

HERITAGE PARK — BUFFALO CREEK

Urban Stream and Wetland Restoration

Considerations for Design



Presentation:

IAFSM
Illinois Association for
Floodplain and Stormwater Management

Presented by:

Vince Mosca
Senior Ecologist

Hey and Associates, Inc.

Engineering, Ecology and Landscape Architecture

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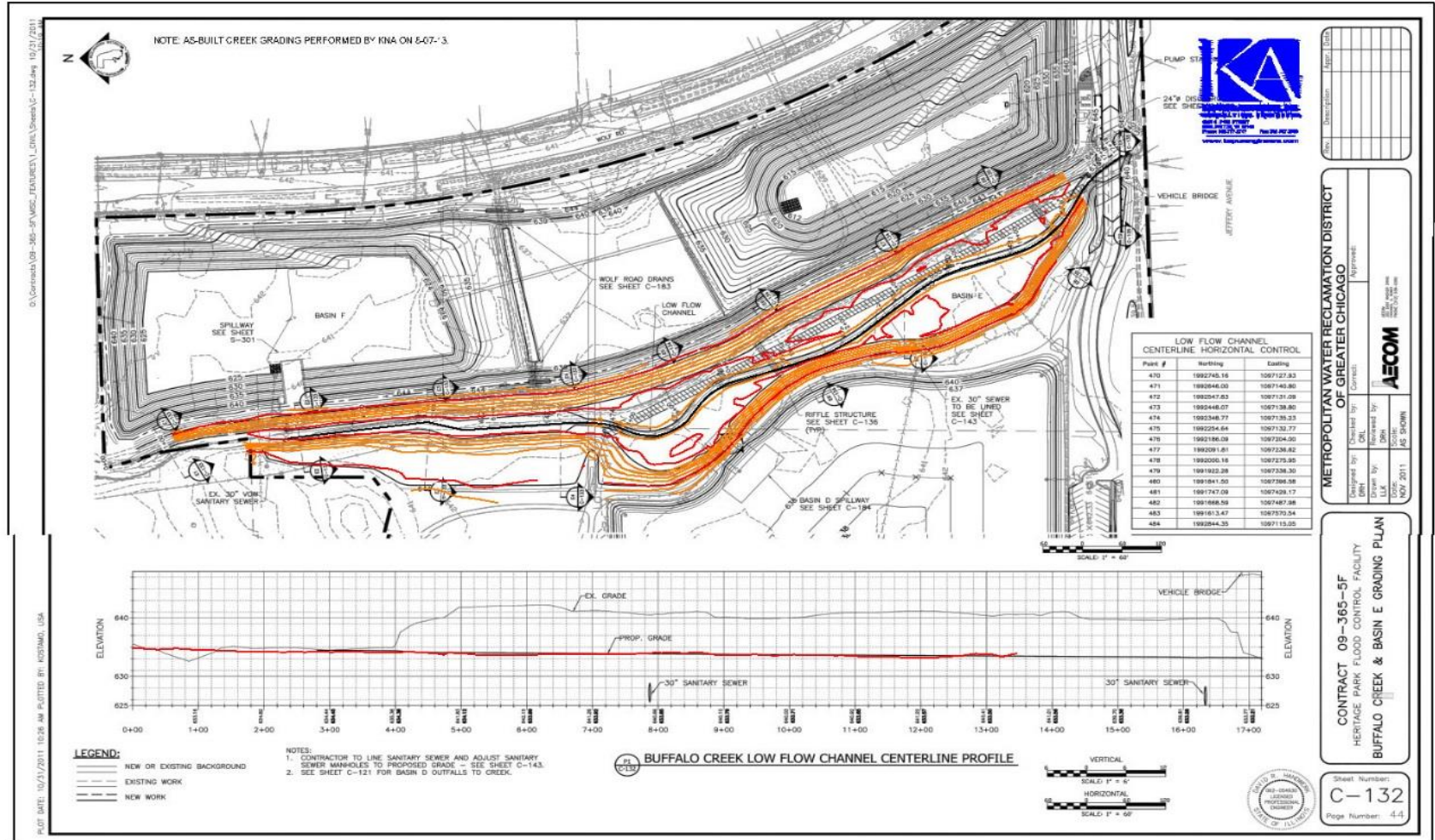
Hey and Associates, Inc.

HEY'S INVOLVEMENT

- Brought in by grading contractor for overall Heritage Park flood control improvements in early 2015 to review site conditions and the failed native wetland plantings
- Had performance criteria for MWRDGC contract and Army Corps permit to meet and contract obligations



AS-BUILT OF BASIN E



PRE-PLANTING CONDITIONS



PLANTED LATE SUMMER 2013

August 27



November 14



FIRST WINTER



FIRST WINTER

Flooding and ice stress



SPRING 2014



Herbivore
protection
damaged
by ice and
flowing
water

EARLY SPRING 2015



EARLY SPRING 2015



LATE JULY 2015



PROBLEM ASSESSMENT

- Live plantings in the active channel only
- Seed only on the floodplain terrace
- 24 square mile watershed – other regional streams almost never have emergent plants in flow channel
- Underestimated the backwater effects of DPR
- A little bad luck on rainfall events

18 cfs flow is out of bank (without rifle)

