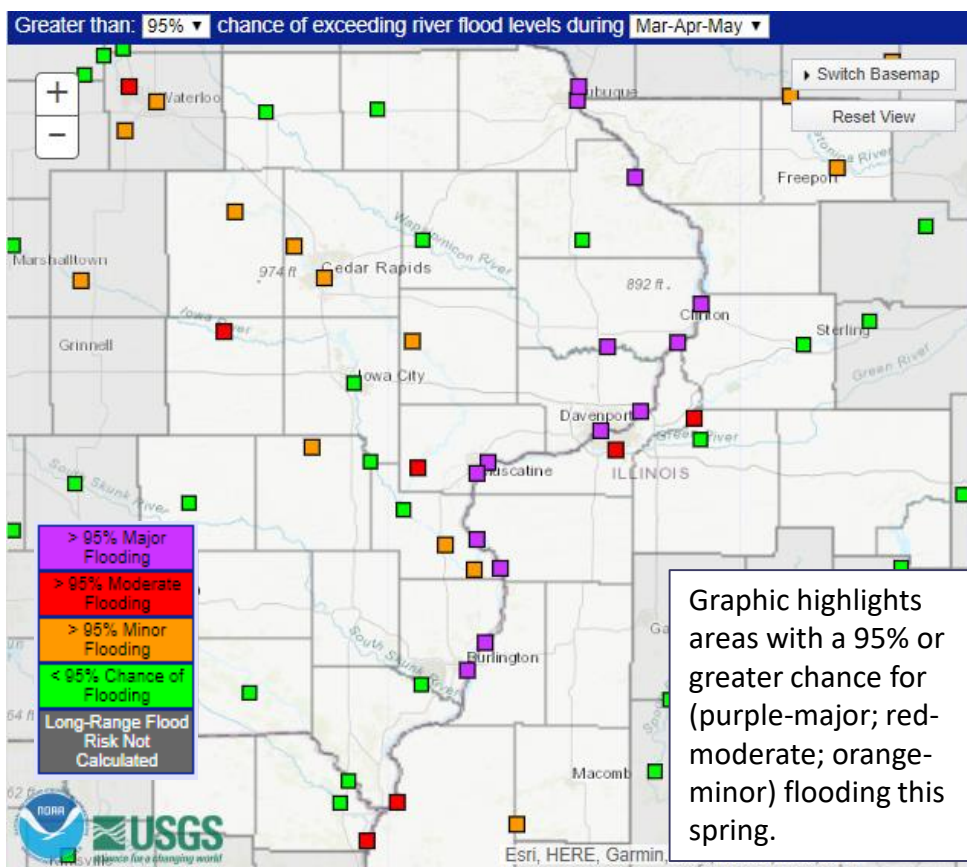




Spring Flooding Risk – Above to Well Above Normal



Mississippi River:

A growing snowpack in the upper parts of the Mississippi River basin has increased probabilities for major flooding, with potential for near record or record flooding on parts of the Mississippi River.

Local Tributary Rivers:

Most continue to have an elevated chance for flooding this spring.

Main Points:

- Saturated soils have persisted across the region since fall of 2018.
- Snowpack, snow water content, frozen ground, winter precipitation, high river levels, and continued ice action have combined to prime the area for an active and potentially significant spring flood season.
- Snowmelt alone will cause rivers to rise near or above flood stage.
- The rate of snowmelt in combination with any heavy spring rains will determine the severity of eventual river crests.
- Ice jam flooding will continue while rivers remain ice covered.

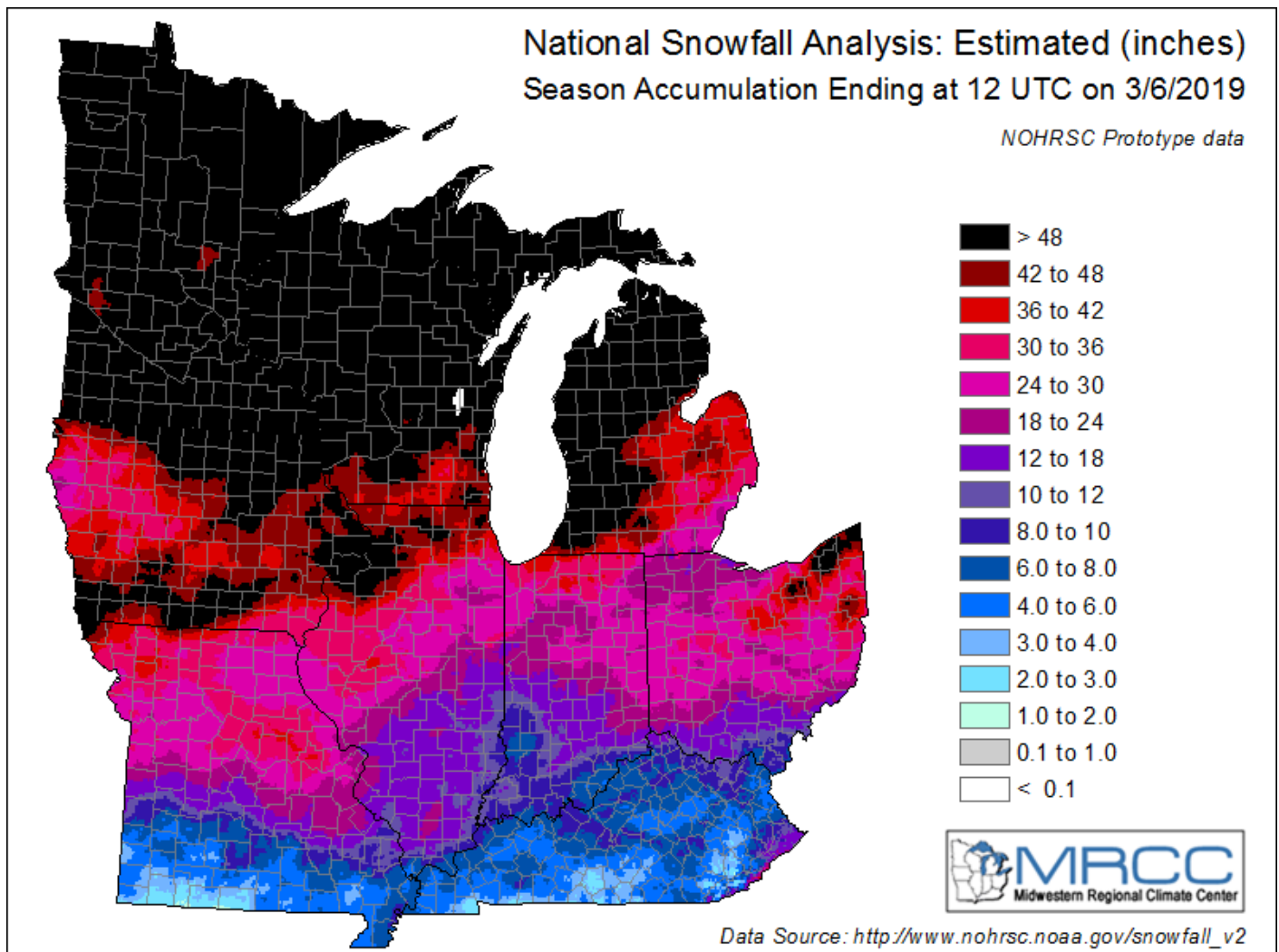
Changes since the last outlook:

- The snowpack over Minnesota and Wisconsin continues to grow.
- Probabilities have increased along the Mississippi River as snowpack in the basin increased. Potential for near record or record levels is possible on parts of the Mississippi River.



