

Automated Design Storm Notification System

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14th Annual Climate Prediction Applications Science Workshop

March 22-24, 2016

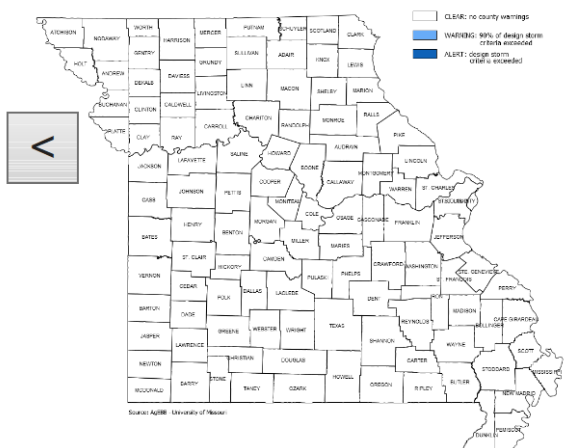
Burlington, VT

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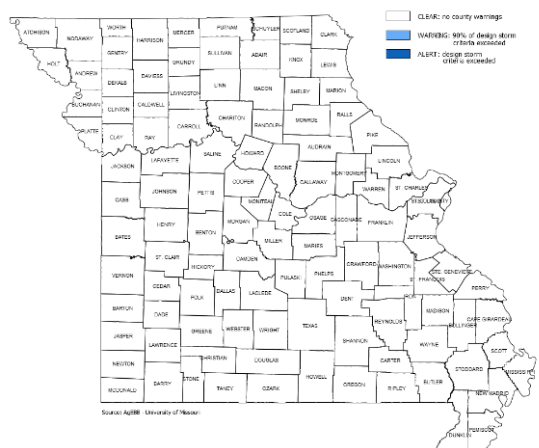
Design Storm Maps for 3/20/2016

3/20/2016 ▼

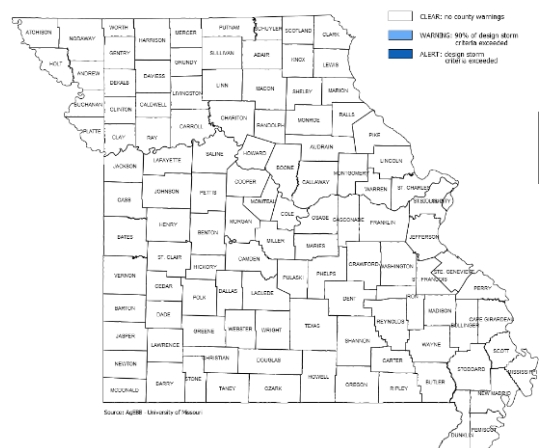
Design Storm Alert
24 Hour Mean Rainfall Amounts for 25 year/24 hour period
24-hour period ending 1200 UTC March 20, 2016



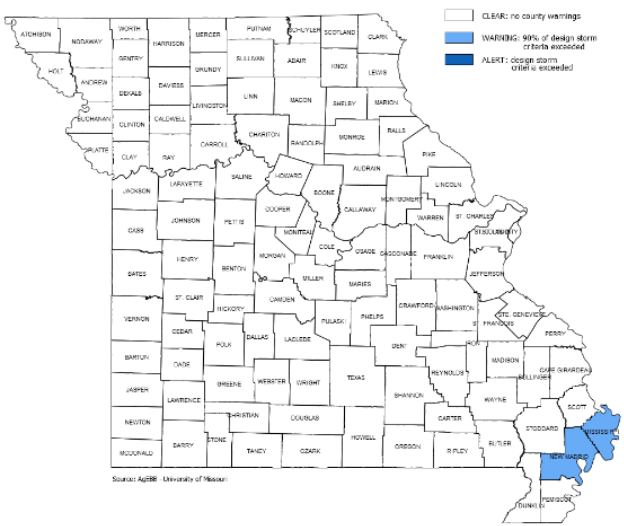
Design Storm Alert
Mean Rainfall Amounts for 10 year/10 day period
10-day period beginning 3/10/2016 / ending 3/20/2016



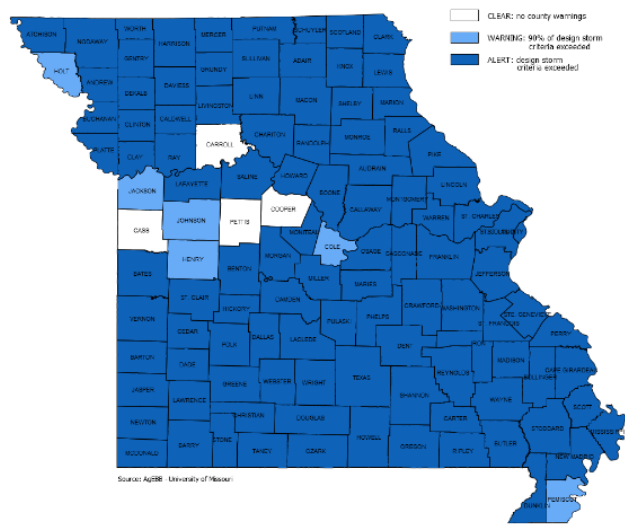
Design Storm Alert
Mean Rainfall Amounts for 10 year/90 day period
90-day period beginning 12/21/2015 / ending 3/20/2016



Design Storm Alert
Mean Rainfall Amounts for 10 year/180 day period
180-day period beginning 9/23/2015 / ending 3/20/2016



Design Storm Alert
Mean Rainfall Amounts for 10 year/365 day period
365-day period beginning 3/22/2015 / ending 3/20/2016