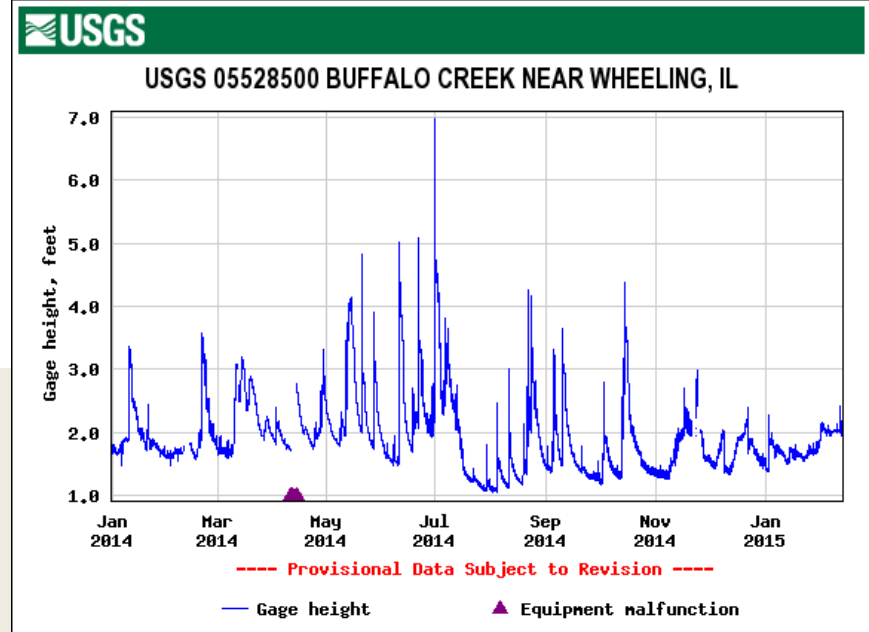
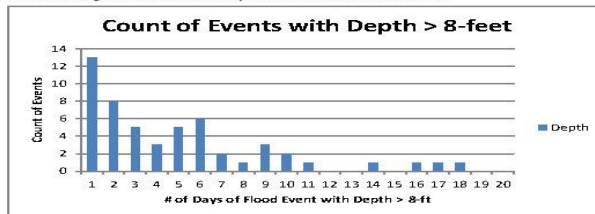
Year	No. of Times Q > 18 cfs (no.)	Avg. Duration of Q > 18 cfs (days)
1993-2015	8.182 (mean)	3.483 (mean)
Years	(no.)	(days)
1994	3	3.33
1995	9	2.44
1996	8	5.00
1997	4	5.00
1998	10	3.10
1999	11	3.64
2000	6	2.83
2001	10	2.30
2002	9	3.44
2003	5	2.60
2004	10	3.70
2005	5	2.40
2006	4	2.00
2007	13	3.85
2008	12	3.08
2009	10	4.40
2010	10	4.00
2011	12	4.25
2012	5	2.40
2013	8	4.50
2014	14	4.36
2015	2	4.00

BASIN E FLOODING

Des Plaines River Depth Analysis

	10/1993 - 3/2015
Number of times Des Plaines Depth > 8-feet	62
Minimum # of Days of Event with Depth > 8-feet	1
Maximum # of Days of Flood Event with Depth > 8-feet	19
Average # of Days of Flood Event with Depth > 8-feet	5.23
Mode # of Days of Flood Event with Depth > 8-feet	2
Median # of Days of Flood Event with Depth > 8-feet	4

When depths on the Des Plaines River are greater than 8-feet, then there is a high chance of backwater effects causing water surfaces to flood the Heritage Park overbanks adjacent to the low flow channel



PROPOSED FIXES

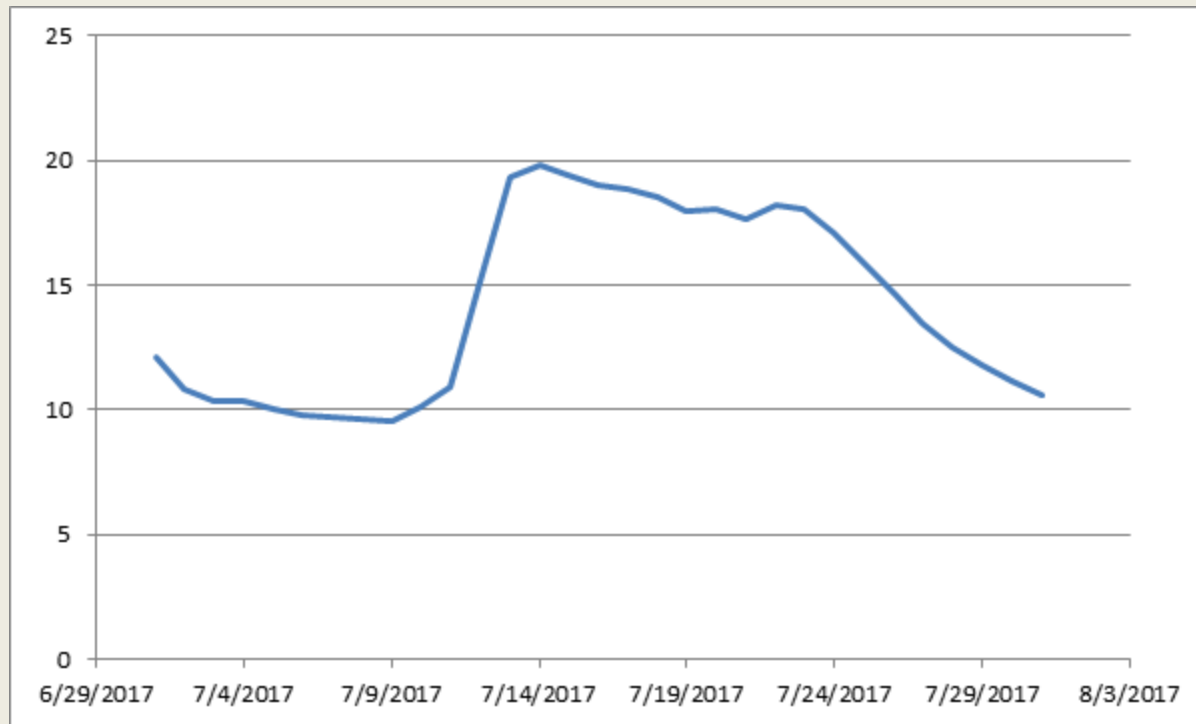
- No channel plantings
- Hardy perennial plants on floodplain – prairie cordgrass
- Seeding with more common native floodplain/disturbance tolerant species
- Simplify planting plan
- Lower diversity requirements
- Modify M&M plan



