

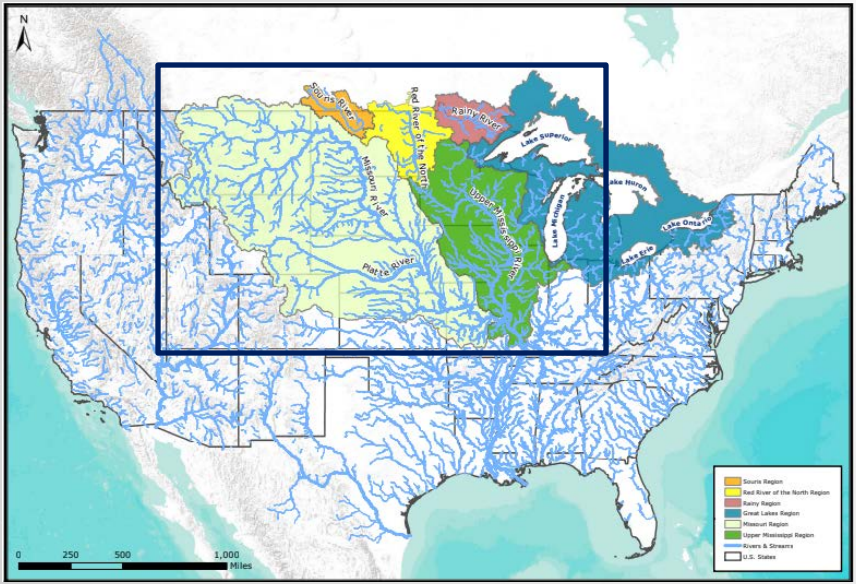


# 2019 May Hydrologic Outlook Central Region (North Central U.S.)



**For audio, please dial: 415-655-0052 Passcode: 532-514-076**

**Summary of Current Conditions and the Spring and Summer 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  
Dennis Todey – USDA Midwest Climate Ag. Hub Director**

**May 2, 2019**



*Building a Weather-Ready Nation*



# Key Messages



## What is New since early April

- **Extremely long duration flooding on mainstem rivers is expected to continue**
- **Mississippi River in the Quad Cities area is now at Day 40 above Major flood levels and the crest is forecast to break 1993 flood levels**
- **The mainstem Missouri and Mississippi Rivers will see several peaks into June**
- **Late spring and summer rain events are more likely to produce excessive rainfall**
- **Some areas have saturated soils and are currently experiencing flash flood impacts with less than 1 inch of rain**



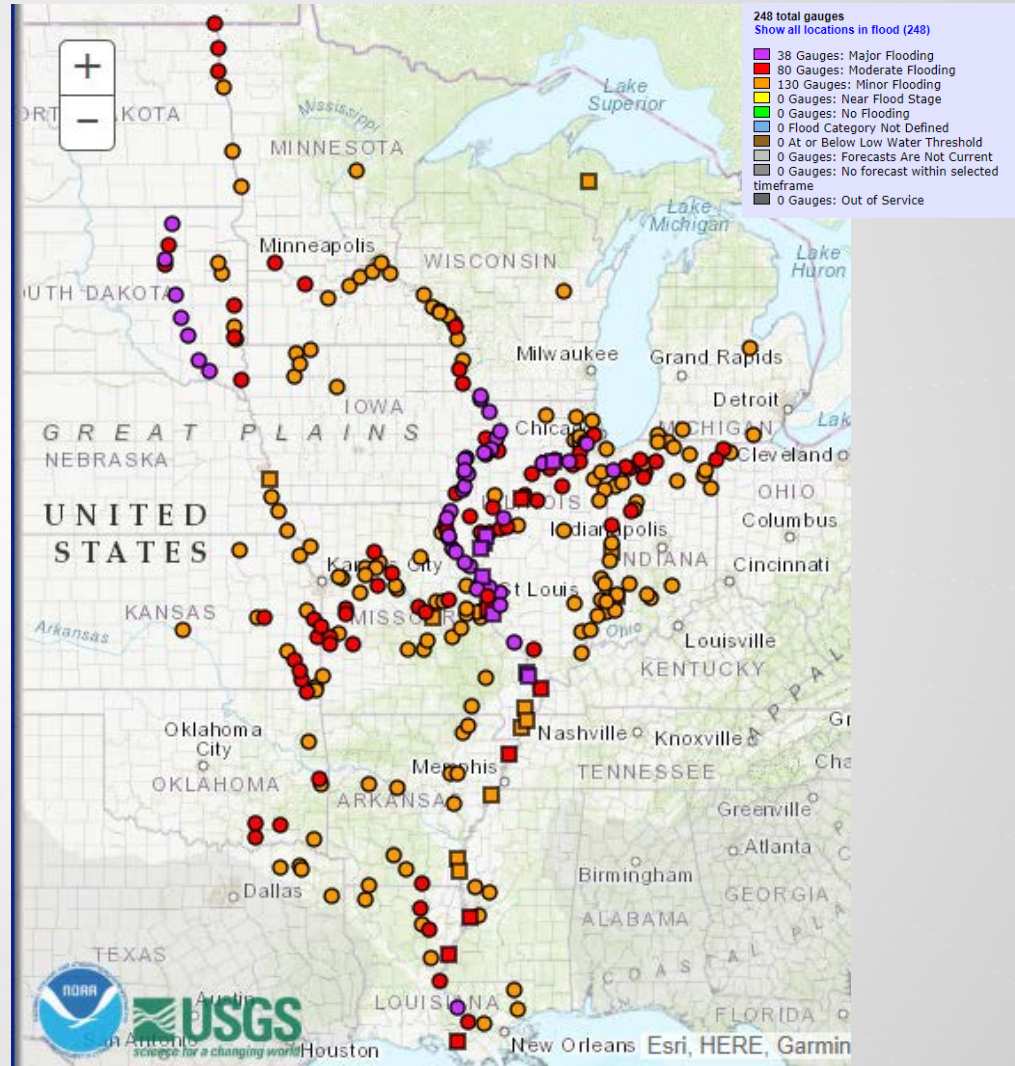




# Current River Flood Forecast



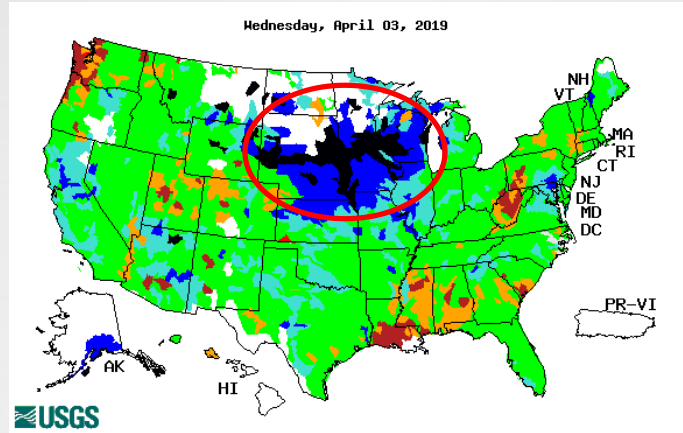
- **Moderate to Major** flooding continues in North Dakota, South Dakota, Minnesota, Iowa, Wisconsin, Illinois, Indiana, Kansas, and Missouri, and a few sites further downstream in the lower Mississippi basin
- Southeastern Colorado snowmelt flooding has begun earlier than normal and is melting quickly and will need to be monitored for the next 6-7 weeks
- The region continues to be *vulnerable to flooding* due to very wet soil conditions and elevated rivers and lakes. Late Spring and Summer thunderstorms may cause additional flooding/flash flooding



# USGS Streamflow Conditions

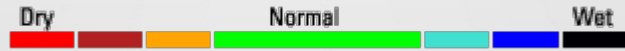
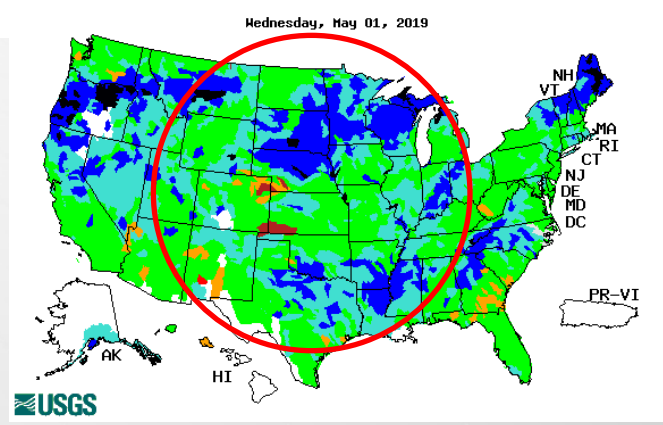
April 3, 2019

- Comparing USGS 28-day average stream flows from early April



- Above Normal flows in much of the Missouri, Ohio, and upper and lower Mississippi River basin

May 2, 2019



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



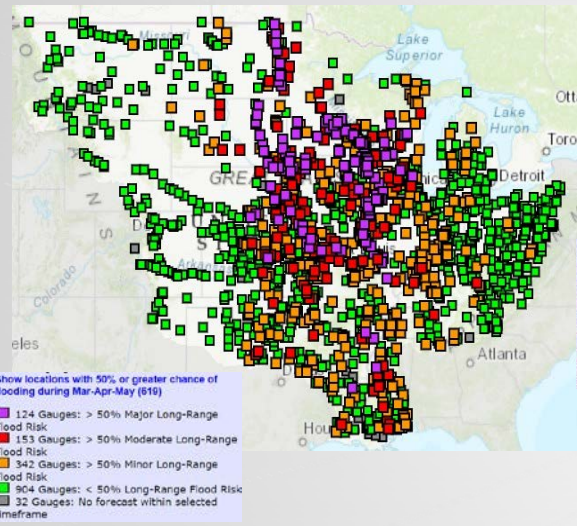


# Flood Outlook

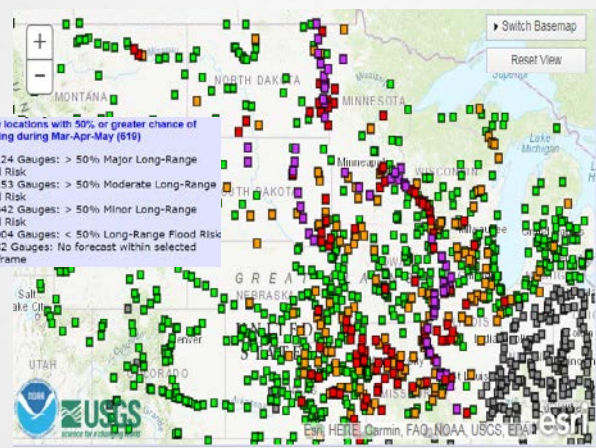
## Through mid-June 2019

### 50% or Greater Chance of Flooding

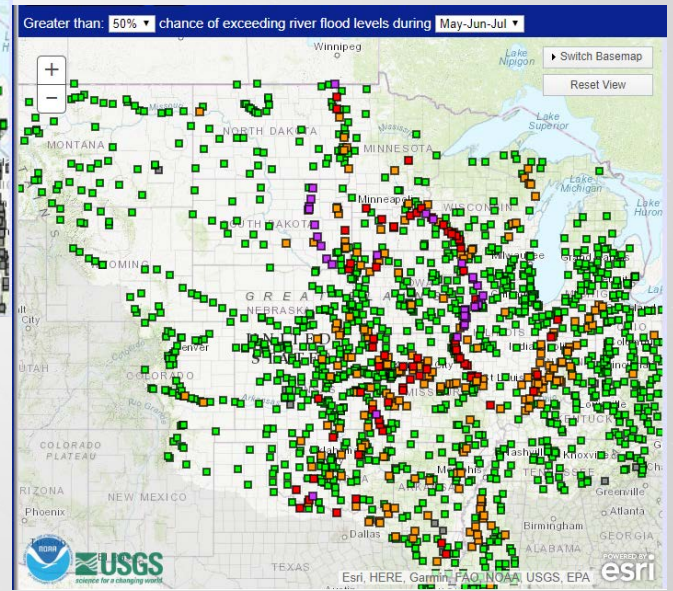
March 7, 2019



March 31, 2019



April 30, 2019  
Valid through mid-July



[http://water.weather.gov/ahps/region\\_long\\_range.php?rfc=mvrfc&percent=50](http://water.weather.gov/ahps/region_long_range.php?rfc=mvrfc&percent=50)



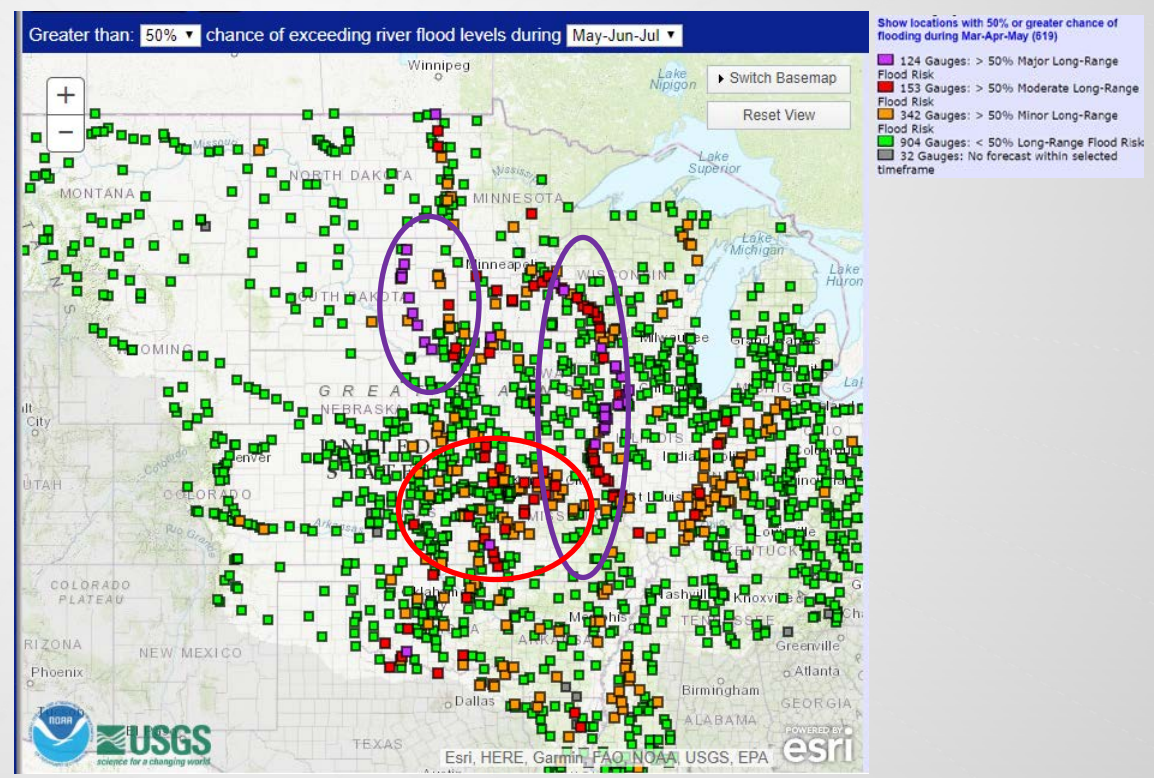


# Flood Outlook Through mid-July 2019



- **Moderate to Major** flooding may continue into June and July in the Mississippi River basin and portions of the Missouri River basin.
- Flooding chances remain **higher** and **more widespread** than last year and in several years
- Long duration flooding at very high levels is expected to continue

## 50% or Greater Chance of Flooding Valid through mid-July



[http://water.weather.gov/ahps/region\\_long\\_range.php?rfc=mvrfc&percent=50](http://water.weather.gov/ahps/region_long_range.php?rfc=mvrfc&percent=50)