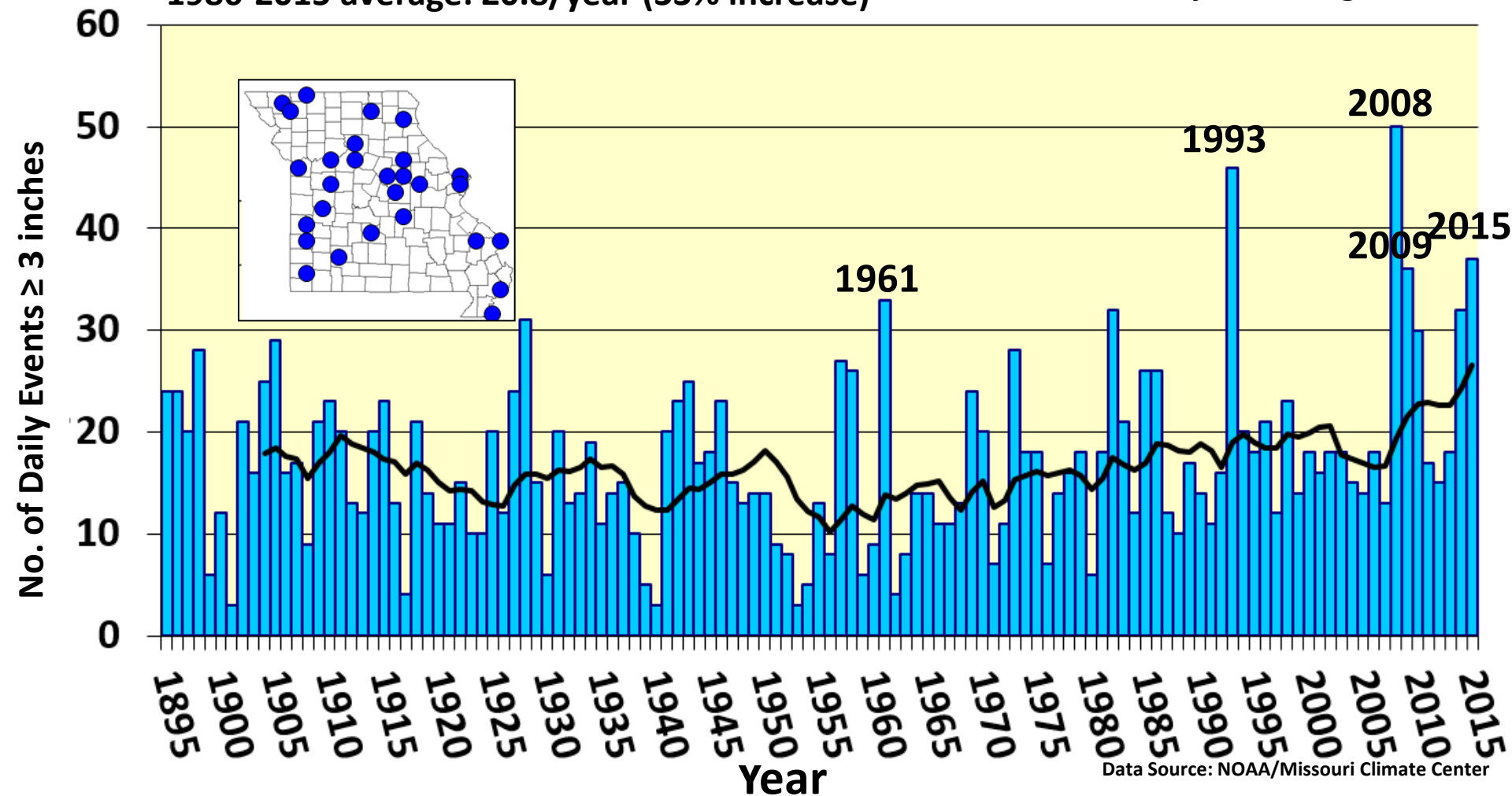
Special 12/27/2015

Number of Daily Rainfall Events ≥ 3 -inches in Missouri 1895-2015

1895-1985 average: 15.6/year

1986-2015 average: 20.8/year (33% increase)

 10 yr. running mean



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- Concentrated animal feeding operations, frequently referred to as CAFOs, are large animal agricultural facilities that raise a specific number of animals in production barns or confinement pens.
- In 2012, the Missouri Department of Natural Resources (MDNR) amended their CAFO regulatory rules for **catastrophic** and **chronic** weather events. The Missouri Climate Center was designated an official entity in determining chronic wet weather events.
- Catastrophic storm event— A precipitation event of 24 hour duration that exceeds the 25 year, 24 hour storm event as defined by the most recent publication of the National Weather Service Climate Atlas 14, Volume 8.
- Chronic weather event—The chronic weather event will be based upon an evaluation of the 1-in-10 year return rainfall frequency over a 10-day, 90-day, 180-day, and 365-day operating period. It is preferred the University of Missouri's Missouri Climate Center will determine, within a reasonable time frame, when a chronic weather event is occurring for any given **county** in the state; Rules of MDNR, Div. 20, Clean Water Commission 10, Chapter 6, Permits, CSR 20-6.300, Page 56

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Wet Weather Management Practices for CAFOs in Missouri

Excerpts from Missouri DNR PUB2422:

- Extreme weather “can leave both the environment and facilities at substantial risk of spills....”
- The CAFO general permit states: “When wastewater storage structures are in danger of an overflow due to a chronic weather event, CAFO owners shall take reasonable steps to lower the liquid level in the structure....”

