SENSIBLE SALTING AND WATER RESOURCES

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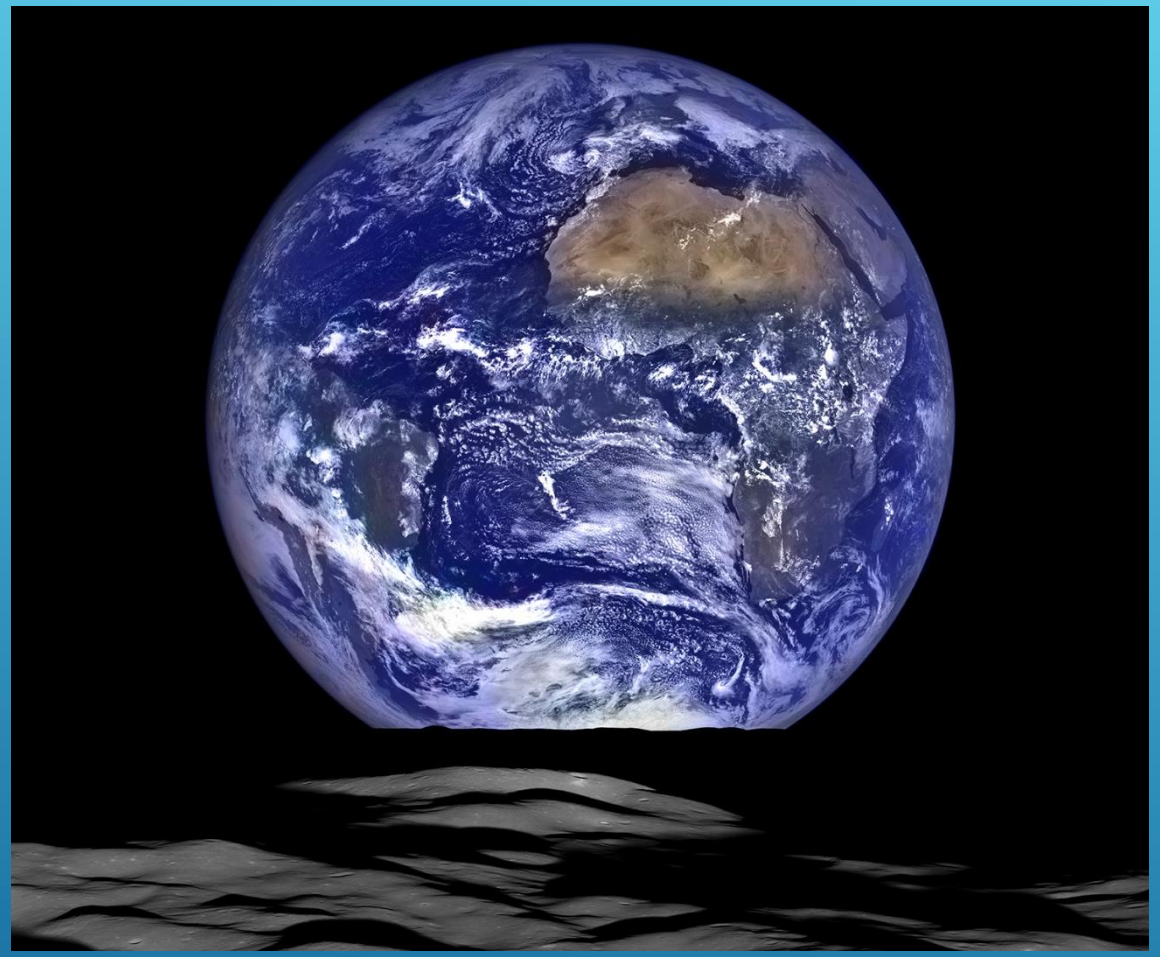
Why are we here today?

To understand the connection between the use of road salt, and our water resources!

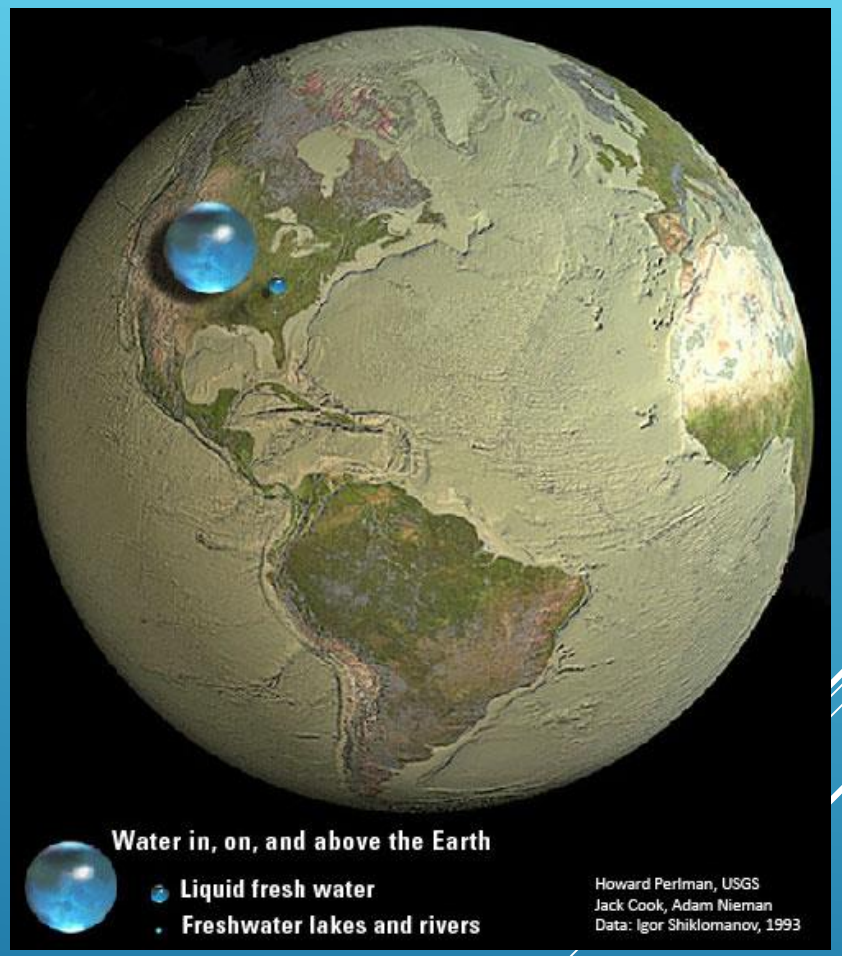
Consider this…



We live on a blue planet where about 75% of the Earth's surface is covered with water…