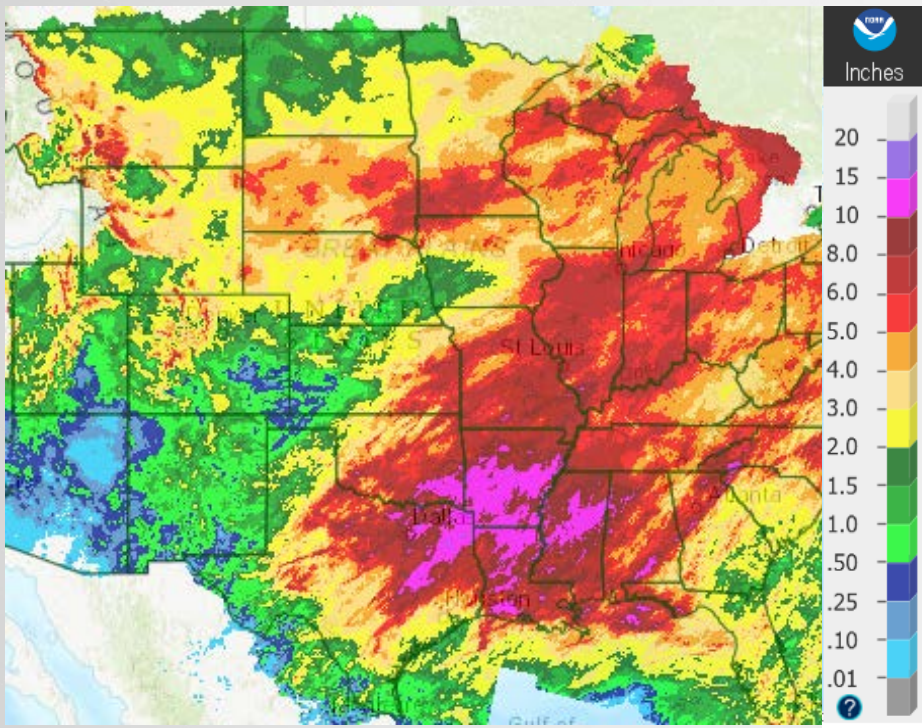




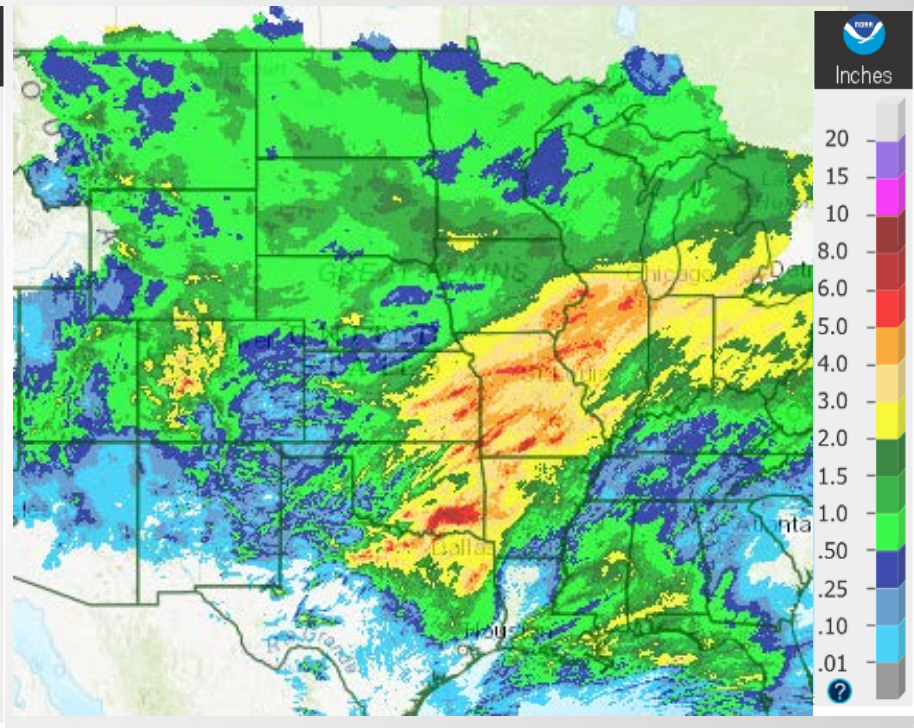
# Past Precipitation



Past 30 days



Past 7 days



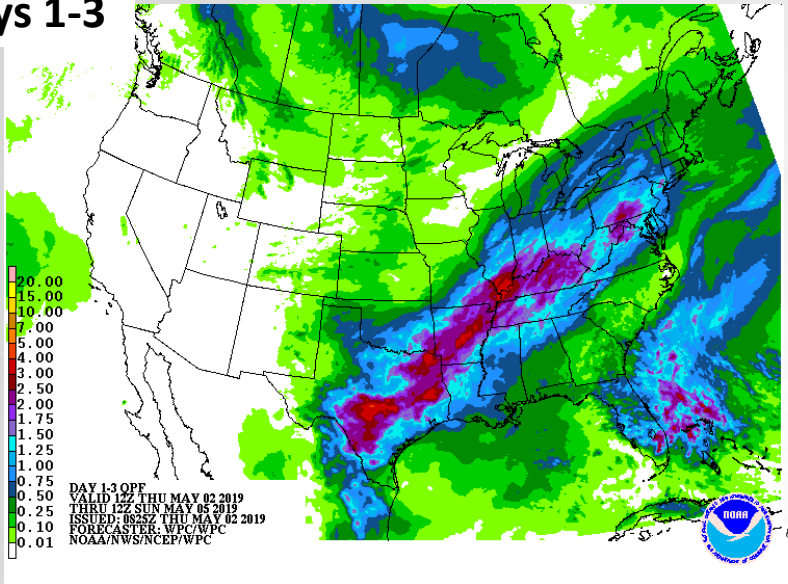


# Precipitation Forecasts for May 2-9

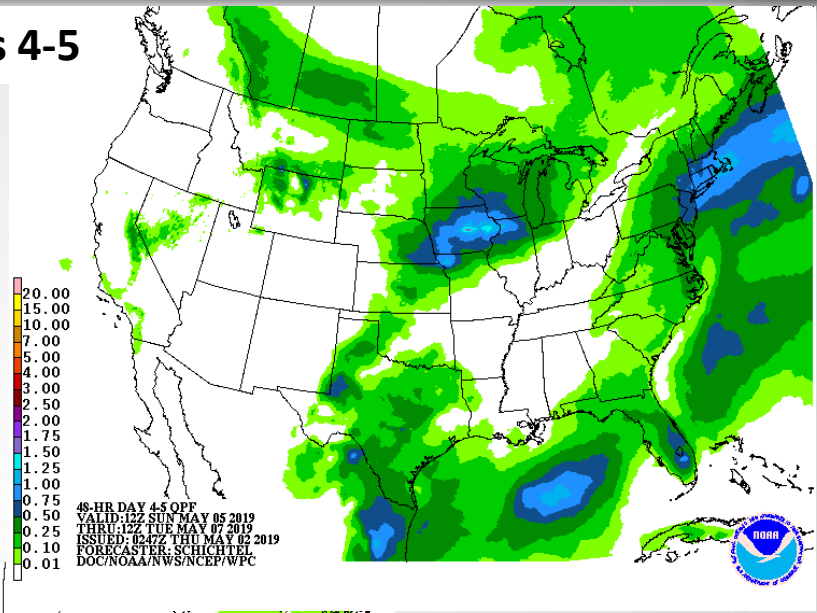


## Days 1-3, Days 4-5, Days 6-7

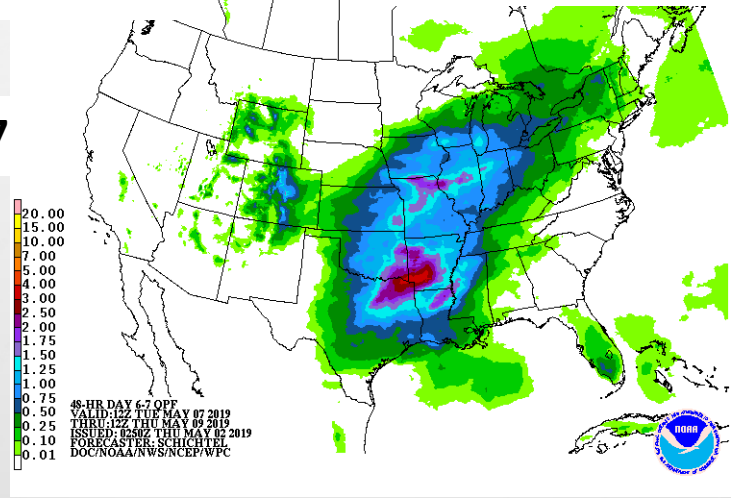
### Days 1-3



### Days 4-5



### Days 6-7







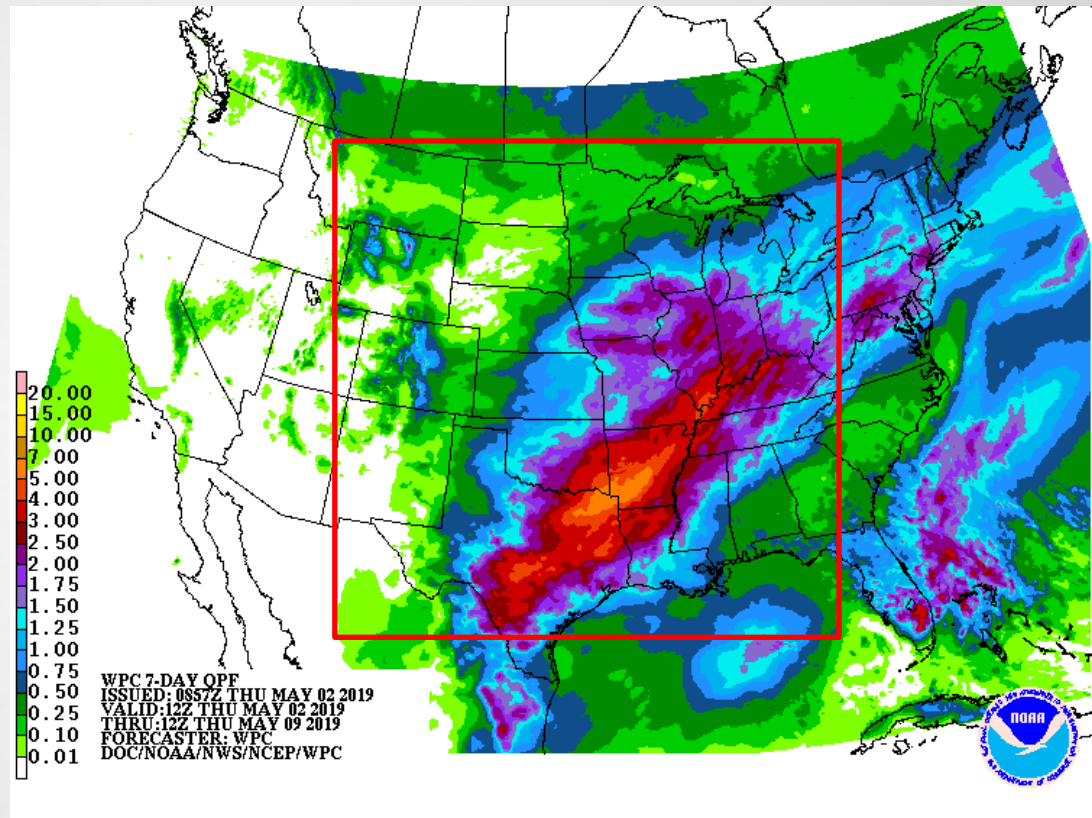
# Week 1 Precipitation Forecast



## May 2 Through May 9, 2019

Heavy rain is expected the next 7 days across the lower Missouri, Ohio, and Mississippi River basins

Looking into Week 2 there is a chance for two more significant weather systems May 10-12 and May 16-18



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





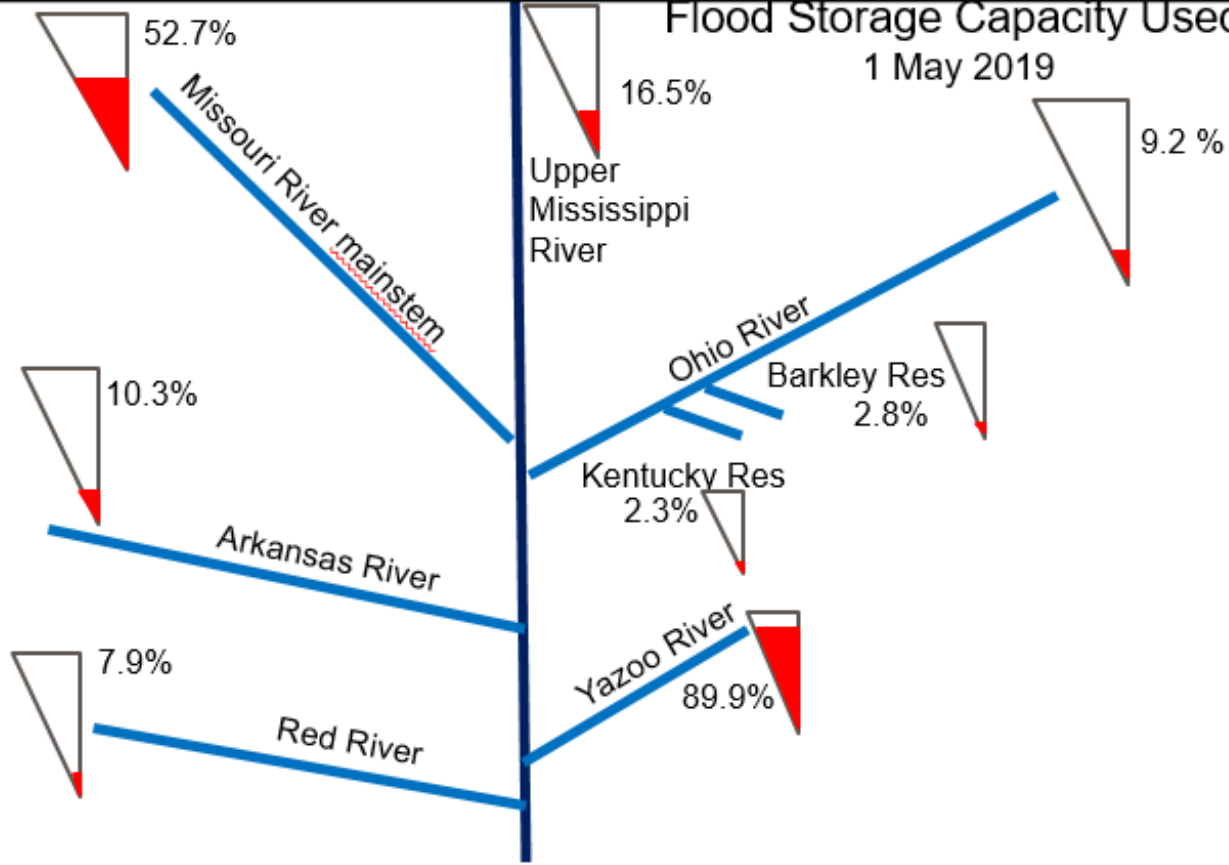
# USACE Flood Storage Used



UNCLASSIFIED// FOR OFFICIAL USE ONLY



## Flood Storage Capacity Used 1 May 2019



1

UNCLASSIFIED// FOR OFFICIAL USE ONLY



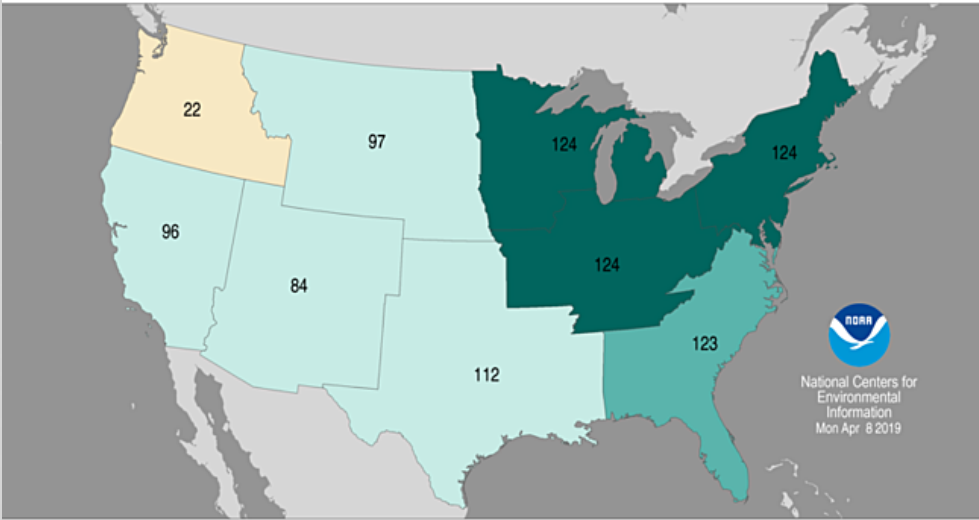




# Historical Precipitation Rankings Last 12 months (April 2018 - March 2019)



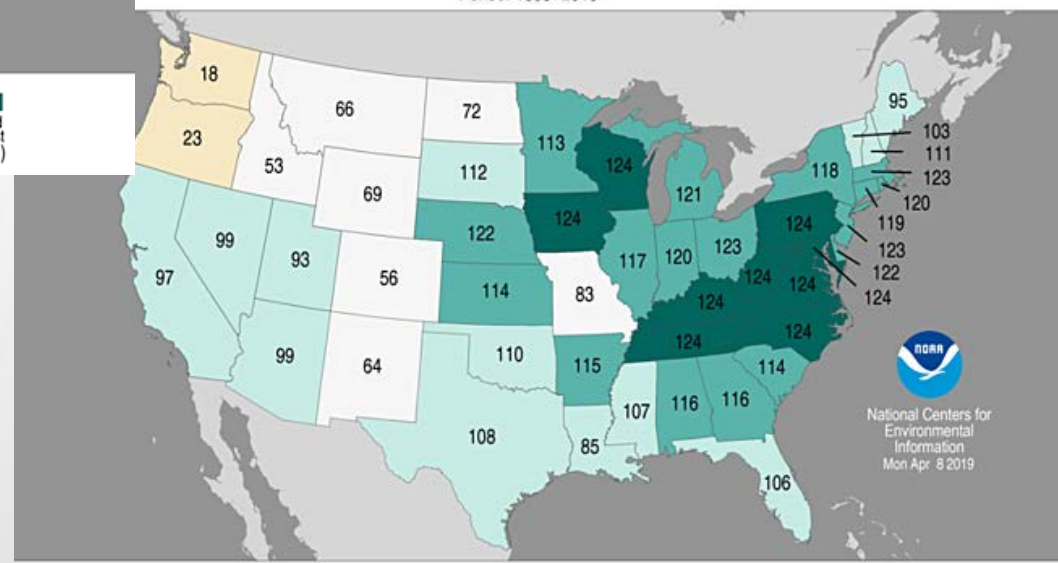
Regional Precipitation Ranks  
April 2018–March 2019  
Period: 1895–2019



