Flooding at the confluence of the Rock and Mississippi Rivers

Sep 4, 2020

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Illinois State Water Survey

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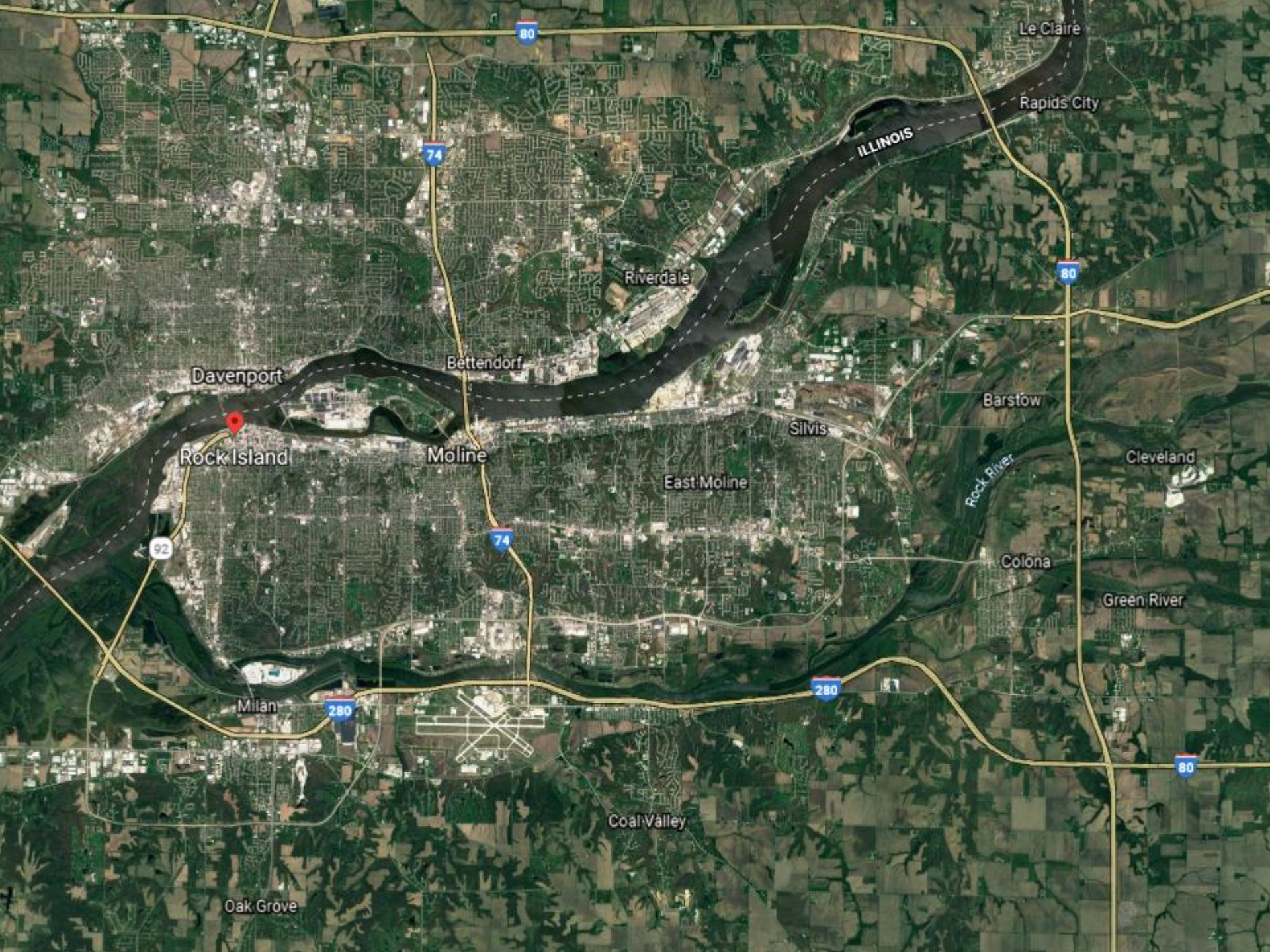
The staff of the Coordinated Hazard Assessment and Mapping Program which includes 18 Certified Floodplain Managers (CFM), seven Professional Engineers (PE), and seven Geographic Information Sytems Professionals (GISP)

www.illinoisfloodmaps.org

Topics

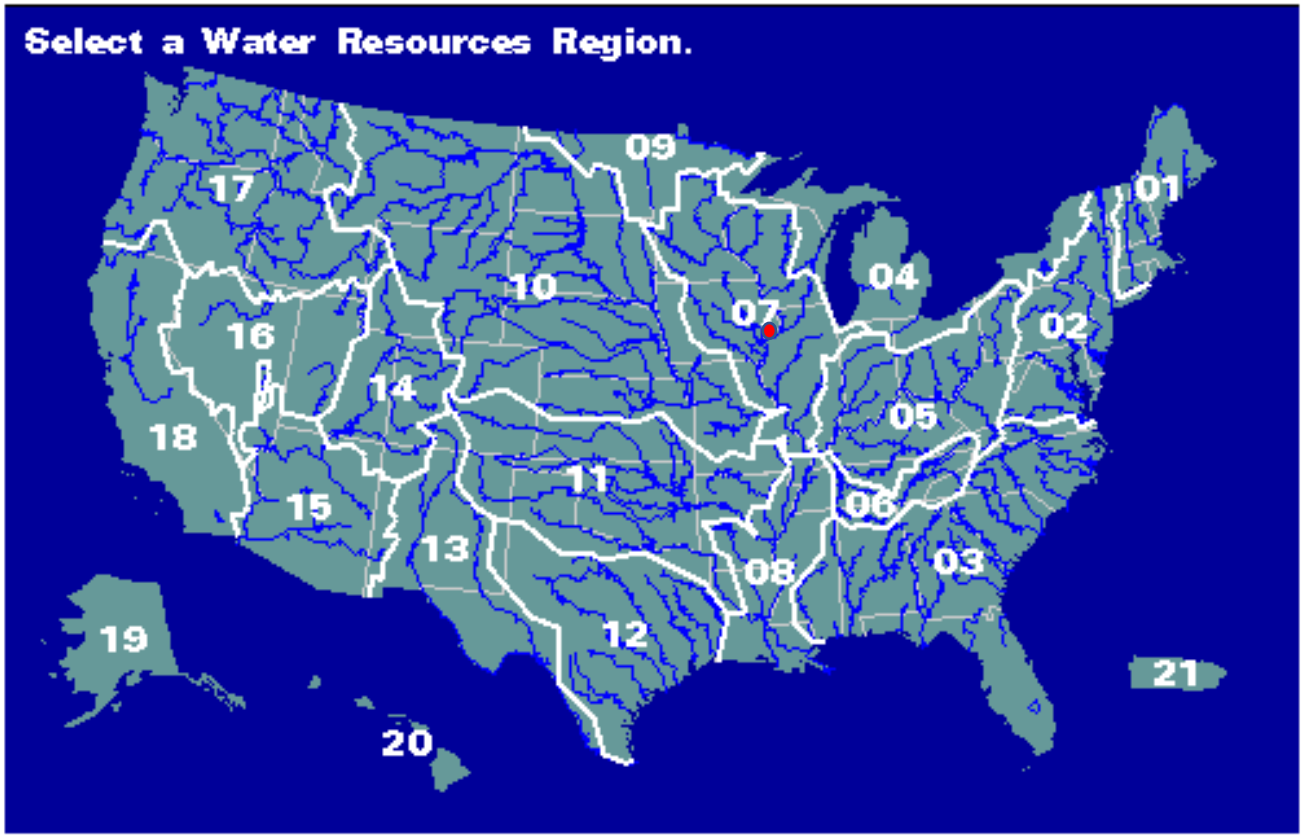
- Mississippi and Rock River Watersheds
- Historic and Recent Flood Events
- Mississippi and Rock River Levees
- Status of Floodplain Mapping
- Urban Flooding
- Updated rainfall statistics
- Flood Forecasting Information Resources
- Mitigation

Watersheds and Hydrologic Unit Codes (Where the water comes from)


Le Claire
Rapids City
ILLINOIS
80
74
Riverdale
Bettendorf
Davenport
Rock Island
Moline
East Moline
Silvis
Barstow
Cleveland
Rock River
Colona
Green River
92
280
Milan
Coal Valley
Oak Grove

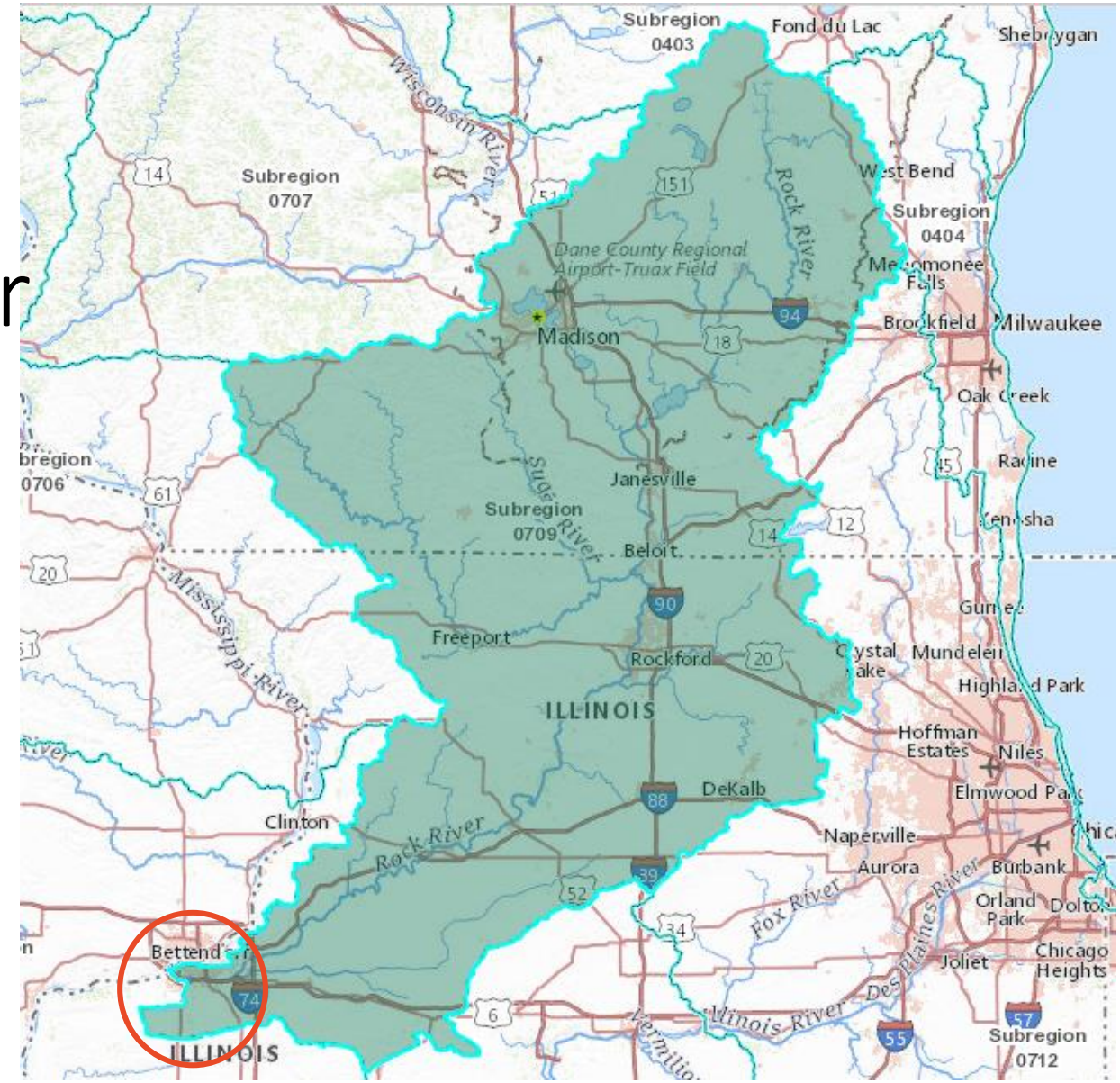
Upper Mississippi River Basin (HUC2)

