



STORMWATER MANAGEMENT COMMISSION

We hope to see you back so soon at the next TAC meeting on **Thursday, May 16, 2019** at 9:00 AM.

The meeting will be held at our normal location:

Lake County Central Permit Facility

500 W. Winchester
Main Conference Room
Libertyville, IL 60048

Meeting Topic:

Staff presented the updated Bulletin 70 technical findings and concerns at the May 2, 2019 SMC Board Meeting. The following policy-level guidance was provided:

1. Using the Waukegan point data to represent flood risk for Lake County was not supported.
2. Performing a separate analysis to determine Lake County-specific rainfall data was not supported. One item of concern was that the data may not be accepted by IDNR/OWR or FEMA.
3. Use of the updated Bulletin 70 rainfall, as best available data, was supported.

Staff will be requesting a 30-day public comment period at the June 6th SMC Board Meeting, along with a couple of public information meetings in July. SMC Board Members requested that this information be provided to the public as soon as possible.

Additional WDO amendments (related and non-related) will be brought to TAC at subsequent meetings and the typical adoption process will be followed including a public hearing and comment period later this year. An estimated timeline indicates the revised WDO would be adopted in March 2020. In the interim there is an immediate need to provide guidance and recommendations on how to implement the new rainfall.

Guidance Memo #1 will be discussed at the TAC meeting. Additional guidance memos are anticipated and will be created as needed.



STORMWATER MANAGEMENT COMMISSION

**TECHNICAL ADVISORY COMMITTEE
AGENDA**

May 16, 2019

9:00 AM – 12:00 PM

500 W. Winchester, Libertyville, Illinois



- 1.0 CALL TO ORDER
- 2.0 ADDITIONS TO THE AGENDA
- 3.0 PUBLIC COMMENT
- 4.0 STAFF REPORT
 - 4.1 FLOOD INUNDATION WEB APPS
- 5.0 APPROVAL OF THE MINUTES
 - 5.1 APRIL 18, 2019 MINUTES
ACTION REQUESTED: APPROVAL
- 6.0 OLD BUSINESS
- 7.0 NEW BUSINESS
 - 7.1 UPDATED BULLETIN 70 RAINFALL GUIDANCE MEMO #1
ACTION REQUESTED: APPROVAL
- 8.0 ADJOURNMENT

Technical Advisory Committee

<p>James Anderson (Term Expires May 2020) Director of Natural Resources LC Forest Preserve District 1899 W. Winchester Rd. Libertyville, IL 60048 Phone: 847-968-3282 Fax: 847-367-6649 Email: janderson@lcfpd.org</p>	<p><u>Alternates</u> John Nelson Director of Operations & Infrastructure LC Forest Preserve Dist. 19808 W. Grand Avenue. Lindenhurst, IL 60046 Phone: 847-968-3407 Fax: 847-367-6649 Email: jnelson@lcfpd.org</p> <p>Ken Klick Restoration Ecologist LC Forest Preserve Dist. 1899 W. Winchester Rd. Libertyville, IL 60048 Phone: 847-968-3284 Fax: 847-367-6649 Email: kklick@lcfpd.org</p>	<p>Tom Polzin (Vice Chairman) (Term Expires May 2020) Hey & Assoc., Inc. 26575 W. Commerce Dr., Ste. 601 Volo, IL 60073 Phone: 847-740-0888 Fax: 847-740-2888 Email: tpolzin@heyassoc.com</p>	<p><u>Alternate</u> Vince Mosca Hey & Assoc., Inc. 26575 W. Commerce Dr., Ste. 601 Volo, IL 60073 Phone: 847-740-0888 Fax: 847-740-2888 Email: vmosca@heyassoc.com</p>
<p>Mike Zemaitis (Term Expires May 2020) Engineer of Design LC Division. of Transportation 600 Winchester Rd. Libertyville, IL 60048 Phone: 847-377-7400 Fax: 847-362-5290 Email: mzemaitis@lakecountyil.gov</p>	<p><u>Alternate</u> Al Giertych Assist. County Engineer LC Division of Transportation 600 Winchester Rd. Libertyville, IL 60048 Phone: 847-377-7400 Fax: 847-362-5290 Email: agiertych@lakecountyil.gov</p>	<p>Pat Bleck (Term Expires May 2020) Bleck Engineering Co., Inc. 1375 Western Ave. Lake Forest, IL 60045 Phone: 847-295-5200 Fax: 847-295-7081 Email: pbleck@bleckeng.com</p>	<p><u>Alternate</u> Joy Corona Bleck Engineering Co., Inc. 1375 Western Ave. Lake Forest, IL 60045 Phone: 847-295-5200 Fax: 847-295-7081 Email: jcorona@bleckeng.com</p>
<p>Patrick Glenn (Term Expires May 2020) Senior Engineer Gewalt Hamilton Assoc. Inc. 625 Forest Edge Dr. Vernon Hills, IL 60061 Phone: 847-478-9700 Fax: 847-478-9701 Email: pglenn@gha-engineers.com</p>	<p><u>Alternate</u> Mei Zhu Senior Engineer Gewalt Hamilton Assoc. Inc. 625 Forest Edge Dr. Vernon Hills, IL 60061 Phone: 847-478-9700 Fax: 847-478-9701 Email: mzh@gha-engineers.com</p>	<p>Bill Heinz (Term Expires May 2020) Village of Grayslake 585 Berry Ave. Grayslake, IL 60030 Phone: 847-223-2323 Fax: 847-223-4821 Email: wheinz@villageofgrayslake.com</p>	<p><u>Alternate</u> Kurt Baumann Baxter & Woodman 442 N. Cedar Lake Rd. Round Lake, IL 60073 Phone: 815-444-3313 Email: baumann@baxterwoodman.com</p>
<p>Kathy Chernich (Term Expires May 2020) U.S. Army Corp. of Engineers 231 LaSalle St., Ste. 1500 Chicago, IL 60604 Phone: 312-846-5531 Fax: 312-353-4110 Email: Kathy.G.Chernich@usace.army.mil</p>	<p><u>Alternate</u> Kaitlyn Pascus U.S. Army Corp. of Engineers 231 LaSalle St., Ste. 1500 Chicago, IL 60604 Phone: 312-846-5533 Fax: 312-353-4110 Email: kaitlyn.a.pascus@usace.army.mil</p>	<p>Peter Manhard (Term Expires May 2020) Vice President Manhard Consulting 900 Woodlands Parkway Vernon Hills, IL 60061 Phone: 847-634-5550 Fax: 847-634-0095 Email: pmanhard@manhard.com</p>	<p><u>Alternates</u> Brian Valleskey Manhard Consulting, Ltd. 900 Woodlands Parkway Vernon Hills, IL 60061 Phone: 847-634-5550 Fax: 847-634-0095 Email: bvalleskey@manhard.com</p> <p>Marcy Knysz Manhard Consulting, Ltd. One Overlook Point, Ste. 290 Lincolnshire, IL 60069 Phone: 847-325-7300 Fax: 847-634-0095 Email: mknysz@manhard.com</p>

Technical Advisory Committee

<p>Don Dressel (Chairman) <i>(Term Expires May 2020)</i> Christopher Burke Engineering 9575 W. Higgins Rd., Ste. 600 Rosemont, IL 60018-4920 Phone: 847-823-0500 Fax: 847-823-0520 Email: Ddressel@cbbel.com</p>	<p><u>Alternate</u> Kay Whitlock Christopher Burke Engineering 9575 W. Higgins Rd., Ste. 600 Rosemont, IL 60018-4920 Phone: 847-823-0500 Fax: 847-823-0520 Email: kwhitlock@cbbel.com</p>	<p>Ramesh Kanapareddy <i>(Term Expires May 2020)</i> City of Highland Park 1150 Half Day Rd. Highland Park, IL 60035 Phone: 847-432-9907 Fax: 847-432-0807 Email: rkanapareddy@cityhpil.com</p>	<p><u>Alternate</u> Manny Gomez City of Highland Park 1150 Half Day Rd. Highland Park, IL 60035 Phone: 847-432-1186 Fax: 847-432-0807 Email: egomez@cityhpil.com</p>
<p>Eric Steffen <i>(Term Expires May 2020)</i> Senior Engineer Lake County Planning Building & Development 500 W. Winchester Rd. Libertyville, IL 60048 Phone: 847-377-2109 Fax: 847-984-5853 Email: esteffen@lakecountyil.gov</p>	<p><u>Alternates</u> Matt Meyers Assistant Chief Engineer/Operations Manager Lake County Planning, Building & Development 500 W. Winchester Rd. Libertyville, IL 60048 Phone 847-377-2079 Fax: 847-984-5853 Email: mmeyers@lakecountyil.gov</p> <p>Brian Frank Senior Engineer Lake County Planning, Building & Development 500 W. Winchester Rd. Libertyville, IL 60048 Phone: 847-377-2086 Fax: 847-984-5853 Email: bfrank@lakecountyil.gov</p>	<p>Heather Galan <i>(Term Expires May 2020)</i> Village Engineer Village of Gurnee 325 N. O'Plaine Rd. Gurnee, IL 60031 Phone: 847-599-7582 Fax: 847-623-9475 Email: hgalan@village.gurnee.il.us</p>	<p><u>Alternates</u> Nicholas Leach Village of Gurnee 325 N. O'Plaine Rd. Gurnee, IL 60031 Phone: 847-599-7586 Fax: 847-623-9475 Email: NLeach@village.gurnee.il.us</p> <p>Dave Ziegler Director of Community Development Village of Gurnee 325 N. O'Plaine Rd. Gurnee, IL 60031 Phone: 847-599-7550 Fax: 847-623-9475 Email: davidz@village.gurnee.il.us</p>

**TECHNICAL ADVISORY COMMITTEE
MEETING MINUTES
April 18, 2019
Lake County Stormwater Management Commission
600 W Winchester, Libertyville, IL**

1.0 CALL TO ORDER 9:05 AM

TAC Members & Alternates		Staff Present	General Public	
Brian Frank	Mei Zhu	Glenn Westman	Barry Stuedemann	Joanna Colletti
Joy Corona	Tom Polzin	Kurt Woolford	Kaitlyn Pascus	Scott Griffith
Kathy Chernich	Brian Valleskey	Kelcey Traynoff	Susan Novak	Tyler Dickinson
Donald Dressel	Kurt Baumann		Robert Phillips	
Mike Zemaitis	Heather Galan		Ron Milanesie	
Manny Gomez			Jacob Wellbank	

Guest: Dr. Momcilo Markus via conference call.