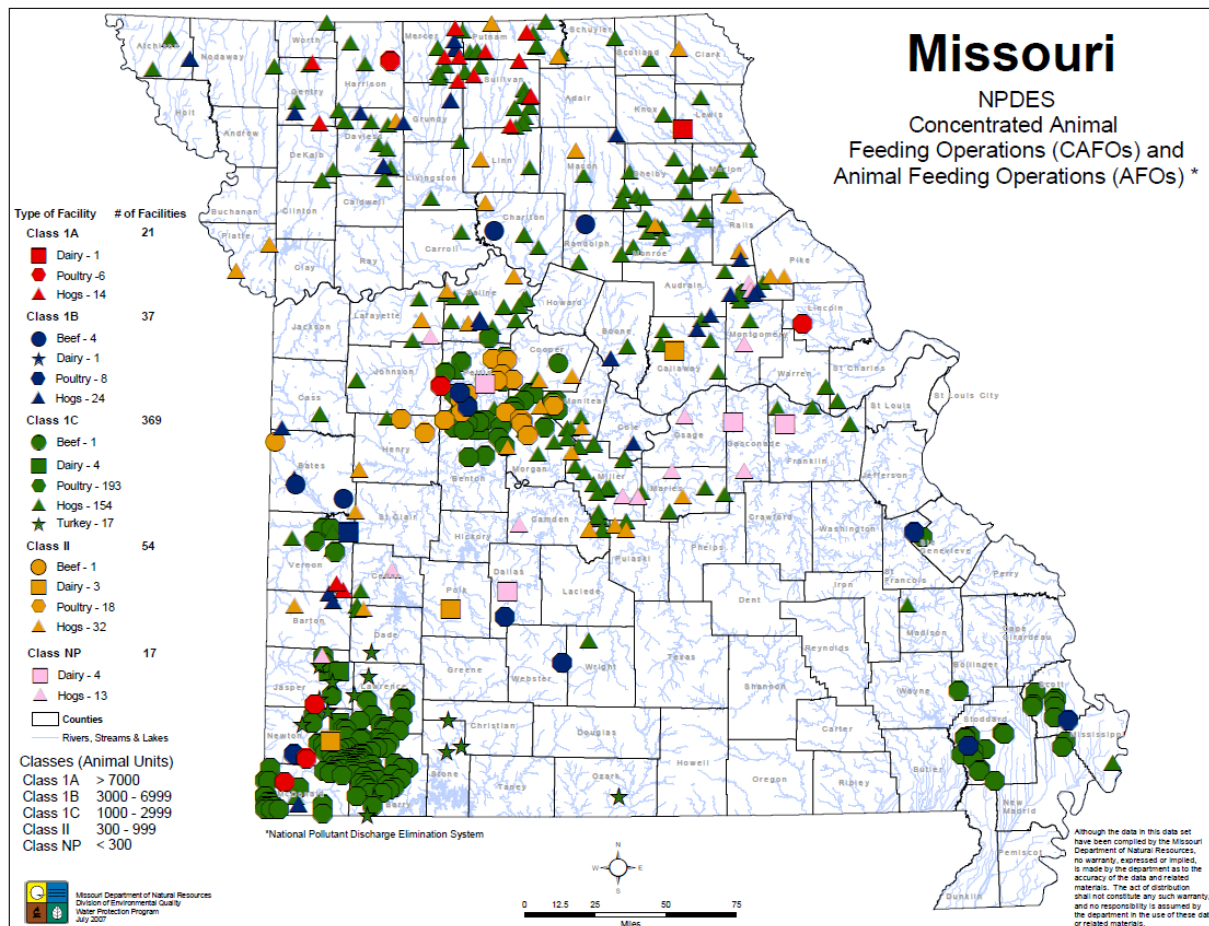


CAFO Wastewater Storage Structure

<http://dnr.mo.gov/pubs/pub2422.pdf>

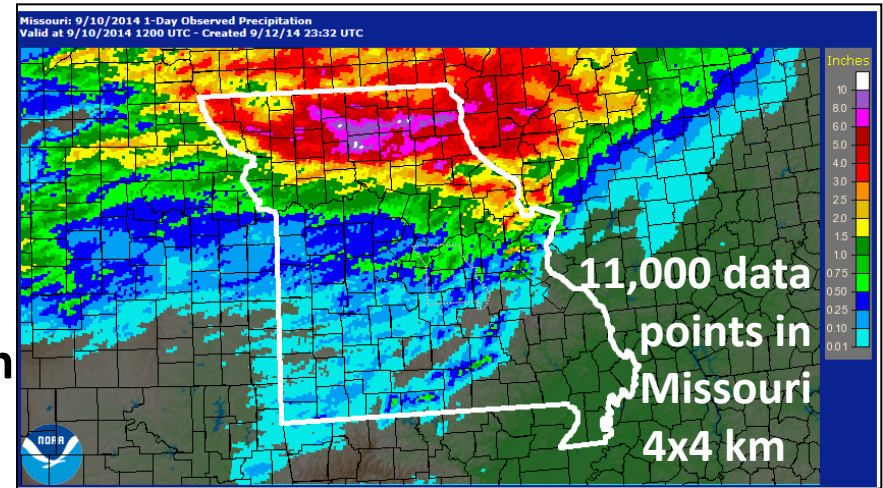
Economic Impact...

- There are more than 500 permitted animal feeding operations in Missouri.
- An automated design system will reduce compliance costs and fines, and increase the value of better management.
- Unpermitted facilities who participate are less likely to have discharges leading to expenses associated with regulatory oversight.



