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NWS Decision Support In Preparation For Spring 2019 Mississippi Watershed Flood





Analyzing Spring Flood Potential

1. High Fall Soil Moisture
2. Deep Hard Ground Frost
3. Heavy Winter Snow Cover
4. Widespread Heavy Rains During The Melt
5. Rapid Melt



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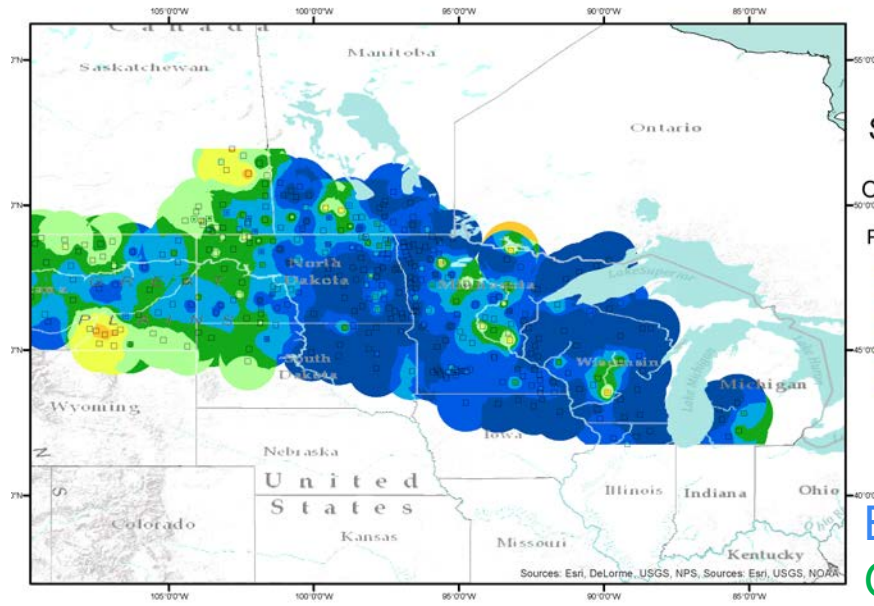


Battle Rhythm

- Fall soil moisture assessment
- Maintain situational awareness
- Mid-February 1st outlook
- Two weeks later 2nd outlook
- Two weeks later 3rd outlook if necessary
- Spring Outlook National Press Briefing



Fall Soil Moisture Assessment



Soil Moisture
(upper 20 cm)

Oct 7 - Nov 9, 2019

Fall 2019

Percent (%)

- 0 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 64

- Airborne Measurement
- △ Airborne Interpolation

Blue – Saturated +
Green – Nearing Saturation



Office Of Water Prediction
National Weather Service, NOAA
Chanhassen, MN

0 140 280 560 Nautical Miles



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Situational Awareness

- Ice jam formation/break-up condition
- Winds during major snowfalls
- Frozen ground potential





2019 Hydrologic Outlook

Mississippi Basin



For audio, please dial: 1-██████████ Passcode: ██████████

Late Winter and Early Spring Outlook for the Mississippi Basin including Red River of the North, Souris River and Great Lakes Drainages

- Lead Presenter
- Presenters

Jim Noel – OHRFC
Corey Loveland – NCRFC
Kevin Low – MBRFC
James Paul – ABRFC
Jeff Graschel - LMRFC



February 22, 2019



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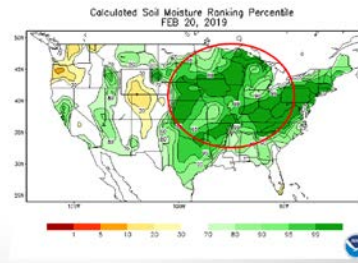


Soil Moisture



- Much of the basin is in the 90th percentile or higher.

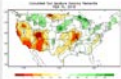
February 20, 2019



- Much wetter than last year.