2.0 ADDITIONS TO THE AGENDA – None

3.0 PUBLIC COMMENT- None

4.0 STAFF REPORT-

- 4.1 The TAC members introduced themselves. Mr. Woolford introduced the new TAC members and alternates.
- 4.2 Mr. Woolford discussed the changes to the TAC by-laws, which included removing some of the purposes and duties of the TAC and changing the TAC member appointment period from two years to four years. Item C of Article III in the by-laws was also addressed due to the new wording, which now requires TAC to contain representatives from each of the four categories: County government, Development, Environmental, Municipal Government. A vacancy exists for an environmental representative member.
- 4.3 Mr. Woolford addressed the option for the TAC to adopt an electronic meeting attendance policy. The Lake County Board is currently revising their rules for this allowance and could be used as a template, although not required.

5.0 APPROVAL OF THE MINUTES

- 5.1 Mr. Tom Polzin moved to approve the June 18, 2015 TAC minutes, seconded by Mr. Kurt Baumann. TAC members requested that the minutes be distributed in a timely manner if there will be a long period before the next TAC meeting.
Vote: Approved 8-0-3 (abstain: Galan, Gomez, Zhu).

6.0 Old Business - None

7.0 New Business

- 7.1 Mr. Woolford introduced the updates to Bulletin 70, SMC’s request for a technical discussion, and the immediate need to provide guidance to Enforcement Officers. A conference call was held with Dr. Momcilo Markus, co-author of the updated Bulletin 70 report. Dr. Markus presented the attached presentation. TAC members and attendees were invited to ask questions.

- 7.2 Main items and concerns discussed by the TAC members included:
- 7.2.1 The impacts to critical duration analyses and floodplain modeling will not be fully understood until ISWS releases the second report later this summer/fall. This report will include potential changes to the Huff distribution curves.
 - 7.2.2 Discussion regarding what has been observed (point data) compared to the climatic region values was an item that was debated and will require a policy level decision. TAC requested SMC Staff to contact the ISWS regarding the process to perform and fund a local analysis to generate data to create Lake County-specific isohyets. An idea mentioned was to use a centroid point between Aurora and Waukegan.
 - 7.2.3 Detention volume sizing and siting was unanimously identified as the #1 item of concern. It was also identified at TAC, that the current 100-year detention design requirement (6.5 inches) would only provide storage for a 25-year design using the updated Northeast Region rainfall (6.45 inches). To achieve a 100-year storage design (8.57 inches) required a significant increase in volume, which reduces the net buildable area on many development sites. Possible considerations to adjust detention sizing criteria were discussed e.g., release rates, soil types/curve numbers, 50-year design, and 3-stage restrictors. There was also discussion on the potential adverse impacts from larger basins and extended drawdown periods e.g., water temperature, erosion, vegetation, and other environmental stresses. Additional analyses to understand these impacts is needed. TAC requested SMC staff to look at existing submittals and evaluate how site plans will be affected.
 - 7.2.4 Base flood elevations (BFEs), depressional/compensatory storage, and overland flow paths were other provisions mentioned that may have a significant impact on development plans. Other provisions in the WDO are “workable” but may have an increased cost on development.
 - 7.2.5 One idea discussed was to require that permit applicants submit an alternative analysis using the new rainfall. The results of the analysis would be considered for design changes, if possible, but not required. This requirement is implemented in Aurora. Another idea was to recommend a factor-of-safety number or percentage, primarily for building protection elevations.

8.0 ADJOURNMENT

- 8.1 Motion to adjourn by Mr. Polzin, seconded by Ms. Zhu. Meeting adjourned at 11:32 AM.
Vote: Approved 11-0-0 (unanimous).

Attachment: Illinois State Water Survey (ISWS) Presentation for Lake County

Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70

Jim Angel and Momcilo Markus

Illinois State Water Survey

PRAIRIE RESEARCH INSTITUTE



Acknowledgments

Work supported by the [Illinois Department of Commerce and Economic Opportunity](#) under Grant No. 08-355061 and funded by the U.S. Department of Housing and Urban Development's Community Development Block Grants Award No. B-08-DI-17-0001.

Coordinated with [IDNR Office of Water Resources](#).

Sally McConkey, David Kristovich, Brian Kerschner, Mary Richardson, Wes Cattoor, Kexuan Ariel Wang, Lu Jin, Shaoxuan Guo, Shailendra Singh, Tom Over, Annie Peiyong Qu, Francina Dominguez, Ryan Shriver, and Lisa Sheppard

Rainfall frequency sources

TP-40, ISWS Bulletin 70, NOAA Atlas 14

U.S. DEPARTMENT OF COMMERCE
LUTHER H. BOGGS, Secretary

WEATHER BUREAU
F. W. REICHELBERGER, Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and
Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture



WASHINGTON, D.C.
May 1961

Reprinted and Replaced January 1963

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Price \$1.50

BULLETIN 70



Frequency Distributions and Hydro climatic Characteristics of Heavy Rainstorms in Illinois

by FLOYD A. HUFF and JAMES R. ANGEL

Title: Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois.

Abstract: This report presents the results of an extensive investigation of the distribution of heavy rainstorms in Illinois based on data for 61 precipitation stations operated during 1901-1963. Shown are frequency distributions of point rainfall for periods ranging from 5 minutes to 14 days and for recurrence intervals of from 2 months to 100 years. Results are presented in two forms: mass relations for 10 regions of approximately homogeneous precipitation climate, and statewide isohyetal maps based on the 61-station data. Frequency relations are presented on both an annual and seasonal basis. Results of a special investigation are presented for Chicago and the surrounding six counties subject to urban influences on precipitation distribution. Information is provided on the expected dispersion of point rainfall frequency distributions about the mean in the 10 regions of similar mass relations climate. Information is also provided on the spatial and temporal characteristics of heavy rainstorms in Illinois.

Reference: Huff, Floyd A., and James R. Angel. Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois. Illinois State Water Survey, Champaign, Bulletin 70, 1969.
Indexing Terms: Climatology, heavy rainstorms, hydroclimatology, hydrometeorology, Illinois, rainfall, synoptic weather conditions.



NOAA

NOAA Atlas 14

Precipitation-Frequency Atlas of the United States

Volume 7 Version 2.0: Alaska

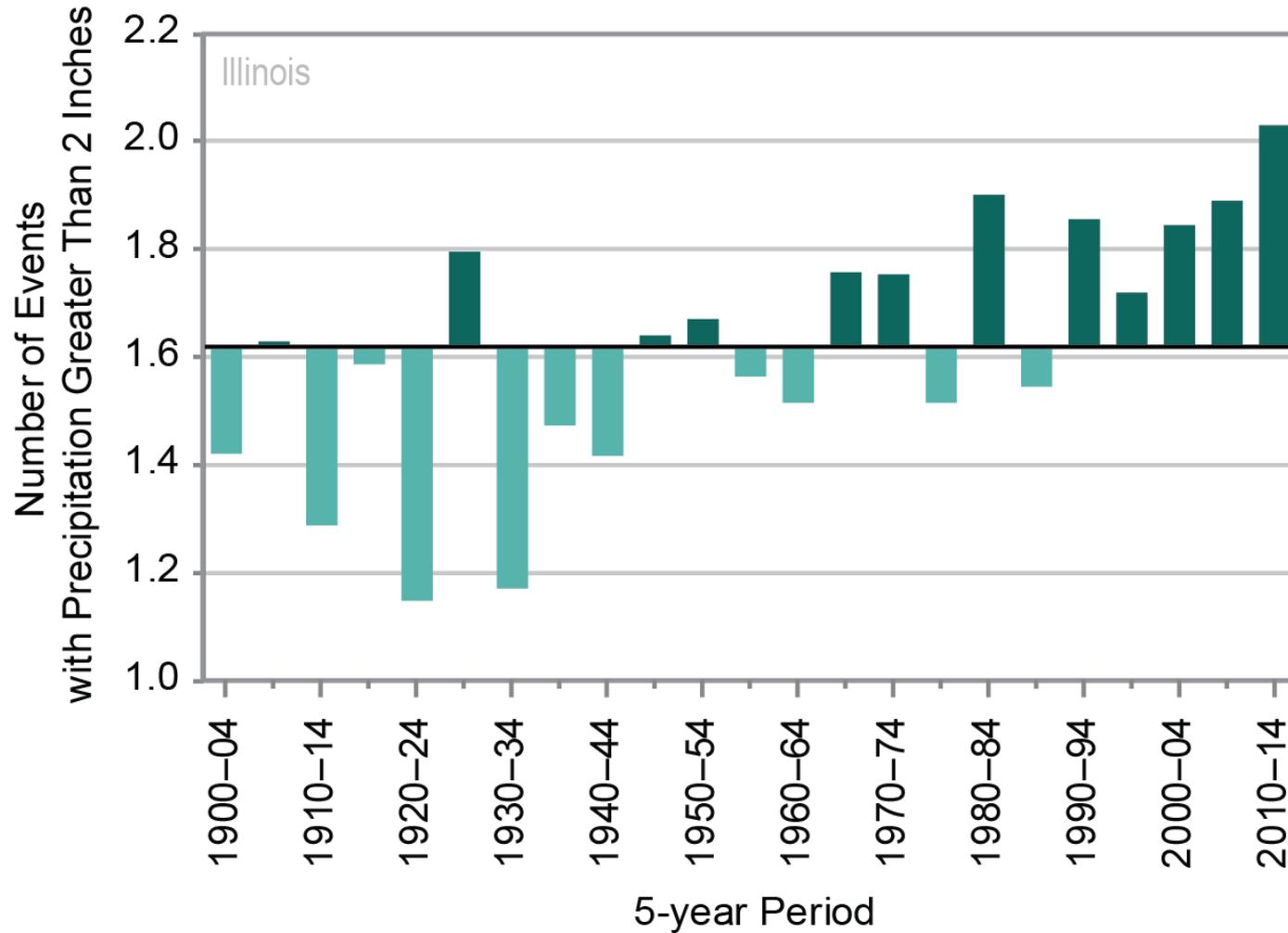
Sanja Perica¹, Douglas Kane², Sarah Dietz¹, Kazungu Maitaria¹,
Deborah Martin¹, Sandra Pavlovic¹, Ishani Roy¹, Svetlana
Stuefer², Amy Tidwell², Carl Trypaluk¹, Dale Unruh¹, Michael
Yekta¹, Erica Betts², Geoffrey Bonnin¹, Sarah Heim¹, Lillian
Hiner¹, Elizabeth Lilly², Jayashree Narayanan², Fenglin Yan¹,
Tan Zhao¹

