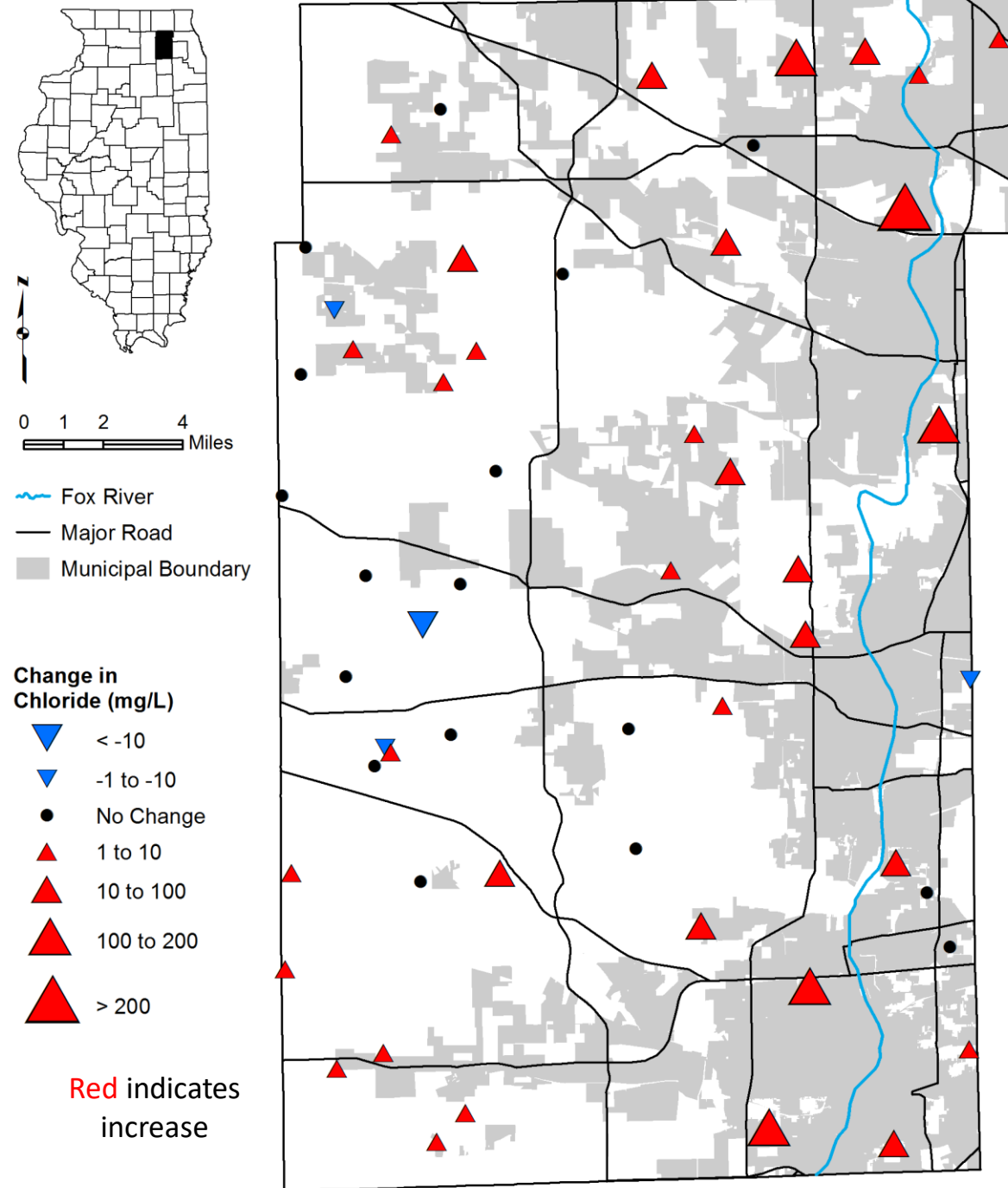




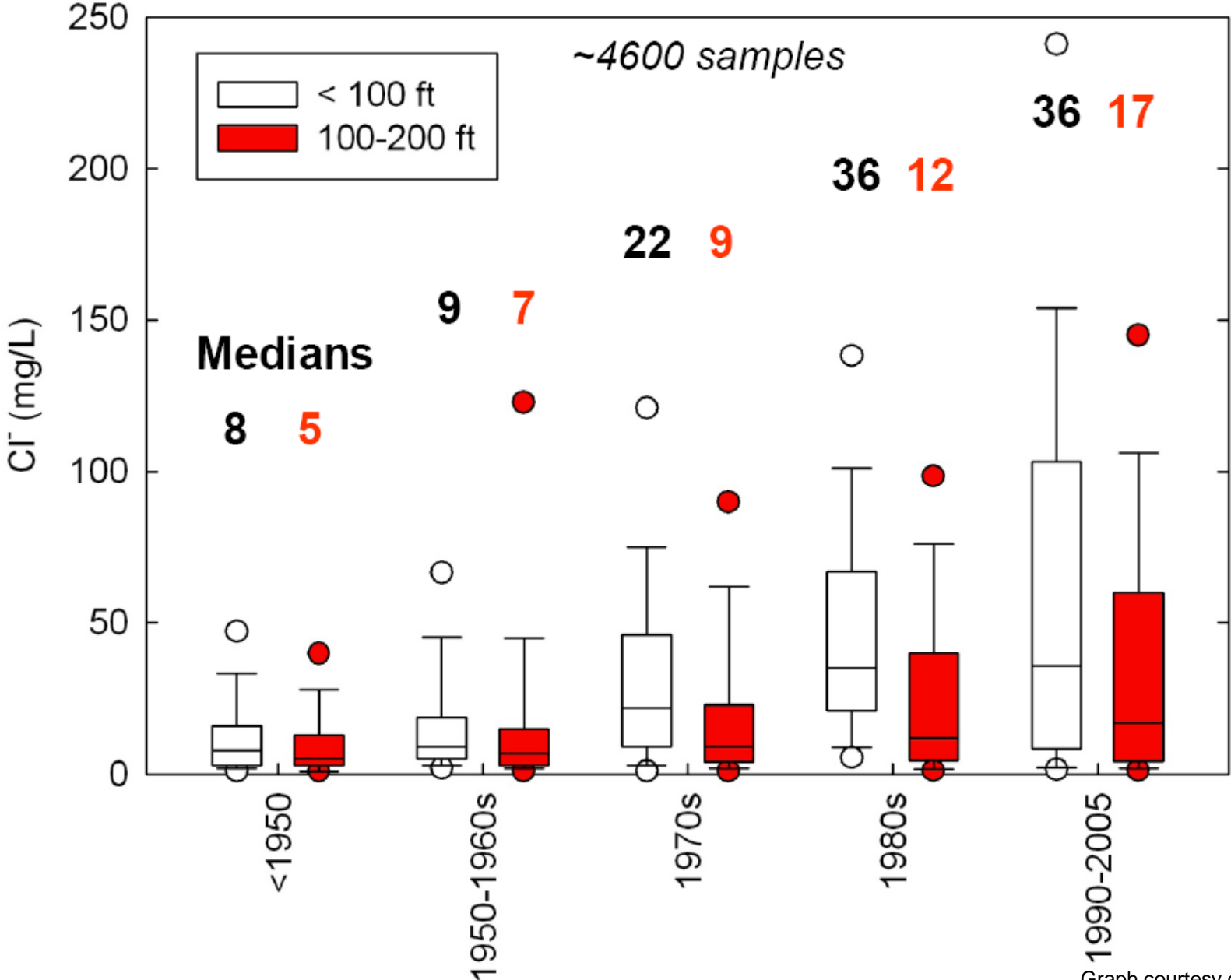
# Change in chloride groundwater concentrations : 2003 - 2015

- 5 wells increased more than 100 mg/L
- Average chloride increase in East wells was 46.3 mg/L
  - about 4 mg/L per year

Slide from Daniel Abrams, Illinois State Water Survey, Referencing study by Kelly et al. 2015