Hydrologic Unit Map
(Based on Data from USGS Water-Supply Paper 2294)



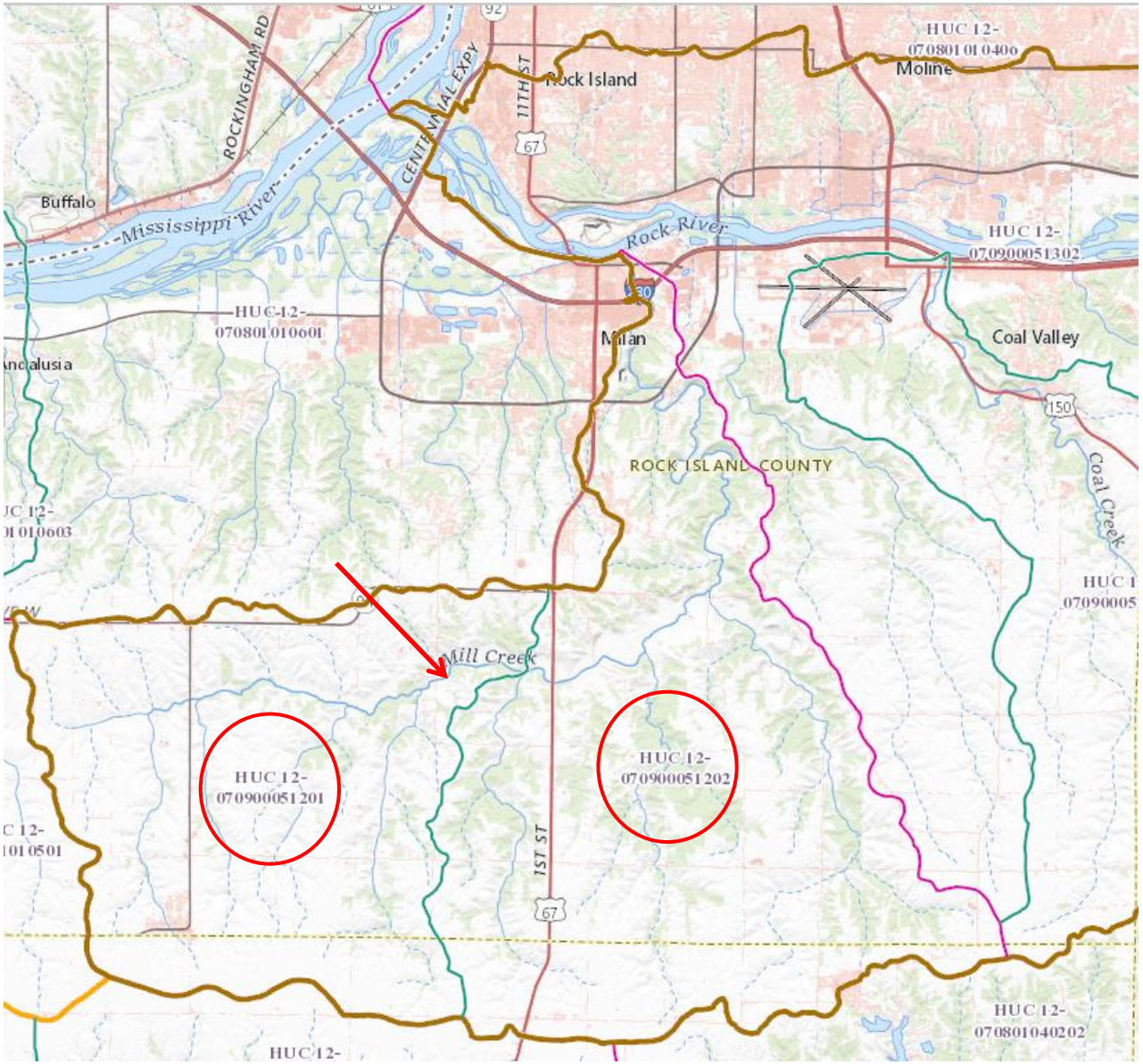
https://water.usgs.gov/GIS/regions.html

Rock River HUC4 National Map Viewer



https://viewer.nationalmap.gov/basic/?basemap=b1&category=nhd&title=NHD%20View

Mill Creek HUC 10 watershed two HUC12 National Map Viewer



https://viewer.nationalmap.gov/basic/?basemap=b1&category=nhd&title=NHD%20View

Historical and Recent Flood Events (How floods are measured and compared)

April 21, 2013 Flood on Rock River

Flooding along North Shore Drive in Moline, Illinois Monday April 22, 2013.
Kevin Schmidt/QUAD-CITY TIMES

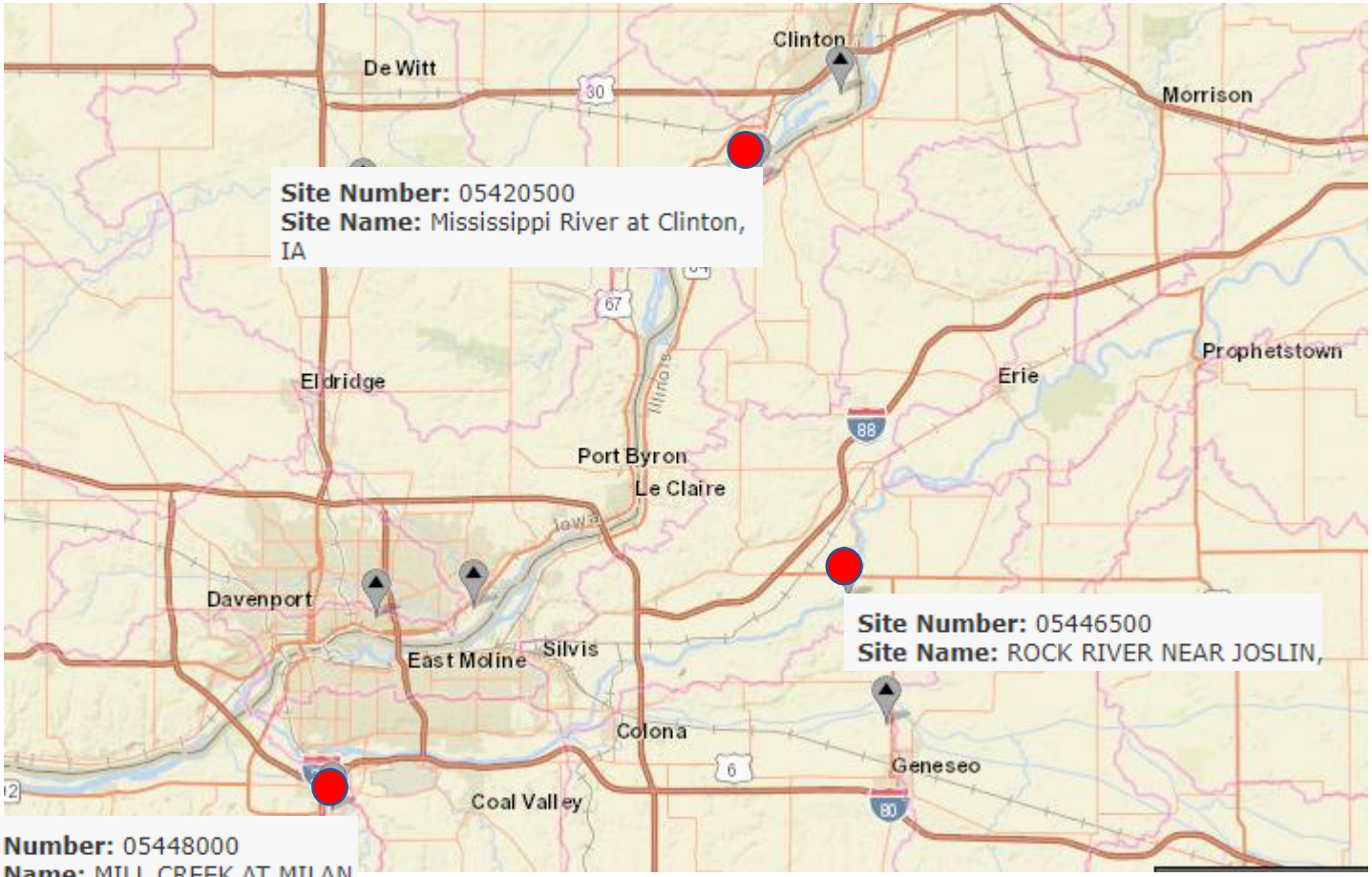
Spring 2019 Flood

Flooding closes streets in Rock Island

5th Avenue just west of 40th Street will be closed due to the Mississippi River flooding.

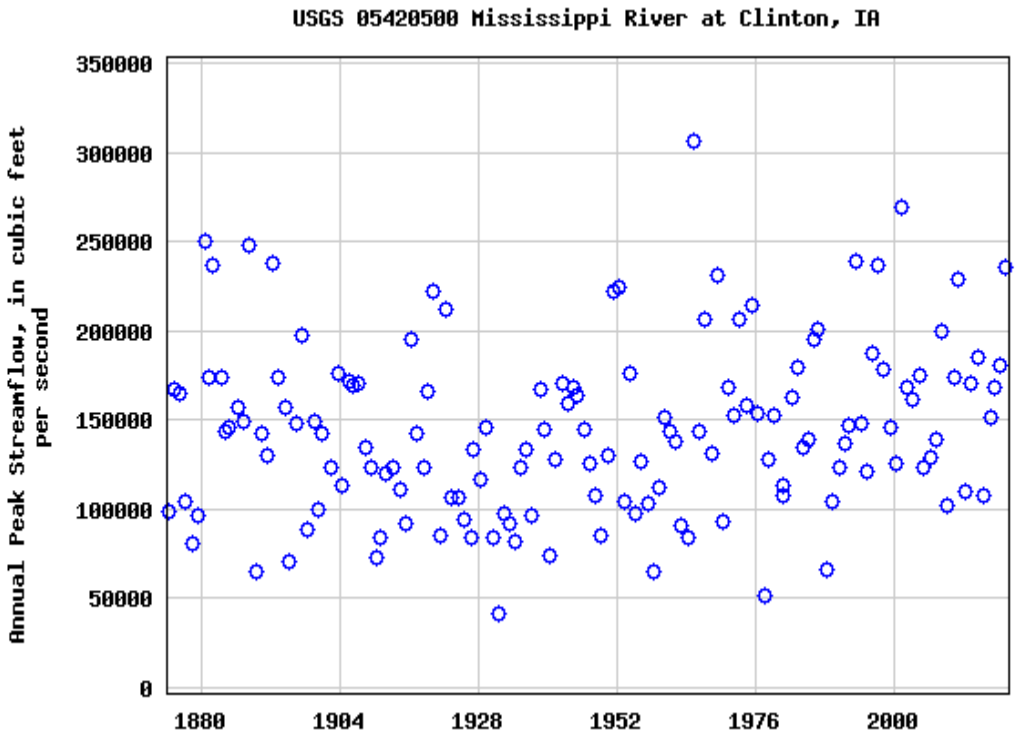
WQAD8abc news
https://www.wqad.com/article/news/local/drone/8-in-the-air/flooding-closes-streets-in-rock-island/526-85e476d7-4d01-48f9-8e3a-14c2da690793