SEPTEMBER 2016



DES PLAINES RIVER



DPR
jumped
about
10 feet
during
July
2017
storm

JULY 20, 2017



AUGUST 20, 2017



AUGUST 20, 2017



Progress towards better
coverage by perennials



JULY 2019



Essentially 100% coverage of floodplain terraces with “robust” perennials



JULY 2020



Can you have
“too many”
plants?

What
Manning’s n
would you
assign here?!?!?

JULY 2020



Uber coverage
on terraces.

Note that the
channel proper
is still
unvegetated.

PRETTY GOOD PROGRESS IN 5 YEARS

2015



2020



YEAR 7

Fall 2022



Prairie cordgrass is
chest high!!



DESIGN ISSUES

- Design team (and regulators) really didn't understand the urban stream dynamics
- Designed the plantings as “aspirational” not “realistic”
- Planting design was probably more aggressive and laid out more than necessary
- Have to be cognizant of natural perturbations and stressors



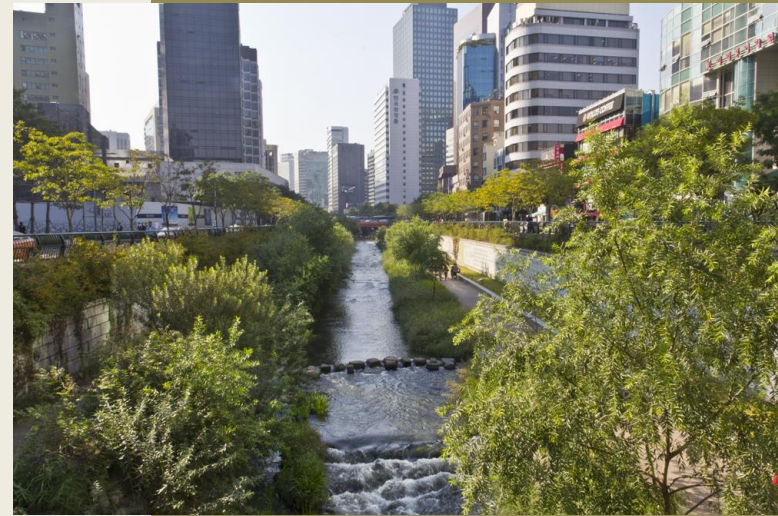
PERSPECTIVE

- Shows that water quality issues and flooding don't necessarily prevent restorations of natural systems in modified habitats
- Initial plantings mostly failed due to human design issues, not road salt and sediment
- Be practical and leave a little wiggle room for natural patterns to establish.



PERSPECTIVE

- Use caution when designing urban stream restorations
- Water quality limitations will likely overwhelm any habitat features in certain situations
- Hot summer waters
- Salty water (or worse)
- Consider the value of the CORRIDOR, not just the channel



CLIMATE CHANGE?!?!?!?

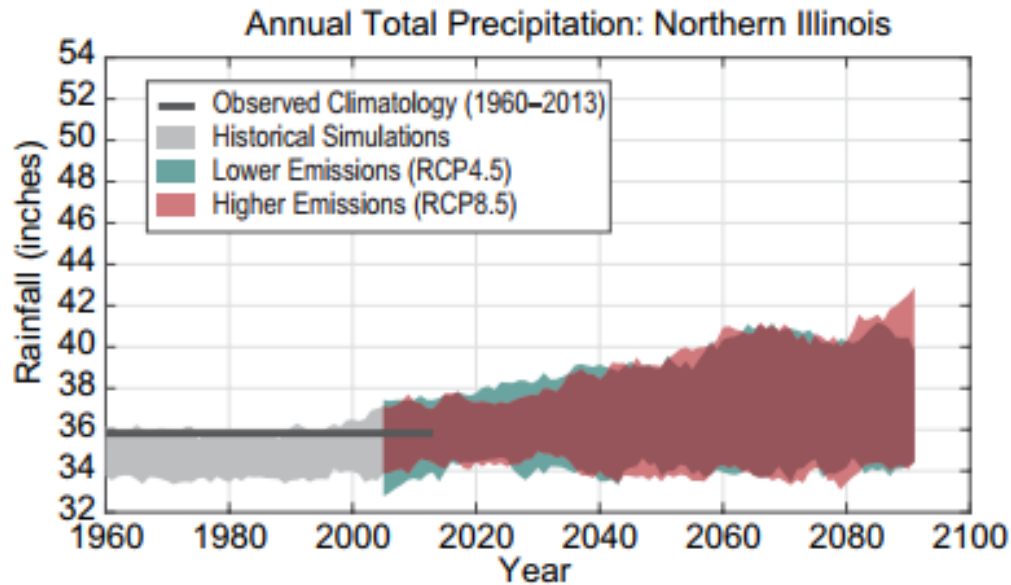
WHAT DOES THE FUTURE BRING?



