



## Building a Weather-Ready State: Embedding NWS Staff in the Illinois State Emergency Operations Center during the Record Setting Mississippi River Flood of December 2015/January 2016.

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*20<sup>th</sup> Annual NWA Severe Storms and Doppler Radar Conference*



# Outline

- Event Background
- WFO Lincoln (ILX) State Emergency Operations Center (SEOC) Impact-based Decision Support Services (IDSS) Program
- The Event
- Conclusions



# NWS IDSS Program Background

- Weather-Ready Nation

“With today’s increasingly complex environmental, societal, technological, and economic challenges, the NWS must become more agile, open and flexible to achieve its mission to meet society’s changing needs. Our information services must advance from transmitting information in discrete messages to helping core partners understand the spectrum of information we provide so they can make good decisions.”

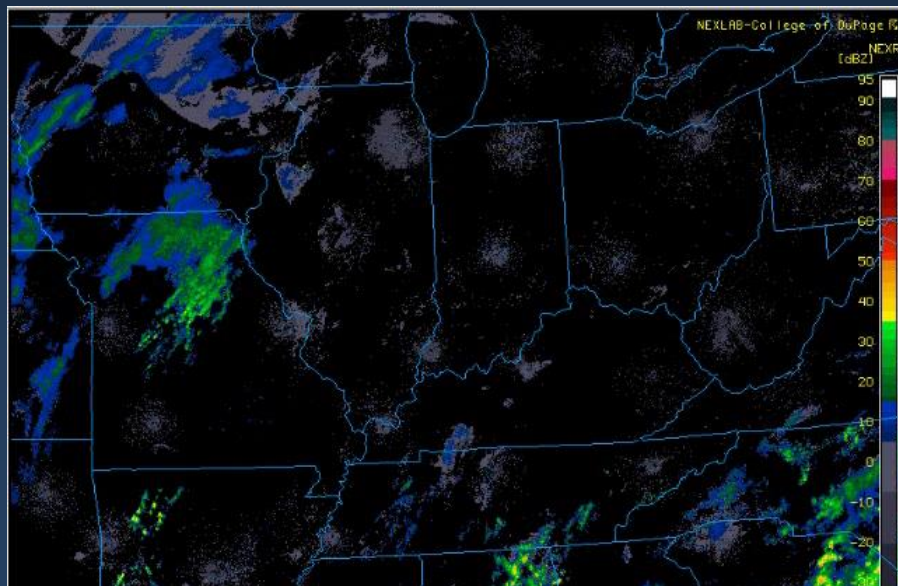
– Executive Summary, Weather-Ready Nation Roadmap

- On-site support at the state-level has a long history
  - Des Moines WSFO Support for the 1993 Midwest Floods
- A drive to enhance and expand this focus

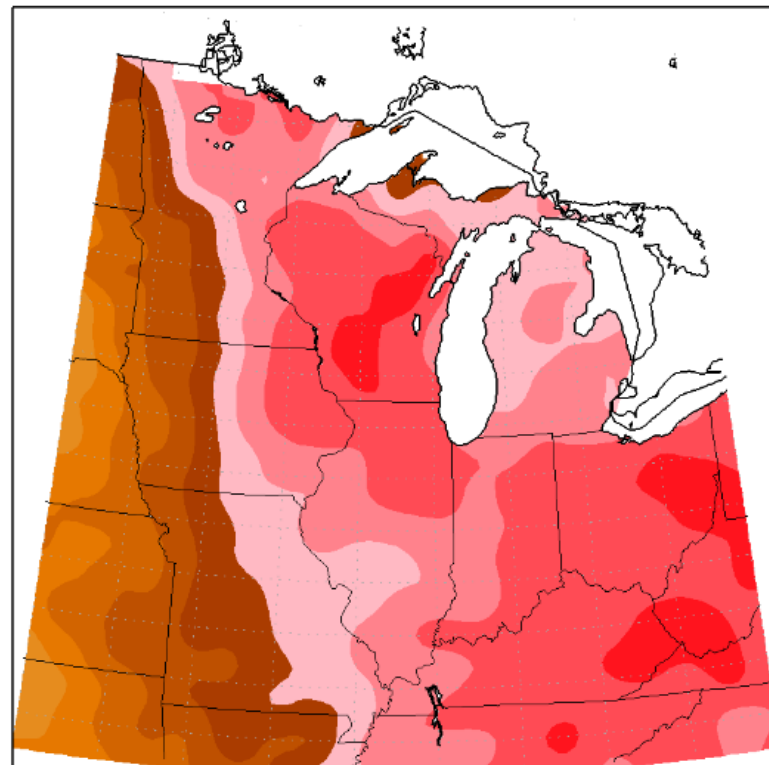


# Brief Event Overview

- Antecedent Conditions
  - Record Warm December
  - Convective Event on 12/23



Average Temperature ( $^{\circ}\text{F}$ ): Departure from Mean  
December 1, 2015 to December 31, 2015



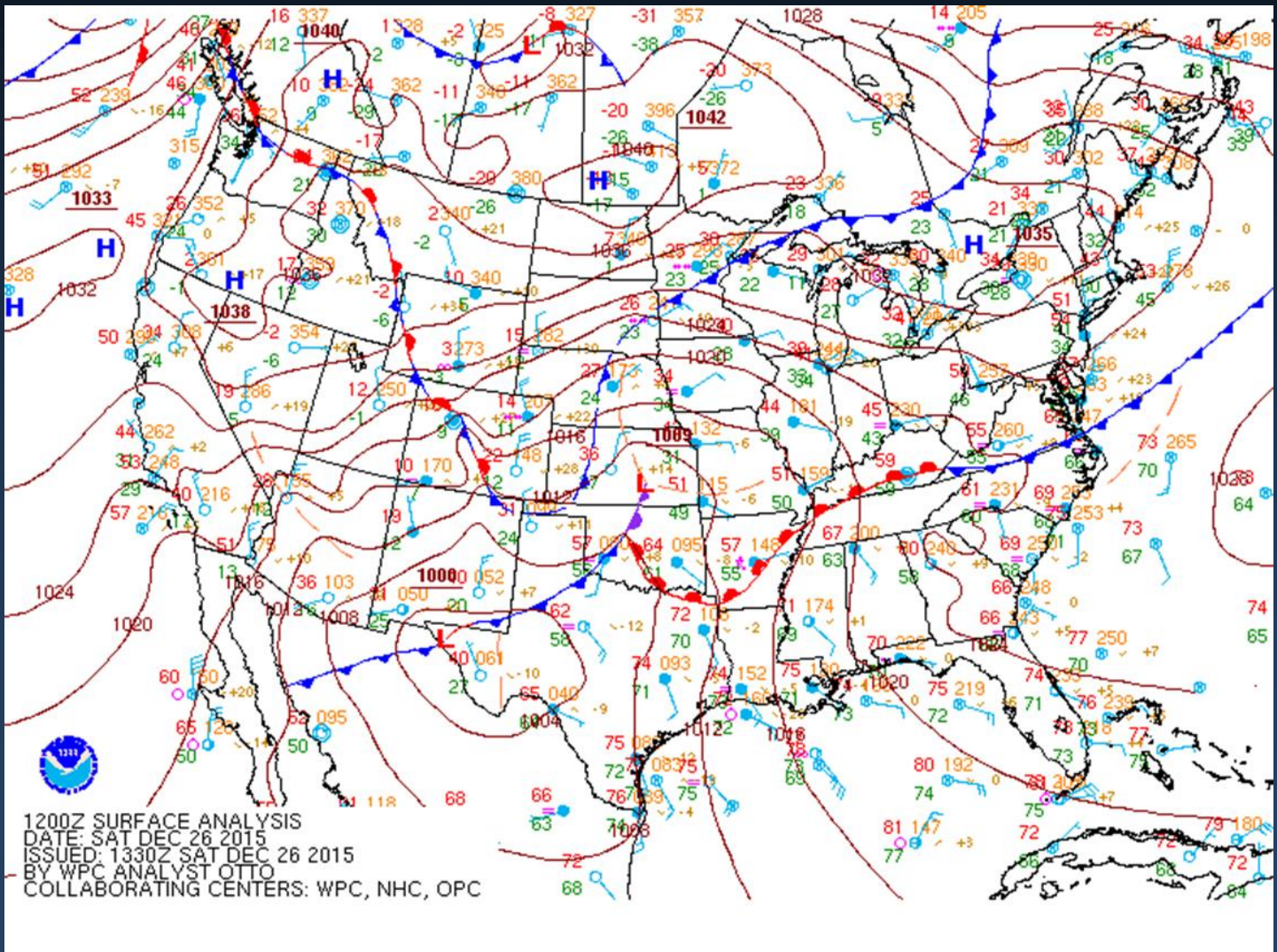
Midwestern Regional Climate Center  
Illinois State Water Survey, Prairie Research Institute  
University of Illinois at Urbana-Champaign





