

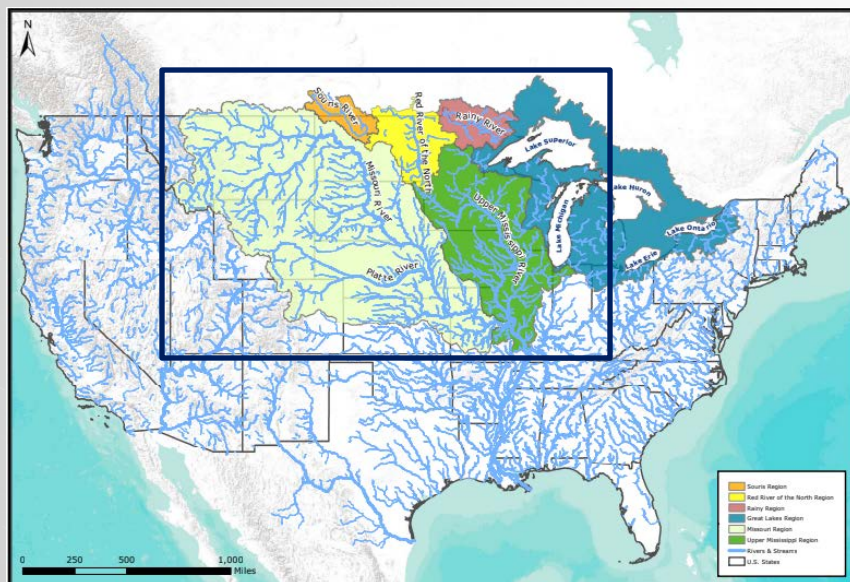


2019 April Hydrologic Outlook Central Region



For audio, please dial: 213-929-4212 Passcode: 531-134-889

**Spring Outlook for the Missouri basin, Upper Mississippi basin,
Red River of the North, Souris River, and Great Lakes Drainage**



Wendy Pearson, Deputy Chief for Hydrologic Services
Corey Loveland – North Central River Forecast Center
Kevin Low – Missouri Basin River Forecast Center
Doug Kluck – NOAA NCEI Regional Climate Services Director

April 4, 2019



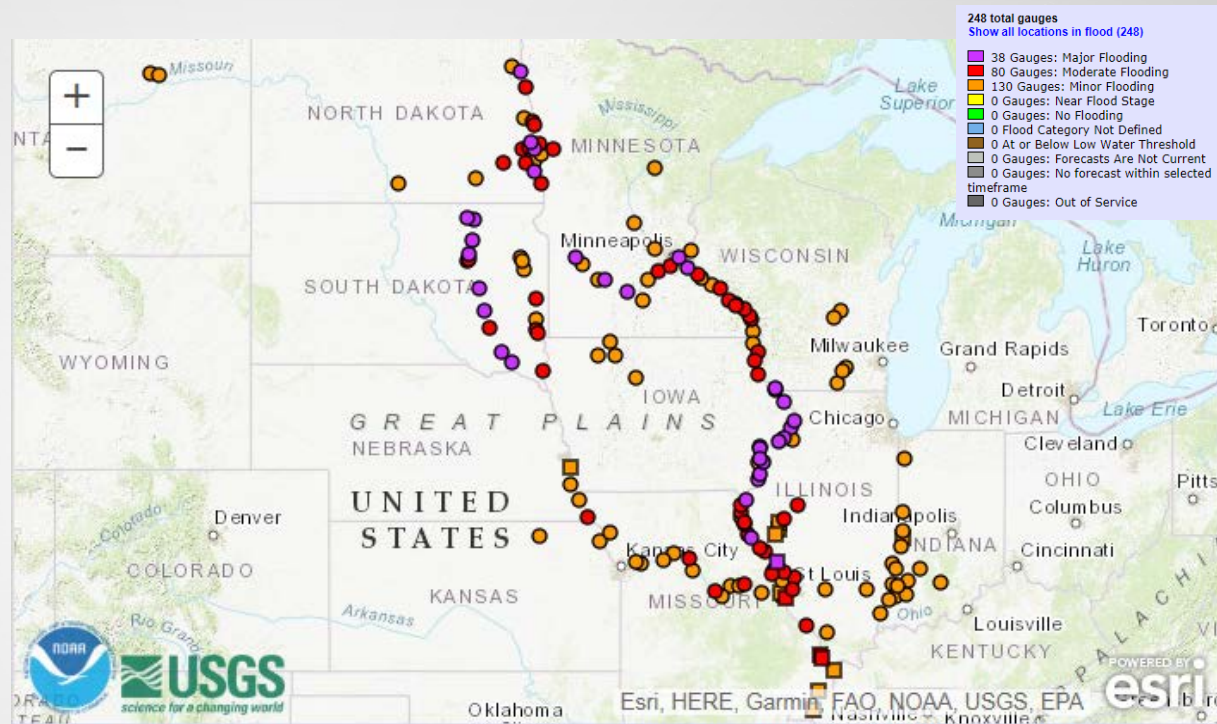


Our hearts go out to all of the families and businesses who are dealing with the aftermath of the devastating flooding that occurred in March 2019.



Current River Flood Forecast

- **Moderate to Major** flooding is ongoing in North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Missouri, and Illinois
- Due to very wet soil conditions and elevated rivers and lakes, the region is *vulnerable to flooding* this spring and early summer. Spring rainfall and thunderstorm events may cause additional flooding



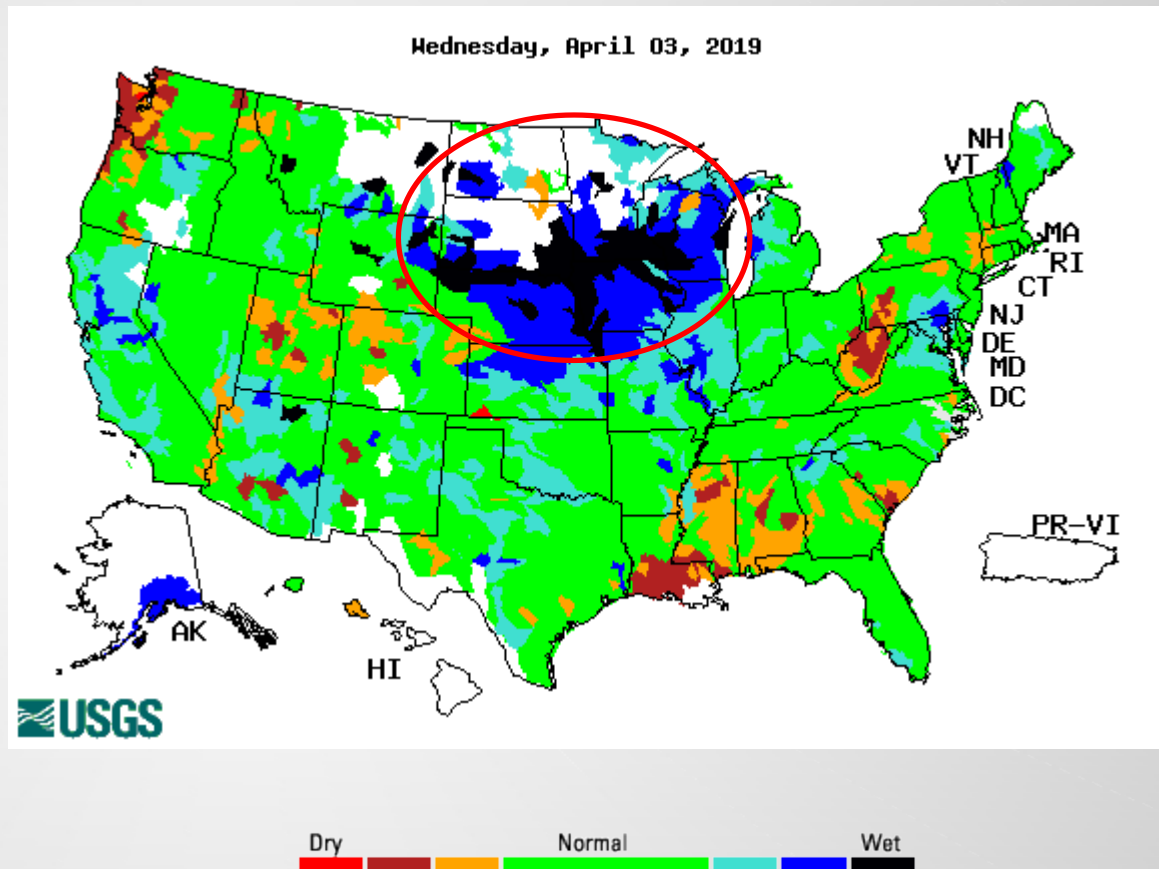


Early Spring USGS Streamflow Conditions



- USGS 28-day avg stream flows reflect the above normal soil moisture conditions in the lower Missouri and Middle Mississippi basins.
- Above normal flows in much of the region
- Ice remains in place in northern areas and ice jam action is at or above normal due to cold weather

April 3, 2019



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

4



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Ice Jam Threat Update: Normal to Above Normal



- **Colder than normal** temperatures persist in Red River of the North, & northern MN.
- Ice jams may continue for the next couple of weeks.



Ice caused flooding on Grand River nr Grand Haven, MI on Feb 28





Flood Outlook

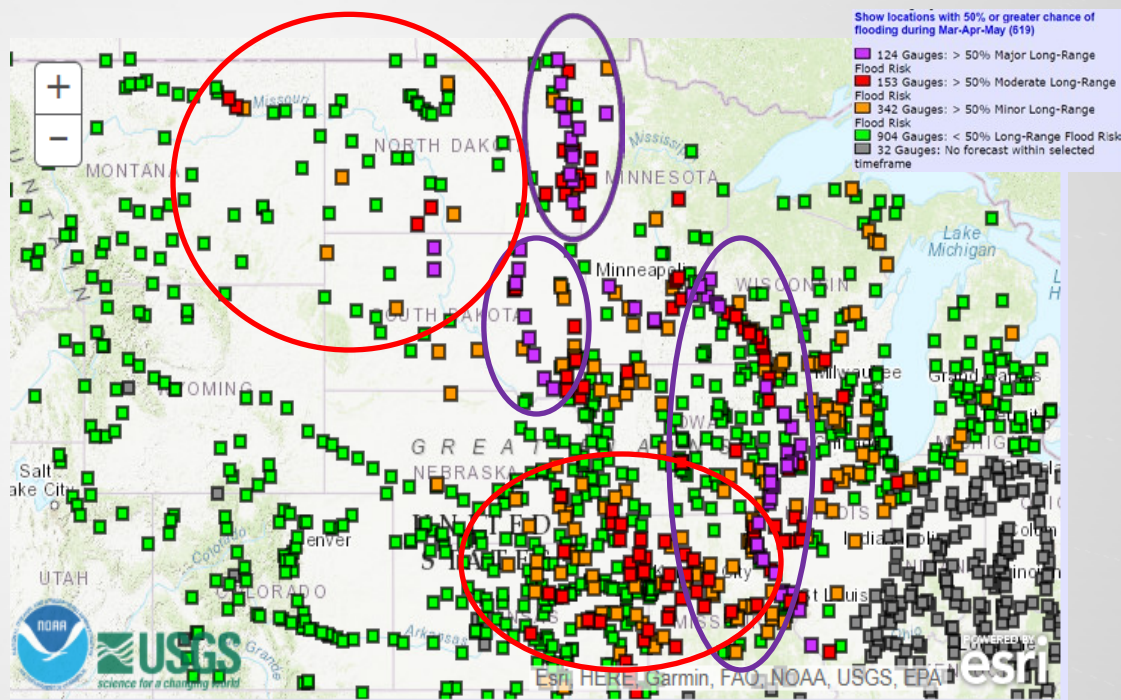
Through mid-June 2019



50% or Greater Chance of Flooding

Valid through mid-June

- Moderate to Major flooding still possible across eastern SD, the Red River Valley, southern MN, the middle Mississippi River and much of the Missouri River basin.
- Flooding chances remain higher and more widespread than last year and in several years



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

6



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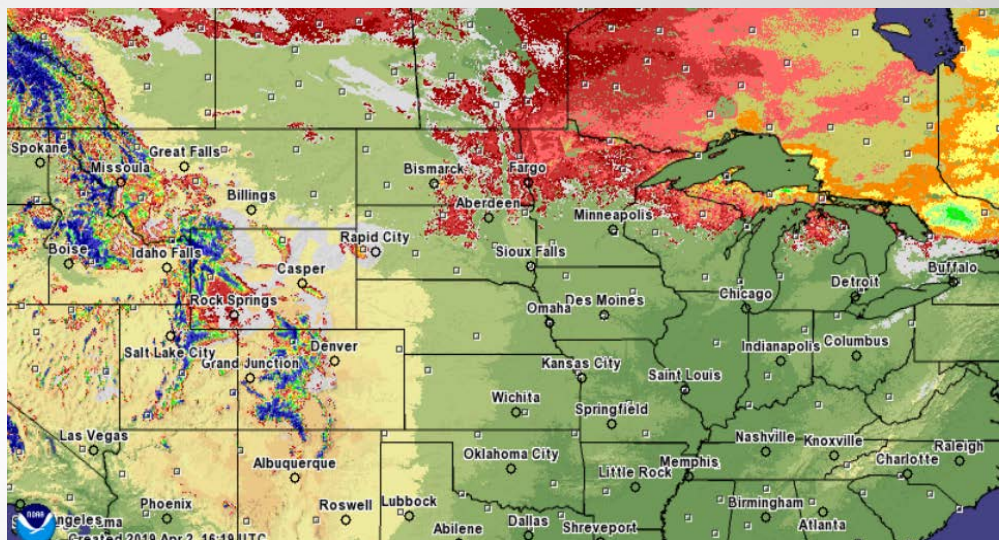
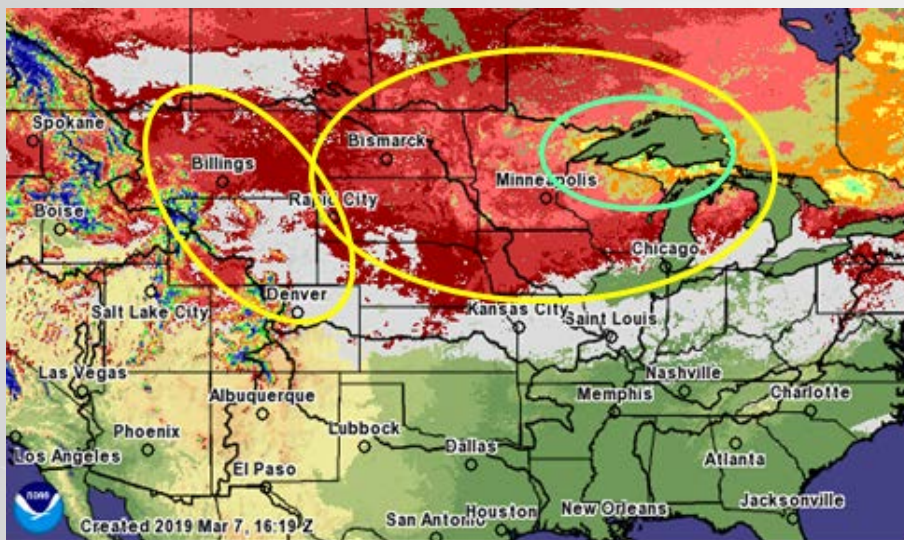


Snow Water Content Comparison



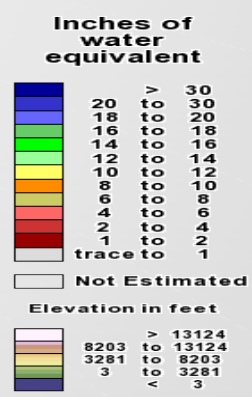
March 7, 2019

April 4, 2019



- Snow cover area has been lessened but snow water content levels remain in place in Red River of the North and across northern MN, northern WI, and Upper Michigan.

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



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North Central RFC Basin Flood Outlook

Frost Depths



Frost depths generally 18" - 60" due to shallow snow insulating ground cover before deep freeze in late January.