Expected Trends:

- Extreme warm periods
- Increase in total annual precip
- Increase in rainfall intensity
- Higher evapotranspiration
- More and extended droughts

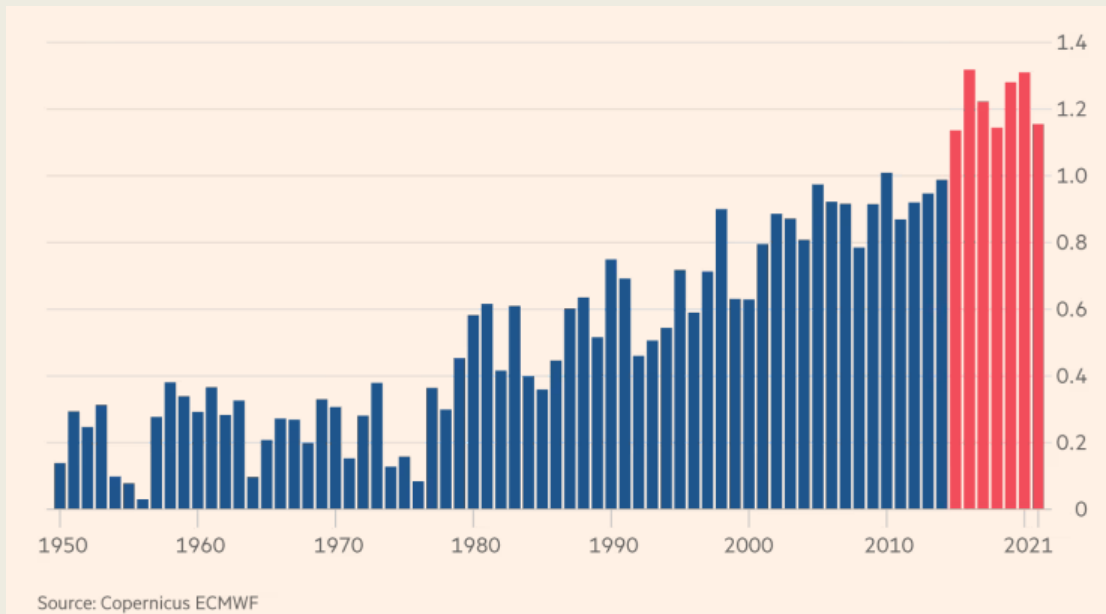
THROUGH WHAT MECHANISMS?



Weather patterns:

- Wetter winter and springs
- Hotter summers
- Warmer nights
- More heavy rainfall
- More droughts