Department of
Commerce,
Oceanic
and
Atmospheric
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National Oceanic
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Oceanic and
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Administration
Center

Spring,
2012

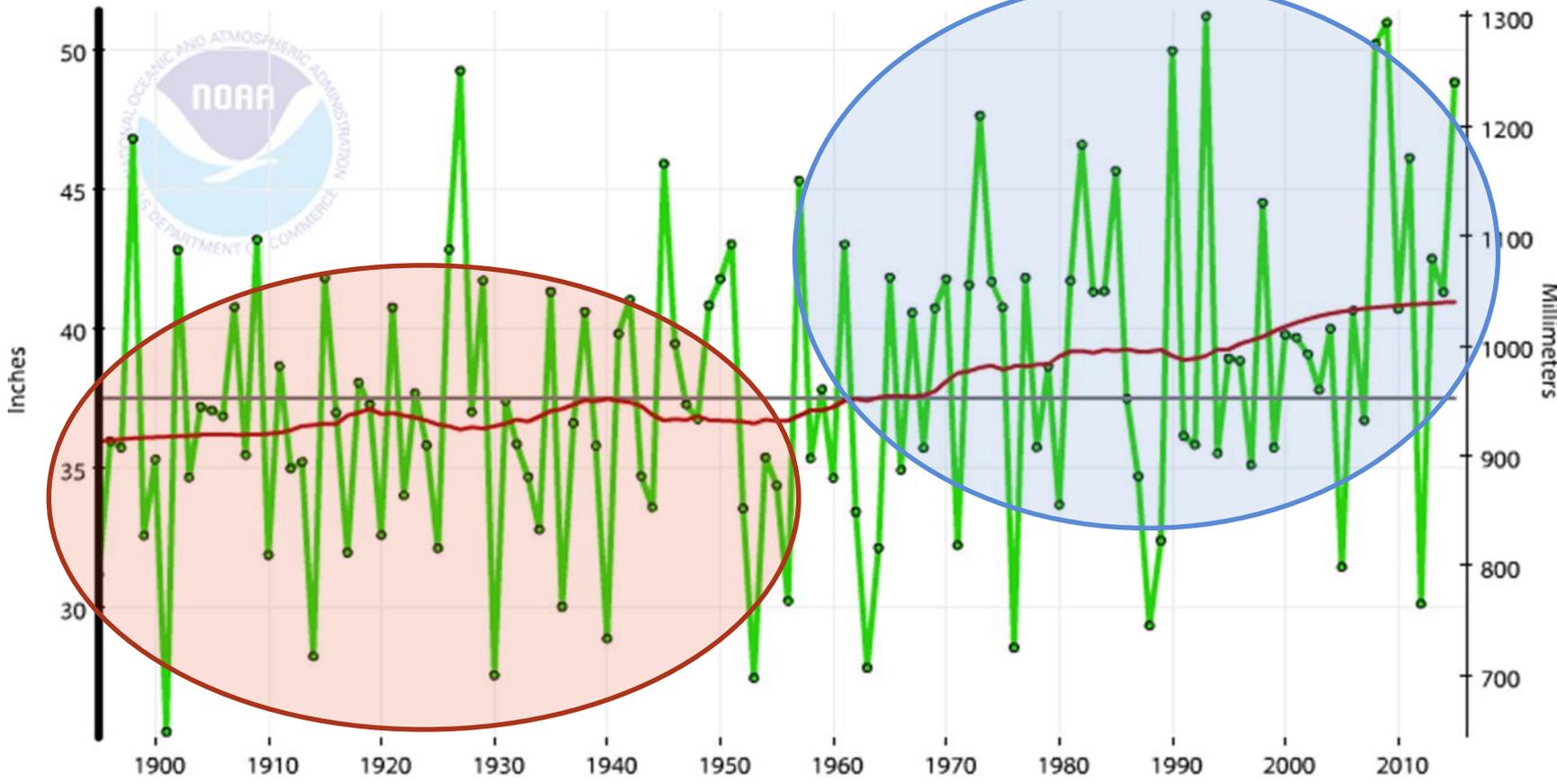
Illinois

Observed Number of Extreme Precipitation Events



Illinois, Precipitation, January-December

— LOESS — 1901-2000 Mean: 37.47" —○— Precip



Our Solution to Observed Changes

- Use 1948-2017 data to better represent the current, wetter climate
- Three times as many stations are available from 1948 onward
- Include a Bulletin 70 style adjustment by giving more weight to the second half of the record

Similar to Bulletin 70

- Same 10 regions
- Return Period from 2 years to 500 years
- Durations of 1 hour to 10 days
- Designed to take into account **observed** climate change

The second report

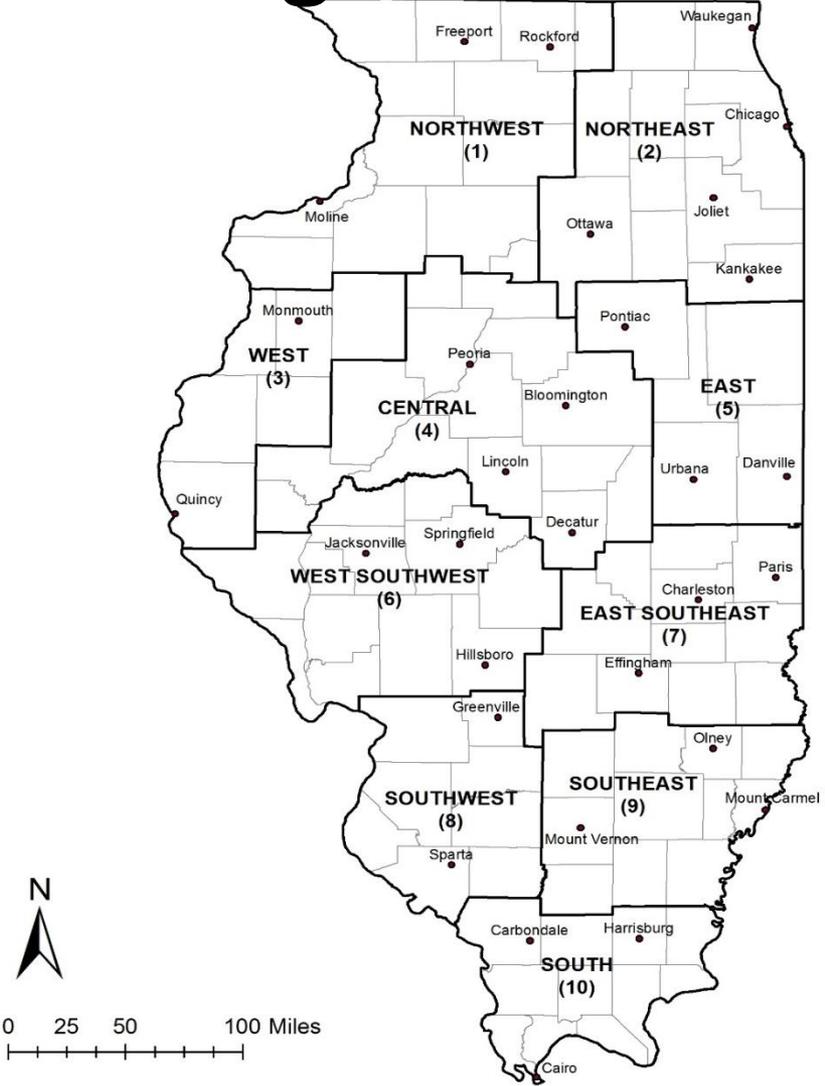
The second report, expected out in June 2019, will

1. Revisit the distribution of precipitation within the storm, also known as the Huff curves
2. The relationship between point and areal precipitation patterns out to 400 square miles
3. Comparative analysis between different methods to account for non-stationarity
("That is as far as the grant goes.")

Issues not addressed in the project:

1. Return periods less than 2-year (e.g. 1-year, 6-month, 3-month)
2. Storm durations less than 1-hour (e.g. 30-min., 15-min., 5-min.)
3. Isohyetal maps

