

Winter Chloride Monitoring

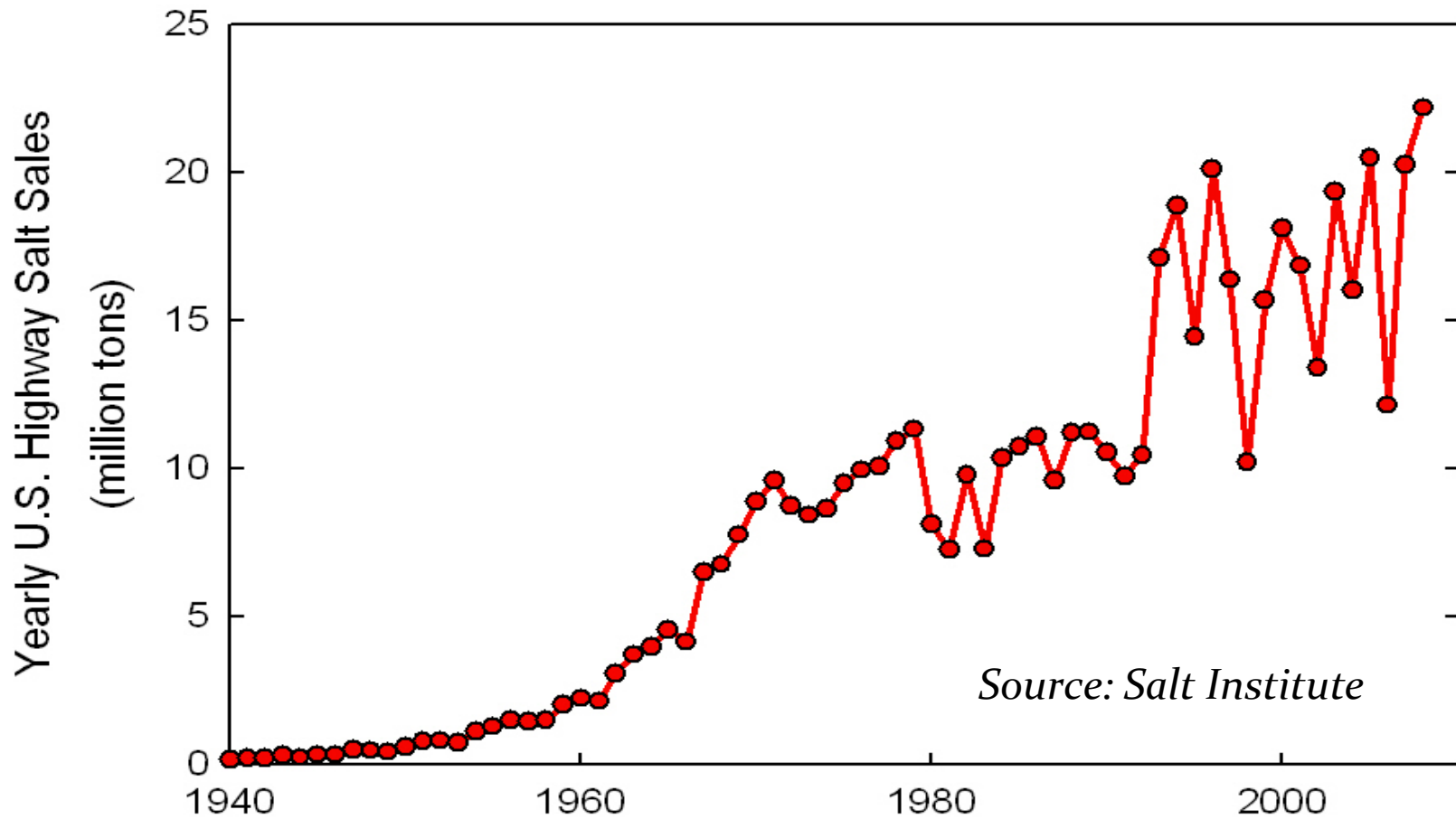
Mike Adam
Senior Biologist
Population Health Services