- One of the most widespread wet soil conditions in many years

Winter 2017/18



https://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml#f



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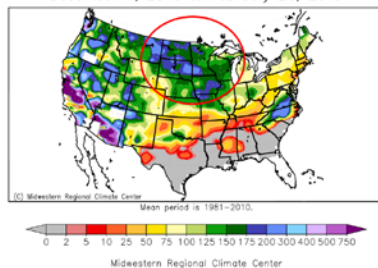


Winter Snowfall



Departure from Normal Snowfall Since Dec. 1, 2018

Accumulated Snowfall: Percent of Mean
December 1, 2018 to February 20, 2019



- Snowfall has been above normal in much of the northern areas, up to twice normal.

- Snowfall has been below normal in much of the southern areas where above normal temperatures have occurred.

<http://mrcc.isws.illinois.edu/>



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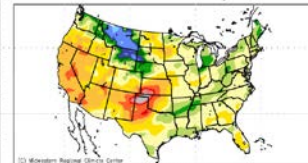


Winter Precipitation

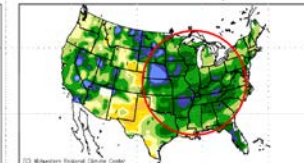


Departure from Normal Precipitation Since Dec. 1, 2018 and 2019

Accumulated Precipitation: Percent of Mean
December 1, 2017 to February 21, 2018



Accumulated Precipitation: Percent of Mean
December 1, 2018 to February 20, 2019



Most of the system is wetter than normal up to 200% of normal, except some of the western sections of the region. Overall, wetter than last year.



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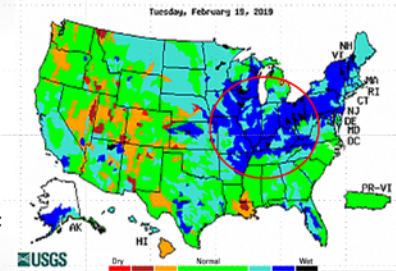


USGS Streamflow Conditions



February 19, 2019

- Soil moisture conditions reflected in USGS 28-day stream flows
- Above normal in much of the region except western sections and far south.
- Ice remains in place in northern areas and ice jam action is at or above normal due to cold weather in upper Midwest and northern Plains
- Earlier ice jams in Ohio Valley are gone



<http://waterwatch.usgs.gov/>



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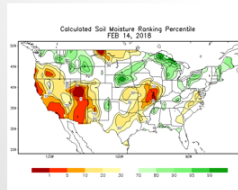


Soil Moisture



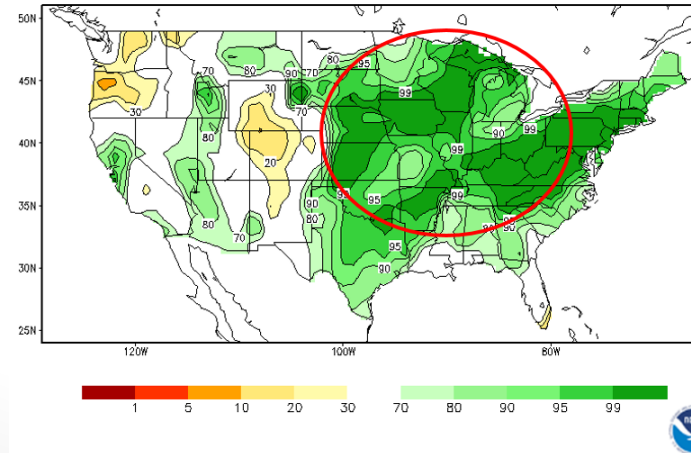
- Much of the basin is in the 90th percentile or higher.
- Much wetter than last year.
- One of the most widespread wet soil conditions in many years

**Winter
2017/18**



February 20, 2019

Calculated Soil Moisture Ranking Percentile
FEB 20, 2019



https://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml#



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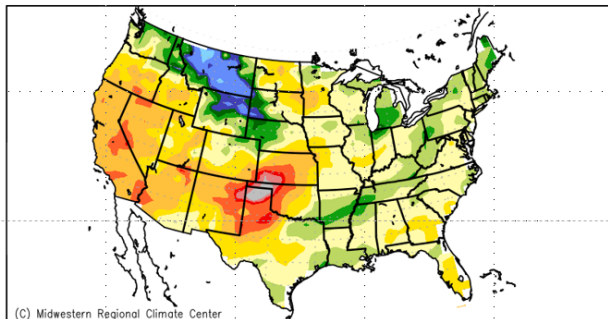