## Long term wetness – Last 12 months:

- **Wettest in 124 years of record**
- **Upper Mississippi, Ohio, Northeast**
- **Wettest state WI, IA, KY**
- **Top ten wettest OH, MI, NE, IL, IN**

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



Record Driest (1)  
 Much Below Average  
 Below Average  
 Near Average  
 Above Average  
 Much Above Average  
 Record Wettest (124)

Record Driest (1)  
 Much Below Average  
 Below Average  
 Near Average  
 Above Average  
 Much Above Average  
 Record Wettest (124)

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



Building

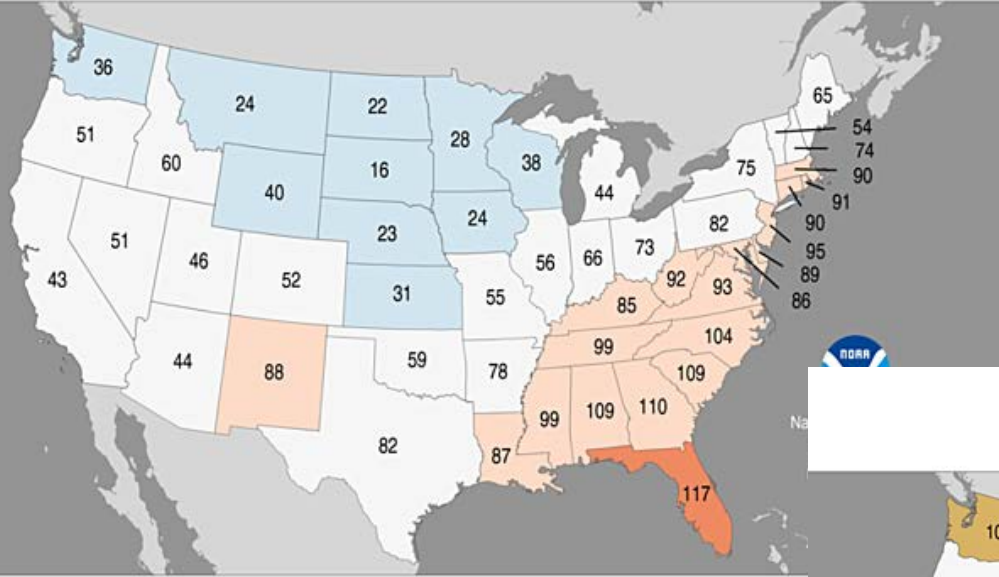


# January – March 2019 Temperature and Precipitation Ranks

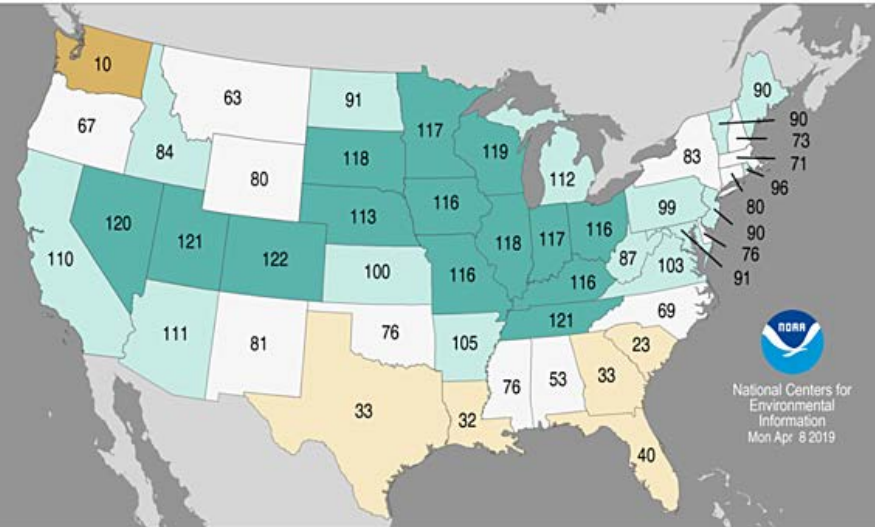


Statewide Average Temperature Ranks  
January–March 2019  
Period: 1895–2019

**Cool and wet persisted through the first 3 months of the year**



Statewide Precipitation Ranks  
January–March 2019  
Period: 1895–2019



Building a

National Centers for Environmental Information  
Mon Apr 8 2019





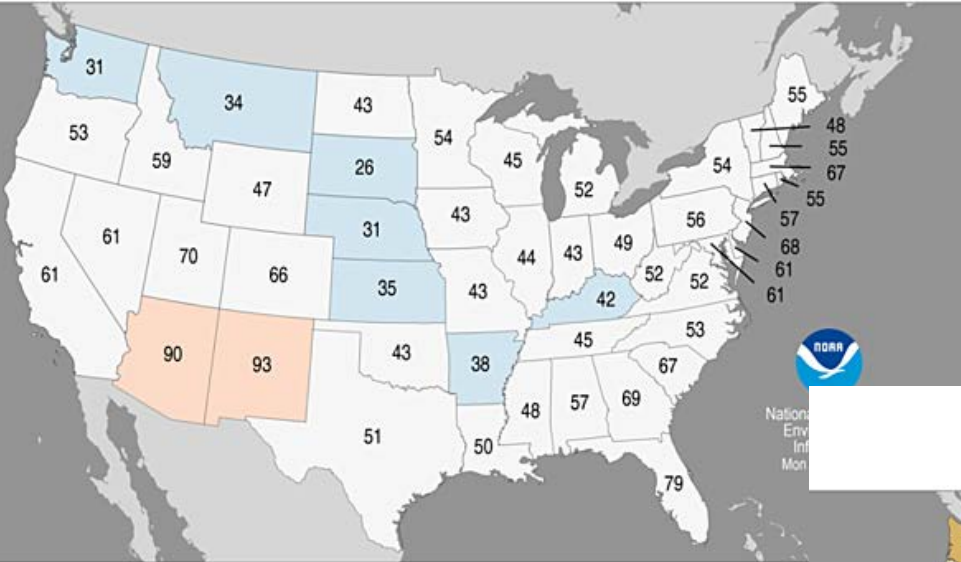
# March 2019 Temperature and Precipitation State Rankings



## Statewide Average Temperature Ranks

March 2019  
Period: 1895-2019

- Relatively drier pattern except for NE, CO, SD
- Cool plains

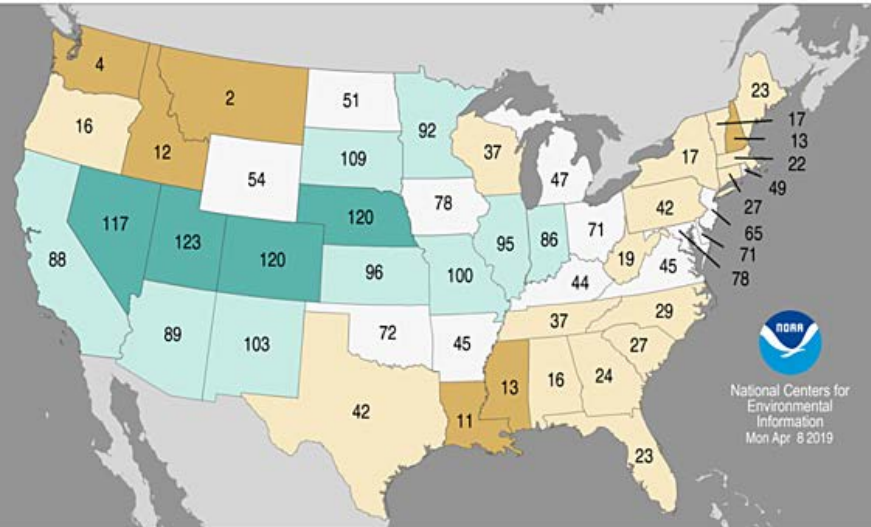


National  
Env  
Inf  
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## Statewide Precipitation Ranks

March 2019  
Period: 1895-2019



National Centers for  
Environmental  
Information  
Mon Apr 8 2019

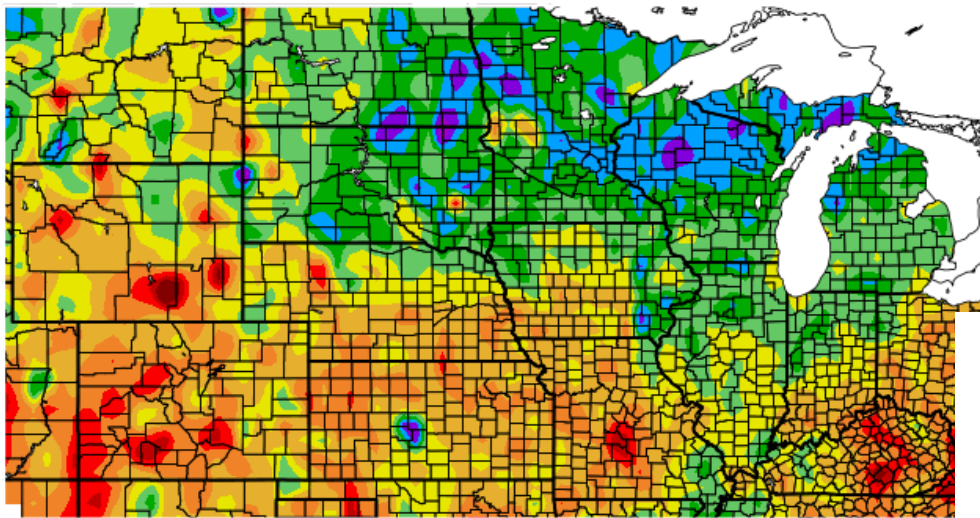




# Last 30 and 90 Day Temperature Departures from Normal

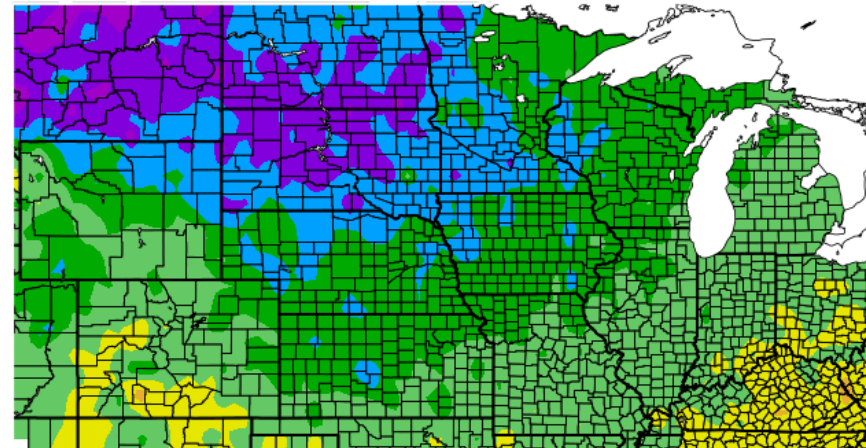


Departure from Normal Temperature (F)  
4/1/2019 - 4/30/2019



- Last 90 days cooler than normal
- Last 30 days cooler than normal north-northeast and warmer south

Departure from Normal Temperature (F)  
1/31/2019 - 4/30/2019



Generated 5/1/2019 at HPRCC using provisional data. NOAA Regional Climate



Generated 5/1/2019 at HPRCC using provisional data. NOAA Regional Climate Center



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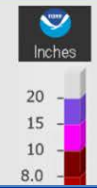
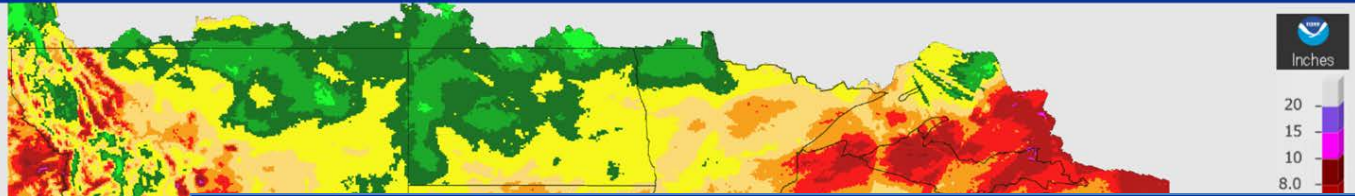
# Precipitation – Last 30 Days