Historical Floods
Streamflow Records



https://maps.waterdata.usgs.gov/mapper/index.html

Mississippi River at Clinton, IA (drainage area = 85,600 sq. mi.) USGS 05420500



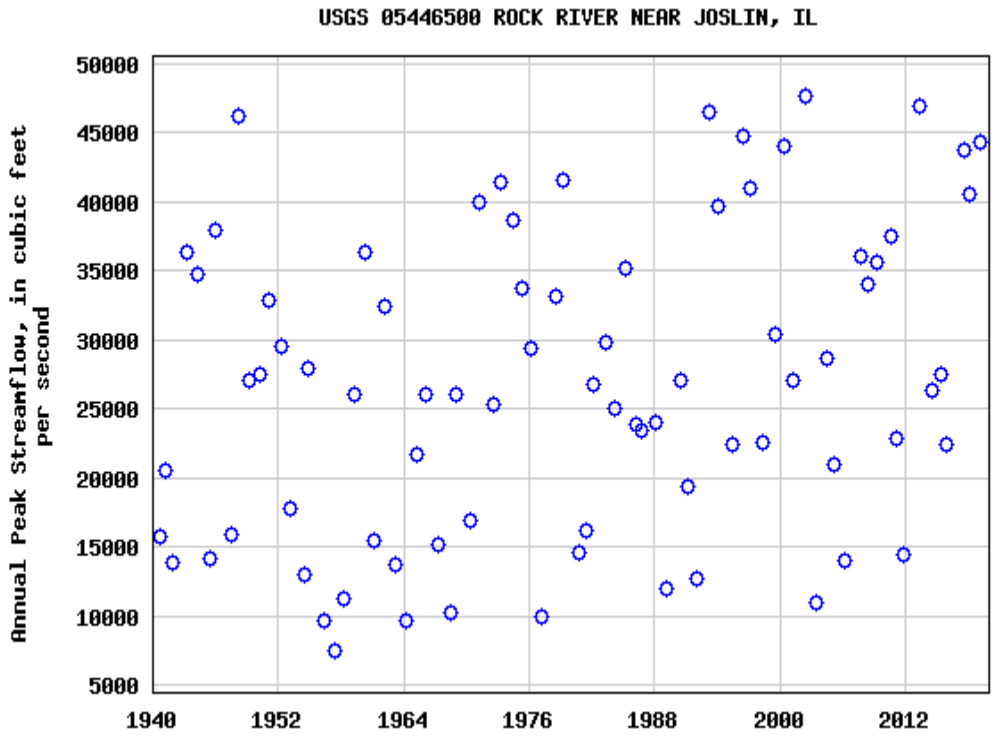
https://nwis.waterdata.usgs.gov/nwis/peak/?site_no=05420500

Water Year	Date	Gage Height (feet)	Streamflow (cfs)
1965	Apr. 28, 1965	24.65	307,000[1,6]
2001	Apr. 23, 2001	23.55[2]	270,000[6]
1993	Jul. 07, 1993	22.87[2]	239,000[6]
2019	Apr. 30, 2019	22.65[2]	236,000
2011	Apr. 20, 2011	21.802	229,000[6]
1997	Apr. 19, 1997	21.58	237,000[6]
1952	Apr. 27, 1952	21.24	225,000[1,6]
1951	Apr. 26, 1951	21	222,000[1,6]
2014	Jul. 03, 2014	20.82[2]	185,000[6]
1975	May 07, 1975	20.78	214,000[1,6]

Peak Gage-Height Qualification Codes.
2 -- Gage height not the maximum for the year
Peak Streamflow Qualification Codes.
1 -- Discharge is a Maximum Daily Average
6 -- Discharge affected by Regulation or Diversion

ROCK RIVER NEAR JOSLIN, IL (drainage area = 9549 sq. mi.)

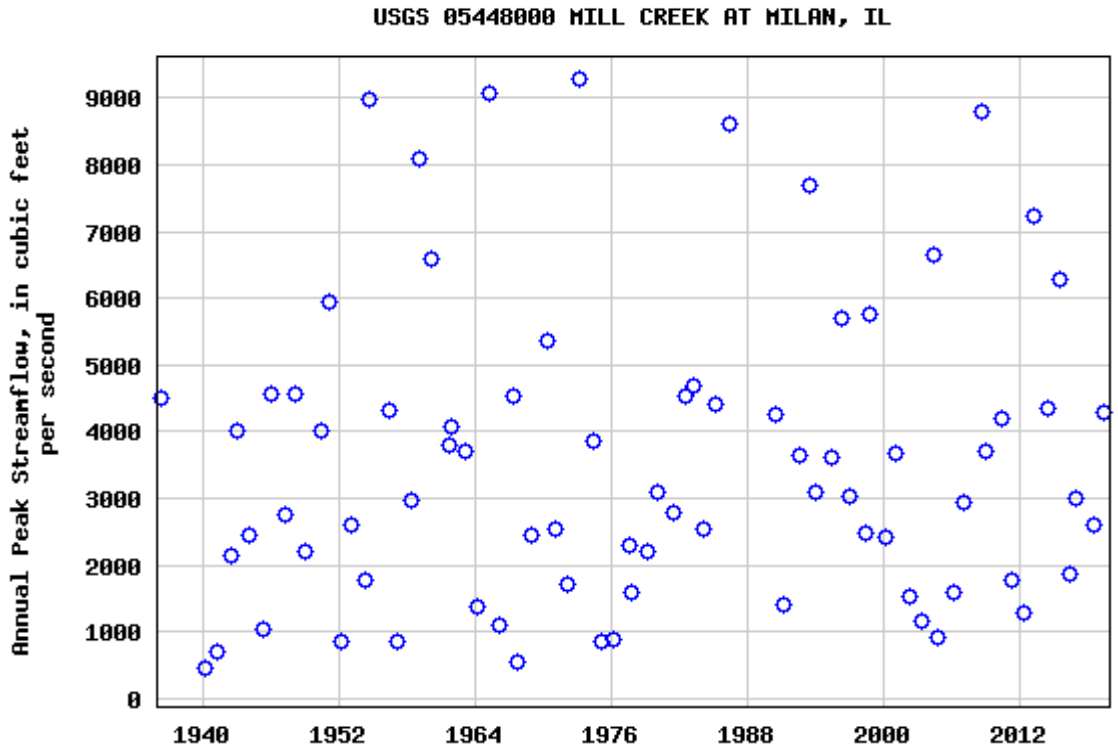
USGS 05446500



https://nwis.waterdata.usgs.gov/nwis/peak/?site_no=05446500

Water Year	Date	Gage Height (feet)	Streamflow (cfs)
2002	Jun. 07, 2002	19.24	477,005
2013	Apr. 21, 2013	19.11	470,005
1997	Feb. 23, 1997	18.88[1]	410,000[2,5,9]
1996	31-May-96	18.73	448,005
2019	Mar. 16, 2019	18.59	444,005
2000	Jun. 16, 2000	18.55	440,005
2017	Jul. 25, 2017	18.51	438,005
2018	Feb. 23, 2018	18.36	406,005
1993	Mar. 26, 1993	18.35	465,005
2001	Feb. 27, 2001	18.02[1]	270,000[2,5,9]

MILL CREEK AT MILAN, IL
USGS 05448000
(drainage area = 62.4 sq. mi.)



Water Year	Date	Gage Height (feet)	Streamflow (cfs)
1973	Apr. 22, 1973	11.65	9,300
1965	Apr. 24, 1965	11.53	9,060
2008	Sep. 13, 2008	11.37[2]	8,790[C]
2015	Jul. 07, 2015	11.07	6,270[C]
2013	Apr. 18, 2013	10.84	7,240[C]
1993	Jun. 25, 1993	10.29	7,680[C]
2004	30-May-04	10.23	6,650[C]
1963	Mar. 04, 1963	10.14[1]	37,002
1986	Jul. 08, 1986	9.9	8,600
2019	29-May-2019	9.74	4,290[C]

C -- All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other

https://nwis.waterdata.usgs.gov/usa/nwis/peak/?site_no=05448000

Mississippi River at Rock Island

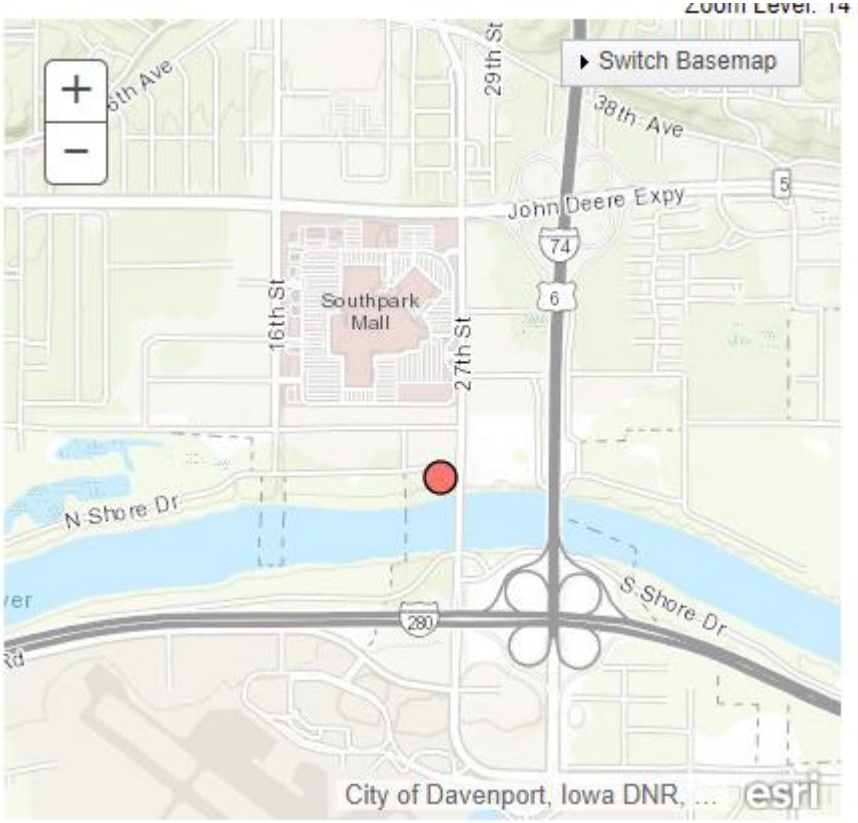
https://water.weather.gov/ahps2/hydrograph.php?wfo=dvn&gage=rcki2

Historic Crests- **Daily**
(1) 22.70 ft on 05/02/2019
(2) 22.63 ft on 07/09/1993
(3) 22.48 ft on 04/28/1965
(4) 22.33 ft on 04/25/2001
(5) 22.00 ft on 03/10/1868
(6) 21.68 ft on 06/01/2019 (P)
(7) 21.49 ft on 06/16/2008
(8) 20.90 ft on 07/04/2014
(9) 20.71 ft on 04/22/2011
(10) 20.68 ft on 04/08/2019 (P)