LakeCounty
Health Department and
Community Health Center

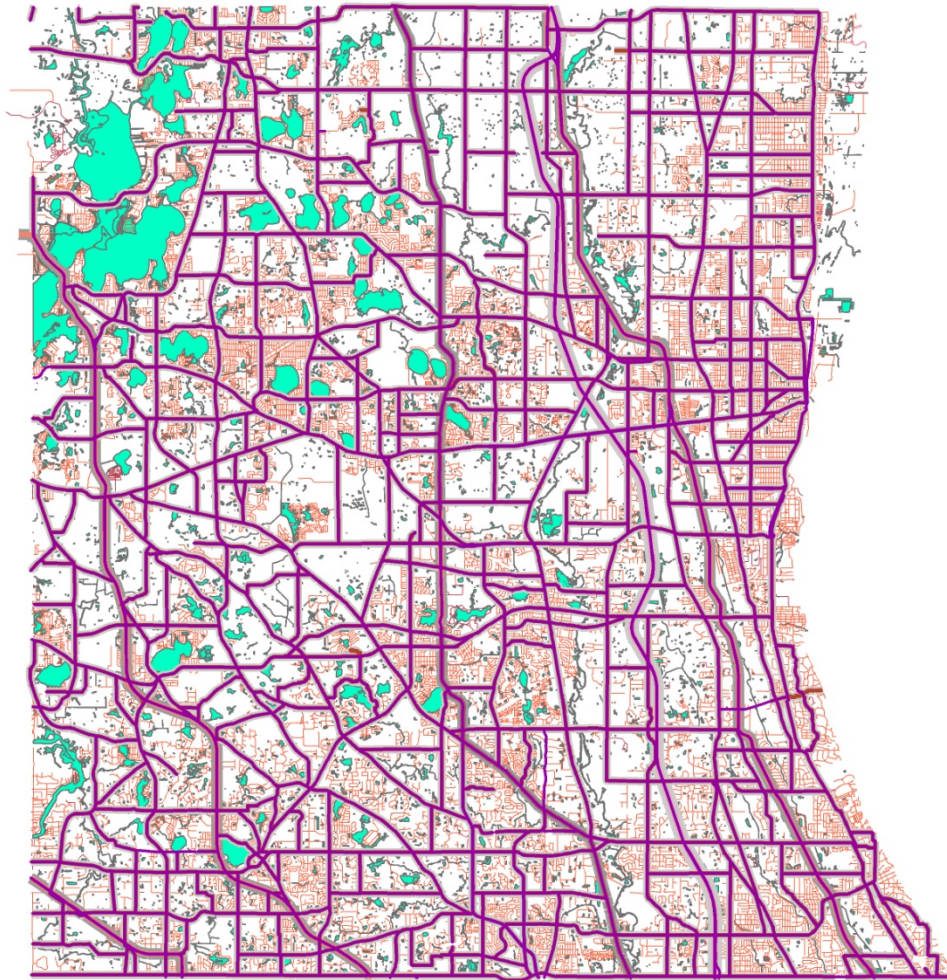
Road Salt in U.S.

