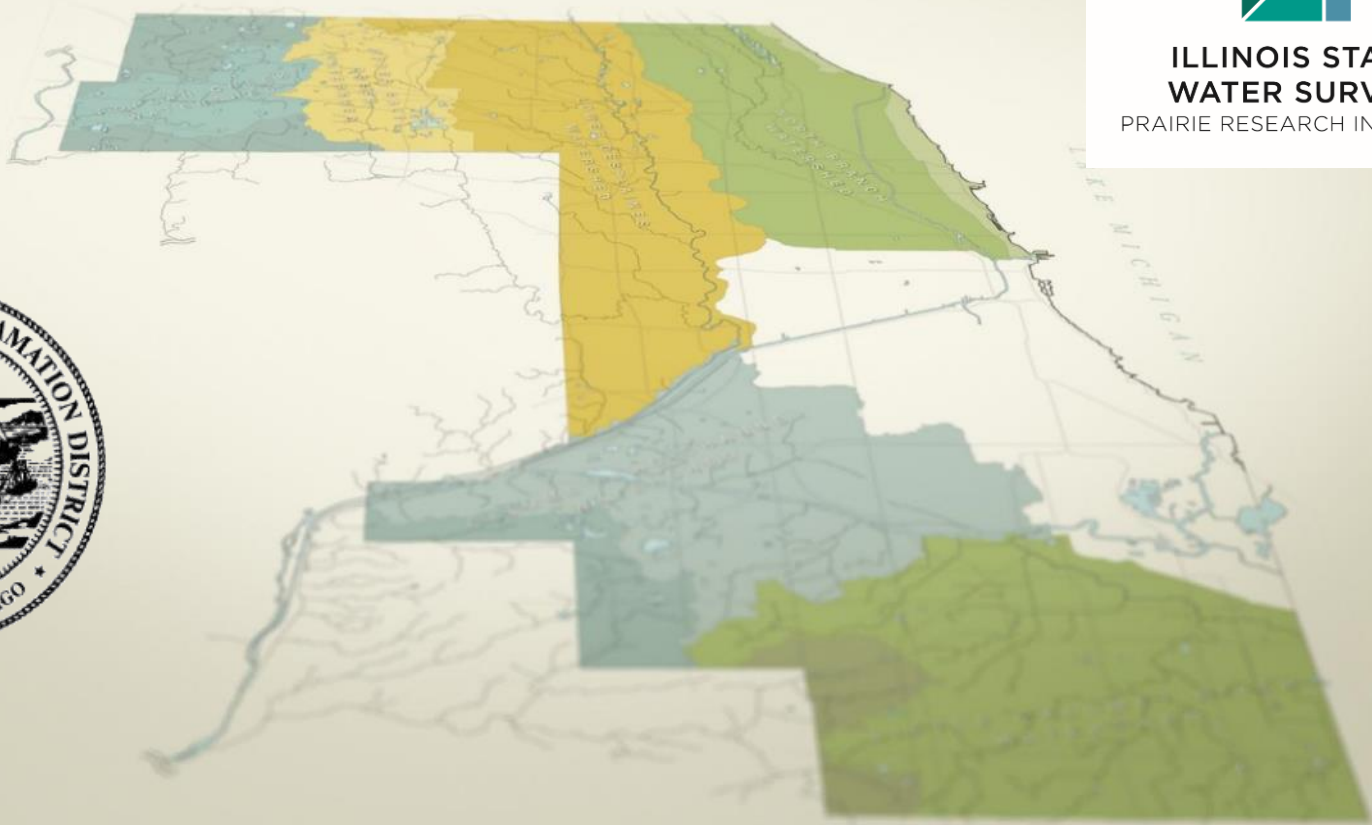


Evaluating Release Rates for Specific Watersheds in Cook County



**ILLINOIS STATE
WATER SURVEY**
PRAIRIE RESEARCH INSTITUTE



IAFSM

March 8, 2017



Summary of MWRD Facilities

- 7 Water Reclamation Plants
 - (including one of the worlds largest)
- ~ 554 Miles of Interceptors
- ~ 109 Miles of Deep Tunnels
- ~ 10.6 Billion Gallons of CSO Storage
 - Includes Thornton Reservoir online in 2015