P= preliminary value subject to further review

Rock River at Moline

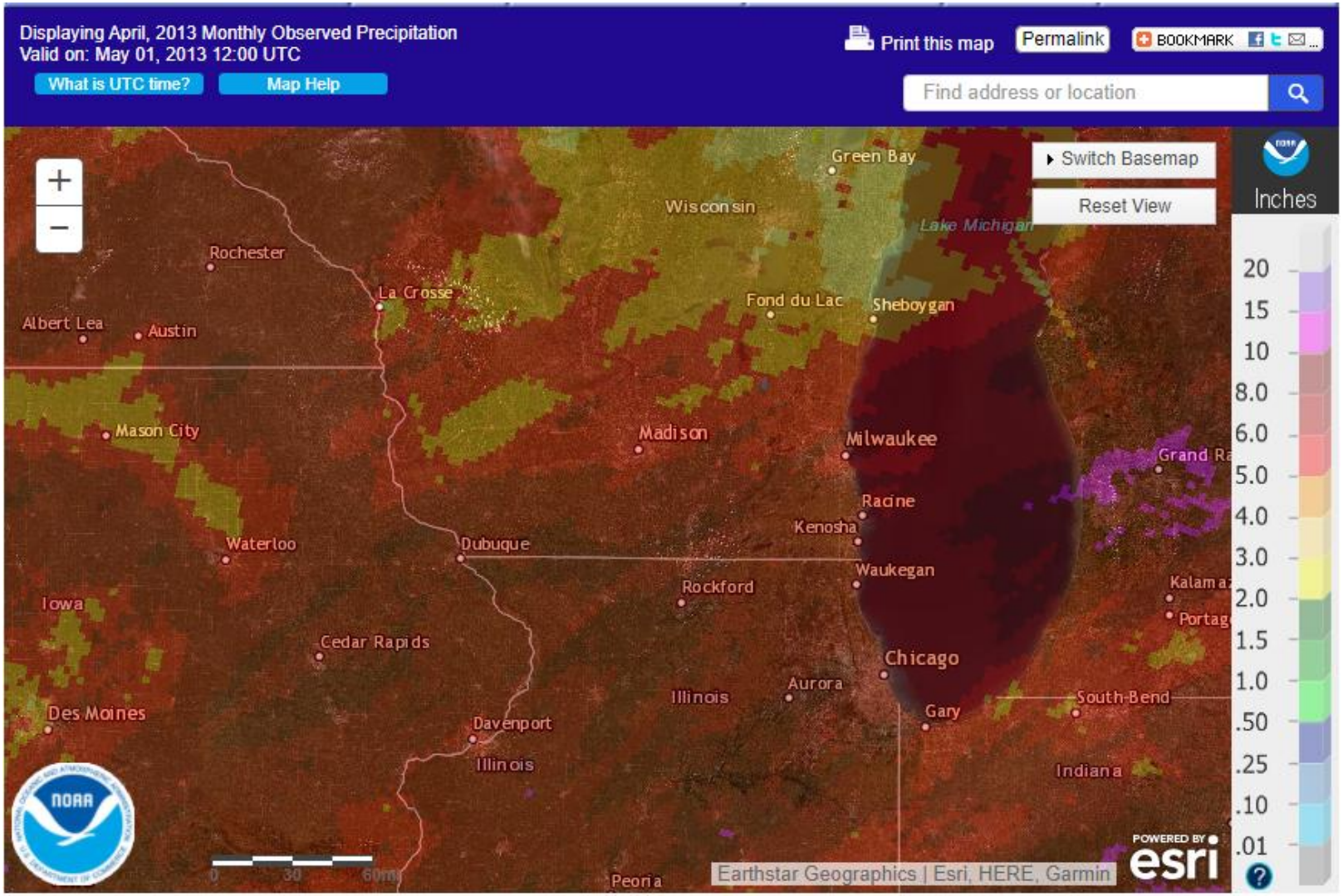
https://water.weather.gov/ahps2/hydrograph.php?wfo=dvn&gage=mlii2



Historic Crests - Daily
(1) 16.53 ft on 04/21/2013
(2) 16.38 ft on 03/06/2008
(3) 16.21 ft on 06/02/2019 (P)
(4) 16.15 ft on 04/26/1973
(5) 15.79 ft on 06/07/2002
(6) 15.70 ft on 05/20/1974
(7) 15.57 ft on 03/17/2019 (P)
(8) 15.40 ft on 07/26/2017 (P)
(9) 15.36 ft on 05/03/2019 (P)
(10) 15.31 ft on 02/24/1997