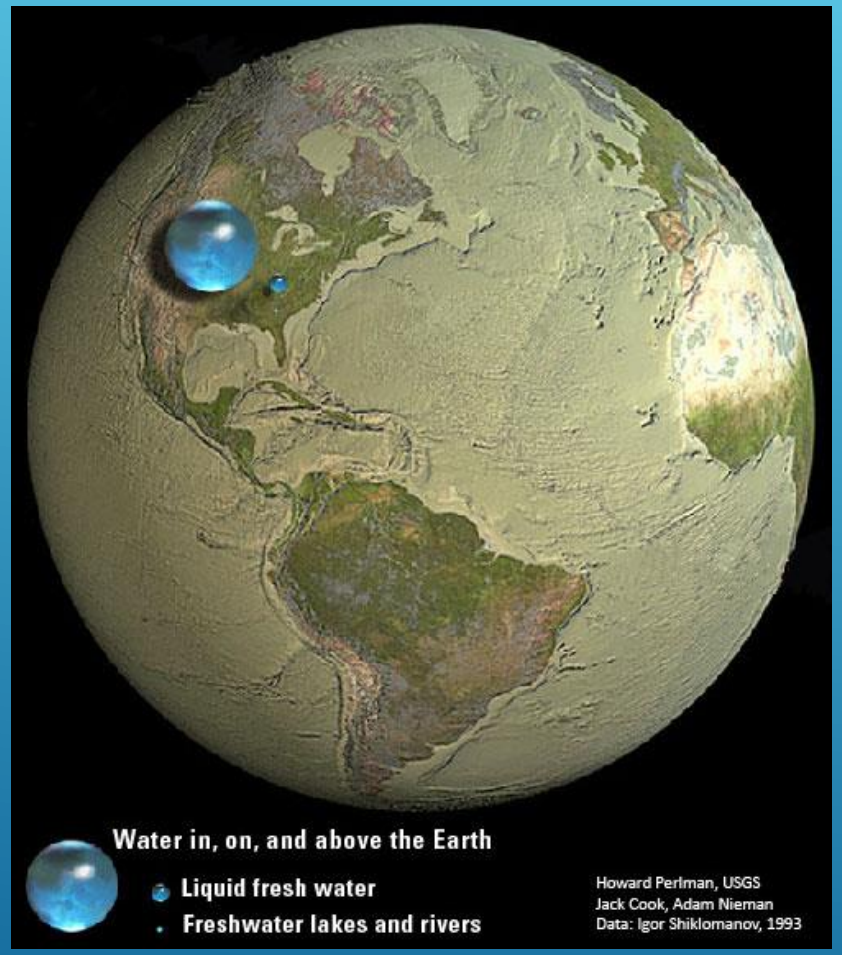
Consider this…

97.5% is ocean



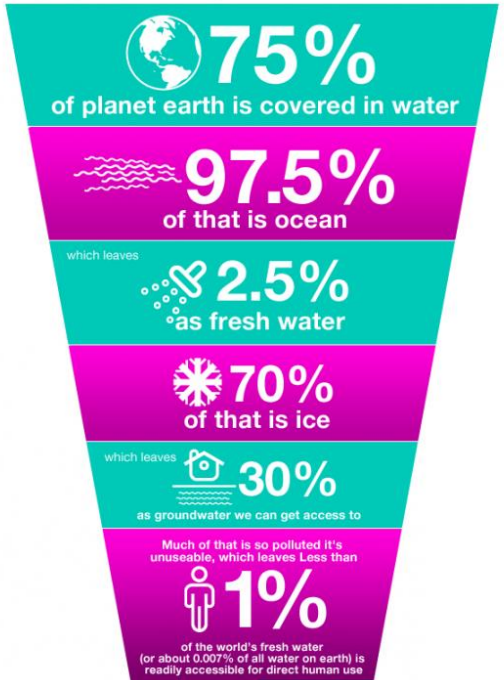
only 2.5% is fresh water

Consider this…



2.5% Fresh Water

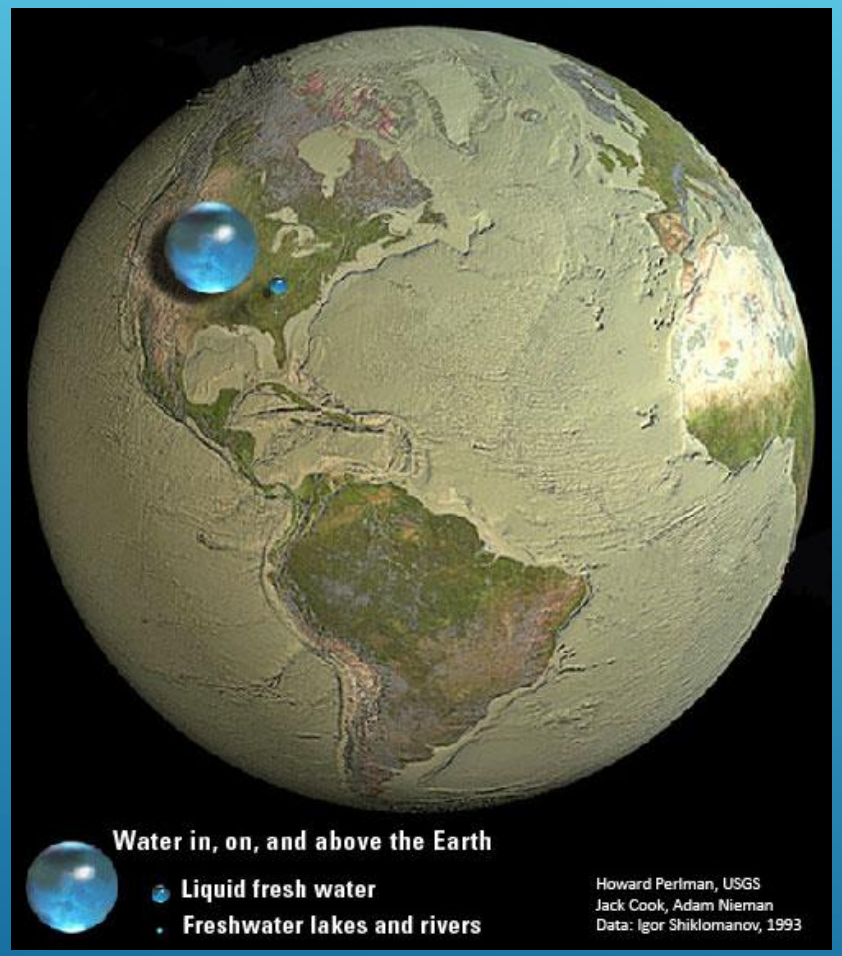
- 70% of that is ice
- Most of remaining 30% is inaccessible or unusable
- Only 0.007% is clean & accessible
  - 70% used for Irrigation
  - 22% used for Industry
  - 8% for domestic use

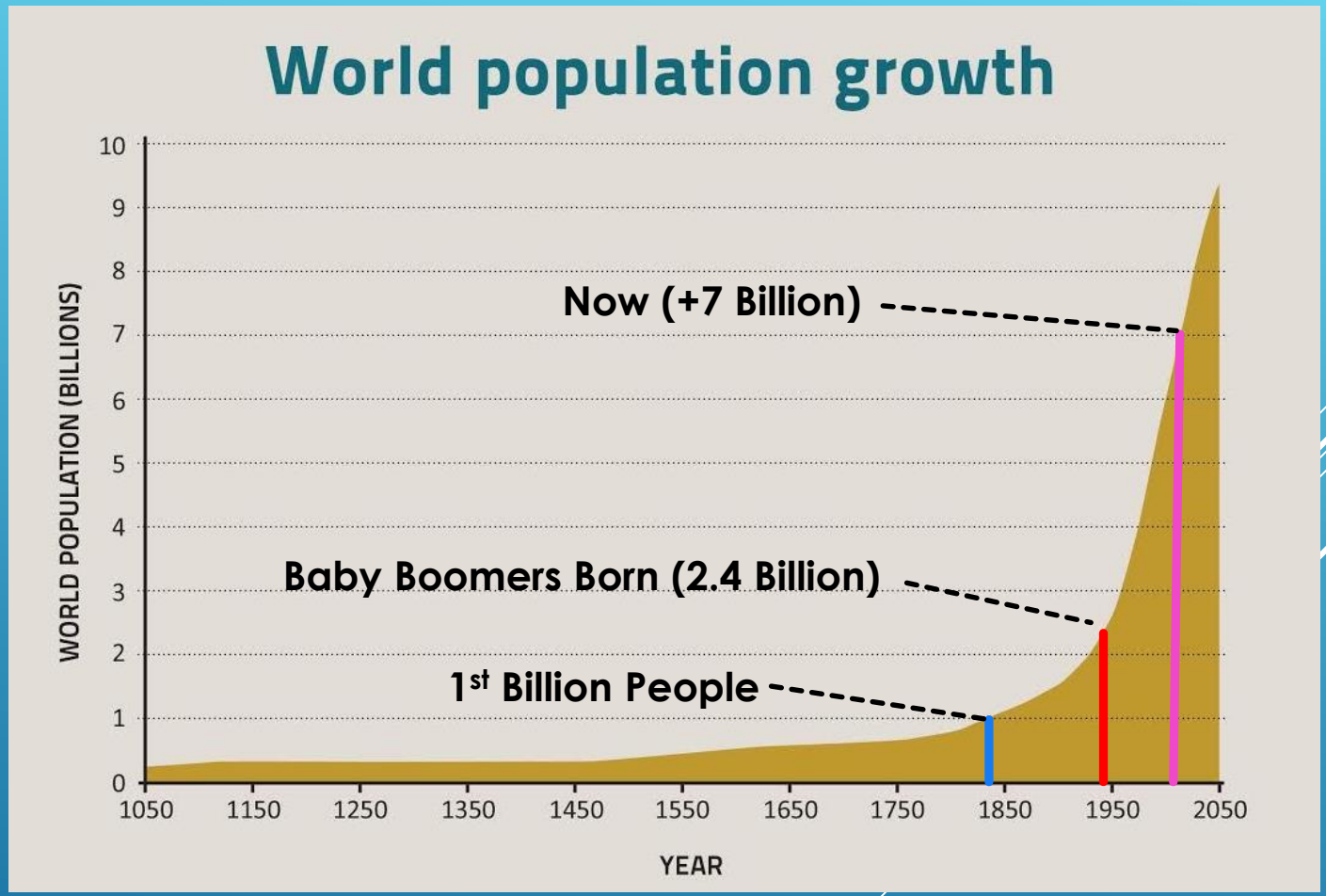


Approximately 0.007 % of water on Earth is readily accessible for human use

Only about 0.007 % of all the water on the planet is available to support humanity

Consider this…





200 thousand years for 1st billion people, only 200 years for the next 8 billion people