<https://water.weather.gov/precip>

May 02, 2019 30-Day Observed Precipitation

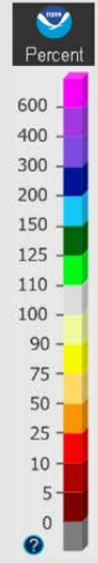
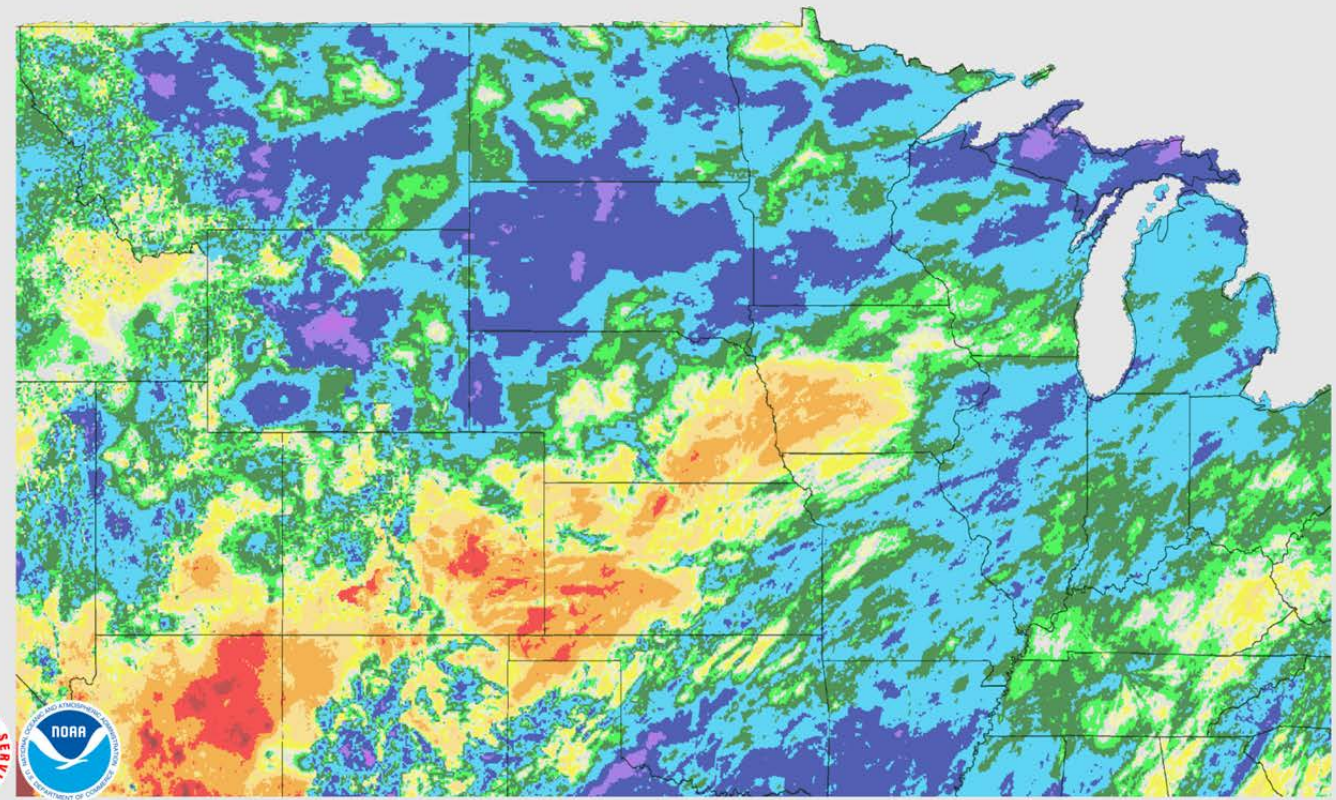
Created on: May 02, 2019 - 15:12 UTC  
Valid on: May 02, 2019 12:00 UTC



**Last 30 days continued wet to extreme wet over most of the area.**

May 02, 2019 30-Day Percent Precipitation

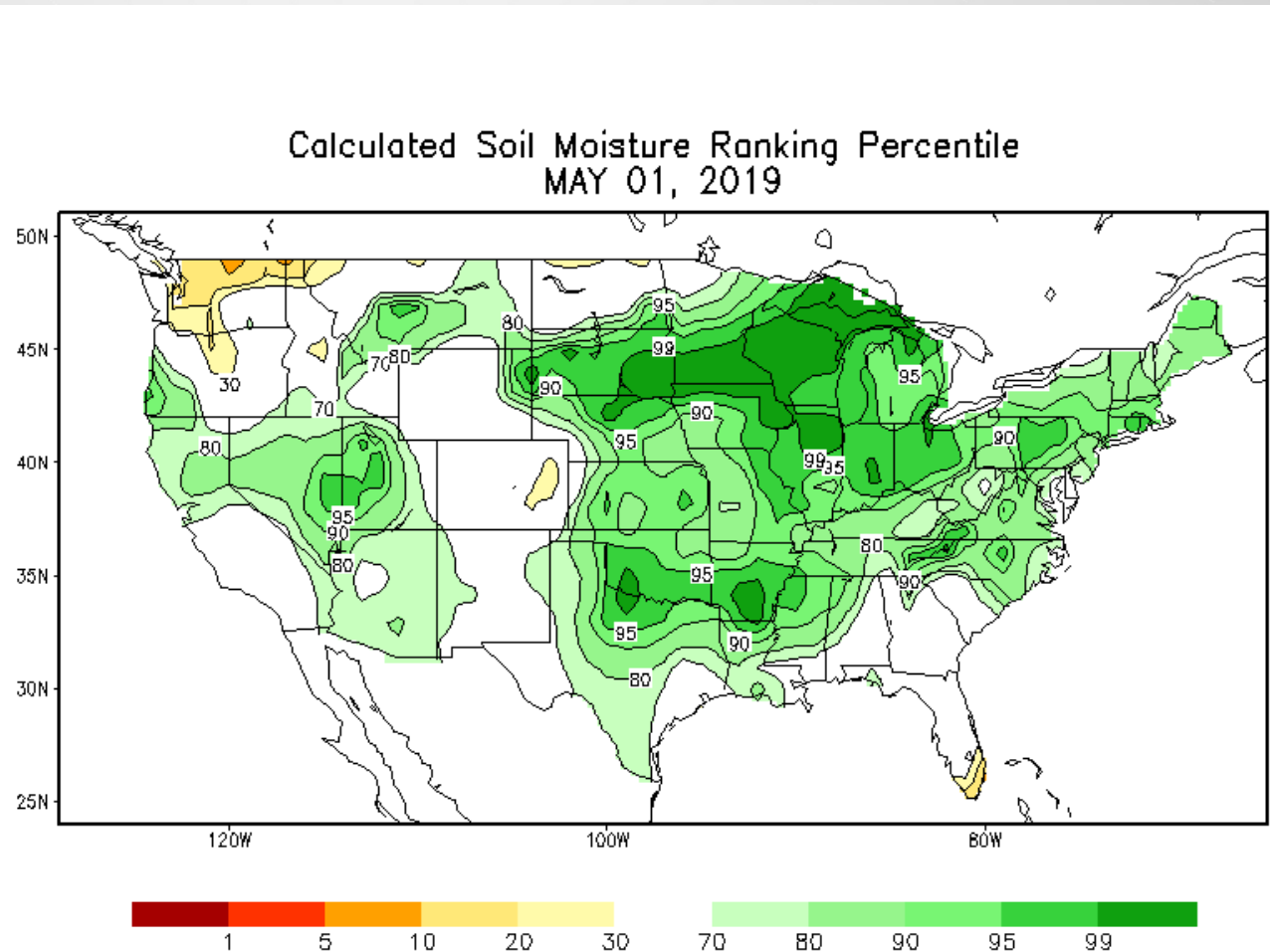
Created on: May 02, 2019 - 15:15 UTC  
Valid on: May 02, 2019 12:00 UTC



- Still widespread very wet conditions

## Current Conditions

- Has been wet for several months
- Drying will take months



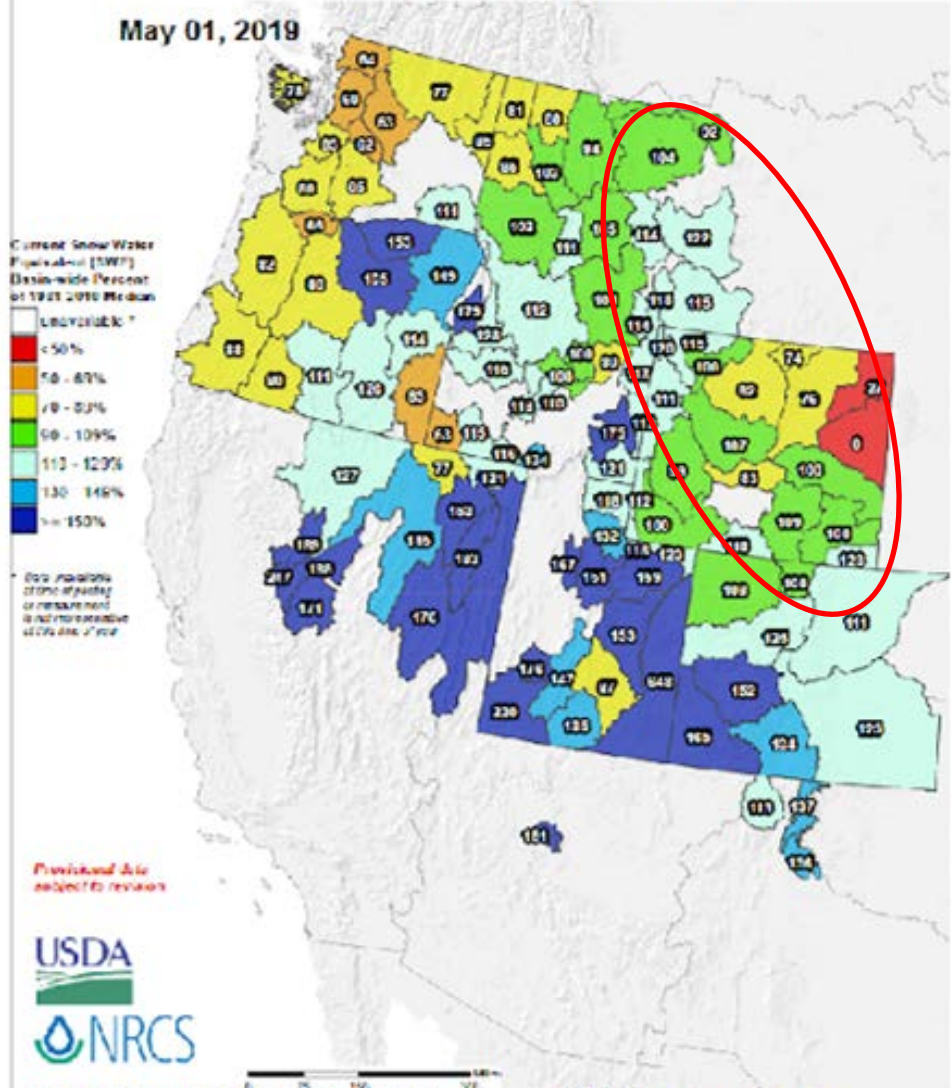




# Mountain Snowpack Current Conditions

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

May 01, 2019



- Near average to slightly above conditions
- At the end of average mountain accumulation period
- Snowmelt through June

The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first one day of the day (usually 00:00).  
 Prepared by: USDA NRCS National Water and Climate Center, Portland, Oregon. <http://water.weather.gov/precip/>



# Shifting to Outlooks

- El Nino
- Weeks 2, 3, 4
- May
- May – July
- June – August

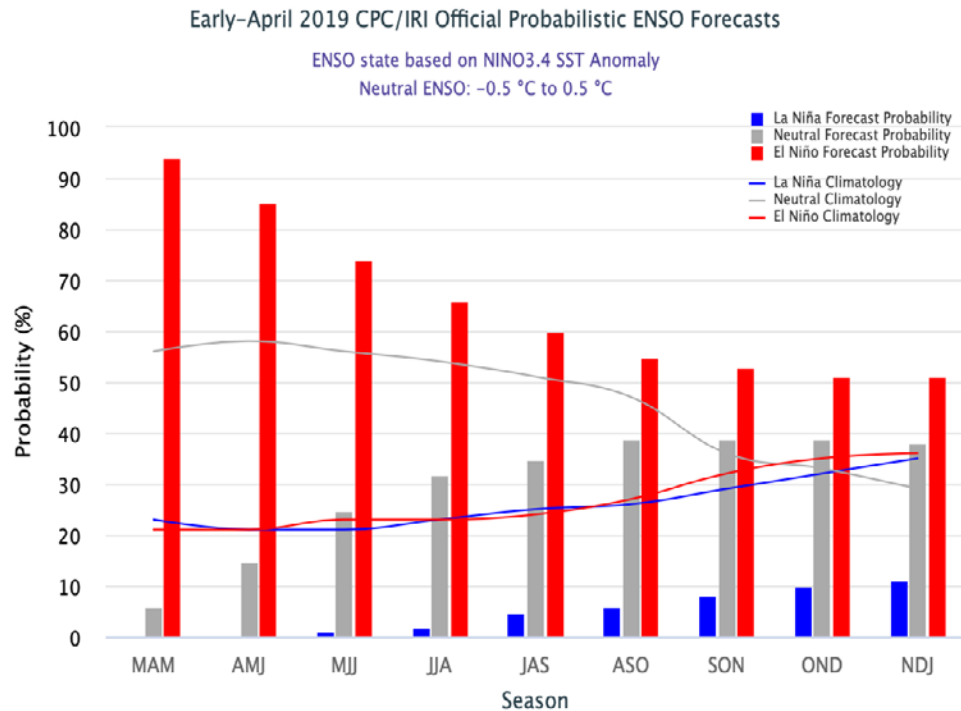




# CPC/IRI Probabilistic ENSO Outlook

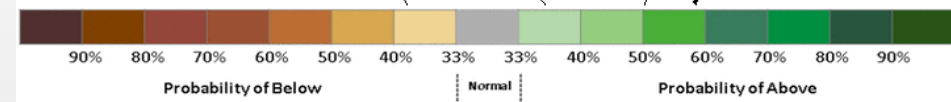
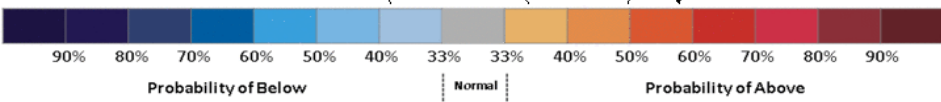
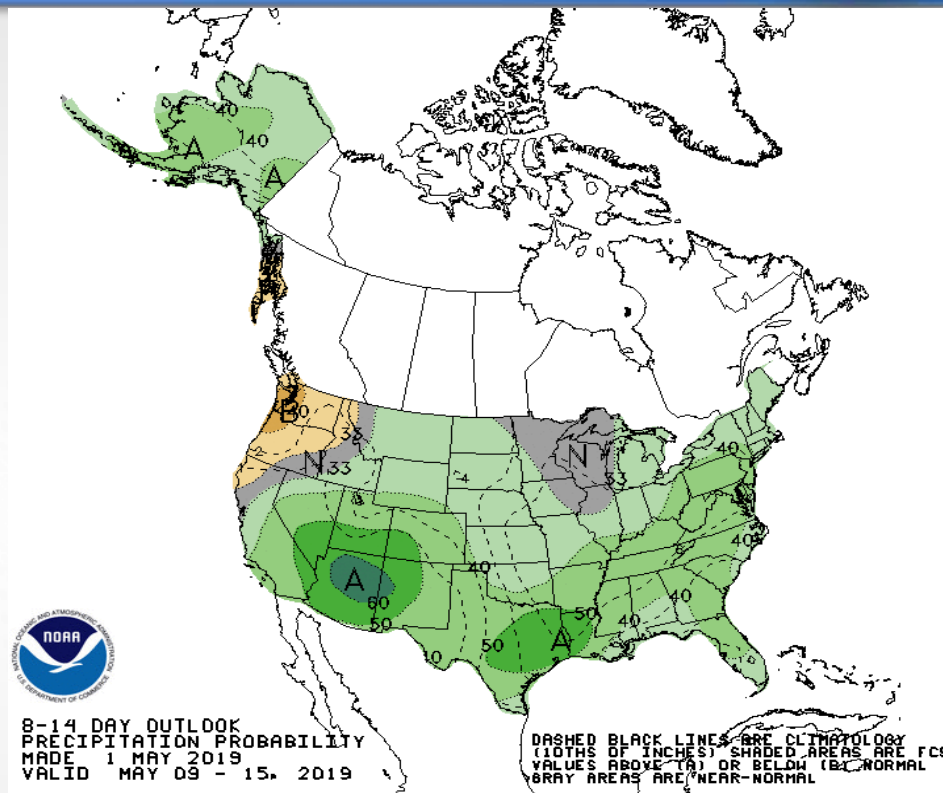
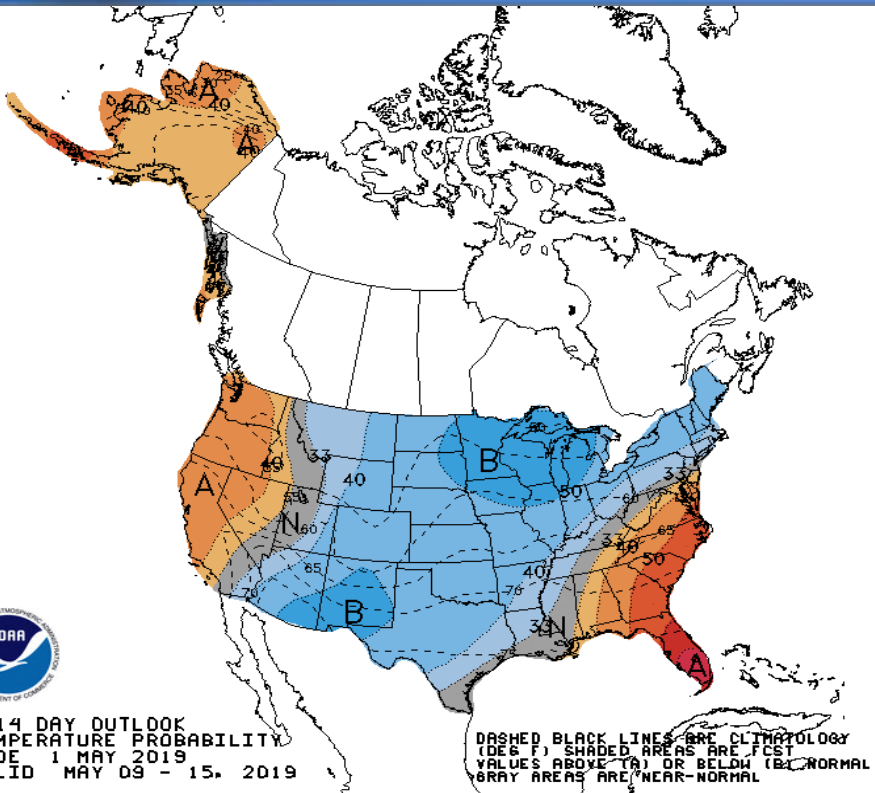
Updated: 11 April 2019

El Niño conditions are favored to continue through fall 2019 with diminishing chances (~50% in October-November-December).