Factors Considered in this Outlook

- Seasonal Temperatures and Precipitation
- Snow Cover/Liquid Water Equivalent
- Frost Depth
- Soil Moisture
- Current River Streamflows
- Weather Forecasts & Outlooks

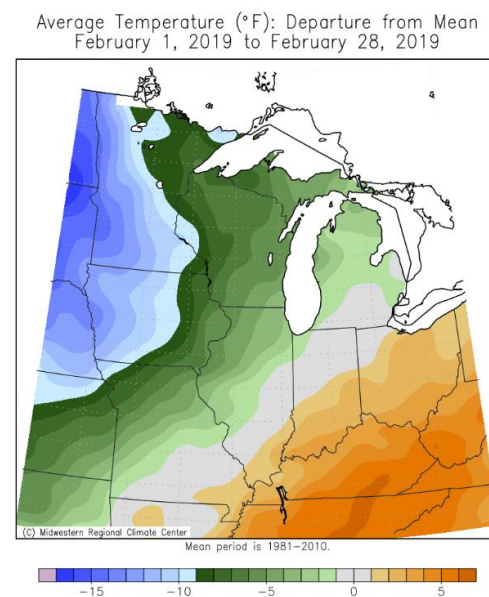
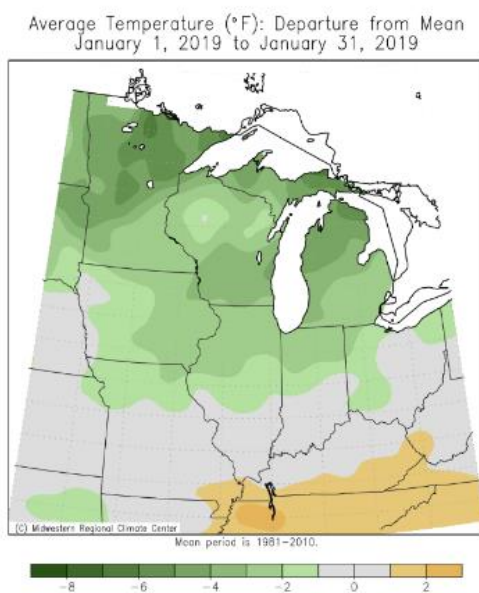




Seasonal Temperatures/Precipitation

Average Winter Temperatures:

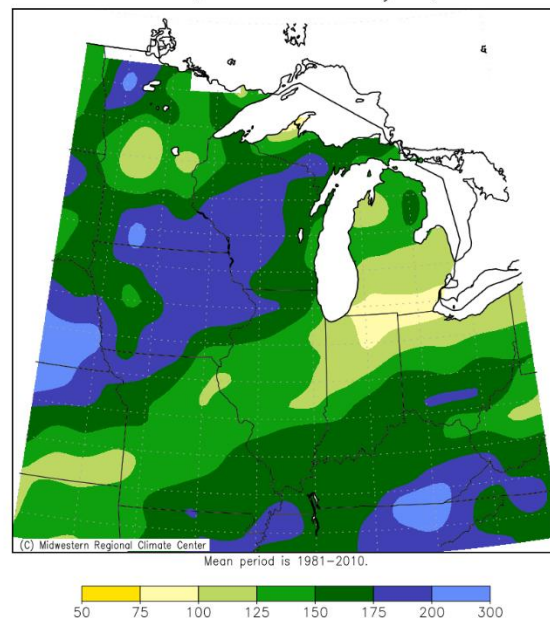
- Below Normal Temperatures in January & February.
- Promoted ground to freeze, kept ice in the rivers, and allowed the snowpack to grow.



Winter Precipitation:

- Above Normal
- Extensive area of 175% to 300% of normal.

Accumulated Winter Precipitation Departure from Normal

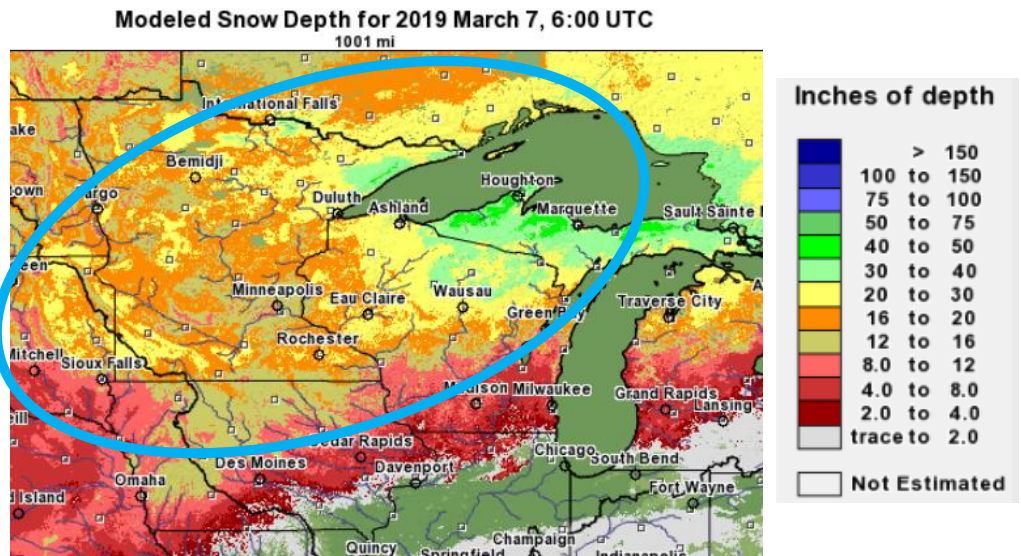




Snow Cover/Liquid Water Equivalent

Snow Cover (as of March 7, 2019)