More people relying on the 0.007% of available fresh water

Our actions are Polluting the 0.007%

WATER IS NECESSARY FOR ALL LIVING THINGS

WATER IS NECESSARY FOR ALL ECONOMIC DEVELOPMENT

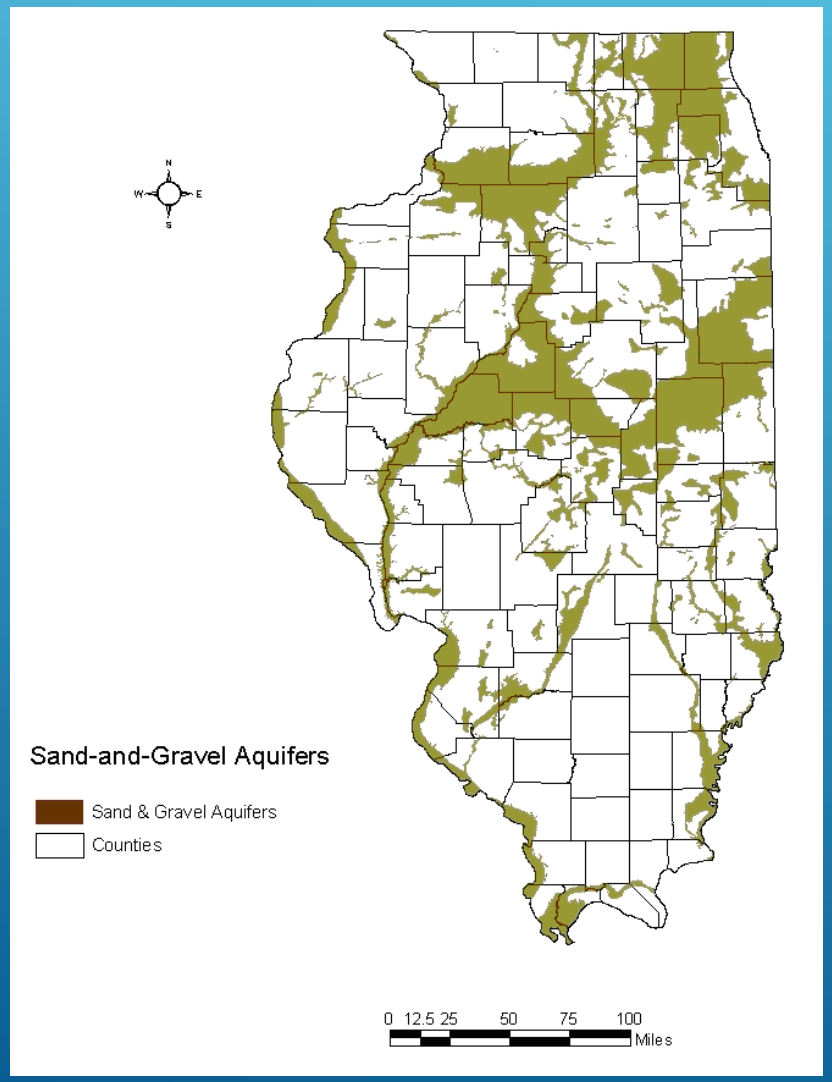
Water is scarce in much of the world

- **By 2025: 2/3 of worlds population under water stress**

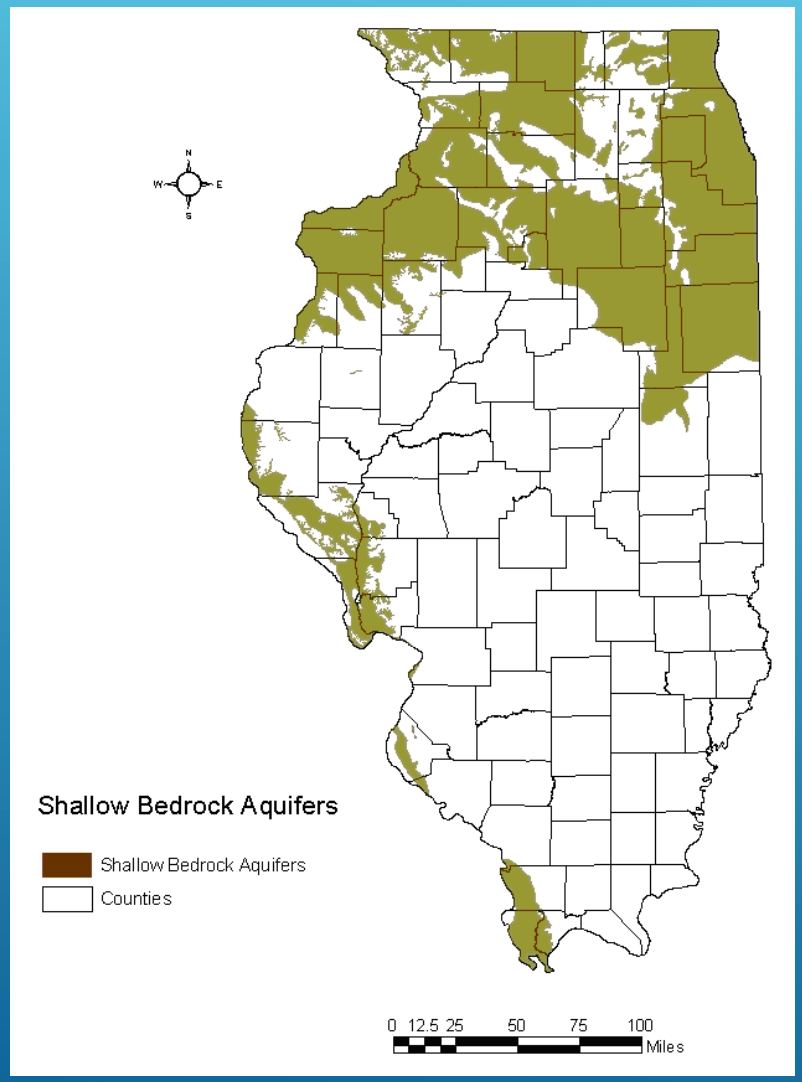
  1.8 billion people in absolute water scarcity