# Chloride levels in drinking water wells < 200 feet from road in NE Illinois



Graph courtesy of Walt Kelly



# So what can be done ?

## - Contract services

- Model Contract for snow and ice management services
- Facilities Planning
- Model Storage Ordinance

## - Practices

- Calculate area of surface to treated
- Mechanical removal first
- Use surface Temperature, not air temperature
- Facilities Planning



# PARKING LOT DEICING

## SALT APPLICATION RATE GUIDANCE



DuPage River Salt Creek Workgroup

## DuPage River – Salt Creek Watersheds

Effective salt application rates will be different at different pavement temperatures. Pavement temperature sensing is considered best management practice and essential for best estimating salt application rates. Pavement temperature sensors have become very affordable and readily available from deicing equipment suppliers, including very simple to use hand-held sensors.

Per other deicing guidance (*Winter Parking Lot and Sidewalk Maintenance Manual, Fortin Consultants*), the practice of pre-wetting or pre-treating salt can reduce the application rate for solid salt up to one-third of the normal application rates. The practice of pre-wetting salt involves adding a liquid to the salt as it comes off of the truck. The practice of pre-treating salt involves adding a liquid to the salt stockpile before spreading occurs.

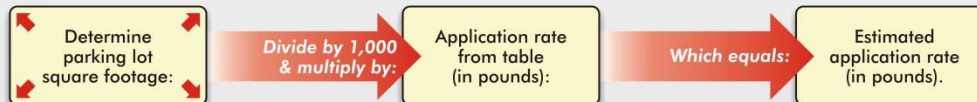
The table to the right provides application rates suggested for a range of pavement temperatures.

| PARKING LOT SPREADING TABLE |                              |
|-----------------------------|------------------------------|
| Pavement Temperature Range  | Pounds per 1,000 Square Feet |
| >30° F                      | 3                            |
| 25°- 30° F                  | 5                            |
| 20°- 25° F                  | 6                            |
| 15°- 20° F                  | 7                            |
| 5°- 15° F                   | 8                            |

The application rates contained within this guidance have been developed by combining the experience of deicing program managers and information contained within numerous deicing program reference documents. Your own experience and trials with the application rates suggested in this guidance will produce the optimal results.