# May 9<sup>th</sup> - May 15<sup>th</sup> Probability Outlooks Temperatures and Precipitation



- Decent chances for below normal temperatures
- Slightly elevated chances for above normal precipitation across Midwest/Plains (near normal chances Upper Mississippi)





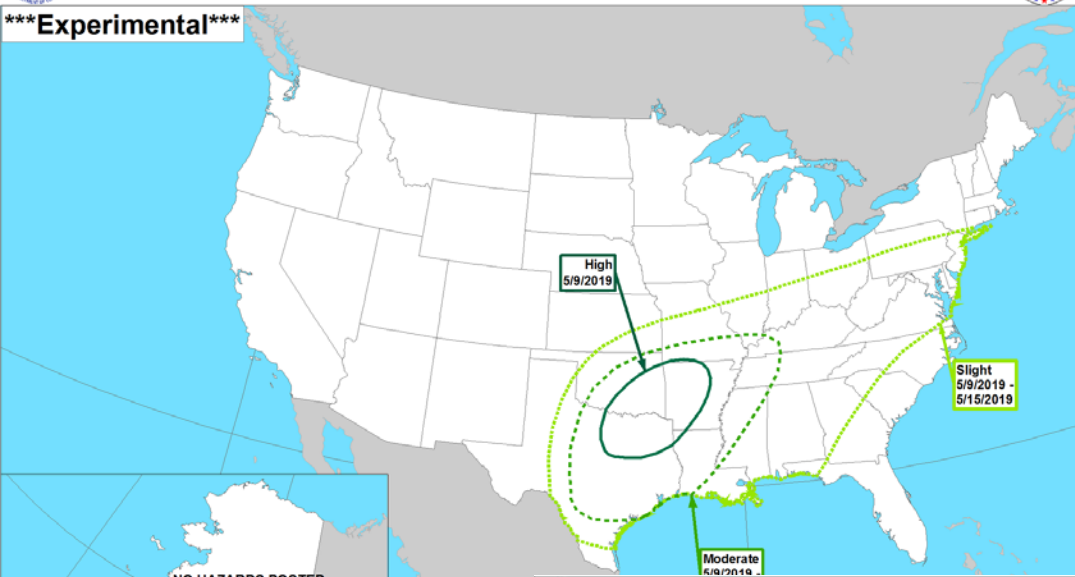


# Potential Week 2 Precip & Temp Extremes (May 9-15)



**Risk of Heavy Precipitation**  
Valid: 05/09/2019-05/15/2019

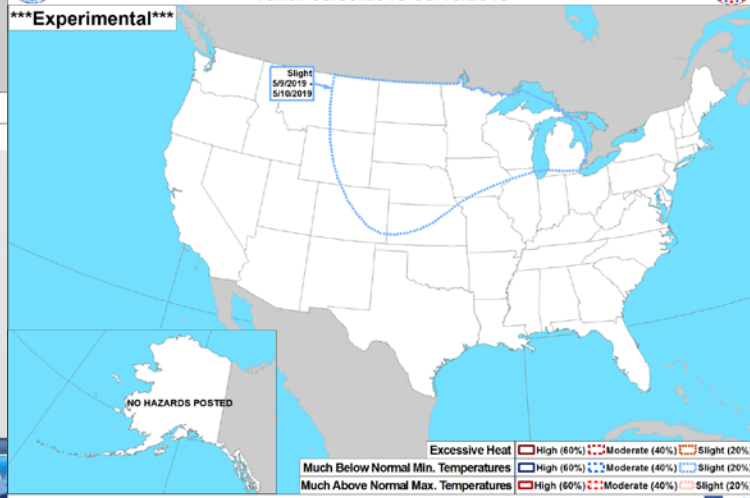
\*\*\*Experimental\*\*\*



- Major storm systems focused on the S. Plains – Lower Mississippi to the Mid-Atlantic
- Beginning May 9<sup>th</sup> but stretching through the 15<sup>th</sup>
- Cooler than normal temps north – potential freeze/frost far north

**Risk of Hazardous Temperatures**  
Valid: 05/09/2019-05/15/2019

\*\*\*Experimental\*\*\*



Climate Prediction Center  
Made: 05/01/2019 3PM EDT

Climate Prediction Center  
Made: 05/01/2019 3PM EDT

Excessive Heat	High (60%)	Moderate (40%)	Slight (20%)
Much Below Normal Min. Temperatures	High (60%)	Moderate (40%)	Slight (20%)
Much Above Normal Max. Temperatures	High (60%)	Moderate (40%)	Slight (20%)

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

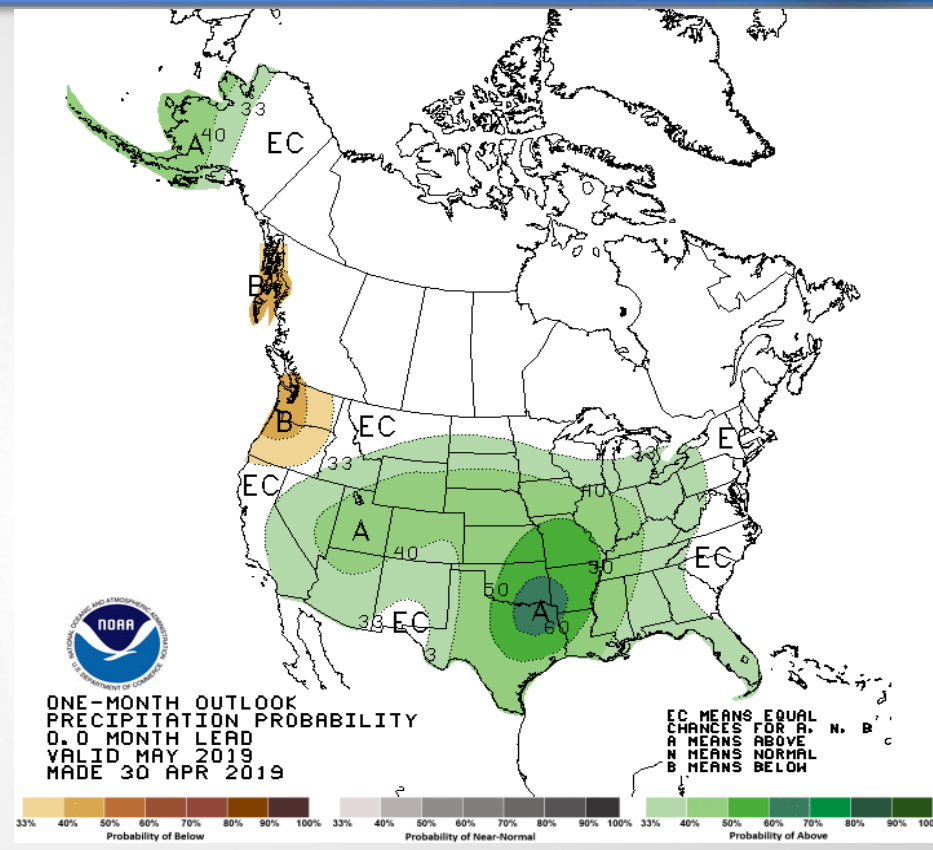
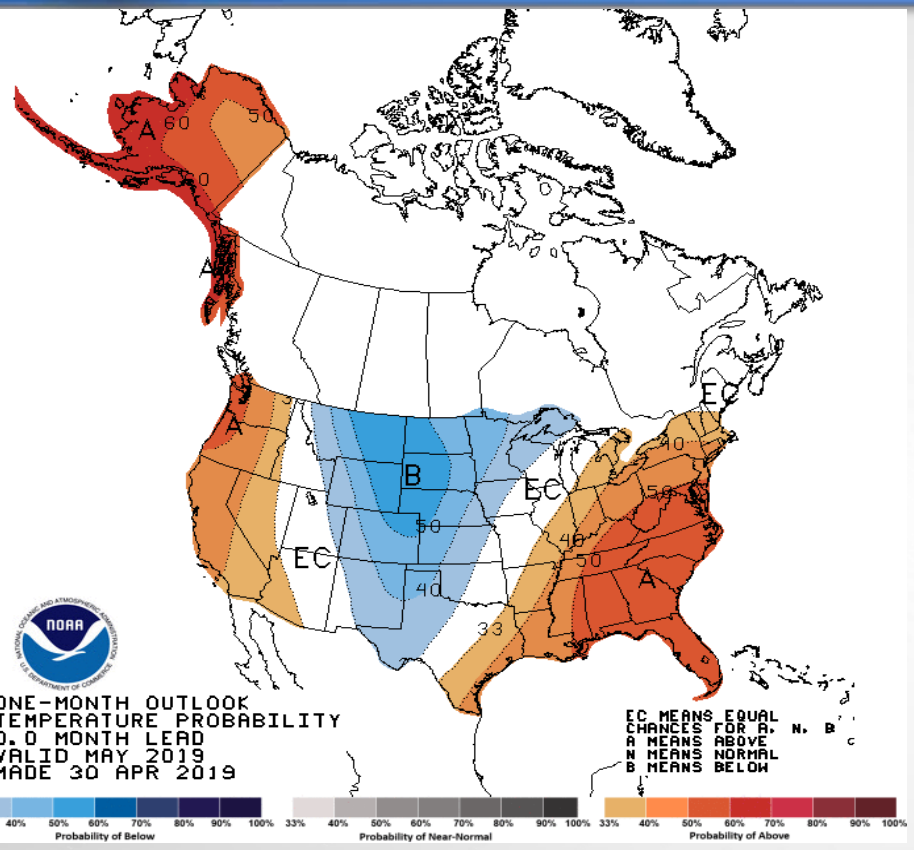


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# May Temperature and Precipitation Probability Outlooks



- Enhanced chances for above normal precipitation entire region (except far north)
- Enhanced chances for below normal temperature across the plains (border to border)

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

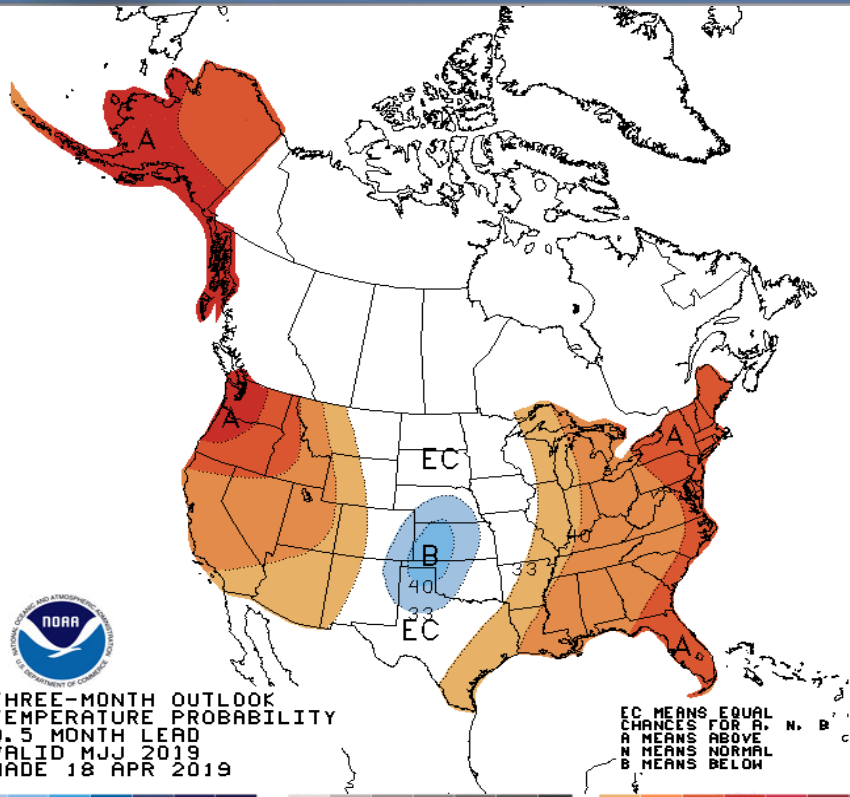


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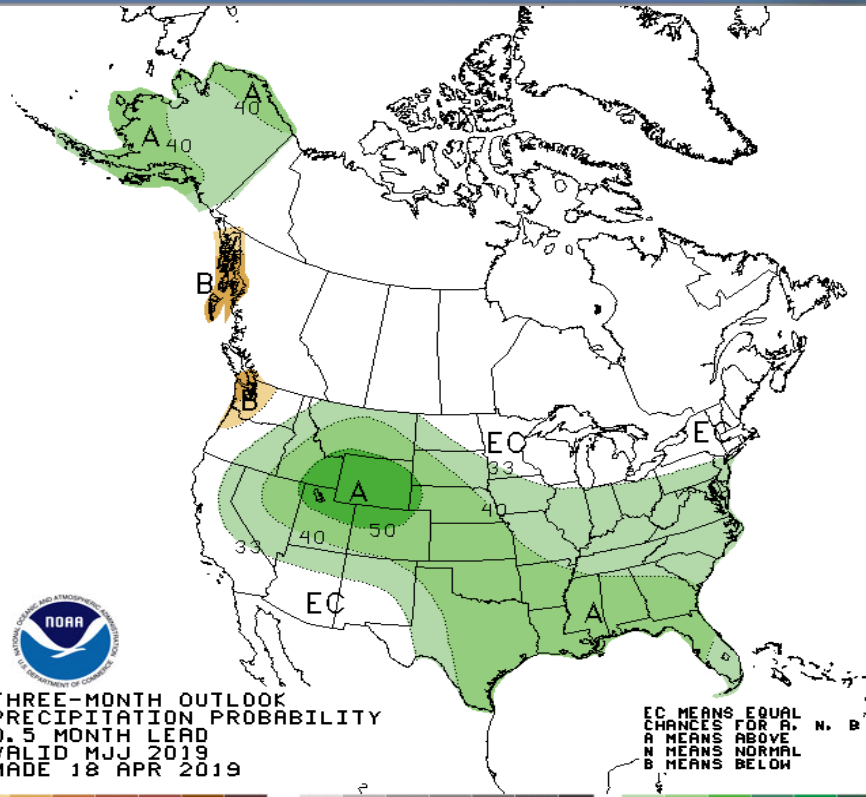
# May – June - July

## Temperature and Precipitation Probabilities



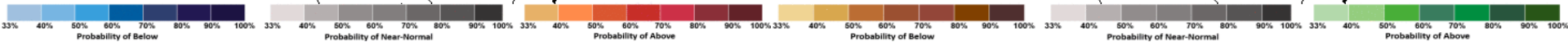
THREE-MONTH OUTLOOK  
TEMPERATURE PROBABILITY  
0.5 MONTH LEAD  
VALID MJJ 2019  
MADE 18 APR 2019

EC MEANS EQUAL CHANCES FOR A, B, C  
A MEANS ABOVE  
N MEANS NORMAL  
B MEANS BELOW



THREE-MONTH OUTLOOK  
PRECIPITATION PROBABILITY  
0.5 MONTH LEAD  
VALID MJJ 2019  
MADE 18 APR 2019

EC MEANS EQUAL CHANCES FOR A, B, C  
A MEANS ABOVE  
N MEANS NORMAL  
B MEANS BELOW



- Enhanced chances for precipitation across most of the are with focus in WY, northern CO. Equal chances Great Lakes and northern areas of MN/ND
- Leaning below normal temperatures central Plains, equal chances for above, below and near normal temperatures most of region w/above normal chances east.