# Brief Event Overview

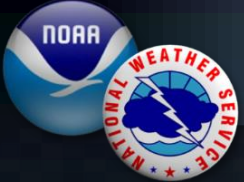
Surface Map – 1330 UTC December 26





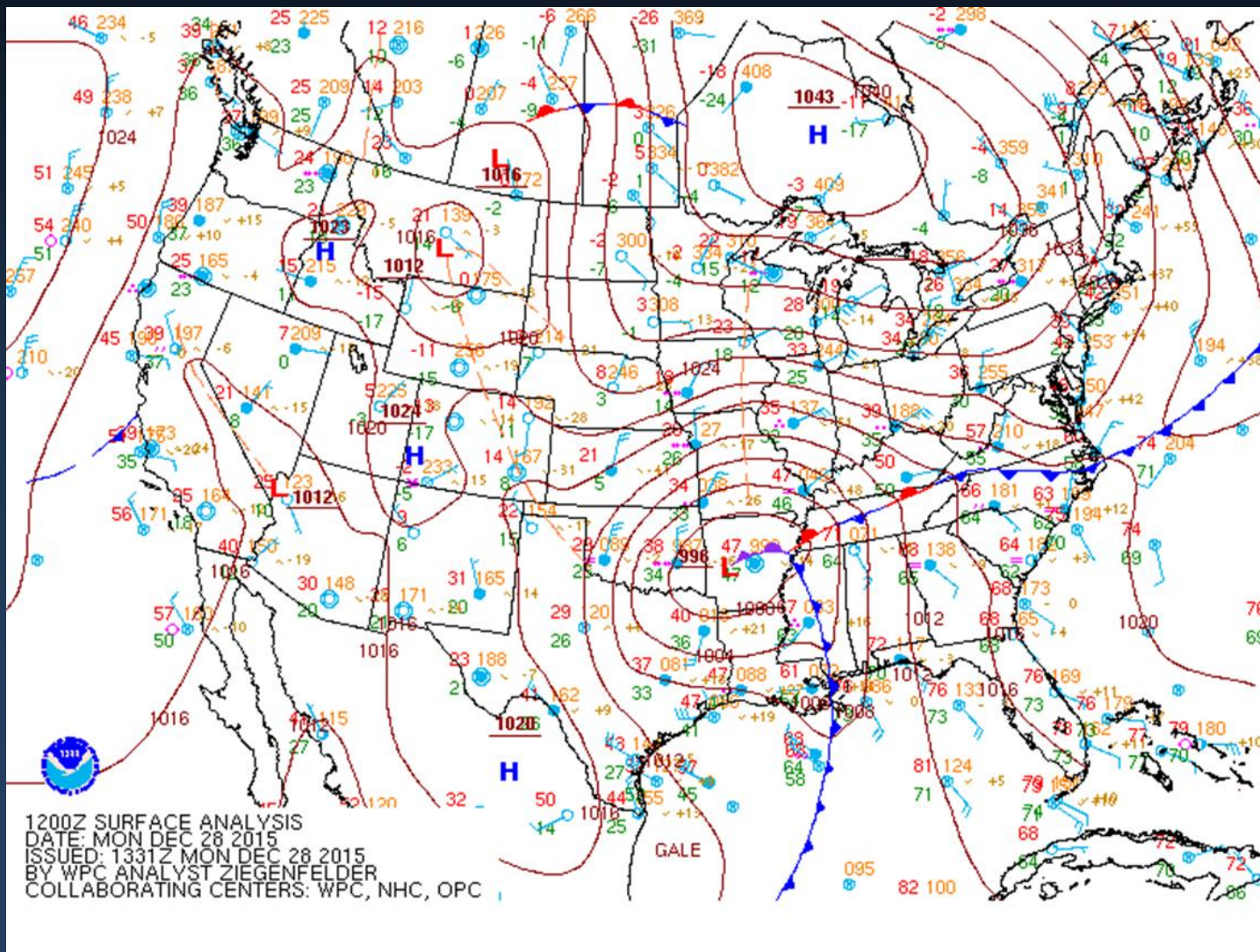






# Brief Event Overview

Surface Map – 1330 UTC December 28

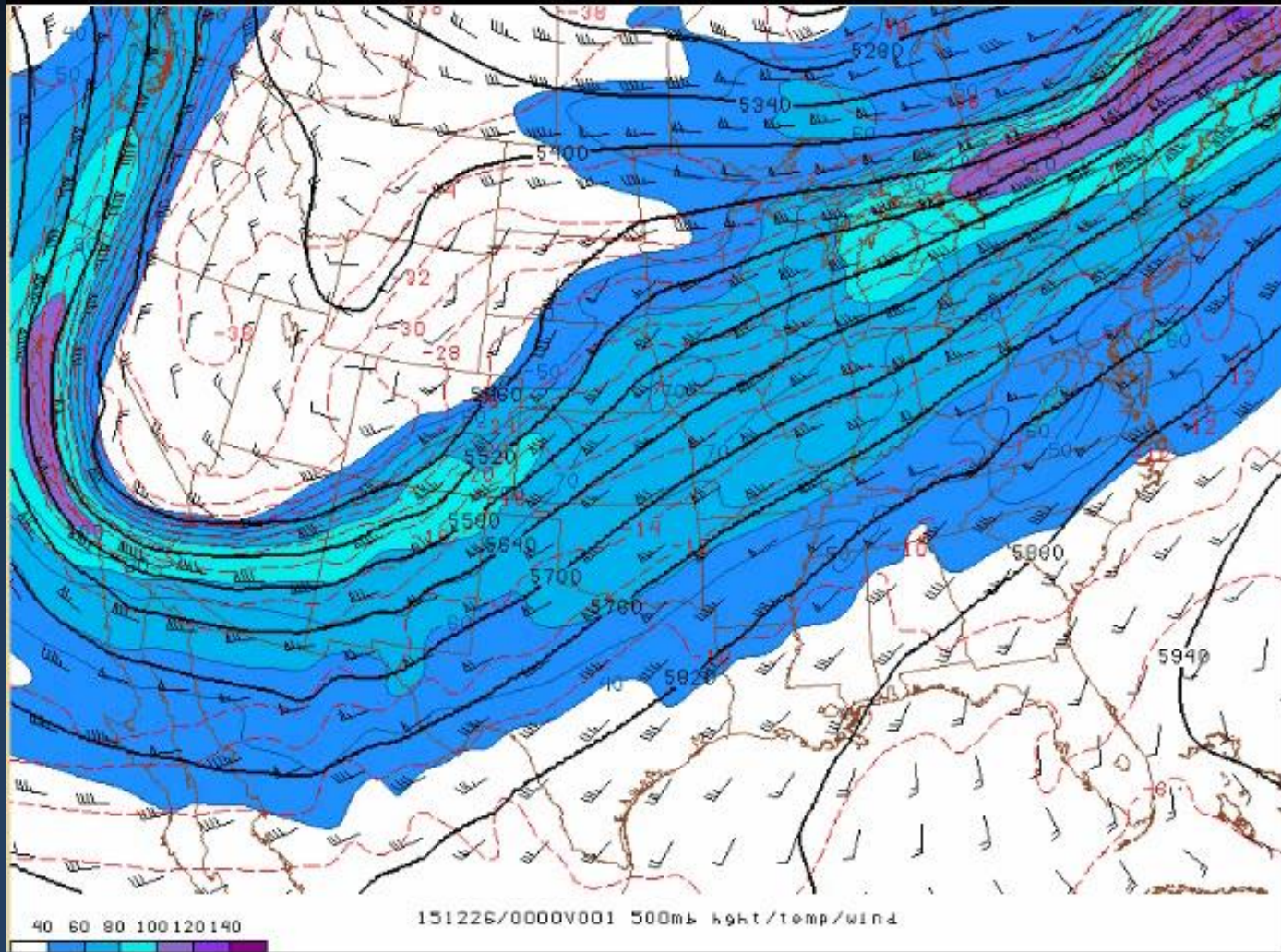






# Brief Event Overview

500 MB – 00 UTC December 26 through 18 UTC December 29

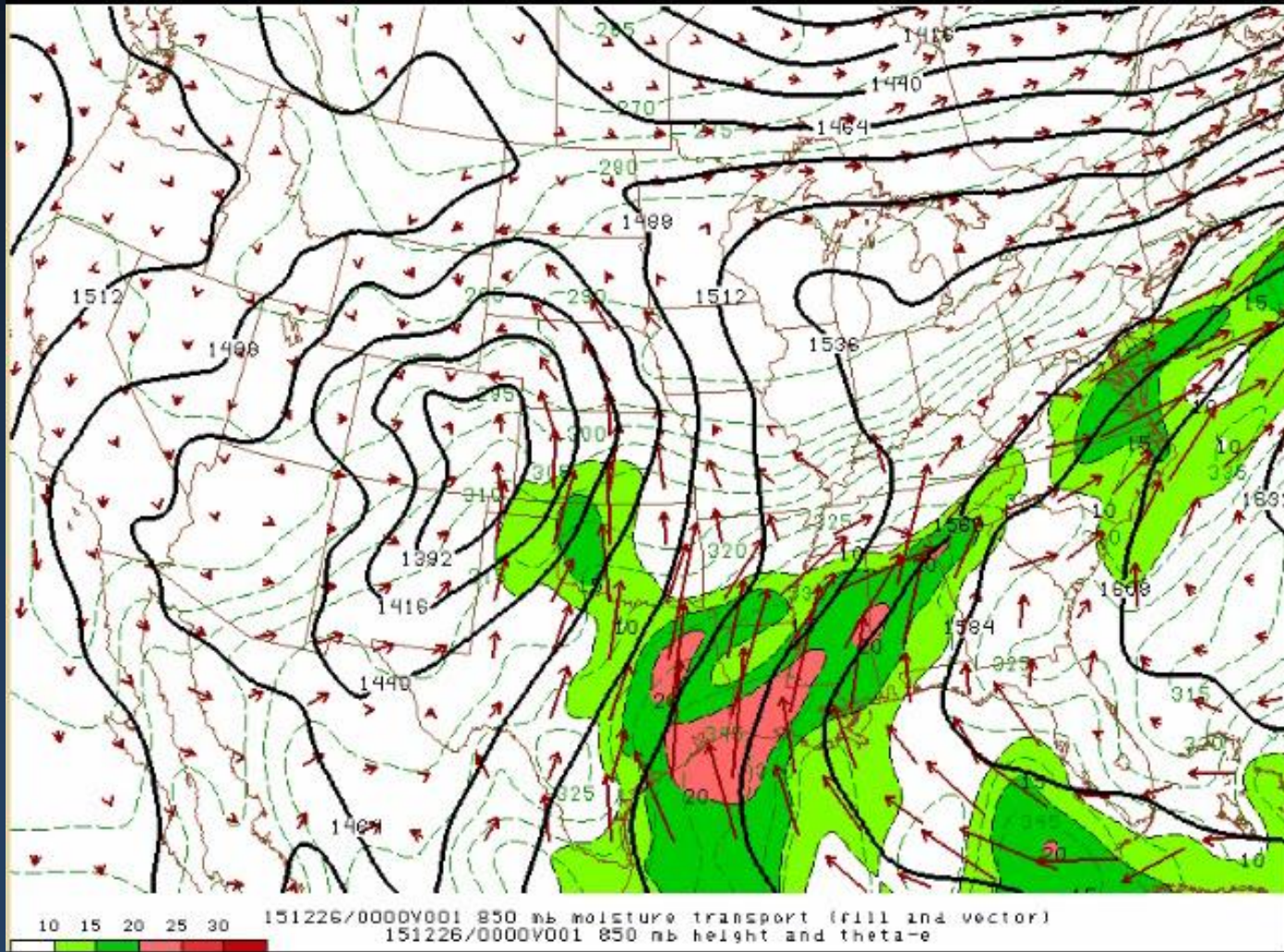






# Brief Event Overview

850 MB Moisture Transport – 00 UTC December 26 through 10 UTC December 29

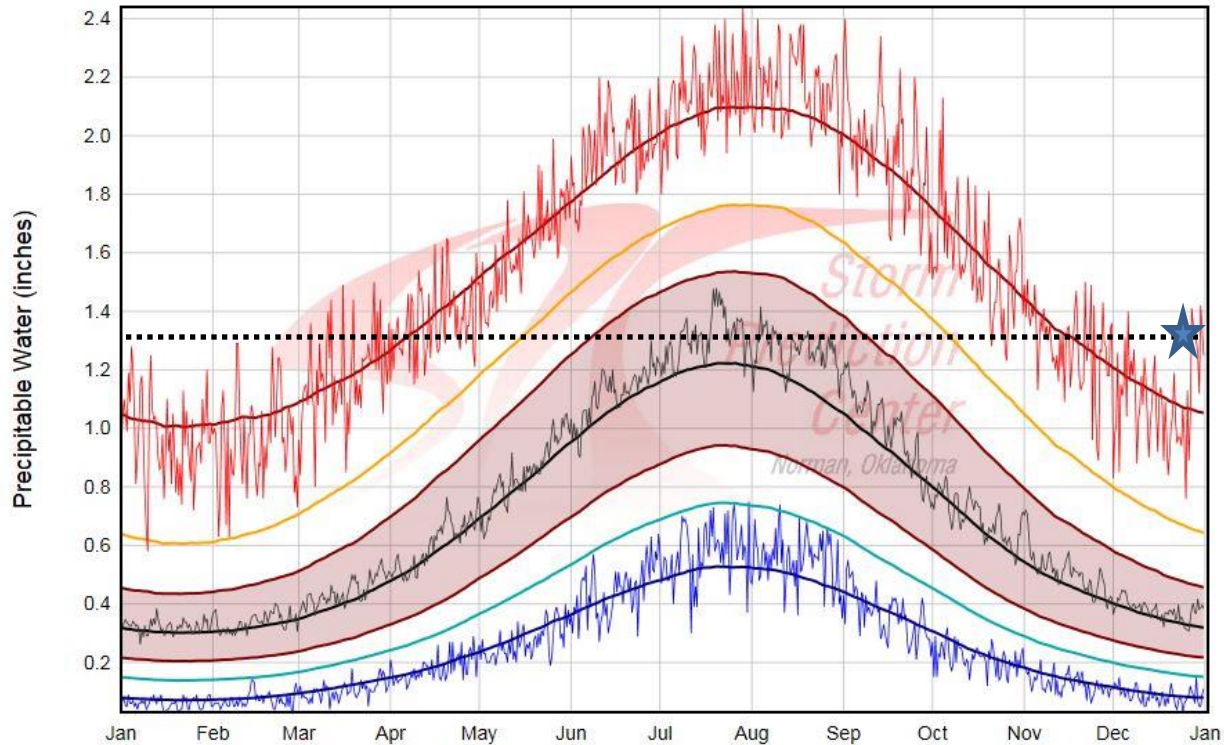




# Brief Event Overview

ILX Sounding Precipitable Water – 00 UTC December 27, 2015

ALL Soundings for ILX



Actual PW: 1.33 inches

27 Dec 00 UTC

Daily Min (Thin Line): 0.12  
Min Moving Average: 0.08  
10% Moving Average: 0.15  
25% Moving Average: 0.22

