

Flash-Flooding Event from 21-22 September 2016

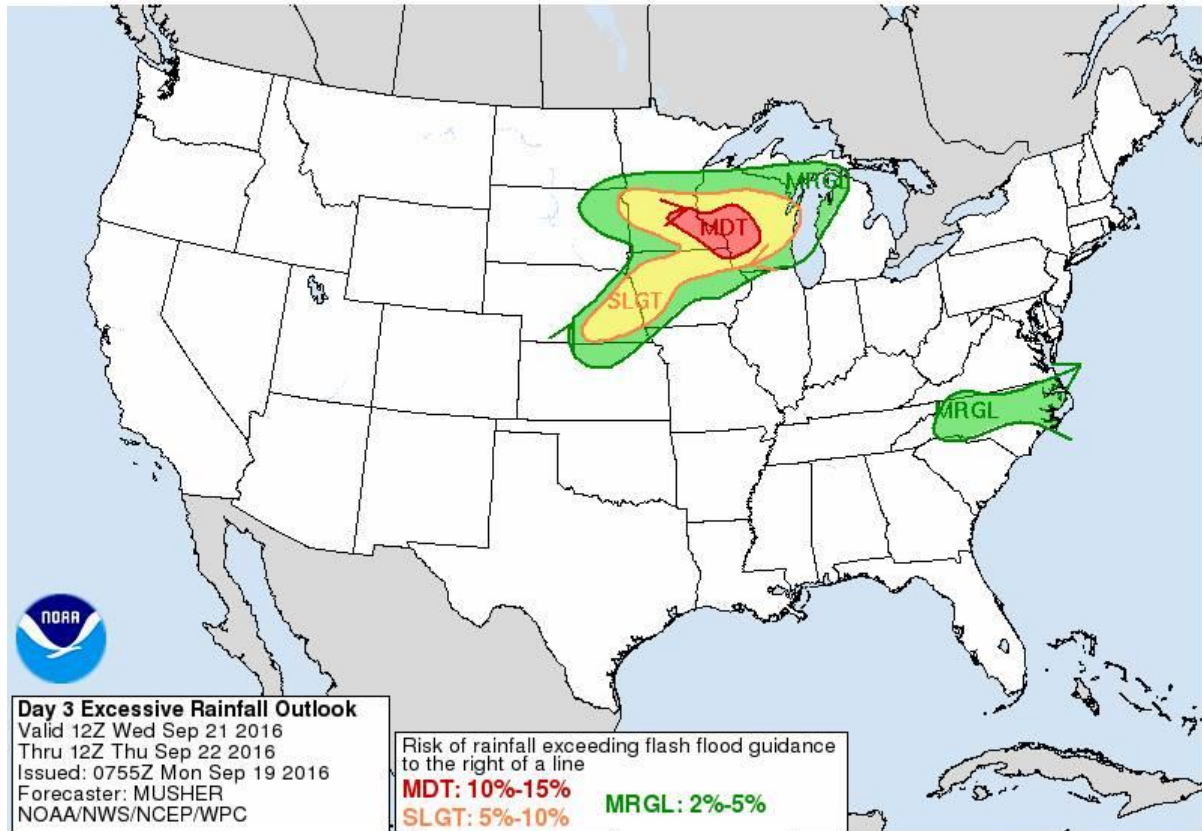
Event Overview

On the evening of September 20th, a warm front was stretched west to east across the Midwest originating from a developing low pressure system across the South Dakota and Nebraska border. The weather pattern was to be nearly stagnant for the following 36 to 48 hours and the front became stationary across southern Minnesota. The atmosphere was ripe with deep moisture evident by near record high Precipitable Water (PWAT) values for this time of year.


That evening, an area of thunderstorms formed along and north of the warm front in southern Minnesota. Heavy rain fell in south central Minnesota, especially the Waseca area has shown in the precipitation map shown below. A Flash-Flood Warning was issued for Waseca but no major issues were reported. Ultimately, 2.52 inches of rain fell in a rather short period of time in Waseca that night, which created very wet antecedent conditions heading into the night of September 21st.