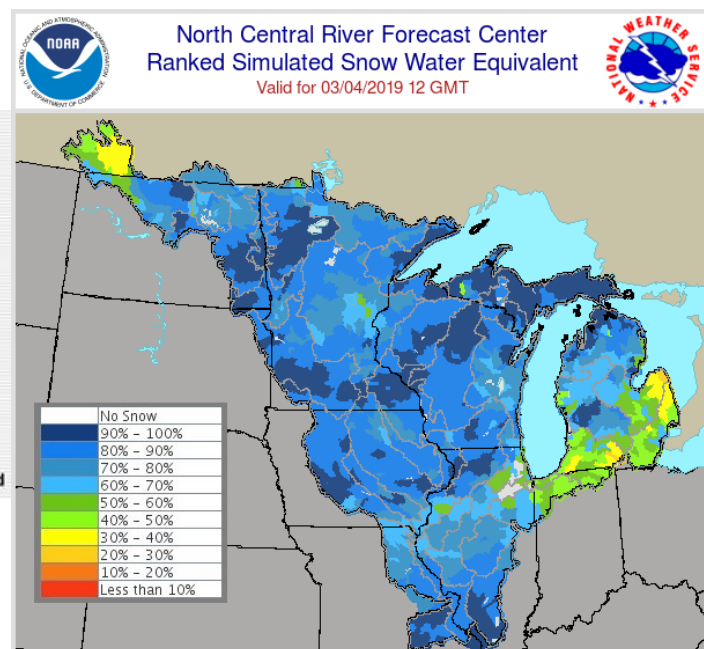
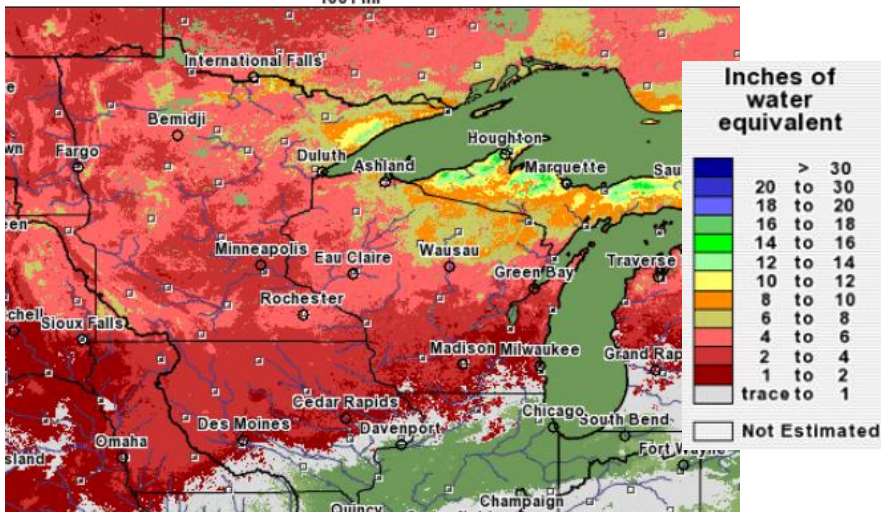
Widespread
snow depths
1 ft or greater



Snow Water Equivalent (SWE) as of March 7, 2019:

- Widespread 2 to 6 inches of SWE. Some areas up to 8 inches.
- SWE amounts are well above normal, in the top 1/4 of the historical record

Modeled Snow Water Equivalent for 2019 March 7, 6:00 UTC



Contribution to flood potential:

- Snowmelt alone has a high potential for flooding. The severity will depend on the rate of the snowmelt.



Frost Depth

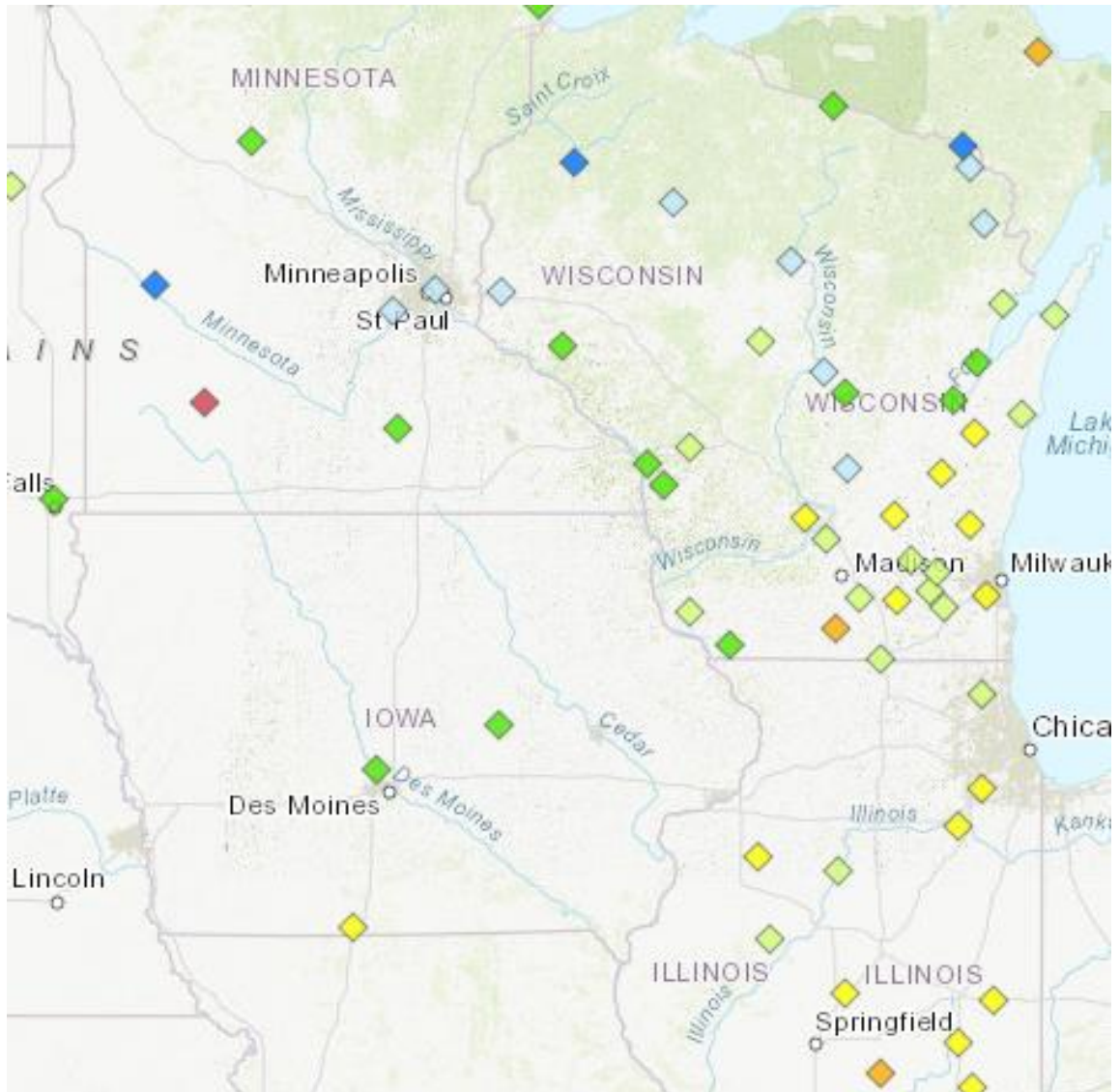
Frozen ground, near normal

- Cold temperatures have promoted near to deeper than normal frozen ground.