McCook Reservoir
Phase I - 3.5 BG Online in 2017
Phase 2 - 6.5 BG Online in 2029



Watershed Management Ordinance



Watershed Management Ordinance (WMO) became effective May 1, 2014

- Applies to all development within the boundaries of Cook County, Illinois, and qualified sewer construction within the District's corporate boundaries or service agreement areas
- Components which are regulated under the WMO include:
 - Qualified Sewer Construction
 - Drainage and Detention
 - Volume Control
 - Floodplain Management
 - Isolated Wetland Protection
 - Riparian Environment Protection
 - Soil Erosion and Sediment Control
- Provides uniform stormwater management regulations to prevent future commercial, municipal, and residential development and redevelopment projects from exacerbating flooding and protects environmentally sensitive areas



Watershed Specific Release Rate Study



WMO Article 5. Requirements for Stormwater Management

§504: Site Detention Requirements

3. The allowable release rate for a development shall be determined at the time a complete Watershed Management Permit application is accepted by the District and shall be:
 - A. 0.30 cfs/acre of development for the storm event having a one percent probability of being equaled or exceeded in a given year (100-year storm event) until April 30, 2019; and
 - B. Based on a watershed specific release rate after and including May 1, 2019 as specified in Appendix B. The watershed specific release rate shall not be less than 0.15 cfs/acre of development.



Two Phases



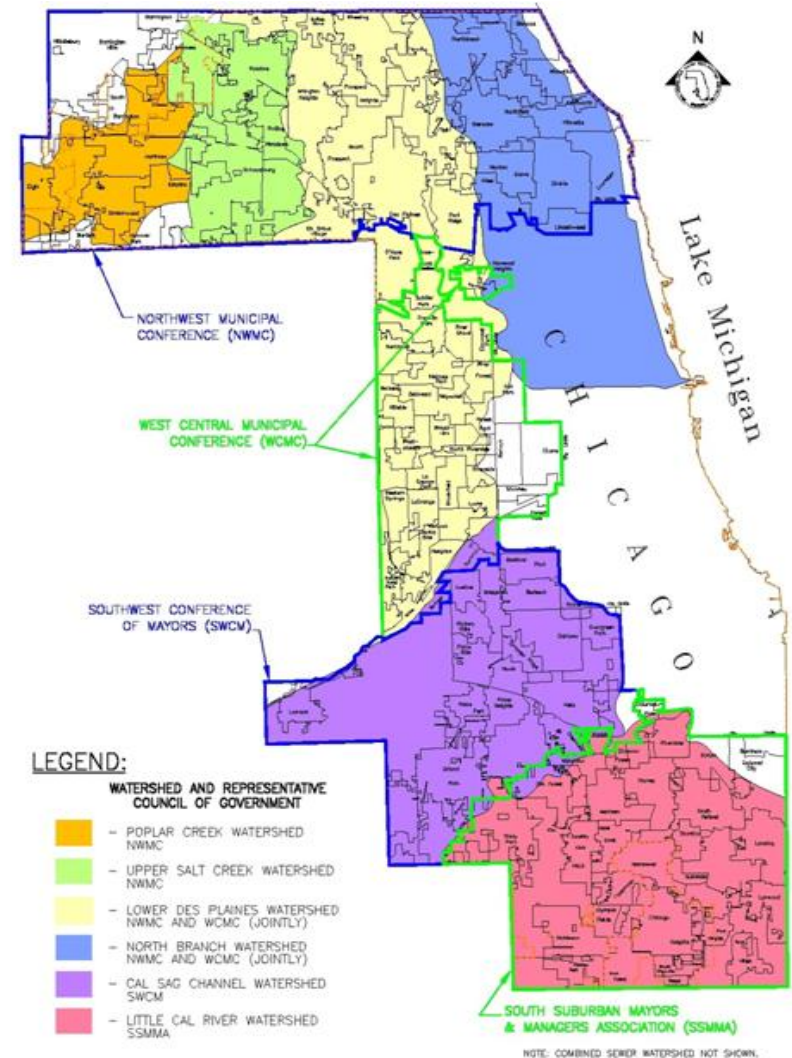
ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Phase I