April 3, 2019

NCRFC_Frost_Depth

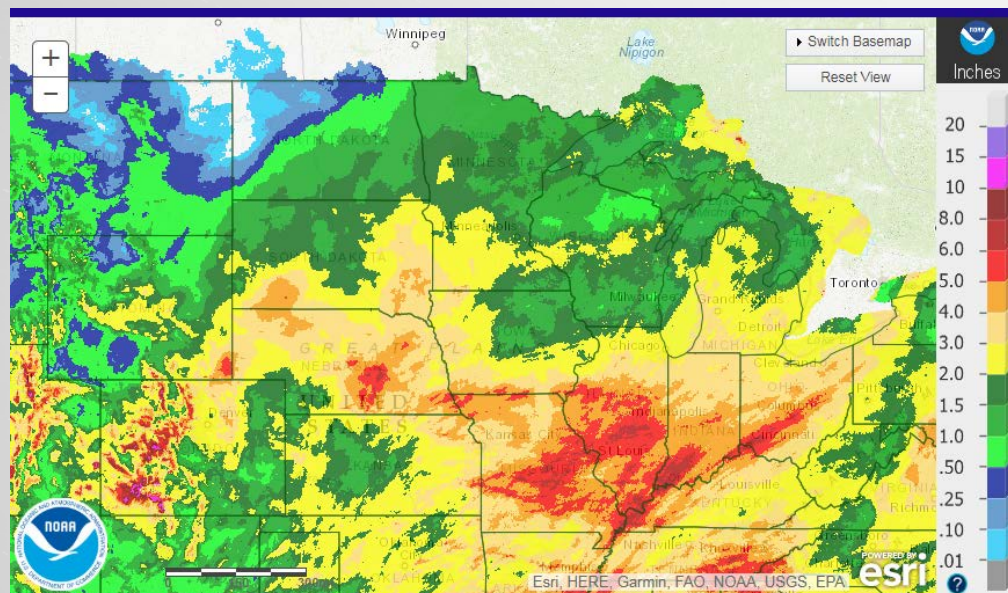
FrostDepth

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

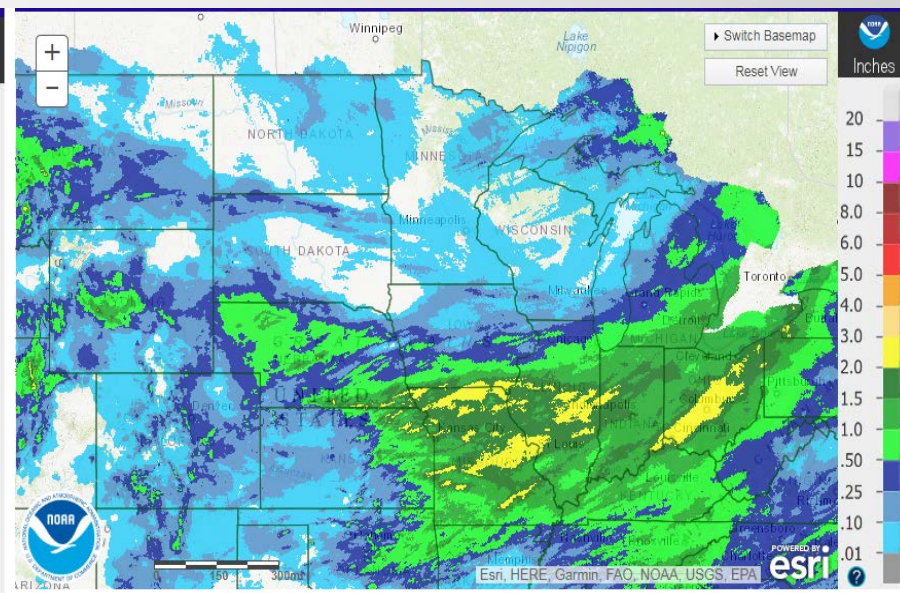


Past Precipitation

Past 30 days



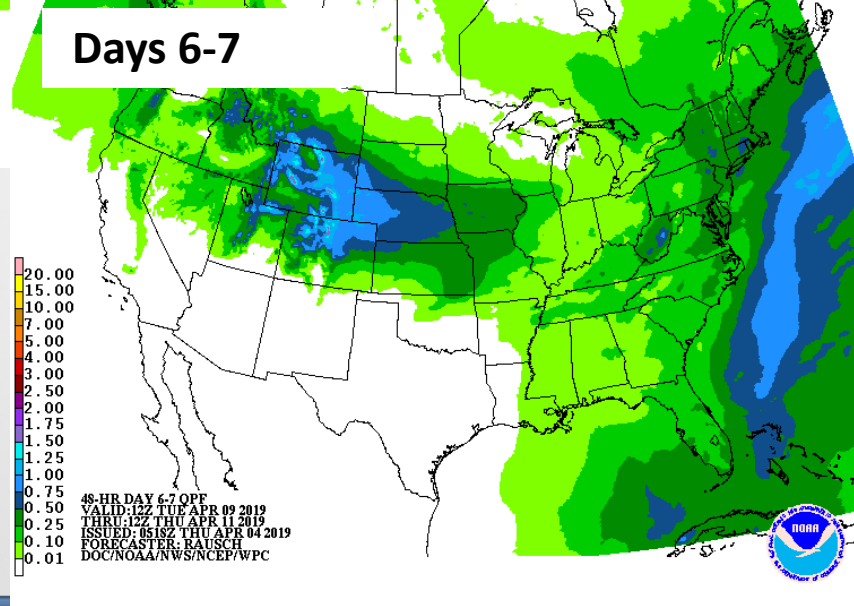
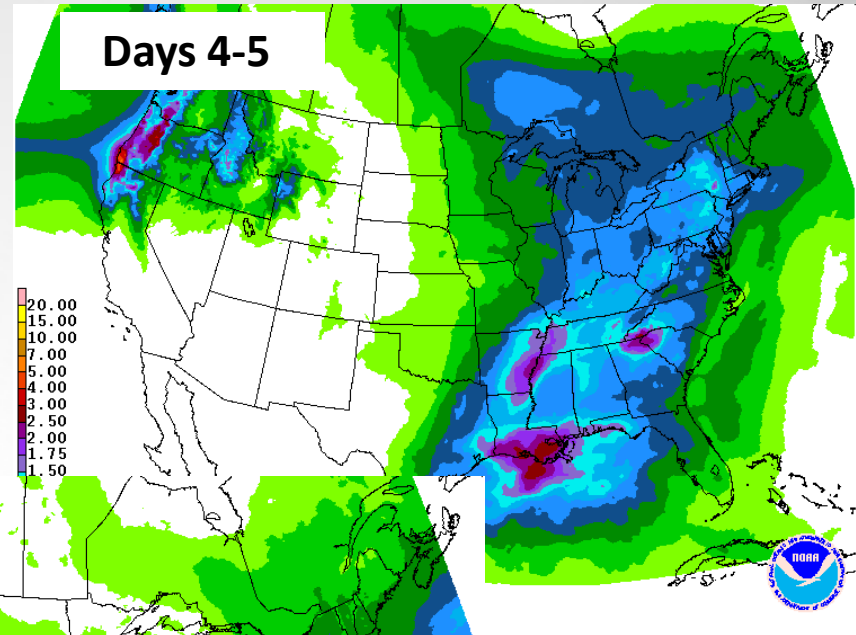
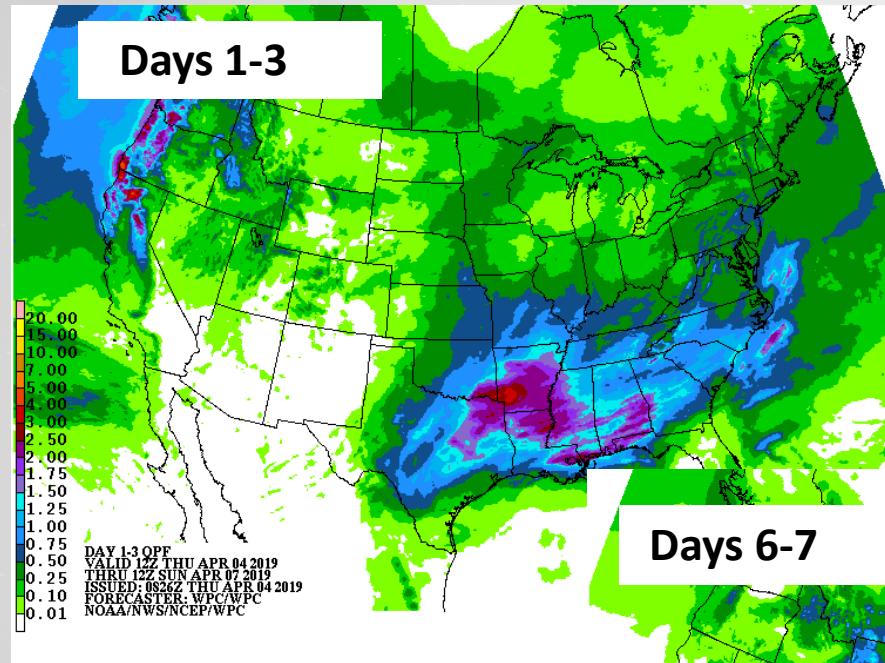
Past 7 days





Precipitation Forecasts for April 4-11

Days 1-3, Days 4-5, Days 6-7





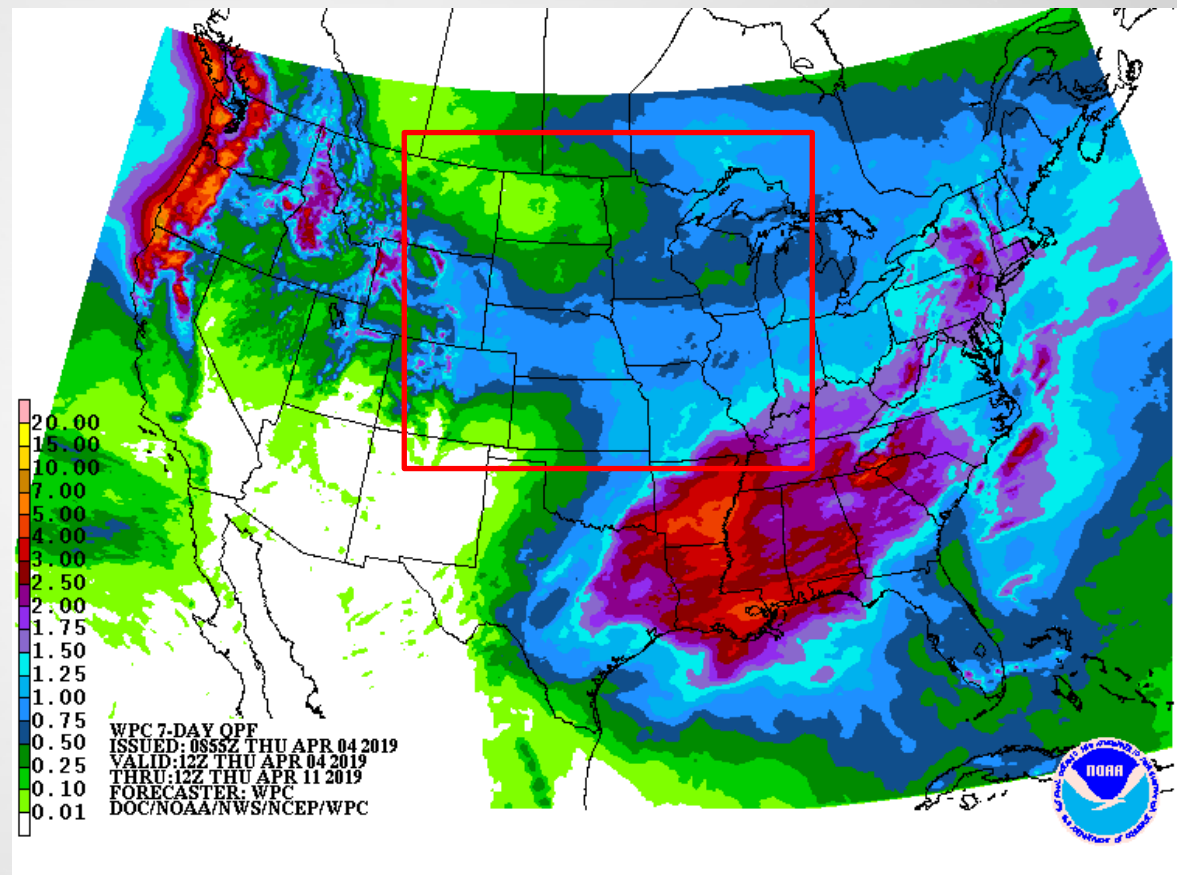
Week 1 Precipitation Forecast



April 4 Through April 11, 2019

A mix of rain and snow is expected the next 7 days across the upper plains, middle Mississippi River basin and the Great Lakes

Looking into Week 2 there is a chance for two more significant weather systems April 13-15 and April 17-19





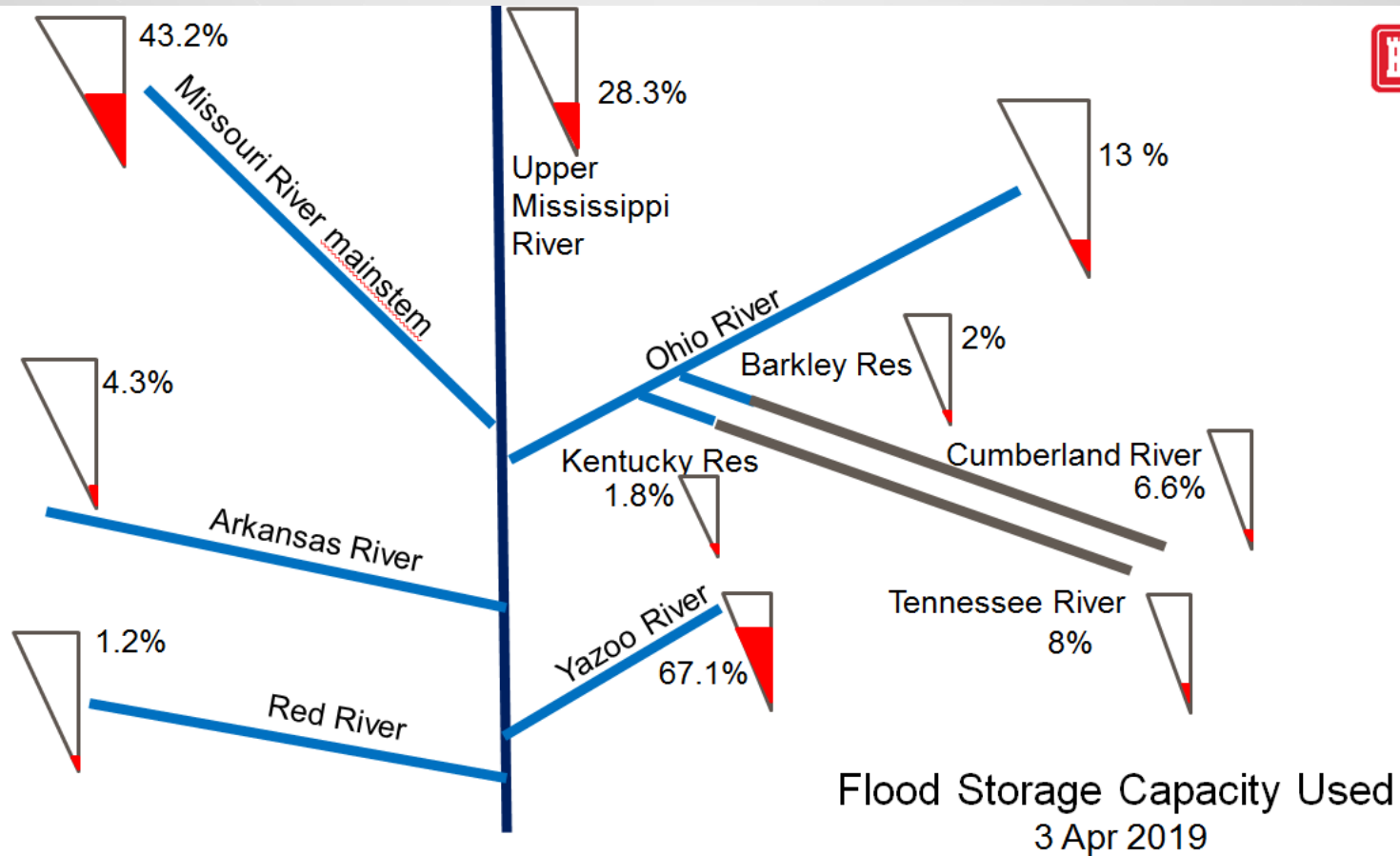
During this time of year, the Central U.S. typically gets weather systems that can produce a mix of snow and convective thunderstorms.

NOAA NWS River Forecast Centers in our region are using 24 hours of future rainfall in our river model forecasts due to the uncertainty of timing and amounts of precipitation.

Additional precipitation in the Week 1 and Week 2 timeframe means we will see the main-stem Missouri and Mississippi rivers rise and fall repeatedly throughout the month of April.