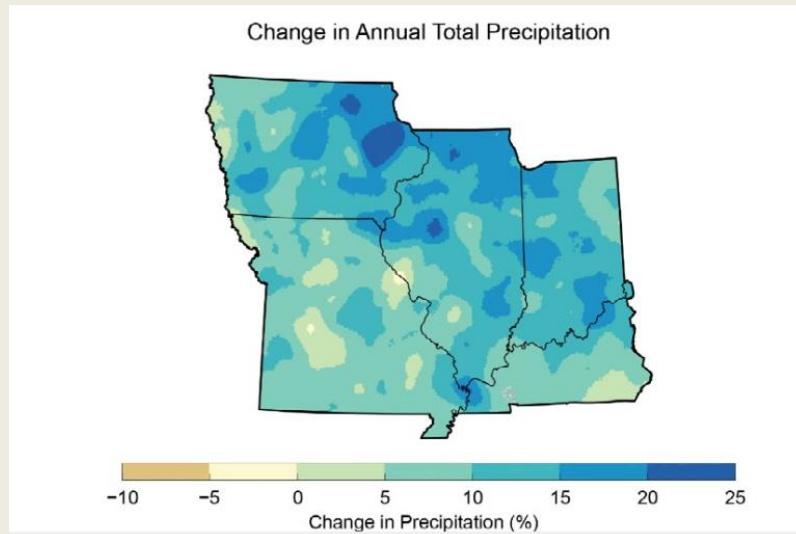
HOTTER PLANET



Trend is obvious

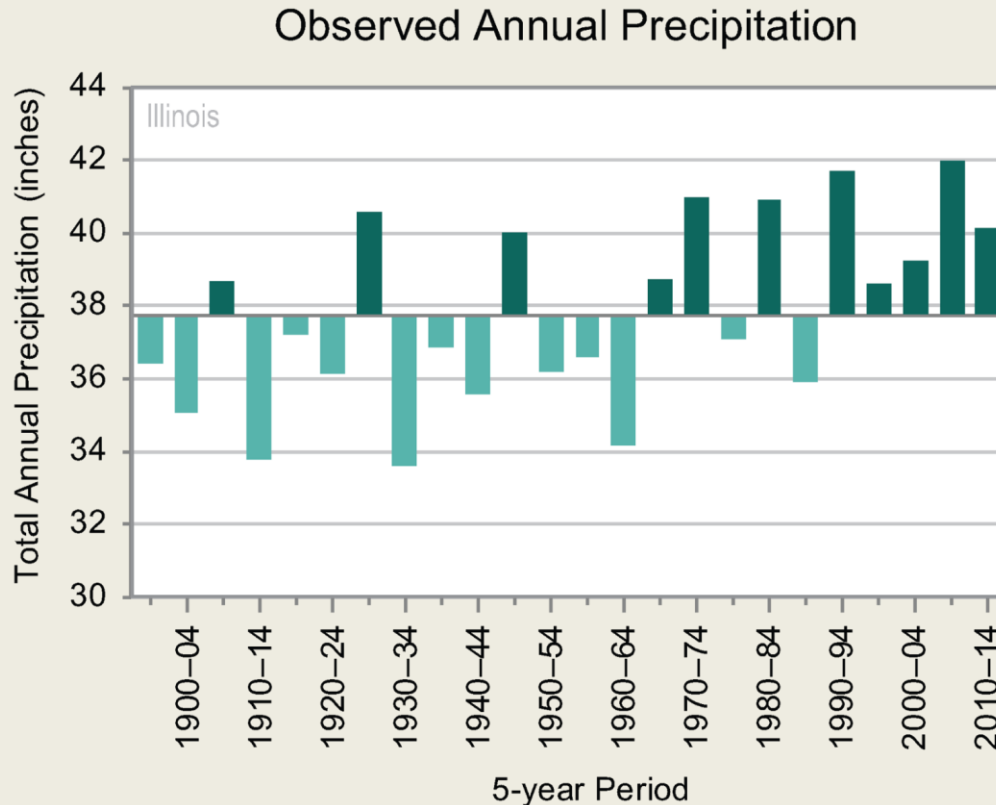
PRECIPITATION

Season	Precipitation (inches)	Precipitation (% Change)
Winter	+0.54	8.5%
Spring	+1.33	12.5%
Summer	+1.55	14.3%
Fall	+1.33	15.9%



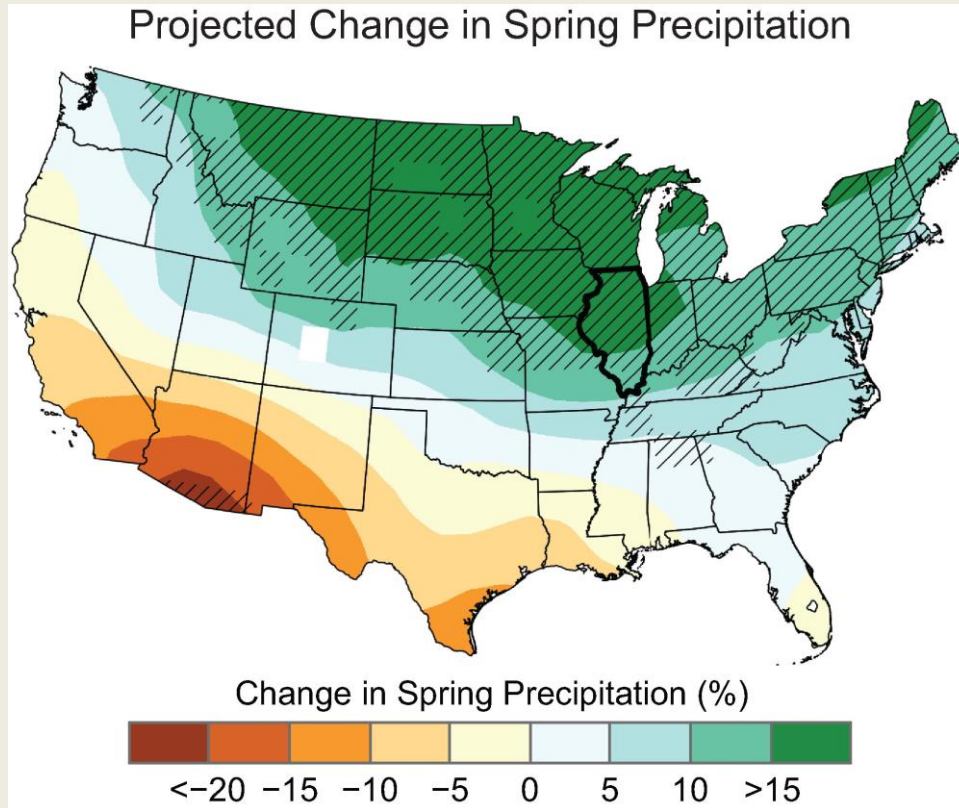
- Most of the Midwest will receive more rainfall
- Northern IL will undergo more change more than southern IL
- Changes spread throughout the season