Winter Precipitation



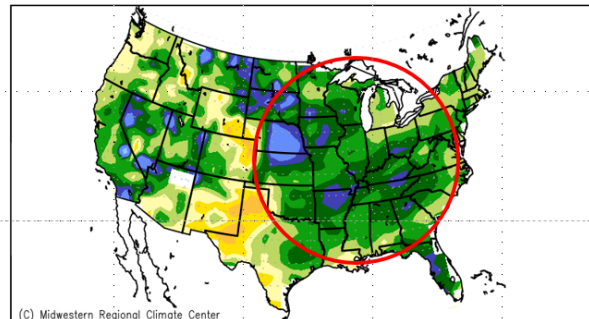
Departure from Normal Precipitation Since Dec. 1, 2018 and 2019

Accumulated Precipitation: Percent of Mean
December 1, 2017 to February 21, 2018



(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
0 2 5 10 25 50 75 100 125 150 175 200 300 400
Midwestern Regional Climate Center

Accumulated Precipitation: Percent of Mean
December 1, 2018 to February 20, 2019



(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
10 25 50 75 100 125 150 175 200 300 400
Midwestern Regional Climate Center



<http://mrcc.isws.illinois.edu/>

Most of the system is wetter than normal up to 200% of normal, except some of the western sections of the region. Overall, wetter than last year.

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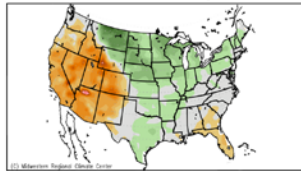
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Winter Temperatures

Departure from Normal Temperatures Since Dec. 1, 2018 and 2019

Average Temperature (°F): Departure from Mean
December 1, 2017 to February 21, 2018

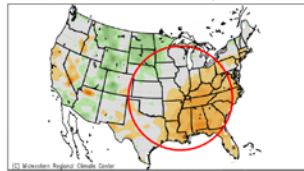


Mean period is 1981-2010.



Midwestern Regional Climate Center

Average Temperature (°F): Departure from Mean
December 1, 2018 to February 19, 2019



Mean period is 1981-2010.



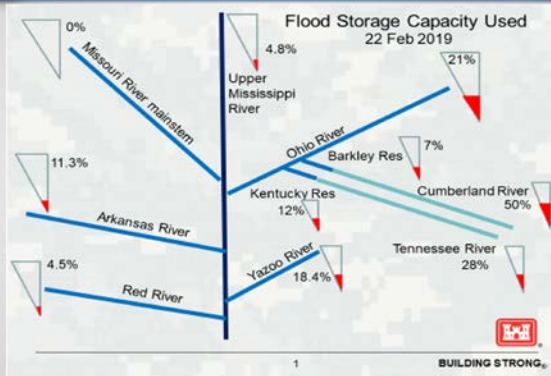
Midwestern Regional Climate Center

<http://mrcc.isas.illinois.edu>

- Temperatures colder than normal upper basin and warmer south and east basin. Temperature profile supporting active storm track.

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USACE Flood Storage Used



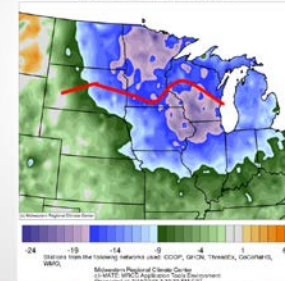
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North Central RFC Basin Flood Outlook

January 22nd to January 31st

17 to 21 **below** normal over MN, southern WI, eastern IA and northern IL

Average Temperature (°F): Departure from 1981-2010 Normals
January 22, 2019 to January 31, 2019



Below Red Line is where snow depth was shallow before hard freeze hit—therefore allowing deeper frost depths