Groundwater Aquifer Distribution in Illinois

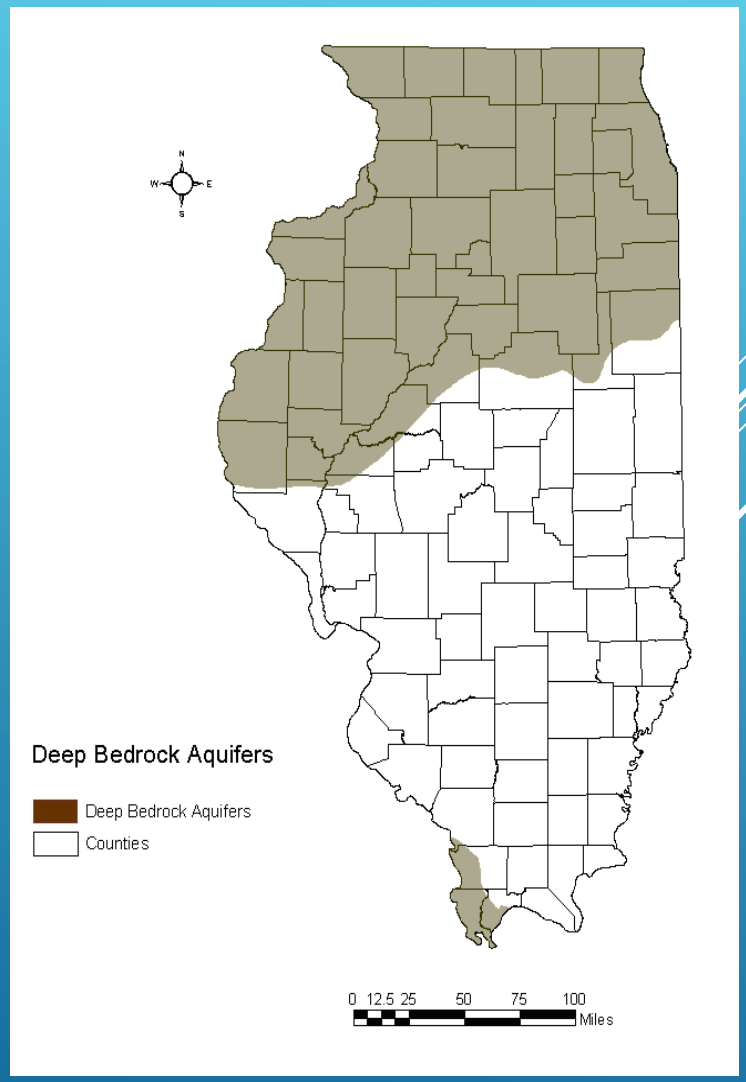
Sand & Gravel



Limestone

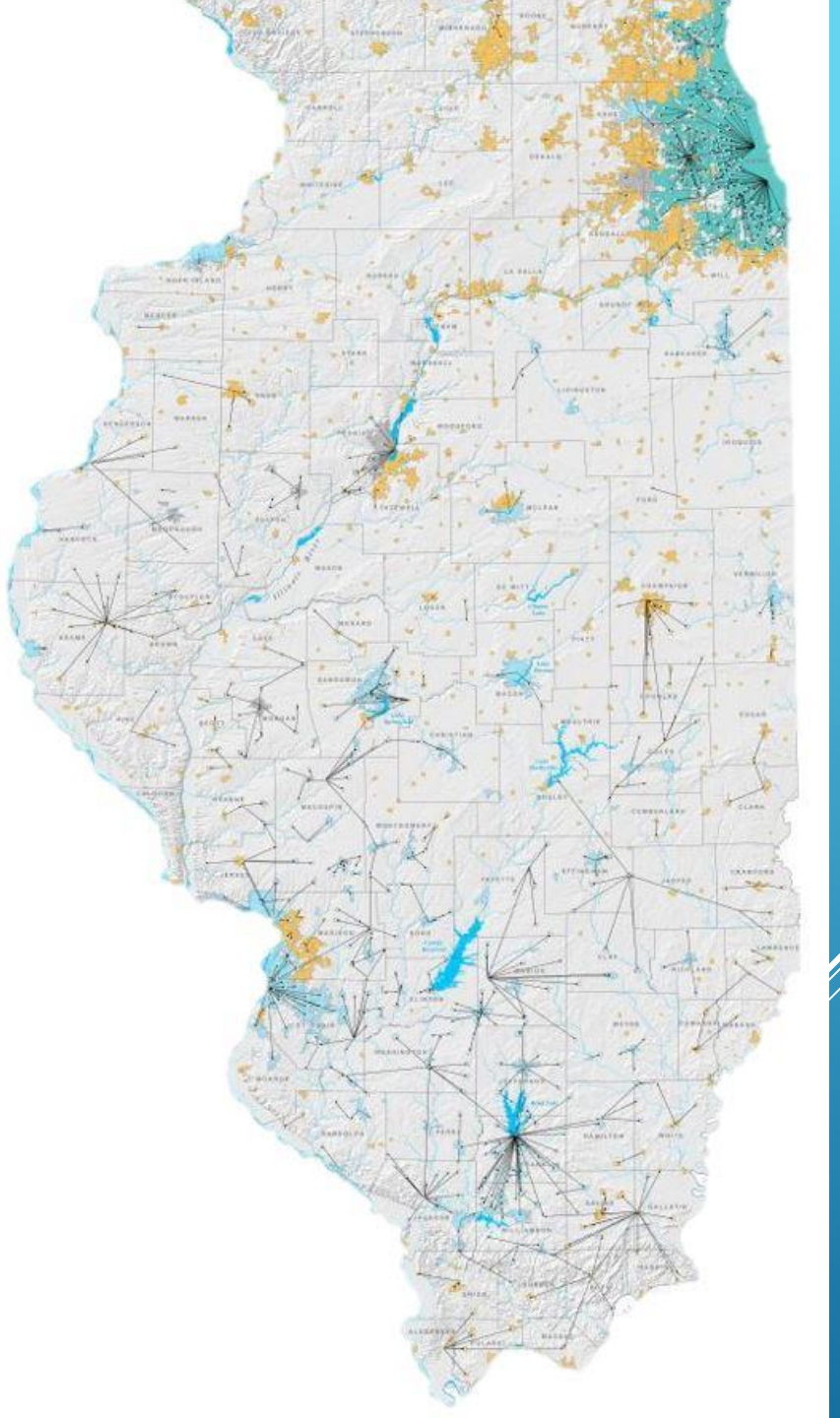


Sandstone



Distribution of Water Use in in Illinois

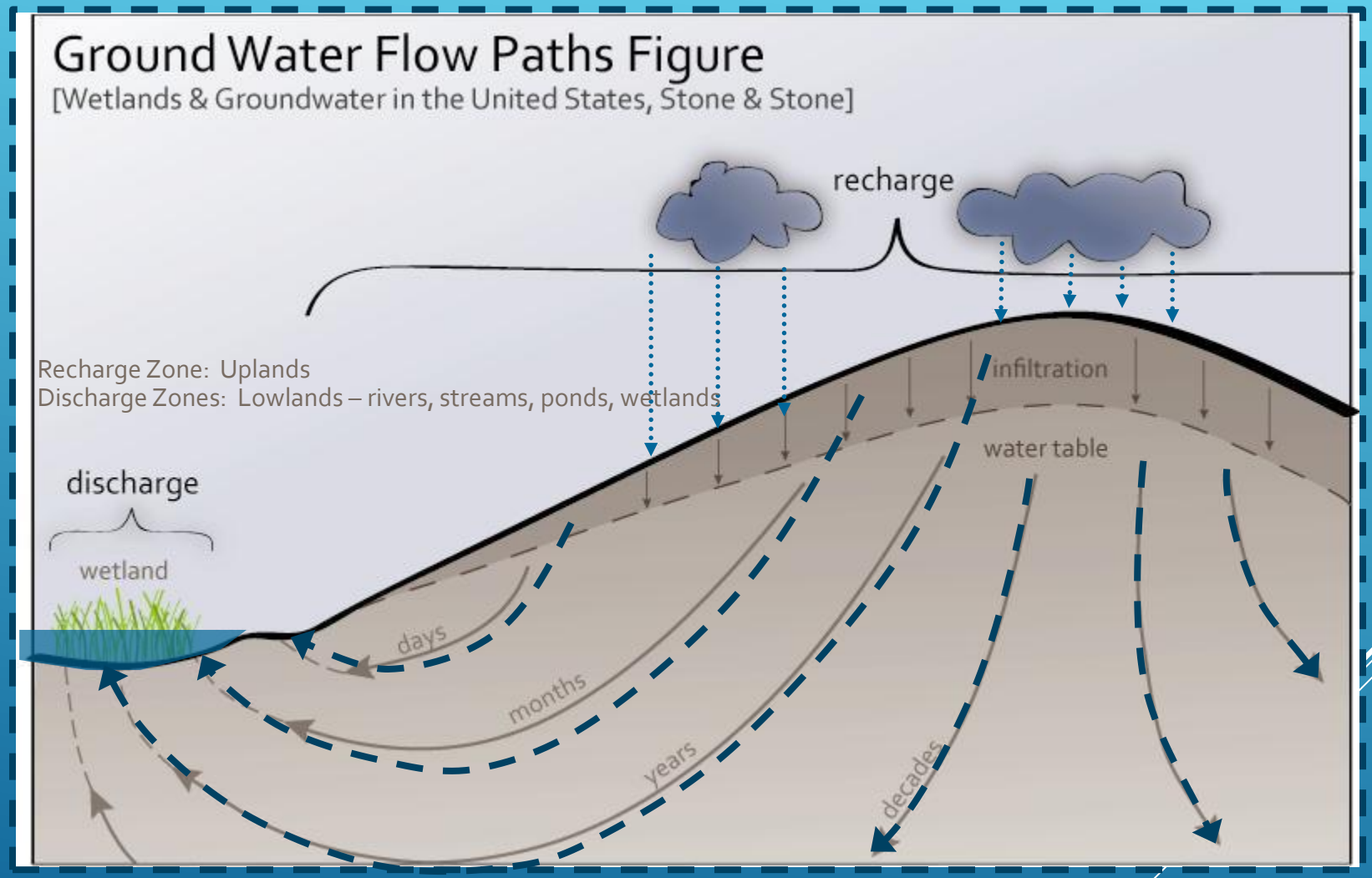
- **Groundwater…**
- **Lakes & Rivers**
- **Reservoirs**