The evening and overnight of September 22nd-23rd saw much more and widespread heavy rainfall across parts of Minnesota. The two areas hit the hardest were the north metro and from the Mankato area eastward through Waseca and Steele counties. Thunderstorms that night were much more widespread, and trained over the same areas along and north of the front. Significant Flash-Flooding was reported across portions of the state that night. From the University of Minnesota State Climatology office: *“There were sixty abandoned cars with water least to their doors in northwest metro suburbs during the height of the storm. Interstate 94 in the north metro was closed for a period that night. The ground was already saturated at places like Waseca and this exacerbated the flooding situation. There were many reports of basements flooded, closed roads and washouts, and standing water in Waseca and other locations as well. The indoor ice arena in Waseca had six inches of water on the freshly-iced rink. Loon Lake in Waseca rose over its banks and is flooding nearby streets in town. The rising waters of Fountain Lake in Albert Lea encroached into town during the day on September 23, detouring Highway 65 (Main Street) near the lake. I-90 was closed for a time in Austin on September 22.”*

Leading up to the event, the National Weather Service indicated much of the State of Minnesota in a Moderate Risk of excessive rainfall, as shown in the image below.




On the afternoon of September 20th, the National Weather Service issued a Flash-Flood Watch for the following two days. See the forecast graphic below.




Severe Weather Possible Tonight

Heavy Rainfall Tonight-Thursday

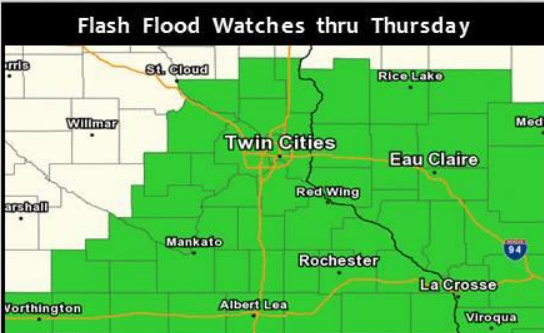


Severe Weather Threat Tonight





1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)
Isolated severe thunderstorms possible Limited in duration and/or coverage and/or intensity	Scattered severe storms possible Short-lived and/or not widespread, isolated intense storms possible