NCRFC_Frost_Depth

FrostDepth

- ◆ > 60 - 80
- ◆ > 48 - 60
- ◆ > 36 - 48
- ◆ > 24 - 36
- ◆ > 18 - 24
- ◆ > 12 - 18
- ◆ > 6 - 12
- ◆ > 3 - 6
- ◆ 0 - 3



Contribution to flood potential:

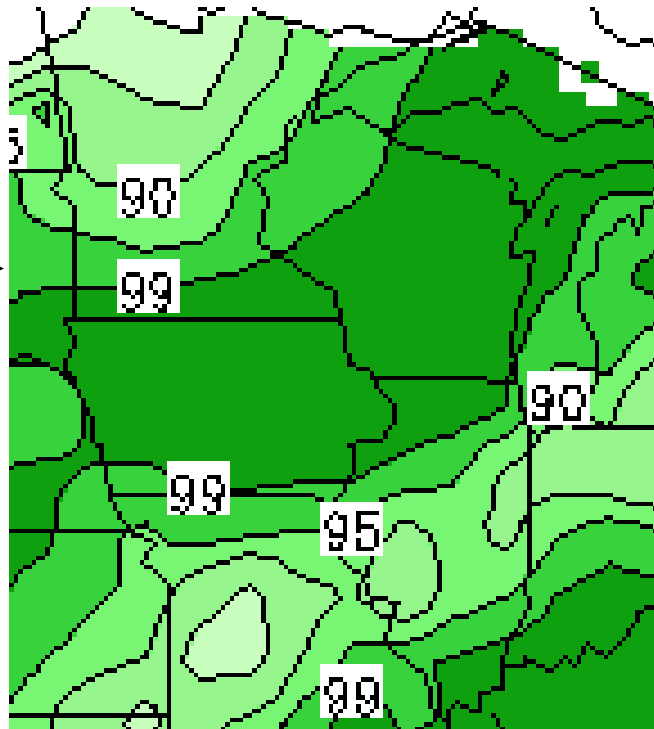
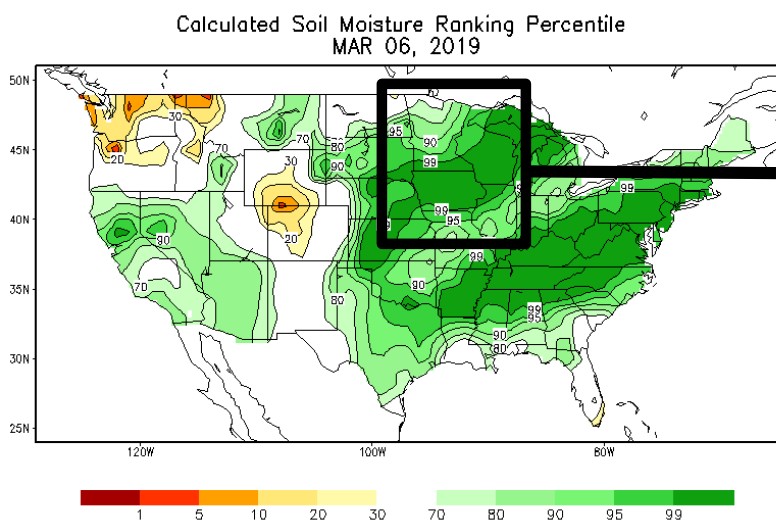
- *Frozen ground will prohibit runoff from soaking into the ground, promoting increased runoff from snowmelt or heavy spring rains.*



Soil Moisture

Wet/Saturated Soils → No Areas in Drought Conditions:

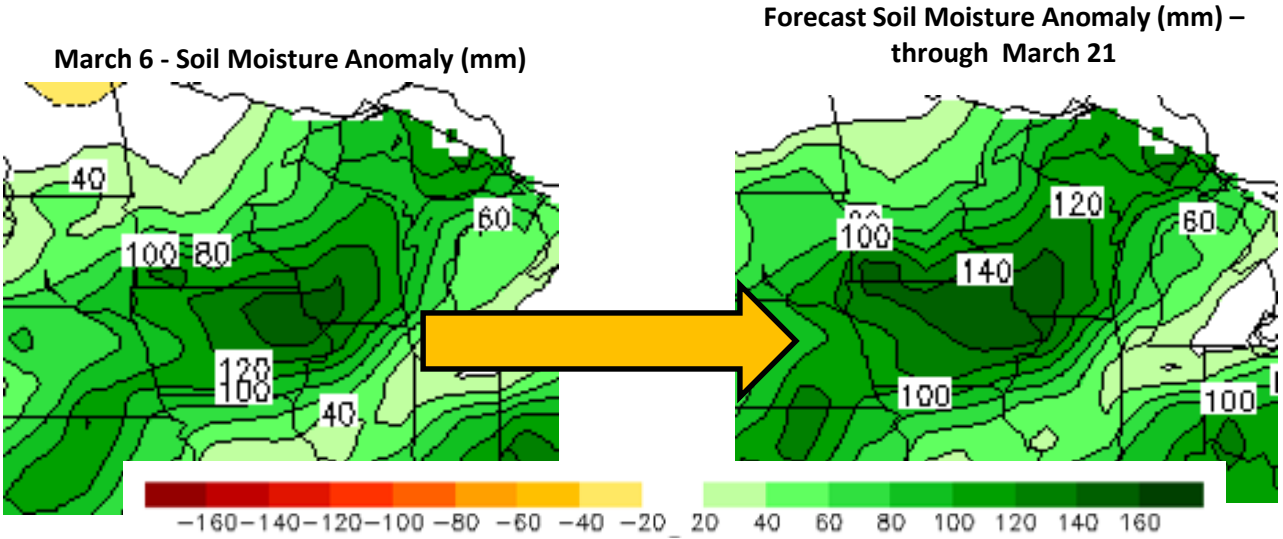
- Soils are nearly saturated, ranking in the 95th to 99th percentile of soil moisture rankings.



Contribution to flood potential:

- With nearly saturated soils, little water will be able to soak into the ground.
→ The majority of any snowmelt runoff or rainwater runoff will flow directly into the rivers.

Forecast is for an increase in soil moisture over the next 2 weeks.