### SPREADING CALCULATION TEMPLATE

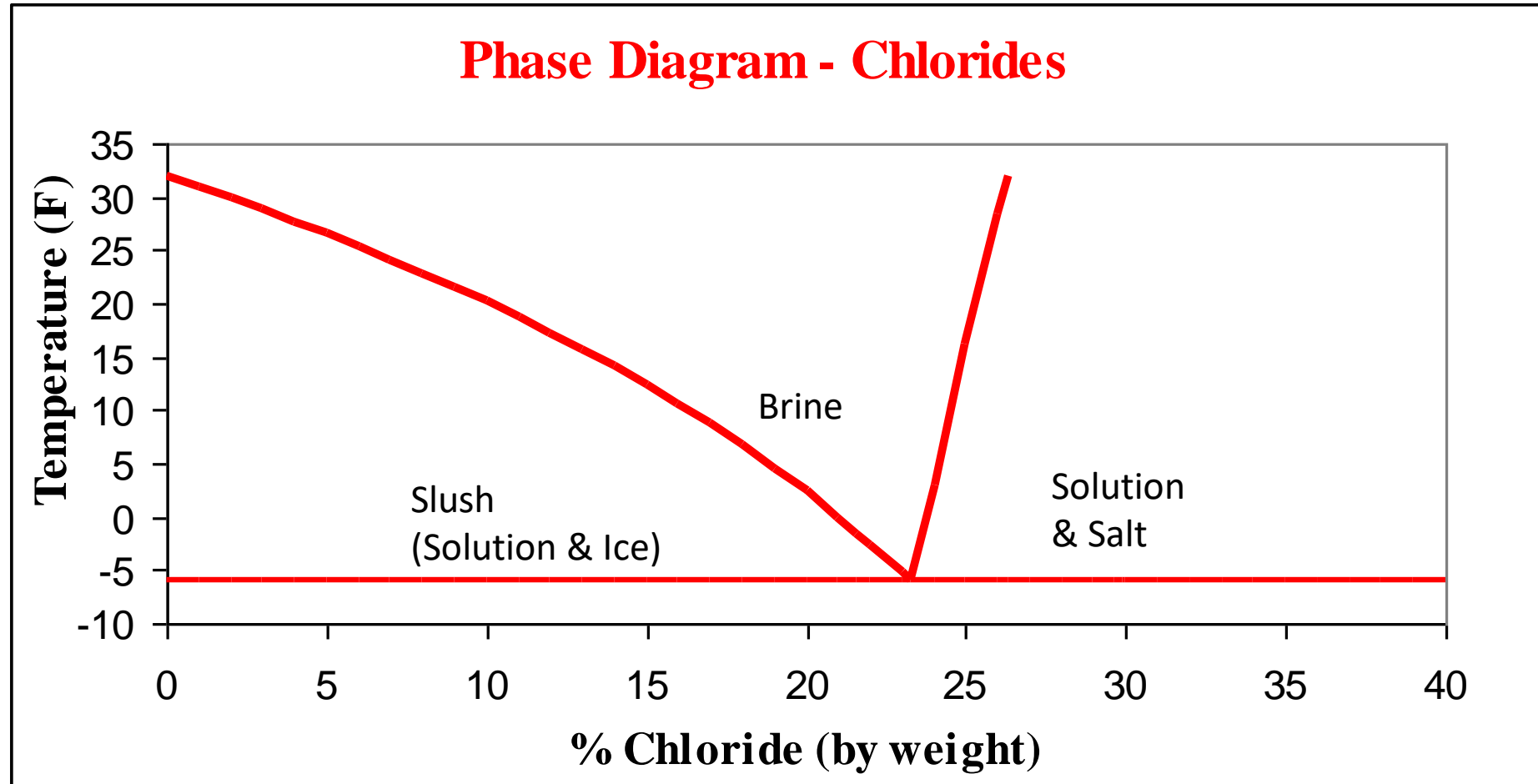
Use this template to estimate the amount of salt needed for your parking lot.