Median Moving Average: 0.33  
Daily Mean (Thin Line): 0.35

75% Moving Average: 0.47  
90% Moving Average: 0.66  
Max Moving Average: 1.07  
Daily Max (Thin Line): 1.04

Period of Record

RAN (1949/01/01-1956/09/11; 4908 soundings)  
PIA (1957/06/01-1995/02/14; 27073 soundings)  
ILX (1995/02/15-2014/10/26; 13895 soundings)





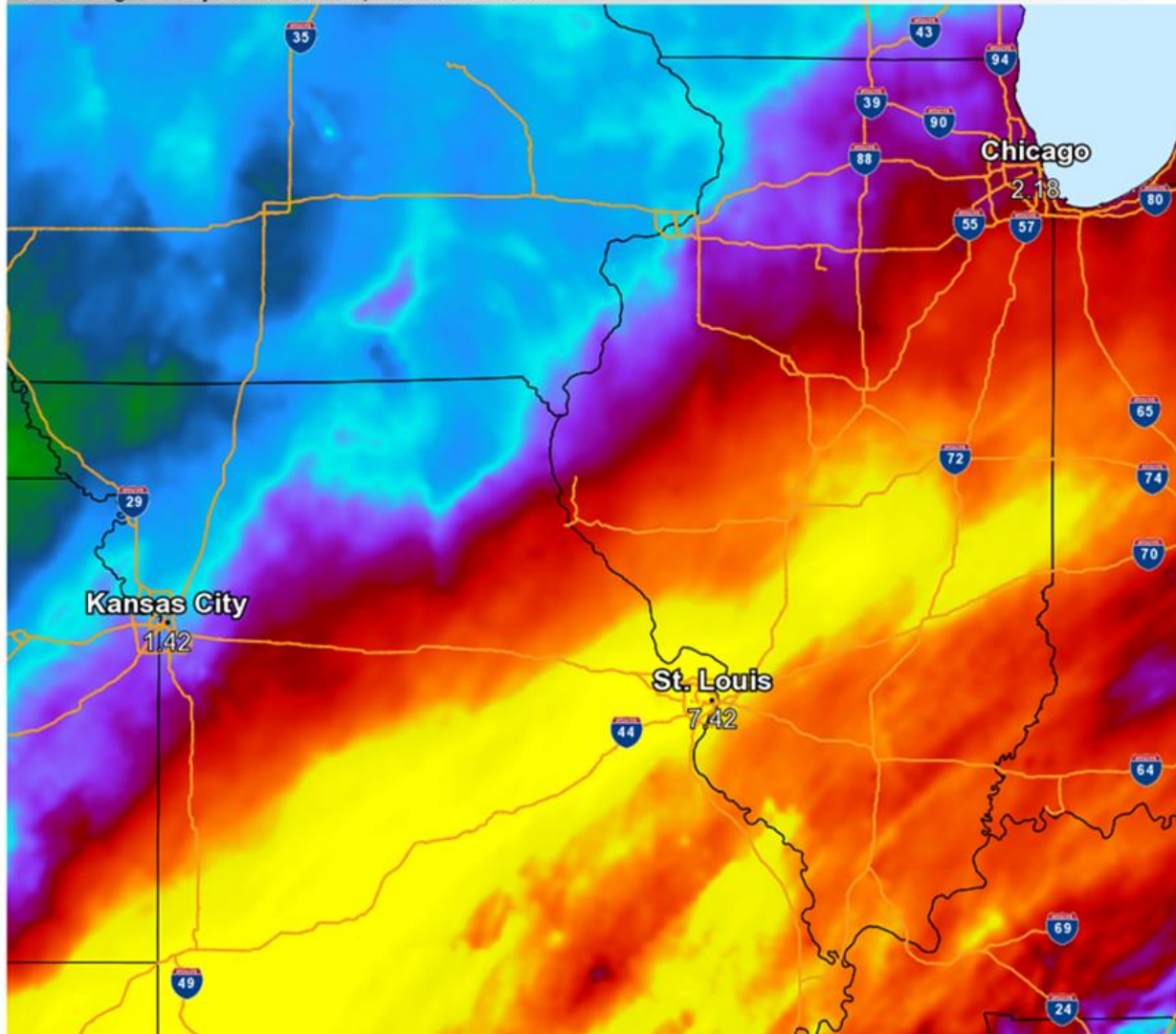
# Brief Event Overview

72-hr Observed Precipitation Ending at 18 UTC December 29

## Observed Precipitation



Valid Ending Tuesday December 29th, 2015 at 12 PM CST



Graphic Created  
December 29th, 2015  
1:38 PM CST



# Laying the Foundation





# Laying the Foundation

*Collaborating with the IL SEOC*

- On-site Participation
  - Illinois SEOC Director has participated in internal IDSS Workshops
  - ILX has been active participants in state-level SEOC exercises
  - ILX represents Illinois NWS offices at monthly SEOC threat summary meetings
- On-site Activations
  - Since 2011
  - Prior 2015 support
    - Galena Train Derailment – March 5
    - Rochelle and Fairdale Tornadoes – April 9 & 10
    - June Flooding/Severe Weather – June 19-July 2
    - Tornado Outbreak – July 16 & 17



# Laying the Foundation

*Collaborating with the IL SEOC*

- Daily Threat Slide Deck
  - Since July 2012
  - Daily dissemination
  - Have done a local version for ILX county warning area since 2010

The collage features several slides from a weather briefing. The top-left slide is titled "Decision Support Briefing" and is dated "UPDATED: 1245 pm - Tuesday, March 15, 2016". It includes the NOAA logo, social media icons for Facebook, Twitter, and YouTube, and contact information for the National Weather Service Central Illinois: <http://www.weather.gov/ilx/DS>, Email: ILXspotter@noaa.gov, and Phone: 217-732-2871.

The middle-left slide is titled "Decision Support Briefing" and "WIND GUST FORECAST FOR WEDNESDAY". It shows a map of Central Illinois with a color-coded legend for "Maximum Forecast Wind Gusts" ranging from 10 mph (blue) to 65 mph (red). A text box on the right states: "STRONG WESTERLY WINDS OF UP TO 50-55 MPH WILL BE POSSIBLE OVER".

The bottom-right slide is titled "Decision Support Briefing" and "Illinois 7-Day Outlook". It displays a 7-day forecast grid for five Illinois regions: Chicago, Quad Cities, Springfield, Metro East, and Marion. Each region's forecast includes a table with columns for Today, Wednesday, Thursday, Friday, Saturday, Sunday, and Monday, showing weather icons and temperature ranges.





# Laying the Foundation

Collaborating with the IL SEOC

## Decision Support Briefing

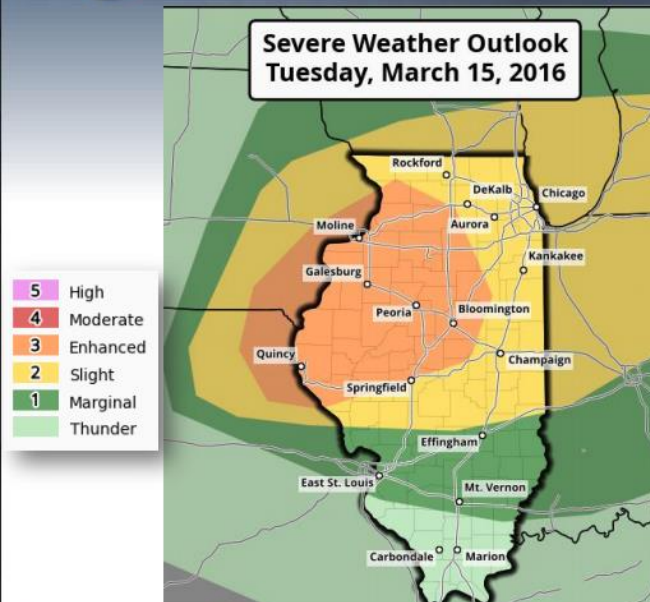
Bottom Line Up Front

What	Where	When	Impacts
Severe thunderstorms	Mainly north of I-70 ----- Greater risk in west, NW & central Illinois	Late this afternoon and evening (5pm-Midnight)	<ul style="list-style-type: none"> <li>Lightning</li> <li>Locally heavy rain</li> <li>Potential for a few tornadoes, damaging wind gusts, and hail</li> </ul>
Strong winds	North of I-70	Wednesday late morning to evening	20-30 mph winds with gusts to 40-45 mph may produce difficult driving conditions especially N-S roadways
River Flooding	Wabash River	Starting Late Tuesday	<ul style="list-style-type: none"> <li>Little if any significant impacts are expected.</li> </ul>

## Decision Support Briefing

SEVERE WEATHER OUTLOOK FOR TODAY

### Severe Weather Outlook Tuesday, March 15, 2016



- 5 High
- 4 Moderate
- 3 Enhanced
- 2 Slight
- 1 Marginal
- Thunder

### SEVERE WEATHER DETAILS:

**Timing:** Thunderstorms are expected to develop over western IL between 5 and 7 pm.

### Primary Threats:

- A few tornadoes possible in the Enhanced (orange colored area)
- Damaging wind gusts
- Large hail

Most of the storms should be east of IL by Midnight.



# Laying the Foundation

## *Staff Preparation*

- Staff Training
  - FEMA ICS Courses
  - Semi-annual internal IDSS workshops
  - Local WFO/SEOC scenarios
  - Local certification program
    - Demonstrate competencies in procedures, briefing preparation, and presentation of IDSS materials
    - Nine staff members currently locally certified for on-site liaison support at SEOC
    - Four additional staff members in training
- Uncertainty regarding how locally-developed training program will phase with current national and regional IDSS training proposals



# Laying the Foundation

## *Staff Preparation*

- WebEOC Software – Utilized by IL Emergency Management Agency (IEMA)
  - All NWS Forecast Staff were given accounts that can be monitored remotely at the WFO or used at the SEOC.
- Google Site Developed
  - Access given to IL WFOs and the NWS Central Region Regional Operations Center (ROC)
    - Useful to exchange IDSS information and products, briefing slide decks, etc
    - Organizations can view internal event logs and IL SEOC Situation Reports for information that will assist the local office such as road closures and power outages.