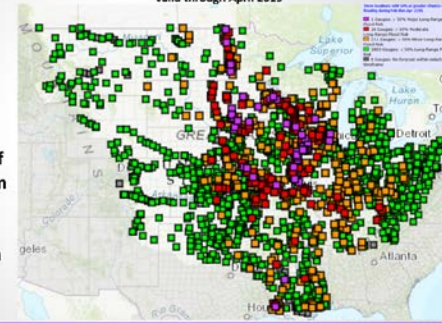
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Flood Outlook Through April 2019

50% or Greater Chance of Flooding

Valid through April 2019

- Minor to moderate flooding expected across much of the area
- Areas of major flooding expected especially upper half of Mississippi system
- More widespread than last year and in several years



http://water.weather.gov/ahps/region_long_range.php?rfc=mrvc&percent=50

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North Central RFC Basin Flood Outlook

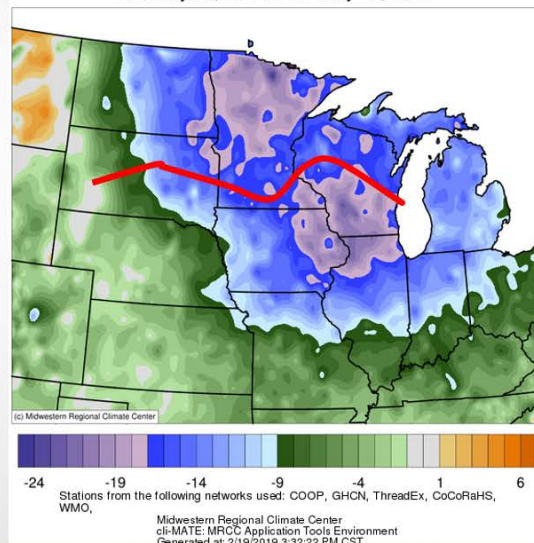
Frigid Temperatures!



January 22nd to January 31st

17 to 21° below normal over MN, southern WI, eastern IA and northern IL

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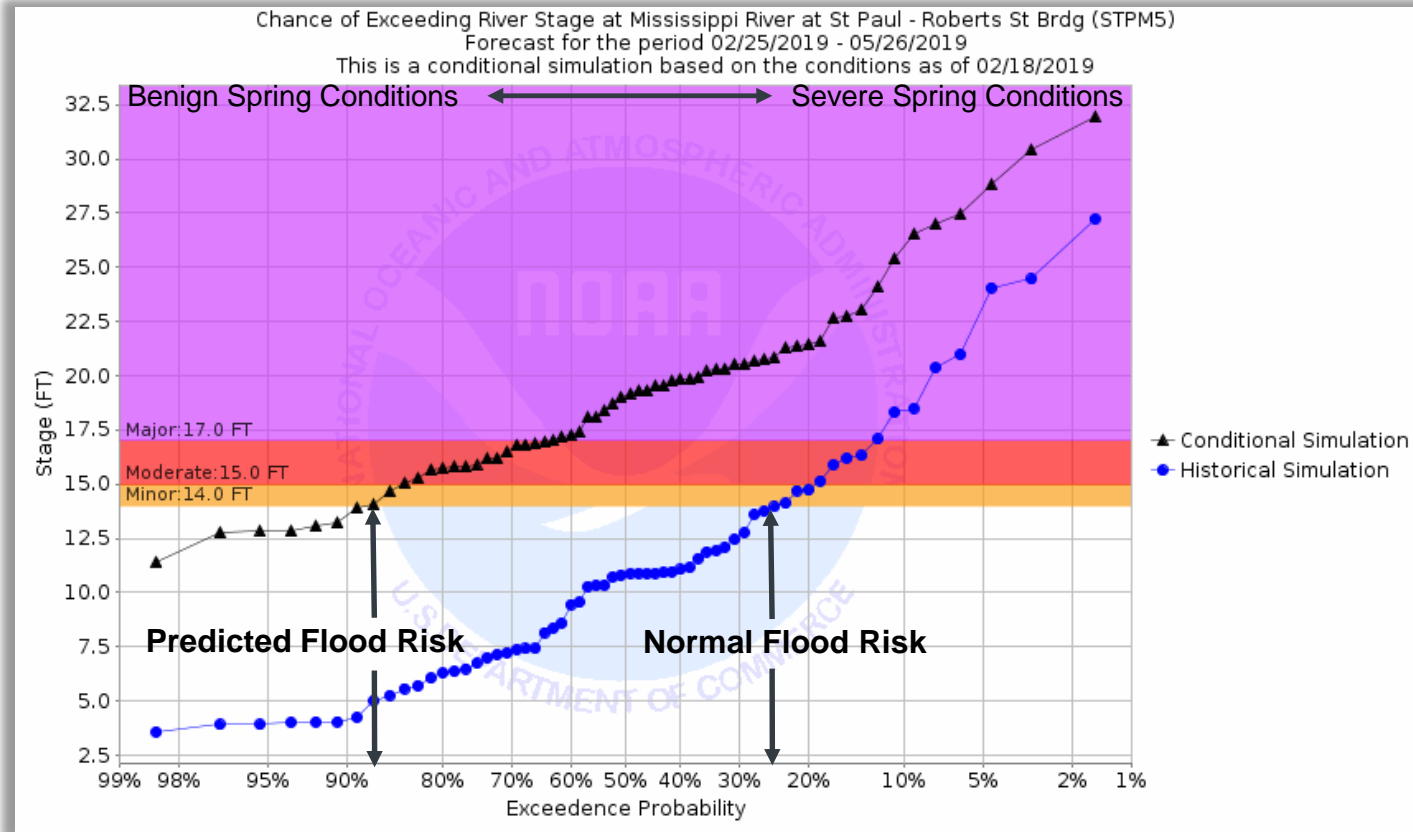
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Flood Outlook