- Evaluate two pilot study areas
- Develop streamlined methodology and set of assumptions
- Evaluate release rates for pilot study areas

Phase II

- Use same methodology as Phase I
- Determine release rates for watersheds under WMO regulation





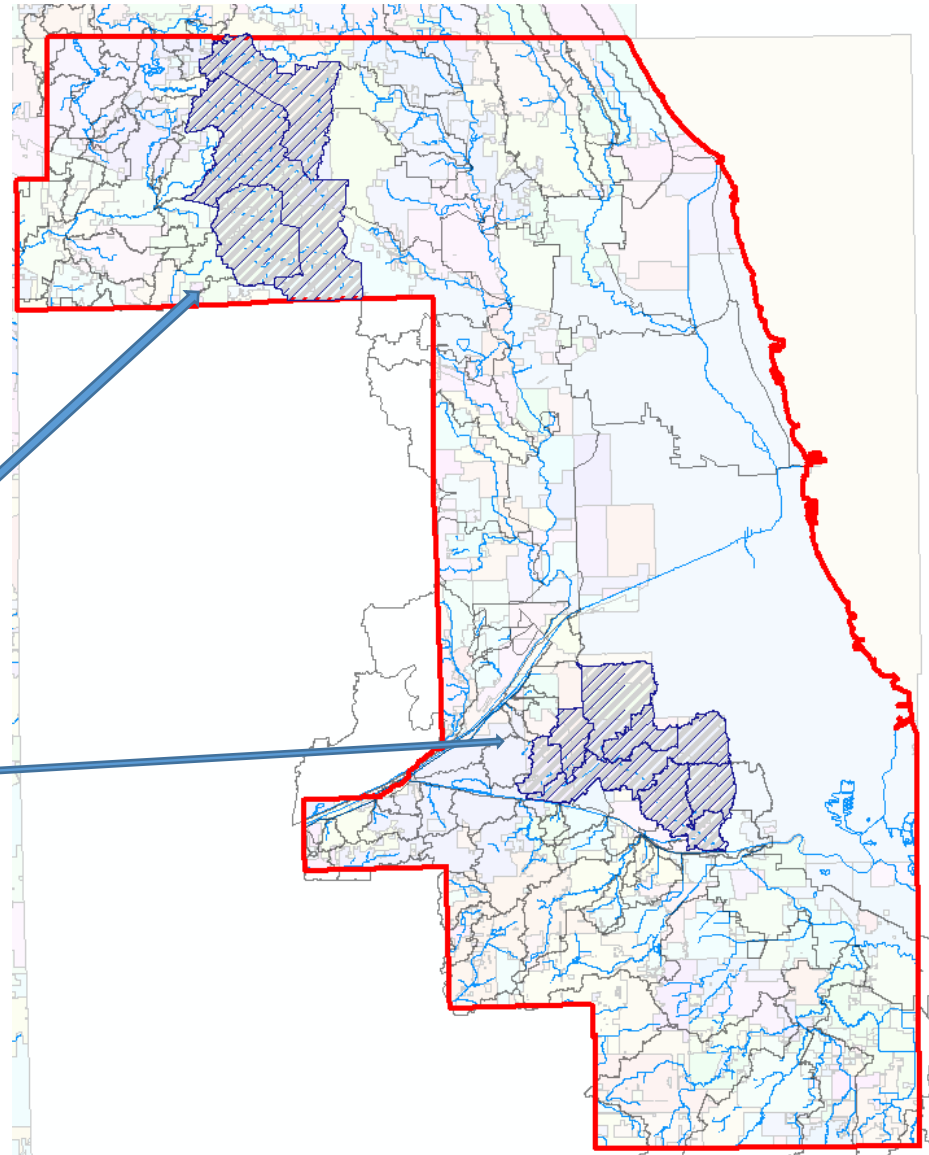
Two Study Areas



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Upper Salt Creek

Stony Creek





Basis of Methodology



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Base Condition:

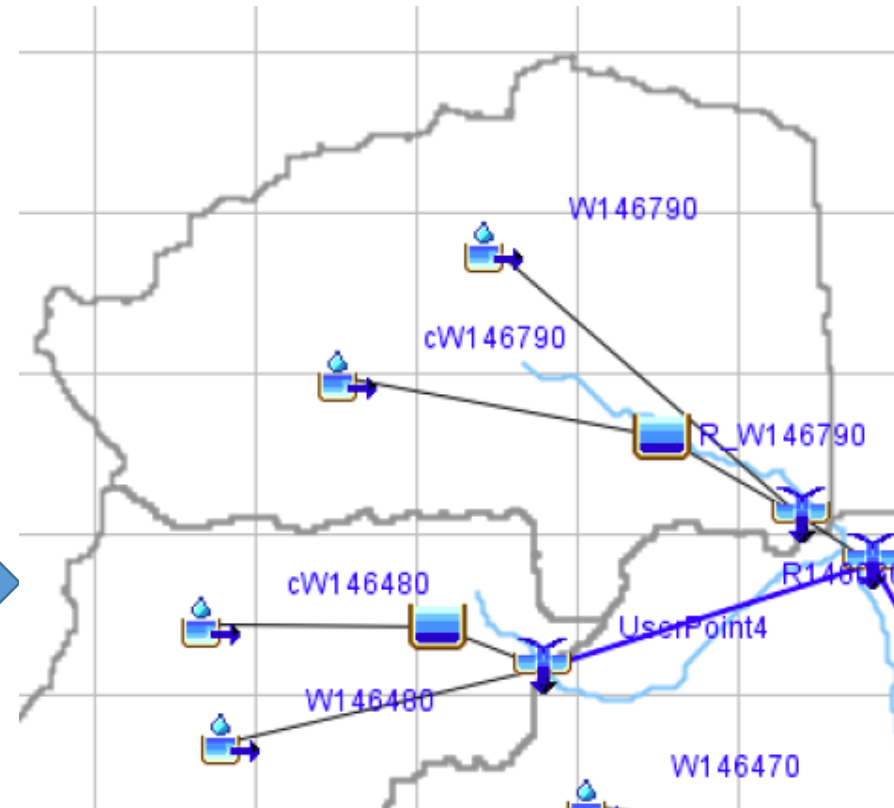
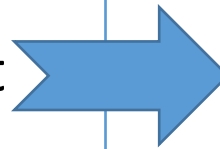
DWP H&H

with some updates

Future Condition:

Increased Development

WMO Requirement





Predicting the future?



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE



Downtown Los Angeles, 2019, in "Bladerunner"



Predicting the future?



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE



Image from iRobot, final scene, looking west at impressive future suburban growth in 2035



Predicting the future?