P= preliminary value subject to further review

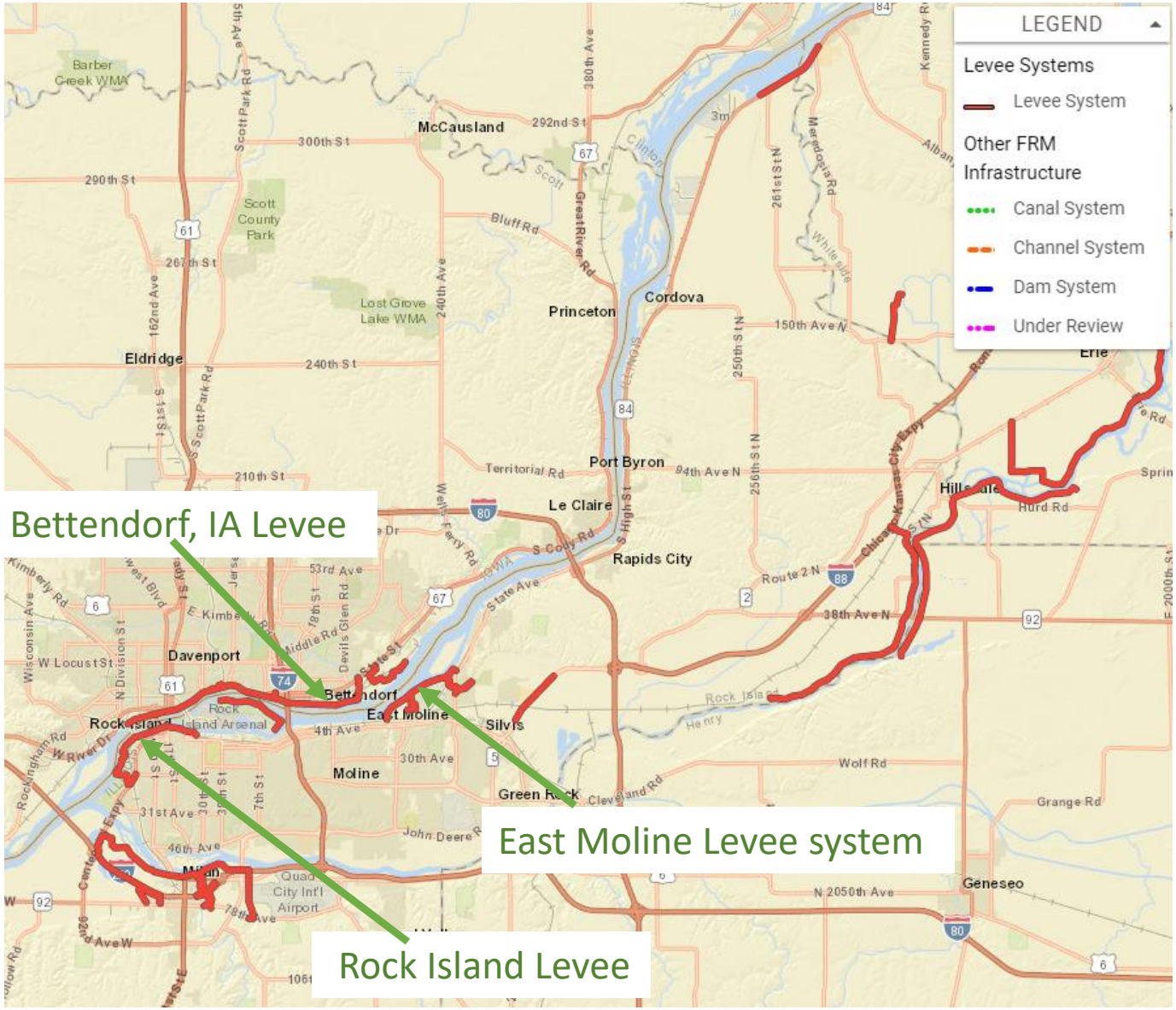
April 2013 total precipitation



https://water.weather.gov/precip/

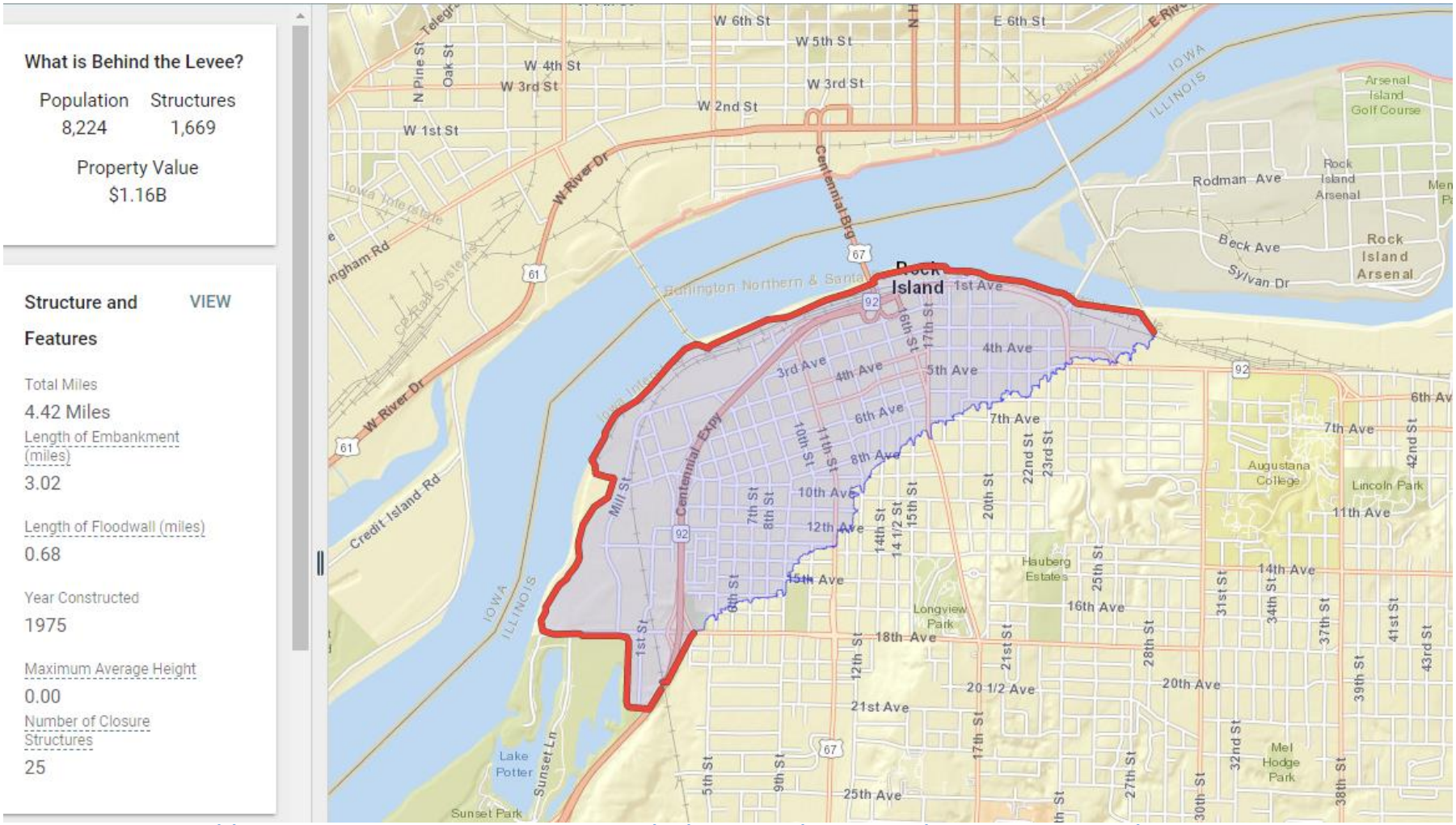
Mississippi and Rock River Levees

USACE National Levee Database



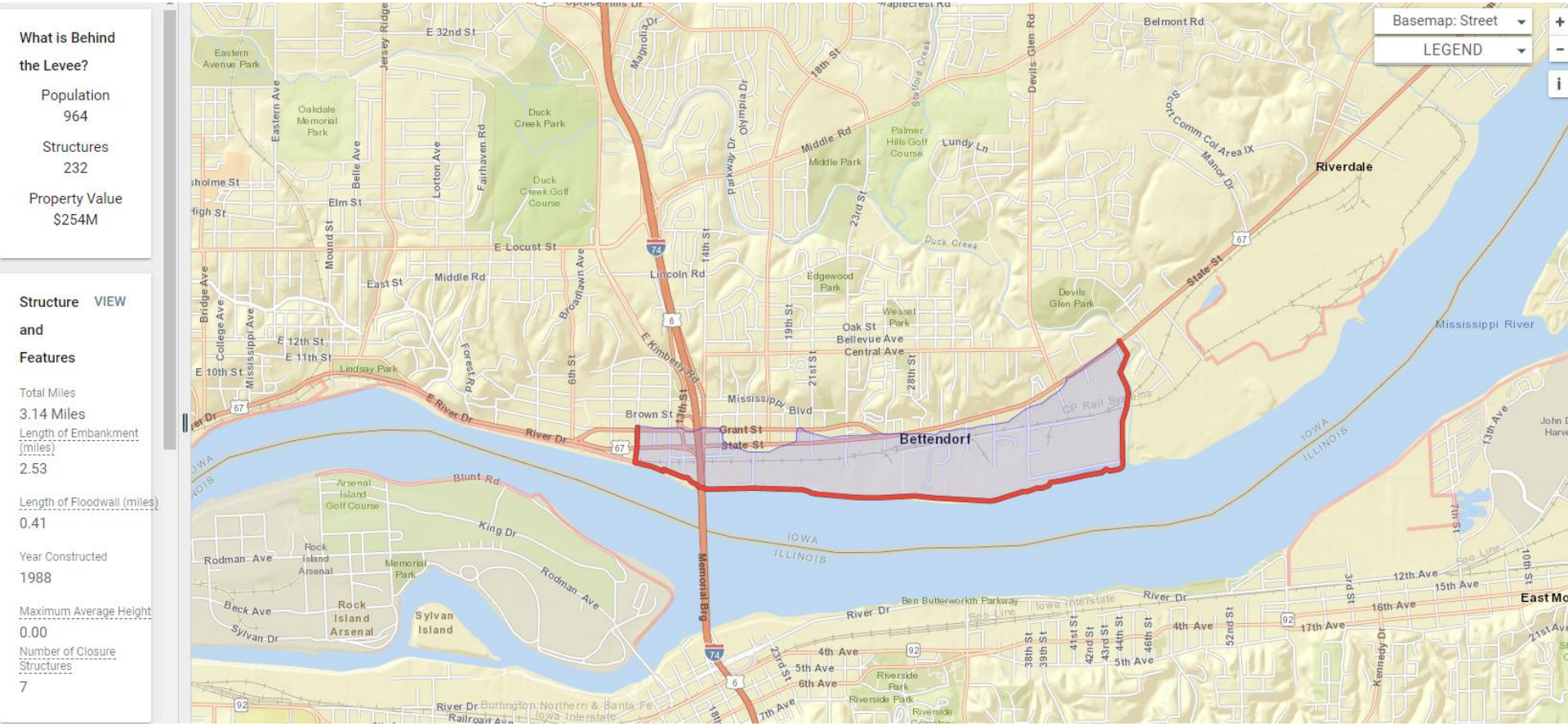
https://levees.sec.usace.army.mil/#/

National Levee Database
Rock Island Levee



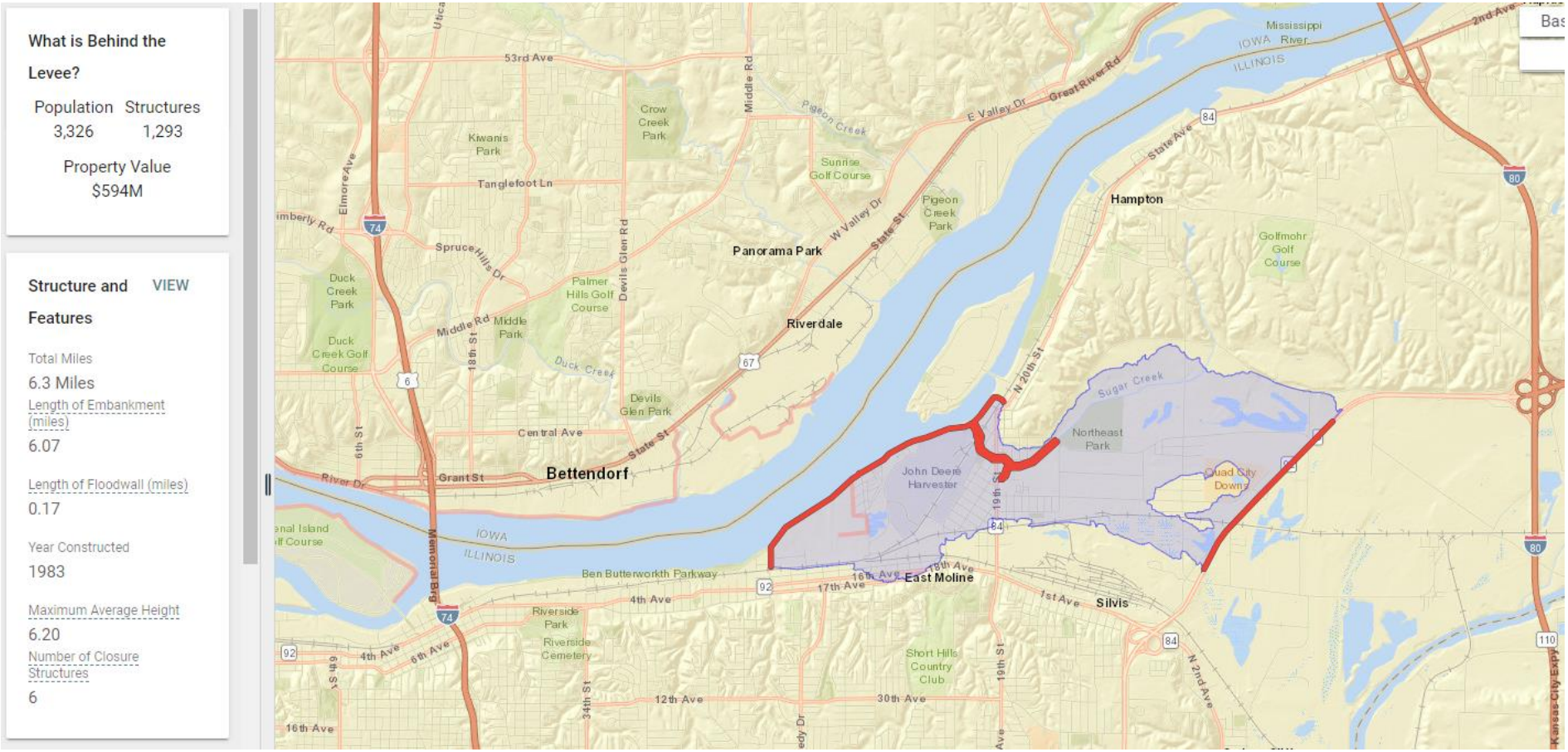
https://levees.sec.usace.army.mil/#/levees/system/5105240001/summary

National Levee Database
Bettendorf, IA Levee



https://levees.sec.usace.army.mil/#/levees/system/5105020001/summary

National Levee Database
East Moline Levee system



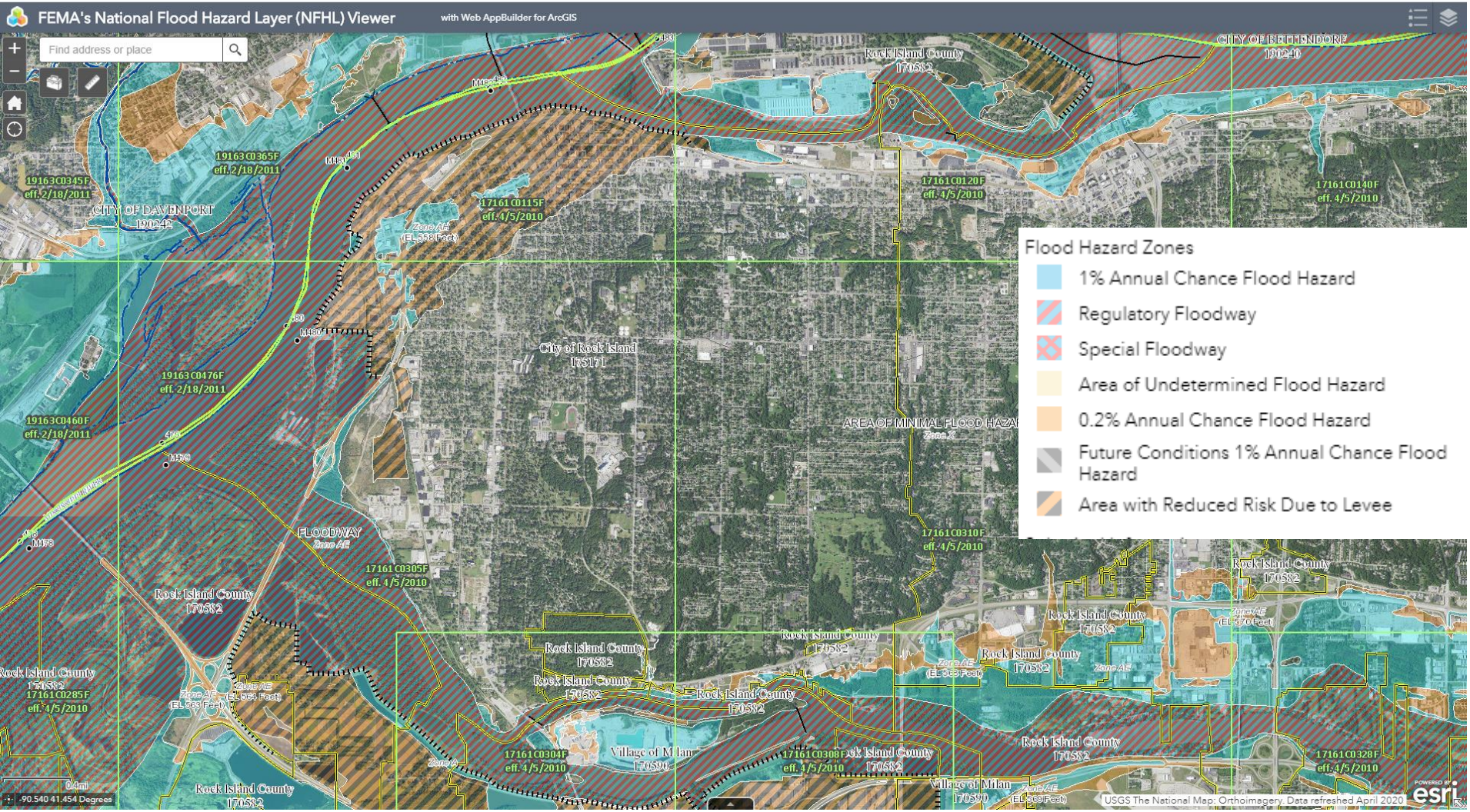
https://levees.sec.usace.army.mil/#/levees/system/5105100001/summary

Status of Floodplain Mapping

Federal Emergency Management Agency (FEMA)
Flood Insurance Rate Maps (FIRMS)

- FIRMs are the official community maps that show Special Flood Hazard Areas (SFHA)
- Alert local officials and the general public of flood hazards
- Used by the community floodplain management
- Used to determine if flood insurance is required for federally backed mortgages and to determine applicable insurance rates
- Used for planning among many other applications