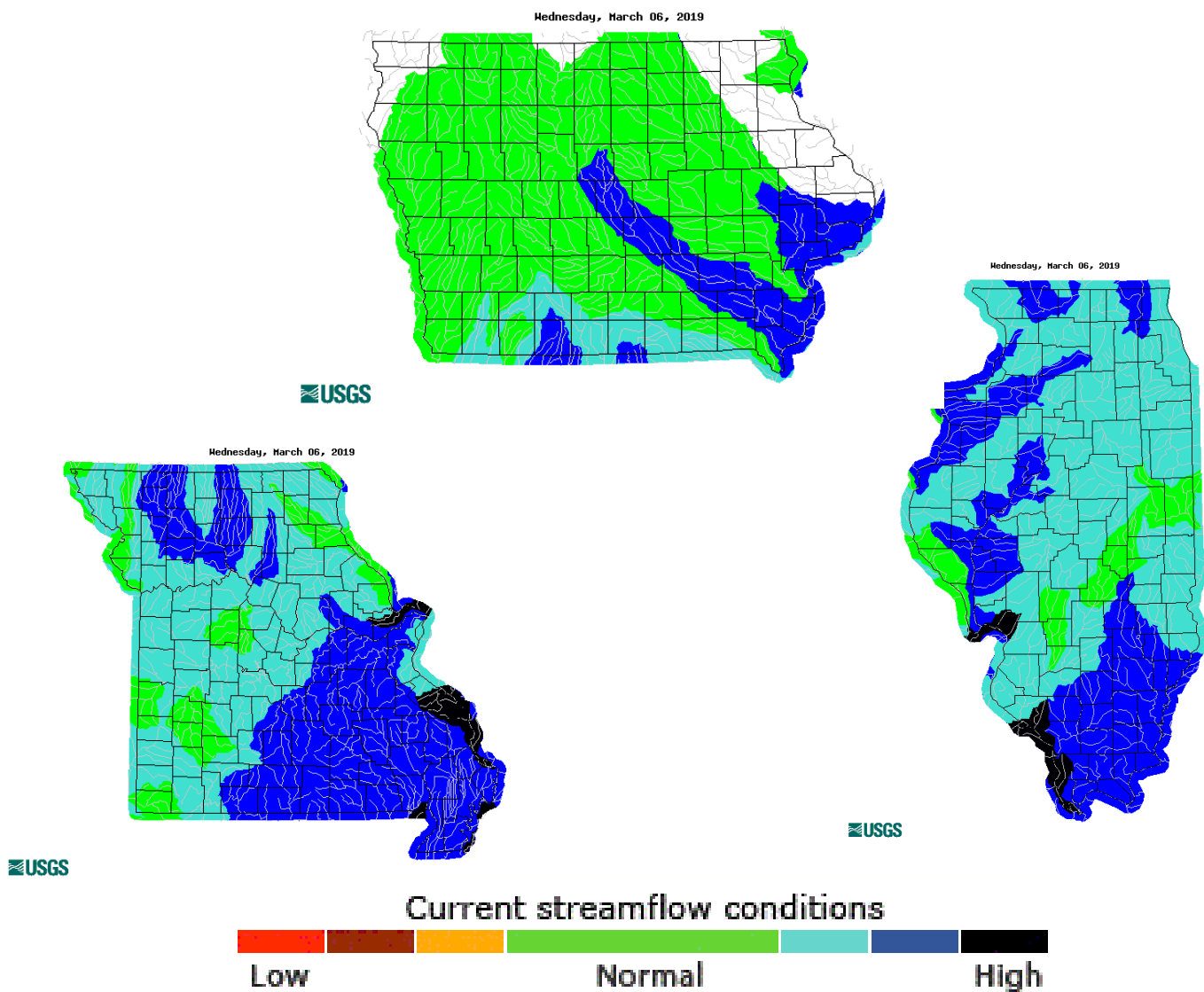




Streamflows

Background Conditions:

- Streamflows are above normal and have been running at high levels since fall of 2018. Current flows have been decreasing, but rain this weekend will likely cause rises in the next week.



Contribution to flood potential:

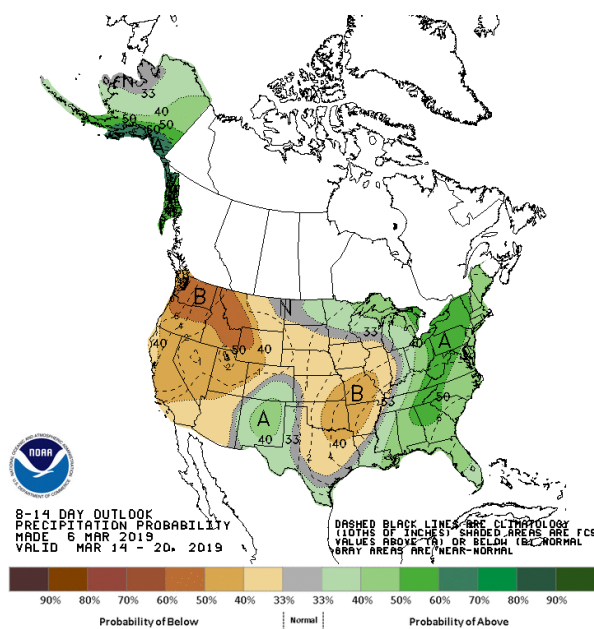
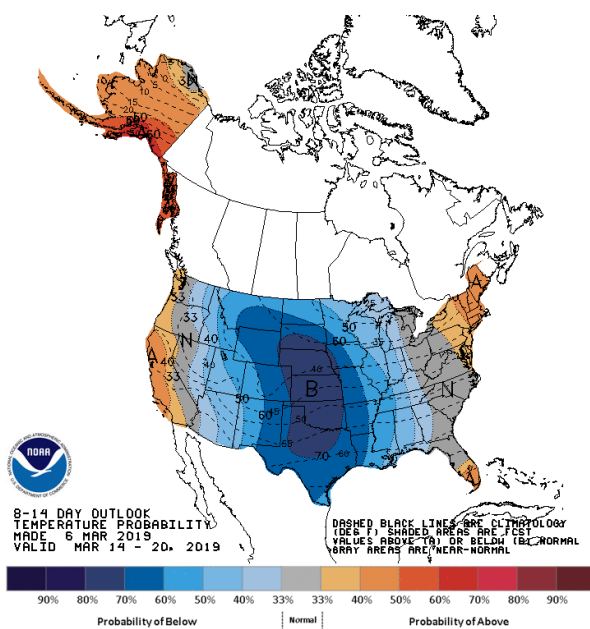
- Higher river levels will result in less capacity in the rivers for additional runoff from snowmelt water and spring rains.



Weather Outlooks

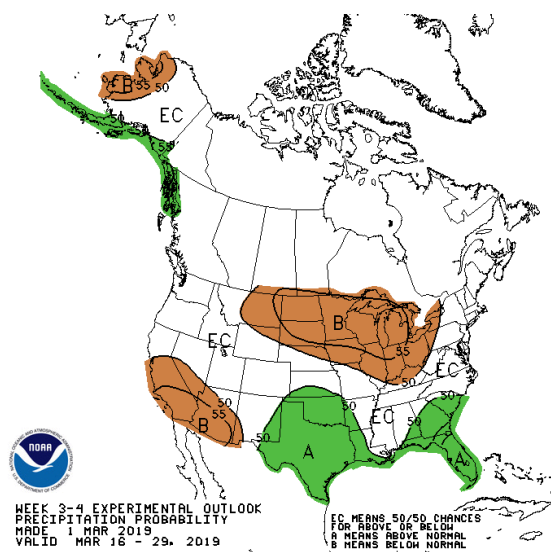
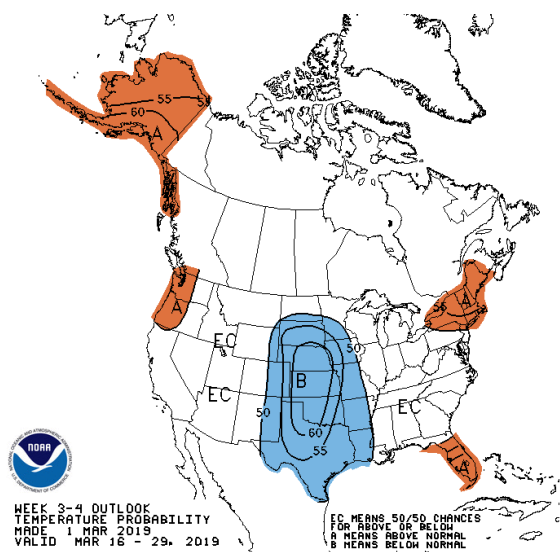
8-14 Day Temperature and Precipitation Outlooks (2/28-3/5):