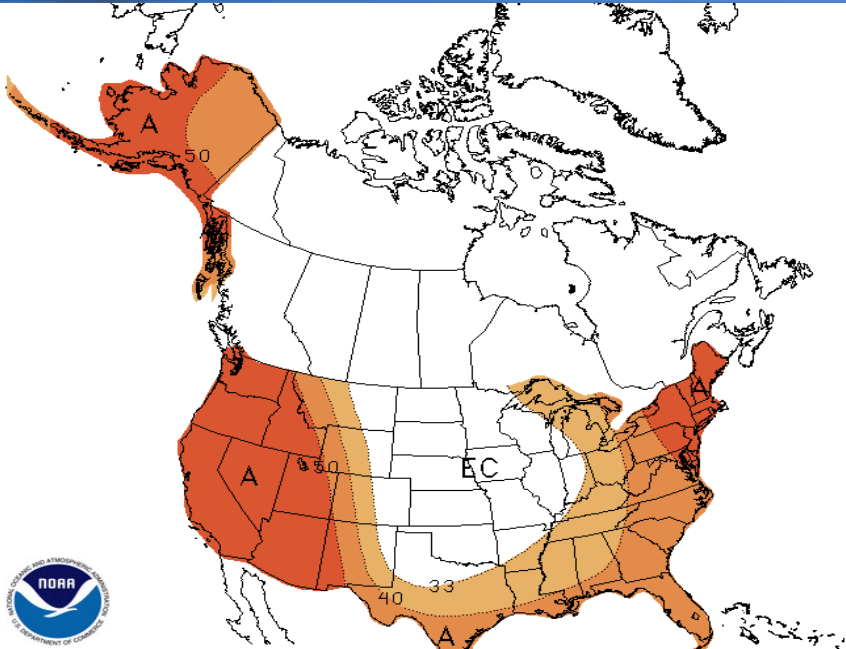
<https://www.cpc.ncep.noaa.gov/>





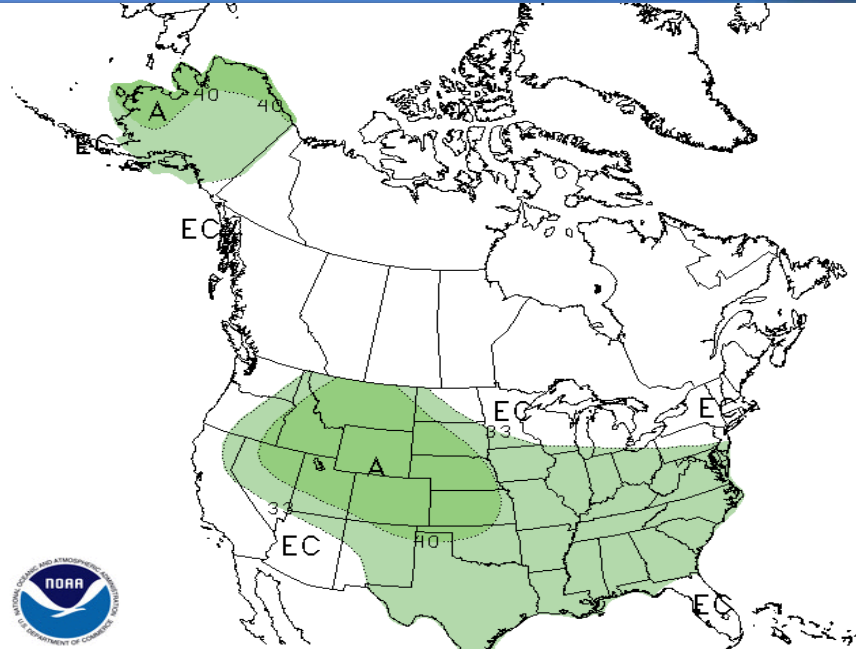


# June – July - August Temperature and Precipitation Probabilities



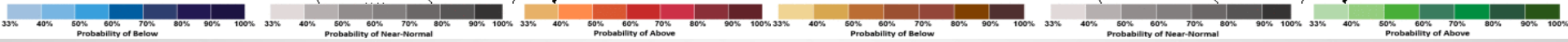
THREE-MONTH OUTLOOK  
TEMPERATURE PROBABILITY  
1.5 MONTH LEAD  
VALID JJA 2019  
MADE 18 APR 2019

EC MEANS EQUAL CHANCES FOR A, N, B  
A MEANS ABOVE NORMAL  
B MEANS BELOW



THREE-MONTH OUTLOOK  
PRECIPITATION PROBABILITY  
1.5 MONTH LEAD  
VALID JJA 2019  
MADE 18 APR 2019

EC MEANS EQUAL CHANCES FOR A, N, B  
A MEANS ABOVE NORMAL  
B MEANS BELOW



- Enhanced chances for above normal precipitation continues (except for Great Lakes areas)
- Mostly equal chances with some slight leaning toward warmer than normal temperatures east/west





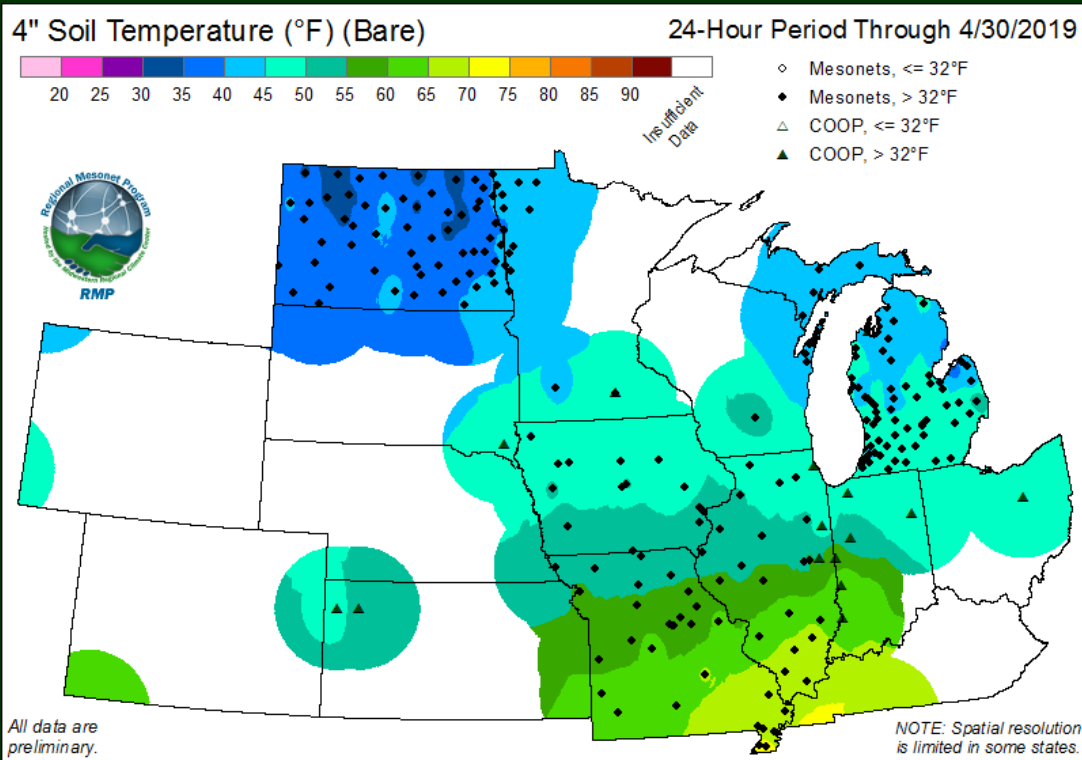
# Summary – Long Term Outlooks



- **May – June climatological wettest time of the year on average**
  - Average rainfall will continue to cause flooding
- **May – continued better chances for above normal precipitation**
- **May – July: continued better chances for above normal precipitation**
- **El Nino: Potential contributor to continuing wetness in some areas.**



# Soil Temperature

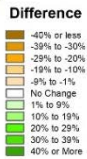
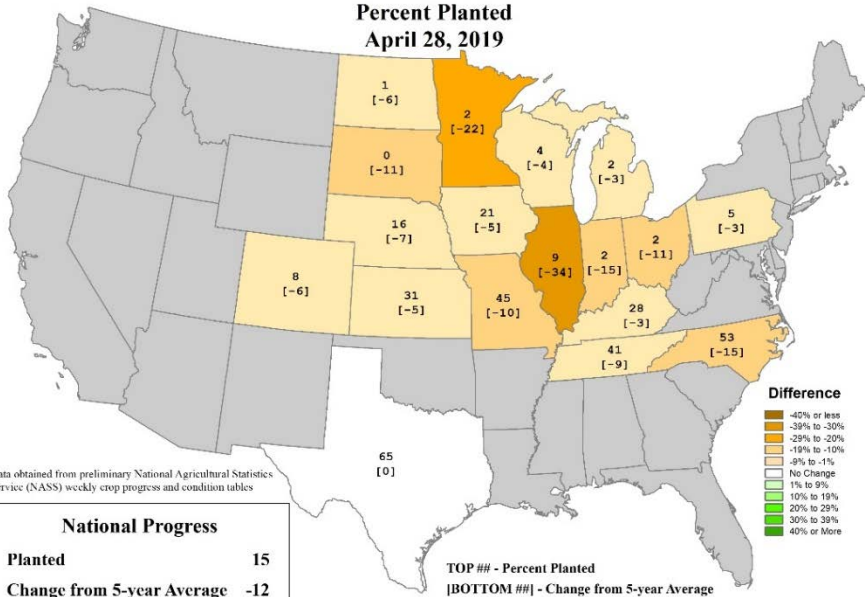


- Cold temperatures limiting some planting/planted crops
- Crops are sitting in many soils below 50 F (typical temperature for corn)
- 40 F appropriate for small grains
- Southern Corn Belt areas are somewhat warmer.



# U.S. Corn Progress

Percent Planted  
April 28, 2019



Data obtained from preliminary National Agricultural Statistics Service (NASS) weekly crop progress and condition tables

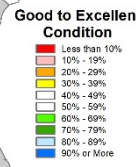
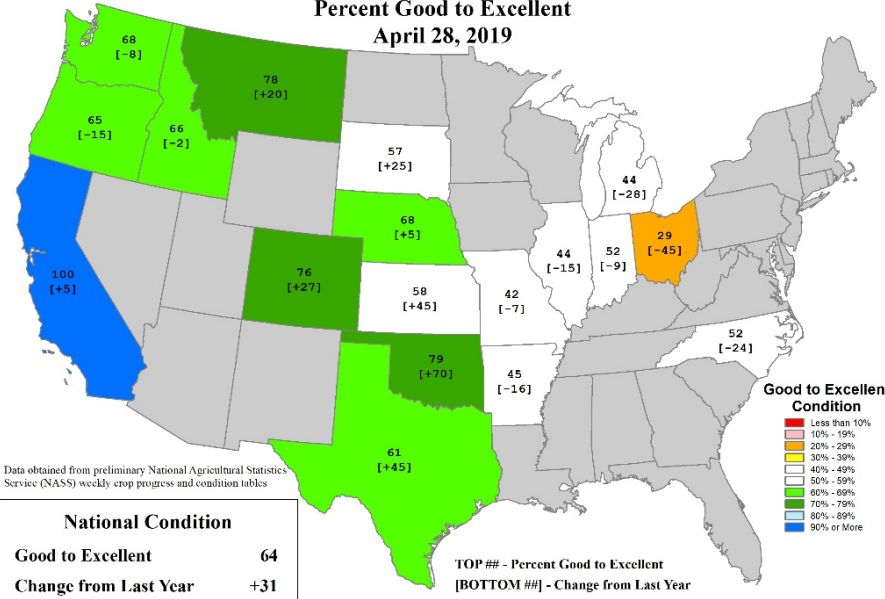
National Progress	
Planted	15
Change from 5-year Average	-12

TOP ## - Percent Planted  
[BOTTOM ##] - Change from 5-year Average

# USDA-NASS Crop Progress

## U.S. Winter Wheat Conditions

Percent Good to Excellent  
April 28, 2019



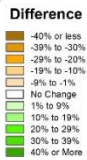
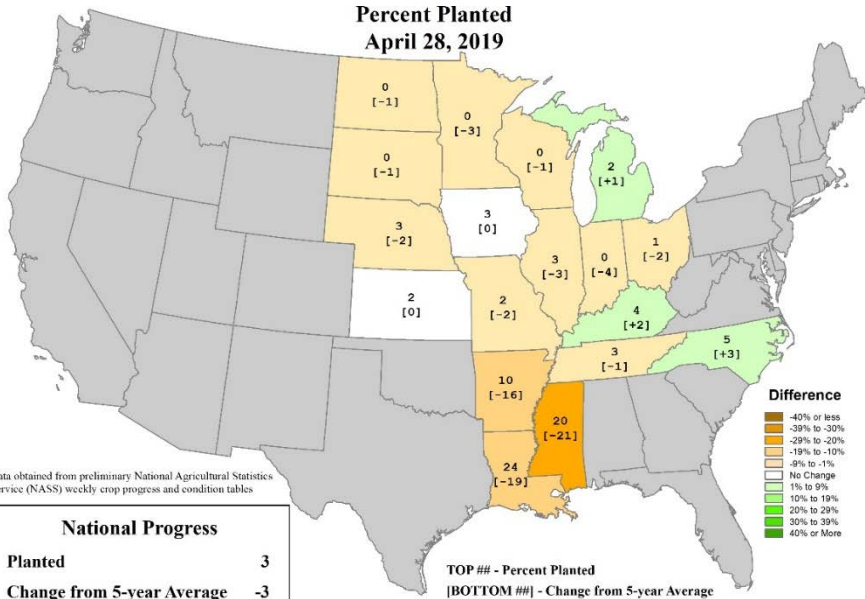
Data obtained from preliminary National Agricultural Statistics Service (NASS) weekly crop progress and condition tables

National Condition	
Good to Excellent	64
Change from Last Year	+31

TOP ## - Percent Good to Excellent  
[BOTTOM ##] - Change from Last Year

## U.S. Soybeans Progress

Percent Planted  
April 28, 2019



Data obtained from preliminary National Agricultural Statistics Service (NASS) weekly crop progress and condition tables

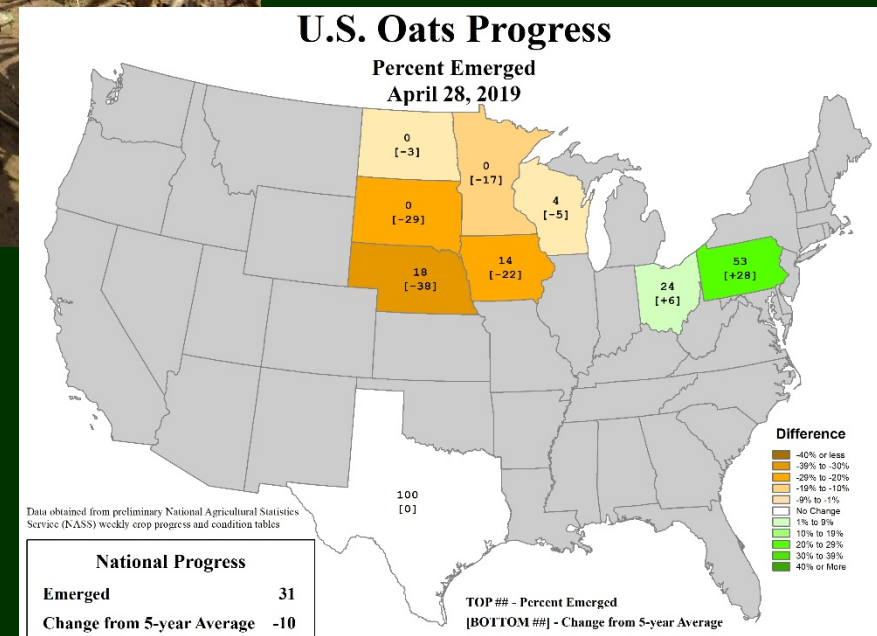
National Progress	
Planted	3
Change from 5-year Average	-3