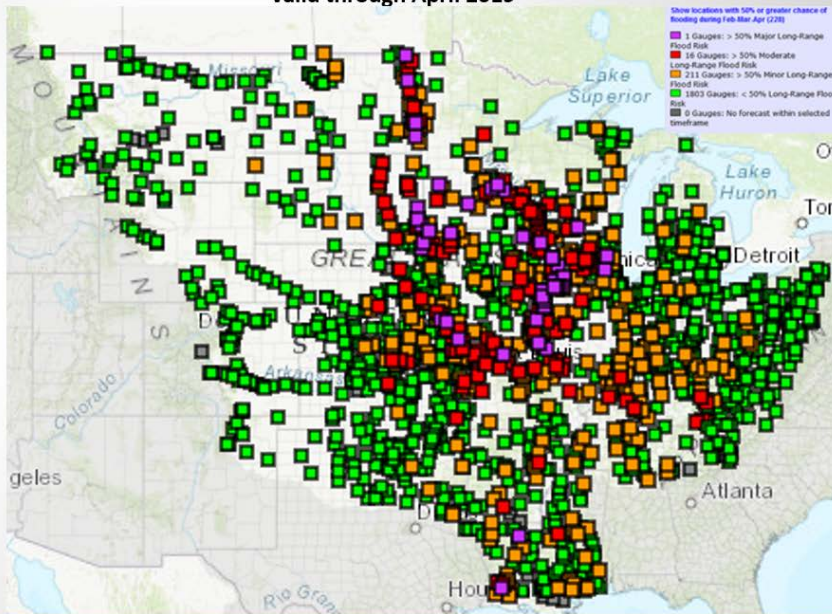
Through April 2019



50% or Greater Chance of Flooding

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- Minor to moderate flooding expected across much of the area
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http://water.weather.gov/ahps/region_long_range.php?rfc=mvrfc&percent=50 15



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Flood Outlook Summary

Through April 2019



Due to current wet conditions, the region is vulnerable to future storm systems.

- **Above Normal Flood Risk** – Upper, middle and lower Mississippi basins (including main-stem Mississippi River), eastern Missouri basin, most of Ohio basin, Cumberland basin and Tennessee basin. In addition, Red River of the North basin and Great Lakes
- **Normal Flood Risk** – Souris basin, Upper Ohio basin, Arkansas/Red basins
- **Below Normal Flood Risk** – Western Missouri basin

- **PLEASE MONITOR FUTURE FORECASTS AND OUTLOOKS**
- NOAA/National Weather Service will continue to monitor the flood risk.