# Laying the Foundation

## Collaboration Tools



## NWS Central Illinois

Search this site

- ▼ Home
- ▼ Announcements
- Sitemap

### Navigation

- Emergency Contacts
- SDM
- HSM
- Staff
- Station Digest
- Shift Log

## SEOC-Support

This Google site will provide references for use when providing support to the Illinois SEOC/SIRC.



### [References](#)

### [Briefing Notes](#)

### [Agency Reports](#)

### [Product Examples](#)

### [Report/Product Templates](#)

### [Current Event](#)

### [Past Event Archive](#)

CENTRAL ILLINOIS, IL (ILX) WFO 20-30-9436

NWS Weather Forecast Office  
1362 State Route 10  
Lincoln, IL 62656-5417  
Phone: 217-732-4029  
Ernest Goetsch, MIC



# Laying the Foundation

## Collaboration Tools



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[SEOC-Support](#) >

### Current Event

This web page displays the event files for the ongoing event. They will be archived in the google drive folder SEOC/Archive once the event has concluded.

To add a new document, or edit an existing document, click on the link, then on the next screen click on the "open in Drive" button in the top right. If you have not done this before you may see an "add to Drive" button in the top right initially, click on that and then you should see the "open in Drive" button. You can then edit the document by clicking on the one you want, or create or upload a document by using the buttons to the right.

[NWS Event Log](#) - Used to document actions, contacts, responsibilities

[Temporary Workspace](#) - Used to transfer slides, presentations, and files between SEOC and WFOs

[NWS Supplied Information](#) - Used to document slides, presentations, documents distributed to the SEOC

[SEOC Supplied Information](#) - Used to store important information distributed by the SEOC such as situation reports.

CENTRAL ILLINOIS, IL (ILX) WFO 20-30-9436

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# Back to the Event





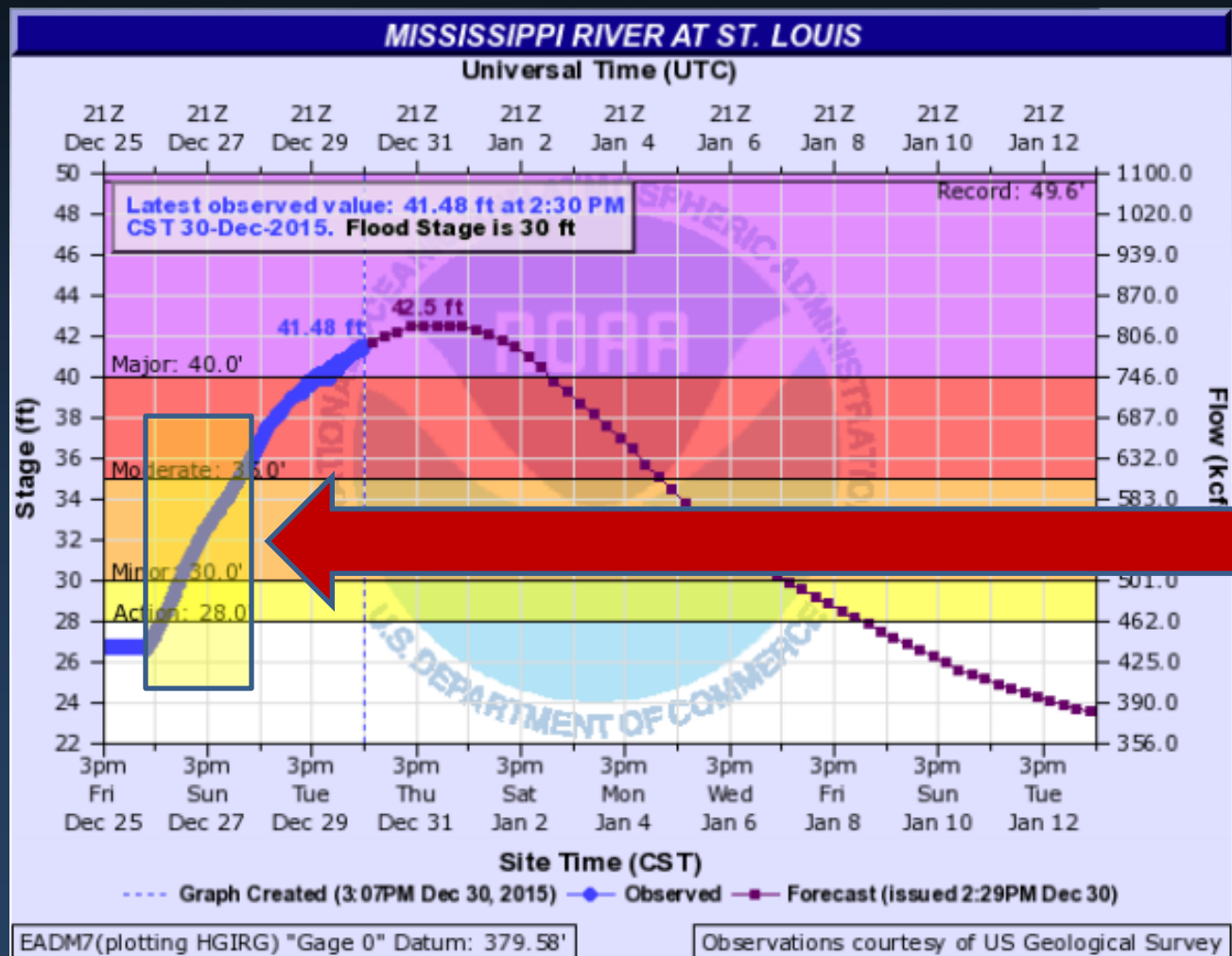
# Meteorological Factors

*Impacts on the Decision-Making Process*

- Warm and Wet Prior to Event
- Extended Period of Isentropic Lift
- Extreme Moisture Content for Late December
- Rainfall Fell “Locally” Resulting in
  - Rapid River Rise and Fall
  - Many Unmeasured Tributaries Contributed Adding Uncertainty to Overall Hydrologic Forecast



# Meteorological Factors



Rise of almost 10 feet (210 kcfs) in 48 hrs



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*Impacts on the Decision-Making Process*

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- Rainfall Fell “Locally” Resulting in
  - Rapid River Rise and Fall
  - Many Unmeasured Tributaries Contributing Adding Uncertainty to Overall Hydrologic Forecast
- Ice and sleet Storm impacted northern Illinois on December 28
  - Officially 1.9” sleet at Chicago O’Hare
  - 175,000 customers without power – some for 3-4 days





# Non-Meteorological Complications

*Impacts on the Decision-Making Process*

- **Holiday Period**
  - Scheduling at WFO
    - WCM and Service Hydrologist on leave
    - 99.75 Hours of OT between December 26 and January 3
    - 2 staff members voluntarily canceled leave
  - Scheduling at State Agencies
- **Rapid rises limited resources available to reinforce threatened levees**
- **State Budget Impasse**
  - Counties were told that they would likely have costs incurred reimbursed, but it was not a given. This made communicating uncertainty even more critical.



# The Playing Field

## Illinois and Mississippi Rivers' Levee Systems

### St. Louis District Flood Event Forecast Map

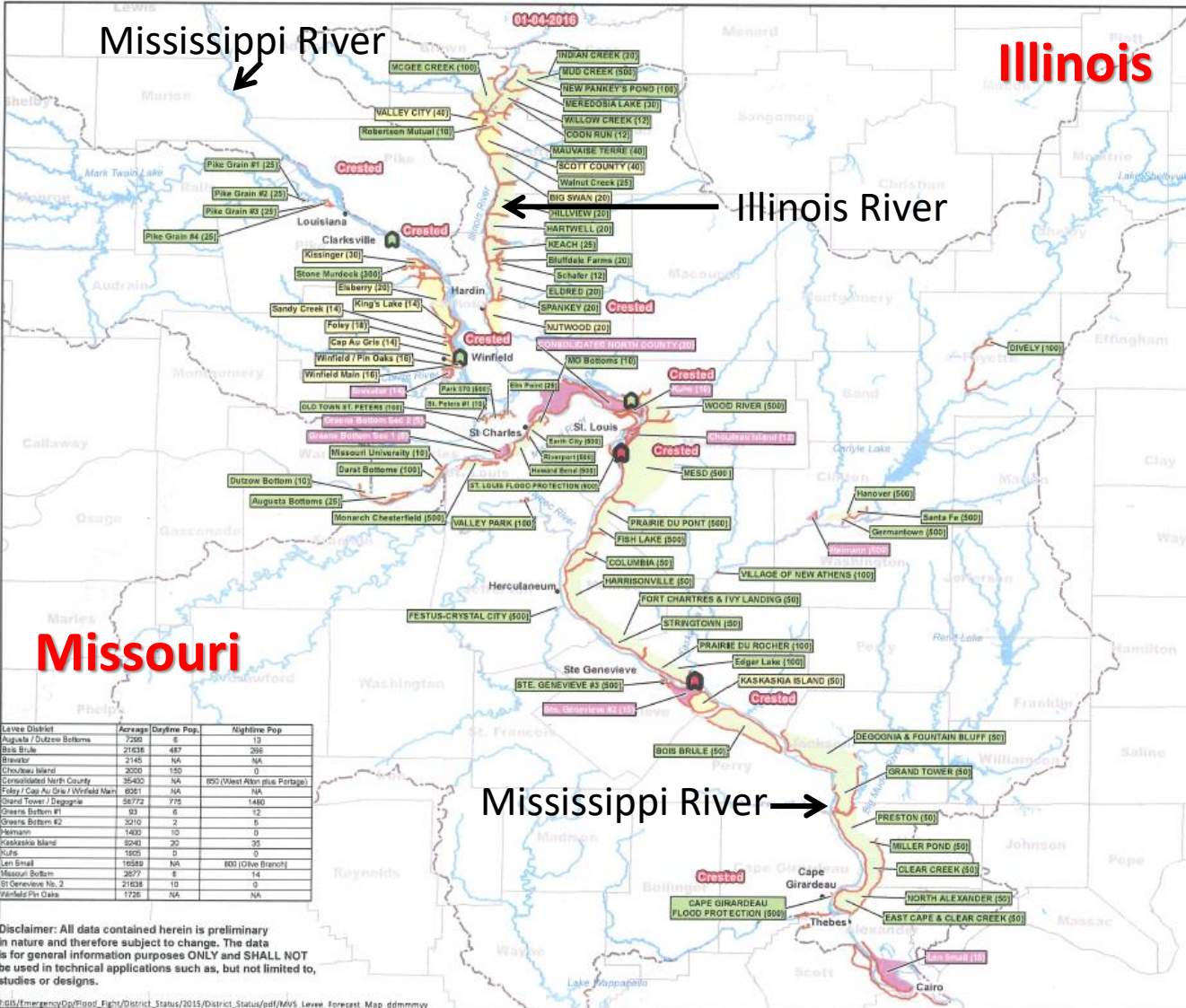
\*\* Flood-fighting efforts not accounted for in projection

02Jan2016

@ 1300 HRS



US Army Corps of Engineers  
St. Louis District



**Levee Status\***

- 3 + ft Freeboard No Distress
- 0.5 to 3.0 ft Freeboard Possible Moderate Distress
- Less than 0.5 ft Freeboard at Crest Possible Significant Distress
- Projected to Overtop
- Controlled Operation In Progress

**Locks and Dams Status**

- Closed
- Open

**Gage Status**

**Crest Date**

\* Predictions based on National Weather Service forecast and field observations.