TOP ## - Percent Planted  
[BOTTOM ##] - Change from 5-year Average

# Crop Impacts



Photo – OSU Extension





# Assorted AG Issues

- Crop planting is delayed over much of the region driven mainly by wet soils, but also cool soil temperatures
- Frequency of rain issues on planting/reaching critical planting time
- Further south planting has moved ahead more.
- Crop conditions are mixed (what has been planted - though delayed). Winter wheat poorer in the eastern wheat areas/better western areas.
- Various winter issues on alfalfa
- Delayed shipments (grain out – fertilizer in) Mississippi due to high water

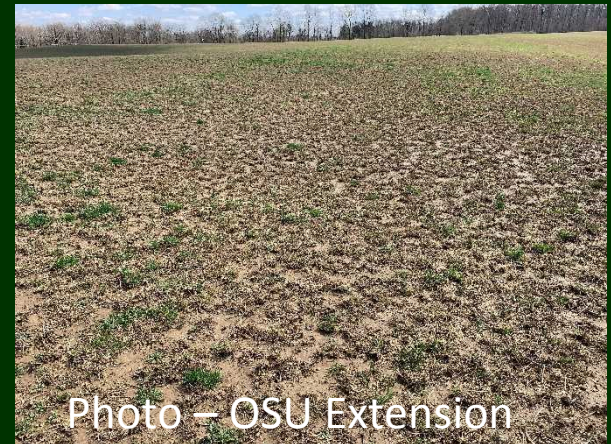


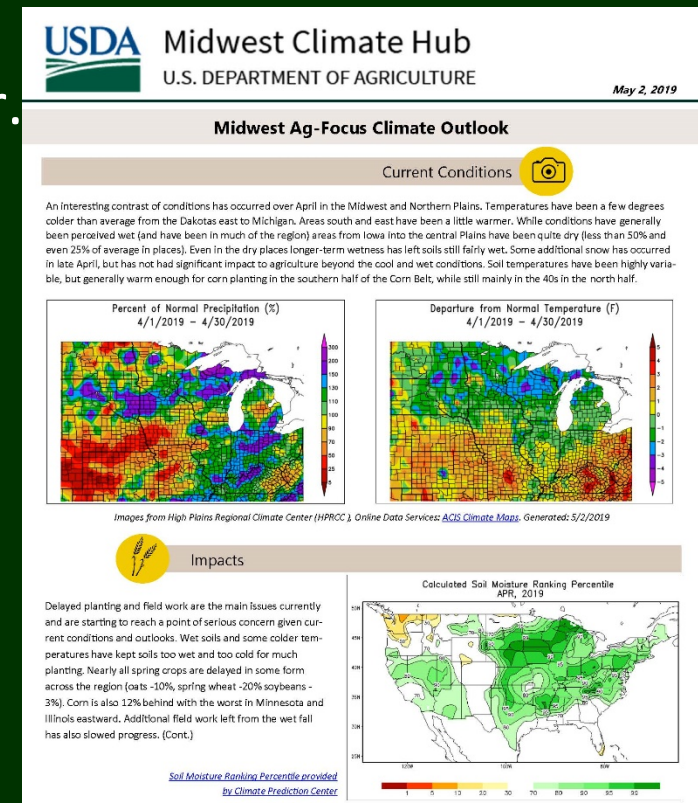
Photo – OSU Extension



# Assorted AG Issues - 2

- Increased potential for disease/poor emergence
- Wet fall pushed some field work to spring
- Many prevent plant acres likely to occur.
- Still inundated acres in flooded areas
- Damaged acres in NE largely from flooding (sand, residues and trash)

<https://www.climatehubs.oce.usda.gov/sites/default/files/5.2.19MidwestFocusAgOutlook.pdf>





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

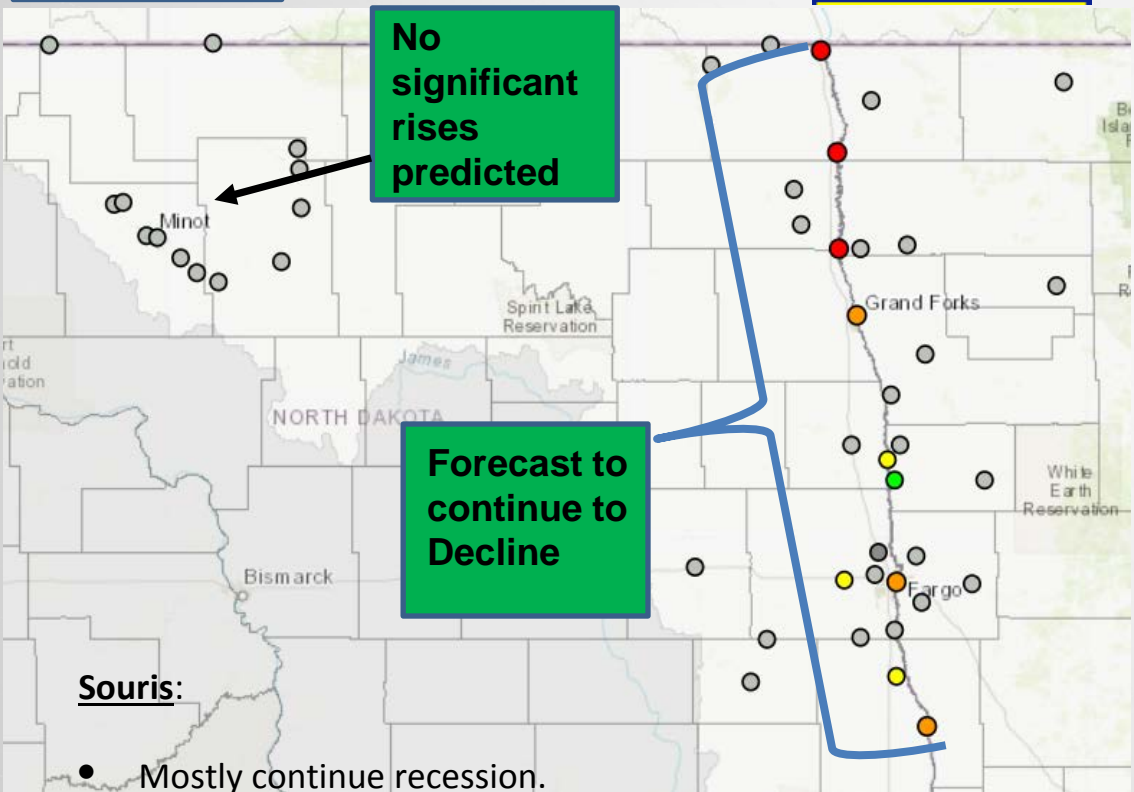


Latest Observed Stages

Major Flooding
Moderate Flooding
Minor Flooding

No significant rises predicted

Forecast to continue to Decline



Souris:

- Mostly continue recession.

Red River of the North (Moderate to Minor, most forecasts in Moderate):

- Continue slow recession throughout the RRN mainstem with mostly slow recession or steady flow in tributaries.
- Elevated River levels may continue through early May depending on precipitation pattern.
- Most all of the snow is melted in the entire RRN basin. (Souris: still some mostly near Minot, ND and near trace amounts near Devils Lake).
- Frozen ground not too much of a concern. (upwards of top 18+ inches thawed out)





# Current NCRFC Flood Status for Minnesota and Upper Mississippi Rivers



(Upper Mississippi River to Dubuque, IA)

Latest Observed Stages

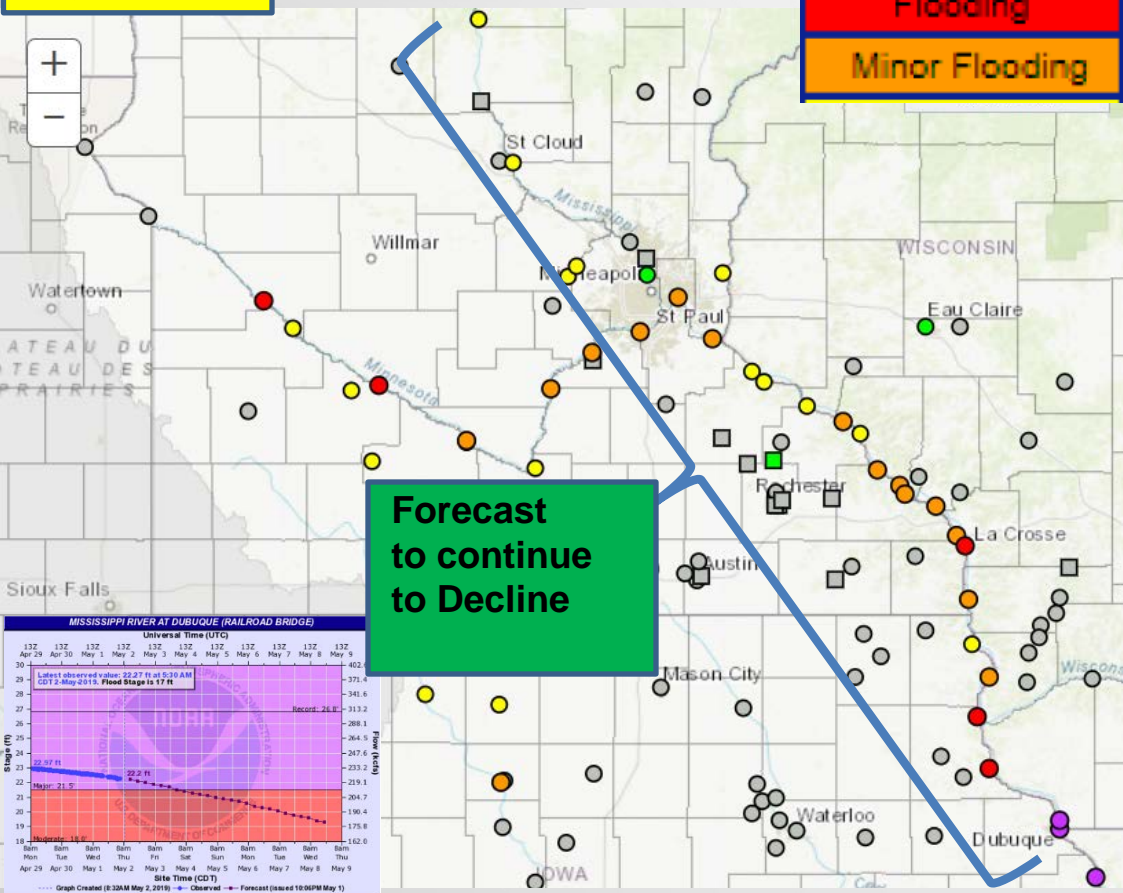
Major Flooding
Moderate Flooding
Minor Flooding

### Minnesota River:

- Continue very slow fall (Moderate to Minor Flooding ongoing-high flows; week +)

### Upper Mississippi to Dubuque, IA (Major to Minor):

- Continue very slow fall-mostly minor flooding for week + (future rainfall dependent)
- Dubuque (Railroad Bridge) forecast to be below Major on Saturday at around 21.5 feet.



Forecast to continue to Decline

DBQ4 (plotting HGR/G) \*Gage 6" Datum: 58547' [Observations courtesy of U.S. Army Corps of Engineers]







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

**Latest Observed Stages**

**Major Flooding**

**Moderate Flooding**

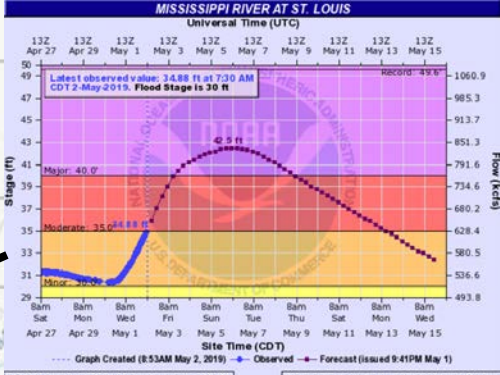
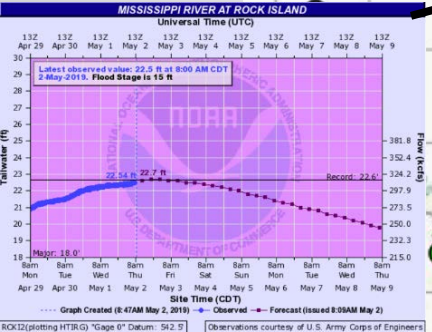
**Minor Flooding**

Mid Mississippi (Major to Moderate, but most levels in Major):

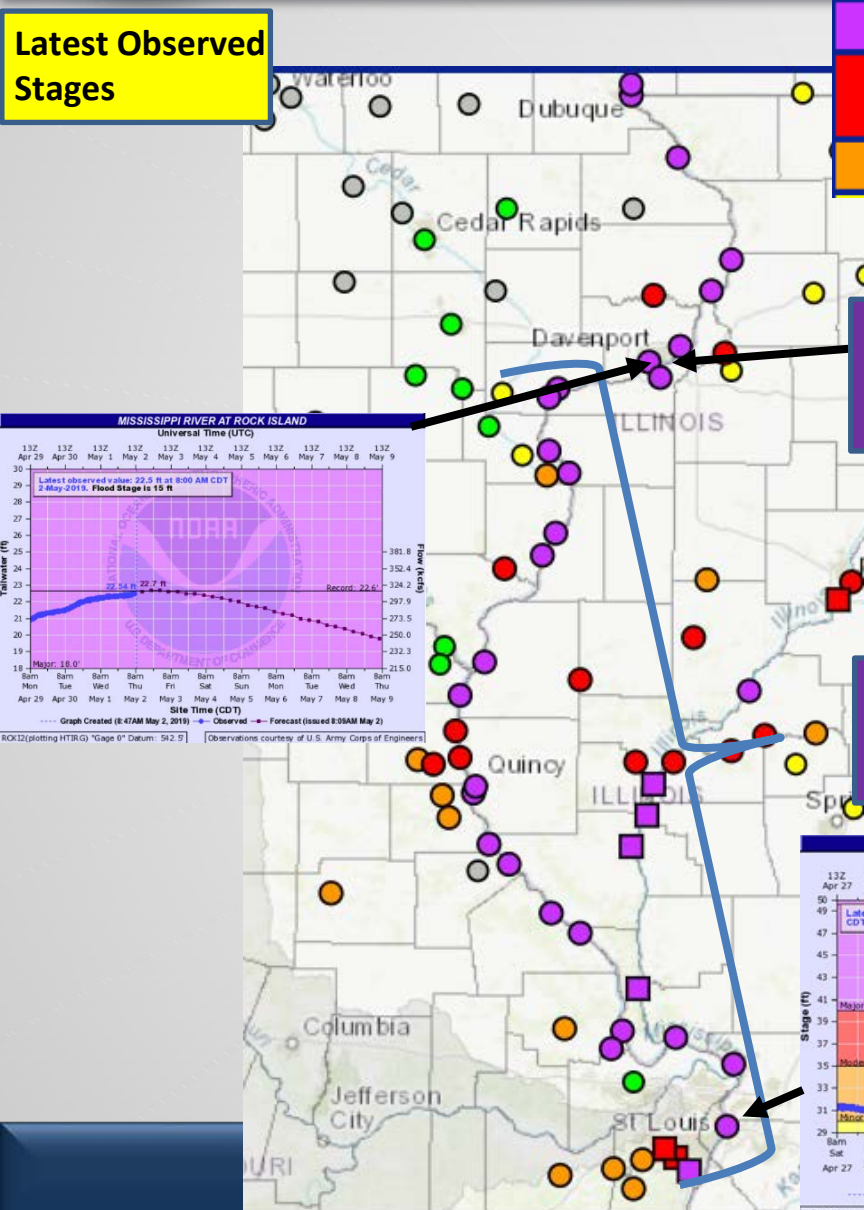
- Currently cresting near Camanche, IA; Continue rises near Davenport, IA area and downstream within Major flooding.
- Mississippi River near Rock Island, near record flooding. Areas of concern for additional breaches along this stretch. The river at St. Louis is forecast to crest early next week around 42.5 feet.
- With widespread 2+ inches total for the 7-day forecast, both Physical and Mental fortitudes will continue to be tested.
- This has been the longest this section of the Mississippi has been in Major flood (40 days) and with the uncertainty in the rain forecast, this long duration of flooding will continue to be even longer.

**Could break record of 1993**

**Forecast to continue rising**



• Both the Illinois and Missouri River basins will continue to add significant water above St. Louis.