Next Briefing/Webinar will be March 7, 2019 at 230 CST

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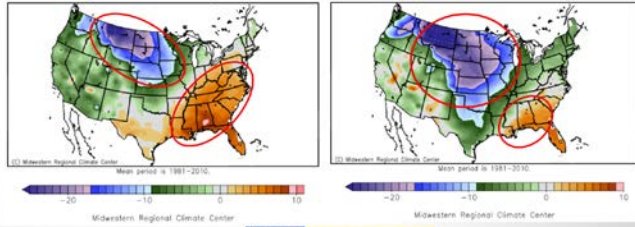
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Late Winter/Early Spring Temperatures

Departure from Normal Temperatures for February and Since February 21st

Average Temperature (°F): Departure from Mean February 1, 2019 to February 28, 2019

Average Temperature (°F): Departure from Mean February 21, 2019 to March 6, 2019

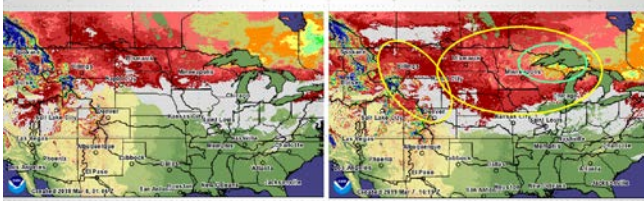


- Colder than normal temperatures in the upper basin and warmer than normal in the south and east part of the basin.

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Early Spring Snow Water Content Comparison

March 7, 2018 March 7, 2019



- More snow water content in ND, SD, MN, WI, IA and northern MI. In the west, eastern MT and Rockies as well.
- The Great Lakes area has significantly more water content, especially in the Upper Peninsula.

<http://www.noahrc.noaa.gov/interactive/html/map.html>

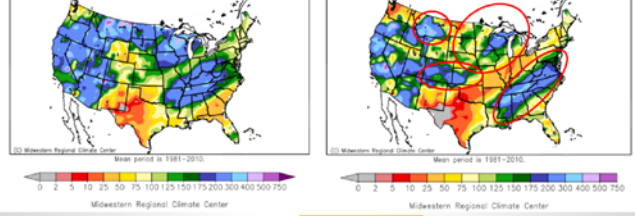
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Late Winter/Early Spring Precipitation

Departure from Normal Precipitation for February and Since February 21st

Accumulated Precipitation: Percent of Mean February 1, 2019 to February 28, 2019

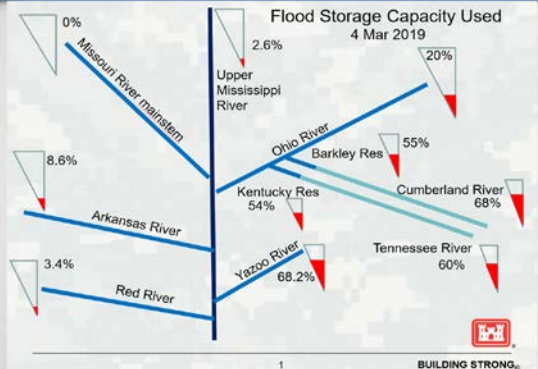
Accumulated Precipitation: Percent of Mean February 21, 2019 to March 7, 2019



- With continued storms, most of the area continues to be wetter than normal; greater than 200% of normal. The West is beginning to catch up from last weekend's storm track.