# Ice Control Chemicals

How ice control chemicals work

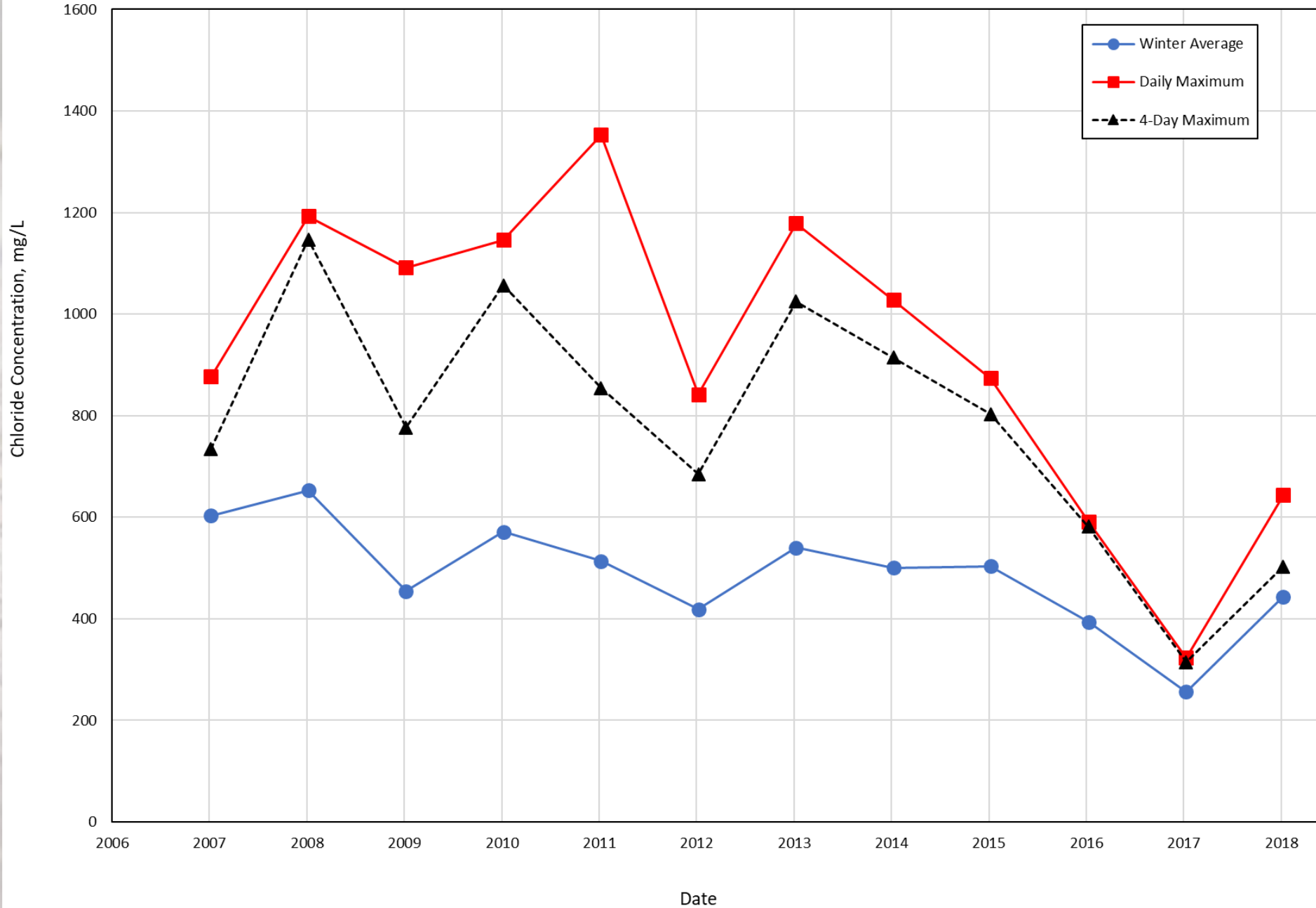


# Results