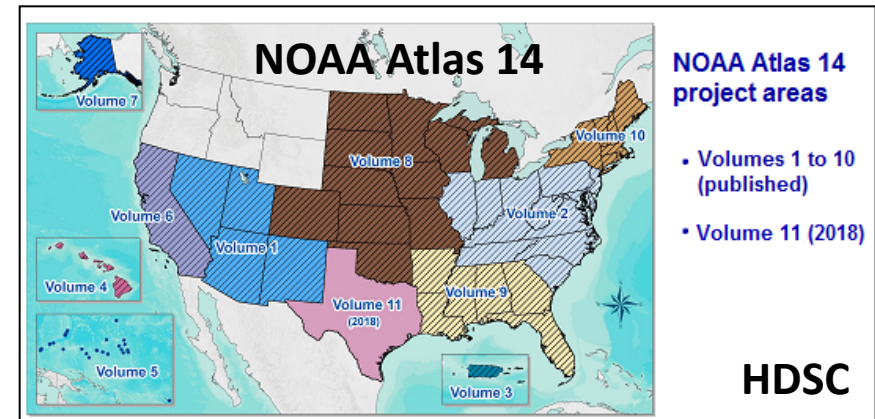
Development of an Automated Design Storm Notification System

- Using the MDNR wet weather regulation criteria, the AHPS Precipitation Analysis, and NOAA Atlas 14, Volume 8, we are creating an automated system to track precipitation accumulations across Missouri.



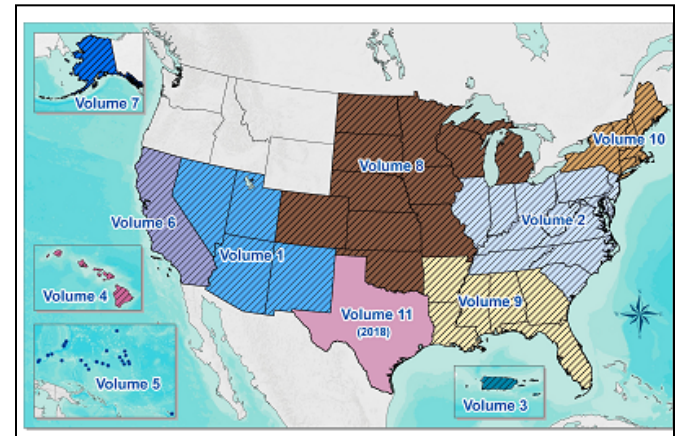
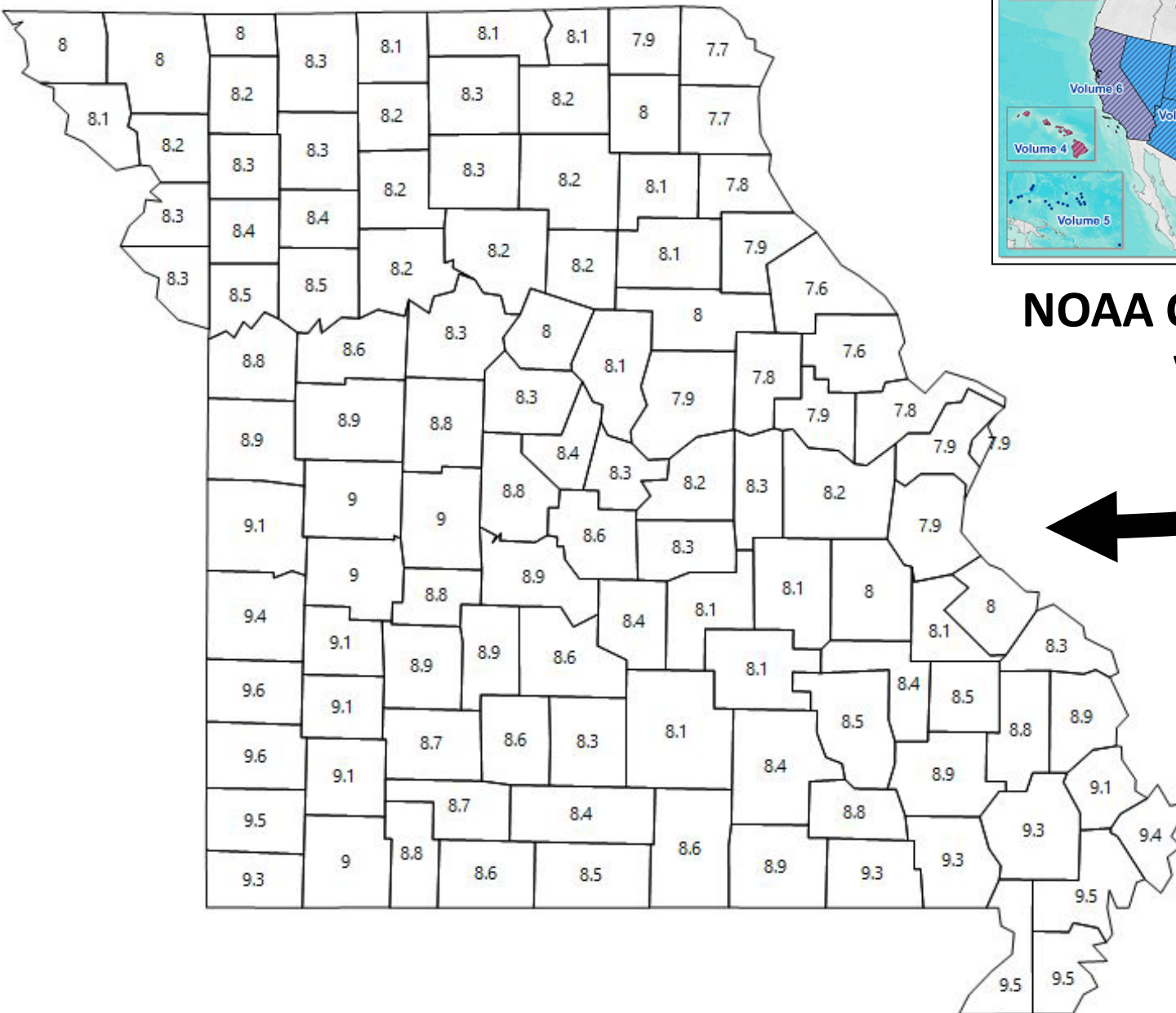
AHPS Precipitation Analysis

- If any county in Missouri meets a pre-determined risk level, the automated system will notify stakeholders when and where wet weather management may be warranted.