Flash Flood Watches thru Thursday




Forecast Rainfall Tonight thru Thursday





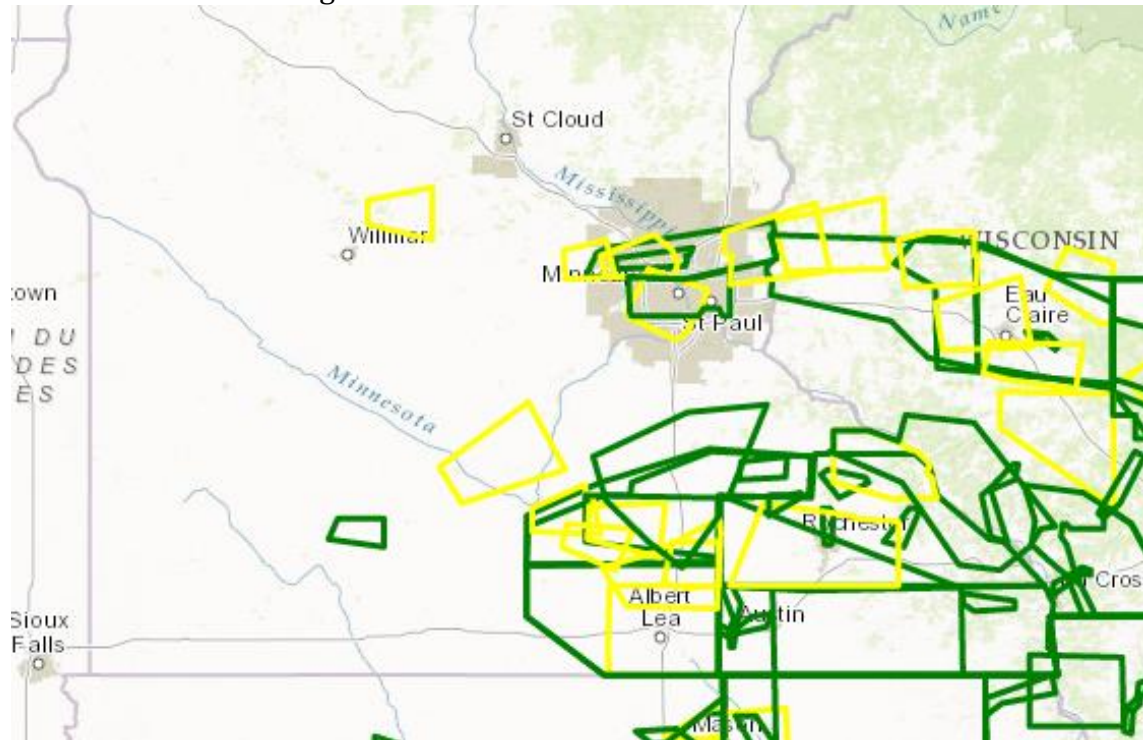
National Weather Service

Twin Cities/Chanhasen, MN



Issued: 3:59 PM - Tuesday, September 20, 2016

Below is a cumulative summary of the Flood Warnings (green) and Severe Thunderstorm Warnings (yellow) issued from September 20-22nd, 2016 across southern Minnesota. No warnings were issued in northern Minnesota.



In addition to the numerous Flash-Flood Warnings that were issued, a Flash-Flood Emergency was issued for a narrow corridor of the northern Twin Cities Metro as shown below in a graphic the National Weather Service shared on the evening of September 21st, 2016.

FLASH FLOOD EMERGENCY

Rain Totals Could Exceed 10 inches

6-9 inches of rain has fallen

Hazards

Widespread Extreme Flash-Flooding

Where

- Brooklyn Park
- Maple Grove
- Osseo
- North of Fridley

Impacts

- Many roads are impassable & cars are stuck on flooded roads.
- Your life will be in danger if you enter flood waters!