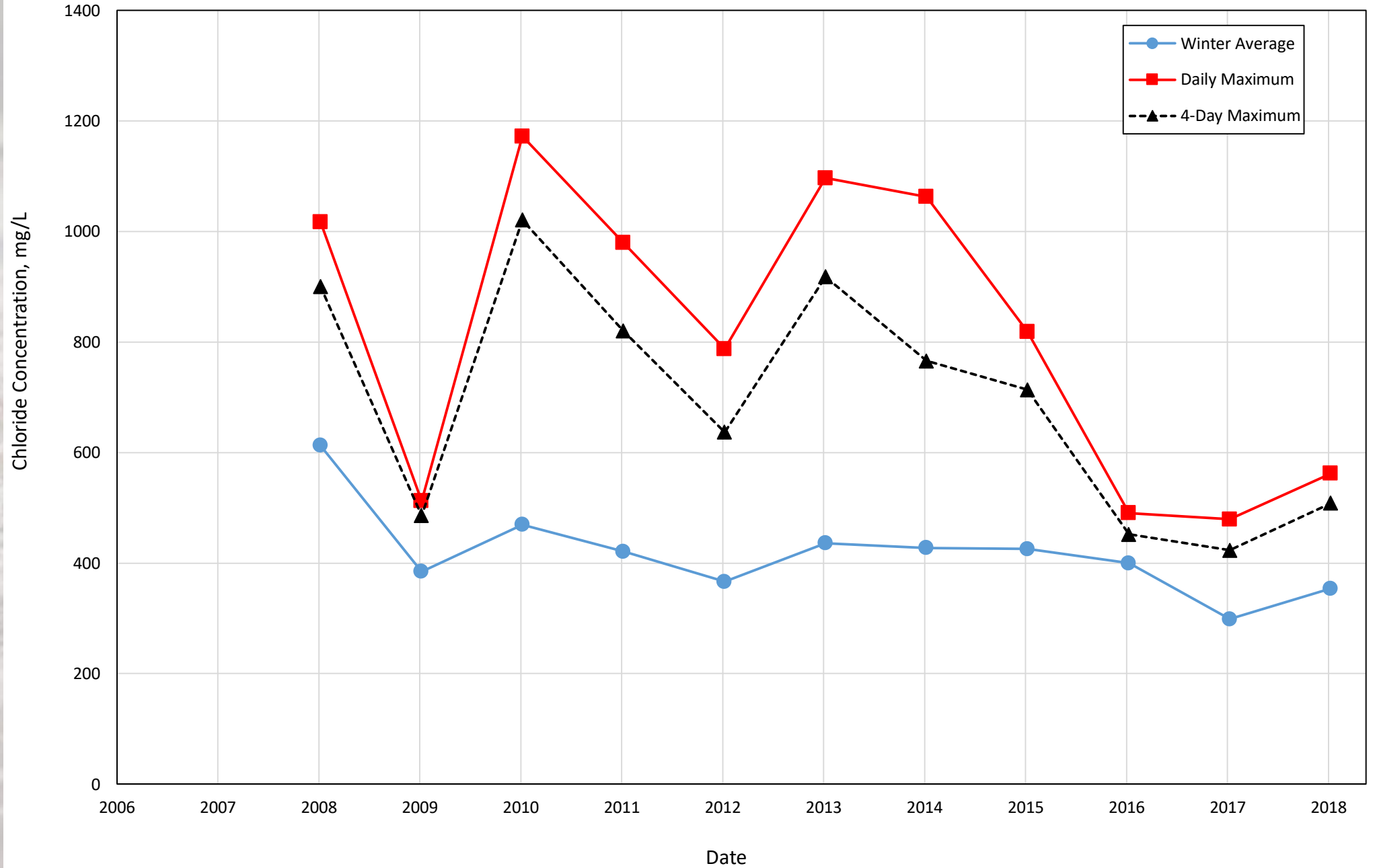
- “Parking lot” operations reporting reductions of 40-90%!
- Road Operations reductions of 25-40%