ANNUAL PRECIPITATION



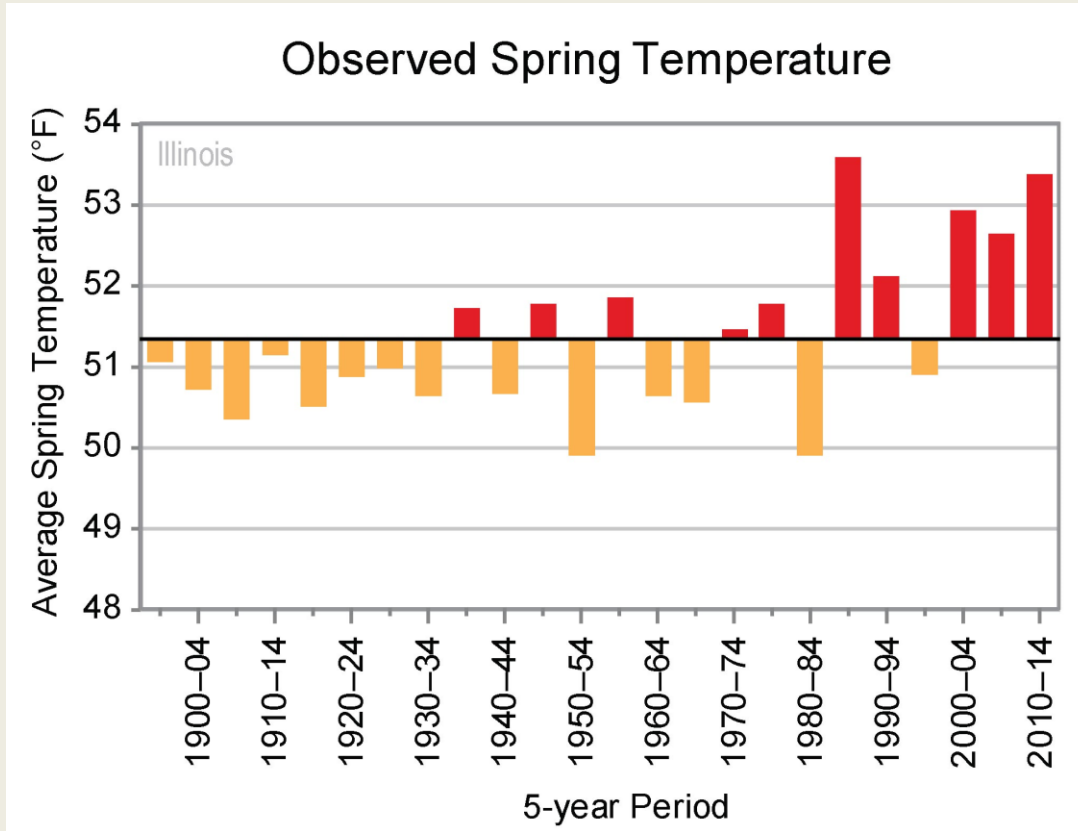
- More overall precipitation – snow and rainfall
- Trends have already been observed in the statistics, not theoretical
- Statewide update in design parameters for stormwater management requirements (Bulletin 75)

SPRING RAINS



- Spring rains are good for wetlands, right?
- Upper Midwest and Plains will have wetter winters and springs
- But, wetlands will dry out faster!