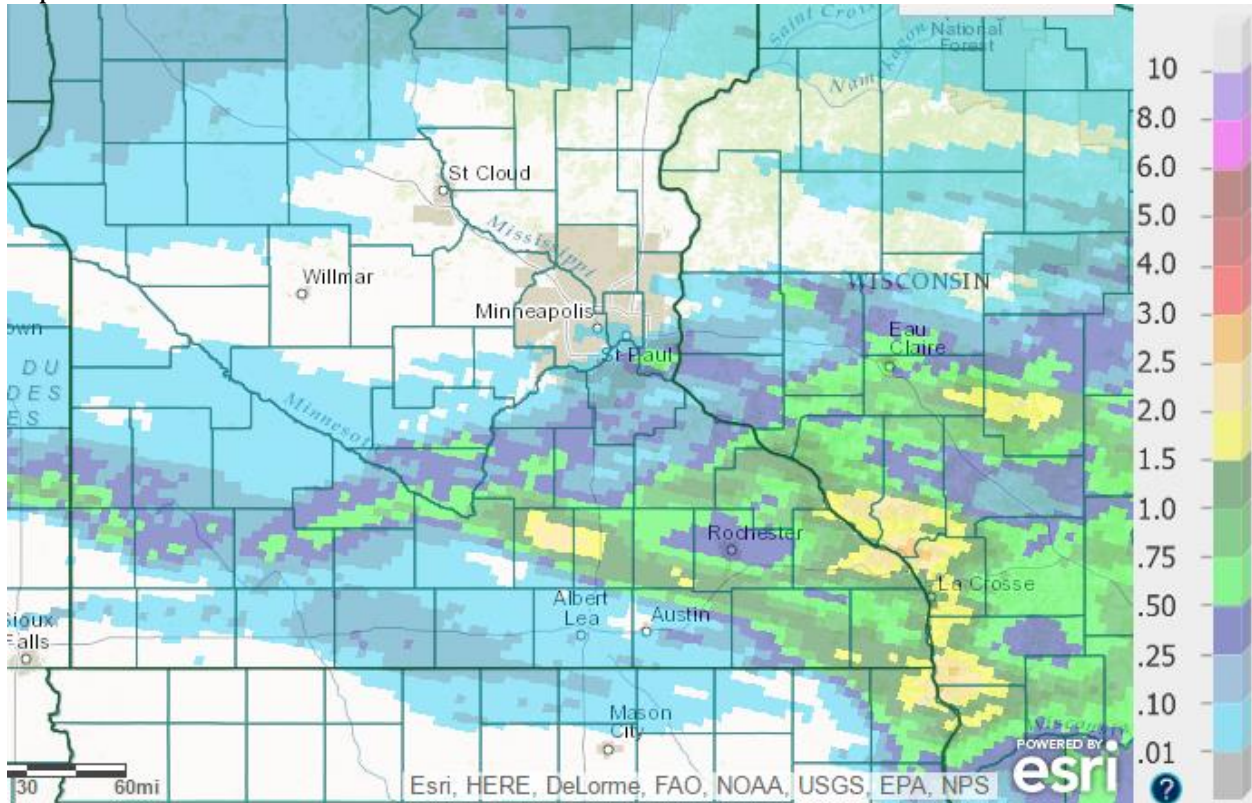
Actions

- **NEVER** drive or walk into flooded roads!
- *Turn Around, Don't Drown!*

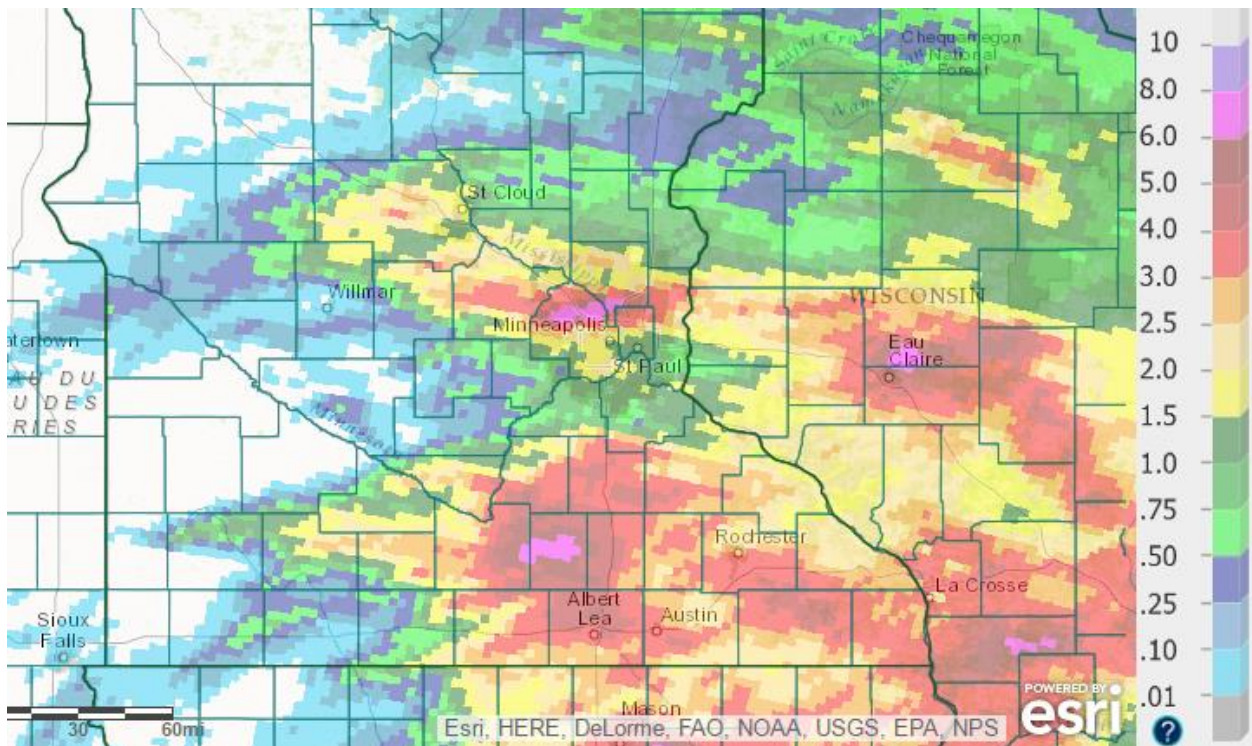
NWS Twin Cities

weather.gov/twincities
Issued: 9/21/2016 11:32 PM CDT

The image images below are radar estimates of how much rain fell on the nights of September 21st and 22nd.