Natural Hydrology

Slide courtesy of James Patchett and Conservation Design Forum

- Naturally cooled
- Naturally cleaned
- Steady baseflow
- Limited evaporation

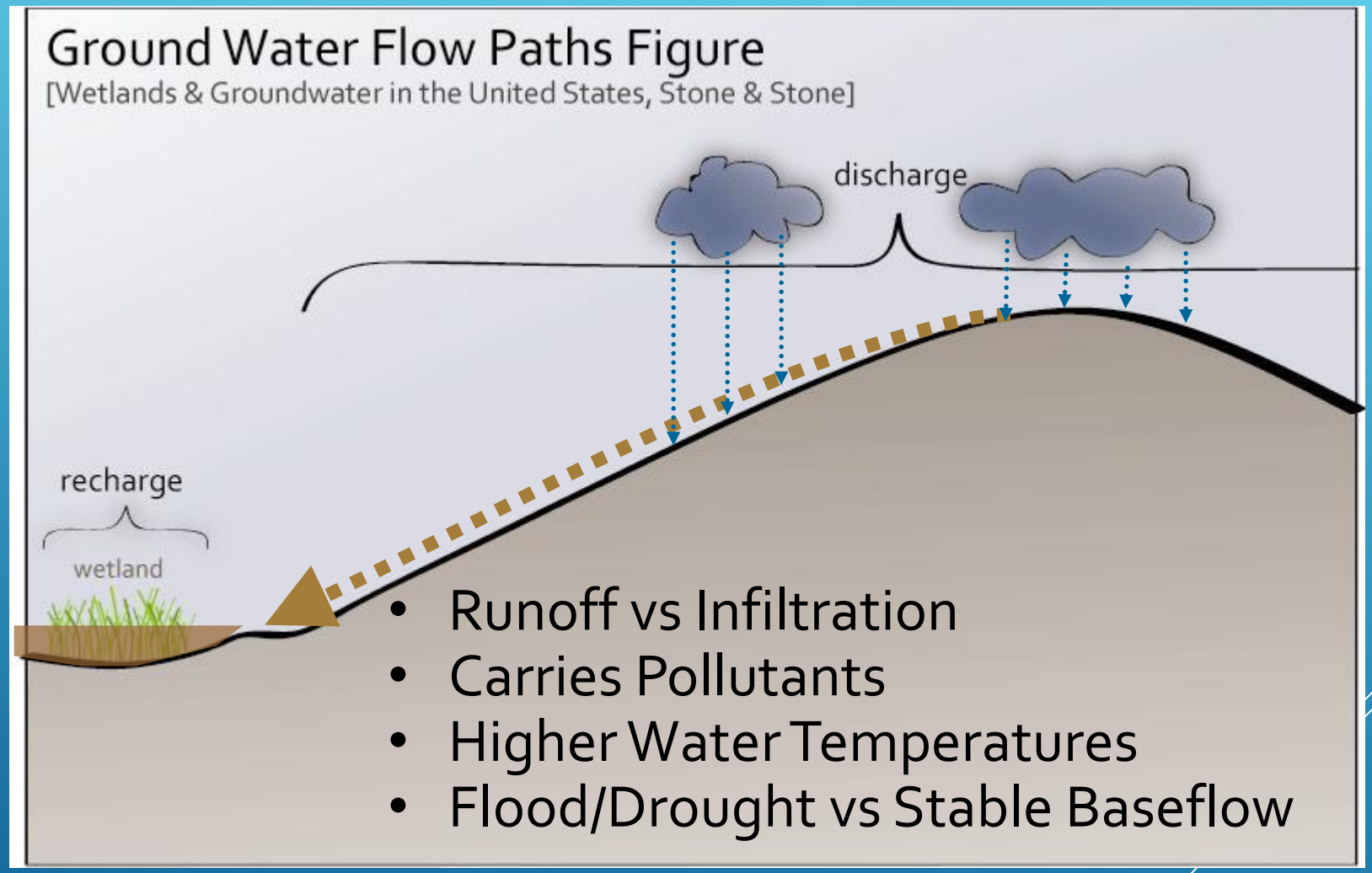


Constant, clean discharge flows, year round to sustain stable surface water hydrology with constant water temperature and chemistry

Urban Hydrology

Slide courtesy of James Patchett and Conservation Design Forum

- Thermal pollution
- Sediment
- Oils and greases
- Heavy metals
- Toxic chemicals
- Fertilizers
- Pesticides
- Salts
- Septic waste
- Animal waste
- Bacteria
- Etc…



Water is a Finite Resource

At the moment, much of Illinois has safe, sustainable water sources

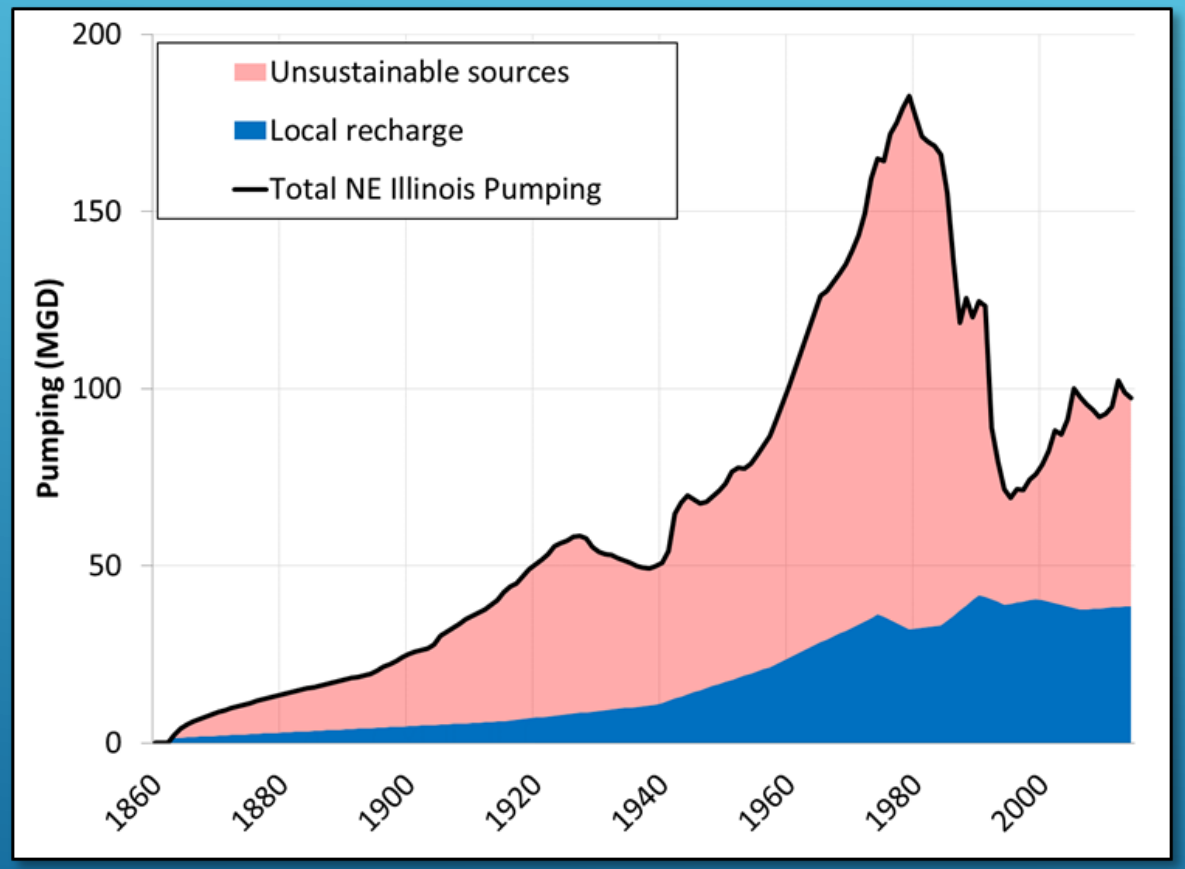
Only if we protect them!

Our Water Resources are Vulnerable…

- Over-Consumption (Finite Supply)
- Loss/Modification of Recharge Area (reduce Recharge)
- Drought (supply decreases/demand increases)
- Pollution (including salt)

Over Consumption…

Groundwater Demand vs. Recharge NE Illinois



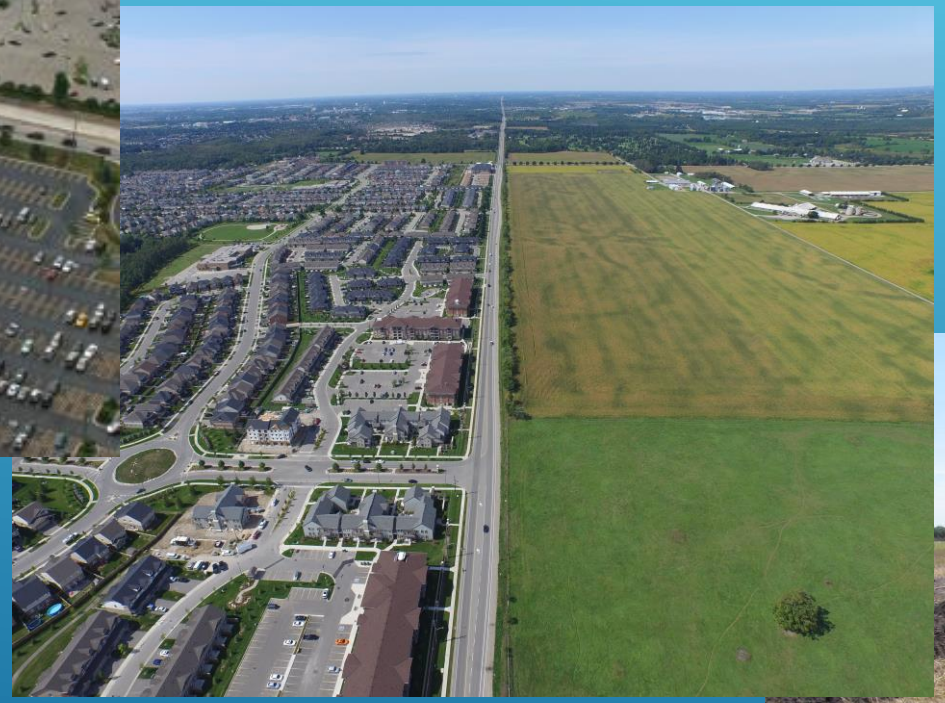
Data provided by Illinois State Water Survey

Sustainable Yield vs. Current Demands
Deep Bedrock Aquifers NE Illinois

County	Sustainable Yield*	Current Demands	Percent Sustainable
Cook and DuPage	8	11	72%
Grundy	7	8	88%
Kane	17	27	63%
Kendall	2	9	22%
Lake	5	5	100%
McHenry	8	8	100%
Will	12	30	40%