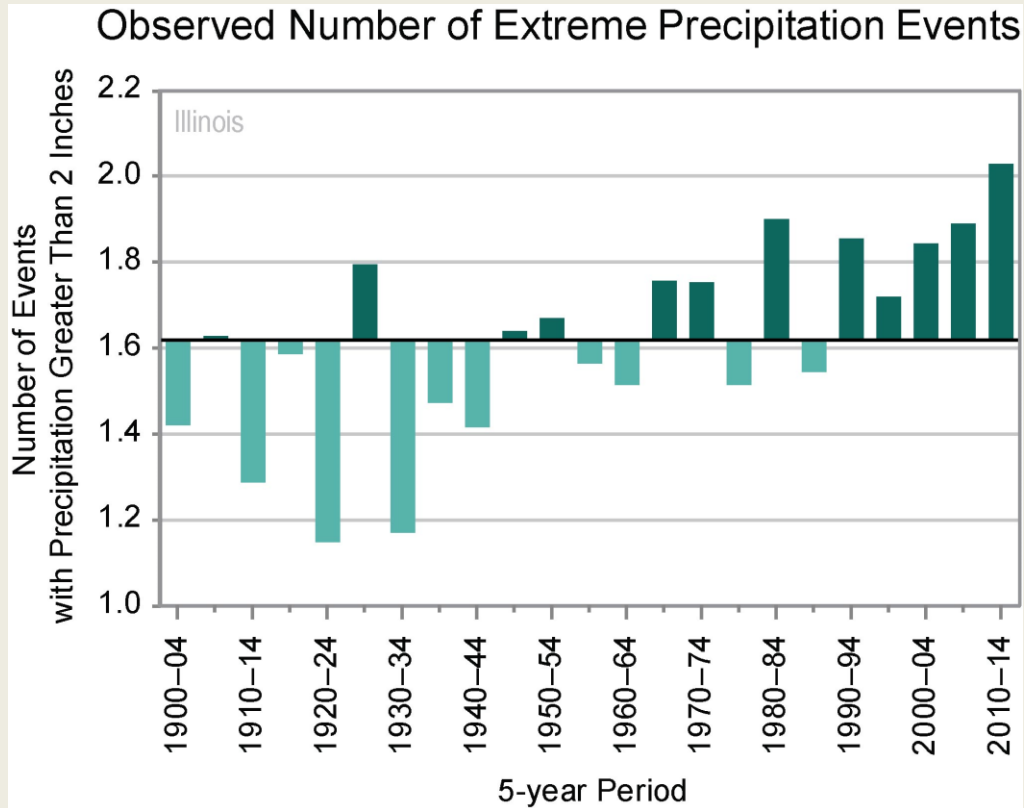
HIGHER SPRING TEMPS



Warmer temperatures
will result in more
evapotranspiration

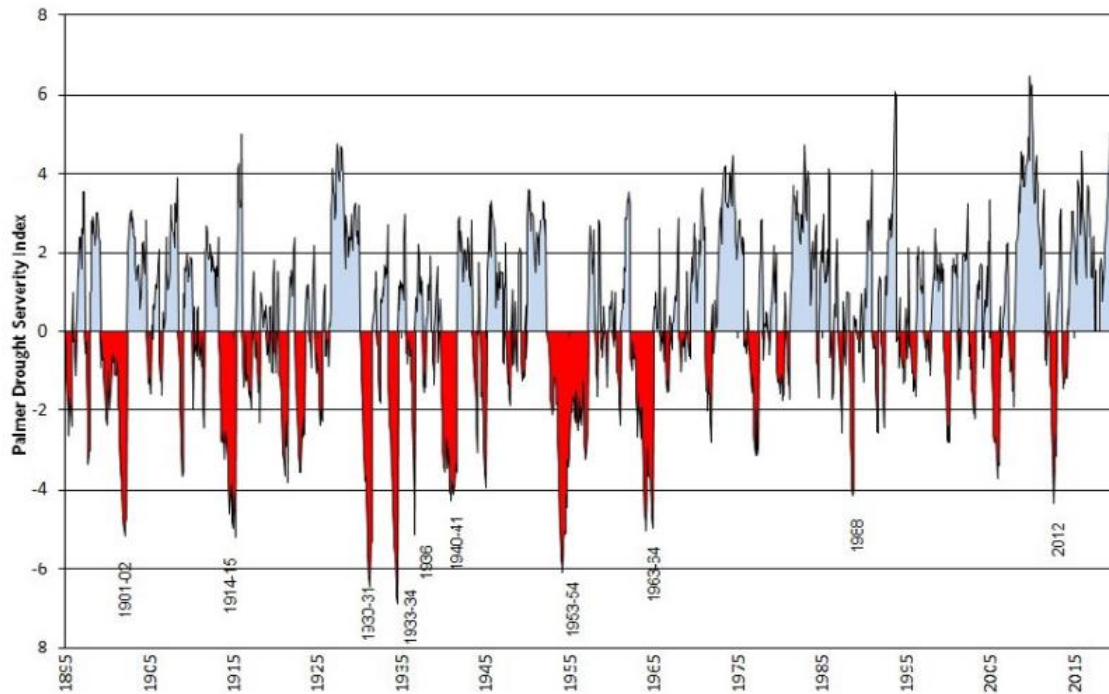
Wetlands will be wetter
in the spring but will
dry out faster

EXTREME EVENTS



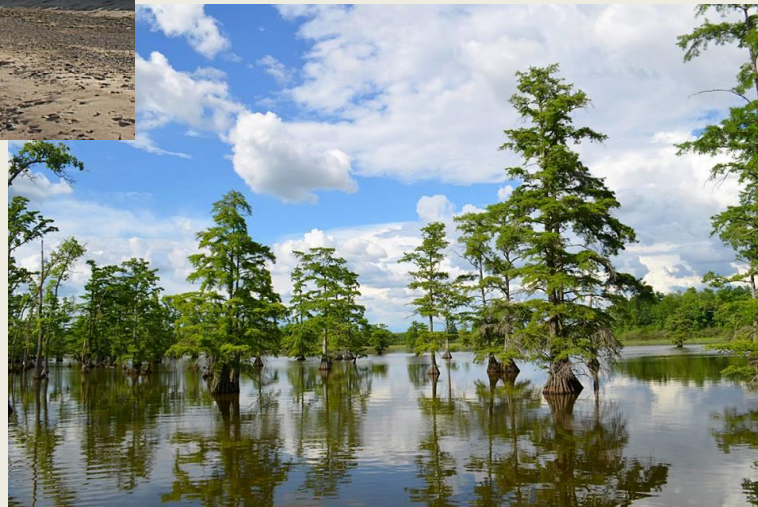
- Heavier rains more often
- High intensity, short duration storms will be more common
- Will strain gray and green infrastructure
- More non-point source pollution likely

MORE DROUGHT PERIODS



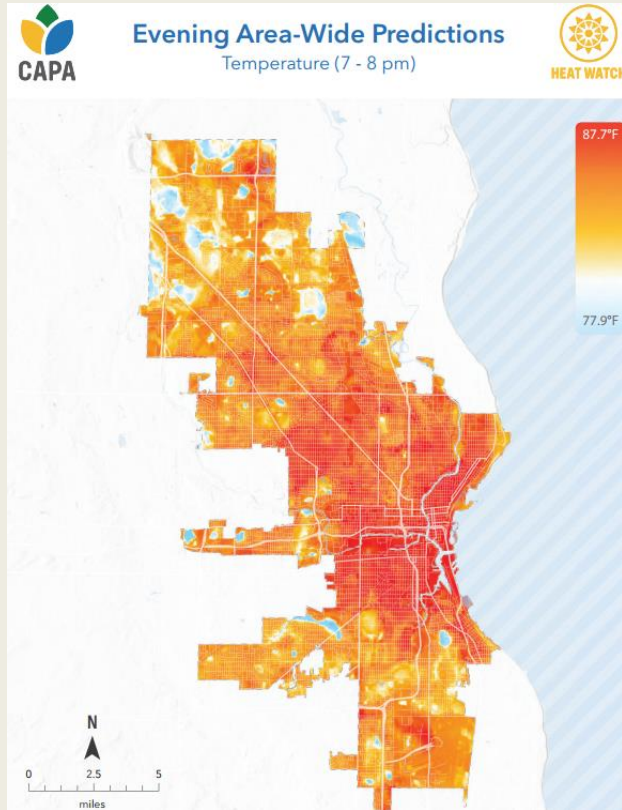
- Feast or famine cycling
- Wetter and drier periods in erratic patterns
- Stress on plant communities will be hard to predict
- Midwest wildfires?