Radar rainfall estimates on the night of September 20-21, 2016. 2.52 inches was recorded the City of Waseca.



Radar rainfall estimates on the night of September 21-22, 2016. Parts of the north metro observed rainfall amounts in the 6-8 inch range, with similar amounts in the Waseca area. The two-day total in Waseca was 10.16 inches.

48-Hour Total Rainfall Reports

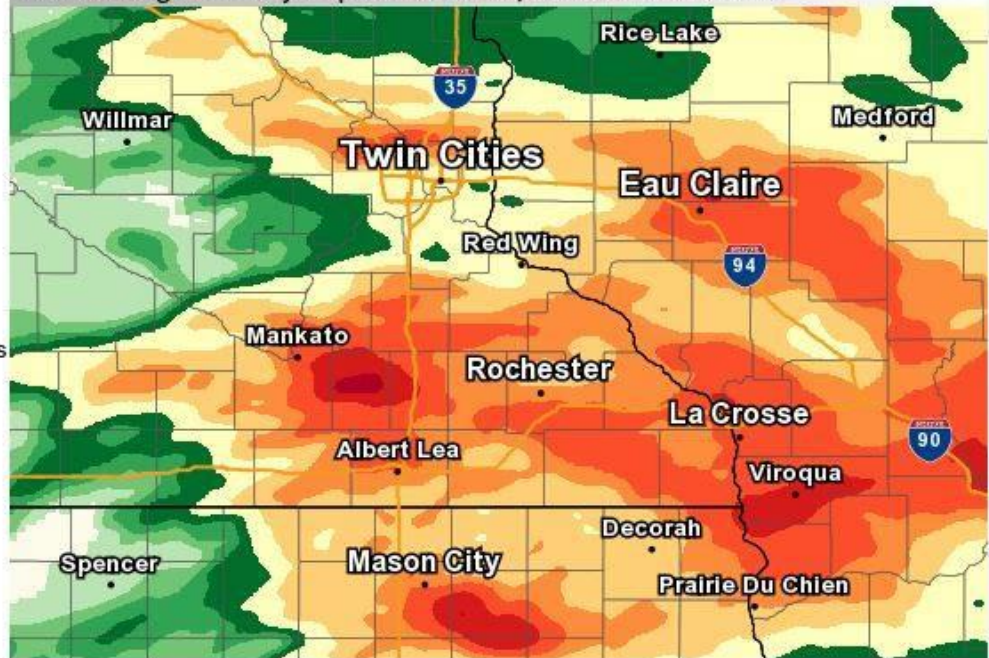
Location	Amount	Time/Date	Provider
Waseca (AG Exp Frm)	10.16 in	0800 AM 09/22	COOP
Waseca 1NNE	9.15 in	0700 AM 09/22	COCORAHS
Maple Grove 1SSW	8.11 in	0700 AM 09/22	COCORAHS
Chippewa Falls 1 NW	7.46 in	0700 AM 09/22	COCORAHS
Brooklyn Park 1SE	7.24 in	0829 AM 09/22	CWOP
Mankato 4E	6.69 in	0700 AM 09/22	UCOOP
Maple Grove 3SW	6.21 in	0633 AM 09/22	COCORAHS
Augusta 4NW	6.02 in	0653 AM 09/22	COCORAHS
Augusta (RS)	6.02 in	0800 AM 09/22	COOP
Augusta 1NW	5.86 in	0905 AM 09/22	RAWS
Osseo 1 NW	5.80 in	0800 AM 09/22	COCORAHS
Kenyon	5.71 in	0600 AM 09/22	COCORAHS
Eau Claire AP	5.65 in	0656 AM 09/22	ASOS
Osseo 1WNW	5.58 in	0745 AM 09/22	COCORAHS
Elk Mound 4 SE	5.54 in	0800 AM 09/22	COCORAHS
Eau Claire 1S	5.45 in	0950 AM 09/22	CWOP
Altoona	5.37 in	0600 AM 09/22	COCORAHS
Owatonna	5.35 in	0630 AM 09/22	COCORAHS
Eau Claire 3 SSW	5.22 in	0700 AM 09/22	COCORAHS
Owatonna (Straight R)	5.19 in	0900 AM 09/22	GOES
Coon Rapids 2ESE	5.10 in	0940 AM 09/22	CWOP
Ellendale	5.06 in	0700 AM 09/22	COCORAHS
Eau Claire 3W	4.81 in	0700 AM 09/22	COCORAHS
Skyline	4.67 in	0700 AM 09/22	COCORAHS
Rockford	4.62 in	0700 AM 09/22	COCORAHS
Eau Claire-Dells Dam (Chip R)	4.53 in	0800 AM 09/22	GOES
Skyline 1ENE	4.52 in	0700 AM 09/22	COCORAHS