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USACE Flood Storage Used



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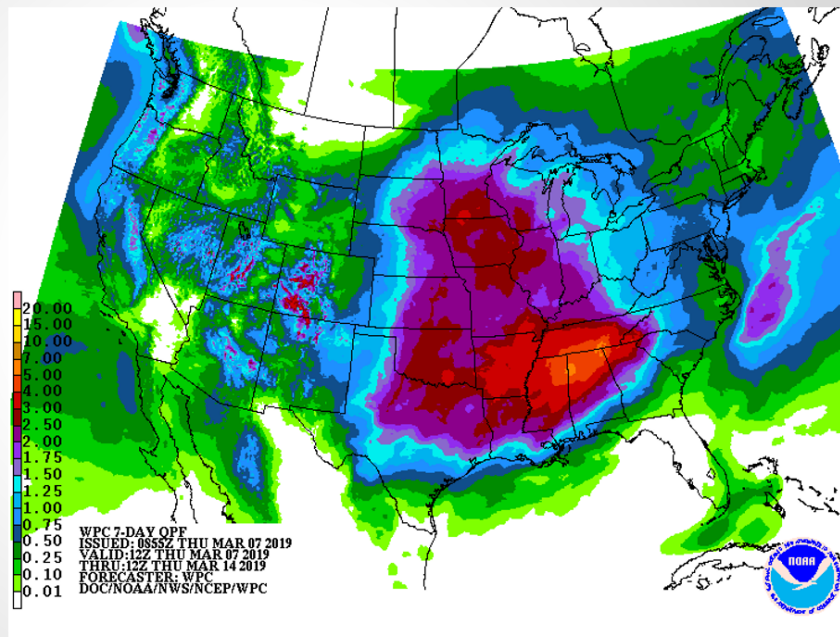
Week 1 Precipitation Forecast



Through Thur, March 14, 2019

Widespread heavy precipitation coming this weekend and through next week across central U.S. and Rockies with heavy rain in lower Mississippi Valley

(Wet/Heavy snow up north and Large amounts of rain in the south)



<http://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml>

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Flood Outlook

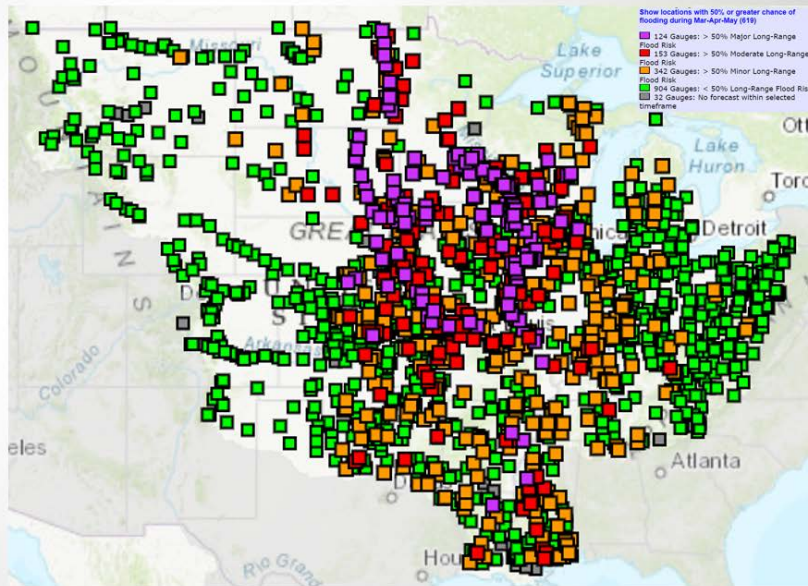
Through mid-June 2019



50% or Greater Chance of Flooding

Valid through mid-June

- Moderate to Major flooding expected across much of the area
- Areas of Major flooding expected especially in upper half of Mississippi system, Lower Missouri
- Flooding chances higher and more widespread than last year and in several years



http://water.weather.gov/ahps/region_long_range.php?rfc=mvrfc&percent=50 12



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Flood Outlook Summary

Through mid-June 2019



****Due to current very wet and/or high water content conditions, the region is vulnerable to future storm systems and temperature rapid warm ups.**

- **Above to Much Above Normal Flood Risk** – Upper, Middle and Lower Mississippi basins (including main-stem Mississippi River), eastern Missouri basin, most of Ohio, Cumberland, and Tennessee basins. In addition, Red River of the North basin, Great Lakes, eastern part of Missouri Basin including tributaries, Neosho River in Kansas and Oklahoma and Arkansas and Louisiana area
- **Normal Flood Risk** – Souris, Upper Ohio, Arkansas/Red basins and Western Missouri basin
- **PLEASE MONITOR FUTURE FORECASTS AND OUTLOOKS**
- NOAA/National Weather Service will continue to monitor the flood risk.