MGD

Loss of Groundwater Recharge/Natural Hydrology…



Drought…

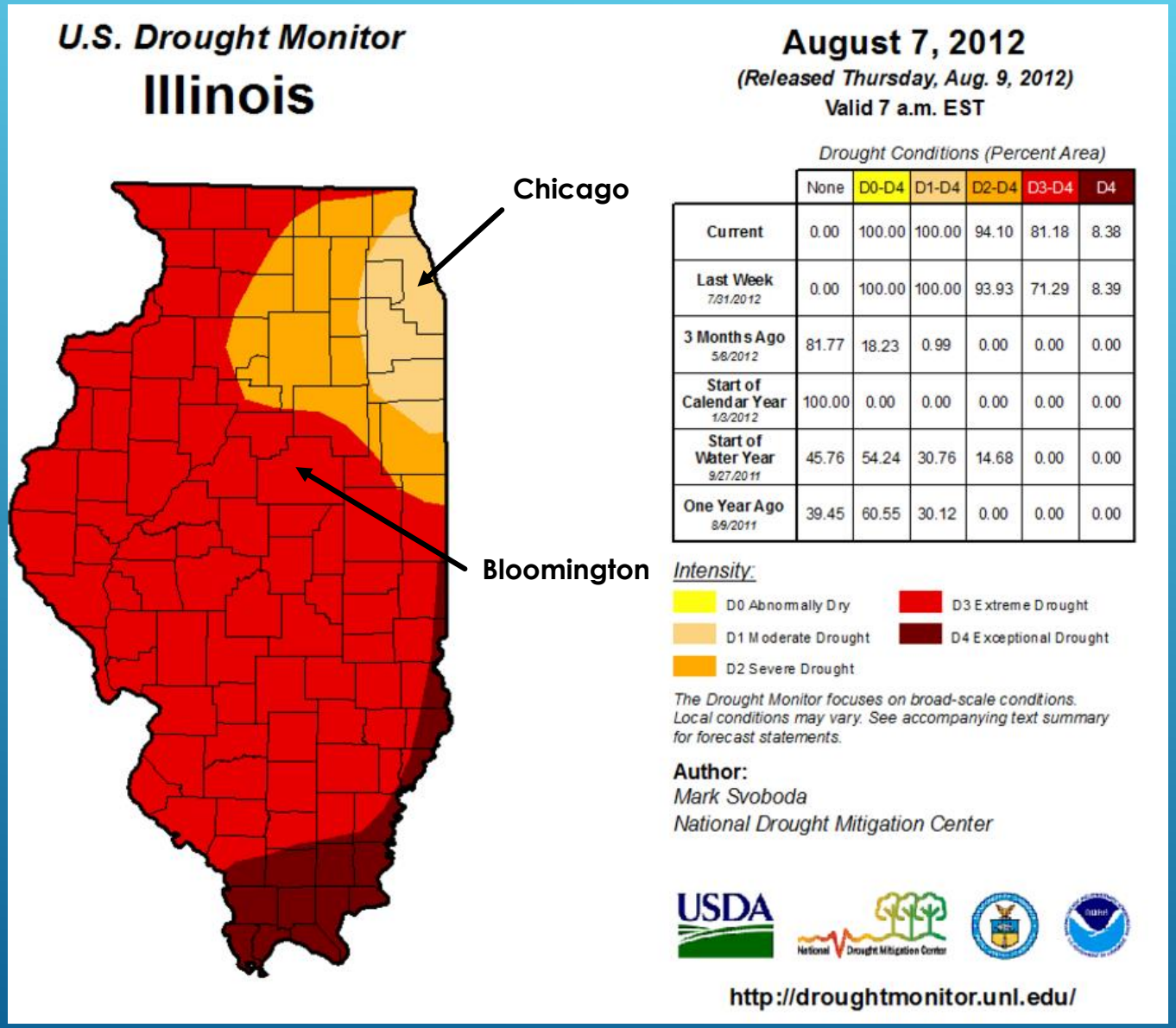
"Period of unusually persistent dry weather that continues long enough to cause serious problems such as crop damage and/or water supply shortages"

(McHenry County National Hazards Mitigation Plan)

During periods of drought:

- Groundwater recharge decreases
- Water use increases across all sectors (SIUC):
  - Public-supply withdrawals increase by 5%
  - Commercial and Industrial withdrawals increase by 5.5-5.6%
  - Irrigation and Agricultural withdrawals increase by 50%

Drought conditions in 2012



2012 Drought
Major Drop in Water Levels

CONTAMINATION…

We use lots of salt!
And it's contaminating our water

- **Road Salt**
- Water Softeners
- Fertilizers

- Toxic to Fish &Wildlife
- Kills Vegetation
- Highly Corrosive (metal/Infrastructure)

Road Salt: Ecological Effects

Photo: Michael Adam, Lake County Health Dept.

Photo: Michael Adam, Lake County Health Dept.

Photo: Scott Kuykendall

Road Salts Can Damage Plants

Road Salt: Ecological Effects

Cattails

Photo: Michael Adam, Lake County Health Dept.

Buckthorn

Photo: Michael Adam, Lake County Health Dept.

Phragmites

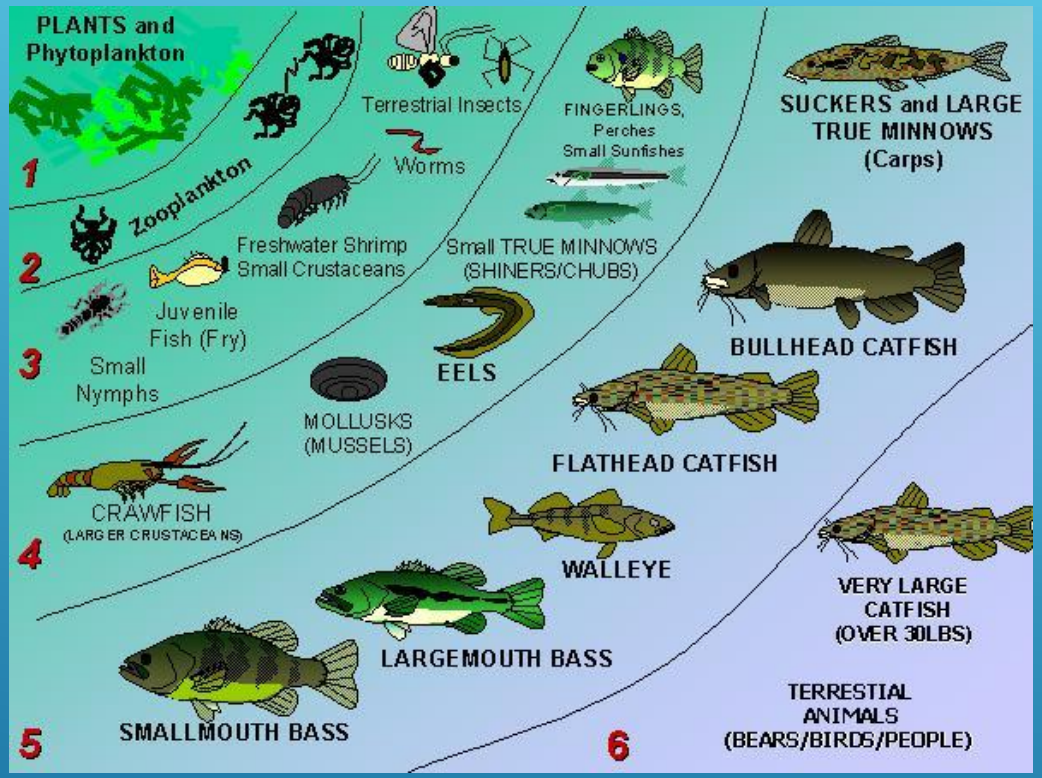
Photo: Scott Kuykendall

Salt tolerant species may outcompete native species, decrease biodiversity

Road Salt: Ecological Effects

- Aquatic life impacted by high salt concentrations
  - Frogs
  - Salamanders
  - Fish, minnows (210 mg/L)
- Some birds may also be affected by salt consumption

Road Salt: Ecological Effects



- Low concentrations kills the food fish depend on…killing fish
- Higher concentrations can kill fish directly

Road Salt: Infrastructure Impacts

Chloride and Corrosion

Road Salt can be a Killer to asphalt and concrete

Road Salt: Infrastructure Impacts

Chloride and Corrosion

Chloride ions are the major cause for the corrosion of metal in cars, of steel reinforcement in concrete, and can accelerate corrosion of metallic pipes and structures

Road Salt: Infrastructure Impacts

Chloride and Corrosion

- Annual direct losses caused by corrosion on U.S. highway bridges are estimated at $276 billion, approximately 3.1 percent of the nation's gross domestic product.
  (U.S. Federal Highway Association)
- An estimated $5 Billion of damage is due directly to road salt!