- Below normal Temperatures & Precipitation favored



Week 3-4 Outlooks (2nd half of March):

- Colder pattern for the Upper Mississippi River basin.
- Wet weather favored in south and east parts of the country

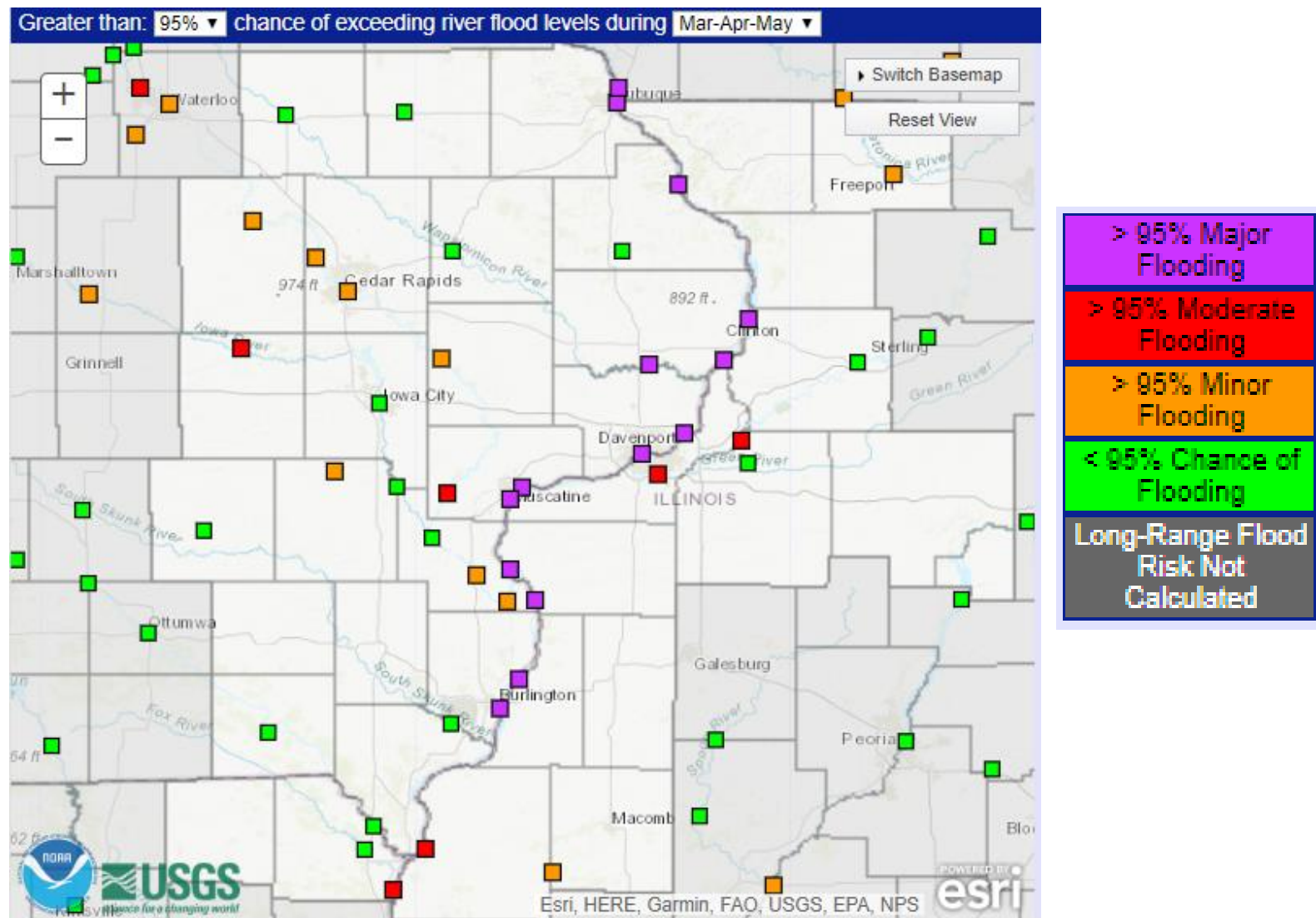




Forecasts & Outlooks: High Probabilities

Locations with high chances for flooding:

- Greater than 95% chance to reach the labeled flood stage



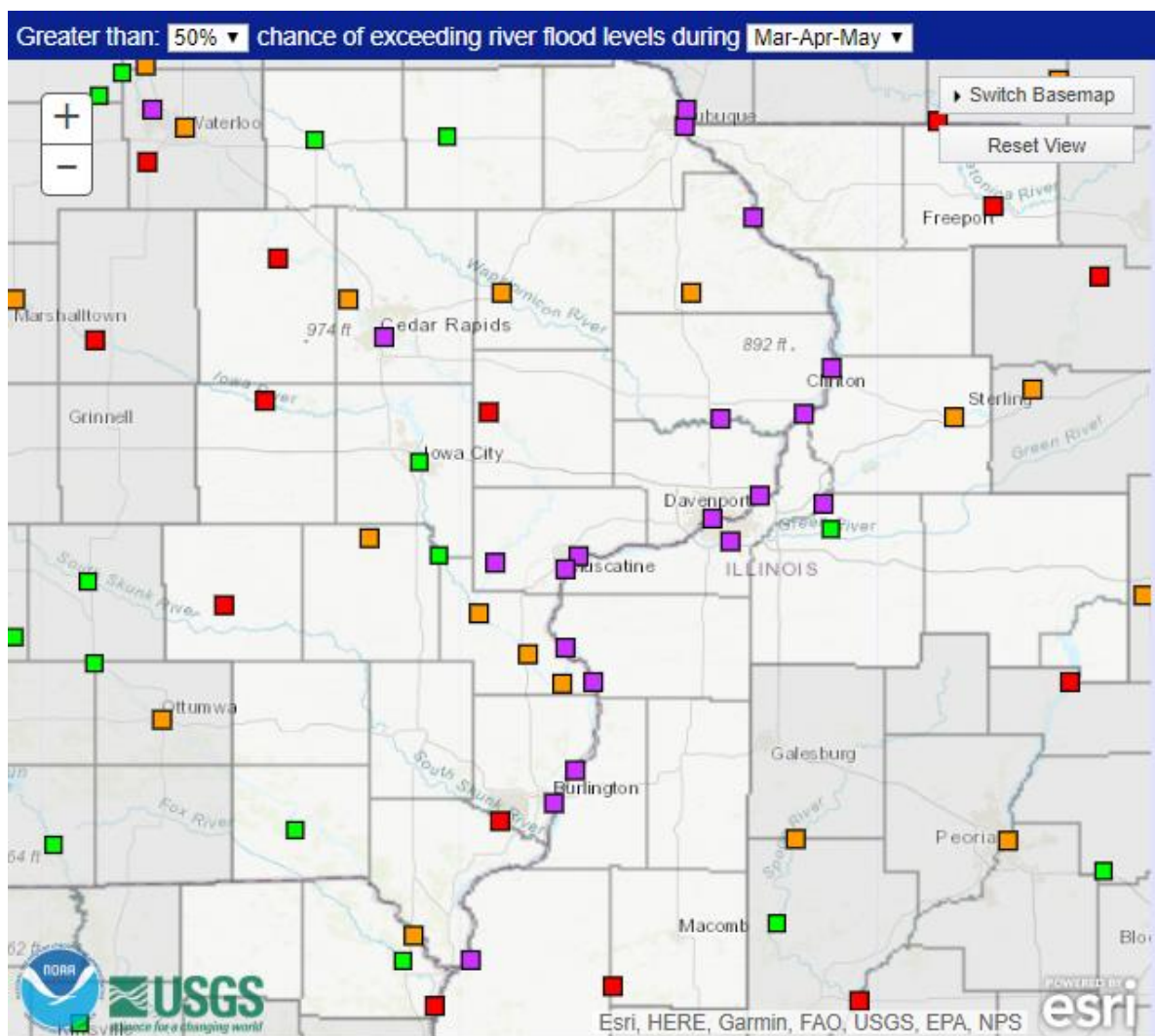
- Locations along the Mississippi River are now likely to see major flood stage.
- Most tributary rivers have a high likelihood to at least reach minor flood stage, with moderate flood stage likely in a few locations.