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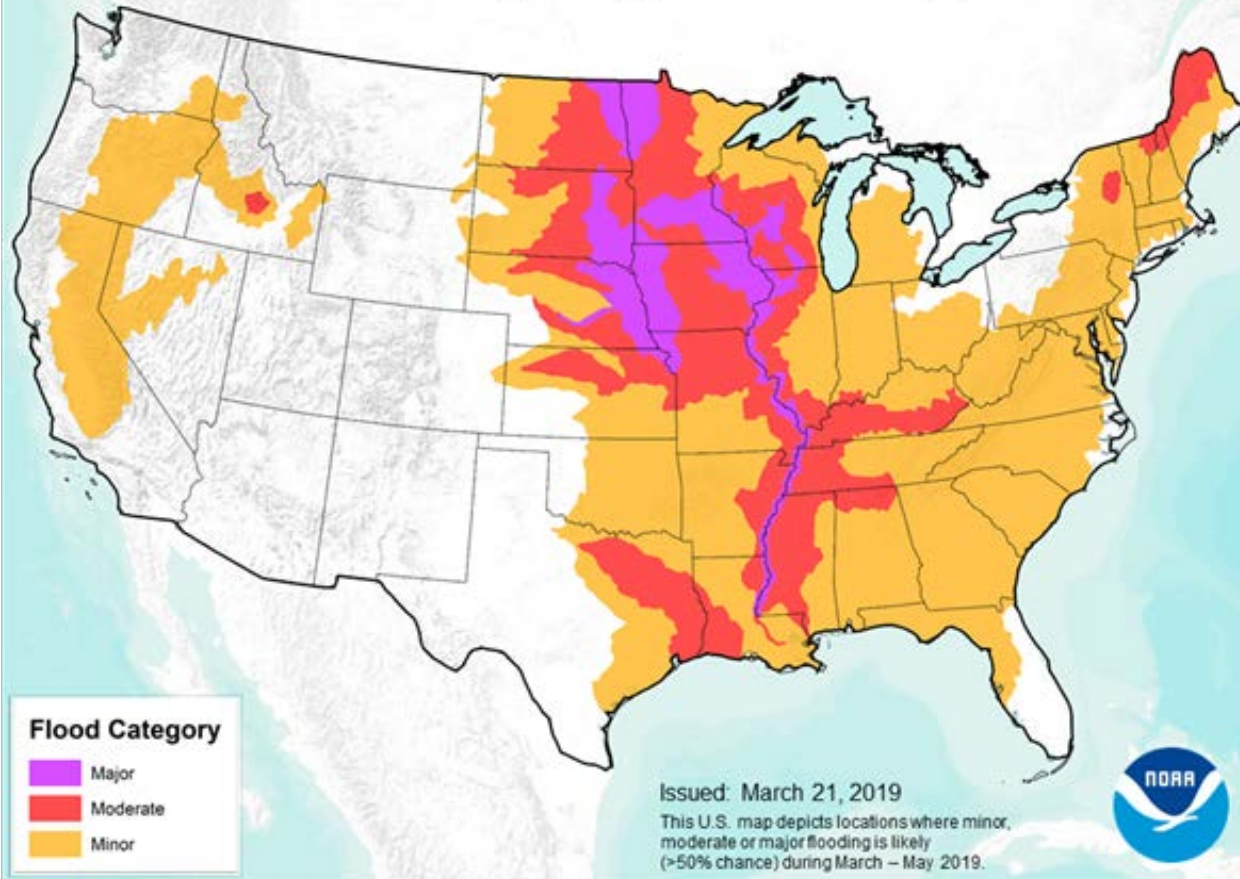


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2019 U.S. Spring Flood Outlook



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The Stage Is Set For What Comes Next...



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The Stage Is Set For What Comes Next...



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The Story Continues....



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