- First applied in earnest around 1960



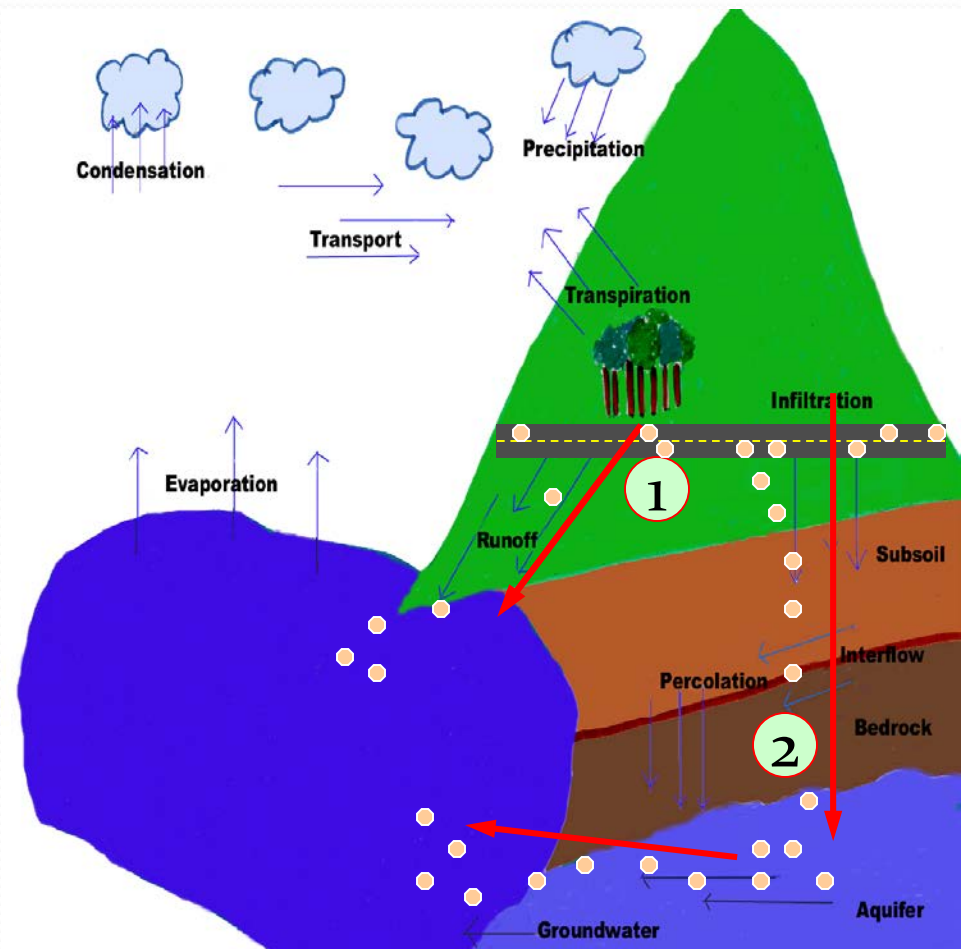
Lake County

Roadways and Waterbodies



Road Salt Background

- **Icy roads to salty water**
 - Upon snowmelt, salt enters water supply through...
 1. Run-off to surface water (~55%)
 2. Percolation to groundwater (~45%)
 - Snowmelt runoff could be >10,000 mg/L Cl⁻