Forecasts & Outlooks: 50% Chance

Locations with chances for flooding:

- Around a 50% chance to reach the labeled flood stage



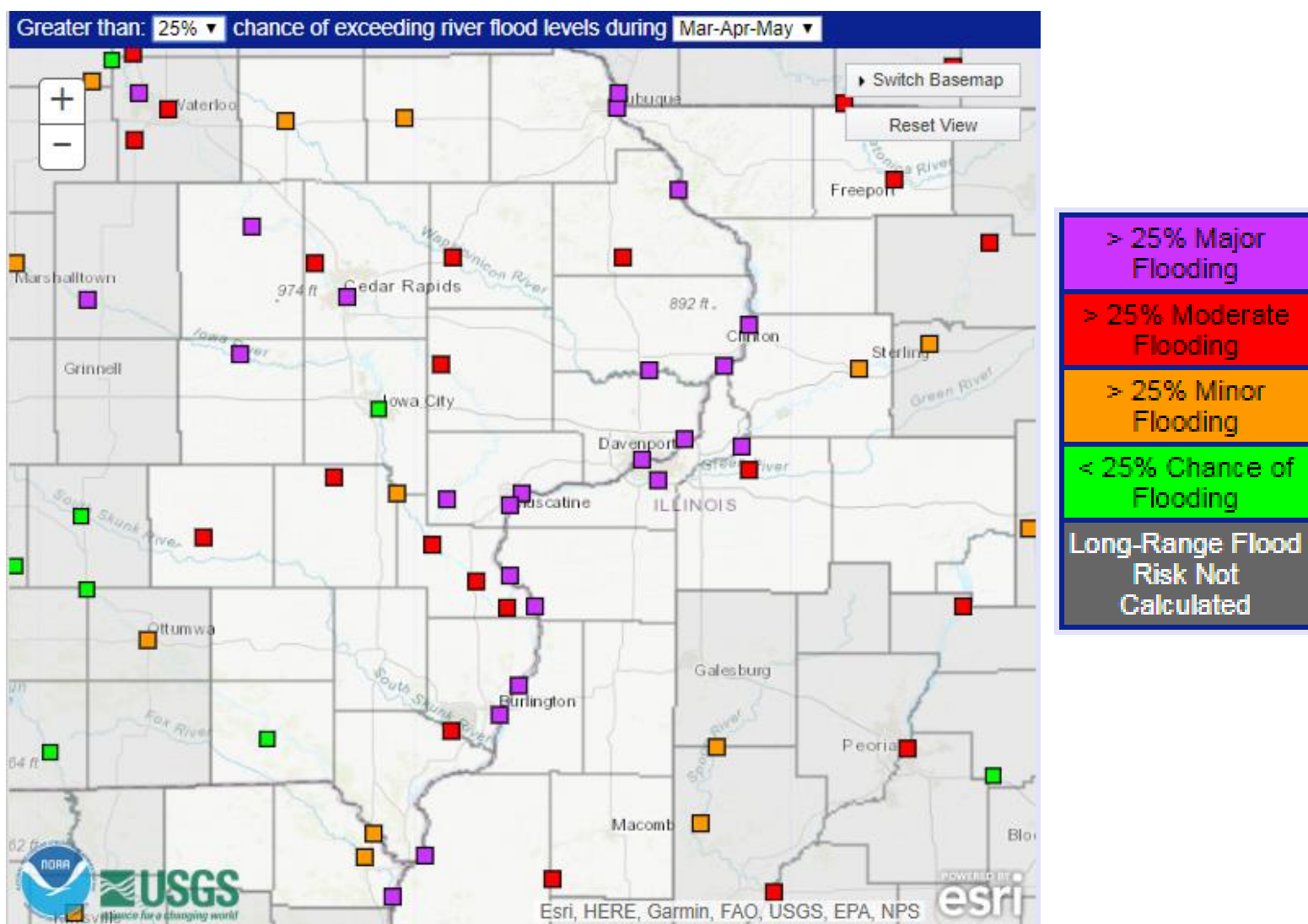
- Most rivers in the local area have a 50% chance for flooding
- The lower parts of the Wapsipinicon, Rock, and parts of the Cedar Rivers have potential to reach major flood stage.
- The Mississippi River has a 50% chance to reach near record levels given a rapid snowmelt along with additional heavy spring rains.



Forecasts and Outlooks: Lower Probabilities

Locations with chances for flooding:

- Around a 25% chance to reach the labeled flood stage



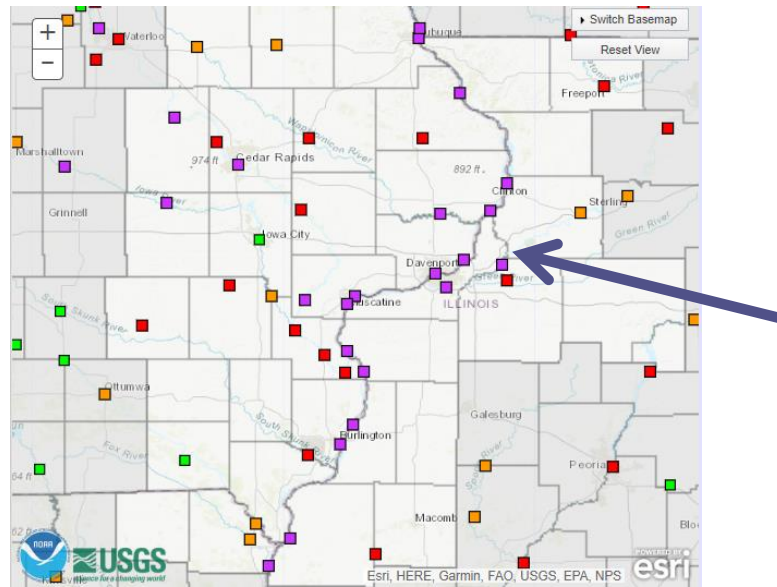
- This graphic shows that the majority of the rivers in the local area have at least a small (25%) chance of reaching flood stage, with many showing at least a low probability of rising to moderate or major flood levels.