FEMA's National Flood Hazard Layer
(Google FEMA NFHL)



https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd

Floodway and Storage

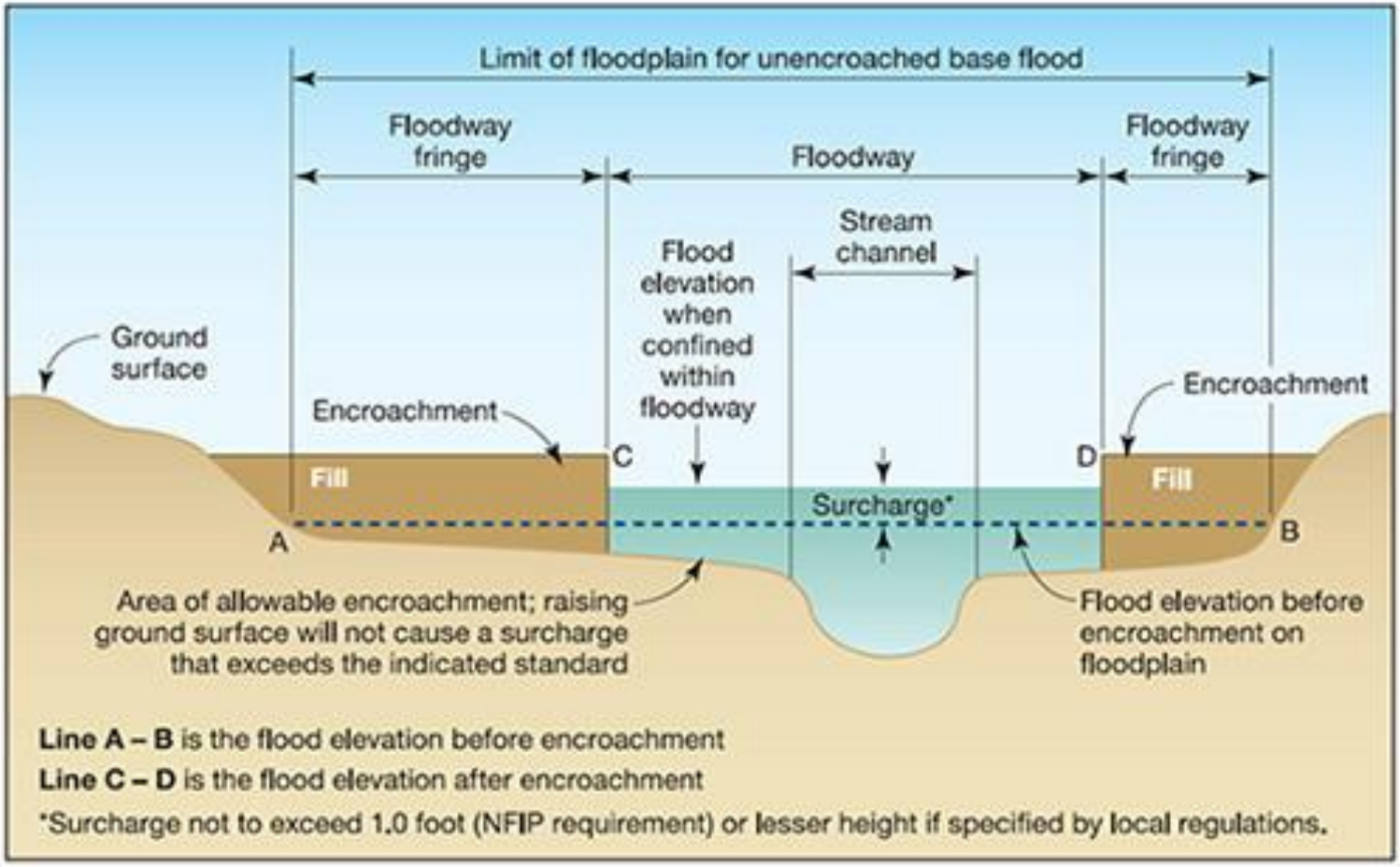
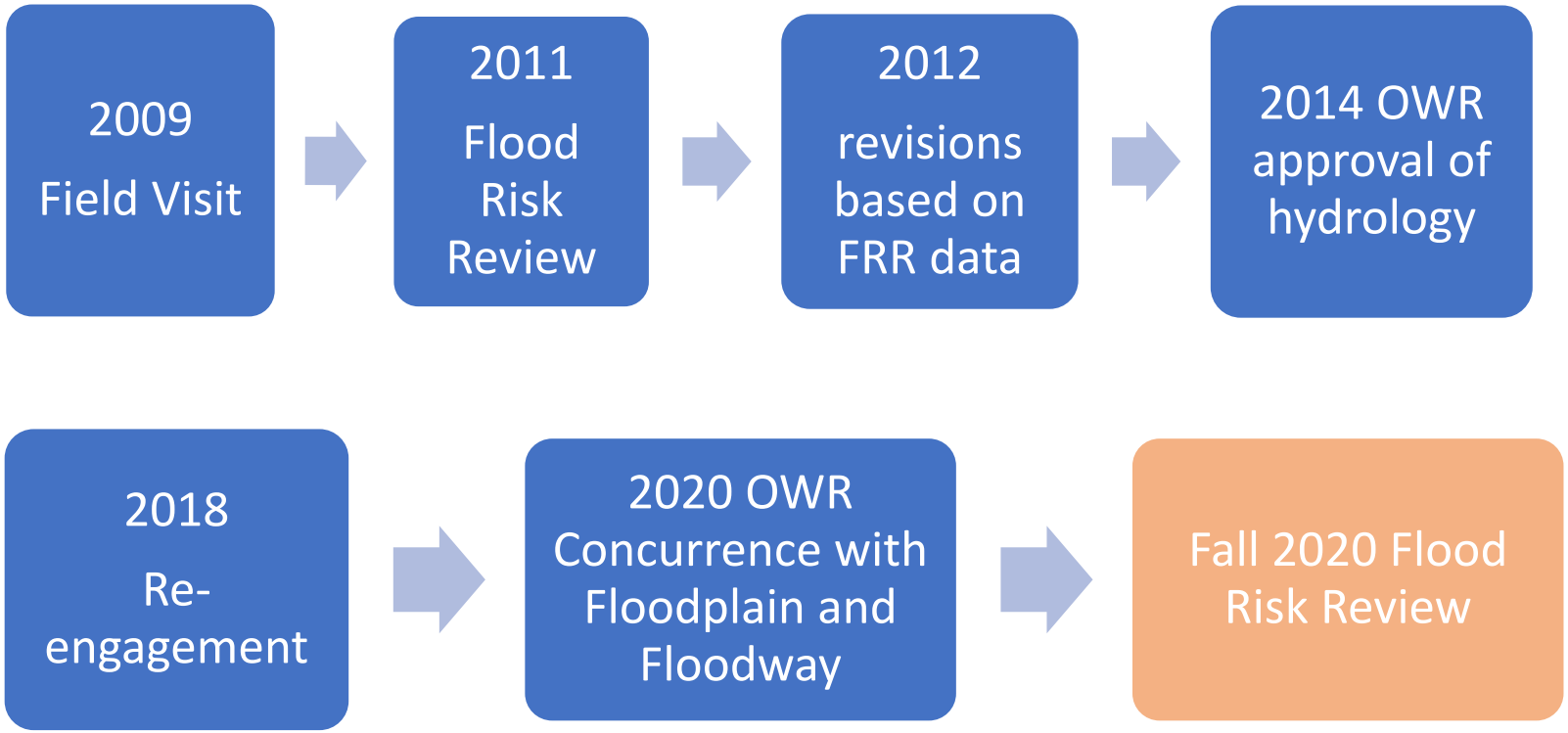
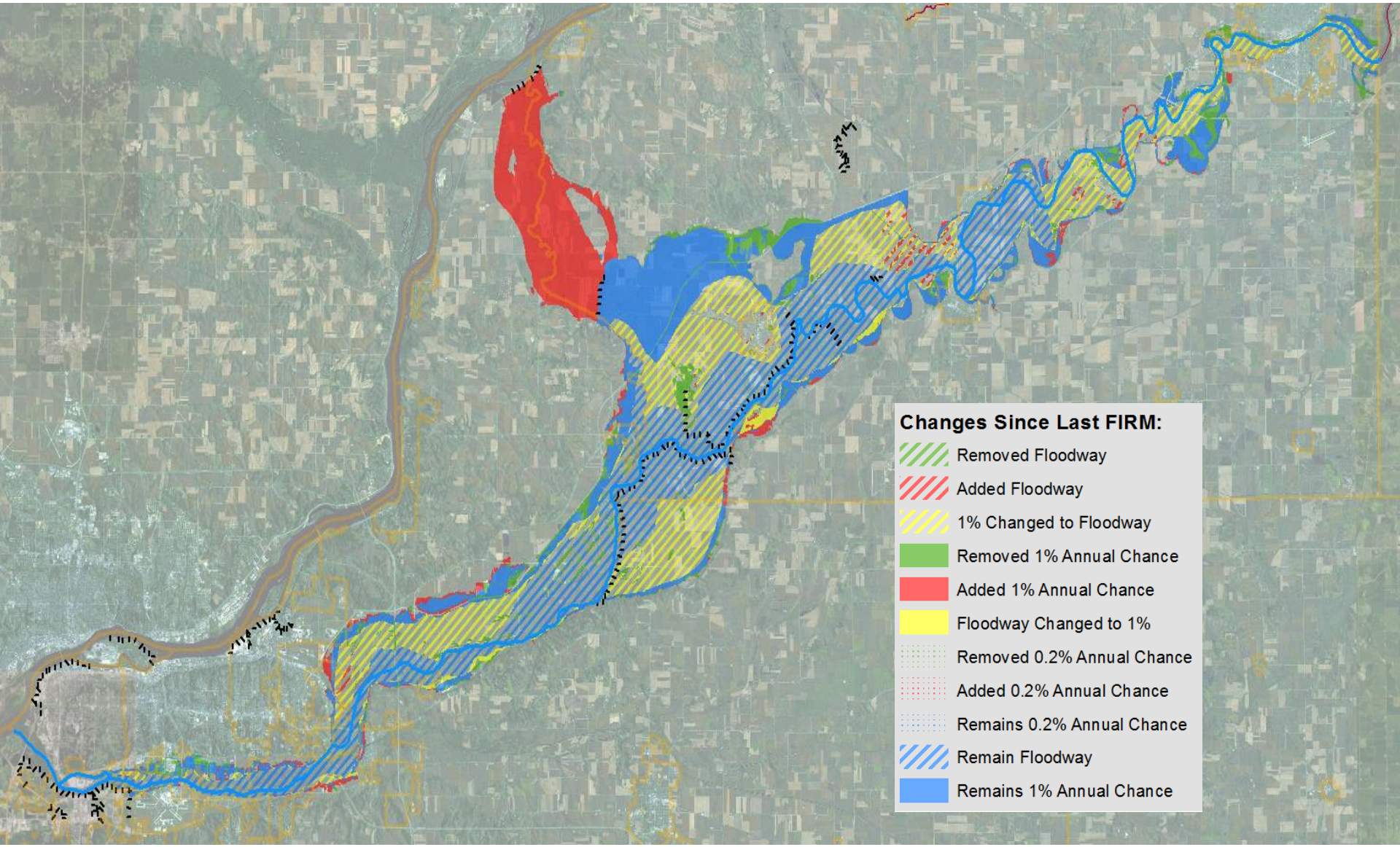


Figure 2-3. Typical riverine floodplain cross section

Updating the Rock River Flood Study (Rock Island, Henry and Whiteside County)




Changes Since Last FIRM:
Removed Floodway
Added Floodway
1% Changed to Floodway
Removed 1% Annual Chance
Added 1% Annual Chance
Floodway Changed to 1%
Removed 0.2% Annual Chance
Added 0.2% Annual Chance
Remains 0.2% Annual Chance
Remain Floodway
Remains 1% Annual Chance