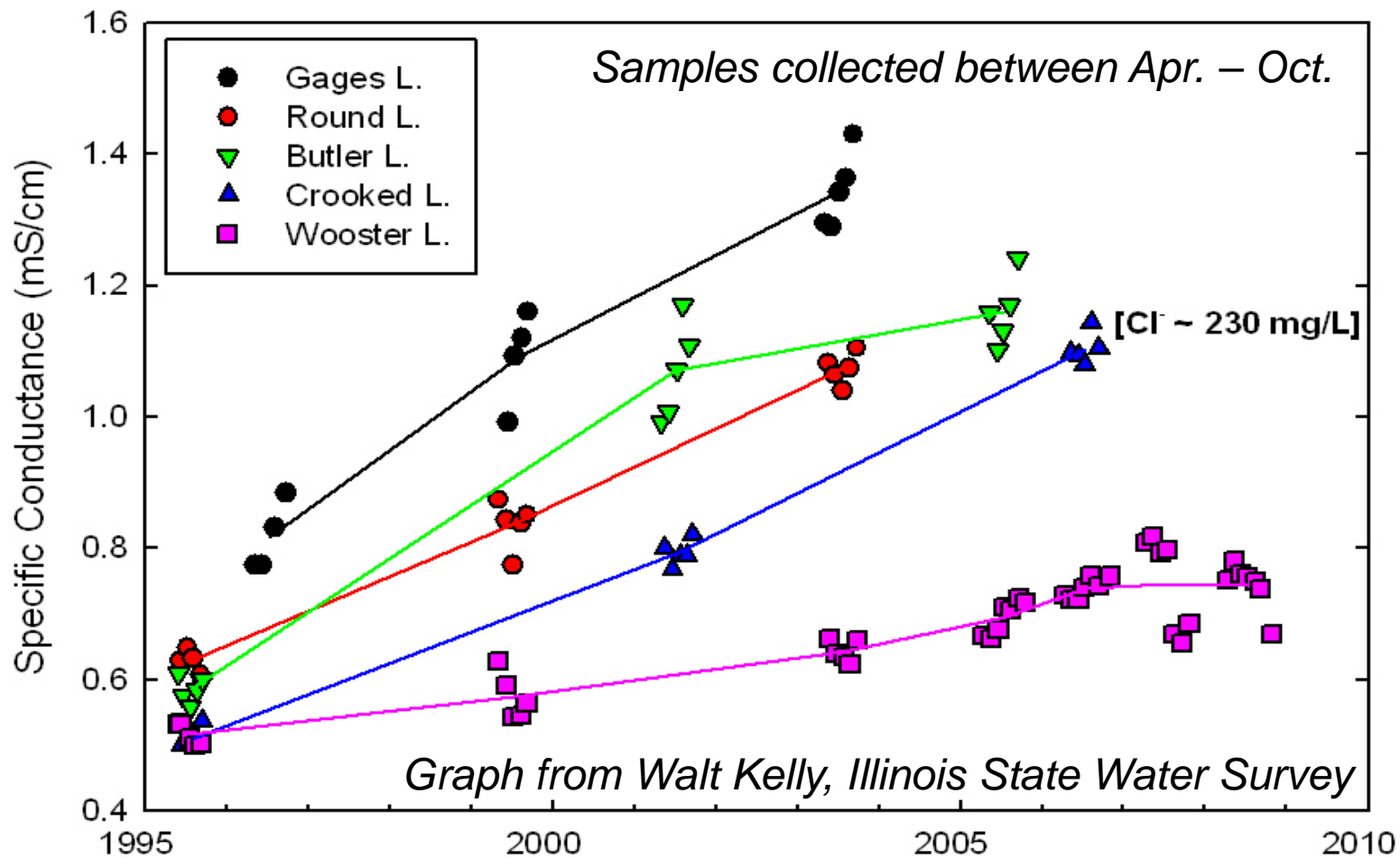


Chloride by the numbers

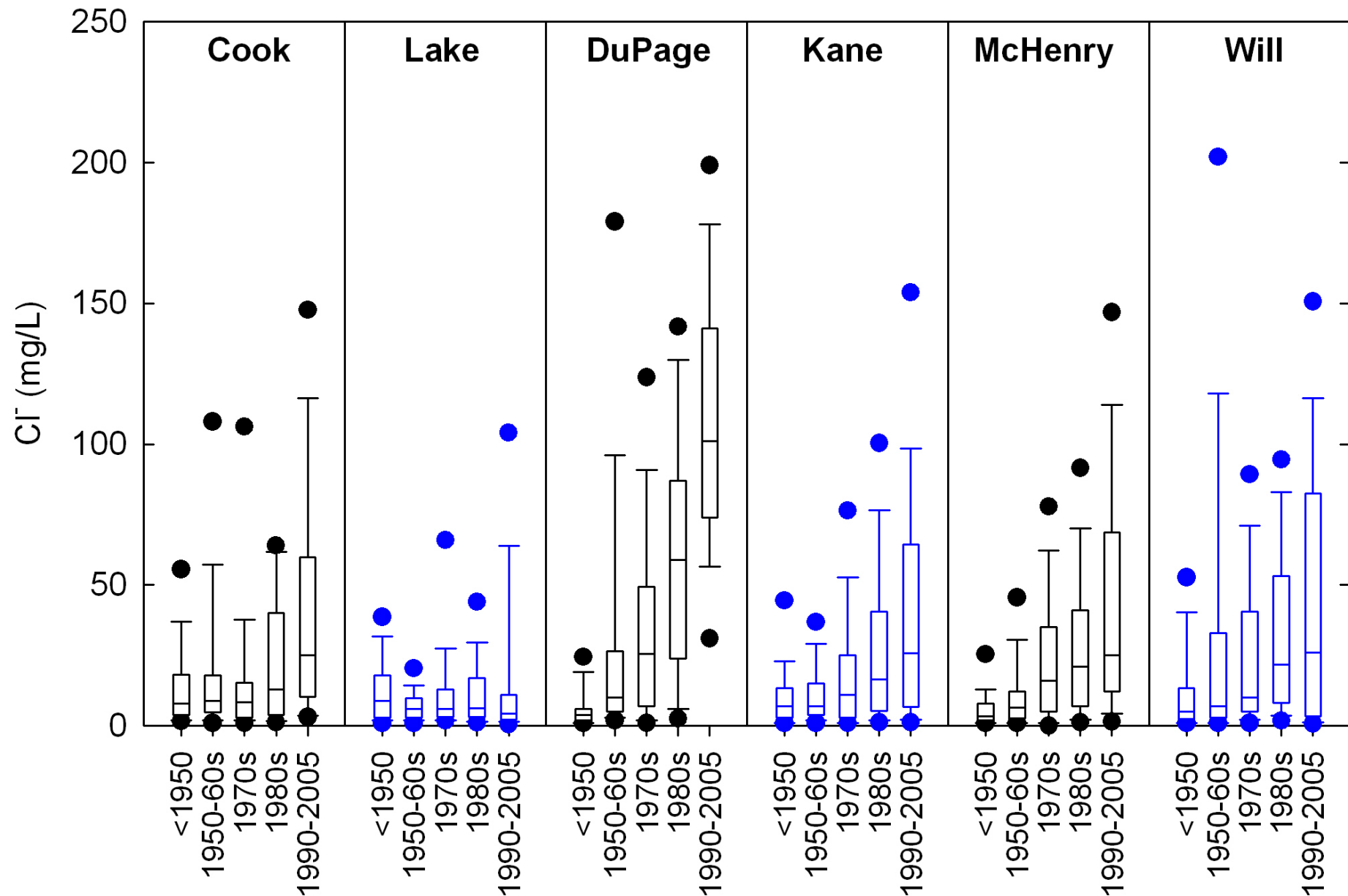
- USEPA Drinking Water Standard = 250 mg/L, however, chronic environmental standard is 230 mg/L
- Illinois General Use Standard = 500 mg/L
- Cl as high as 2,700 mg/L in Lake County lakes (ave = 191 mg/L)
- 1 tsp in 5 gallons water = 280 mg/L Chloride