ANNUAL CHLORIDE CONCENTRATION - WINTER MONTHS (2007-2016)  
SALT CREEK AT WOLF ROAD



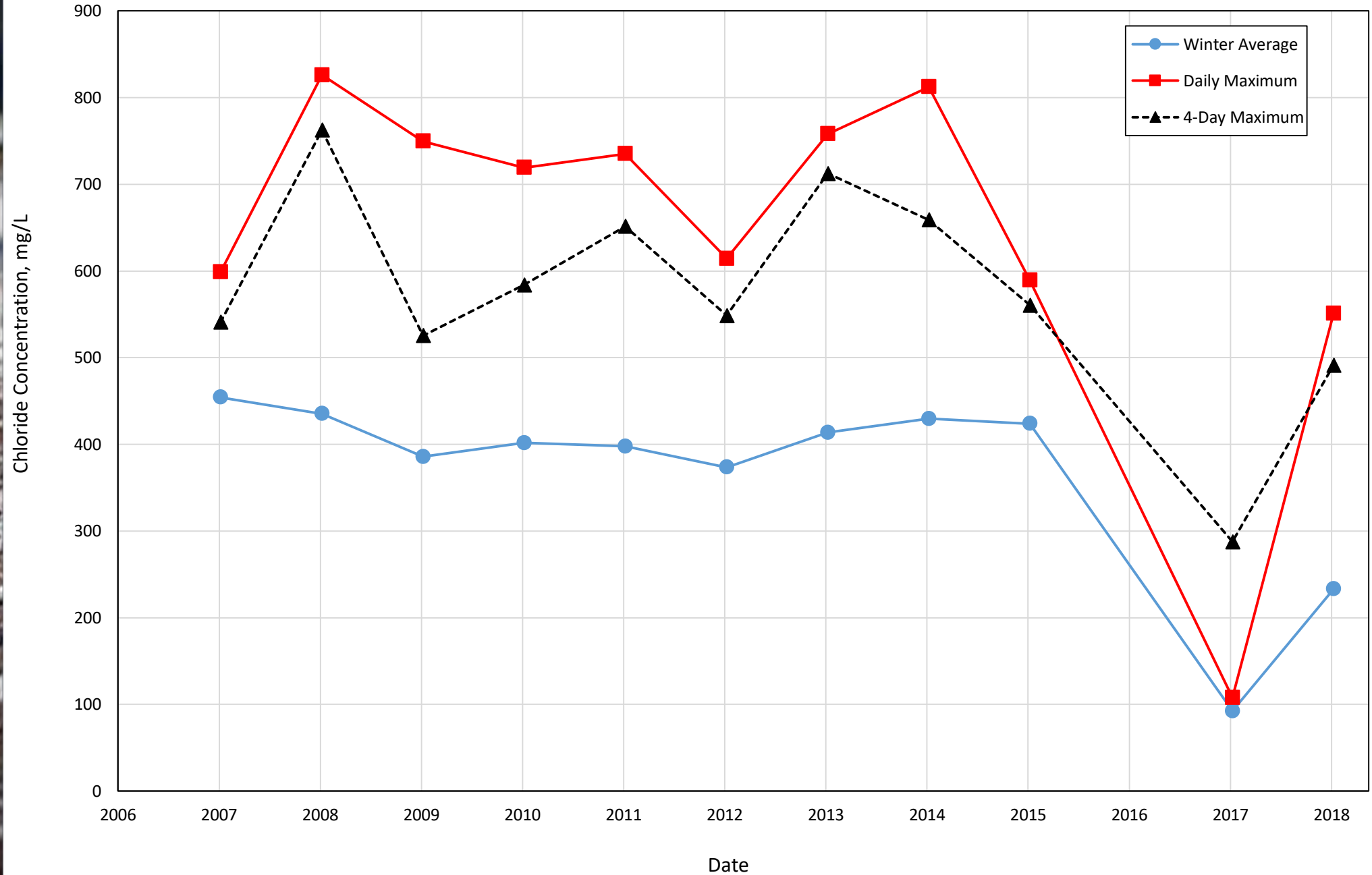
# ANNUAL CHLORIDE CONCENTRATION - WINTER MONTHS (2008-2015) EAST BRANCH at HOBSON ROAD





# ANNUAL CHLORIDE CONCENTRATION - WINTER MONTHS (2007-2018)

## WEST BRANCH





**Somme Woods March 2015** (Photos  
courtesy of Stephen Packard)

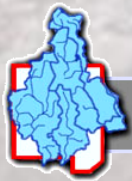






# Saltsmart.org

***What is Salt Smart?*** A collaborative outreach and education initiative started by local watershed groups, The Lower DuPage River Watershed Coalition and The Lower Des Plaines Watershed Group, to improve water quality by reducing the amount of chlorides reaching our local waterways. It is now growing into a regional outreach program coordinated by The Conservation Foundation.



DuPage River Salt Creek Workgroup



Lower DuPage River  
Watershed Coalition





# Salt Smart Outreach Resources

A snow storm is heading our way...

## Ice & Snow Take It Slow!



**SALT SMART SAVE MORE**

**SaltSmart.org**  
Smart salting practices protect our local waterways



**SALT SMART SAVE MORE**

Here are five tips for salting smart this winter:

- 

**1. Shovel first.** Clear all snow from driveway and sidewalks before it turns to ice. Salt should only be used after the snow is removed and only in areas needed for safety.
- 

**2. Size up.** More salt does not mean more melting. A 12-ounce coffee mug of salt should be enough for a 20-ft section of driveway or about 10 sidewalk squares.
- 

**3. Spread.** Distribute salt evenly, not in clumps.
- 

**4. Sweep.** If you see leftover salt on the ground after the ice melts, then you've used too much! Sweep up leftover salt to use again and keep it out of our rivers and streams.
- 

**5. Switch.** Rock salt stops working if the temperature is below 15 degrees. When temperatures drop that low, switch to sand for traction or choose a different deicer formulated for colder temperatures.

Smart salting practices protect you and our local waterways.