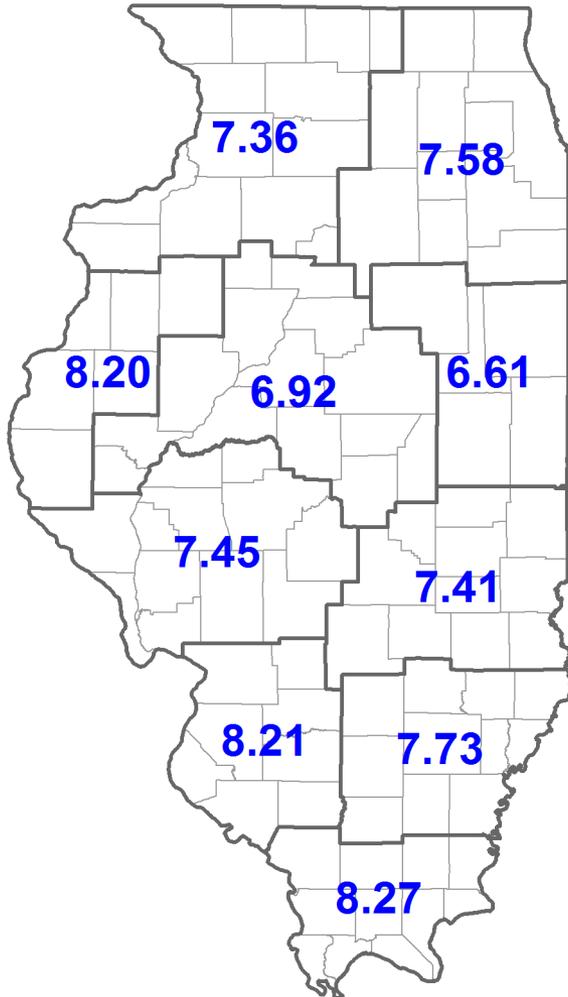
10 Regions in Illinois



Old and New 100-Yr, 24-Hour Storm

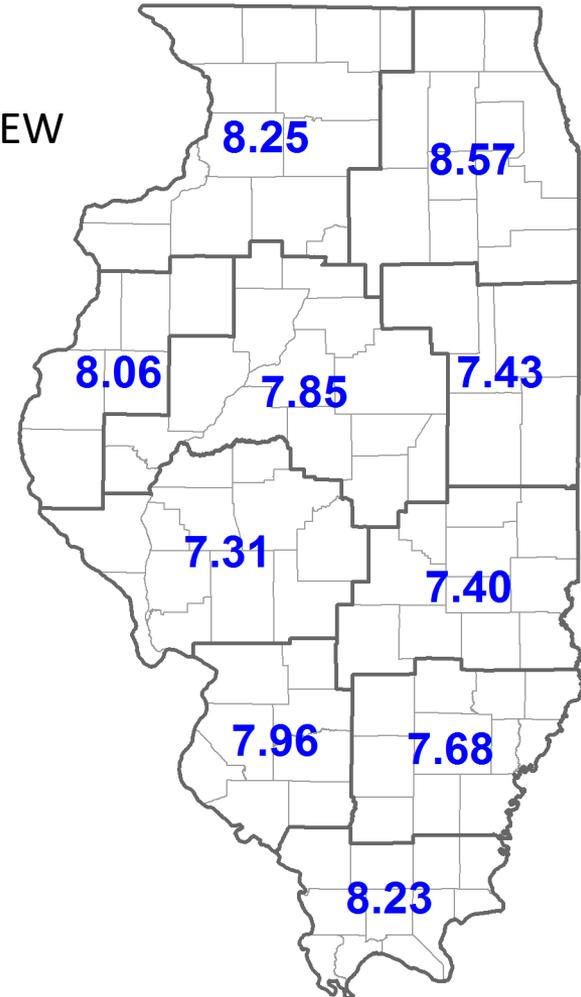
24 Hour, 100 Year

OLD

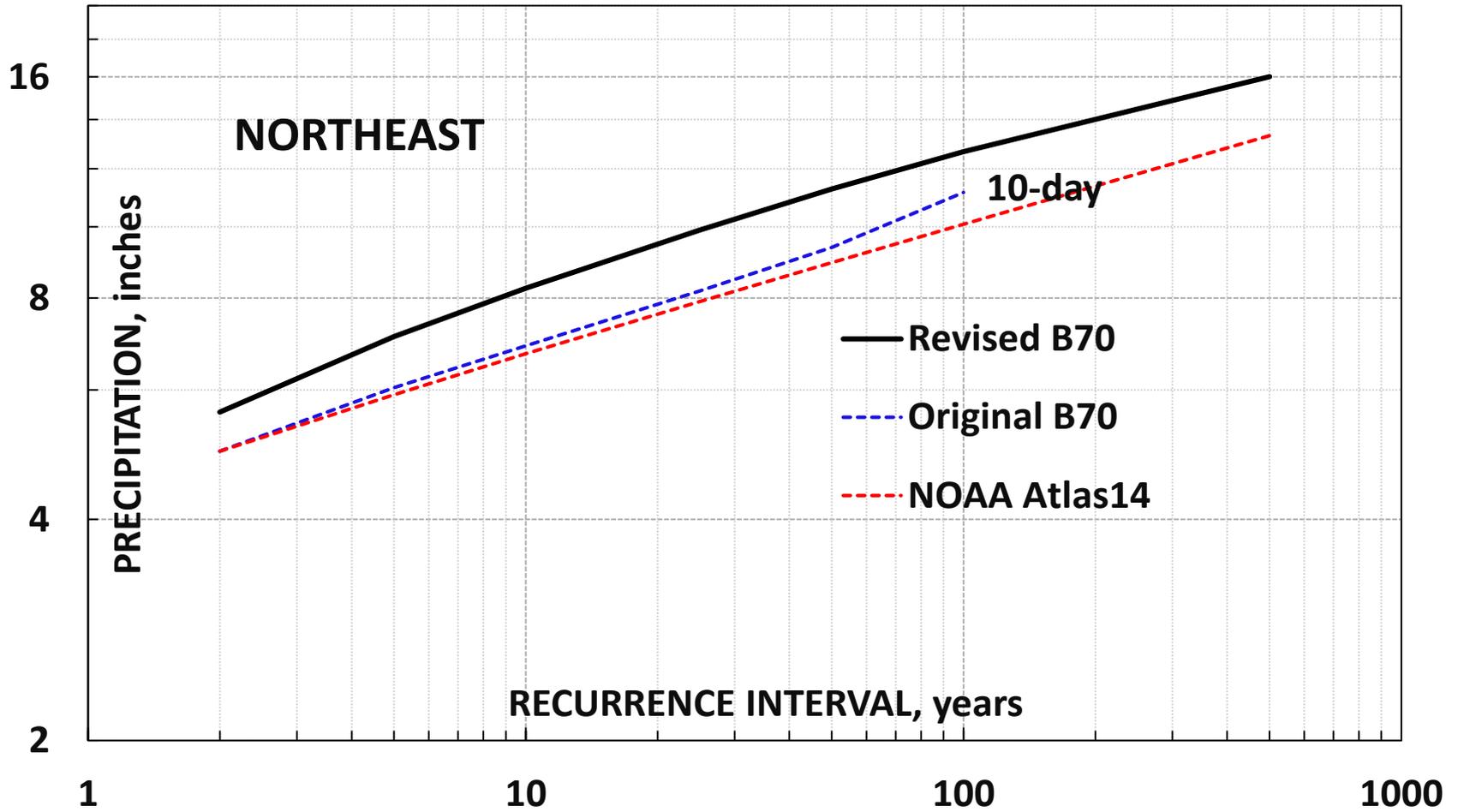


24 Hour, 100 Year

NEW



Issues/questions



Waukegan, IL

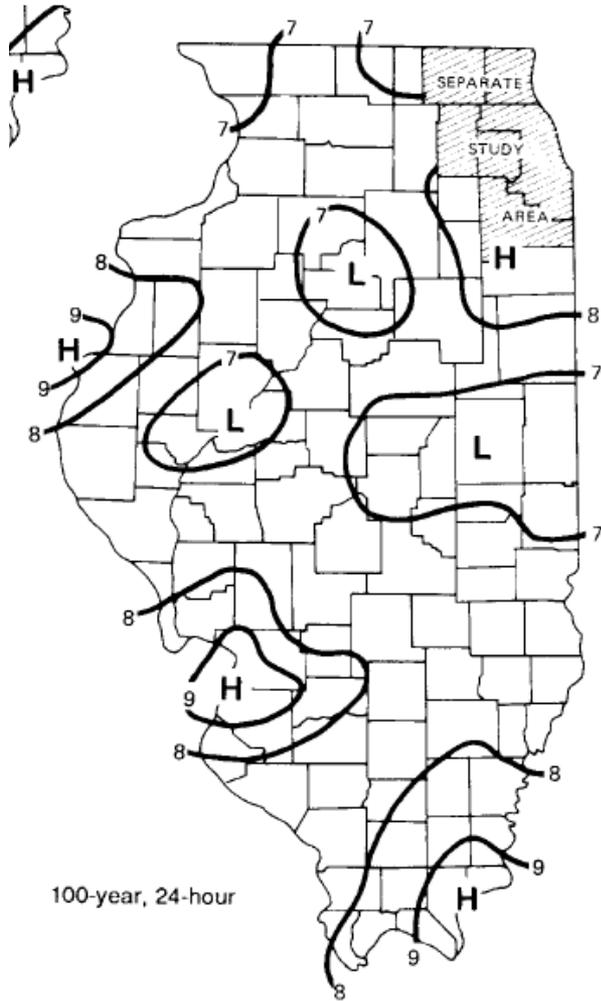
DRAFT Comparison of current WDO rainfall depths and Revised Bulletin 70 rainfall depths											
	Storm Duration (hours)	Storm Recurrence Interval								Multiplier	
		1 year	2 year	5 year	10 year	25 year	50 year	100 year	500 year		
WDO	240	3.45	4.12	5.00	5.70	6.98	8.09	9.56		1.47	For example:
Revised			5.60	7.09	8.25	9.90	11.26	12.65	16.00		Current 100-year, 240-hour rainfall amount is 9.56"
Difference			1.48	2.09	2.55	2.92	3.17	3.09			Revised 100-year, 240-hour rainfall amount is 12.65"
%Increase			36%	42%	45%	42%	39%	32%			This is a 3.09" difference
											This is about a 32% increase

DRAFT Comparison of current WDO rainfall depths and Revised Bulletin 70 rainfall depths											
	Storm Duration (hours)	Storm Recurrence Interval								Multiplier	
		1 year	2 year	5 year	10 year	25 year	50 year	100 year	500 year		
WDO	240	3.45	4.12	5.00	5.70	6.98	8.09	9.56		1.47	For example:
Revised			5.60	7.09	8.25	9.90	11.26	10.53	16.00		Current 100-year, 240-hour rainfall amount is 9.56"
Difference			1.48	2.09	2.55	2.92	3.17	0.97			Revised 100-year, 240-hour rainfall amount is 10.53"
%Increase			36%	42%	45%	42%	39%	10%			This is a 0.97" difference
											This is about a 10% increase