Increased concentrations of Cl⁻ measured in Lakes in Lake County Illinois

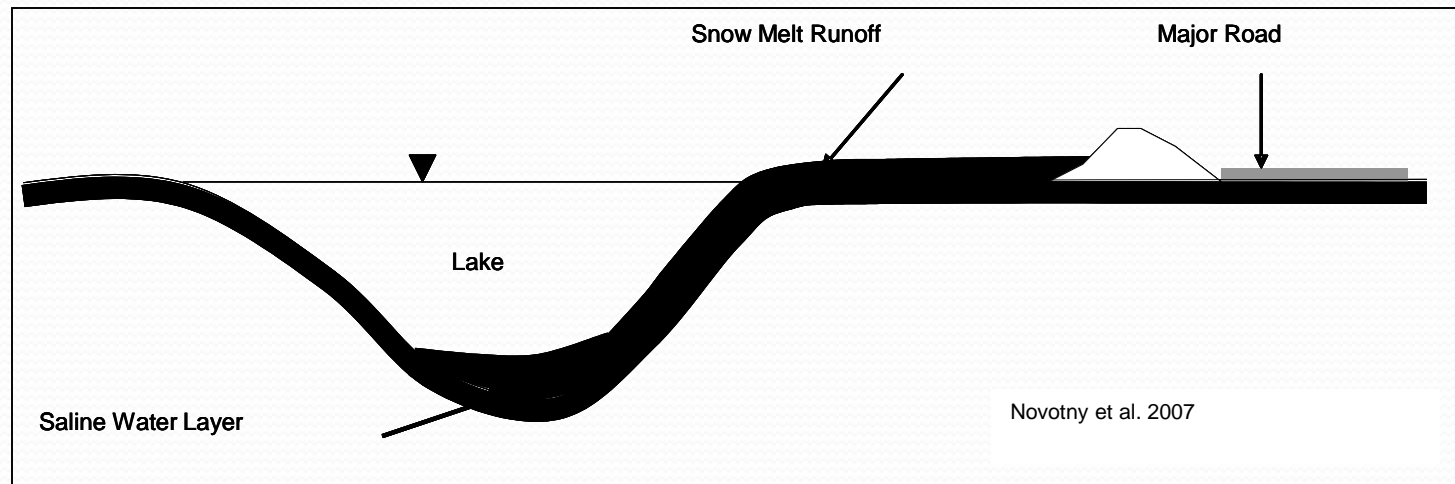


Chloride by County



Potential Impacts of Chloride

- Decrease dissolved oxygen and stratification times
 - Reduce diversity of plants and animals