USACE Flood Storage Used

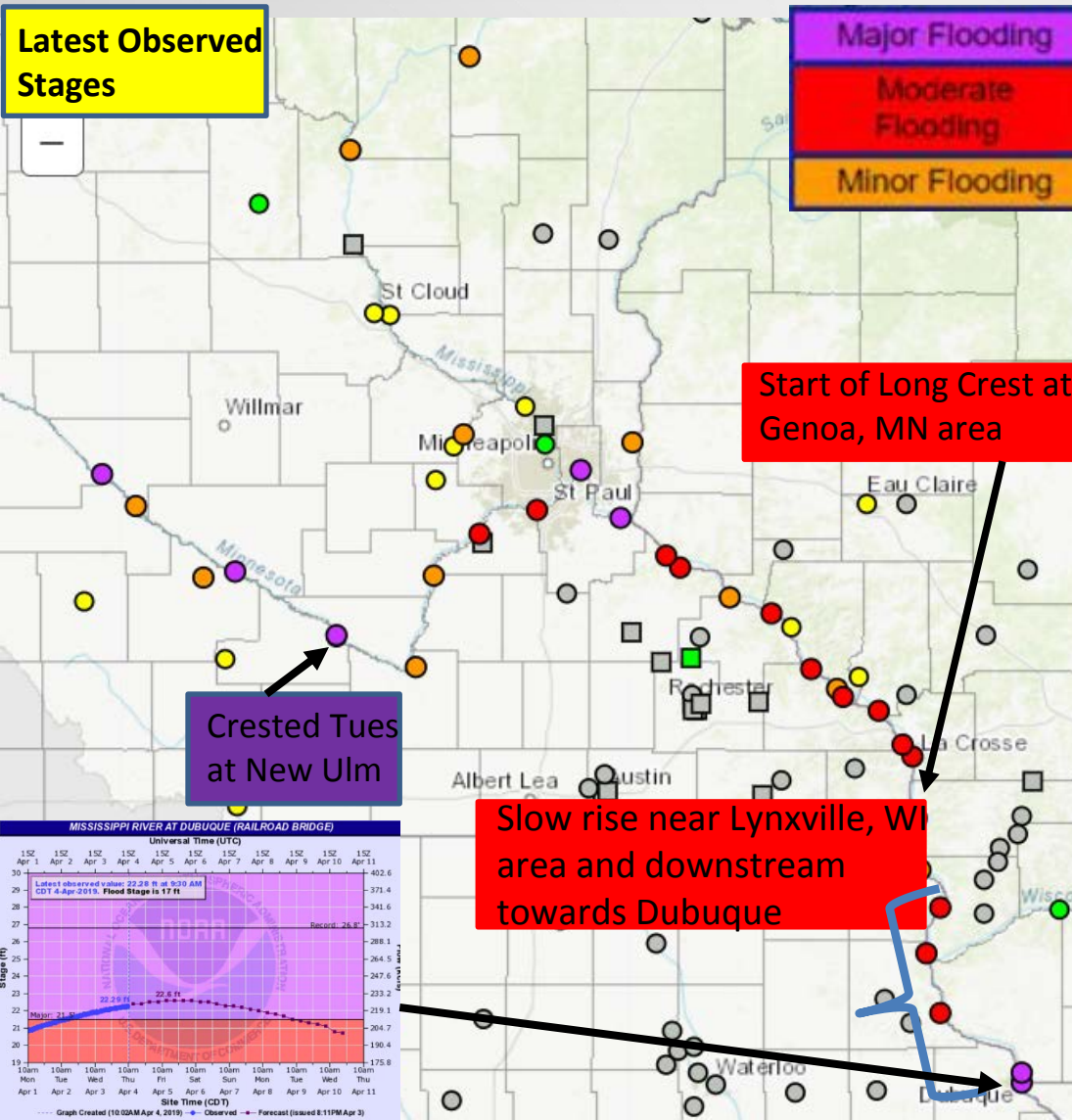




Current NCRFC Flood Status for Minnesota and Upper Mississippi Rivers



(Upper Mississippi River to Dubuque, IA)



Minnesota River:

- Crested; continue slow fall (Major, Moderate and Minor Flooding ongoing)

Upper Mississippi to Genoa area, MN (Major to Minor):

- Crested / Cresting and beginning slow fall-mostly moderate flooding

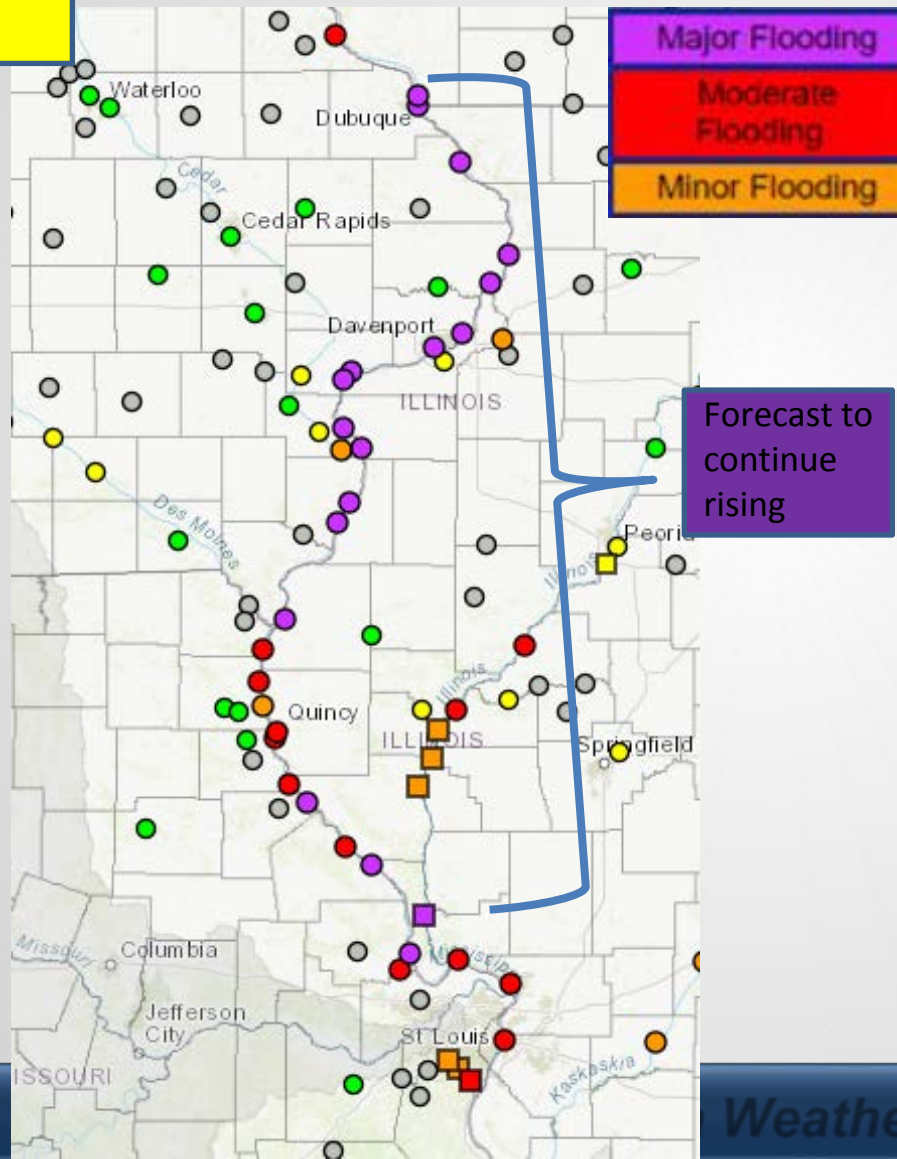
Lynxville, WI area to Dubuque, IA (Major to Moderate):

- Slow rise continues, peak at Dubuque Friday afternoon to Saturday morning in Major flood at about 23 feet at the Railroad bridge.



Current NCRFC Flood Status for Mid Mississippi River (Dubuque, IA to St Louis, MO)

Latest Observed Stages



Mid Mississippi (Major to Minor, but mostly forecasts to Major):

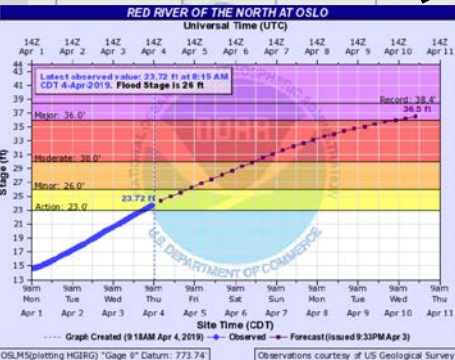
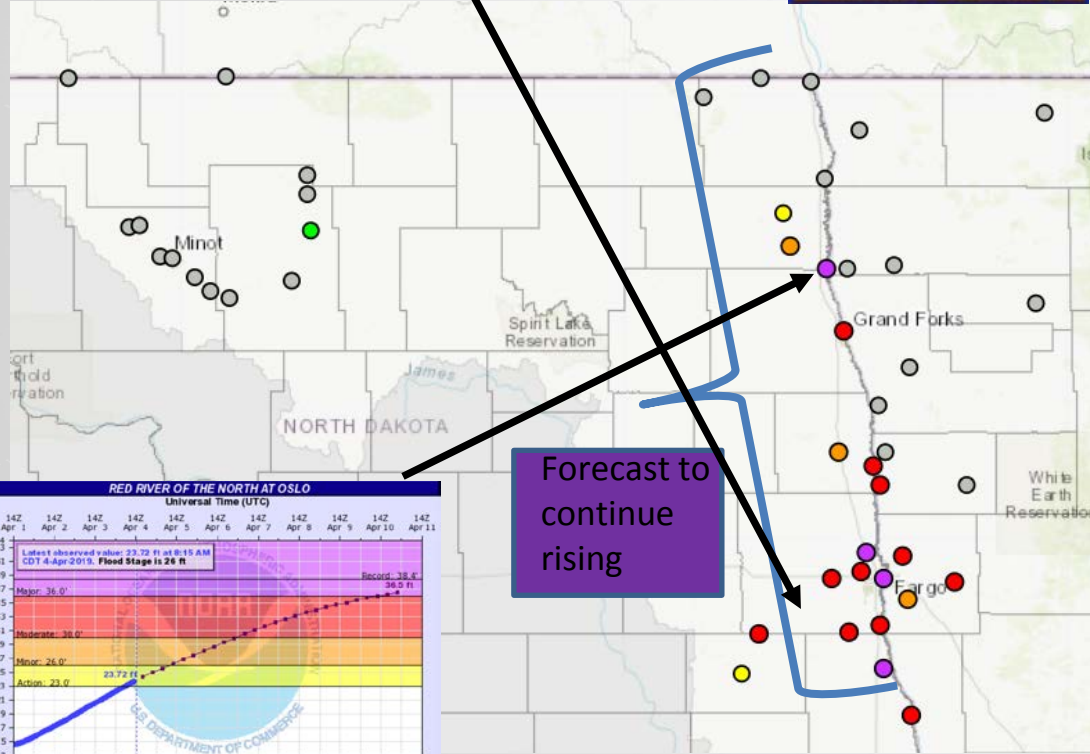
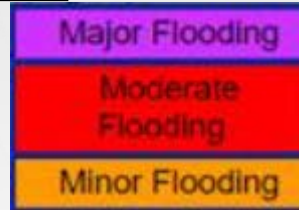
- Continuing slow rises mostly in or toward major flooding.
- With control at the lock and dams, the Mississippi River near St. Louis is forecast to continue to crest and slowly fall entering Minor flood (around 35 feet) around Saturday afternoon.
- Light forecast rain (0.5 – 1" widespread) within next 7 days (total), should not have a measurable impact.
- Longer term rises from additional heavy rainfall remains possible.



Current NCRFC Flood Status for the Red River of the North and Souris Rivers

*Ice jams near Enderlin and Mapleton, ND (Other areas as well)

Latest Observed Stages



Red River of the North (Major to Minor, but mostly forecasts to Moderate):

- Continuing slow rises toward moderate to major flooding
- A lot of snow is gone in headwaters area of the Red (upper ~third).
- With warm forecast temps this weekend/light rain, we should see increase in melt/flows-but uncertainty with rises continues, especially if we get in wet pattern.

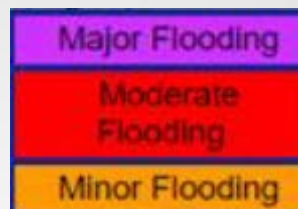
Souris:

- Continue slow rises and Near Towner, continue slow recession below Action Stage.

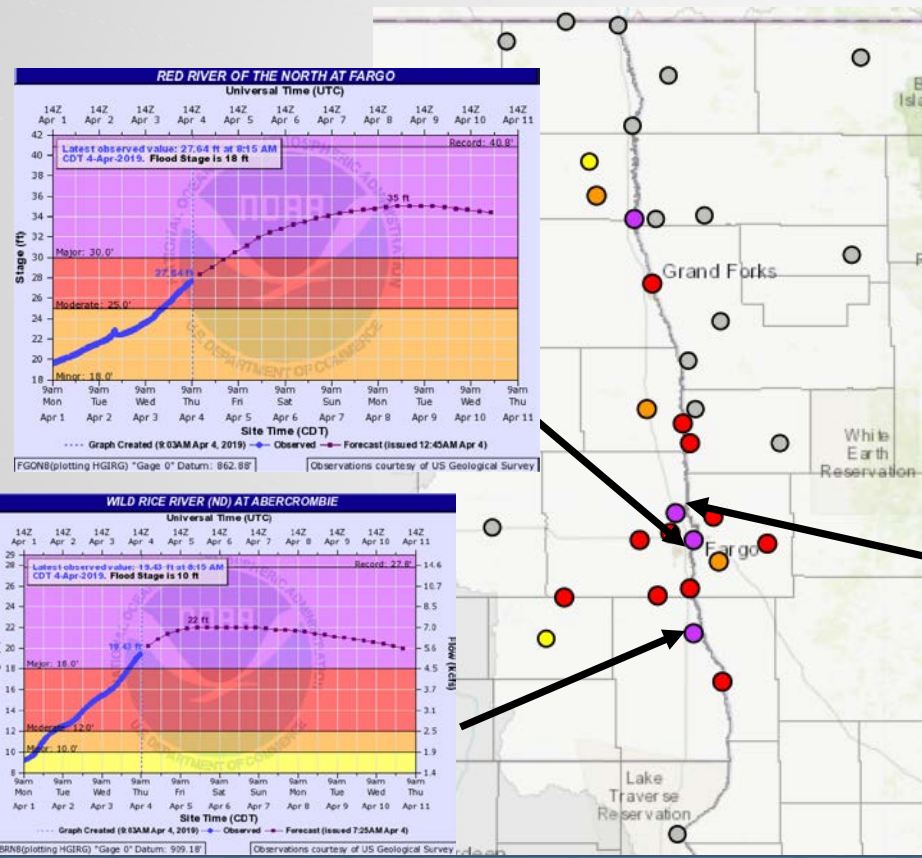




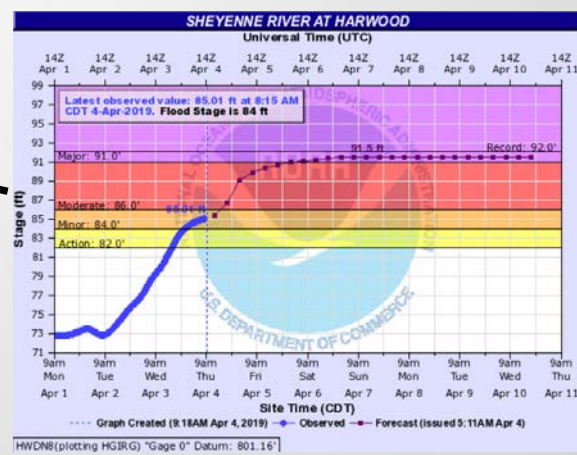
Current NCRFC Flood Status for the Red River of the North



Latest Observed Stages



Again, uncertainty continues beyond this weekend, if we transition into a more wet pattern.



Mississippi / Illinois Rivers Ice Jam Threat Update

Mississippi River:

- Any remaining ice continued to break-up and melt this past week. Temperatures were a little cooler than normal over last week
- Ice reports from the US Army Corps of Engineers mentioned open water on the Mississippi River. Water temperatures ranged from the upper 30's in the north to the low 50's near St Louis.
- The St. Paul Corps took their final ice measurements of the season on March 20th.

Illinois River (Chicago/Illinois R):

- The Corps reported open water on the Illinois and its tributaries with Water temperatures in the 40's.

Before: ~1130 AM:



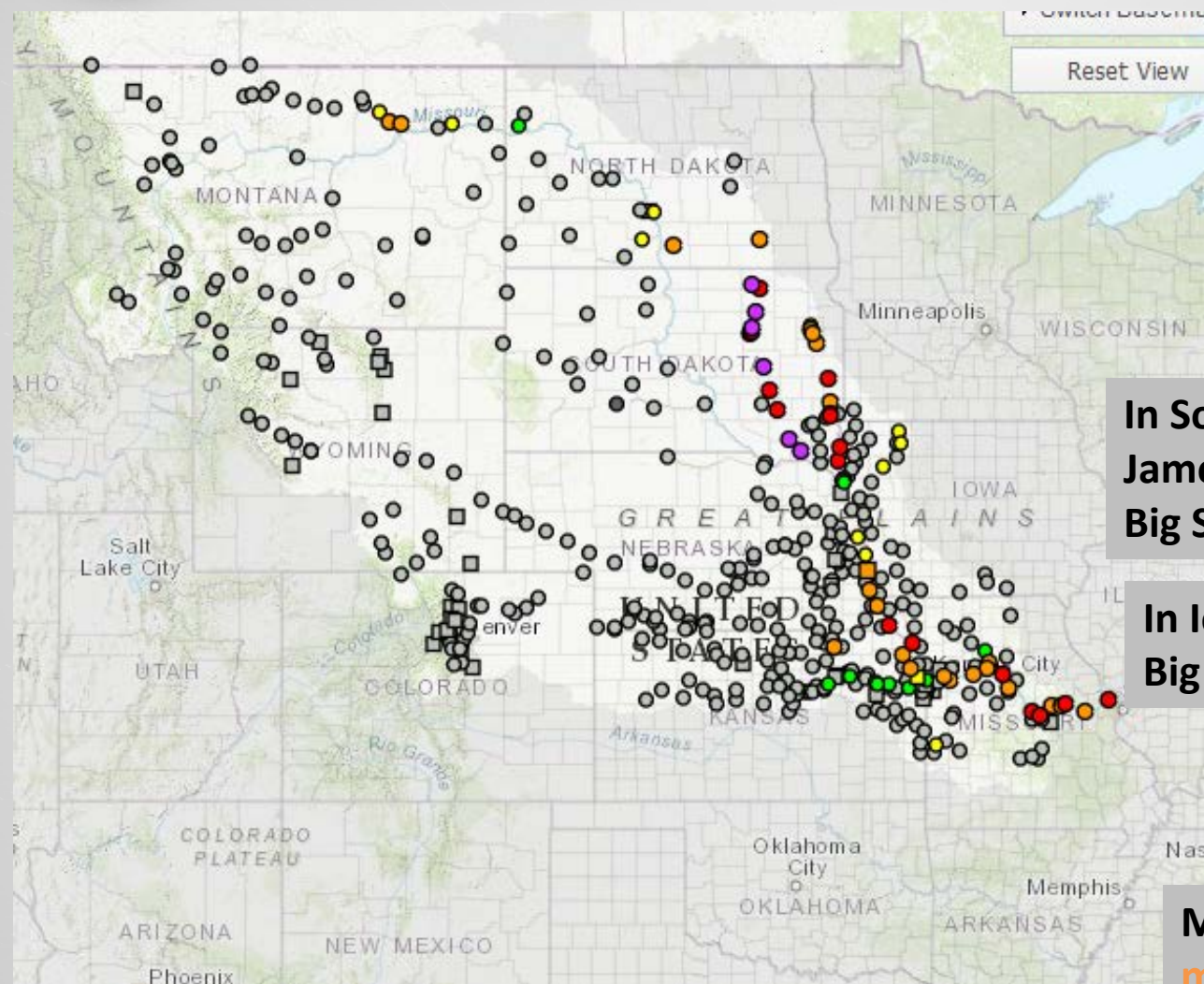
After: ~100 PM:



Mississippi River at Fort Ripley break up on March 27th



MISSOURI RIVER BASIN CURRENT FLOODING



In Montana:

Milk River: **minor, falling**

In North Dakota:

James River: **minor, cresting**

Beaver Cr: **minor, cresting**

In South Dakota:

James River: **major, crest April**

Big Sioux River: **moderate, falling**

In Iowa:

Big Sioux River: **mod, falling**

In Kansas:

Big Blue: **minor, rising**

Missouri River below Gavins:

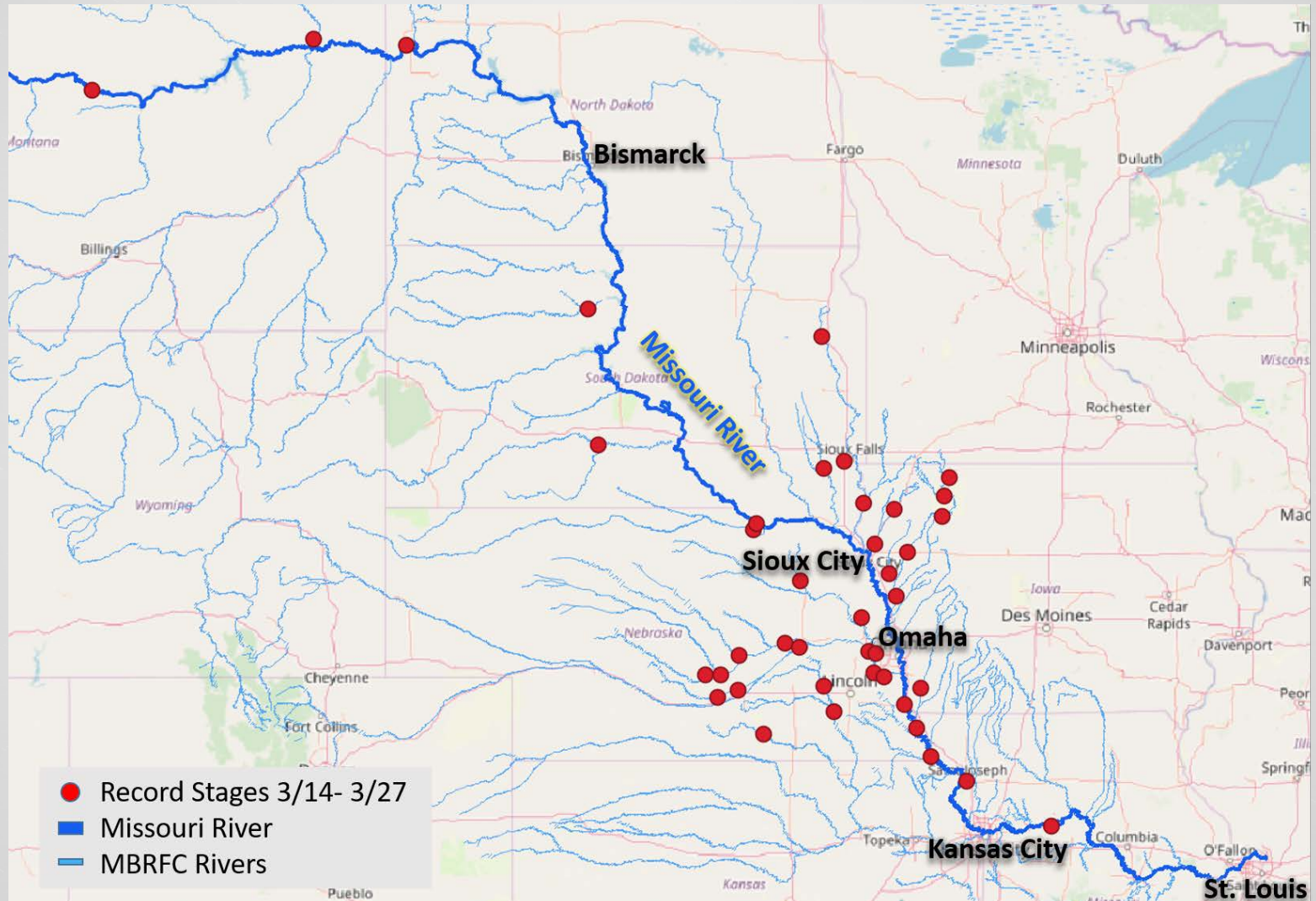
minor*, falling



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MISSOURI RIVER BASIN PROVISIONAL NEW STAGE RECORDS

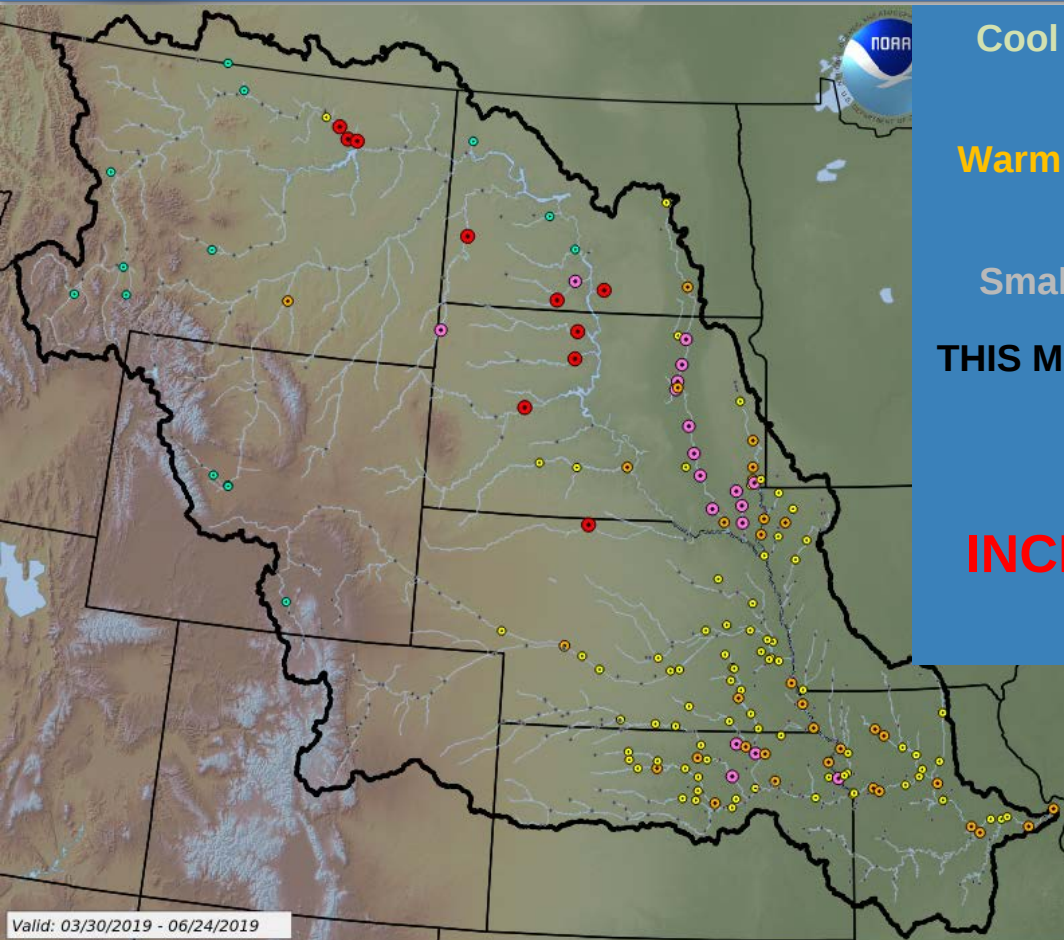


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MISSOURI BASIN

CHANCE OF REACHING FLOOD STAGE
AS COMPARED TO HISTORICAL



Cool colors mean lower chance than “normal” for flooding

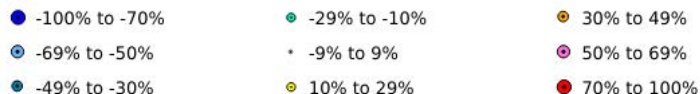
Warm colors mean higher chance than “normal” for flooding

Small gray dot means near “normal” for flooding.

THIS MAP DOES NOT SAY WHETHER A LOCATION IS EXPECTED TO FLOOD, OR NOT

MESSAGE: THERE IS AN INCREASED CHANCE OVER MUCH OF THE MISSOURI BASIN

Percent Difference of Reaching Minor Flooding Compared to Historical Average

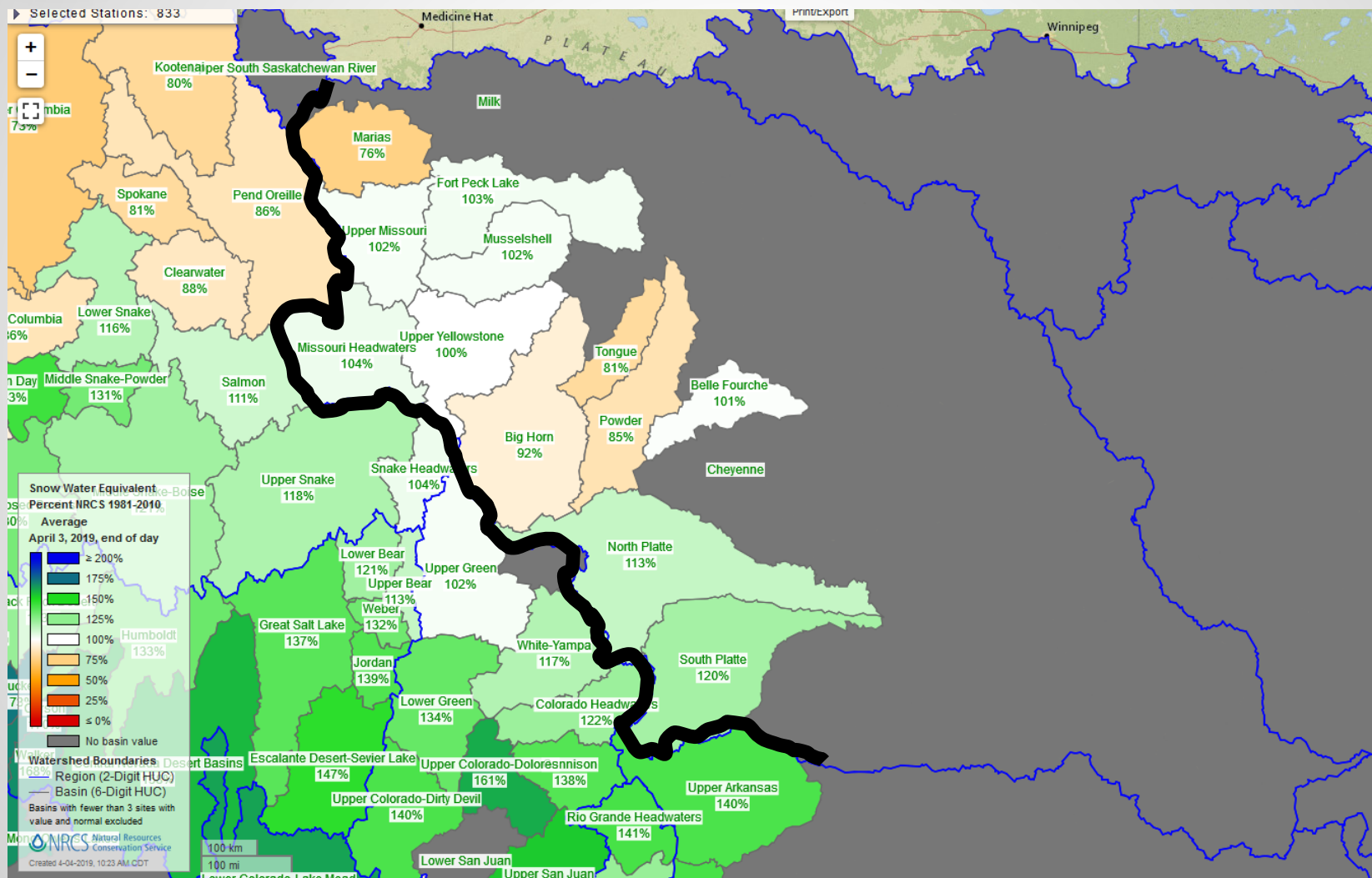


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MISSOURI BASIN

Mountain Snowpack (as of 03 April)



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MISSOURI BASIN

2019 Mountain Runoff

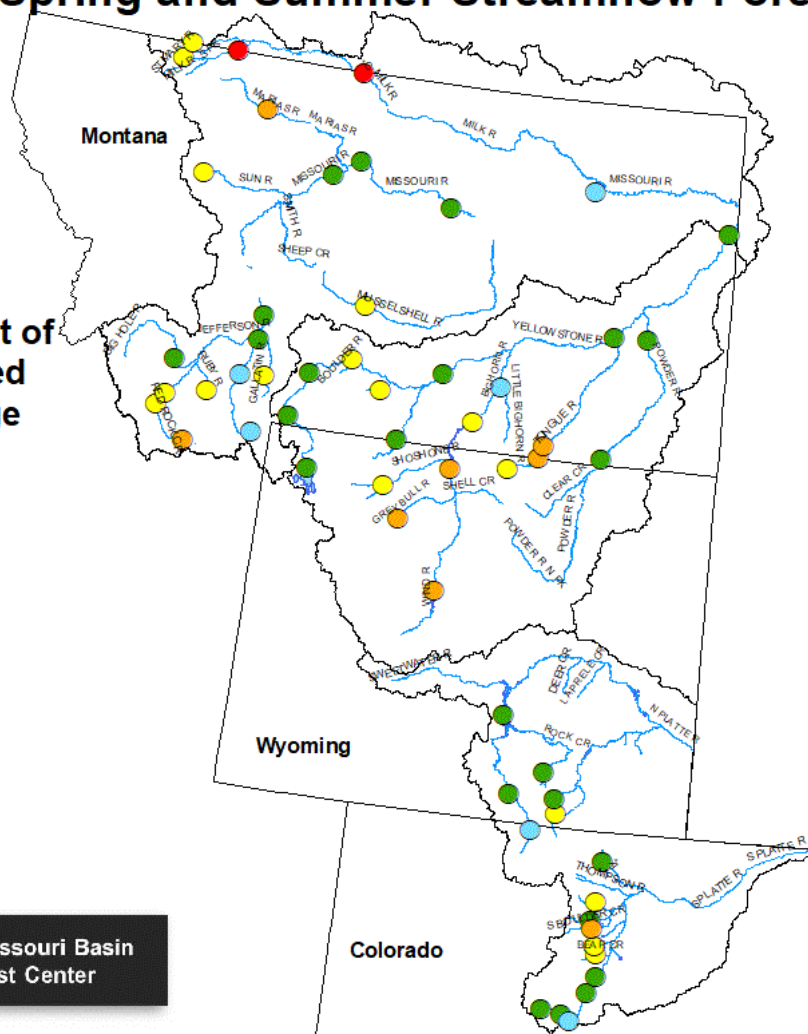
April 2019 Spring and Summer Streamflow Forecast

Forecast as Percent of
1979-2001 Modeled
Historical Average

- > 180%
- 150% - 180%
- 130% - 149%
- 110% - 129%
- 90% - 109%
- 70% - 89%
- 50% - 69%
- 25% - 49%
- < 25%



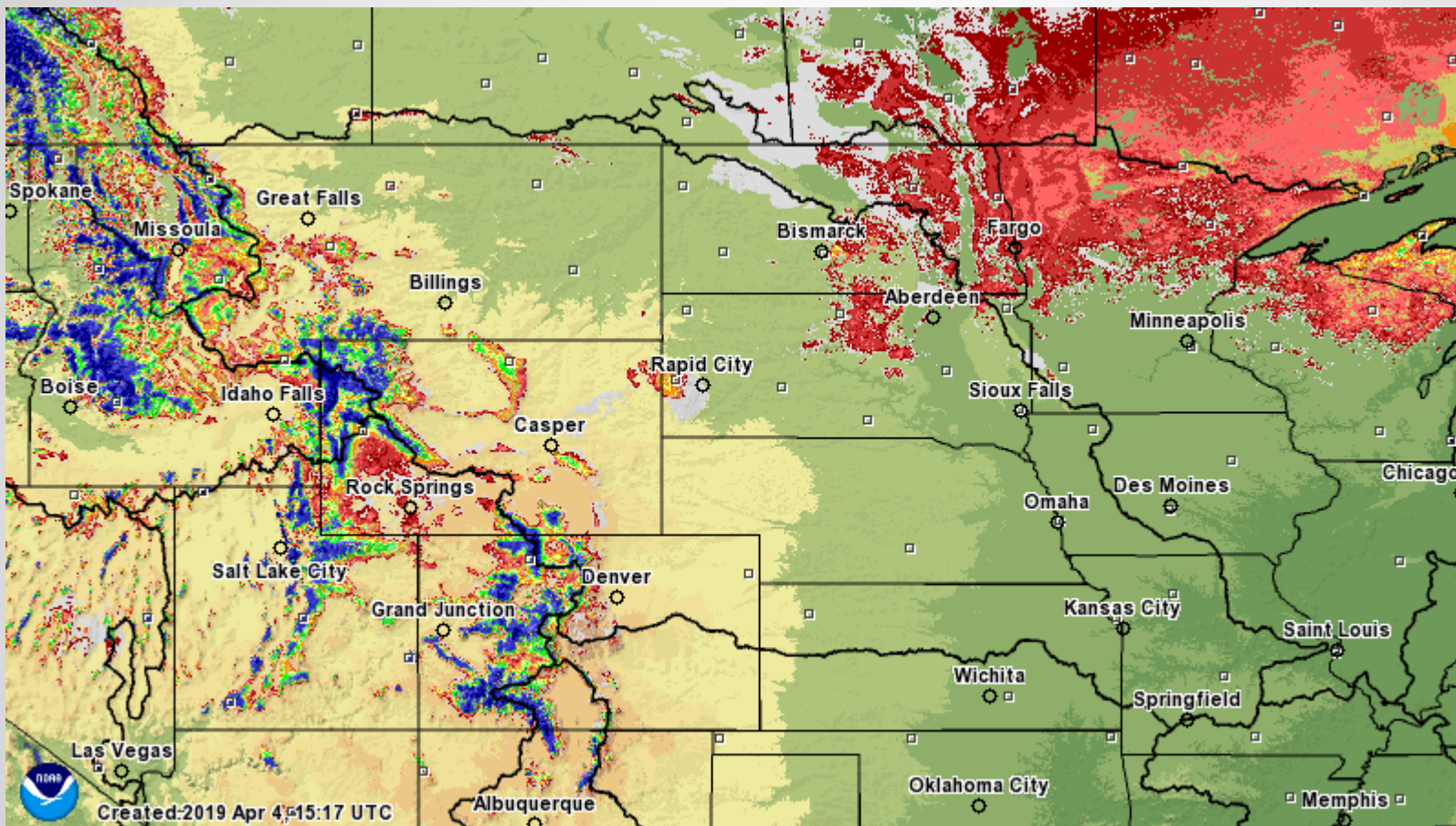
Issued by the Missouri Basin
River Forecast Center