Annual rainfall (inches) for given recurrence interval

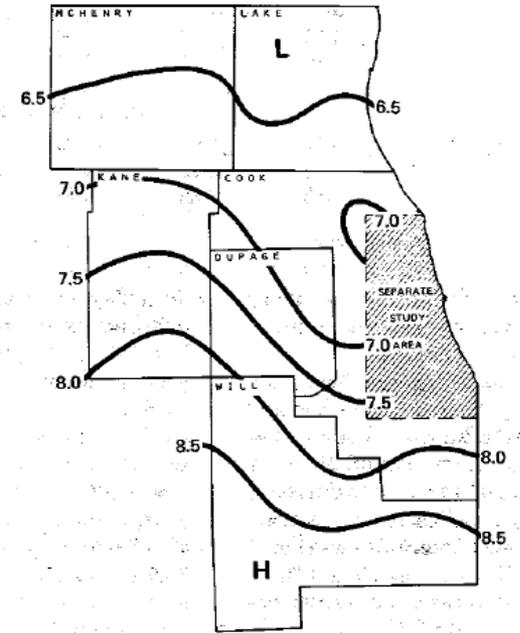
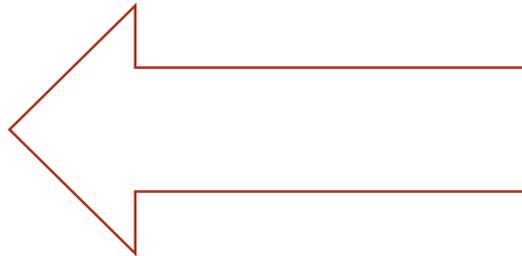
Storm code	Zone code	Station	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1	1	Aledo	2.19	2.63	3.01	3.54	4.07	4.42	5.43	6.56	7.35	8.35	9.30	10.88
1	1	Dixon	2.04	2.45	2.80	3.30	3.79	4.12	5.02	5.95	6.85	8.40	9.70	11.60
1	1	Freeport	2.15	2.59	2.96	3.48	4.00	4.35	5.25	6.30	7.02	8.65	10.40	12.38
1	1	Galva	2.13	2.56	2.93	3.45	3.97	4.31	5.15	6.30	7.14	8.40	9.45	10.60
1	1	Moline	2.21	2.65	3.03	3.57	4.10	4.46	5.41	6.51	7.33	8.45	9.80	11.04
1	1	Morrison	2.14	2.57	2.96	3.49	4.01	4.36	5.15	6.20	7.09	8.40	9.80	11.66
1	1	Mt Carroll	2.19	2.63	3.03	3.57	4.10	4.46	5.25	6.25	7.09	8.35	9.40	10.60
1	1	Rockford	2.16	2.60	3.00	3.53	4.06	4.41	5.25	6.35	7.23	8.40	9.40	10.45
1	1	Walnut	2.16	2.60	3.00	3.53	4.06	4.41	5.19	6.30	7.20	8.45	9.50	10.61
1	1	Aurora	2.08	2.54	2.86	3.36	3.86	4.20	5.06	6.40	7.56	9.33	10.90	12.60
1	1	Chicago	1.93	2.33	2.65	3.11	3.58	3.89	4.78	5.70	6.41	7.70	9.16	11.07
1	1	DeKalb	2.11	2.54	2.92	3.44	3.96	4.30	5.14	6.30	7.05	8.19	9.19	10.78
1	1	Joliet	2.11	2.54	2.92	3.44	3.96	4.30	5.14	6.35	7.30	8.82	10.08	11.55
1	1	Kankakee	2.02	2.43	2.80	3.30	3.79	4.12	4.89	6.04	6.90	8.24	9.70	12.35
1	1	Marengo	1.98	2.38	2.75	3.23	3.72	4.04	4.78	5.70	6.41	7.40	8.29	10.03
1	1	Ottawa	2.06	2.48	2.86	3.36	3.86	4.20	4.99	5.99	6.83	8.19	9.45	10.92
1	1	Haukegan	1.93	2.32	2.68	3.15	3.62	3.94	4.78	5.81	6.67	7.77	8.71	9.56
1	1	La Harpe	2.34	2.82	3.25	3.82	4.40	4.78	5.83	7.20	8.19	9.50	10.75	12.98
1	1	Mormouth	2.16	2.62	3.00	3.53	4.06	4.41	5.41	6.70	7.72	9.24	10.50	11.76
1	1	Quincy	2.26	2.73	3.14	3.70	4.25	4.62	5.56	6.83	7.77	8.98	10.03	11.24
1	1	Bloomington	2.20	2.69	3.02	3.55	4.08	4.44	5.35	6.51	7.37	8.48	9.39	10.21
1	1	Decatur	2.22	2.67	3.05	3.59	4.13	4.49	5.50	6.97	7.93	8.99	9.70	10.60
1	1	Havana	2.03	2.44	2.82	3.31	3.81	4.14	4.90	5.96	6.82	7.95	8.90	10.00
1	1	Lincoln	2.08	2.54	2.88	3.39	3.90	4.24	5.05	6.21	7.02	8.08	8.84	10.01
1	1	Minonk	2.00	2.41	2.78	3.27	3.76	4.09	4.85	6.01	6.62	7.56	8.70	10.28
1	1	Peoria	2.03	2.44	2.82	3.31	3.81	4.14	4.90	5.96	6.82	8.24	9.14	10.31
1	1	Rushville	2.21	2.67	3.07	3.62	4.16	4.52	5.30	6.30	7.09	8.14	9.03	9.87
1	1	Danville	2.26	2.72	3.11	3.66	4.21	4.58	5.46	6.66	7.41	8.44	9.17	9.71
1	1	Hoopeston	2.17	2.63	3.01	3.54	4.08	4.43	5.15	6.18	7.06	8.29	9.27	10.30
1	1	Pontiac	2.02	2.44	2.81	3.30	3.80	4.13	4.99	6.13	7.01	8.20	9.17	10.20
1	1	Roberts	2.04	2.46	2.84	3.34	3.84	4.17	4.94	5.94	6.64	7.72	8.75	10.61
1	1	Urbana	2.19	2.63	3.03	3.57	4.10	4.46	5.20	6.13	6.75	7.57	8.14	8.76
1	1	Carlinville	2.25	2.71	3.09	3.63	4.18	4.54	5.45	6.62	7.57	8.89	10.25	12.24
1	1	Griggsville	2.14	2.58	2.95	3.47	3.99	4.34	5.35	6.72	7.72	8.94	9.85	11.37
1	1	Hillsboro	2.22	2.68	3.09	3.63	4.18	4.54	5.40	6.57	7.47	8.64	9.70	11.49
1	1	Jacksonville	2.17	2.64	3.01	3.54	4.07	4.42	5.25	6.60	7.52	8.69	10.10	11.38
1	1	Morrisonville	2.13	2.56	2.95	3.47	3.99	4.34	5.30	6.42	7.22	8.43	9.49	10.61
1	1	Pana	2.22	2.68	3.07	3.63	4.18	4.54	5.65	6.77	7.52	8.58	9.60	11.19
1	1	Springfield	2.00	2.41	2.77	3.26	3.75	4.08	4.95	6.21	7.12	8.59	9.80	11.11
1	1	White Hall	2.15	2.59	2.99	3.51	4.04	4.39	5.35	6.62	7.57	8.72	9.65	10.65
1	1	Charleston	2.30	2.77	3.16	3.71	4.27	4.64	5.51	6.63	7.39	8.36	9.18	10.10
1	1	Effingham	2.26	2.72	3.11	3.66	4.20	4.57	5.61	6.94	7.80	8.72	9.90	11.27
1	1	Palestine	2.37	2.86	3.29	3.87	4.45	4.84	5.66	6.58	7.24	8.06	9.10	10.38
1	1	Paris	2.20	2.65	3.05	3.59	4.13	4.49	5.51	6.84	7.80	9.03	10.00	11.02
1	1	Windsor	2.27	2.74	3.16	3.71	4.27	4.64	5.61	6.89	7.90	9.23	10.30	11.58
1	1	Belleville	2.20	2.64	3.02	3.55	4.08	4.44	5.30	6.60	7.70	9.25	10.70	13.25
1	1	DuQuoin	2.35	2.82	3.23	3.80	4.37	4.75	5.90	7.20	8.10	9.35	10.15	10.90
1	1	Greenville	2.18	2.62	3.02	3.55	4.08	4.44	5.45	6.67	7.47	8.69	9.85	11.11
1	1	Sparta	2.34	2.81	3.20	3.76	4.32	4.70	5.70	6.95	7.90	9.35	10.60	11.85
1	1	St Louis	2.15	2.59	2.99	3.51	4.04	4.39	5.35	6.72	7.83	9.29	11.00	12.93
1	1	Fairfield	2.32	2.79	3.19	3.75	4.31	4.69	5.71	7.09	8.16	9.64	10.81	12.04
1	1	Flora	2.29	2.76	3.16	3.71	4.27	4.64	5.61	6.89	7.80	9.33	10.60	11.83
1	1	McLeansboro	2.36	2.87	3.28	3.86	4.43	4.82	5.81	7.14	8.16	9.54	10.71	11.83
1	1	Mt Carmel	2.32	2.80	3.22	3.79	4.36	4.74	5.81	7.39	8.40	10.15	11.07	11.94
1	1	Mt Vernon	2.35	2.83	3.25	3.83	4.41	4.79	5.81	7.17	8.16	9.58	10.76	11.83
1	1	Olney	2.35	2.83	3.26	3.83	4.41	4.79	5.71	6.89	7.75	8.98	10.10	11.27
1	1	Anna	2.74	3.30	3.81	4.48	5.15	5.60	6.65	7.95	8.90	10.10	11.00	12.00
1	1	Cairo	2.57	3.10	3.54	4.16	4.78	5.20	6.25	7.75	8.75	10.20	11.50	12.50
1	1	Carbondale	2.50	3.01	3.43	4.04	4.65	5.05	6.35	7.80	8.75	9.80	10.60	11.30
1	1	Harrisburg	2.47	2.98	3.43	4.04	4.65	5.05	6.02	7.60	9.08	11.22	12.40	14.07
1	1	New Burnside	2.65	3.19	3.67	4.32	4.97	5.40	6.52	7.95	9.02	10.40	11.50	12.65