Owatonna (Maple Crk)	4.46 in	0900 AM 09/22	GOES
Hugo 2WSW	4.44 in	0546 AM 09/22	CWOP
Zumbrota	4.39 in	0620 AM 09/22	COCORAHS
Brooklyn Center 1E	4.33 in	0700 AM 09/22	COCORAHS
Skyline	4.31 in	0700 AM 09/22	COCORAHS
St. Peter 1SW	4.18 in	0700 AM 09/22	COCORAHS
St. Peter (Minnesota R)	4.14 in	0900 AM 09/22	UCOOP
Bricelyn	4.06 in	0700 AM 09/22	COOP
Mapleton 4N	4.04 in	0700 AM 09/22	COCORAHS
Colfax 7ESE	3.98 in	0150 AM 09/22	CWOP
Zumbrota 2NNE	3.95 in	0515 AM 09/22	COCORAHS
Hugo 2WSW	3.93 in	0942 AM 09/22	CWOP
Elk Mound	3.91 in	0730 AM 09/22	UCOOP
Jim Falls 3 NW	3.77 in	0630 AM 09/22	COOP
Northfield 1NNW	3.76 in	0700 AM 09/22	COCORAHS
Wanamingo (Zumbro R N Fk)	3.74 in	0930 AM 09/22	GOES
Faribault	3.73 in	0227 AM 09/22	CWOP
Beauford (Big Cobb R)	3.73 in	0945 AM 09/22	GOES
Zumbrota	3.67 in	0948 AM 09/22	CWOP
Winnebago (Blue Earth R)	3.55 in	0945 AM 09/22	GOES
Bloomer	3.48 in	0800 AM 09/22	COOP
St. Peter 6SW (7 Mile Crk)	3.42 in	0945 AM 09/22	GOES
Hanover 3 WNW	3.38 in	0641 AM 09/22	COCORAHS
Nerstrand 4E	3.34 in	0700 AM 09/22	COCORAHS
Rapidan (Le Sueur R)	3.32 in	0945 AM 09/22	GOES
Crystal AP	3.30 in	0653 AM 09/22	ASOS
New Hope 1NNW	3.26 in	0730 AM 09/22	COCORAHS
Buffalo	3.24 in	0804 AM 09/22	COCORAHS
Sveadahl 5NNW	3.20 in	0700 AM 09/22	COCORAHS
Montgomery 3E	3.20 in	0630 AM 09/22	COCORAHS
2 ESE Robbinsdale	3.20 in	0650 AM 09/22	COCORAHS
Northfield 2NE	3.17 in	0654 AM 09/22	COCORAHS
Rapidan (Maple R)	3.12 in	0945 AM 09/22	GOES
St. Peter 6WSW	3.11 in	0700 AM 09/22	COCORAHS
Edina 1SE	3.10 in	0640 AM 09/22	COCORAHS
Garden City 2W (Watowon R)	3.09 in	0830 AM 09/22	USGS
Anoka 1SE	3.09 in	0700 AM 09/22	COCORAHS
Northfield	3.04 in	0940 AM 09/22	CWOP