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE



Back to the future, 2015 Cubs World Series Win



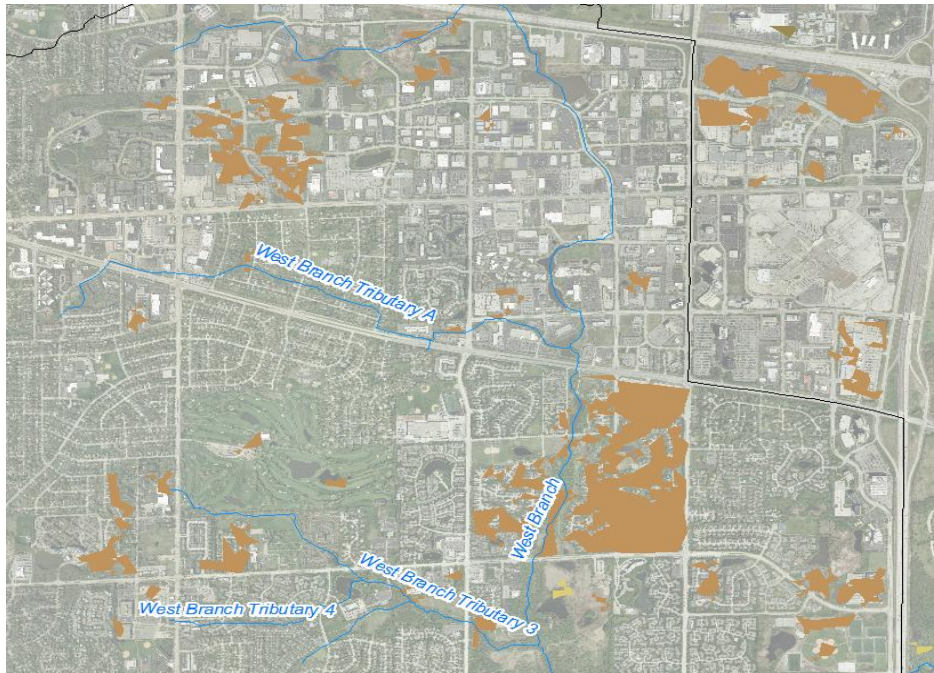
Future Development Scenario



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Based on best available data

- Historical Land Use Change
- GoTo2040 Population Projections, CMAP





Sensitivity analysis

Model versions completed to evaluate the method as a release rate planning tool:

Assumed amount of
development (15%, 40%)

Developed impervious area

Detention routing

Subbasin development location

Volume control modeling

Critical duration event



Critical Characteristics



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Three ways future development impacts hydrology:

1. Release rate compared to existing runoff rate
2. Watershed timing
3. Increased runoff volume / restrictive structures

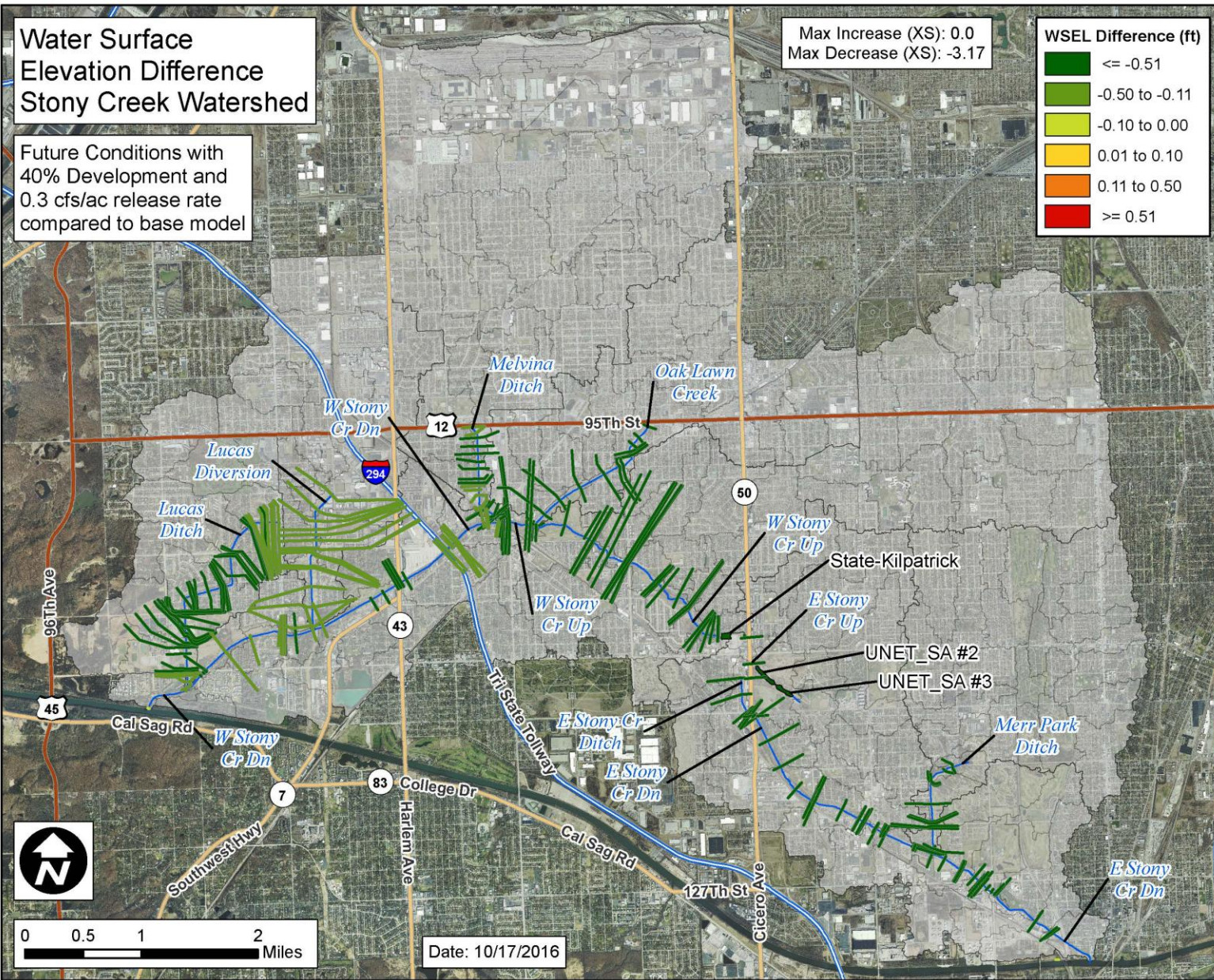


Stony Creek Results



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Future
scenario with
0.3cfs/ac