Bulletin 70



100-year, 24-hour

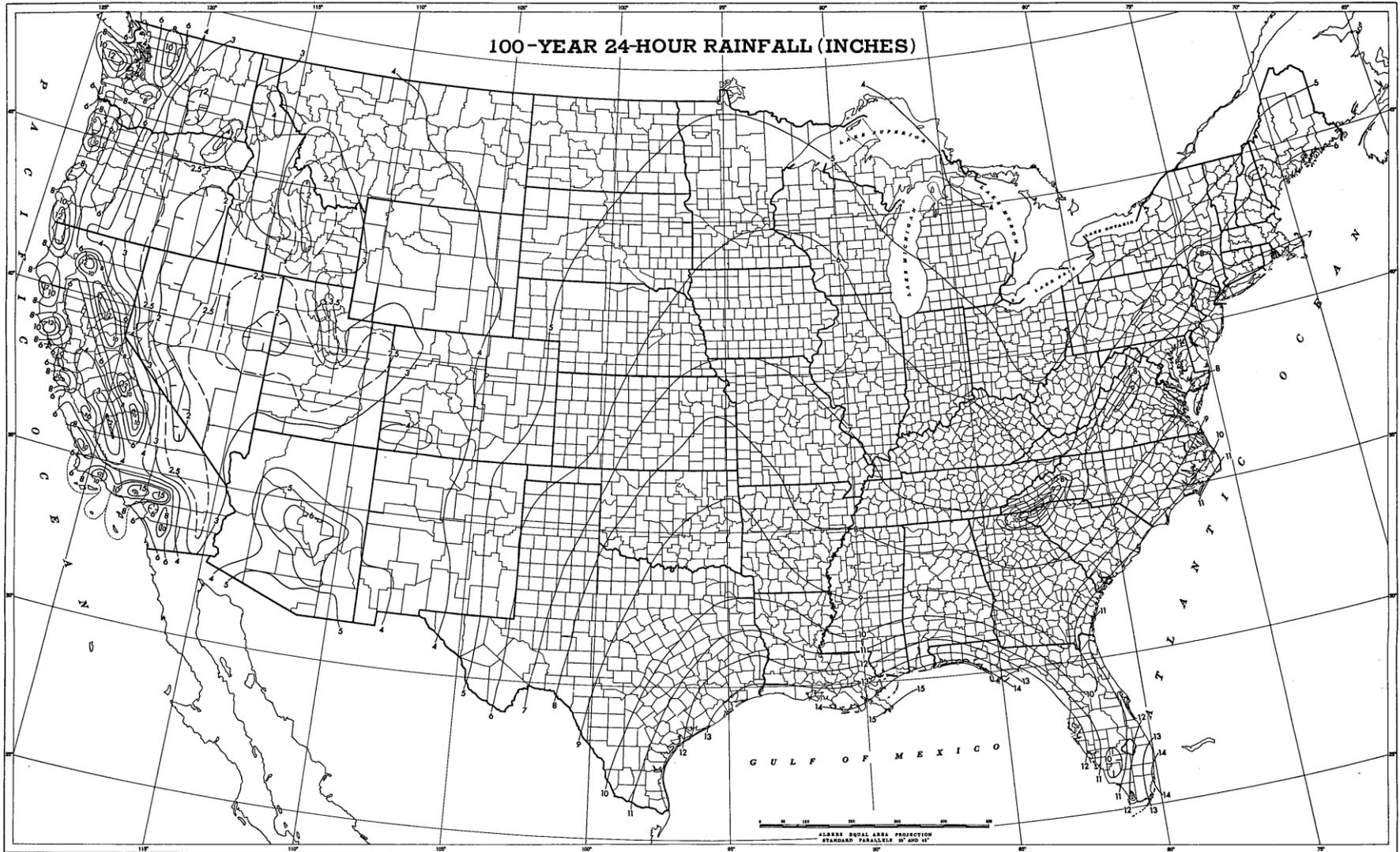
Figure 15. Concluded

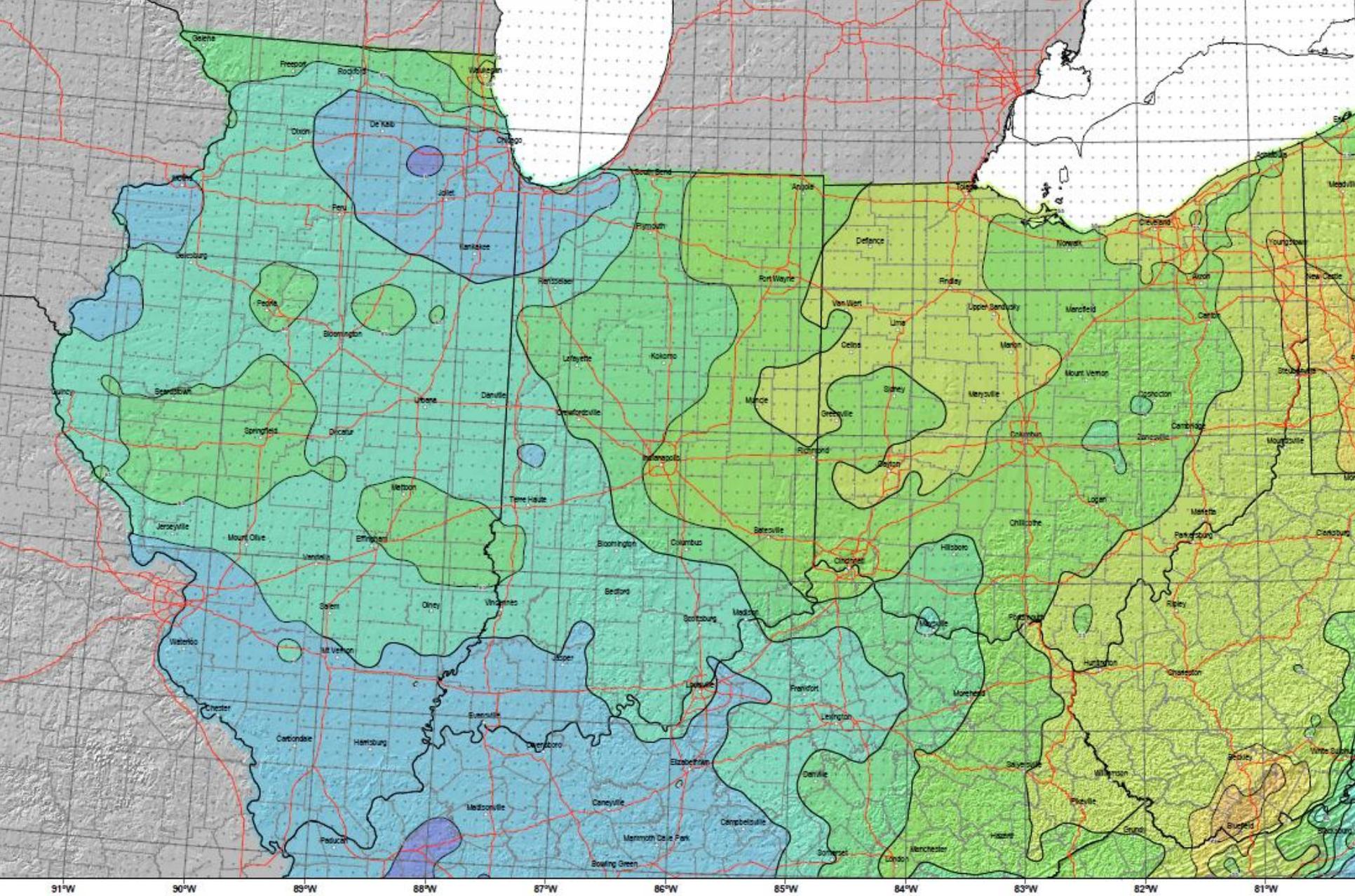


100-year, 24-hour

Figure 21. Concluded

NOAA TP40 (1961)

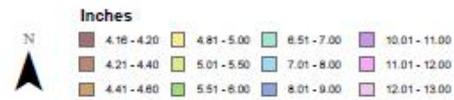




SCALE 1:2,000,000 (when printed/viewed at ANSI C size)
 0 10 20 30 40 50 Miles
 0 5.10 10.20 15.30 20.40 25.50 30.60

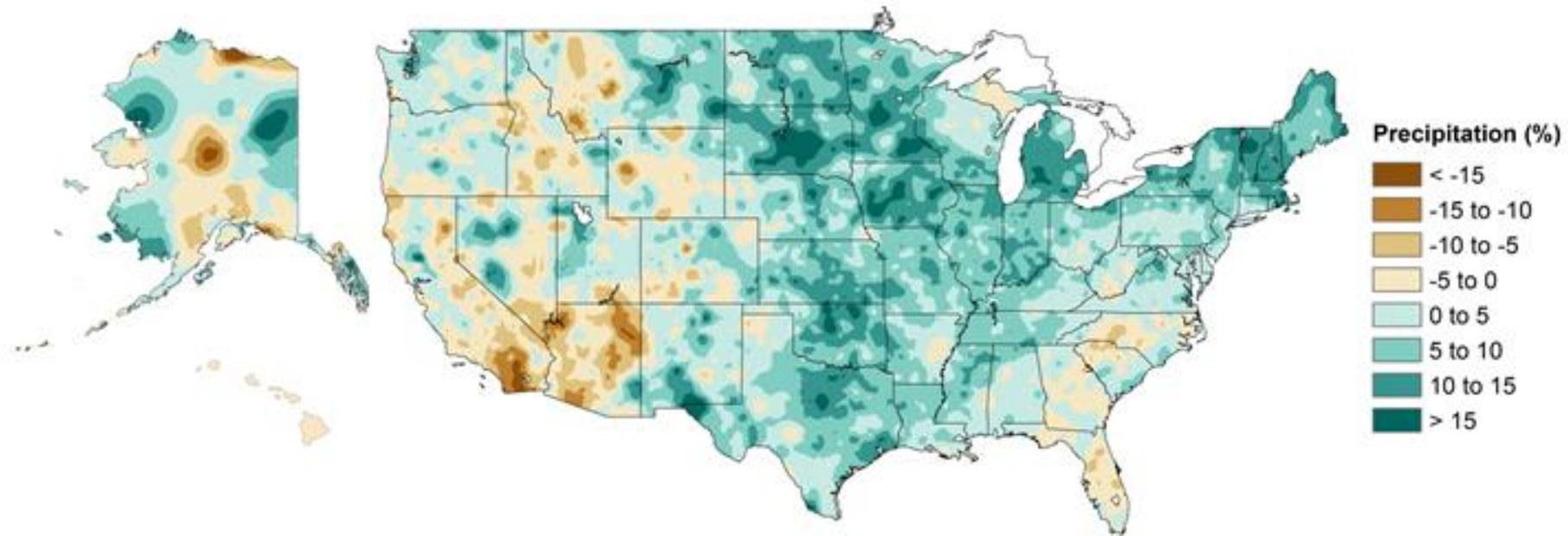
ILLINOIS, INDIANA, OHIO

Isopleths of 24 hour precipitation (inches)
 with Average Recurrence Interval of 100 years



1986-2015 minus 1901-1960

Annual Precipitation



The South-North decreasing gradient

Is the gradient “real” (physically or climatologically justifiable)?