Observed Precipitation

National Weather Service

Valid Ending Thursday September 22nd, 2016 at 10 AM CDT

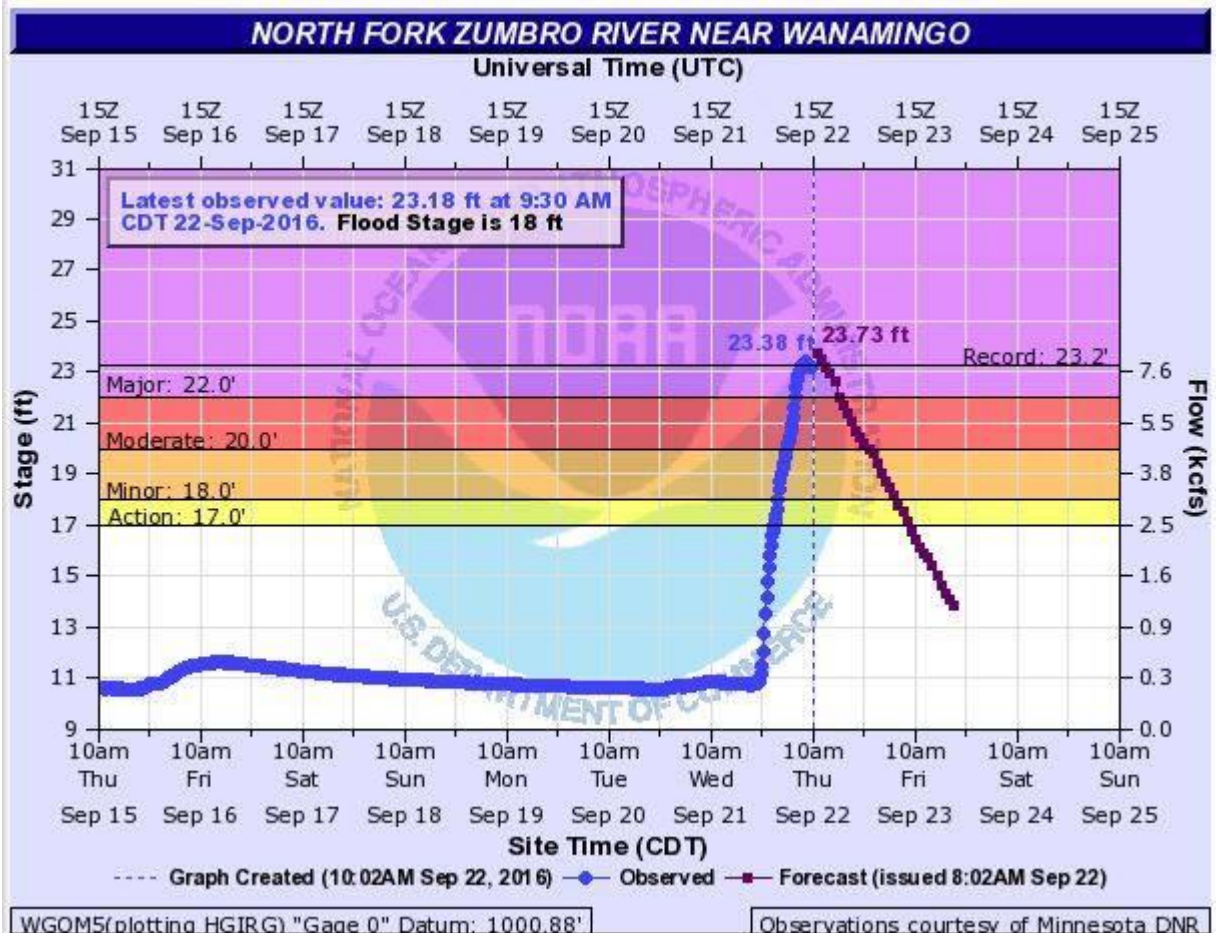
- Up to 0.1 inch
- 0.1 to 0.25 inches
- 0.25 to 0.5 inches
- 0.5 to 1.0 inches
- 1.0 to 2.0 inches
- 2.0 to 3.0 inches
- 3.0 to 4.0 inches
- 4.0 to 6.0 inches
- 6.0 to 8.0 inches
- 8.0 to 10.0 inches
- 10.0 to 15.0 inches
- Greater than 15 inches