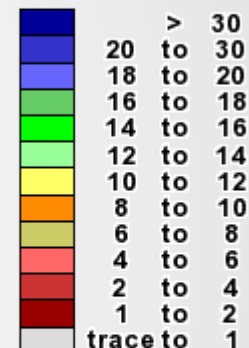


MISSOURI BASIN

Plains Snowpack (as of April 4 2019)



Inches of water equivalent



Not Estimated

Elevation in feet



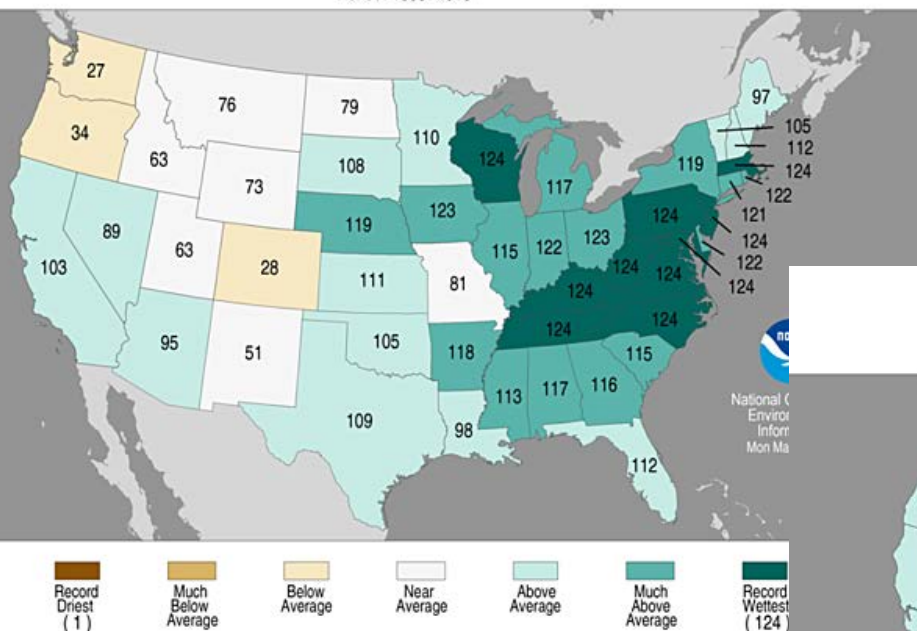
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Precipitation: State Rankings for Winter & Last 12 months (March 2018-Feb 2019)



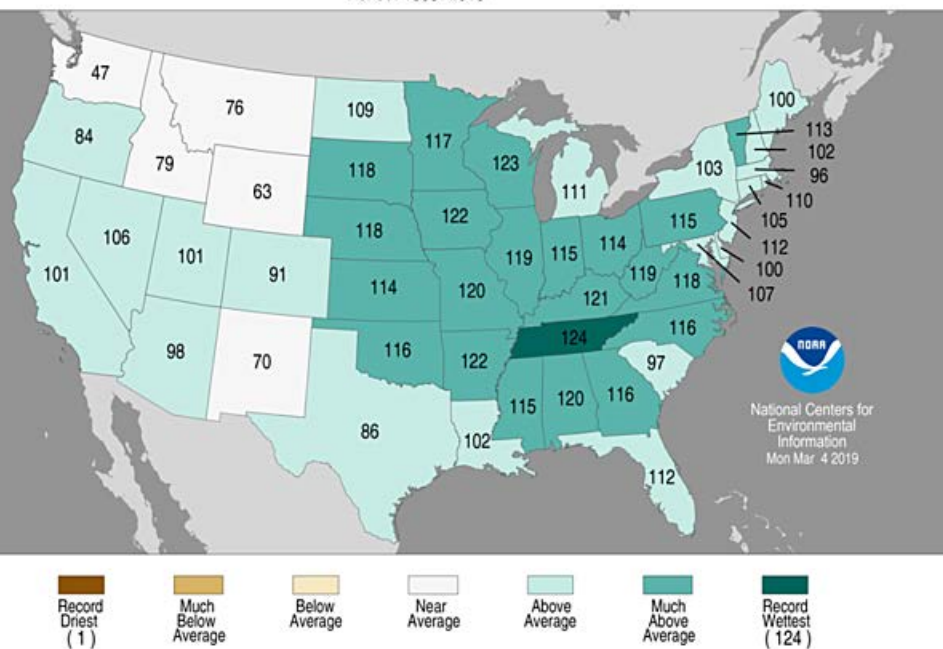
Statewide Precipitation Ranks
March 2018–February 2019
Period: 1895–2019



Long term wetness:

- U.S. wettest in 124 years of record (March 2018 – Feb 2019)
- Wettest Dec 2018 – Feb 2019

Statewide Precipitation Ranks
December 2018–February 2019
Period: 1895–2019



<https://www.ncdc.noaa.gov/sotc/>



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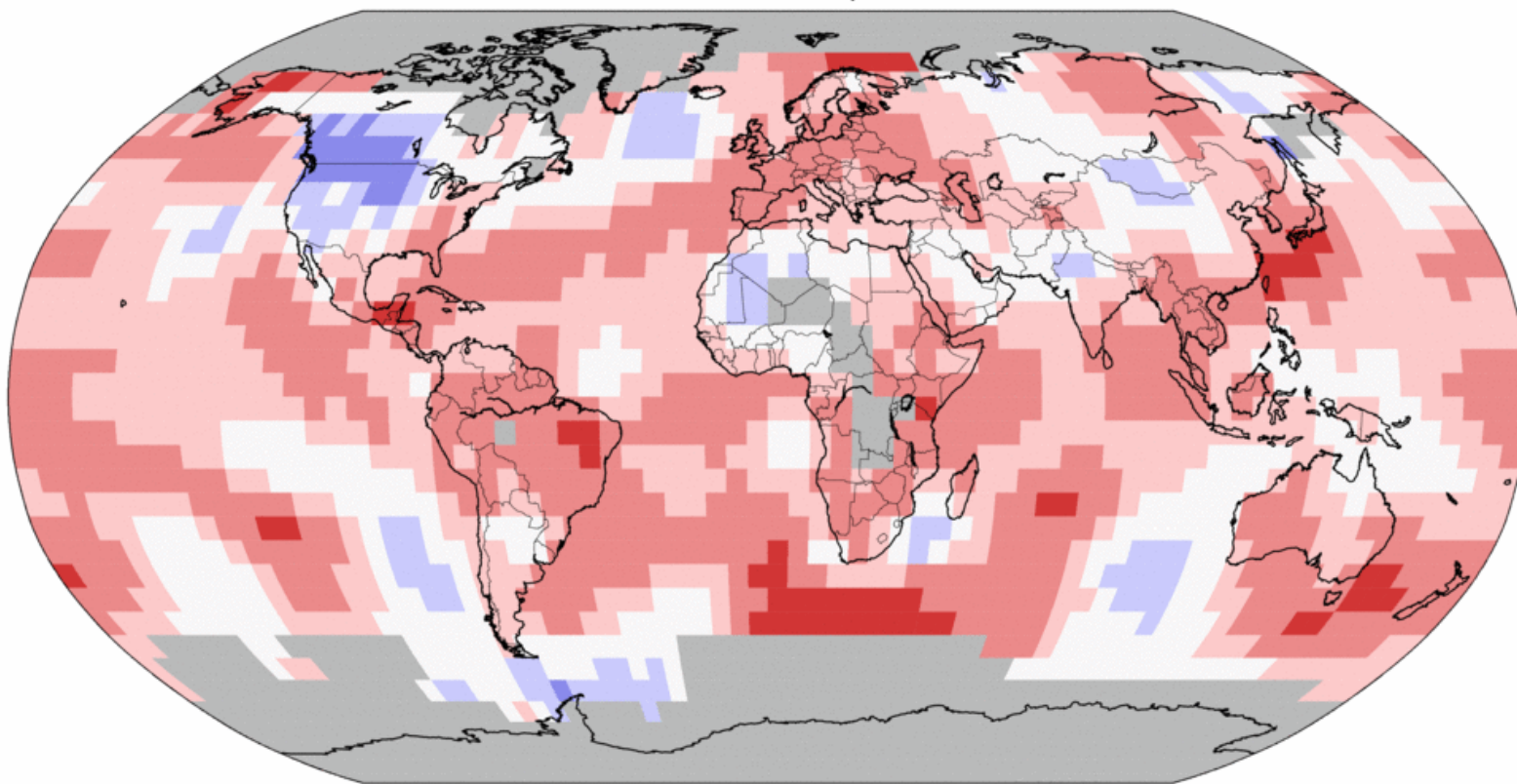
February Temperature and Precipitation



Land & Ocean Temperature Percentiles Feb 2019

NOAA's National Centers for Environmental Information

Data Source: NOAA GlobalTemp v4.0.1-20190312




Record
Coldest


Much
Cooler than
Average


Cooler than
Average


Near
Average


Warmer than
Average


Much
Warmer than
Average


Record
Warmest



v3.3.0.20190312.qca

W1902
(1)

Below
Average

Average

Average

Average

Above
Average

W1902
(125)



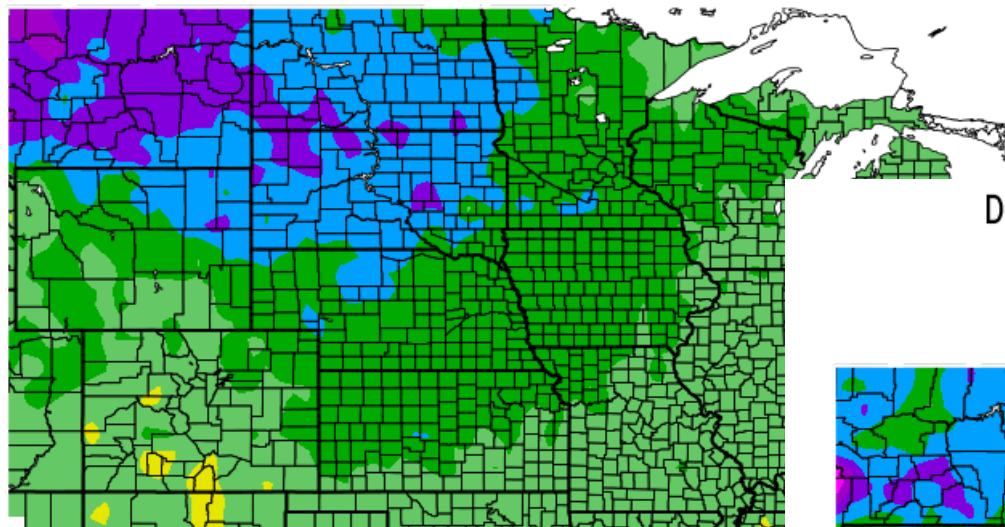
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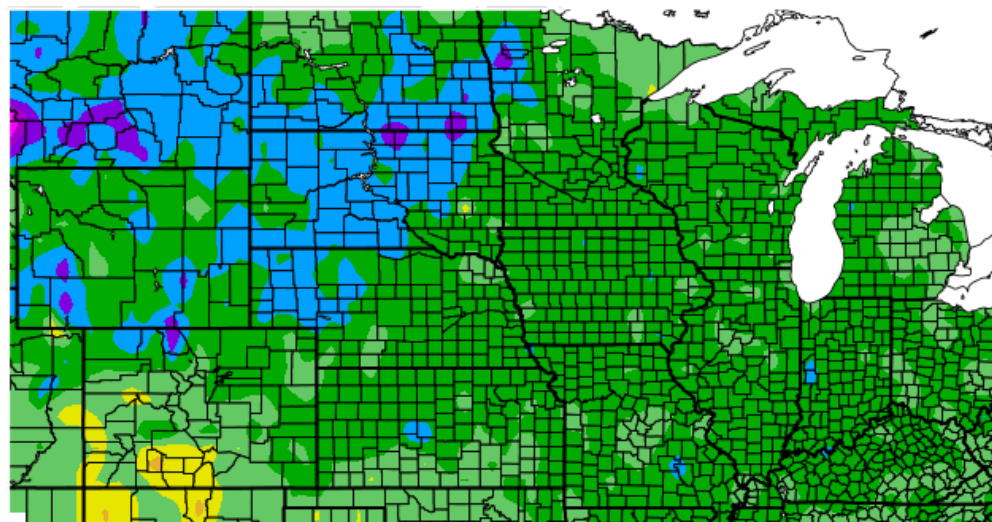
Late Winter/Early Spring Temperatures



Departure from Normal Temperature (F)
2/2/2019 – 4/2/2019



Departure from Normal Temperature (F)
3/4/2019 – 4/2/2019



Generated 4/3/2019 at HPRCC using provisional data.

NOAA

**Much colder than normal
temperatures last 60 and 30 days**



Generated 4/3/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers



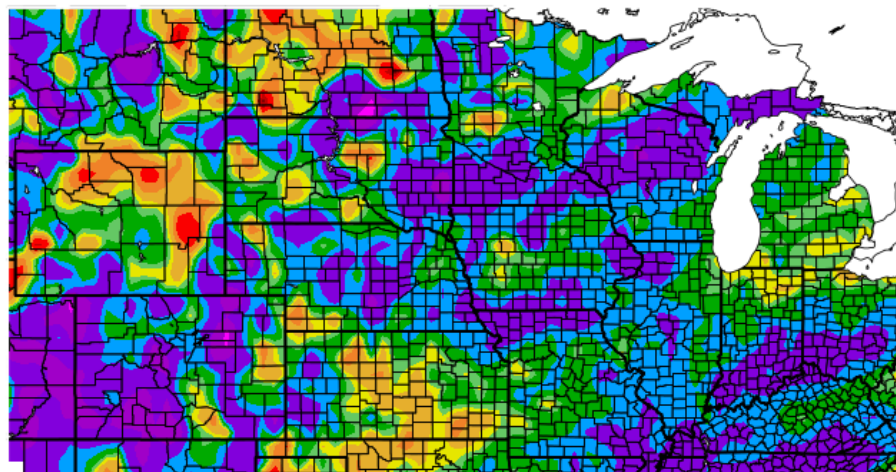
Building



Winter/Early Spring Precipitation



Percent of Normal Precipitation (%)
1/3/2019 – 4/2/2019

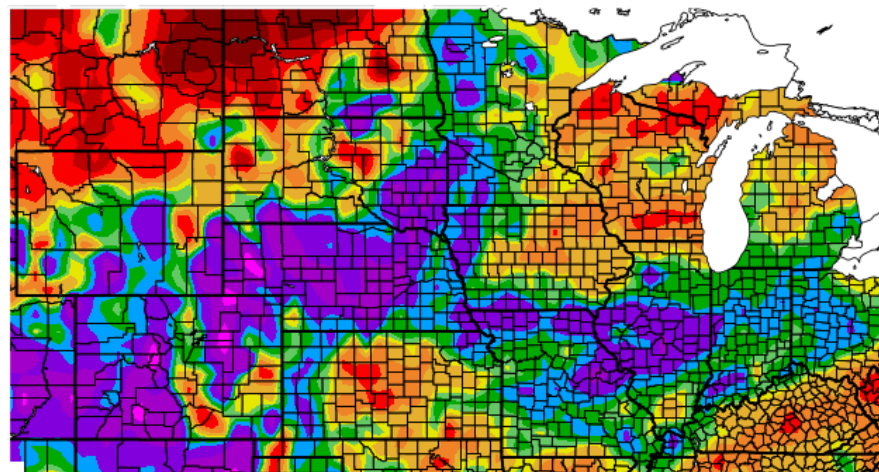


Generated 4/3/2019 at HPRCC using provisional data.

NOAA Regional Climate Center

Last 90 days continued wet over most of the area.