Perhaps, the slope is not naturally present but occurs as a result of the data selection (spatial randomness in a short sample)?

Is it just an artifact of the way we do analysis (e.g. select regions/data)?



U.S. Global Change
Research Program

CLIMATE SCIENCE SPECIAL REPORT

- Volume I of the NCA4
- Precipitation will continue to increase (medium confidence)
- Heavy precipitation events will increase in frequency and amounts (high confidence)

<https://science2017.globalchange.gov/>

Contract Report 2017-05
December 2017

Impacts of Potential Future Climate Change on the Expected Frequency of Extreme Rainfall Events in Cook, DuPage, Lake and Will Counties in Northeastern Illinois

Momcilo Markus, James Angel, Kexuan Wang, Gregory Byard, Sally McConkey, Zoe Zaloudek

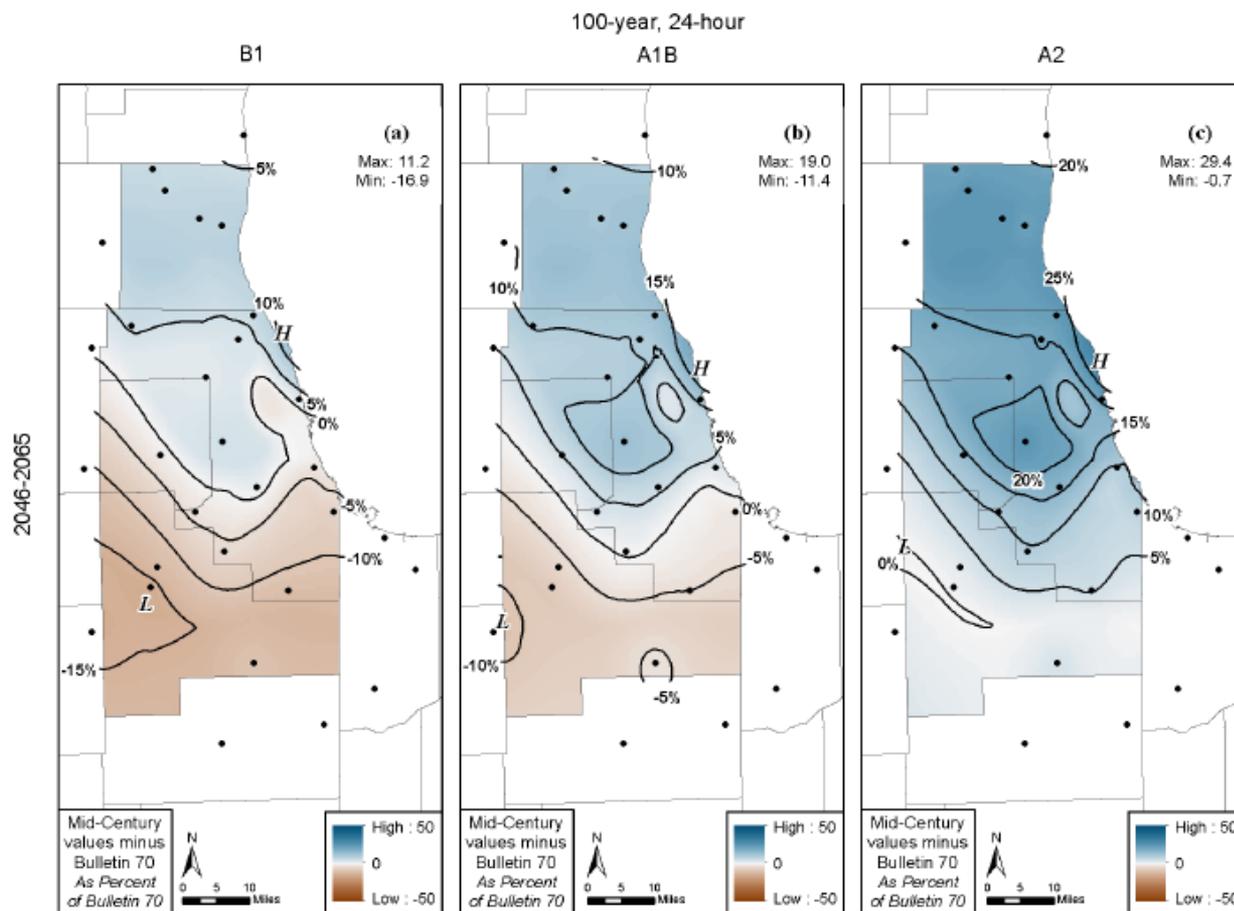


Figure B1.4. Percent differences between projected 100-year 24-hour projected values for mid-21st century based on CMIP3 UW data and Bulletin 70

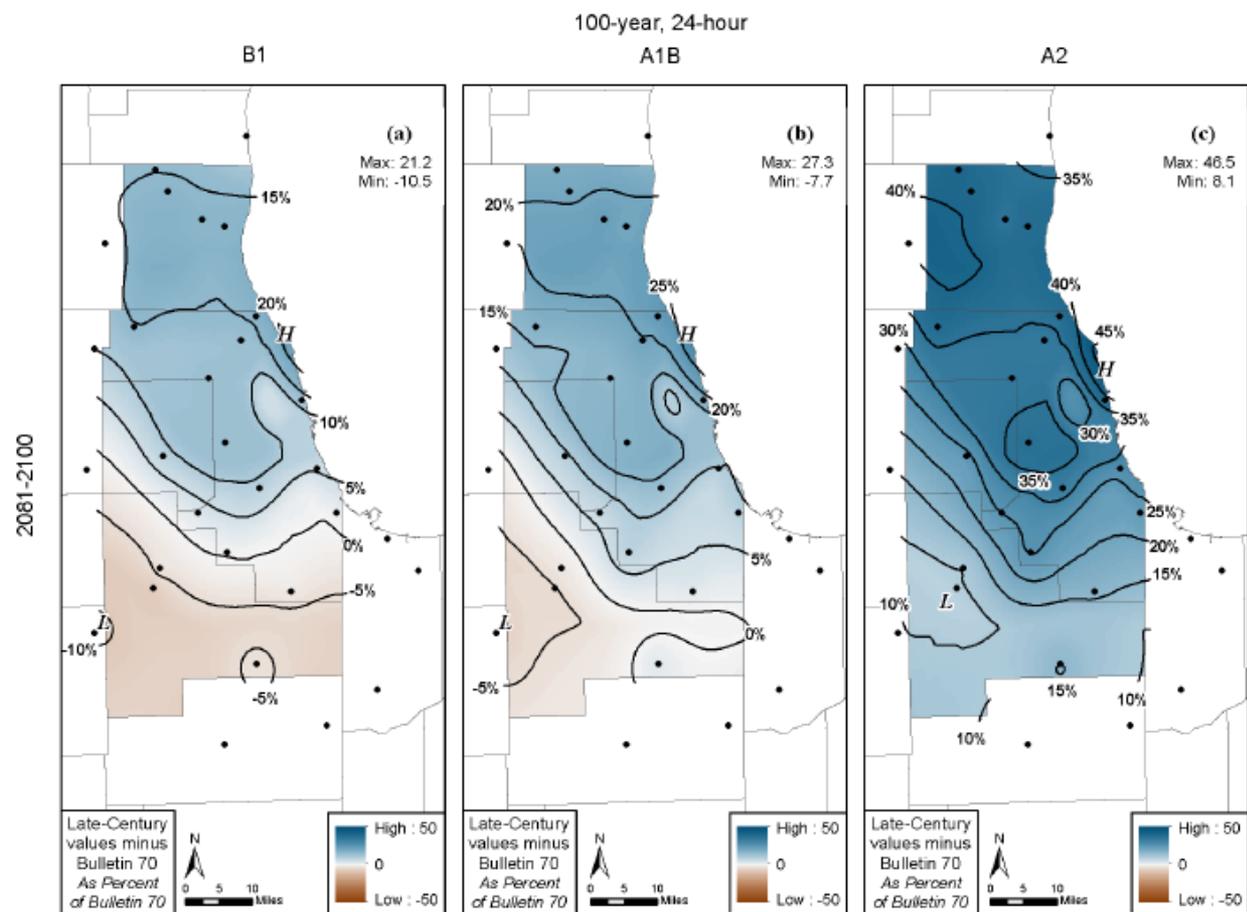


Figure B2.4. Percent differences between projected 100-year 24-hour projected values for late 21st century based on CMIP3 UW data and Bulletin 70

mmarkus@Illinois.edu

217-333-0237



STORMWATER MANAGEMENT COMMISSION

May 10, 2019

TO: Lake County WDO Enforcement Officers and Public Works Directors
FROM: Kurt Woolford, Chief Engineer, Lake County Stormwater Management Commission
RE: **Updated Bulletin 70 Rainfall Guidance Memo #1**

The updated Bulletin 70¹ rainfall is 20-45% higher than the current values used in the Watershed Development Ordinance² (WDO). The large increase reflects current climate conditions and also is due to the prior practice of using records from a single precipitation gage located at the Waukegan Regional Airport. The use of a single point is not appropriate to represent a large area or entire county. See Exhibit 1: July 2017 Rainfall Totals for the discrepancy between the Waukegan point and Lake County.