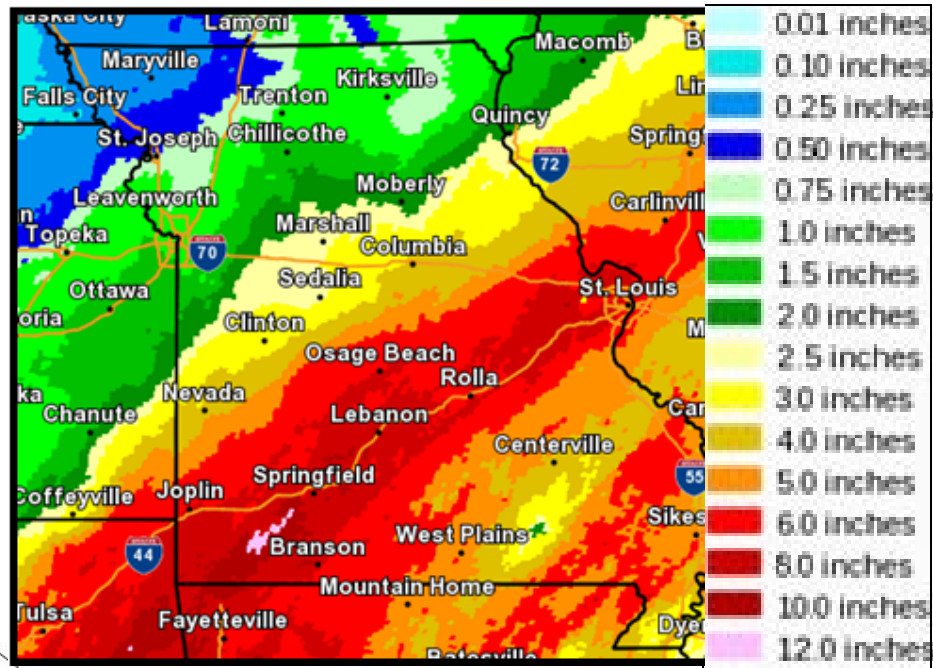
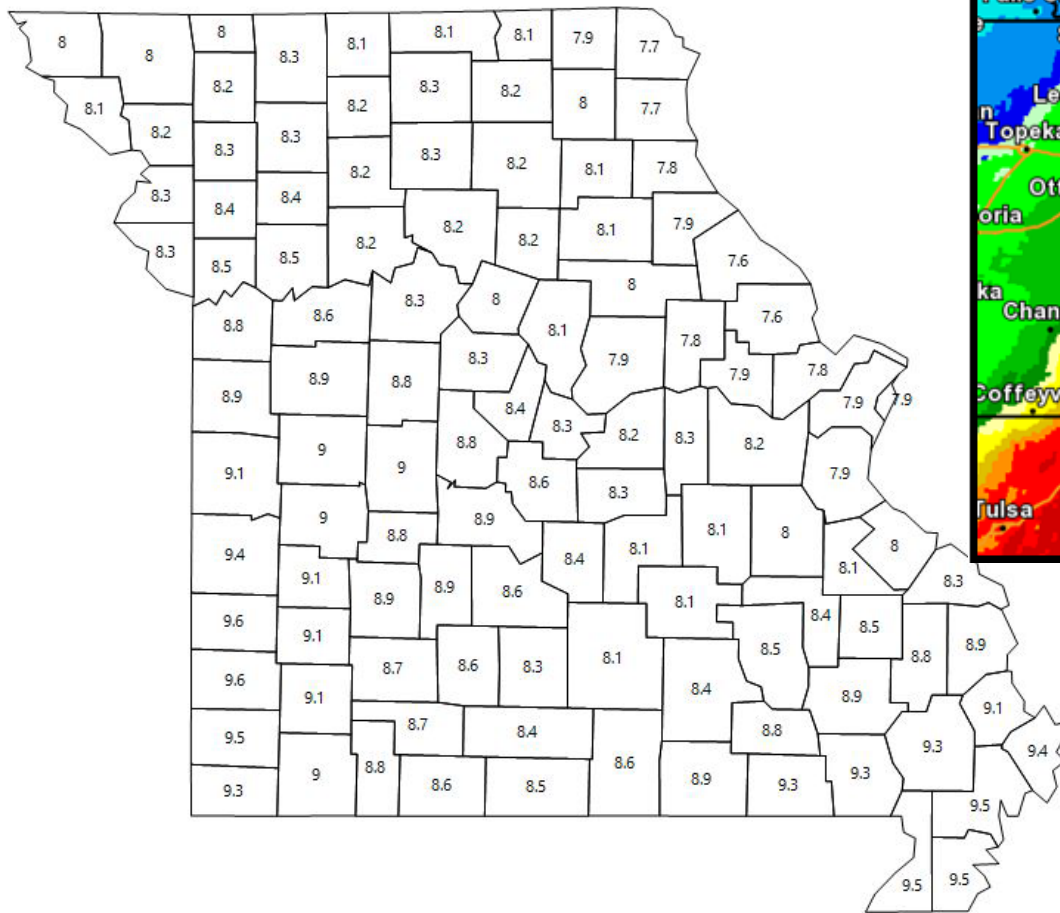
- Stakeholders include key personnel at NRCS, MDNR, University of Missouri, other designated entities and participating farmers in the affected and surrounding counties.