DISCLAIMER: While the United States Army Corps of Engineers, St. Louis District (hereinafter referred to as "USACE") has made considerable efforts to ensure the accuracy of the maps and associated data, it does not explicitly warrant that USACE maps or data are free from errors or omissions, either in whole or in part, or that the information is complete, accurate, or up-to-date. The USACE, its officers, agents, employees, contractors, or subcontractors, shall not be liable for any damages or consequences in any way arising from the use of the information provided hereunder, or from any reliance on the information provided hereunder. The USACE, its officers, agents, employees, contractors, or subcontractors, shall not be liable for any damages or consequences in any way arising from the use of the information provided hereunder, or from any reliance on the information provided hereunder. The USACE, its officers, agents, employees, contractors, or subcontractors, shall not be liable for any damages or consequences in any way arising from the use of the information provided hereunder, or from any reliance on the information provided hereunder.

Levee District	Area (sq. mi.)	Daytime Pop.	Nighttime Pop.
Augsalt / Diversey Bottoms	7200	6	13
Blue Bluffs	21438	487	208
Brewster	2145	NA	NA
Chouinard Island	3000	150	0
Consolidated North County	35430	NA	850 (West Alton plus Portage)
Foley / Cape Au Gris / Winfield Main	6281	NA	NA
Grand Tower / Diversey	58772	775	1480
Greene Bottom #1	63	6	12
Greene Bottom #2	5210	2	5
Hermann	1400	10	0
Kaskaskia Island	5040	30	35
Kuba	1625	0	0
Lain Small	16549	NA	800 (Oliver Branch)
Massou Bottom	2677	5	14
St Genevieve Sub. 2	21638	10	0
Winfield Pin Oaks	1728	NA	NA

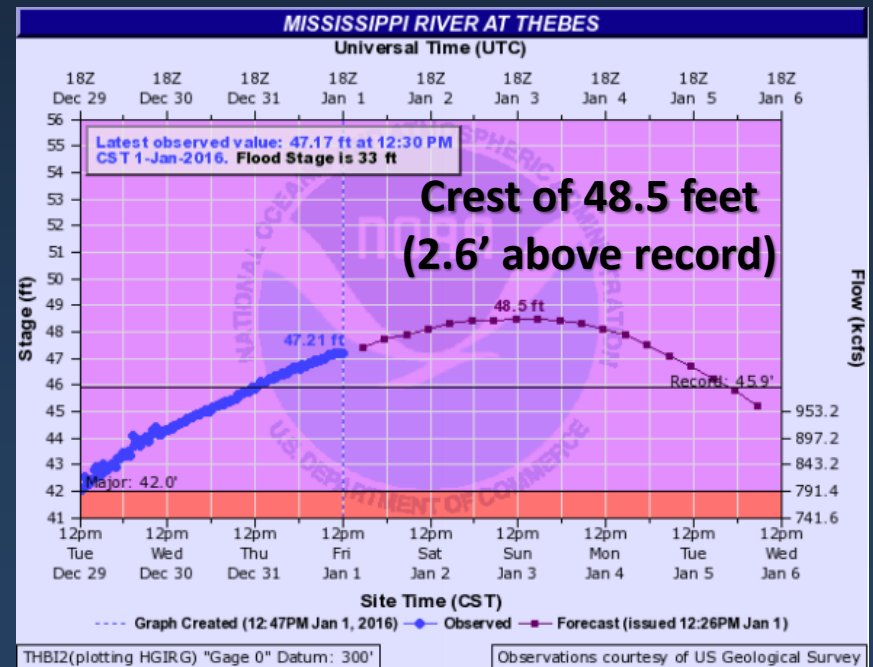
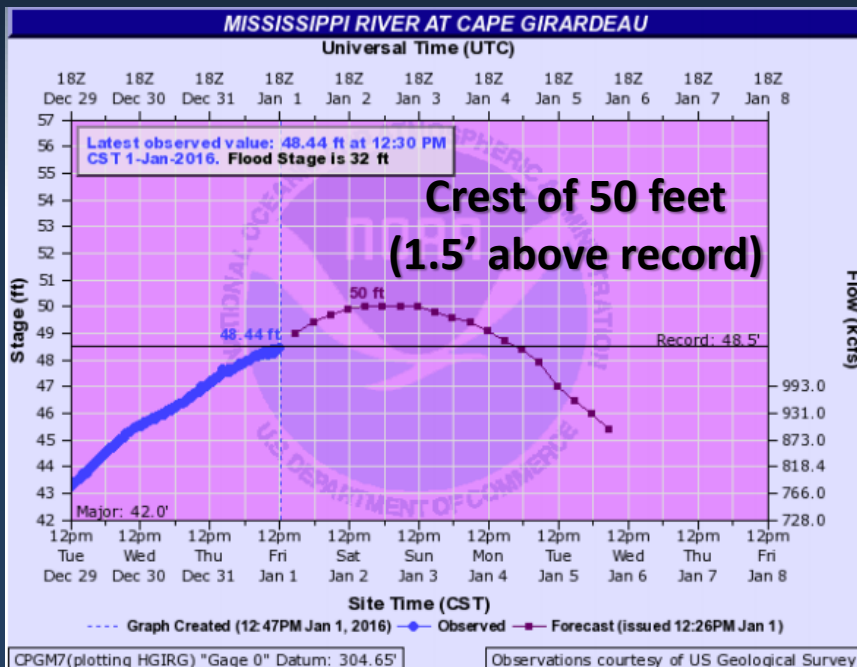
Disclaimer: All data contained herein is preliminary in nature and therefore subject to change. The data is for general information purposes ONLY and SHALL NOT be used in technical applications such as, but not limited to, studies or designs.

St. Louis District  
Emergency Management  
MVS Winter 2015 Flood



# SEOC Activation

- SEOC was activated from December 28 through January 6 for response and recovery for the potentially major flooding in the Illinois and Mississippi River Basins

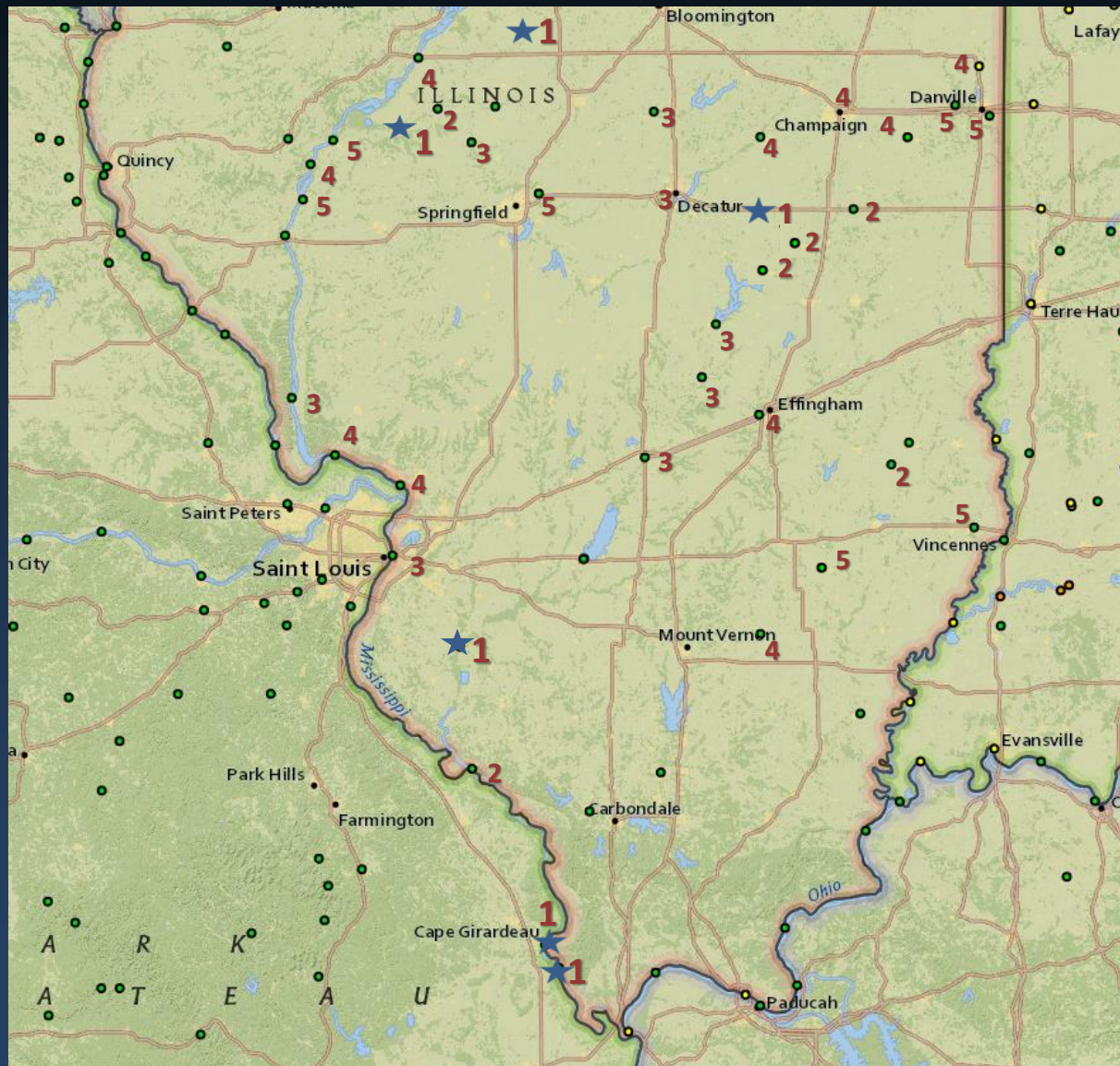






# Flooding Across Illinois

*Illinois River Gauges – Rank of December 2015 Event*



Illinois gauges (or gauges on rivers bordering the state) with crests in their historic top 5

Five records set in Illinois



# SEOC Activation

- SEOC was activated from December 28 through January 6 for response and recovery for the potentially major flooding in the Illinois and Mississippi River Basins
- Also forced to deal with ice/sleet storm in northern Illinois
- NWS liaisons from WFO Lincoln worked 193 hours on-site during this 10-day period
- By December 29, the NWS slide deck led off each of the morning kickoff briefings (and most update briefings)