[www.saltsmart.org](http://www.saltsmart.org)

 @saltsmartil  
 @saltsmartil



## Newsletter

**Winter Weather and the Chilly Reality of Potholes**

Each year, winter weather presents a variety of challenges, motorists would prefer to avoid. Likely, the most troubling of these is the number of potholes that seem to creep up on our daily travels without warning.

Potholes form when water enters cracks in the road surface, expanding and damaging the surface as it freezes. Can further damage the roadway forming a pothole that only increases in size without attention.

Members of Crest Hill Public Works fill potholes at various times throughout the year, paying particular attention during winter months whenever possible. Cold weather prevents them from using hot-mix asphalt, a material that provides a more permanent repair so your help in identifying areas of damage is very important.

Please contact Public Works at 815-741-5188 to report potholes that need attention. Crewmembers are usually able to make repairs within twenty-four hours.

**Plows, Plows... Everywhere**

The Crest Hill Public Works Department is responsible for plowing and salting a total of 17 miles of roadway. We typically use a total of 60 plows to accomplish clearing snow from all arterial and residential streets. Plowing generally begins when snow accumulations reach one inch. Safety is our number one mission when it comes to snow removal and with that mission in mind, we would like to remind residents of a couple things that will help keep our roads safe:

- Parking is prohibited on Crest Hill streets when snow accumulations are 2 inches or more. Cars parked on streets during snowstorms create hazardous conditions during the snowstorm and after the storm has concluded. Cars parked on Crest Hill streets will be towed and towed if not moved from the street in a timely manner. If you have limited parking space try talking with your neighbors to see if they can help free up some room for you to store your vehicle while the City snow crews work to clear the roadways.
- Blowing or shoveling snow to the street from your driveway apron is also prohibited by City ordinance. Snow deposited in the street from driveways will freeze creating an icy condition on the roadway. Additionally, the snow you push to the street will often end up back in your driveway or your neighbors when plows make their next pass.
- If you find yourself behind a plow truck, please do not try to pass it. For your safety, stay back at least 75 feet from the rear of the truck.

If a City plow truck damages your driveway or mailbox contact Public Works at 815-741-5188 in order to file a work request. If your mailbox is damaged by a plow it will be inspected, repaired, or replaced as soon as time permits with a standard first-class approved mailbox and speed post. Parkway damage will be repaired in the spring.

**City of CREST HILL Illinois**

visit us @ [www.cityofcresthill.com](http://www.cityofcresthill.com)



# Training Opportunities

- Public Roads & Parking Lots and Sidewalks
  - Cook County
  - DuPage County
  - Lake County
  - Kane County
  - Will County
- Sensible Salting
  - McHenry County
- Summer Snow Days (ILCA)
- Snow and Ice Leadership Seminar (APWA)
- Winter Preparedness Snow and Ice Conference (SSC)

**SAVE THE DATES!**

|  |  |
|--|--|
| <b>2019 Public Roads Winter Deicing Workshops</b><br>Will County October 16<br>DuPage County October TBD | <b>2019 Parking Lots &amp; Sidewalks Winter Deicing Workshops</b><br>Kane County October 3<br>Will County October 15<br>DuPage County October 17 |
|--|--|



Locations TBD

Visit [SaltSmart.org](http://SaltSmart.org) for more information

## *McHenry County Sensible Salting Workshop*

**WHO:** PUBLIC & PRIVATE SECTOR EMPLOYEES RESPONSIBLE FOR MAINTENANCE OF ROADS, SIDEWALKS & PARKING LOTS  
**DATE:** THURSDAY, OCTOBER 18 OR FRIDAY, OCTOBER 19 (choose one day only)  
**TIME:** 8:00 AM - 2:00 PM \*Registration begins at 7:30 AM  
**PLACE:** CITY OF CRYSTAL LAKE: 100 Woodstock Street, Crystal Lake, IL





Questions?

Deanna Doohaluk

[ddoohaluk@theconservationfoundation.org](mailto:ddoohaluk@theconservationfoundation.org)

Stephen McCracken

[smccracken@theconservationfoundation.org](mailto:smccracken@theconservationfoundation.org)