Precipitation Frequency Estimates 10-year/10-day by county (in.)

NOAA Climate Atlas 14,
Volume 8

Precipitation Frequency Estimates

10-year/10-day by county (in.)



**AHPS estimated rainfall
Dec 26-29, 2015**


If any AHPS grid point in a county reaches 90% or greater of the precip frequency criteria, the alert will be activated for that county.

Automated Design Storm Notification Map

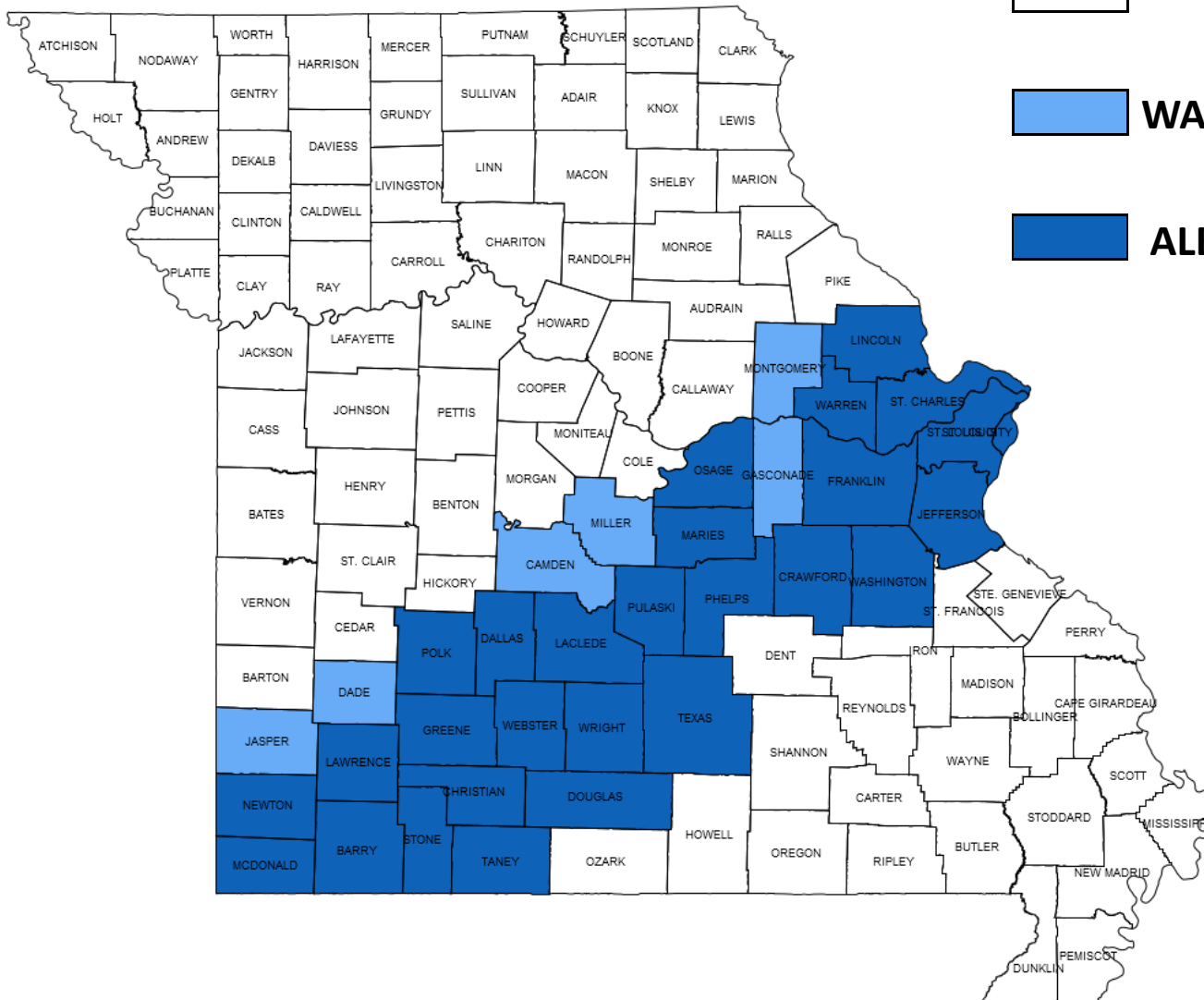