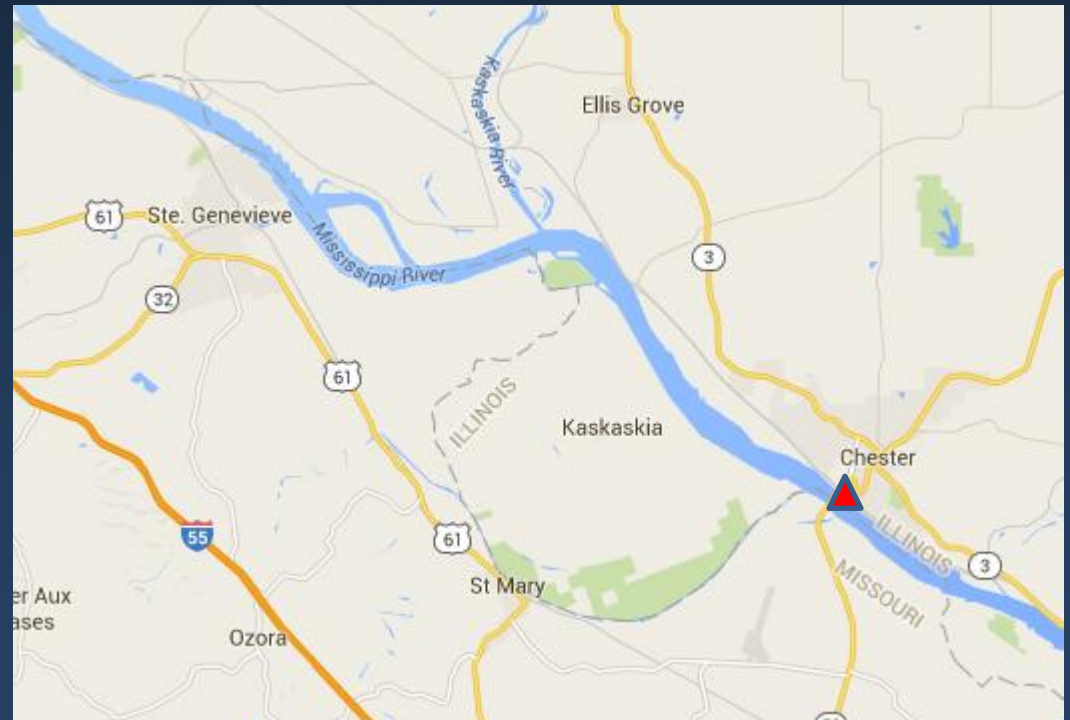
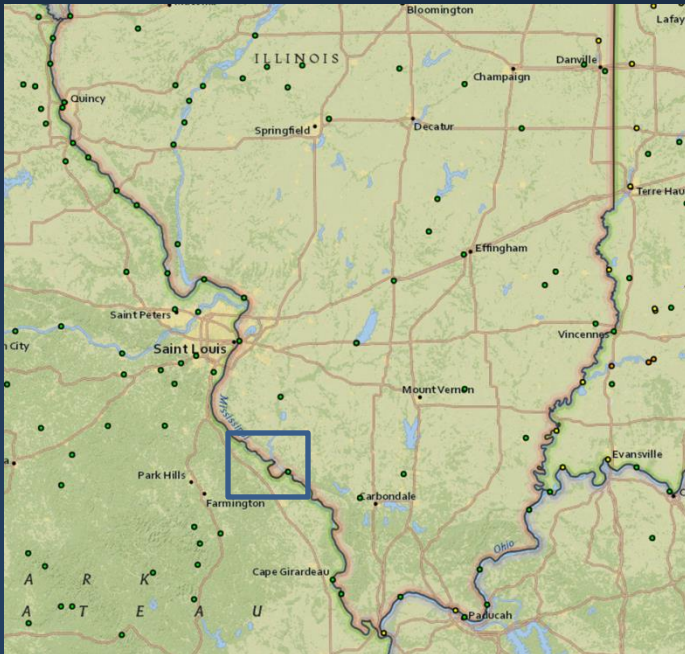




# Why Were We There?

- Provided and interpreted updated information as it came in (including discussion of uncertainty)
- Assisted NWS offices in understanding the needs and concerns of state agencies:

- Kaskaskia Island

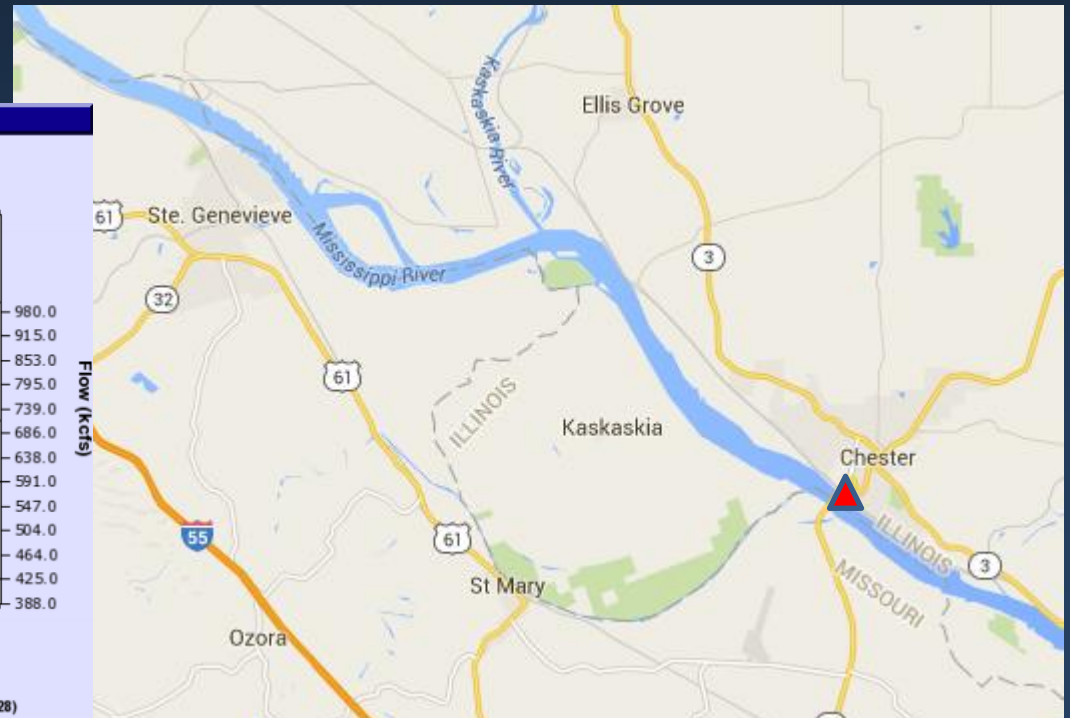
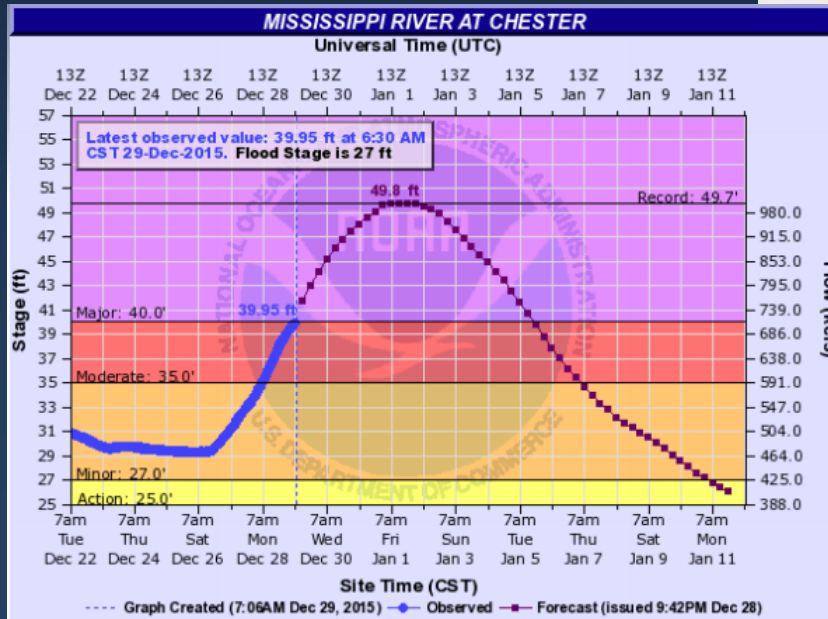