MOST AT RISK SYSTEMS



- Small ephemeral wetlands (and amphibians)
- Depressions with small tributaries
- Coastal wetlands
- Wooded wetlands (increased flooding)
- Less farmed wetlands

TROUBLE — URBAN WETLANDS



- Increased daytime and evening/overnight temperatures will dry out urban systems differentially
- Emphasizes the need for green infrastructure and resiliency planning
- Need for adaptative management

IMPACTS TO AQUATIC SYSTEMS



- More and prolonged riverine flooding
- More droughts
- Results in more non-point source pollution, warmer and saltier water
- High flows from extreme events followed by low base flows during droughts
- Coldwater species won't fair well
- Mussels and good bugs won't fair well either
- Lake stratification effects

EFFECT ON LAKES

- Temperature regime shifts
- Length of stratification
- Ice-covered periods (good and bad)
- Water levels (lower)
- Lower dissolved oxygen levels
- More road salt loadings (probably)
- More rooted plant growth
- New invaders from the south
- Increase in harmful algae blooms
- Increase in non-point source pollutants



ROAD SALT — TOUGH PROBLEM

- Impacts to aquatic organisms at concentrations of 150 mg/l
- State standard is 500 mg/l
- No real BMP or green infrastructure way to treat
- Sensible salting techniques and deicing alternative like brining and beet juice
- All waterways in Lake County are running above 100 mg/l baseline
- Lake Michigan levels are rising but only around 15 mg/l



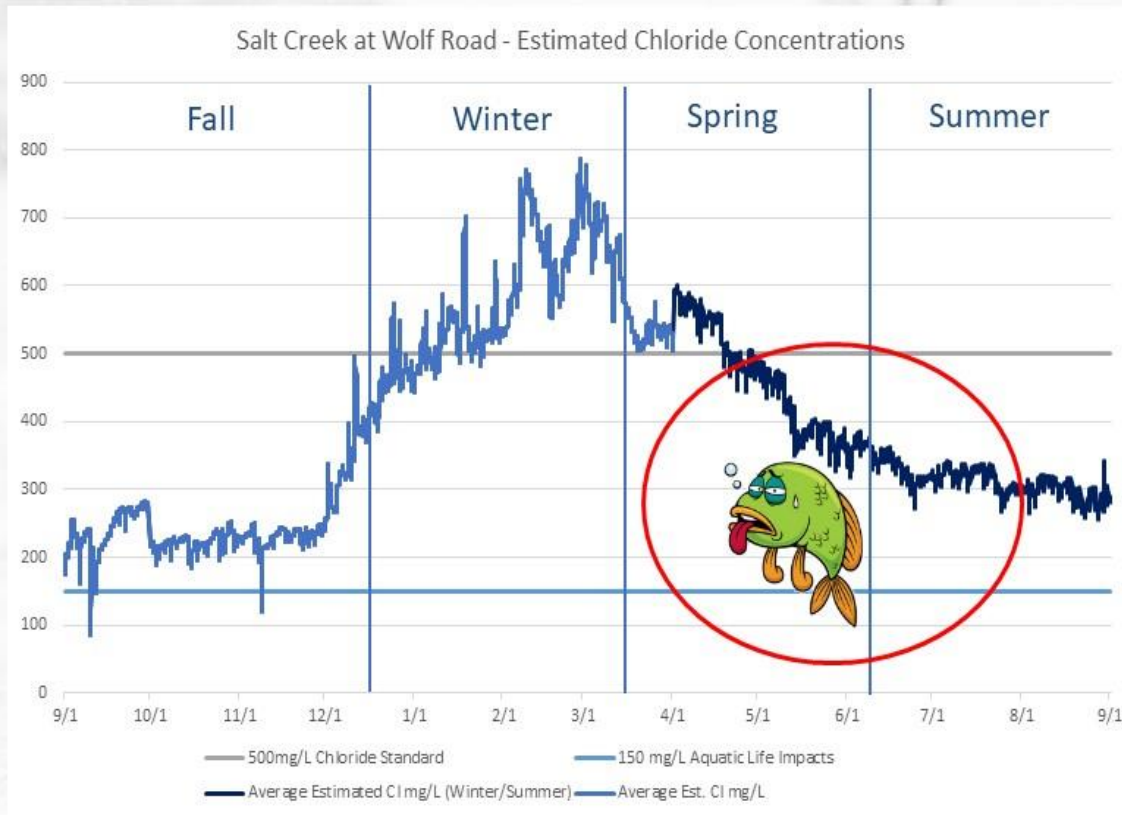
SALTY WATERS

Chloride Concentrations in Illinois Waterways

IL State
Chloride
Standard of
500 mg/L



Impacts to
Aquatic Life at
150 mg/L



Data provided by DuPage River Salt Creek Workgroup



Impacts of Chloride - Natural Environment

- Chloride impacts aquatic life
 - Interferes with reproduction cycles
 - Can be toxic to eggs and juvenile stages
- Chloride kills amphibians
- Chloride can burn or kill vegetation
- Chloride changes soil composition
- Chloride can accelerate growth of Giant Reed
- Chloride levels are rising in groundwater wells



QUESTIONS?

Hey and Associates, Inc.

Engineering, Ecology and Landscape Architecture
26575 W. Commerce Drive, Suite 601
Volo, Illinois 60073

Phone: 847.740.0888

Fax: 847.740.2888
volo@heyassoc.com

Vince Mosca

847-740-0888, x120
vmosca@heyassoc.com

Additional Locations

Chicago

8755 W. Higgins Road
Suite 835
Chicago, IL 60631
773.693.9200
773.693.9202, fax
chicago@heyassoc.com

Milwaukee

9401 W. Beloit Rd, Suite 210
Milwaukee WI 53227
414.327.0440
847-740-2888, fax
milwaukee@heyassoc.com