10-year/10-day

Dec 27, 2015 – Jan 5, 2016

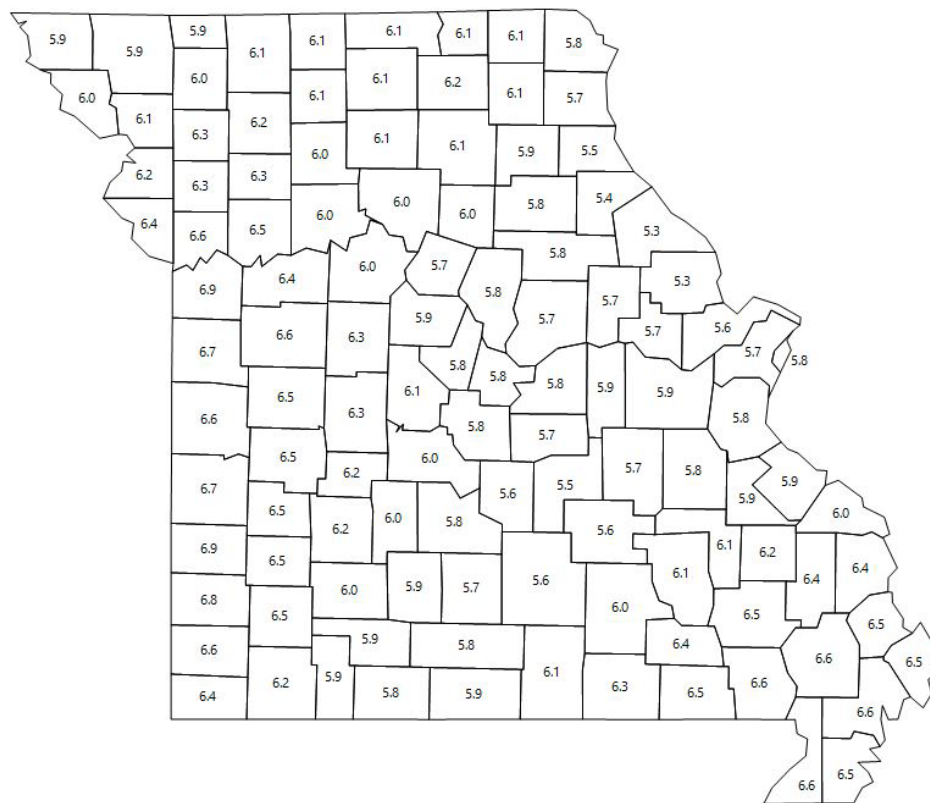
 CLEAR: no county warnings

 WARNING: $\geq 90\%$ of design
criteria exceeded

 ALERT: design storm criteria
exceeded



Precipitation Frequency Estimates 25-year/24-hour by county (in.)



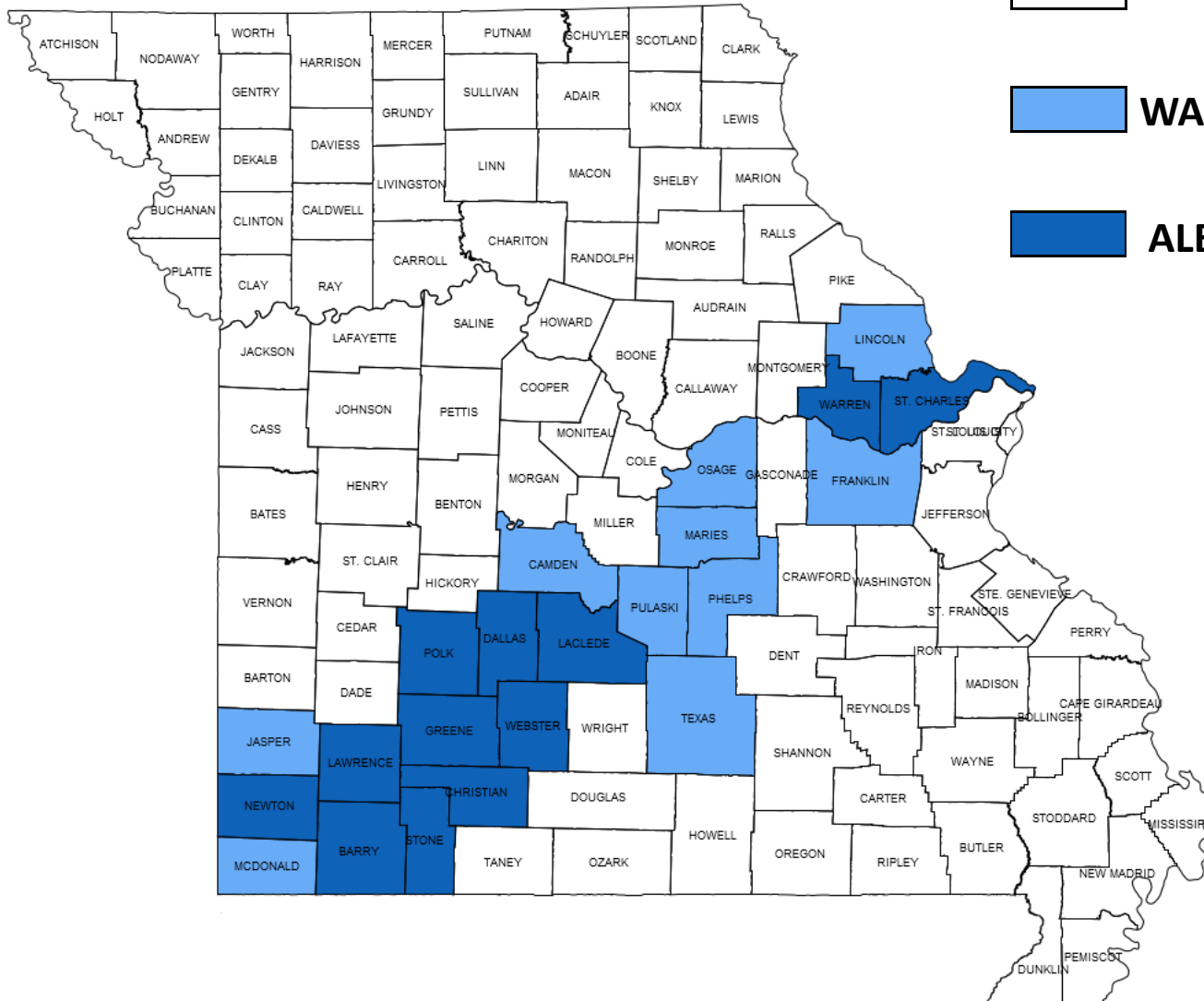
NOAA AHPS rainfall estimates for 24-hour period ending 6 a.m. CST Dec 27, 2015