Rainfall Data Source	Inches	WDO Increase (Inches/%)	Region Increase (Inches/%)
Original Bulletin 70 – Waukegan Point	6.50	0.00 / 0%	-
Original Bulletin 70 – Northeast Region	7.58	1.08 / 17%	0.00 / 0%
Updated Bulletin 70 – Northeast Region	8.57	2.07 / 32%	0.99 / 13%

Future climate models³ for Cook, DuPage, Lake and Will Counties indicate the largest rainfall increases will occur in Lake County and trend toward the regional averages. Adopting the new rainfall reduces the divergence from the increasing regional trends and positions the County to adapt to future conditions and reduce flood risk. It is expected that State and Federal agencies will be adopting the updated information.

Based on policy discussion, there is a high likelihood that SMC will be adopting the updated Bulletin 70 rainfall as best available data in the next WDO revision (anticipated March 10, 2020). Prior to that date, a series of guidance memos will be issued providing recommendations on how to implement the new rainfall for development projects. Table 2 below provides the best available data and its recommended use is on the following page.

Table 2: DRAFT Updated Rainfall Depth-Duration Frequency Table (Inches)

Duration	2 year	5 year	10 year	25 year	50 year	100 year	500 year
5 min	0.40	0.52	0.62	0.77	0.90	1.03	1.35
10 min	0.70	0.90	1.08	1.35	1.58	1.80	2.36
15 min	0.90	1.16	1.39	1.74	2.03	2.31	3.03
30 min	1.24	1.59	1.91	2.39	2.78	3.17	4.16
1 hour	1.57	2.02	2.42	3.03	3.53	4.03	5.28
2 hour	1.94	2.49	2.99	3.74	4.35	4.97	6.52
3 hour	2.14	2.75	3.30	4.13	4.80	5.49	7.20
6 hour	2.51	3.23	3.86	4.84	5.63	6.43	8.43
12 hour	2.91	3.74	4.48	5.61	6.53	7.46	9.78
18 hour	3.14	4.04	4.84	6.06	7.05	8.06	10.57
24 hour	3.34	4.30	5.15	6.45	7.50	8.57	11.24
48 hour	3.66	4.71	5.62	6.99	8.13	9.28	12.10
72 hour	3.97	5.08	6.05	7.49	8.64	9.85	12.81
120 hour	4.42	5.63	6.68	8.16	9.39	10.66	13.81
240 hour	5.60	7.09	8.25	9.90	11.26	12.65	16.00

Table 2 References: For storm durations of 1 hour or greater, rainfall values were obtained from Table 5 of Updated Bulletin 70, 2019. For storm durations less than 1 hour, values were calculated using ratios listed in Table 18 of Bulletin 70, 1989⁴.

SMC recommends that Enforcement Officers require a stormwater system capacity analysis using Table 2 above for all regulated development that have not received a Watershed Development Permit. Section 400.04 of the WDO allows the Enforcement Officer to require this submittal item. The results of the capacity analysis should be considered for design changes.

The #1 item of concern for the updated rainfall is the significant volume increase for detention. The current 100-year detention design requirement of 6.5 inches, is now equivalent to the updated 25-year rainfall amount (6.45 inches). Detention pond overflow configuration and development flood protection heights surrounding the detention pond should be looked at closely and included in the design changes. The volume of the pond should be recommended to be enhanced if possible, although SMC acknowledges that increasing footprint and excavation of ponds could represent significant impact to the configuration of imminent, or near construction development. The concept of imminent or near construction is also an item that will need to be discussed, defined and recommendations included in WDO language.

SMC strongly recommends using the updated rainfall to ensure protection of buildings from flood damage to the greatest extent possible [WDO Purpose: 102.06]. Specifically, the following WDO provisions should use Table 2 for projects that have not started construction. Stormwater and drainage projects that do not require a WDO permit, but include components listed below, are also recommended to use the Table 2 rainfall for infrastructure sizing. This will reduce future flood damage risk.

1. 506 Stormwater Conveyance Systems (Entire Section); and
2. 507.01 Stormwater Facility Emergency Overflow Structure; and
3. 507.02 Building Protection Above Emergency Overflow Elevation; and
4. 703.01 & 706.06 Flood-proofing Activities; and
5. 705 & 900 Public Health Protection Standards. Or conservatively use $FPE = BFE + 3$ feet; and
6. 706 & 901 Building Protection Requirements. Or conservatively increase elevation by one (1) additional foot above current WDO requirements; and
7. 707 Bridge, Culvert Crossing, and Roadway Approaches; and
8. 800 Flood-Prone Area Requirements (except compensatory storage)

For projects that are at any stage of grading, the Enforcement Officer may require additional protective measures including, but not limited to, construction of additional drainage facilities [WDO 1102.01].

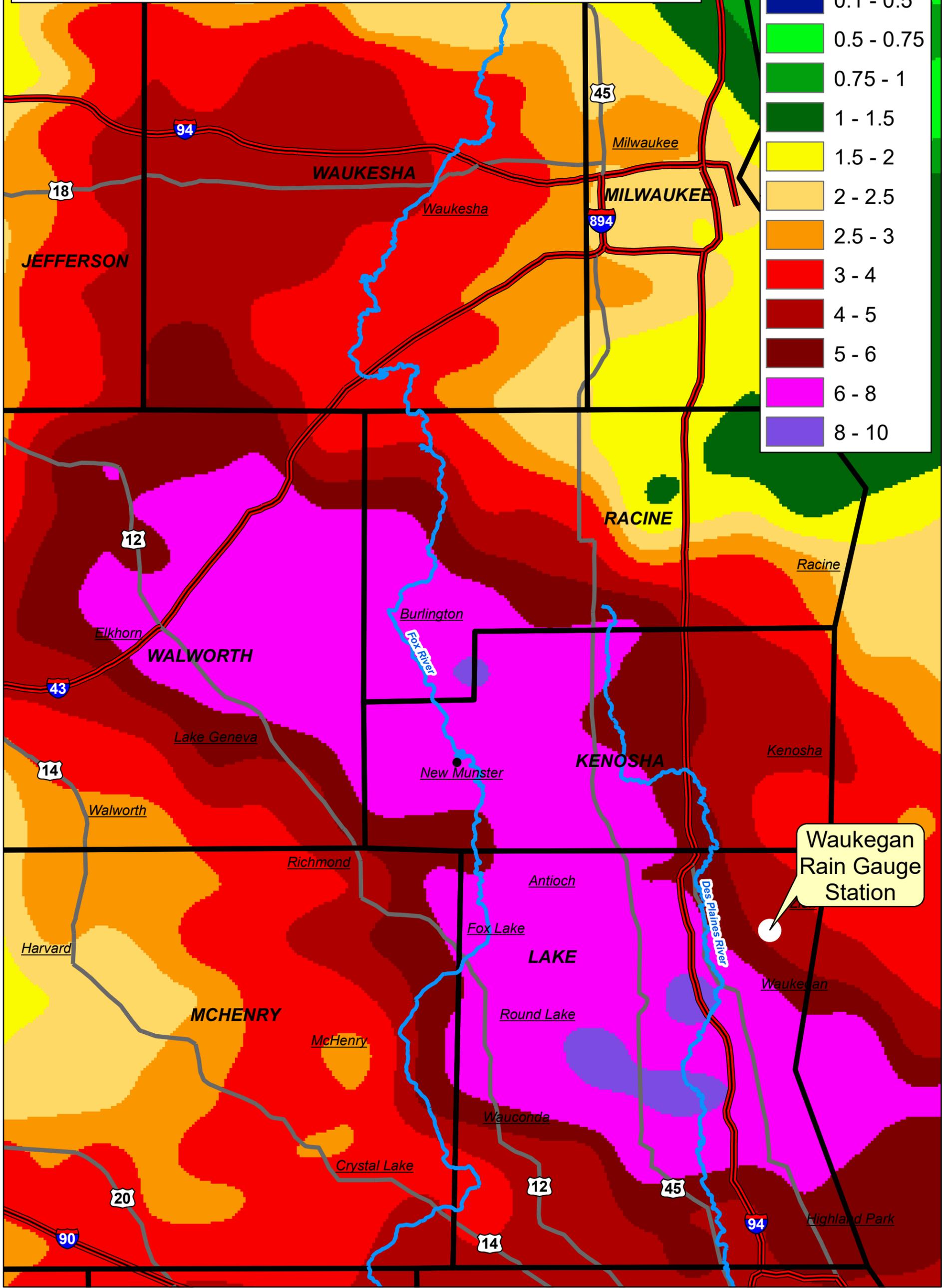
It is our understanding that the Illinois Department of Natural Resources / Office of Water Resources (IDNR/OWR) will require the updated Bulletin 70 starting on January 1, 2020. Base Flood Elevations (BFEs) and Floodplain modeling that will require IDNR/OWR or FEMA approval are recommended to use the Table 2 rainfall as best available data. A second report from the ISWS is due this fall and will revisit the Huff distribution curves that are used for floodplain modeling. The Technical Advisory Committee will review this information once it is available and further guidance will be provided.

References

1. J. Angel, Momcilo, M. 2019. [Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70](#). Illinois State Water Survey Contract Report 2019-05, Champaign, IL.
2. October 13, 2015. [Lake County Watershed Development Ordinance](#). Lake County, IL.
3. Momcilo, M., J. Angel, K. Wang, G. Byard, S. McConkey, and Z. Zaloudek. 2017. [Impacts of Potential Future Climate Change on the Expected Frequency of Extreme Rainfall Events in Cook, DuPage, Lake, and Will Counties in Northeastern Illinois](#). Illinois State Water Survey Contract Report 2017-05, Champaign, IL.
4. Huff, F. A., and J. R. Angel. 1989. [Rainfall Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois \(Bulletin 70\)](#). Illinois State Water Survey, Champaign, IL.

Exhibit 1: July 2017 Flood Rainfall Totals

Rainfall Totals (inches)

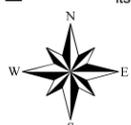


Waukegan Rain Gauge Station



- County Boundary
- Rivers
- Interstates
- US Highways

-DRAFT-



This map is provided for general locational information only. Map features have been derived from various sources, each of which has its own scale and accuracy. The locations of all features are approximate.
 Lake County Stormwater Management Commission
 September 1, 2017
 DATA SOURCES:
 U.S. Census Bureau
 National Weather Service
 United States Geological Service
 Lake County Stormwater Management



STORMWATER MANAGEMENT COMMISSION