Percent of Normal Precipitation (%)
3/4/2019 – 4/2/2019



Generated 4/3/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers

Last 30 days with over 300% of normal in isolated areas

<https://hprcc.unl.edu/maps.php?map=ACISClimateMaps>

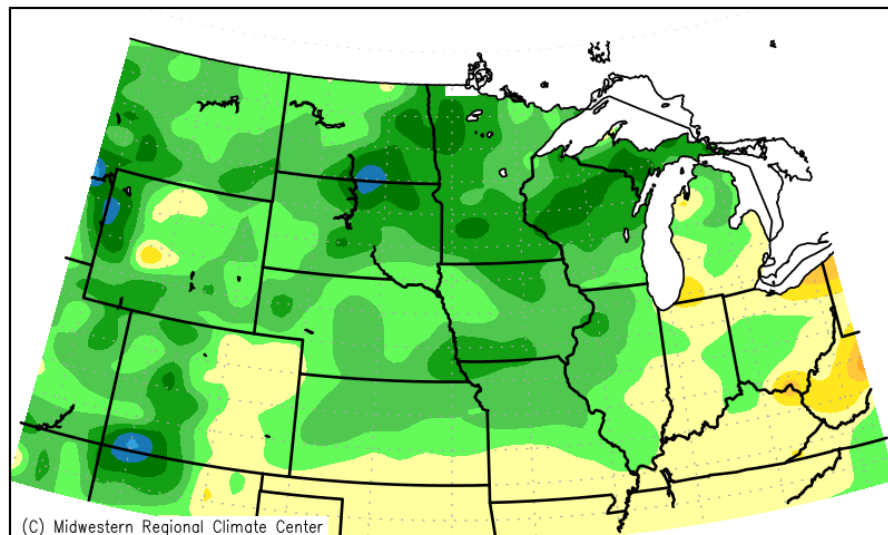


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Winter - Spring Snowfall Totals

Accumulated Snowfall (in): Departure from Mean
November 1, 2018 to April 3, 2019



(C) Midwestern Regional Climate Center

Mean period is 1981-2010.

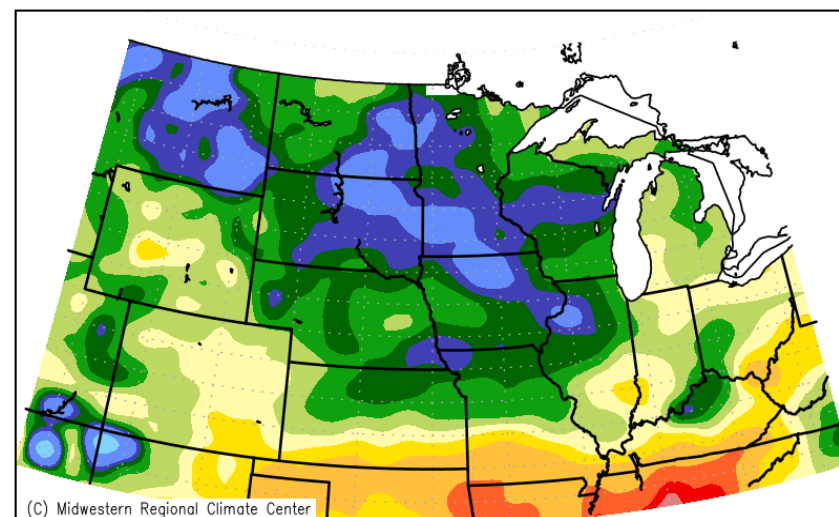


Midwestern Regional Climate Center

Winter snowfall: above normal (since Nov. 1st, 2018)

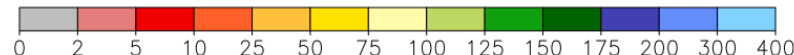
**Much above normal snowfall since Feb. 1st
- Over 200% of normal over large areas**

Accumulated Snowfall: Percent of Mean
February 1, 2018 to April 3, 2019



(C) Midwestern Regional Climate Center

Mean period is 1981-2010.



Midwestern Regional Climate Center

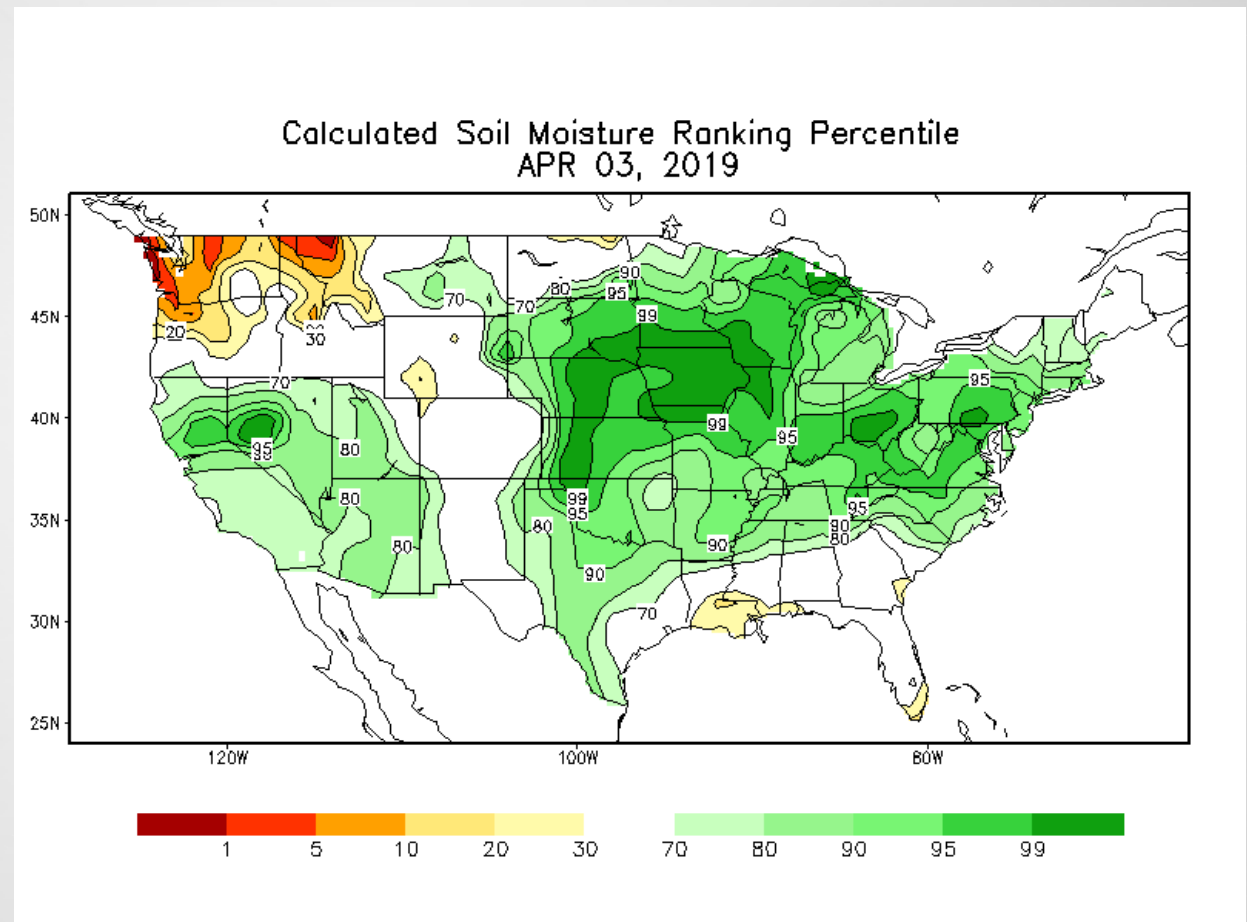


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Soil Moisture

- Widespread very wet conditions
- Has been wet for several months
- Will take time to dry out

Current Conditions



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

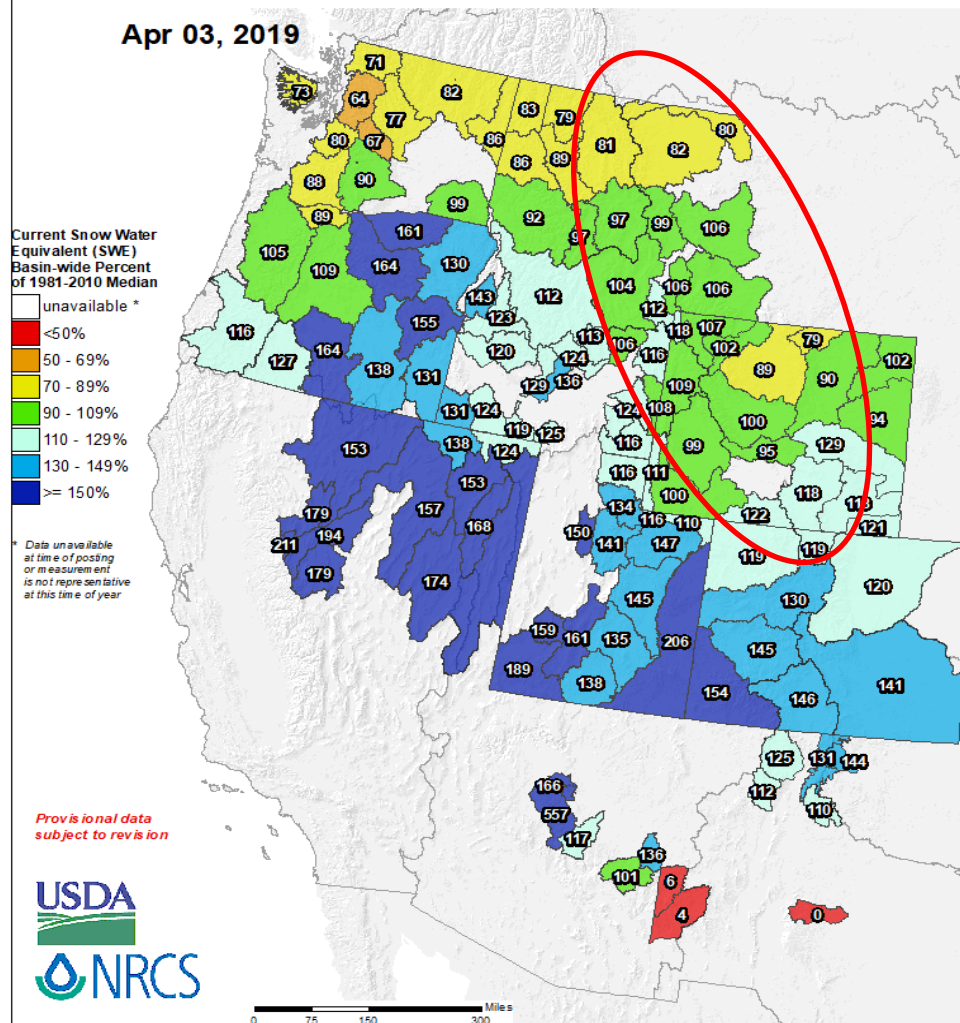


Mountain Snowpack Current Conditions



Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Apr 03, 2019



- Near average to slightly above conditions
- Nearing the end of average mountain accumulation period but more possible via spring storms

https://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west_sweptcnorml_update.pdf



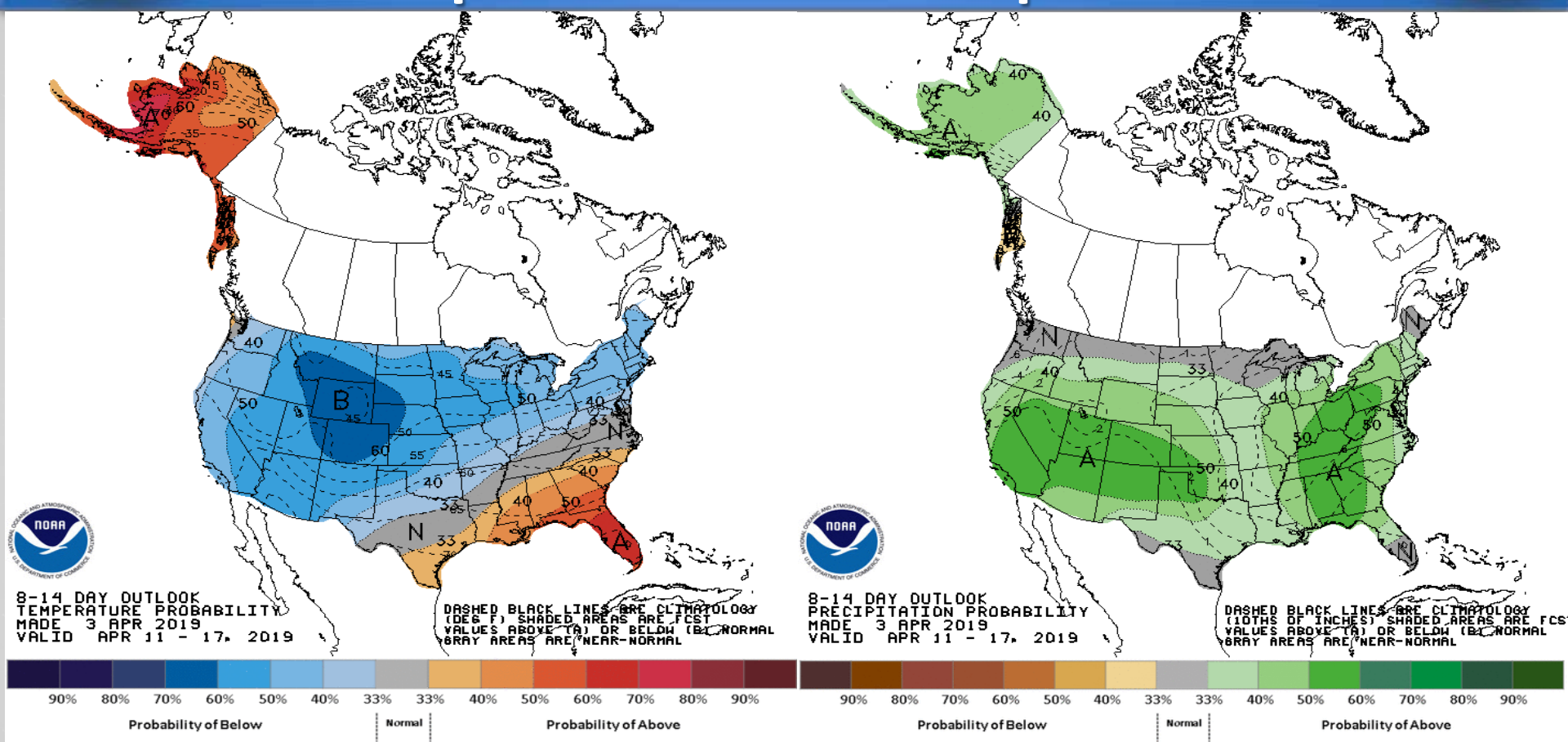
Shifting to Outlooks

- Week 2
- April
- April – June
- May - July





April 11th - April 17th Outlook Temperatures and Precipitation



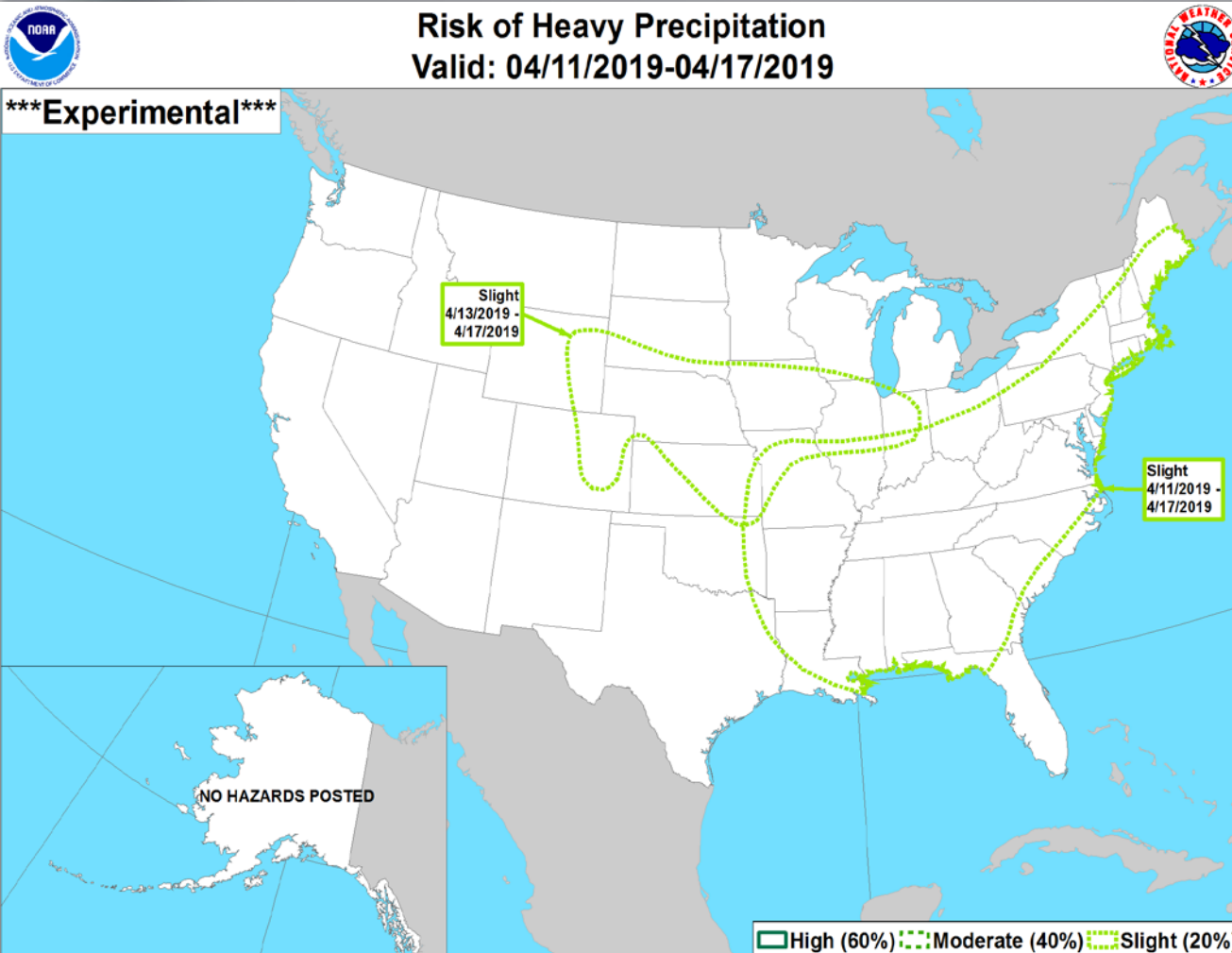
- Decent chances for below normal temperatures especially west
- Moderate chances for above normal precipitation across Midwest/Plains (near normal chances far north)