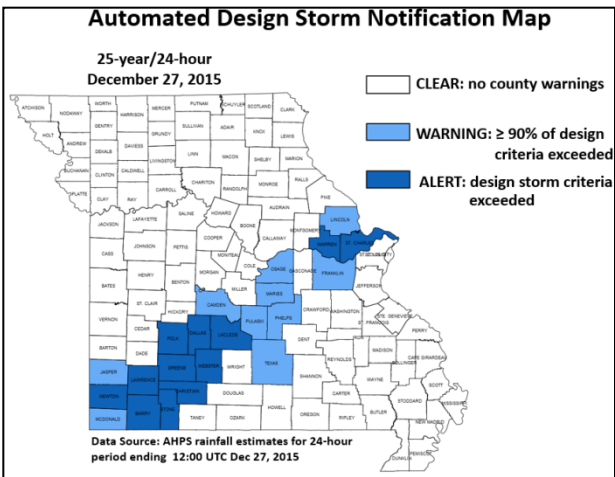
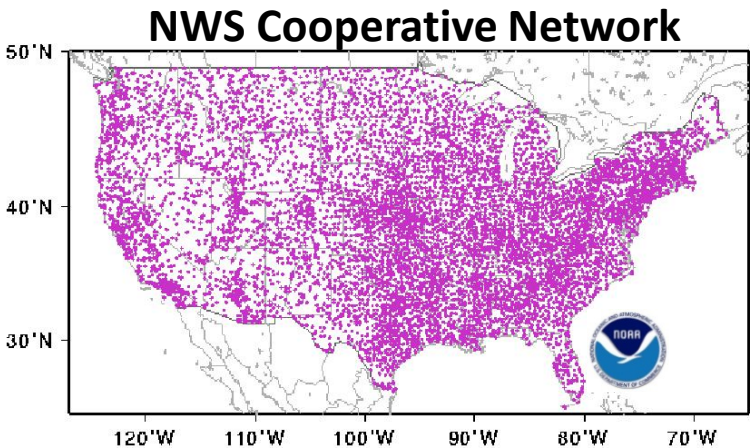
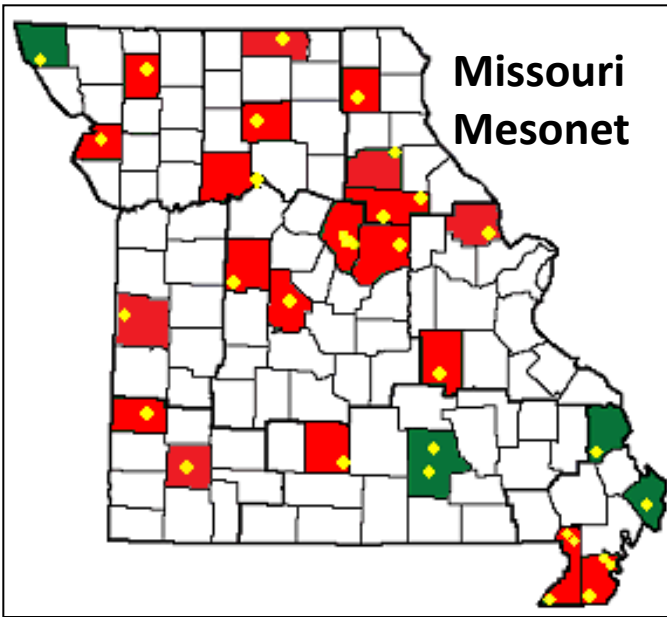
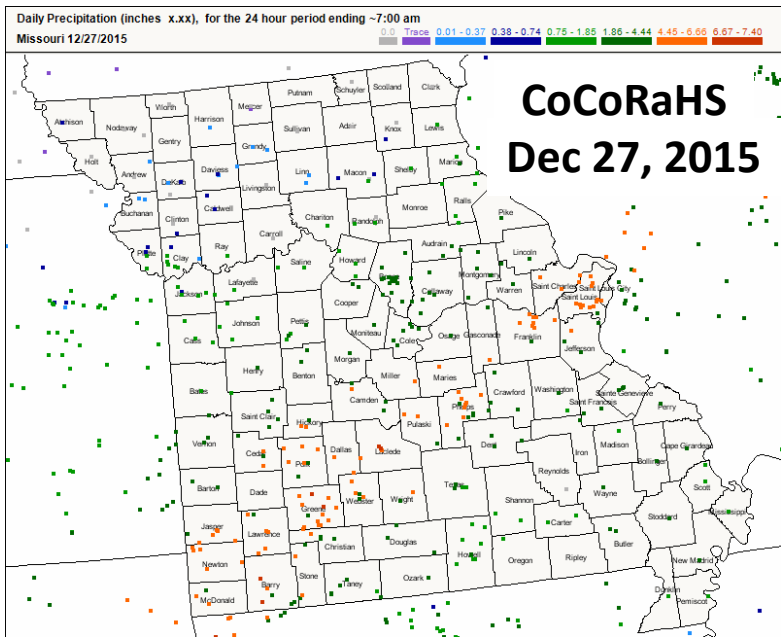
If any AHPS grid point in a county reaches 90% or greater of the precip frequency criteria, the alert will be activated for that county.

**25-year/24-hour
December 27, 2015**

**25-year/24-hour
December 27, 2015**



The Automated Design Storm Notification map is NOT a “be-all and end-all” product. Ground truth reports from CoCoRaHS, NWS COOP, Missouri Mesonet etc. will supplement the map.





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