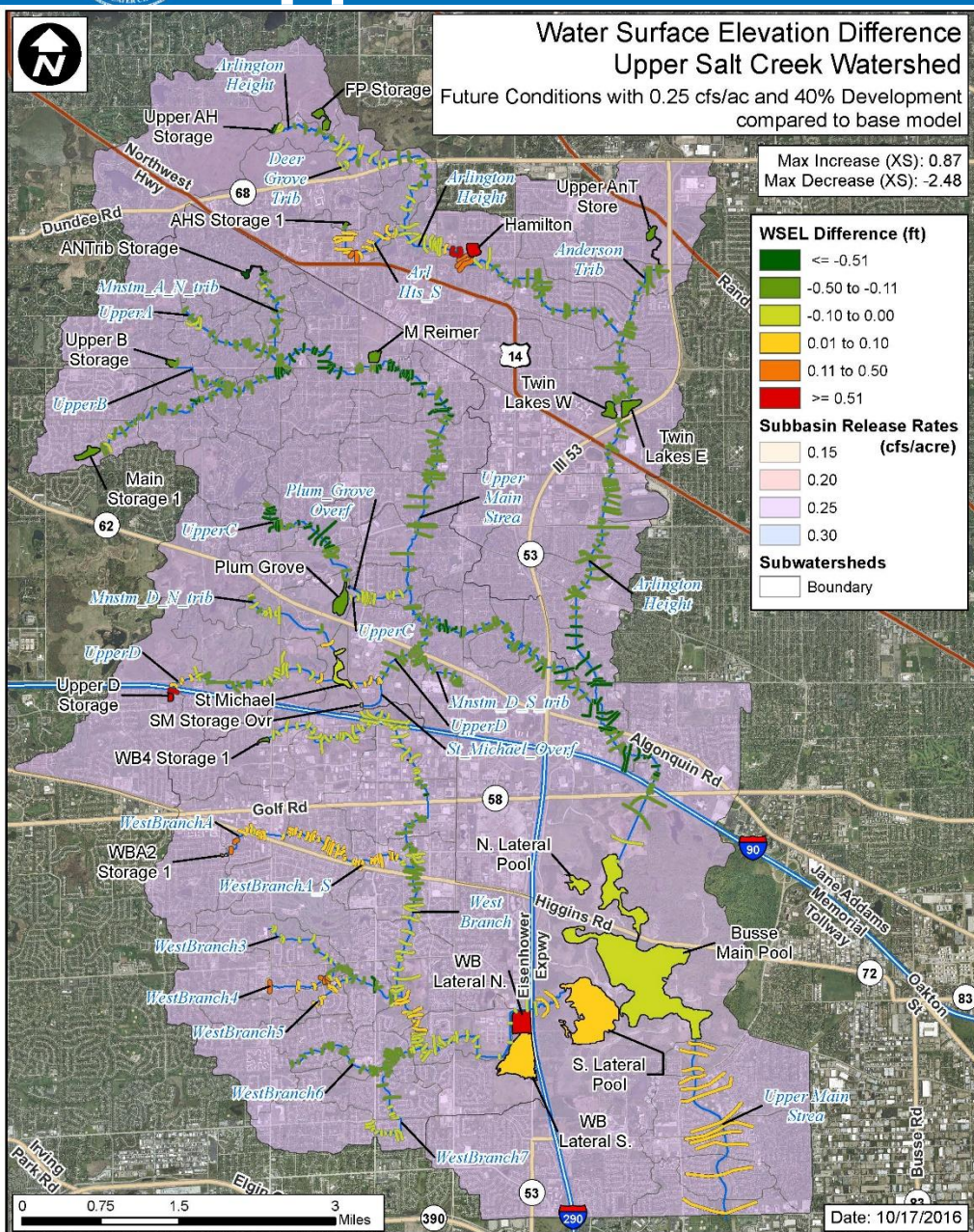




Upper Salt Creek Results



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE



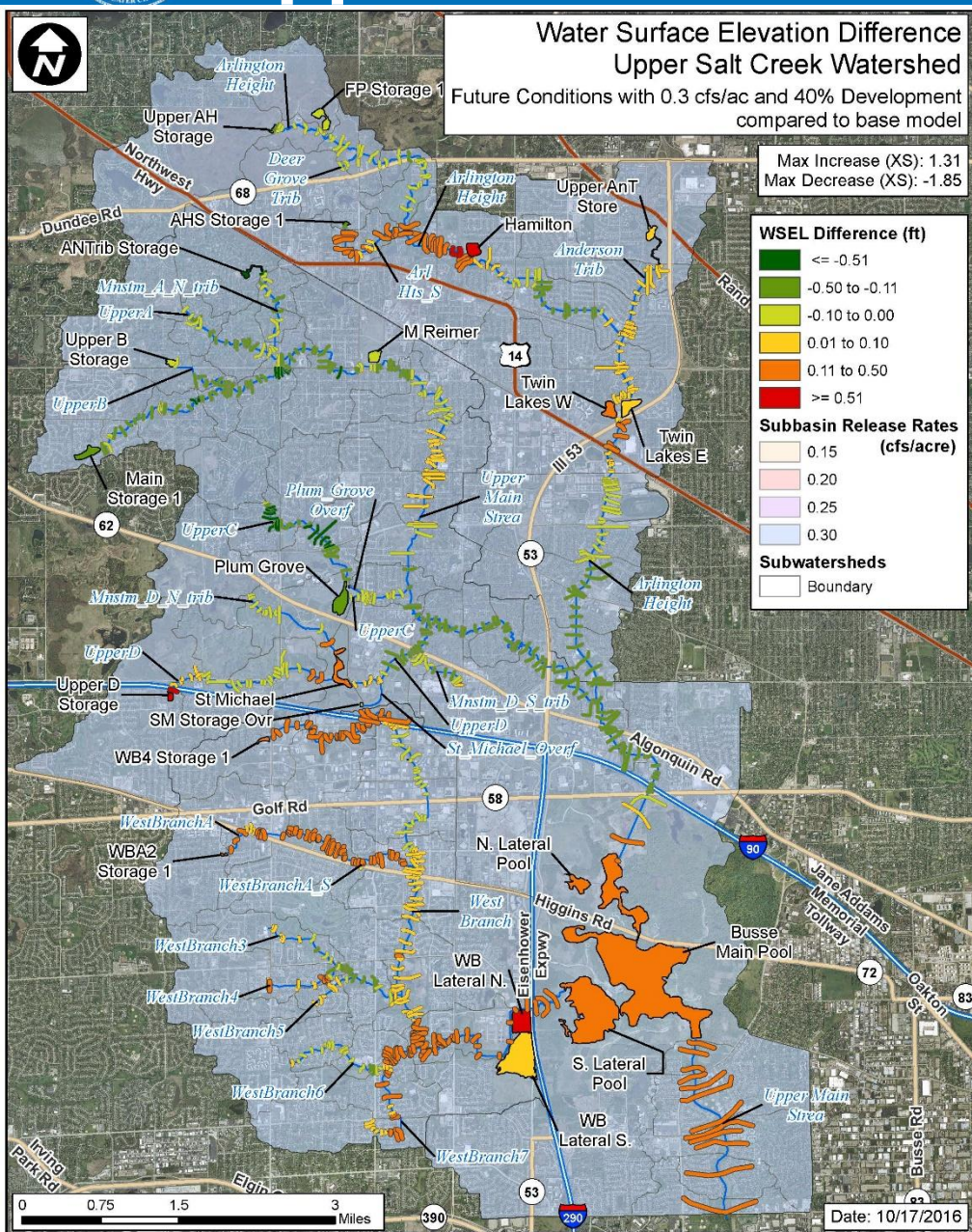
Future scenario with
0.25cfs/ac compared to the
base conditions



Upper Salt Creek Results



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE



Future scenario with
0.30cfs/ac compared to the
base conditions



Upper Salt Creek Results



ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Impact	0.15 cfs/ac	0.20 cfs/ac	0.25 cfs/ac	0.30 cfs/ac
Percentage of stream length with increase in peak WSEL>0.1'	0.7%	0.8%	1.9%	28.5%
Maximum reservoir WSEL change	1.25	1.25	1.26	1.31
Increase in reservoir maximum XS from 0.15 cfs/ac release rate	--	0.18	0.87	1.31
Maximum XS WSEL change	0.72	0.72	0.87	1.31
Increase in reservoir maximum XS from 0.15 cfs/ac release rate	--	0.19	0.87	1.31



Phase I Summary

The methodology does identify that increases in peak stage for a future condition can be reduced using a more restrictive release rate for some watersheds and the selected release rate may vary by watershed.

Phase I analyses provided *insights to indicators* for when a more restrictive release rate may mitigate peak discharge increases in the future condition.

Proposed release rates were **NOT** identified as additional analysis in the Calumet Sag and Upper Salt Creek are anticipated in Phase II.



Phase II

Phase II will continue Phase I methodology focusing on critical areas in each watershed.

Phase II will evaluate use of Onto2050 available data and flood control changes in Upper Salt Creek.

Phase II will be complete in 2019 and identify watershed specific release rates for the WMO.



Contact Information

Ann Gray, P.E.

Senior Civil Engineer

Local Sewer Systems Section

MWRDGC

111 E. Erie St., Chicago, IL 60611

(312) 751-3085

graya@mwrdd.org

Amanda Flegel, P.E., CFM

Illinois State Water Survey

2204 Griffith Dr, Champaign, IL 61820

(217) 300-3468

aflegel@Illinois.edu