Potential Week 2 Precipitation Extremes

April 11th through April 17th



- Two major storm systems during the period
 - 4/11 – 4/17 lower Mississippi to Ohio basin
 - 4/13 – 4/17 central Plains to Midwest
- Relatively transitory thus systems will not likely be slow movers

Climate Prediction Center

Made: 04/03/2019 3PM EDT

Follow us:  

www.cpc.ncep.noaa.gov

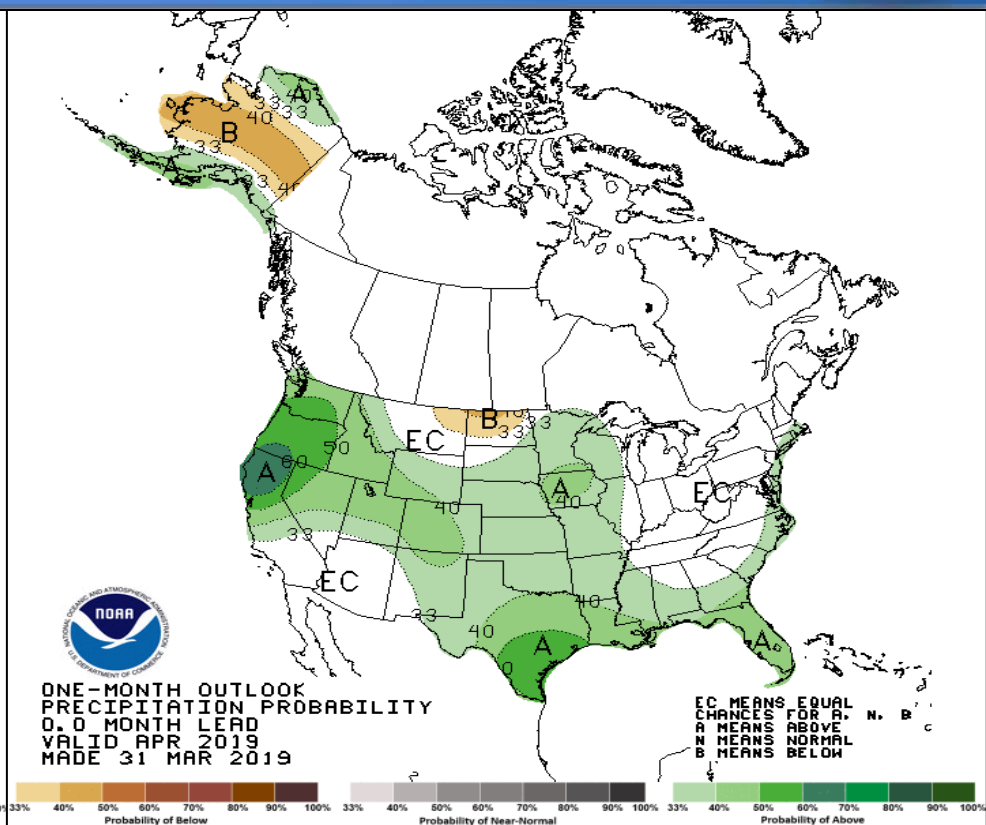
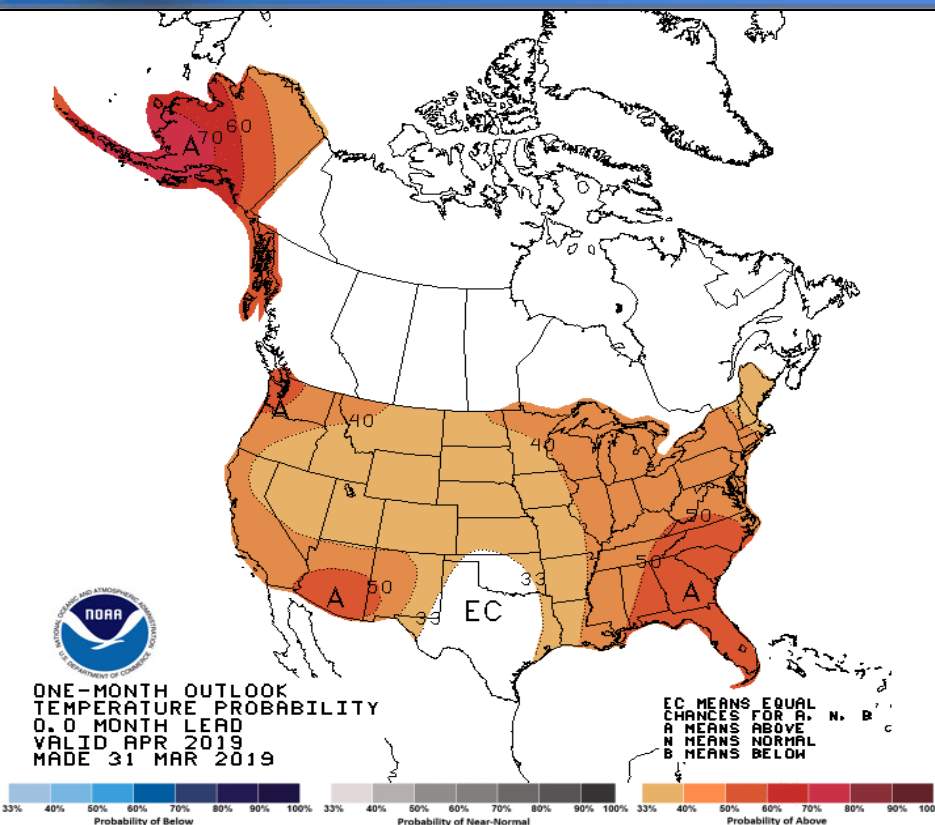
<https://www.cpc.ncep.noaa.gov/>



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April Temperature and Precipitation Outlook



- Slightly enhanced chances for above normal precipitation plains & portions of the Midwest
- Slightly enhanced chances for above normal temperature as well

<https://www.cpc.ncep.noaa.gov/>

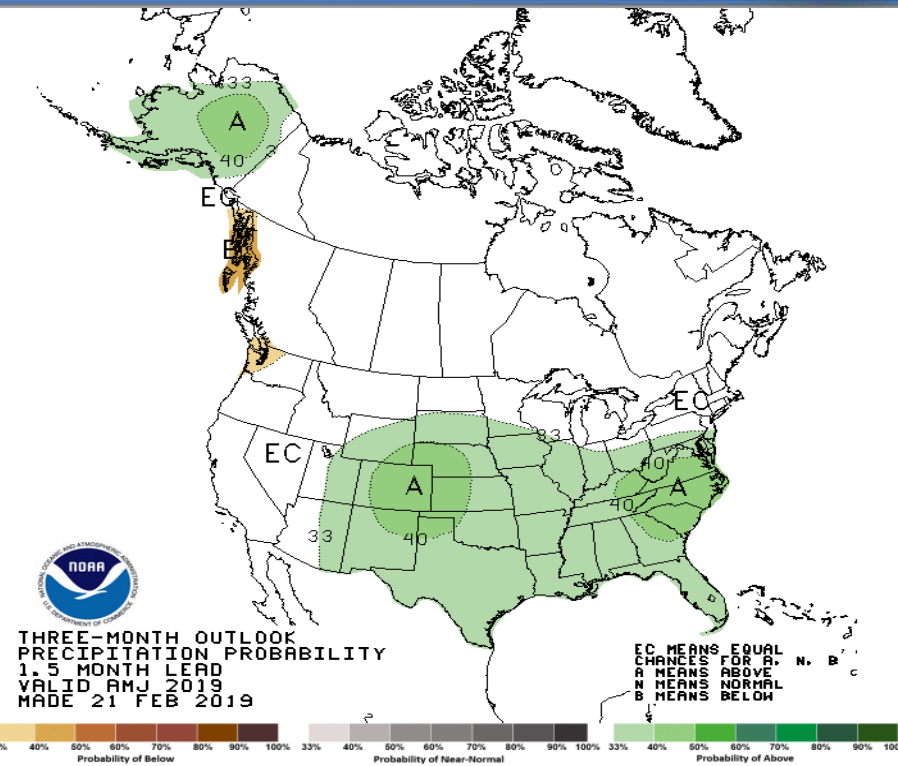
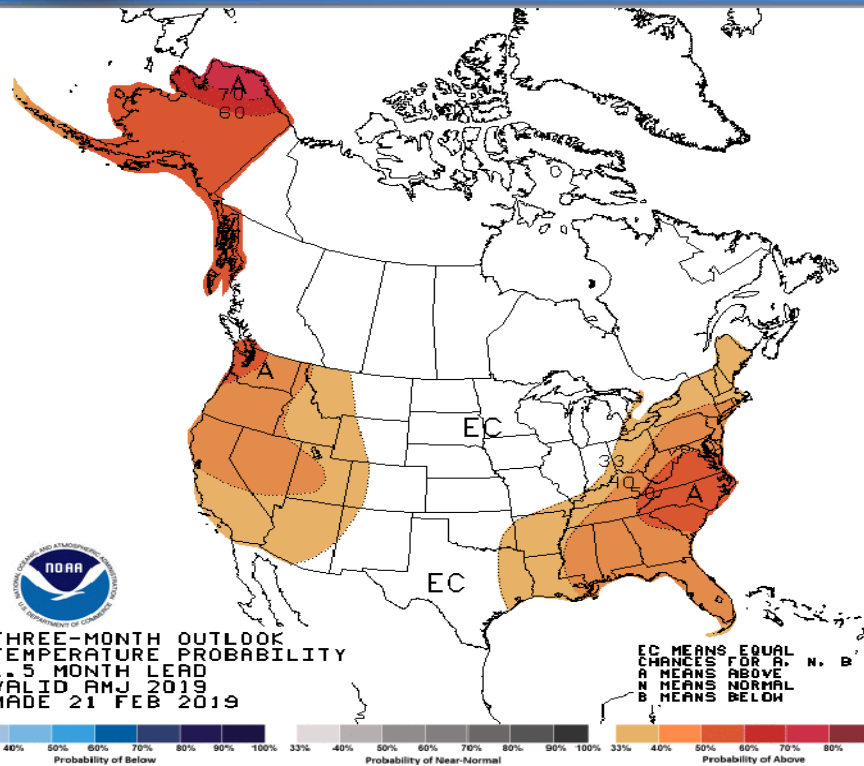


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April – May - June

Temperature and Precipitation



- Slightly enhanced chances for precipitation across with the exception of northern tier of states
- There are equal chances for above, below and near normal temperatures

<https://www.cpc.ncep.noaa.gov/>

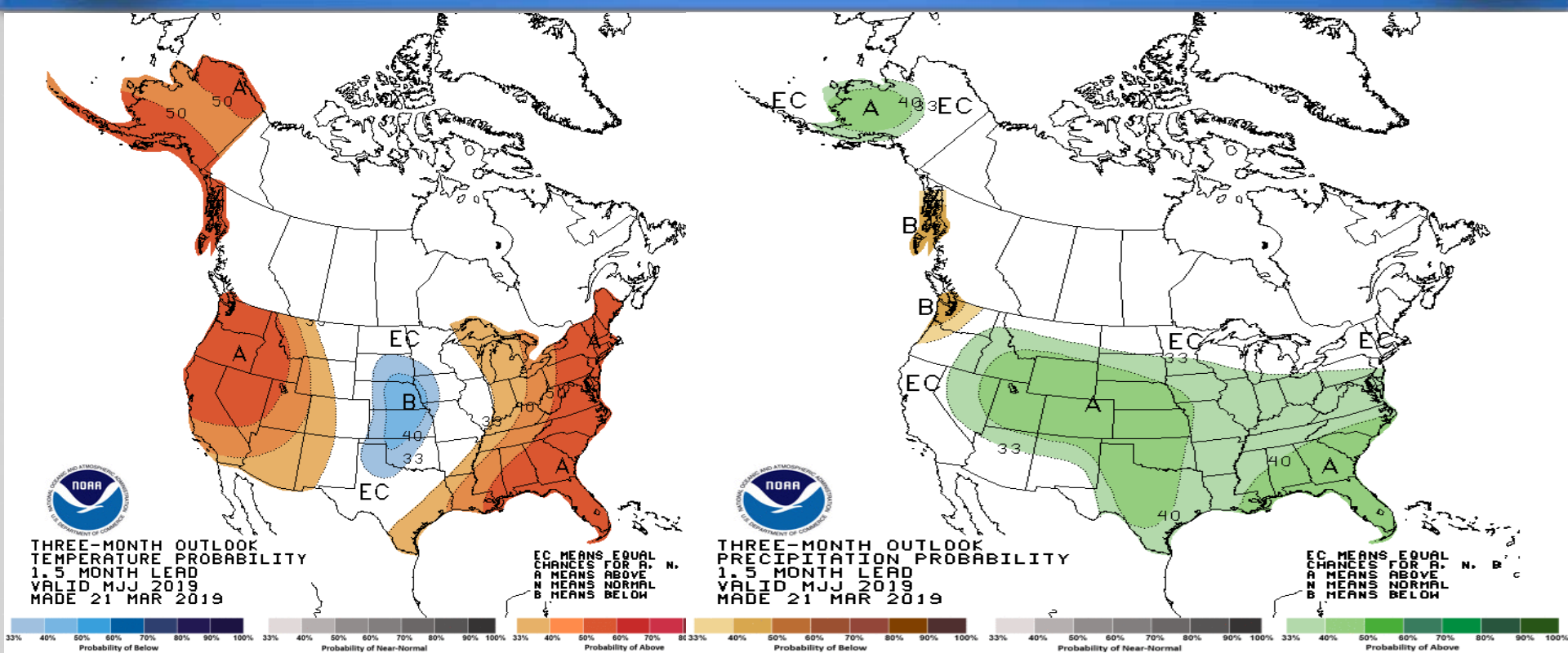


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May – June – July

Temperature and Precipitation Outlook



- Enhanced chances for above normal precipitation continues (except for northernmost areas)
- Enhanced area of below normal temperatures centered in the Central Plains





Summary – Long Term Outlooks



- **April – June climatological wettest time of the year on average**
- **April – continued better chances for above normal precipitation**
 - Relatively transitory storm systems over the next few weeks
 - Slightly elevated chances for above normal temperatures
- **April – July: continued better chances for above normal precipitation**
 - Equal chances of being above, below or near normal temperatures (April-June)
 - Slight leaning towards cooler than normal temperatures May-July Central Plains





Flood Outlook

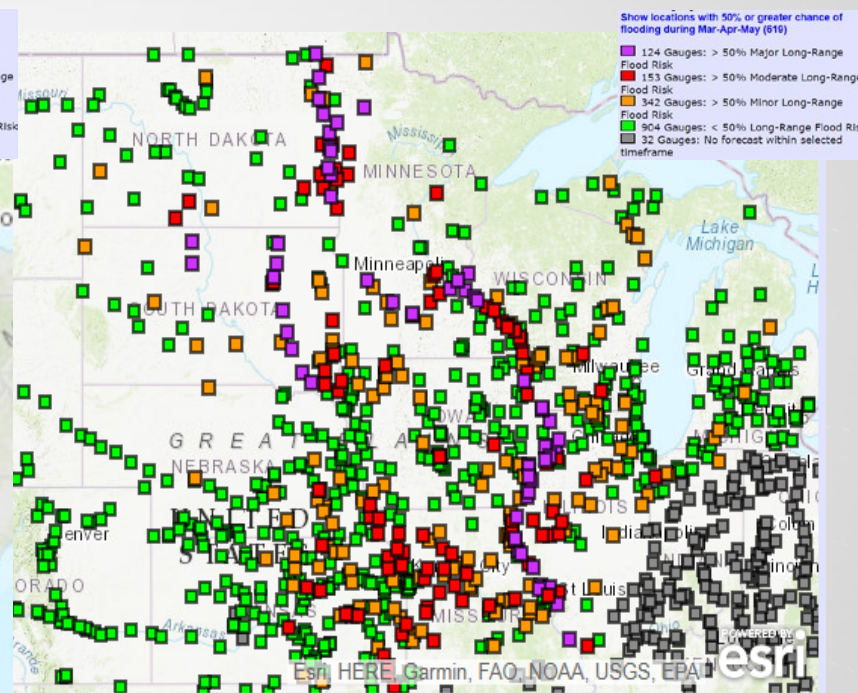
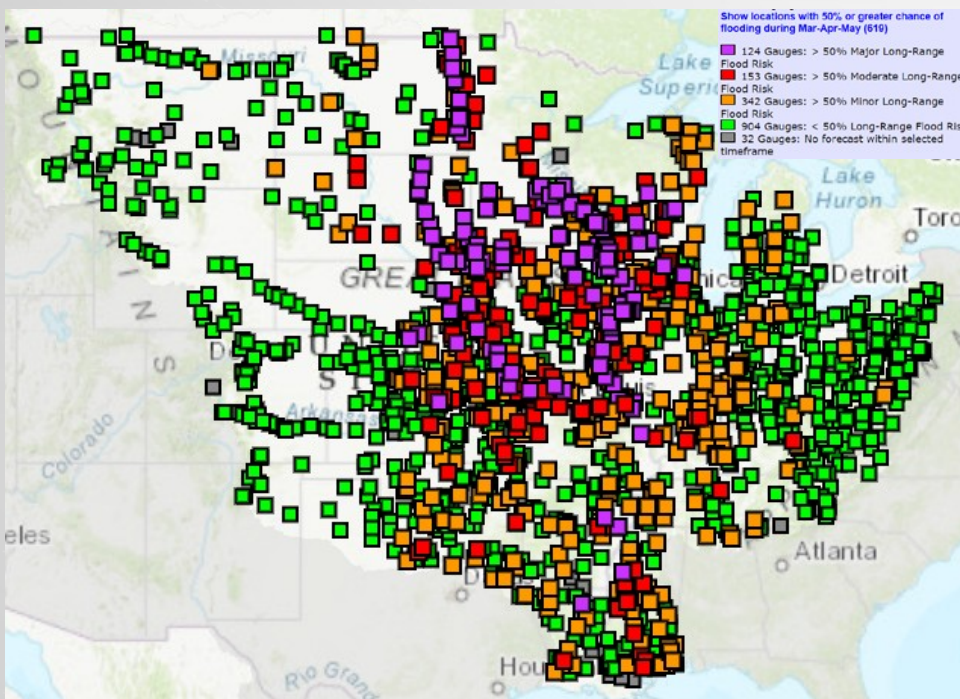
Through mid-June 2019