Urban Flooding

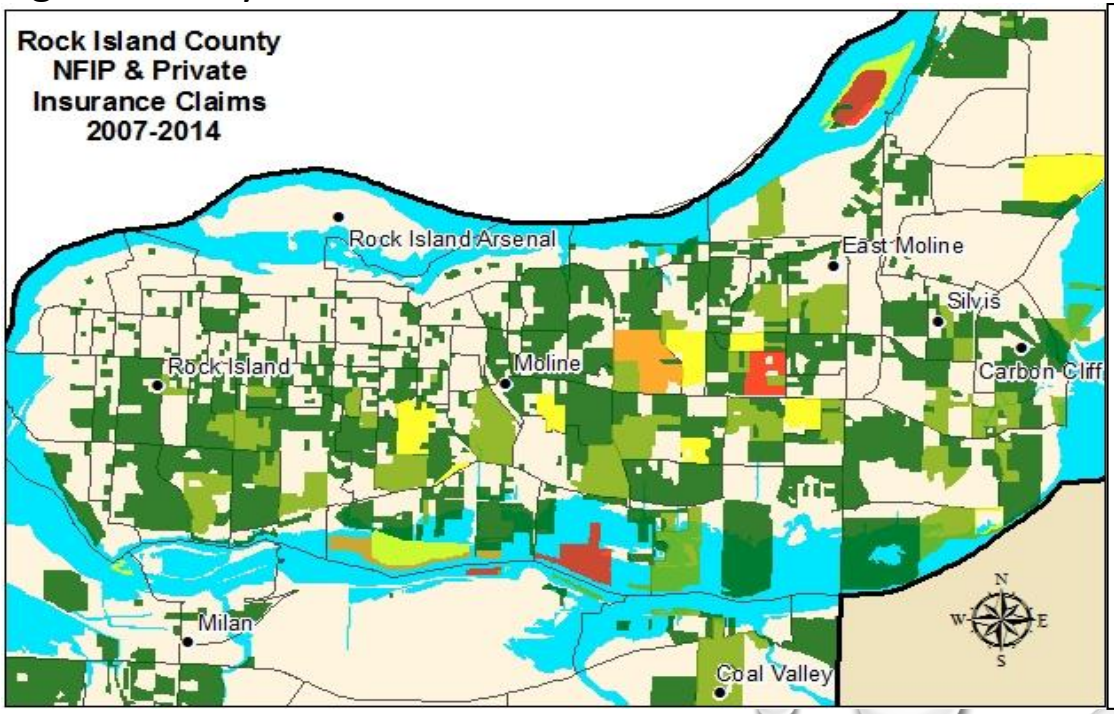
Urban Flooding Awareness Act

- Illinois General Assembly under the *Urban Flooding Awareness Act* (effective August 3, 2014) tasked the Illinois Department of Natural Resources (**IDNR**) to prepare a report on the extent, cost, prevalence, and policies related to urban flooding in Illinois and identify resources and technology that may lead to mitigation of the impact of urban flooding.

Illinois Department of Natural Resources, 2015. *Report for the Urban Flooding Awareness Act.* Report**:** https://www.dnr.illinois.gov/WaterResources/Documents/Final_UFAA_Report.pdf
Appendix**:** https://www.dnr.illinois.gov/WaterResources/Documents/Final_UFAA_Appendices.pdf

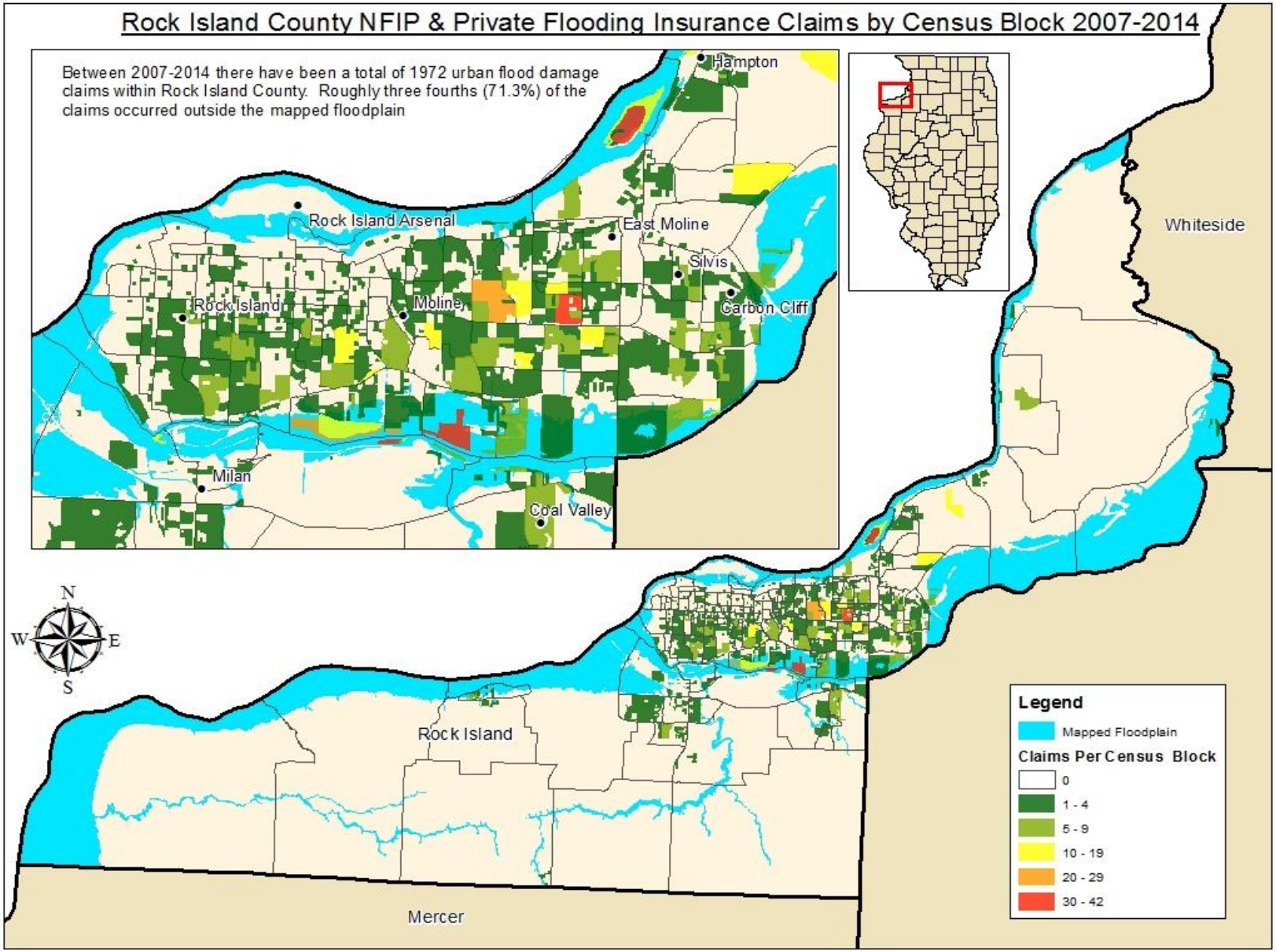
What is Urban flooding?

As defined by the Act: "The inundation of property in a built environment, particularly in more densely populated areas, caused by rainfall overwhelming the capacity of drainage systems, such as storm sewers. 'Urban flooding' does not include flooding in undeveloped or agricultural areas. 'Urban flooding' includes (i) situations in which stormwater enters buildings through windows, doors, or other openings, (ii) water backup through sewer pipes, showers, toilets, sinks, and floor drains, (iii) seepage through walls and floors, and (iv) the accumulation of water on property or public rights-of-way."



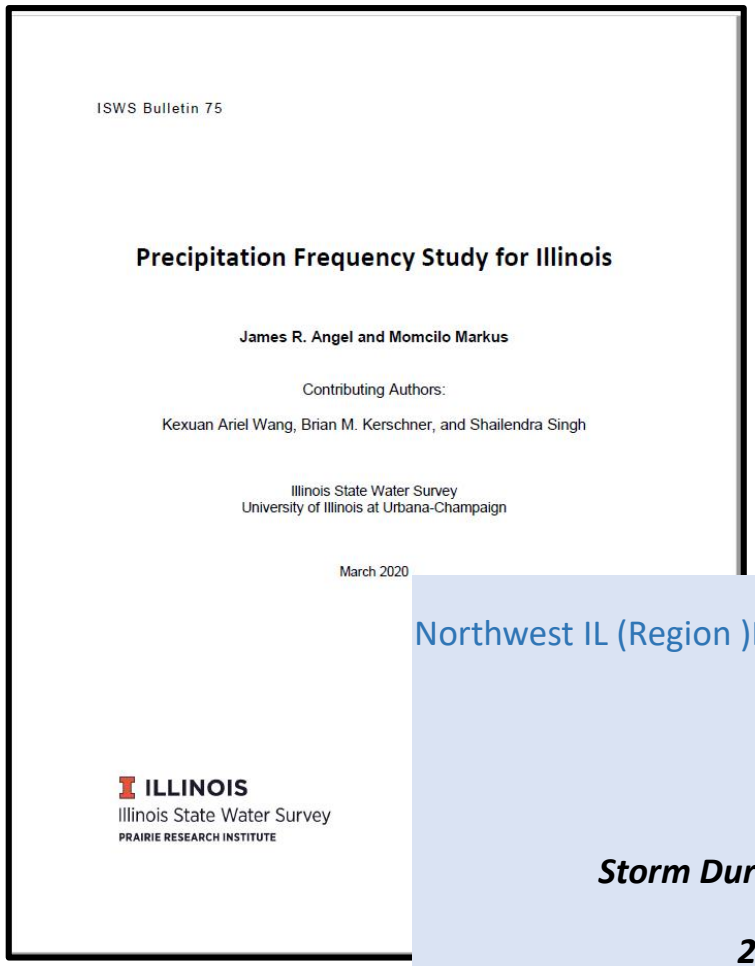
Between 2007 and 2014 there have been a total of 1972 urban flood damage claims within Rock Island County. Roughly three fourths (71.3%) of the claims occurred outside the mapped floodplain.

Report for the Urban Flooding Awareness Act, June 2015



Updated Precipitation Data

ISWS Bulletin 75 supersedes Bulletin 70


ISWS Bulletin 75

Precipitation Frequency Study for Illinois

James R. Angel and Momcilo Markus

Contributing Authors:

Kexuan Ariel Wang, Brian M. Kerschner, and Shailendra Singh

Illinois State Water Survey
University of Illinois at Urbana-Champaign

March 2020

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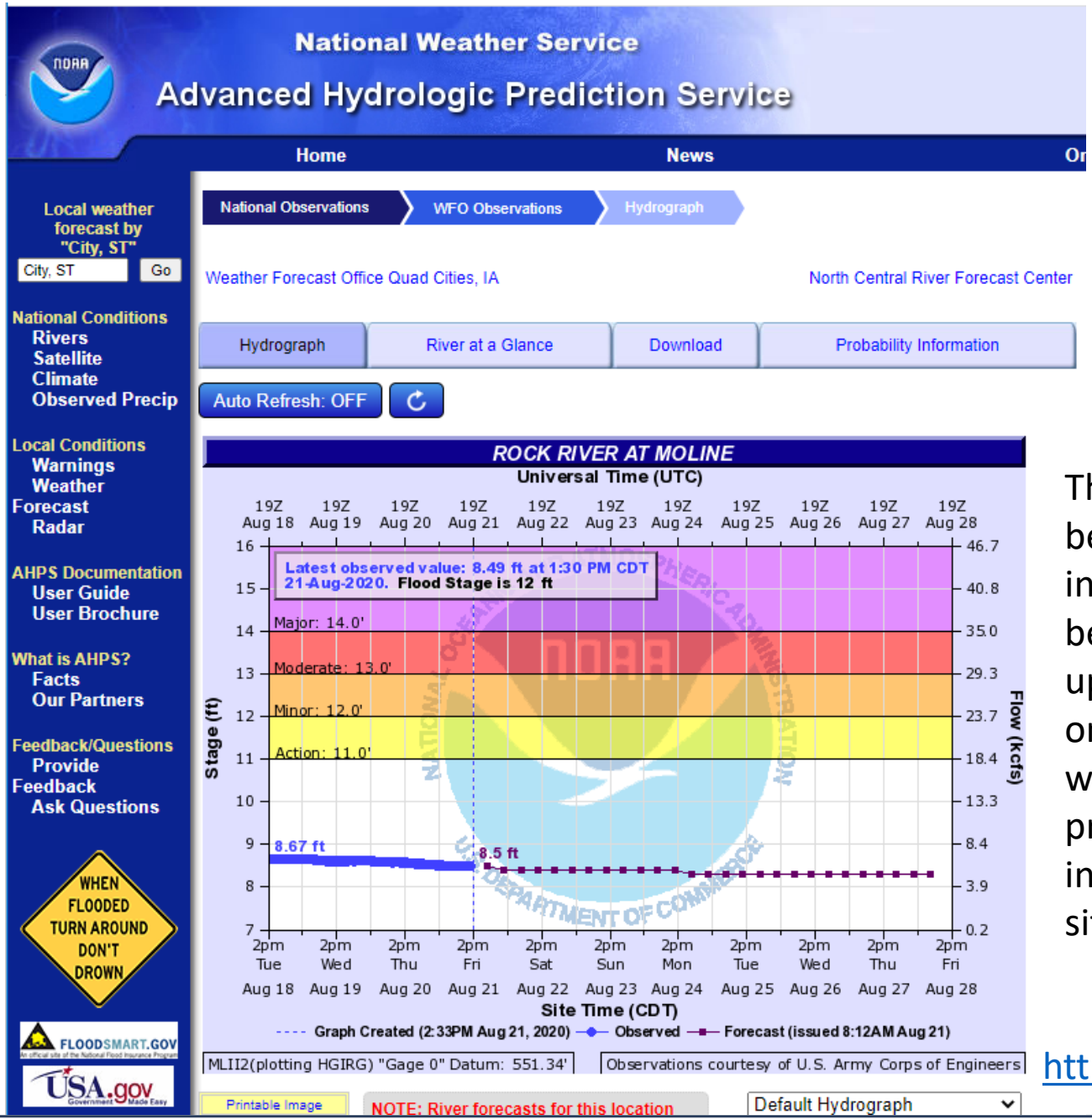
Analyses of frequency distributions of heavy rainfall events provide estimates of the expected depth, duration, and frequency of these events. Estimation of the depth of rainfall over a given period corresponding to a given frequency of occurrence, such as the 1 percent annual chance event or the 10 percent annual chance event, provides information used to manage stormwater and identify floodplains.

Northwest IL (Region)Precipitation Frequency Estimates and Difference from BUL 70 (inches)

	Recurrence Interval				
	2 yr.	***5 yr.***	***10 yr.***	***50 yr.***	***100 yr.***
Storm Duration					
2 hour	1.94 (0.11)	2.45 (0.12)	2.92 (0.18)	4.17 (0.31)	4.78 (0.31)
24 Hour	3.34 (0.23)	4.22 (0.27)	5.03 (0.40)	7.2 (0.67)	8.25 (0.89)

Flood Forecasting Information Resources

The National Weather Service provides River Forecasts



The information displayed can be enhanced by adding inundation maps. These can be developed from the updated Rock River model once fully vetted. ISWS has worked with the NWS to prepared libraries of inundation maps for gage sites in Illinois.

https://water.weather.gov/ahps/

Mitigation

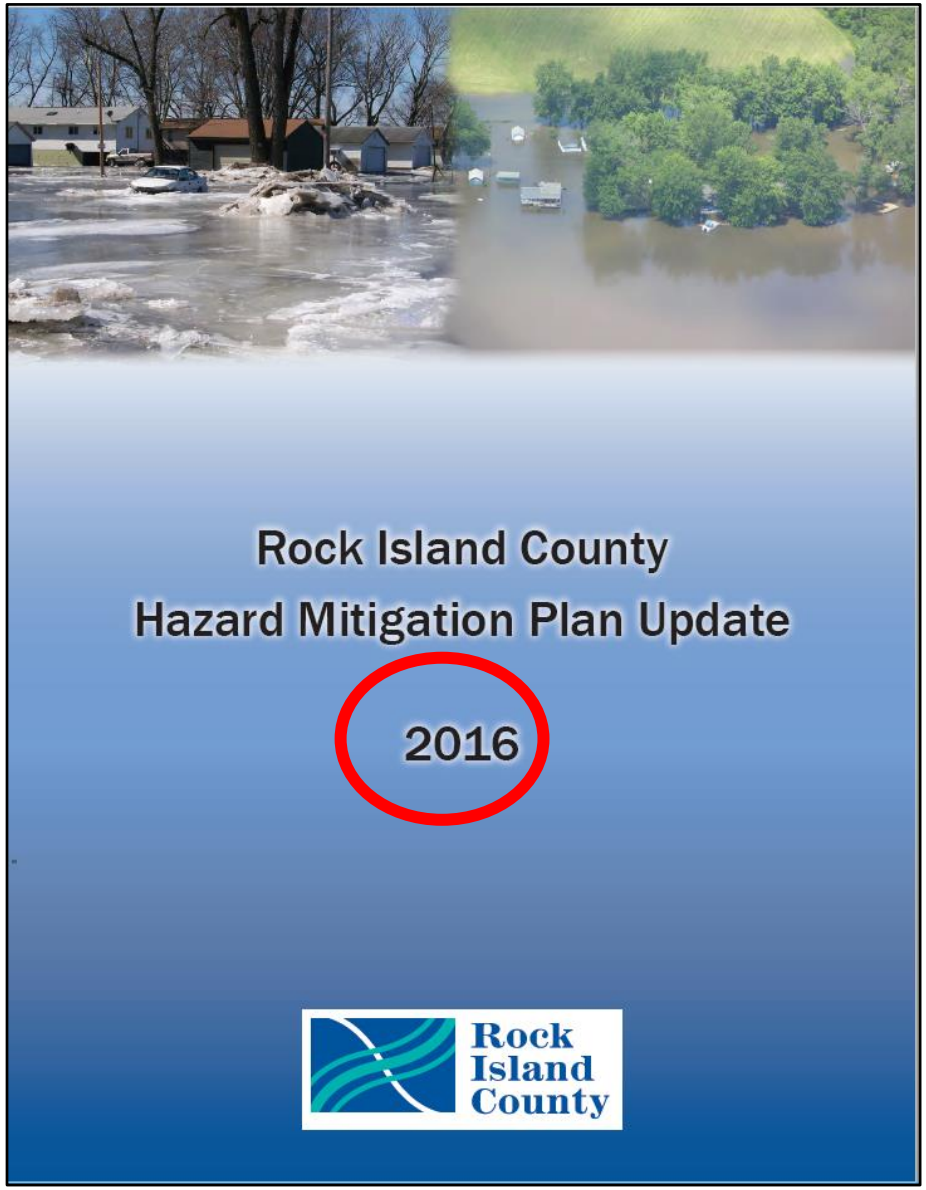
Mitigating Flood Impacts

Mitigation Plan Common Community Goals

- Continue NFIP compliance by enforcing local floodplain ordinances based on State of Illinois Model code, which exceeds NFIP minimum requirements.
- Create a voluntary flood acquisition program and elevations program
- Enforce and keep building codes updated

Consider

- Community outreach to encourage flood insurance and sewer back up insurance
- Inundation mapping linked to NWS forecasts
- Examination of urban flooding root causes



Rock Island County and municipalities should apply for a mitigation planning grant this fall to update the Hazard Mitigation Plan, due in 2021.

Building Resilient Infrastructure and Communities (BRIC) pre-disaster mitigation grant program.

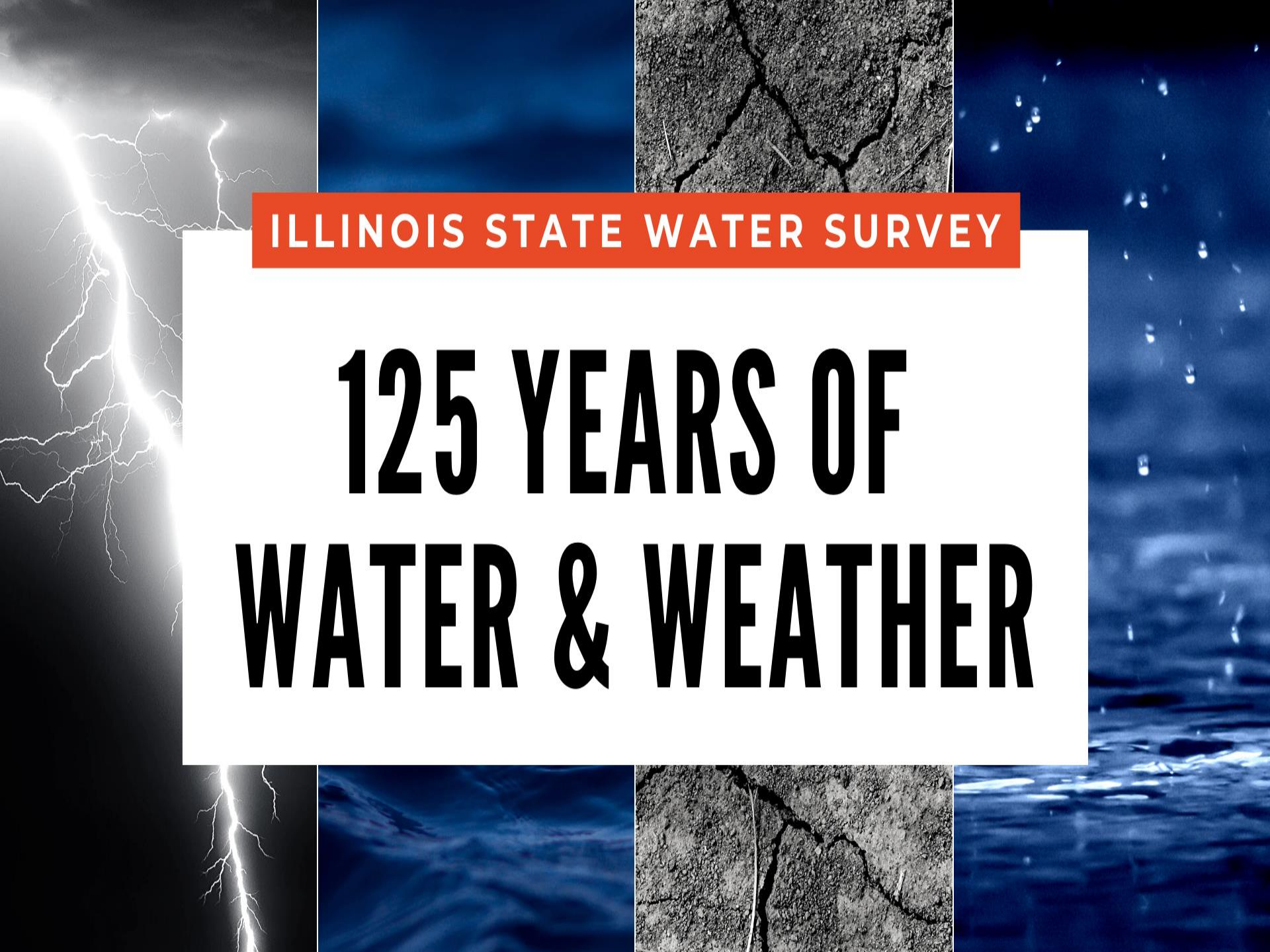
On August 4, 2020, the Federal Emergency Management Agency (FEMA) officially announced the Notice of Funding Opportunities (NOFOs) for the **Flood Mitigation Assistance (FMA)** grant program and the new **Building Resilient Infrastructure and Communities (BRIC)** pre-disaster mitigation grant program.

This year there is $660 million available for these two programs combined, with a record-breaking $500 million of pre-disaster mitigation funding available nationally through this new program.

BRIC priorities are to incentivize:

- public infrastructure projects.
- projects that mitigate risk to one or more lifelines.
- projects that incorporate nature-based solutions.
- the adoption and enforcement of modern building codes.

https://www.fema.gov/grants/mitigation/fy2020-nofo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