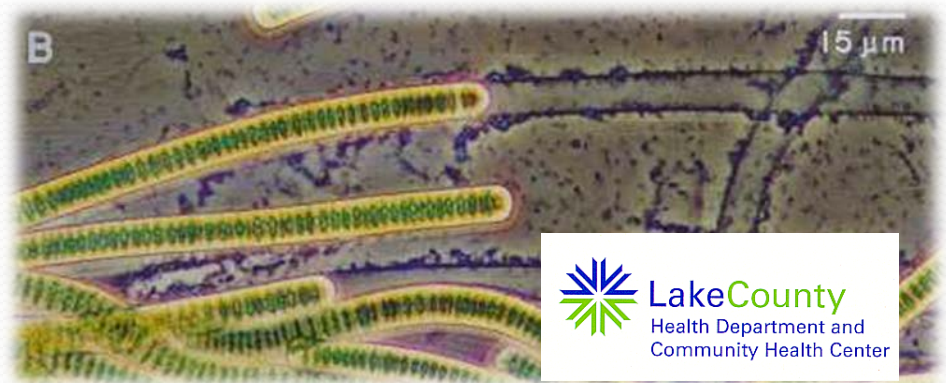
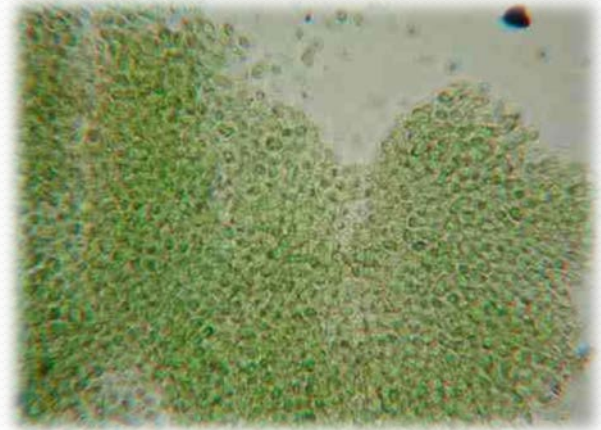
Potential Impacts of Chloride

- At concentrations of 220-240 mg/L
 - 10% of species could die after 30 days (Environment Canada, 2000)
- Affects throughout the food chain
 - Algae
 - Plants
 - Invertebrates and Fish



Cyanobacteria (harmful algae blooms- HABs)

- Toxins
 - Hepatoxin
 - Neurotin



Potential Impacts

...an increase in salt tolerant species =
exotic/invasive species

Cattails



Eurasian Milfoil



Phragmites





Pine Meadows Golf Course Ponds

- Photos of salt-encrusted shoreline (October 2010)



Proper Storage and Use



Proper Storage and Use



Proper Storage and Use



De-icing workshops

- Lake and other Counties
 - Lake County Agencies
 - Stormwater Management Commission
 - Health Department
 - Division of Transportation
 - Public Works
 - American Public Works Association (APWA)
 - Funds from IEPA
 - 2009 – 2014
 - Ave >100 participants
 - October 6 & 7, 2015