50% or Greater Chance of Flooding

Valid through mid-June

March 7, 2019

March 31, 2019



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

39



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Hudson Bay: Souris & Red River Basins

Flood Outlook: (through late-June)

> 50% chance of exceeding flood levels

Near Normal to Slightly Above Normal Flood Risk in the Souris River Basin (rain dependent)

Higher Flood Risk area

Devils Lake

Normal Flood Risk and Inflow continues for Devils Lake area

722 total gauges

Show locations with 50% or greater chance of flooding during Apr-May-Jun (174)

- 47 Gauges: > 50% Major Long-Range Flood Risk
- 48 Gauges: > 50% Moderate Long-Range Flood Risk
- 79 Gauges: > 50% Minor Long-Range Flood Risk
- 247 Gauges: < 50% Long-Range Flood Risk
- 1 Gauges: No forecast within selected timeframe

Above to Much Above Normal Flood Risk in the Red River Basin (more so in lower ~half of basin)



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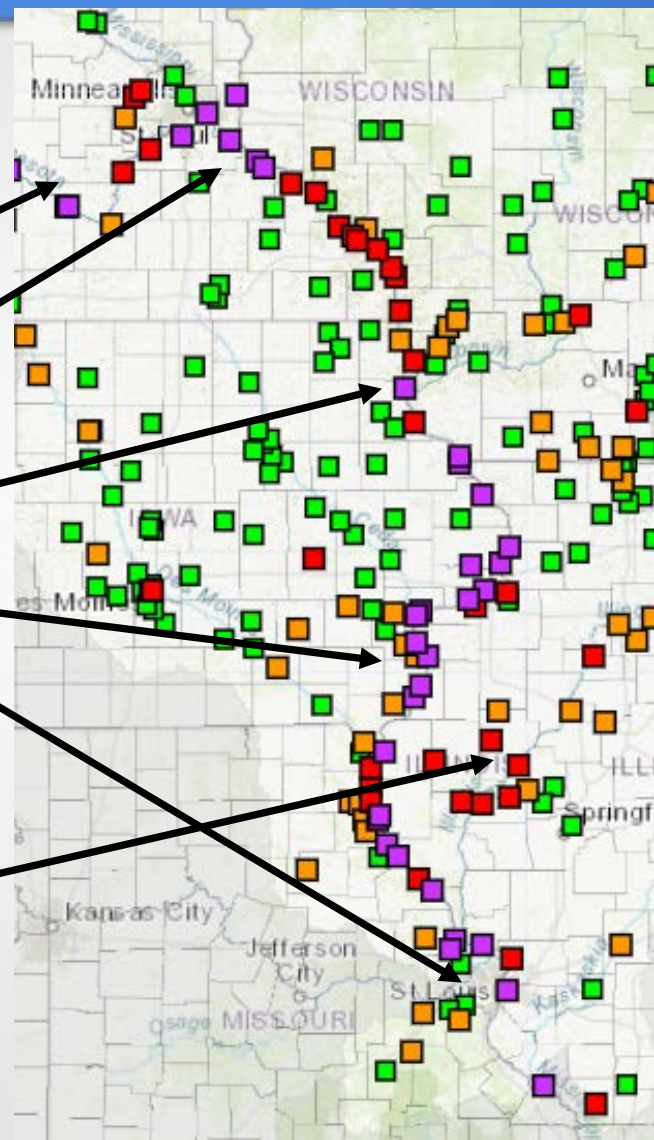
Upper Mississippi Basin Flood Outlook: (through late-June)

> 50% chance of exceeding flood levels

Above to Much Above Normal Flood Risk continues for the Minnesota River and Mississippi Headwaters area in Minnesota

Much Above Normal Flood Risk along mainstem Mississippi River

Above Normal Flood Risk along Illinois River

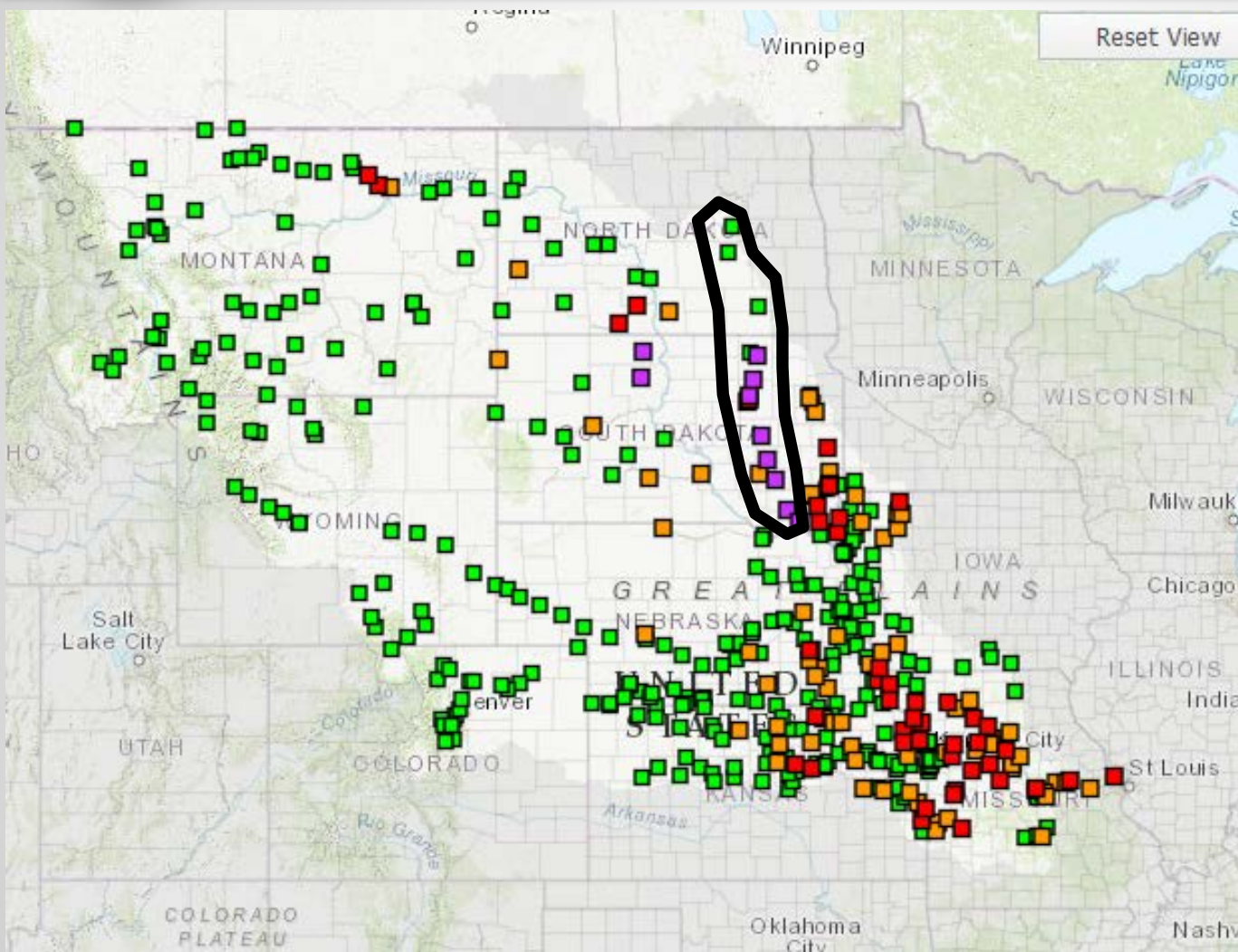


- 722 total gauges
Show locations with 50% or greater chance of flooding during Apr-May-Jun (174)
- 47 Gauges: > 50% Major Long-Range Flood Risk
 - 48 Gauges: > 50% Moderate Long-Range Flood Risk
 - 79 Gauges: > 50% Minor Long-Range Flood Risk
 - 247 Gauges: < 50% Long-Range Flood Risk
 - 1 Gauges: No forecast within selected timeframe





MISSOURI BASIN FLOOD POTENTIAL OUTLOOK



James River:

North Dakota: rising.
Moderate level flooding due to ice action possible.

South Dakota:
rising...**major** flooding occurring and forecast.
Flooding thru end of April.

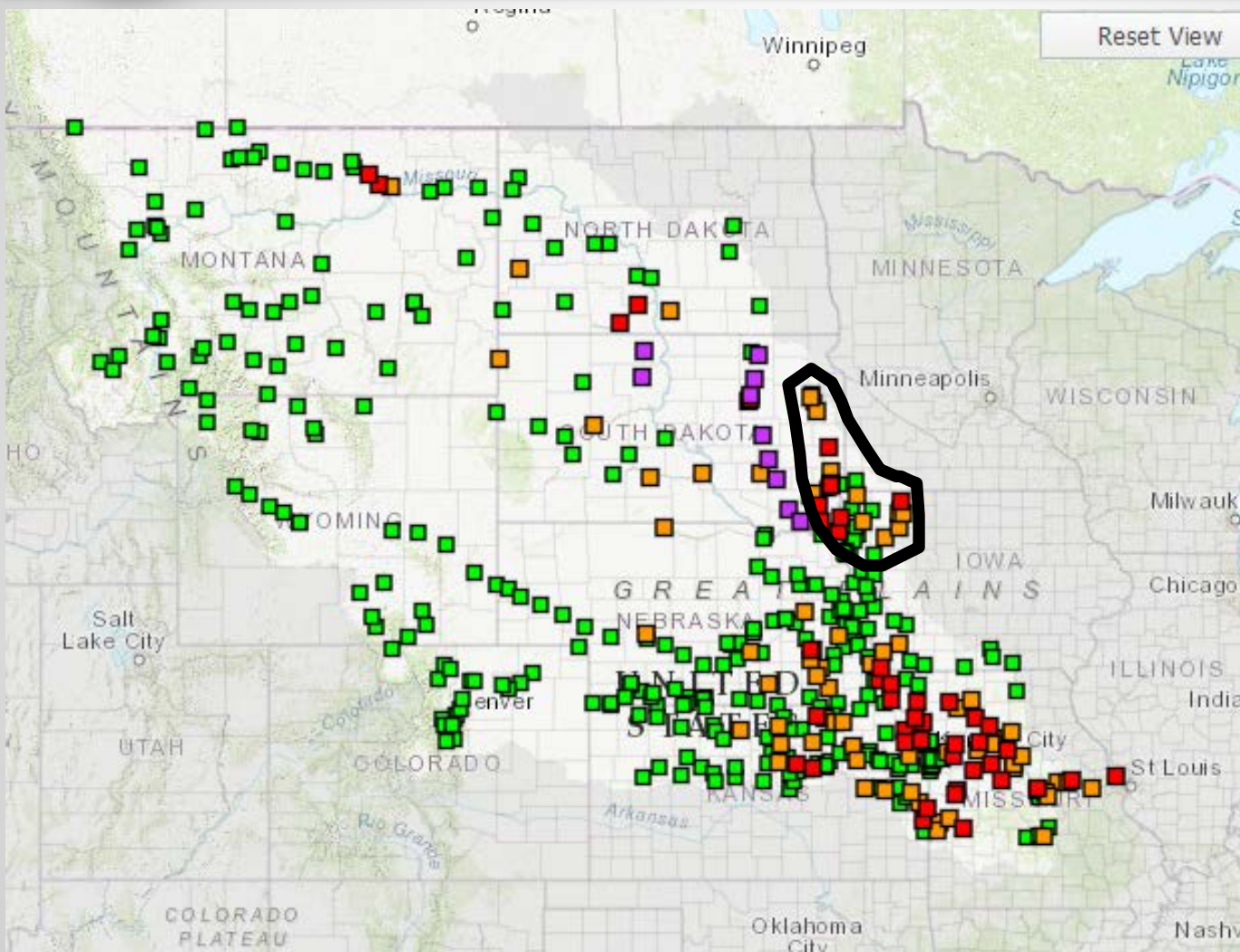
Steady-to-falling trend at mouth of James.



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MISSOURI BASIN FLOOD POTENTIAL OUTLOOK



Floyd: **Minor** flooding likely.

Little Sioux: **Moderate** level flooding likely.

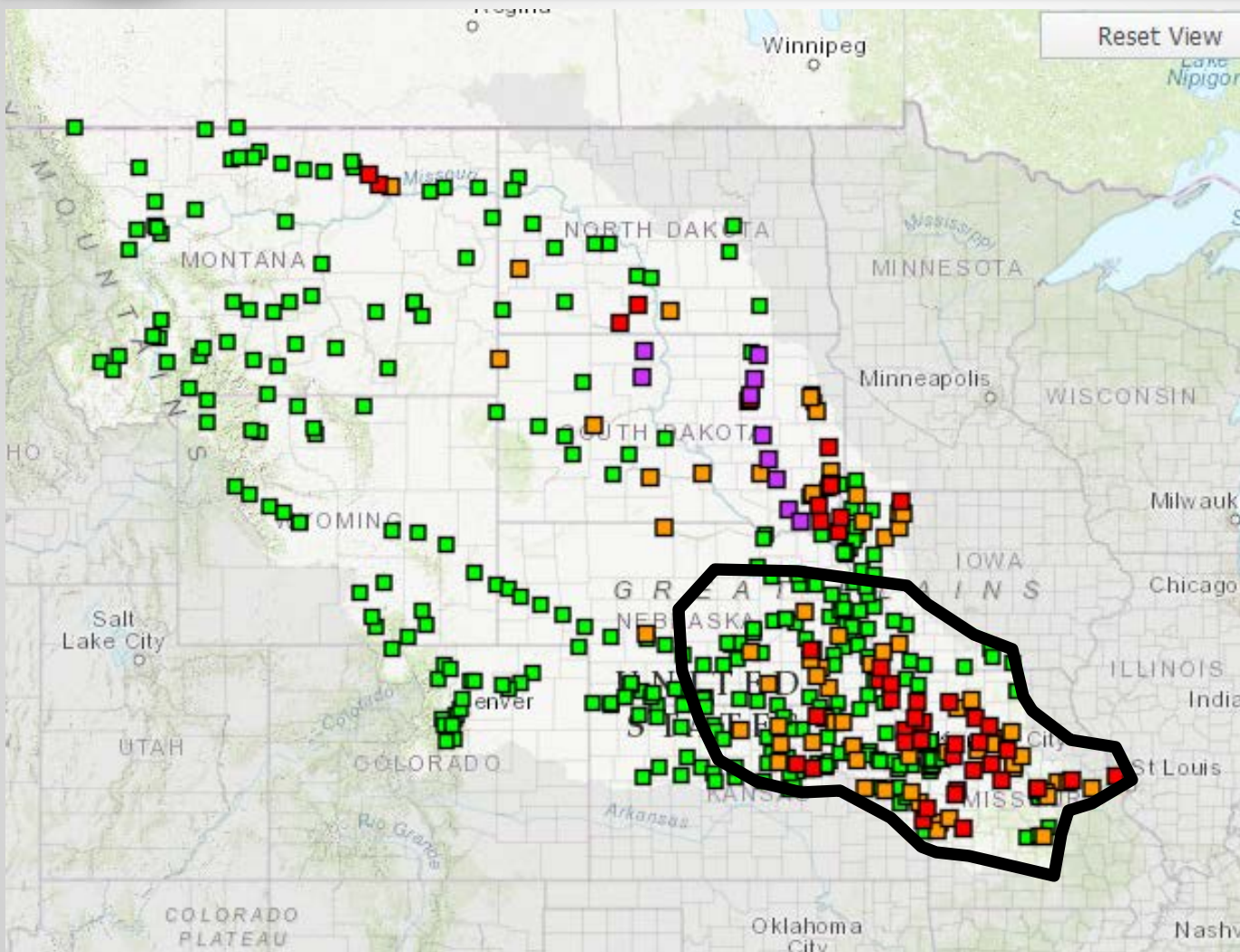
Big Sioux: Expect to see **moderate**.



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MISSOURI BASIN FLOOD POTENTIAL OUTLOOK



Lower basin: episodic **moderate level** flooding likely next 3 months due to convective activity.

This includes the Missouri River from Nebraska City to the mouth at St. Louis.



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MISSOURI BASIN SPRING FLOOD SUMMARY



- Mountain snowpack is near average this year. We should be at peak accumulation now. No significant flooding expected from mountain melt (would take rain, which is always possible).
- Plains snowpack almost gone.
- Have set over 40 new provisional records this season, most stemming from the rain-on-snow event of Mid-March. Plains are left wet and vulnerable to renewed flooding.
- Remaining ice concerns focused on the James River and possibly in the Bighorn River basin.
- Thunderstorm activity sure to bring episodic moderate level flooding across lower basin (southern IA, eastern KS, southeastern NE, MO.) **VERY ACTIVE SPRING FLOOD SEASON STILL AHEAD.**





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 and Middle Mississippi basins (including main-stem Mississippi River), eastern Missouri basin, and Red River of the North basin.
 - **Normal Flood Risk** – Souris and Western Missouri basin
 - **PLEASE MONITOR FUTURE FORECASTS AND OUTLOOKS**
-
- NOAA/National Weather Service will continue to monitor the flood risk.





NWS RFC

Contact Information



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Long-Range River Outlook can be found at:

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

Real-time AHPS River Forecasts are at:

<http://water.weather.gov/ahps/forecasts.php>



<http://www.weather.gov>

***Next Monthly Central U.S. Climate and Drought Outlook Webinar will be April 18, 2019**

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