Salt: Once in Solution, Always in Solution

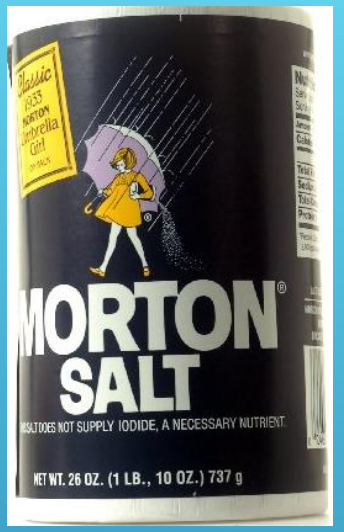
Chloride Standards

- IEPA Class I Potable Groundwater Resource Standard: **200 mg/L**
- USEPA Secondary Drinking Water Standard: **250 mg/L**
- Natural Background Levels
  Fall within range of **1-10 mg/l**

1 teaspoon salt permanently contaminates 5 gal. of water (230 mg/L)

Source: 2008 IL EPA Bureau of Water Integrated Water Quality Report

Permanent Water Impacts from Salt



About 1.5pounds = 3cups = **150 teaspoons**:

Contaminates 4 years worth of drinking water for a person

Makes 30 gallons of water unlivable to fish

24,000 pounds = 48,000 cups = **2,400,000 teaspoons**:

Contaminates 65,753 years worth of drinking water for a person

Makes 500,000 gallons of water unlivable to fish

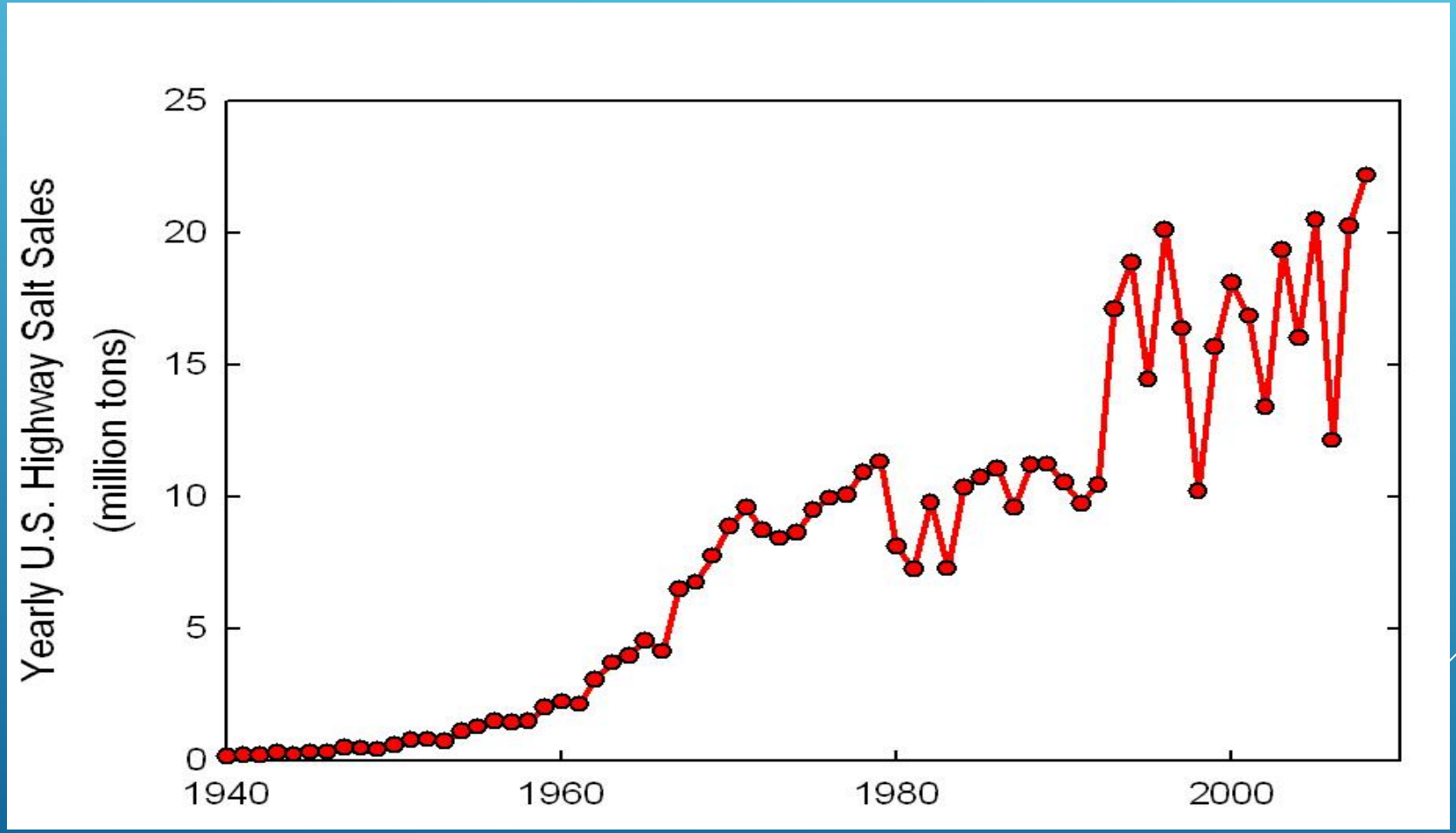
We use lots of salt!

There are over 28,000 linear miles of roadway in the Chicago Metropolitan Area alone

IT'S NOT JUST ROADS WE SALT!

- Parking lots
- Driveways
- Sidewalks

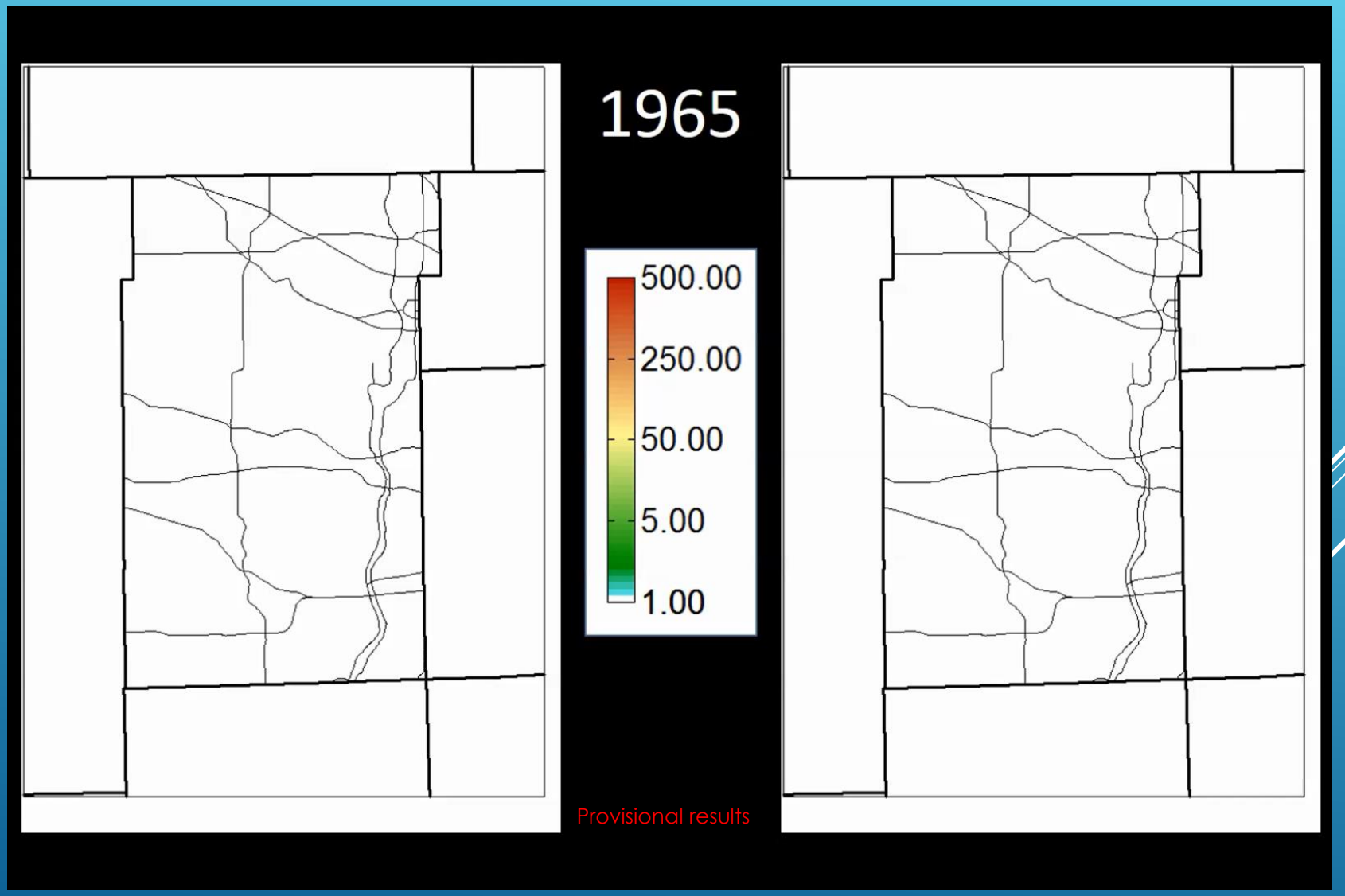
Road Salt in U.S.
Common Use Started in the 1960's



Graph courtesy of Walt Kelly

Increase of Chloride in Groundwater: 1965 - 2015

Study of Kane County by the Illinois State Water Survey



Currently

No Alternative to Salt for Snow/Ice Management

Best Option is to use Salt Wisely

Sensible Salting

"The use of Best Management Practices for snow and ice management that maintains safety for pedestrians, drivers, vehicles and property while eliminating the unnecessary use of salt to minimize impacts to water and the environment."