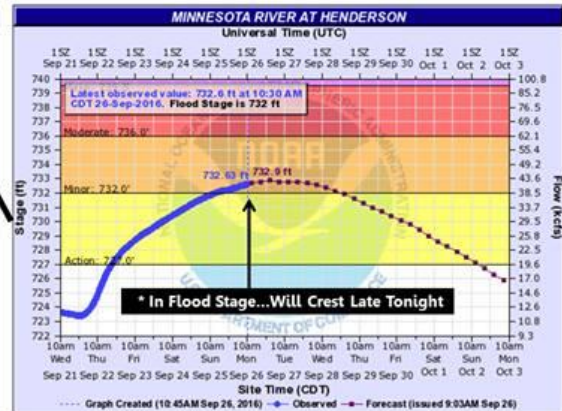
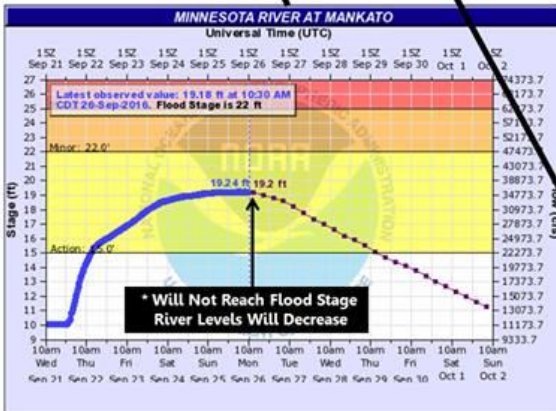
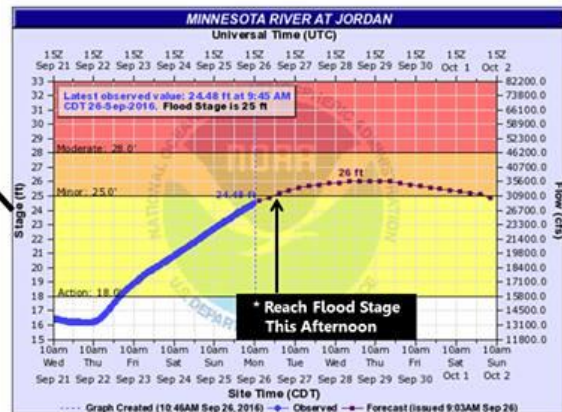
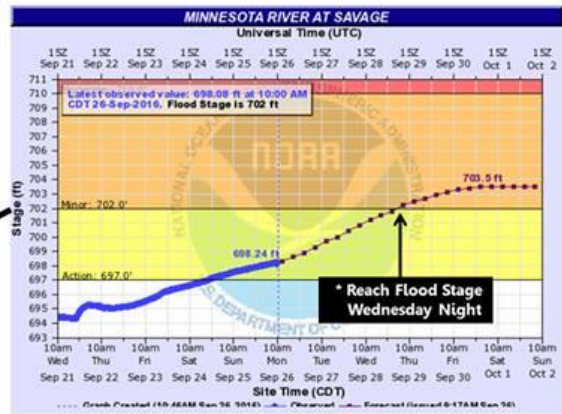
Graphic Created
September 22nd, 2016
11:31 AM CDT

This map shows 48 hour observed precipitation from September 20-22nd, 2016.

In terms of river flooding, several locations along the Minnesota River reached minor flood stage, but the most extreme river flooding was in the City of Wanamingo on the North Fork of the Zumbro River. That location saw its record high crest, recording a level of 23.38 ft.



Monday Morning Update: Flooding along the Minnesota River



Issued: 10:51 AM - Monday, September 26, 2016