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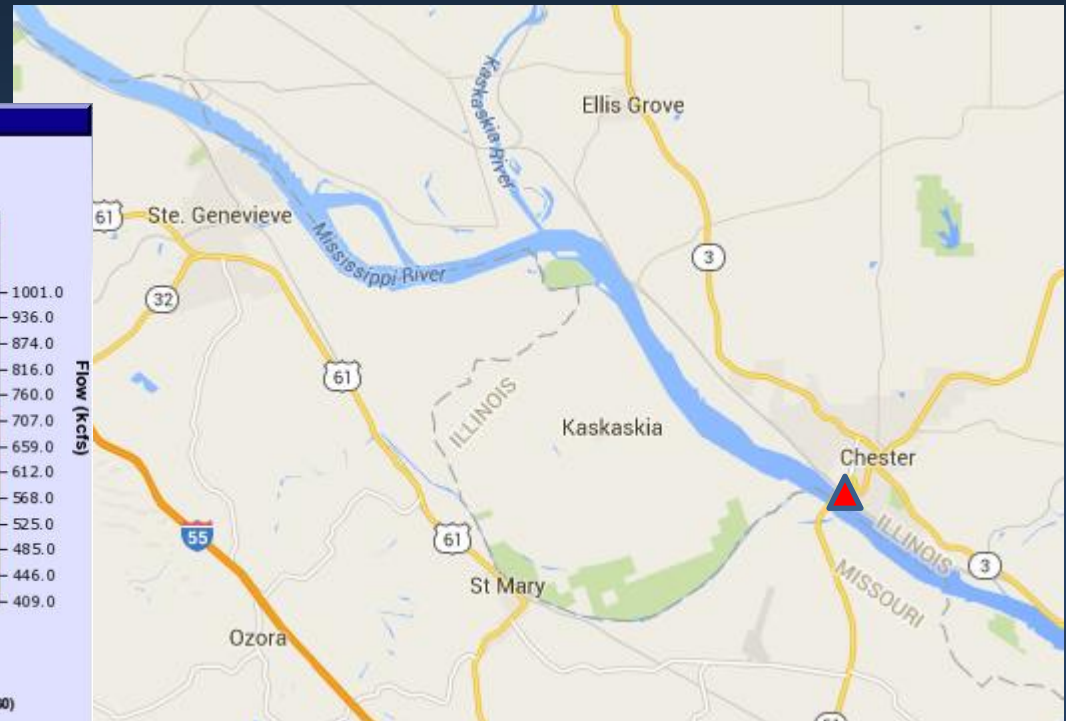
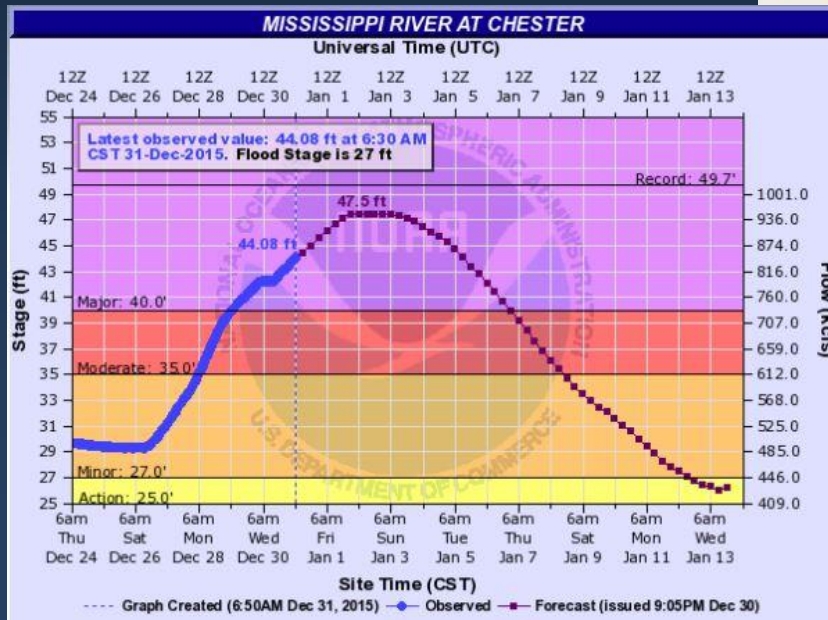
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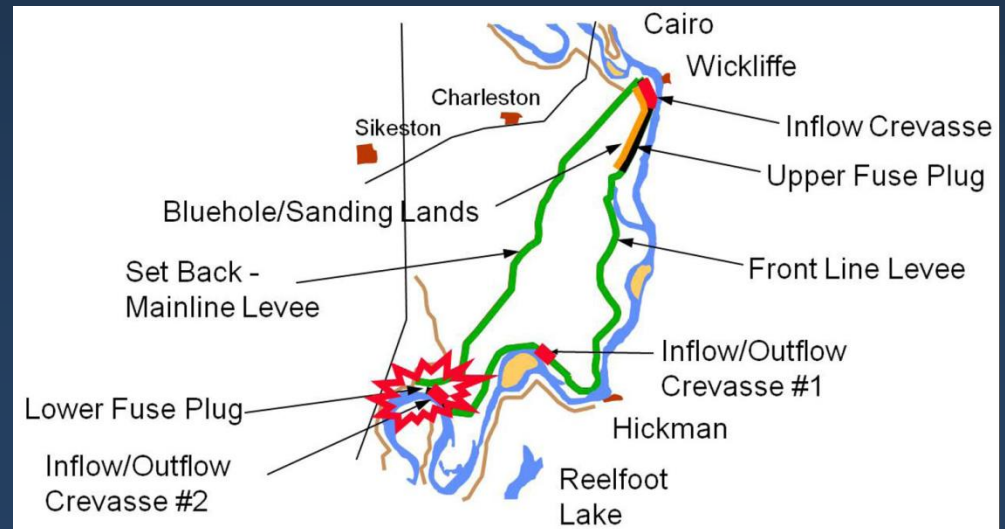
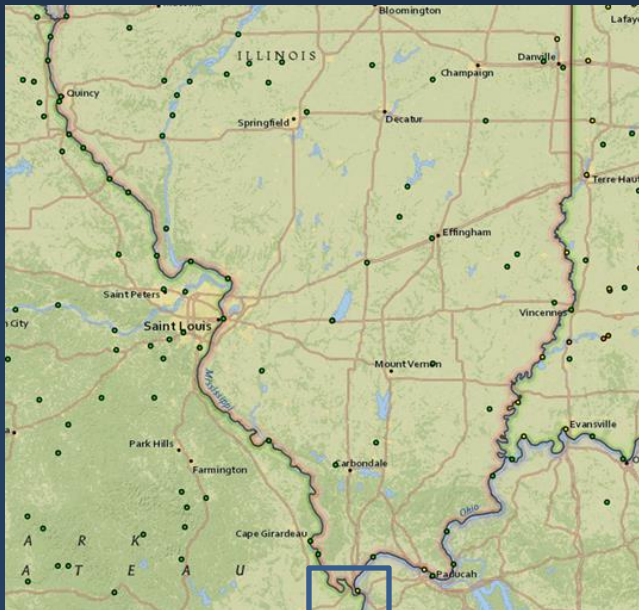
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  - Cairo and the Bird's Point – New Madrid Floodway

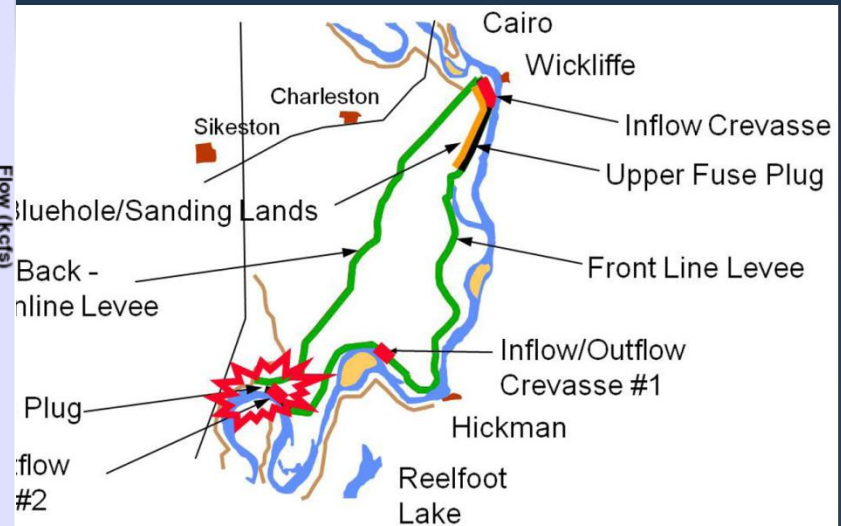
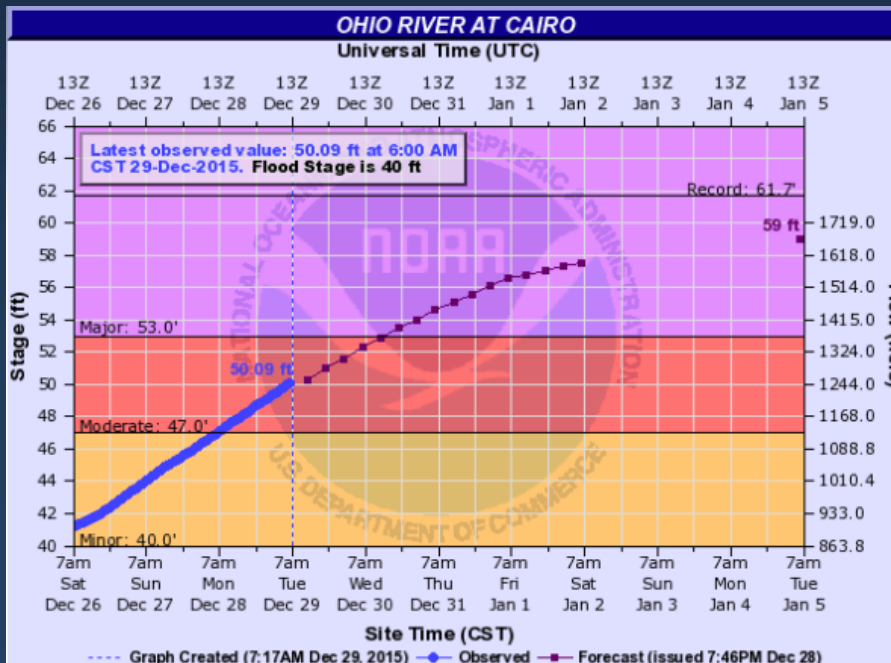






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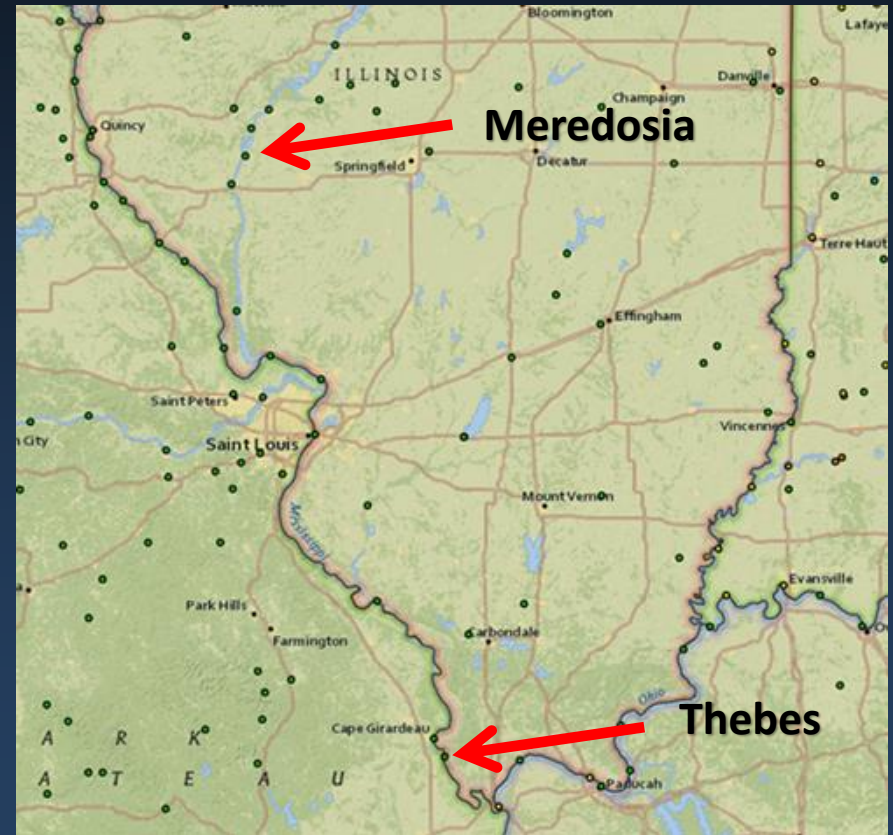
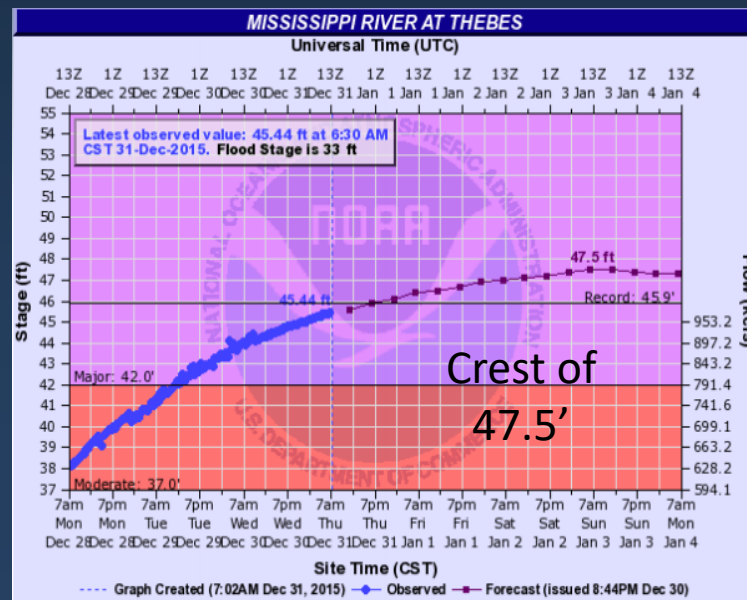
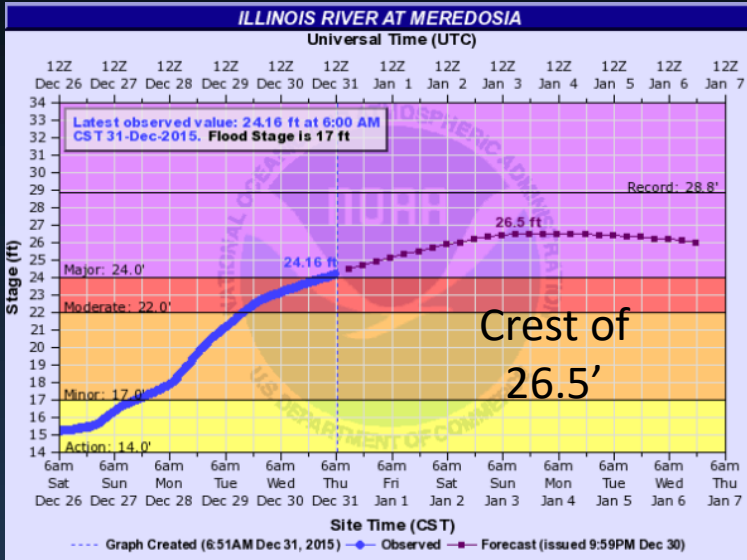
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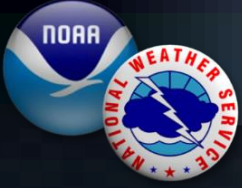