Sensible Salting

- Proper Storage
- Calibrating equipment
- Only applying enough product to be effective
- Tracking Weather
- Applying correct product for road temperature
- Anti-Icing vs. De-Icing
- Using liquid applications before events
- Use of carbohydrates (beet juice)
- Pre-wetting
- Training and Certification

Proper Salt Storage

Wrong

Better

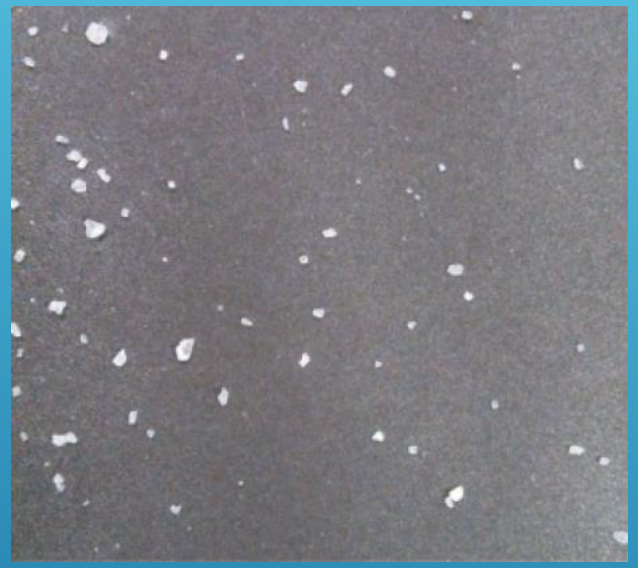
Best

Calibrate Equipment

- Calibrate Annually
- Correct application rate

Photo: Scott Kuykendall

Use Correct Application Rates



More Like This

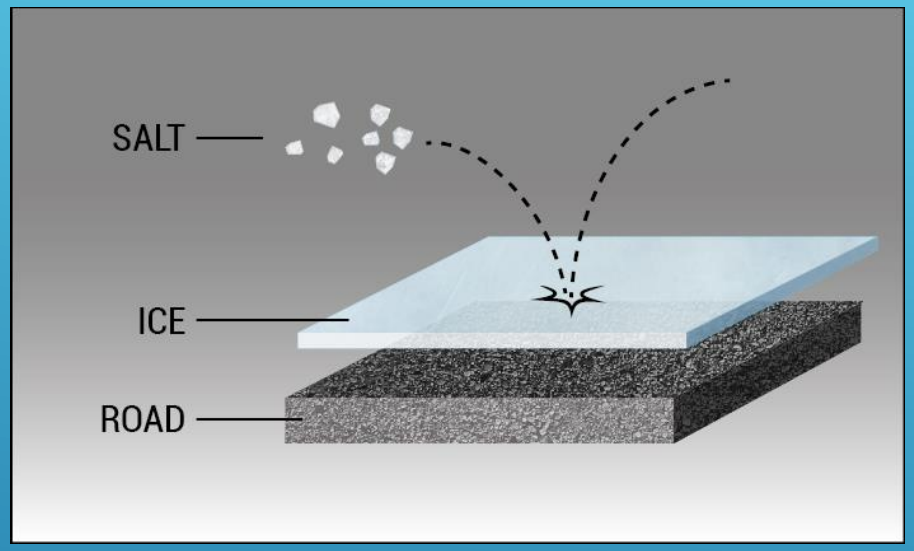
Photo: Matt Wittum

Right

NOT Like This

Wrong

REDUCE SALT USE



Pre-Wet Salt

- Activates the Salt
- Improves Effectiveness
- Reduces Bounce

Use Correct Product for Pavement Temperature

REDUCE SALT USE

Anti-Icing – Liquid Application Prior to Storms

Photo: Scott Kuykendall

- **Prevents bonding**
- **Simplifies snow removal**
- **Reduces need for additional salt applications**

REDUCE SALT USE

Liquid De-Icing – Liquid Application During Storms

- **2018/2019 Season, MCDOT tested "All Liquid Route"**
- **MCDOT Supermix (85% Salt Brine, 10% Organic, 5% Calcium Chloride)**
- **route yielded 38% reduction in road salt usage for season**

REDUCE SALT USE

Living Snow Fences

- 2018/2019 MCDOT and Farmer created Living Snow Fence
- Improves Safety - Reduces drifting, mobilizations, salt use
- Road surfaces routinely 15 degrees warmer

Sensible Salting Training

Hands-On Training

Classroom Training

Photos: Scott Kuykendall

Northwest Water Planning Alliance (NWPA) Sensible Salting Committee

Goal: Protect water quality by reducing unnecessary release of chlorides to water from snow/ice management activities

Findings: Most County's, many municipalities, and other governmental entities working on salt reduction

Private sector has no oversight and actually incentivizes excessive use of salt

Greatest opportunity to influence salt reduction is in private sector

Northwest Water Planning Alliance (NWPA)
Sensible Salting Committee

Sensible Salting for Parking Lots and Sidewalks

Expanded Sensible Salting Committee with partners throughout Chicago Region

Including:

McHenry County Planning and Development	Salt Smart	Illinois Section American Water Works Association	Engineering Enterprises, Inc.
Kane County Stormwater Management and Permitting	Morris Engineering	Illinois State Water Survey (ISWS)	Midwest Salt
Lake County Stormwater Management Commission	Barrington Area Council of Governments (BACOG)	Chicago Metropolitan Agency for Planning (MCAP)	Cornerstone Partners
Lake County Health Department	Metropolitan Water Reclamation District of Greater Chicago (MWRDGC)	Des Plaines River Group	Morris Engineering
Village of Aurora	Sea Grant Illinois-Indiana	Illinois State Toll Highway Authority	Acres Groups
Fortin Consulting	Conservation Foundation	Viasala	Good Samaritan Hospital

Northwest Water Planning Alliance (NWPA)
Sensible Salting Committee

Sensible Salting for Parking Lots and Sidewalks

Developed a <u>Four Step Plan</u>:

1. Regional Sensible Salting Manual
2. Professional Regional Training & Certification program
3. Local ordinances or policy's requiring "Certified" operators
4. State legislation providing limited liability protection for "Certified" operators

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

STEP 1:	REGIONAL SENSIBLE SALTING MANUAL

WE HAVE BEEN SINGING ABOUT SENSIBLE SALTING WITH A SOFT VOICE

Sensible Salting
Training and Outreach

- Counties
- Trade Organizations
- Environmental Groups

NEED TO RAISE THE VOLUME TO 11 !!!

AND SING WITH A LOUD UNIFIED VOICE!

So everyone is aware of the problem

And the solutions!!!

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

STEP 1:	REGIONAL SENSIBLE SALTING MANUAL

- Empower any stakeholder group to speak with a unified message
- Increase awareness about Sensible Salting throughout Northeastern Illinois
- Draft currently going through 2nd round of editing
- 2nd Draft Due Fall of 2019

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

STEP 1:	REGIONAL SENSIBLE SALTING MANUAL

- Partner with SALT SMART to provide widespread access to Regional Manual
- Work with all potential stakeholders to use Regional Manual and promote Sensible Salting
- Use Regional Manual to raise support for STEP 2!

SALT SMART SAVE MORE

http://saltsmart.org/

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

STEP 2:	REGIONAL TRAINING & CERTIFICATION PROGRAM

- Use the Regional Manual to raise interest in salt reduction and get funding to develop a Professional Sensible Salting Training & Certification program for Northeast Illinois

- Use Steps 1 & 2 to raise support for STEP 3!

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

STEP 3:	WORK WITH MUNICIPALITIES TO REQUIRE "CERTIFIED" SNOW/ICE OPERATORS

- Help municipalities develop and implement policies or ordinances
  - Raise awareness of Sensible Salting for property owners and managers
  - Increase participation and demand for training and certification
  - Begin reducing the amount of chlorides
- Use Steps 1, 2 and 3 to raise support for STEP 4!

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

STEP 4:	ENACT STATE LEGISLATION PROVIDING LIMITED LIABILITY PROTECTION FOR PROPERTY OWNERS WHO HIRE "CERTIFIED" OPERATORS

- Uses market forces to drive demand for reduced salt use

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

Billy Bob's

Snow Plow Service

VS.

ACE'S

"CERTIFIED" SNOW PLOW SERVICE WITH LIMITED LIABILITY PROTECTION

SENSIBLE SALTING FOR PARKING LOTS & SIDEWALKS

STEP 4:	ENACT STATE LEGISLATION PROVIDING LIMITED LIABILITY PROTECTION FOR PROPERTY OWNERS WHO HIRE "CERTIFIED" OPERATORS

- Uses market forces to drive demand for reduced salt use
- Incentivize the use of Sensible Salting practices and use less salt
- Fundamentally change snow/ice management on commercial properties
- Result in reduced water pollution from road salt!

Leave safe, sustainable water for future generations

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