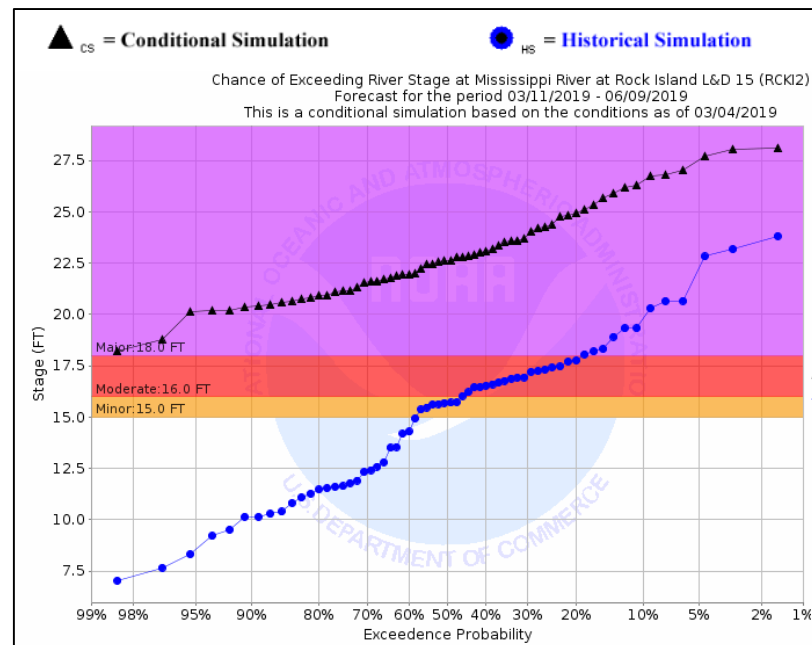
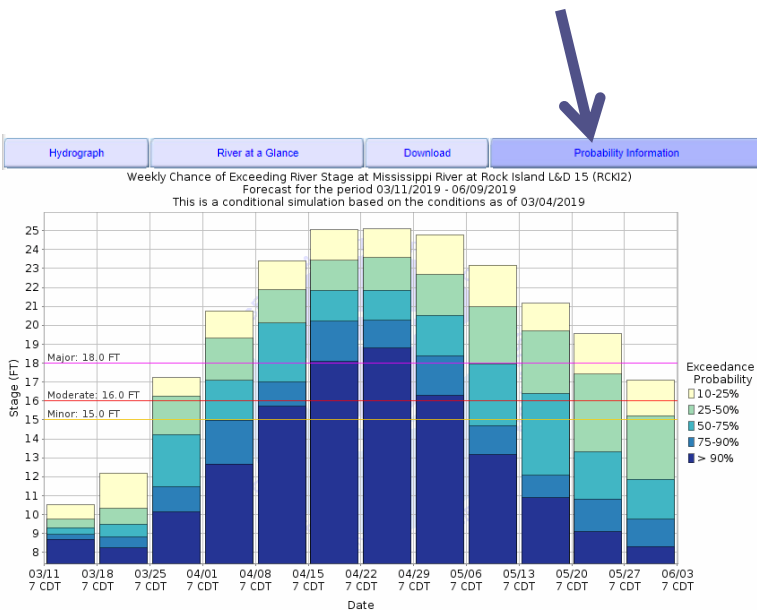
Probabilistic Outlook Information

Where to find the information:

- https://water.weather.gov/ahps2/long_range.php?wfo=dvn
- To see the graphs, choose a location from the map.



- Choosing the Probability Information Tab will get you to the graphical analysis of the probabilities.





Information Sources

Where to find information as active flooding is impending:

Quad Cities WFO Forecast Discussions

(technical weather and hydrology discussion)

forecast.weather.gov/product.php?site=DVN&issuedby=DVN&product=AFD

- NWS Quad Cities Flood Outlook Webpage – www.weather.gov/dvn/2019_springfloodoutlook
- Advanced Hydrological Prediction Service (AHPS) – water.weather.gov/ahps
- North Central River Forecast Center – www.weather.gov/ncrfc
- Probabilistic Information - https://water.weather.gov/ahps2/long_range.php?wfo=dvn
- Midwest Regional Climate Center (MRCC) – <http://mrcc.isws.illinois.edu/>
- US Geological Survey (USGS) WaterWatch page – <http://waterwatch.usgs.gov>
- National Operational Hydrologic Remote Sensing Center (NOHRSC) – www.nohrsc.noaa.gov
- NOAA Climate Prediction Center – www.cpc.ncep.noaa.gov
- NOAA Weather Prediction Center – www.wpc.ncep.noaa.gov



Bottom Line:

- High confidence on widespread river rises to near or above flood stage on all area rivers. Low confidence on peak severity.
- Potential exists for high impact flooding.
- Even a gradual snowmelt with little additional rainfall this spring assures at least minor flooding for many area rivers.
- The rate of snowmelt along with additional rains will be essential to the degree of flooding this season.
- Ongoing conditions across the region have led to the area being vulnerable to heavy rain this spring.
- Many rivers are ice covered. As long as ice exists there will be chances for ice jams if heavy rains cause significant rises on rivers to break up the ice and cause jamming downstream.

Flood Quick Facts and Preparedness:

Quick facts you should know about flooding:

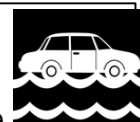
- Flooding can be caused by heavy rain, rapid snow melt, coastal storms, storm surge, waterway overflow, ice jamming, levee overtopping, dam failure, or from wastewater systems.
- Flooding has occurred in every U.S. state and territory.
- It only takes 6 inches of fast-moving water to knock you off your feet.
- A car can be moved in as little as 2 feet of water.
- 90% of all U.S. natural disasters declared by the President involve flooding.

Preparedness:

Know your risk: Are you in a flood-prone area? Know your zone: www.fema.gov/flood-zones

- You must purchase separate flood insurance for your home. There is a 30 day wait period between when you buy a flood insurance policy and when it goes into effect. Plan ahead!
- A **Flood Watch** is issued when conditions are favorable for flooding. *Time to prepare!*
- A **Flood Warning** is issued when flooding is imminent or occurring. *Time to act!*

Never drive into flood waters! Turn around, don't drown!



Find out more information at: www.weather.gov/dvn/2019_springfloodoutlook

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