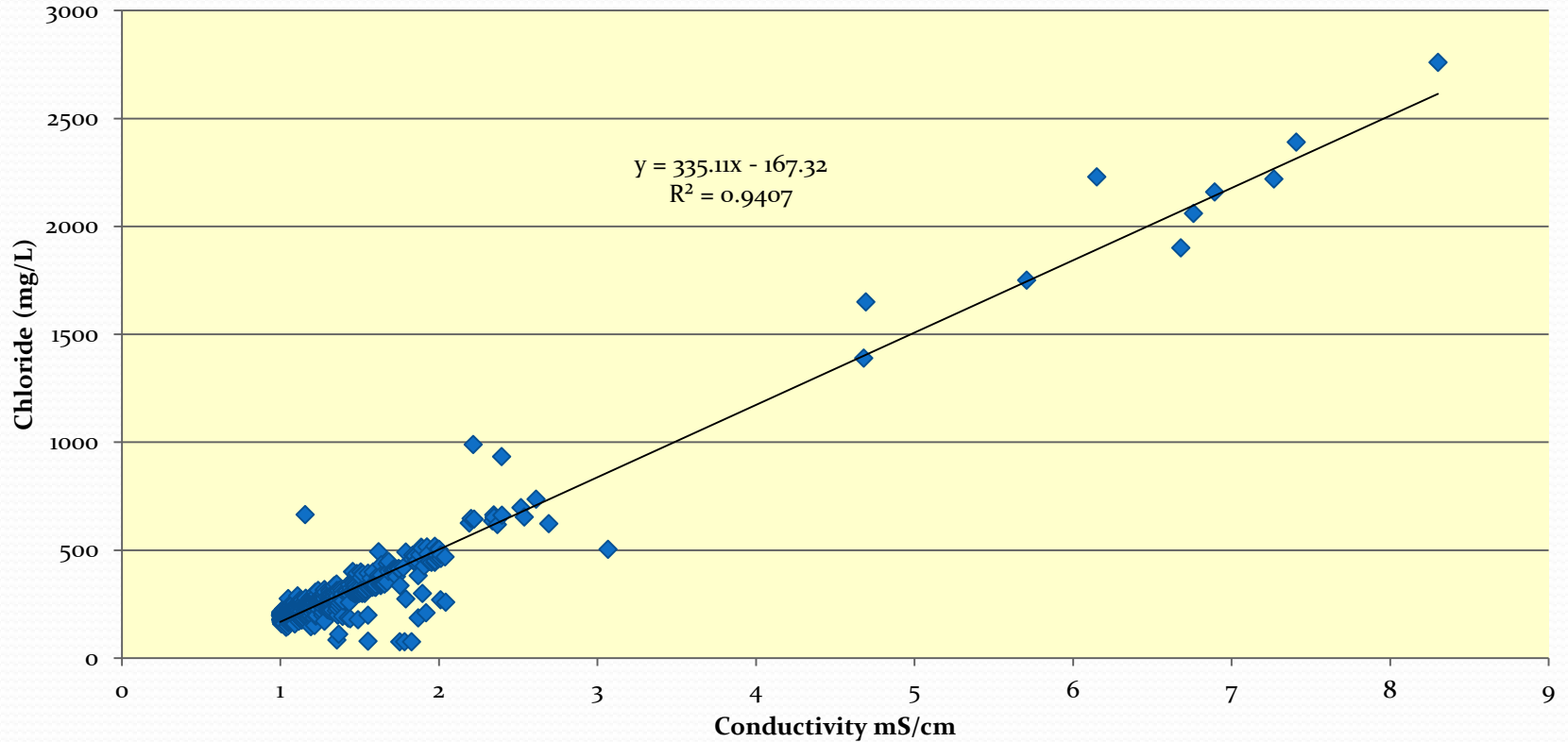


De-icing workshops



Winter Chloride Monitoring 2014-15

Lake County IL Lakes Conductivity > 1 mS/cm vs Chlorides



Winter Chloride Monitoring 2014-15

Lake County

	Sites	Min Cond	Max Cond	Max Cl	% > 2 mS/cm
2014	25	0.553	70.42	8,450	51.00%
2015	39	1.004	91.02	33,400	67.70%

500 mg/L = ~ 2.0 mS/cm

Winter Chloride Monitoring 2014-15 – Lake County

Des Plaines River Watershed

	Sites	Min Cond	Max Cond	Max Cl	% > 2 mS/cm
2014	18	0.553	70.42	8,450	60.00%
2015	20	1.004	91.02	33,400	69.60%

Winter Chloride Monitoring

- Caveats:
 - NOT Flow Based, thus we cannot calculate loads
 - Based on 1-4 sites visits/year
 - Highly variable due to weather
- Conclusions/Needs
 - Mainstem aided by larger flow volumes
 - Smaller tributaries with higher concentrations; “hot spots” identified
 - Need continuous monitoring stations with flow data