# Why Were We There?

Forecasts Issued During the Evening of December 30





# Why Were We There?

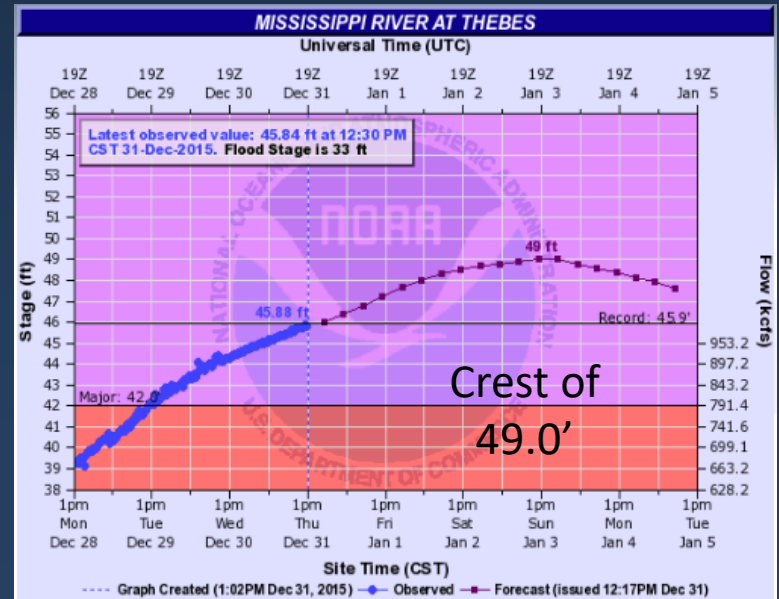
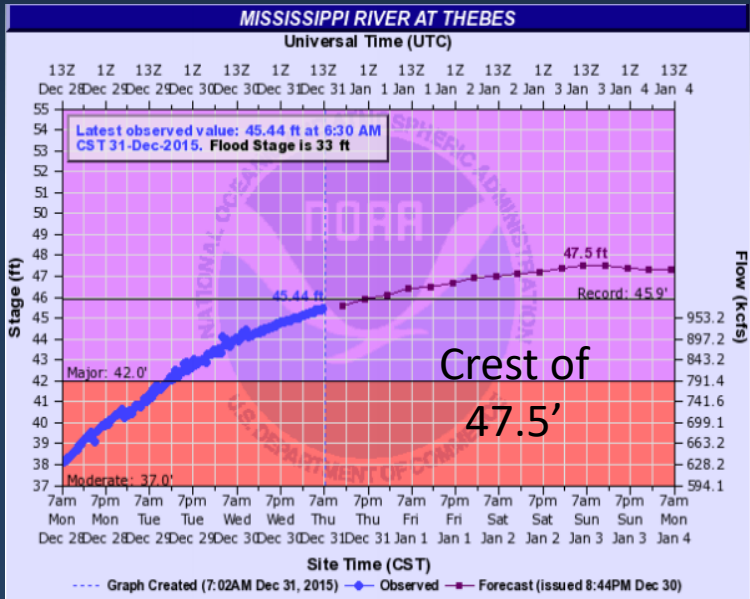
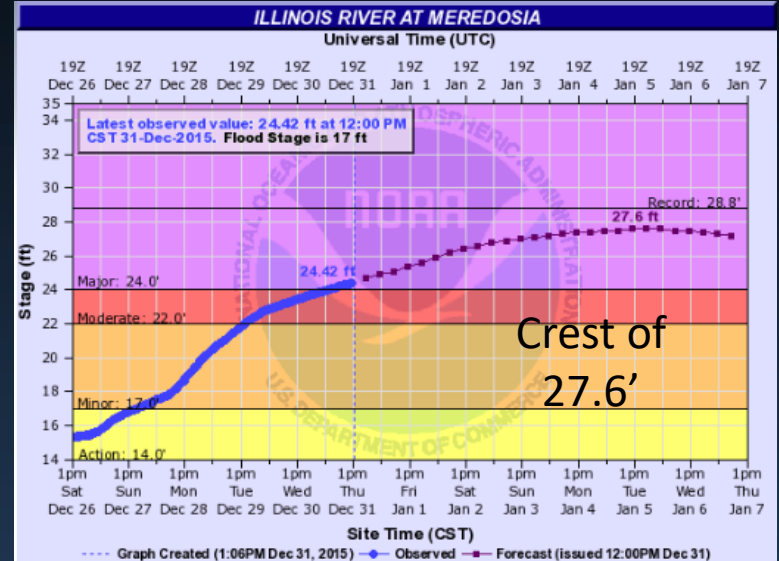
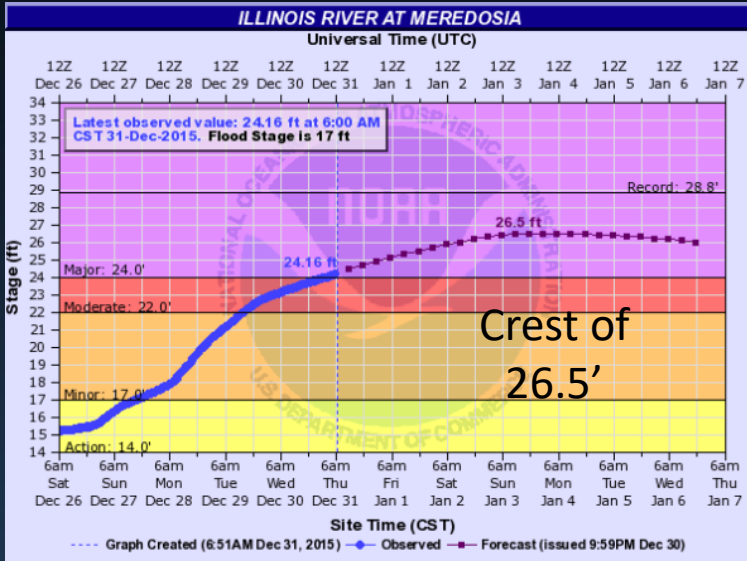
Forecasts Issued Midday December 31



1.1 Feet



1.5 Feet







# Why Were We There?

*December 31*

- Meredosia – Department of Corrections crews sand-bagged to 27’ and then were sent back “home”.
- Thebes – Corp of Engineers advised that levee may hold to 48’. Anything higher would result in widespread overtopping if not breach.
- Frustration due to large change and timing (New Year’s Eve)
  - “I want to know who screwed up!”
- Requested (through CR ROC) written explanations from NCRFC (Meredosia) and LMRFC (Thebes)
- Response received and discussed within two hours
- Had positive impact on credibility moving forward





# Information Flows Both Ways

*NWS Benefits*

01/02/2016 07:07:48 AM



By 7 am Illinois State Police had found the breach ongoing on the Len Small Levee in Alexander County Illinois





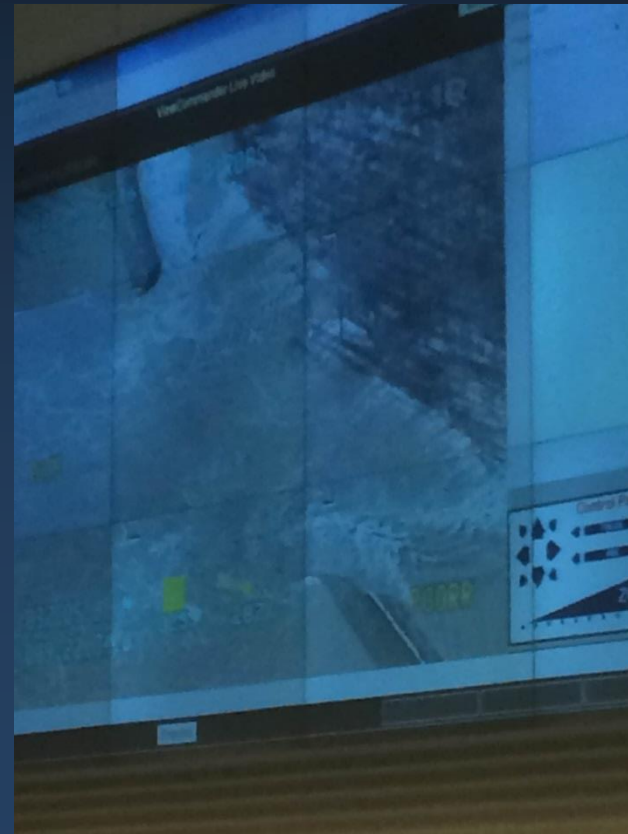
# Information Flows Both Ways

## *NWS Benefits*

- WFO Paducah was unaware of the breach

They told us that they just got off phone with Alexander County EMA and they said that they had some overtopping and possibly some erosion but that was all.

- Sent them pictures of the video so they could judge the size and flow of the breach
- Initial indication to the WFO that a breach was underway in Alexander County.





# Conclusion

- Data is out there – our expertise is the resource
  - Able to provide uncertainty caveats
  - Assisted with event summaries for state SITREPs and disaster declarations.
- Important to be on-site
  - Builds credibility and confidence
  - Shows concern for needs of state agencies
  - Information flows both ways
  - Strengthens relationships

NWS was only federal agency represented when Governor Rauner visited the SEOC to thank state liaisons and partners early morning New Year's Day.





# Conclusion

*Issues NWS is Working to Solve*

- Staffing can be an issue
  - IDSS requires flexibility
  - Current WFO staffing based on 1970s paradigm
- Implications for consistency of service?
  - Not all state capitals are a reasonable distance from a WFO
  - Some states have hired their own meteorologists (or private partners) to fill this role
- Briefing and Communications Tools
  - Tools (and training) need to be provided to ensure that on-site personnel have everything they need to provide IDSS





# Special Thanks to

- Illinois Emergency Management Agency
- Illinois State Police
- Lower Mississippi River Forecast Center
- Midwest Regional Climate Center
- NEXLAB – College of Dupage
- North Central River Forecast Center
- NWS Central Region and the Central Region Regional Operations Center
- NWS Staff at WFOs Lincoln, St. Louis, and Paducah
- Storm Prediction Center
- U.S. Army Corps of Engineers (St. Louis and Memphis Districts)



# Questions?