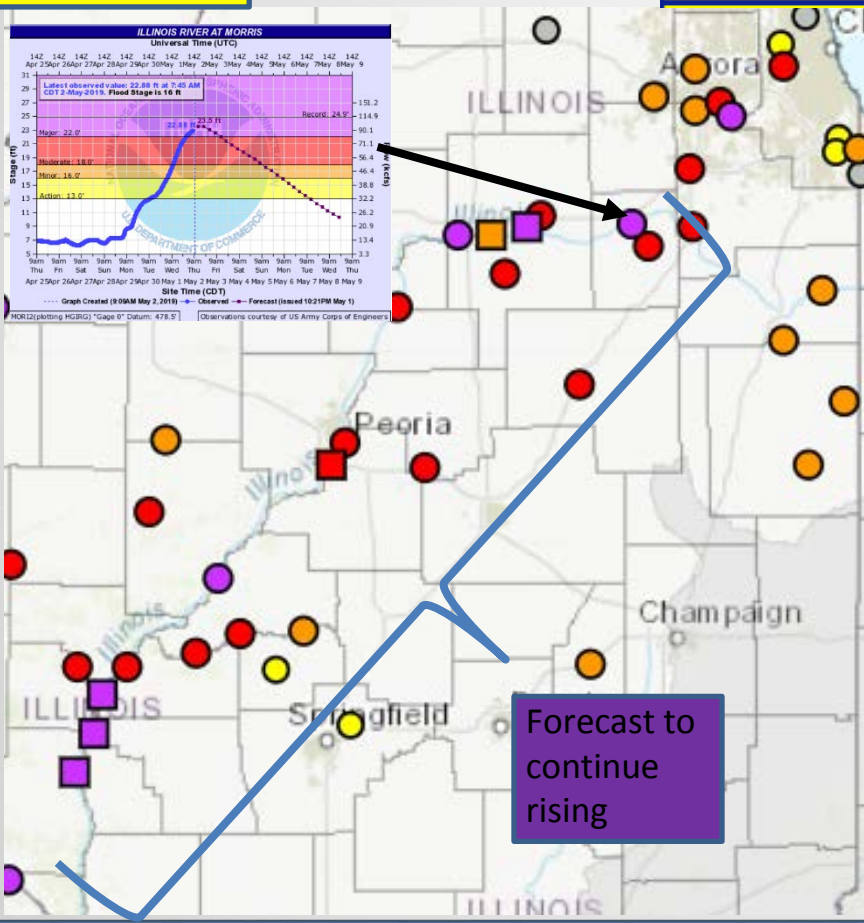
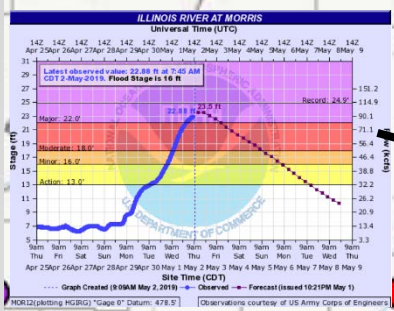




# Current NCRFC Flood Status for the Illinois River

Latest Observed Stages

Major Flooding
Moderate Flooding
Minor Flooding



## Illinois River (Major to Minor, but most levels in or going to Major):

- Continue rise throughout the system. Illinois at Morris forecast to crest today or tomorrow near 23.5 feet.
- Will continue to add significant water to the Mississippi River during this time of long duration high water adding to the stress on levee and water control systems.
- Central and southern Illinois forecast to receive significant rainfall within the next 7-days (3+ inches).
- Very High levels will continue beyond a few weeks from now; depending on rainfall amounts and frequency.



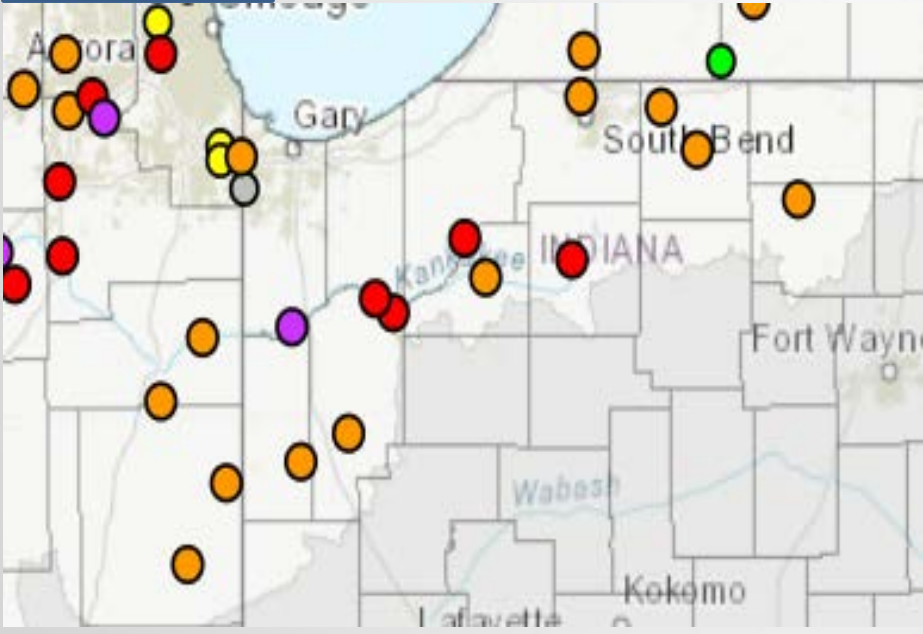


# Current NCRFC Flood Status for the St Joseph, Yellow, Kankakee and Iroquois Rivers



Latest Observed Stages

Major Flooding
Moderate Flooding
Minor Flooding



## Rivers: (Major to Minor):

- Near crests on the St. Joseph and Yellow Rivers. The Kankakee will continue to rise in the next week or so with a potential record within Major stage at Shelby near 13 feet over the weekend.
- The Iroquois cresting now or soon, within Minor flood levels.
- Forecast rainfall within the next 7 days will keep levels up and prolong the recessions.







# NCRFC, Hudson Bay: Souris & Red River of the North Basins

## Flood Potential Outlook: (through late-July)

> 50% chance of exceeding flood levels

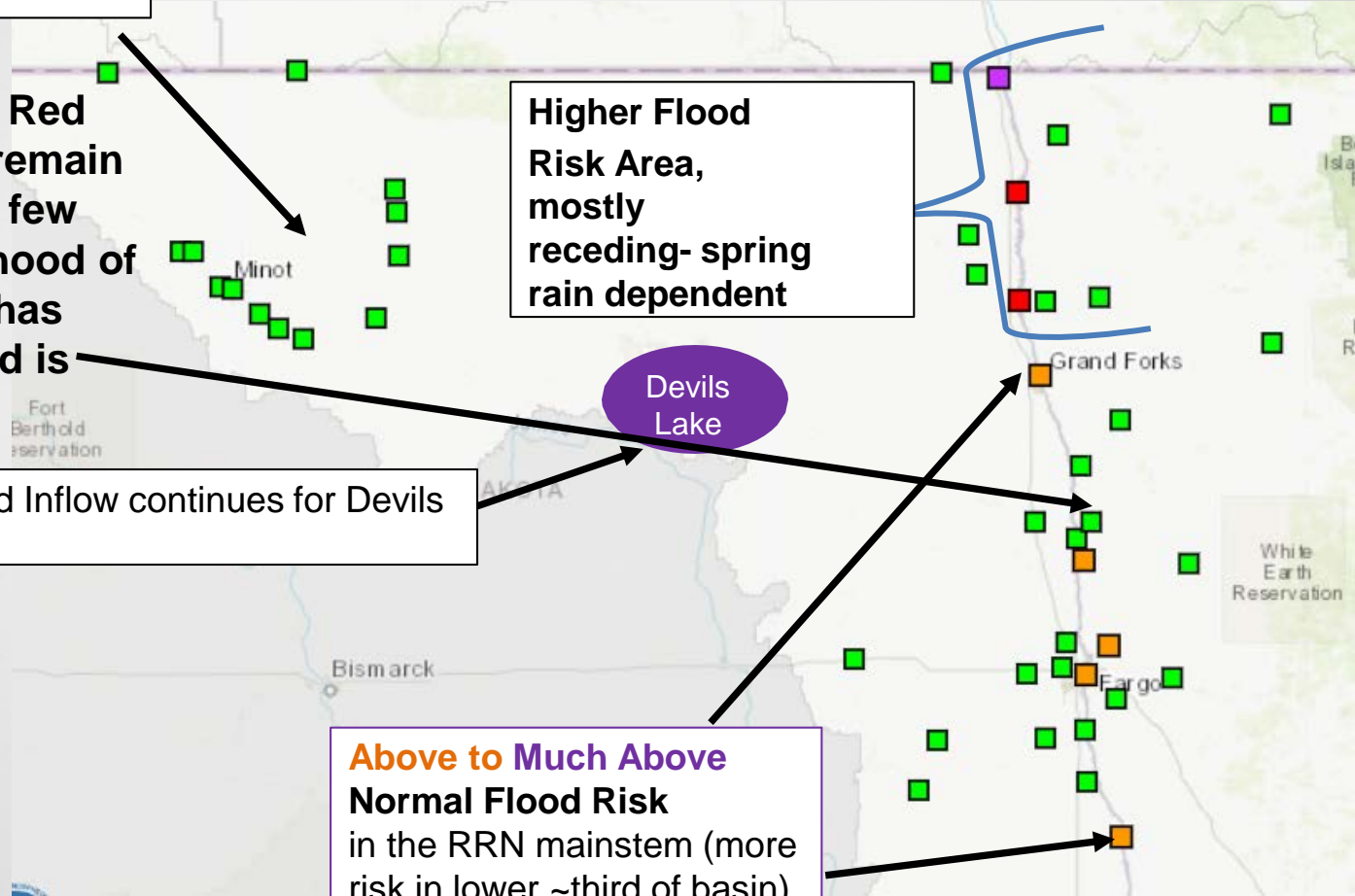
**Near Normal to Slightly Above Normal Flood Risk** in the Souris River Basin (rain dependent)

Even though the Red River North will remain high for the next few weeks, the likelihood of exceeding what has already happened is very unlikely.

**Higher Flood Risk Area, mostly receding- spring rain dependent**

**Normal Flood Risk** and Inflow continues for Devils Lake area

**Above to Much Above Normal Flood Risk** in the RRN mainstem (more risk in lower ~third of basin)



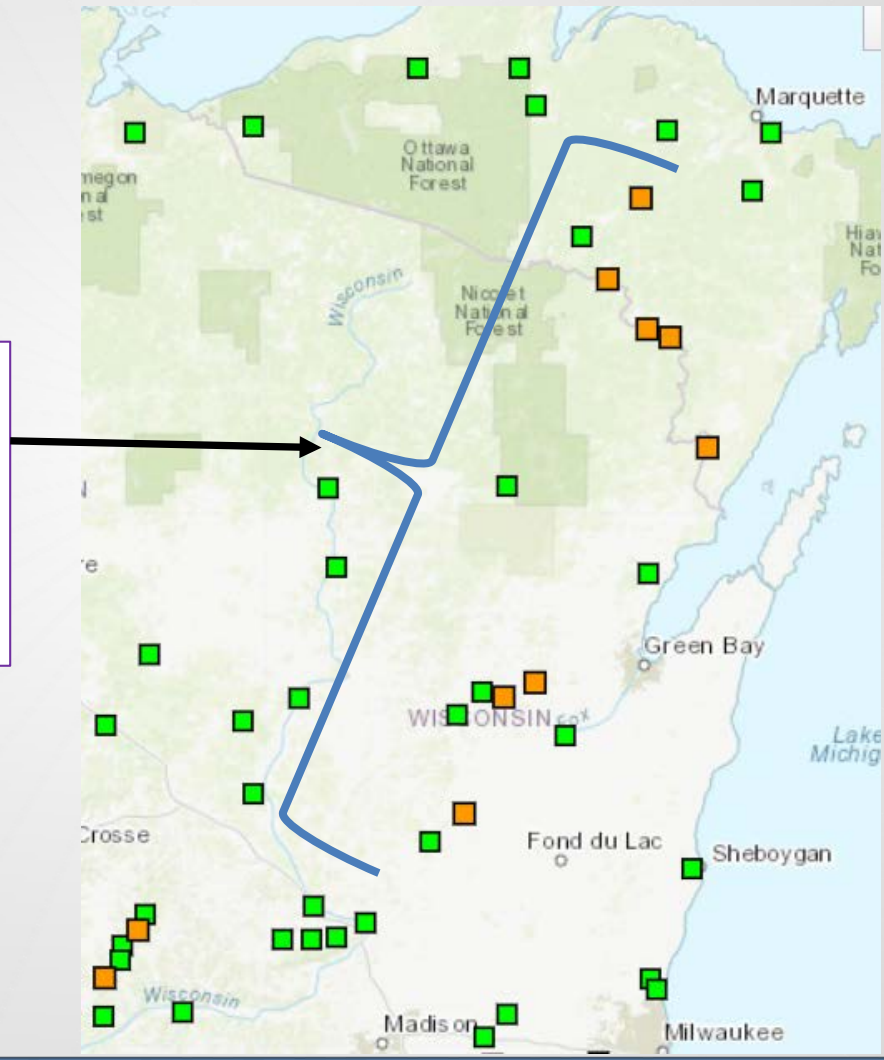


# NCRFC, Wisconsin and Upper Peninsula Basins Flood Potential Outlook: (through late-July)



> 50% chance of exceeding flood levels

**Above to Near Normal Flood Risk**  
Continues in the next few months; saturated soils, above normal winter snowpack and uncertainty with future rainfall remains.





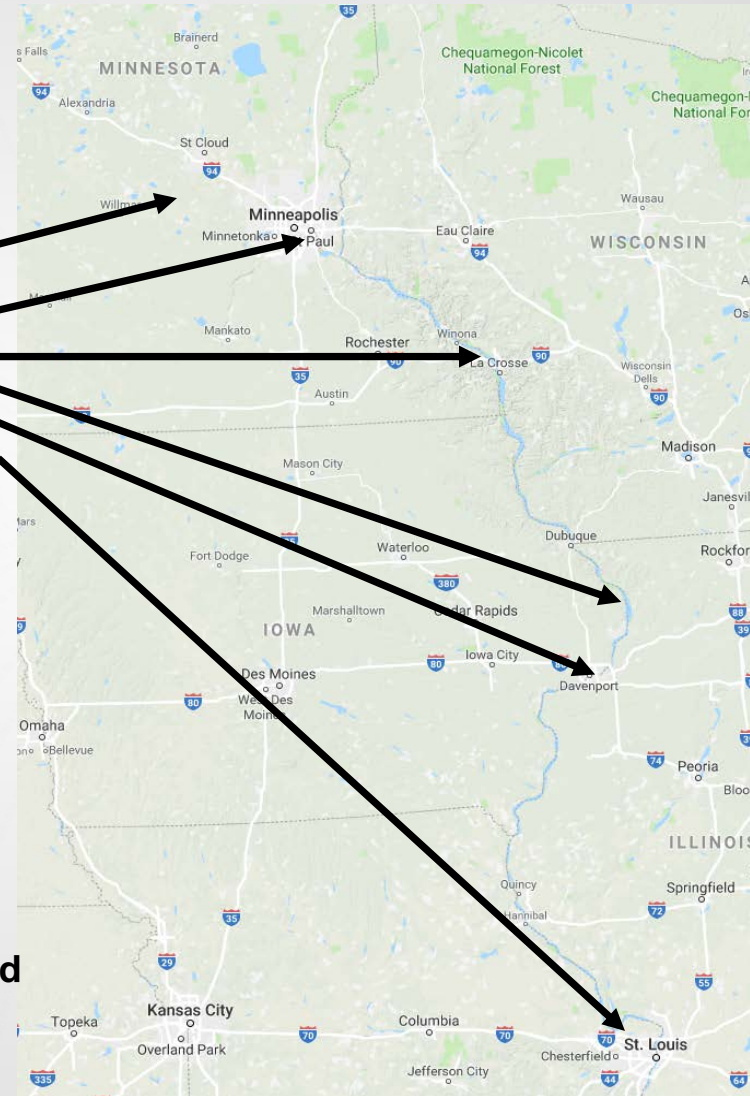
# NCRFC, Mississippi Basin Flood Potential Outlook: (through late-July)



> 50% chance of exceeding flood levels

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

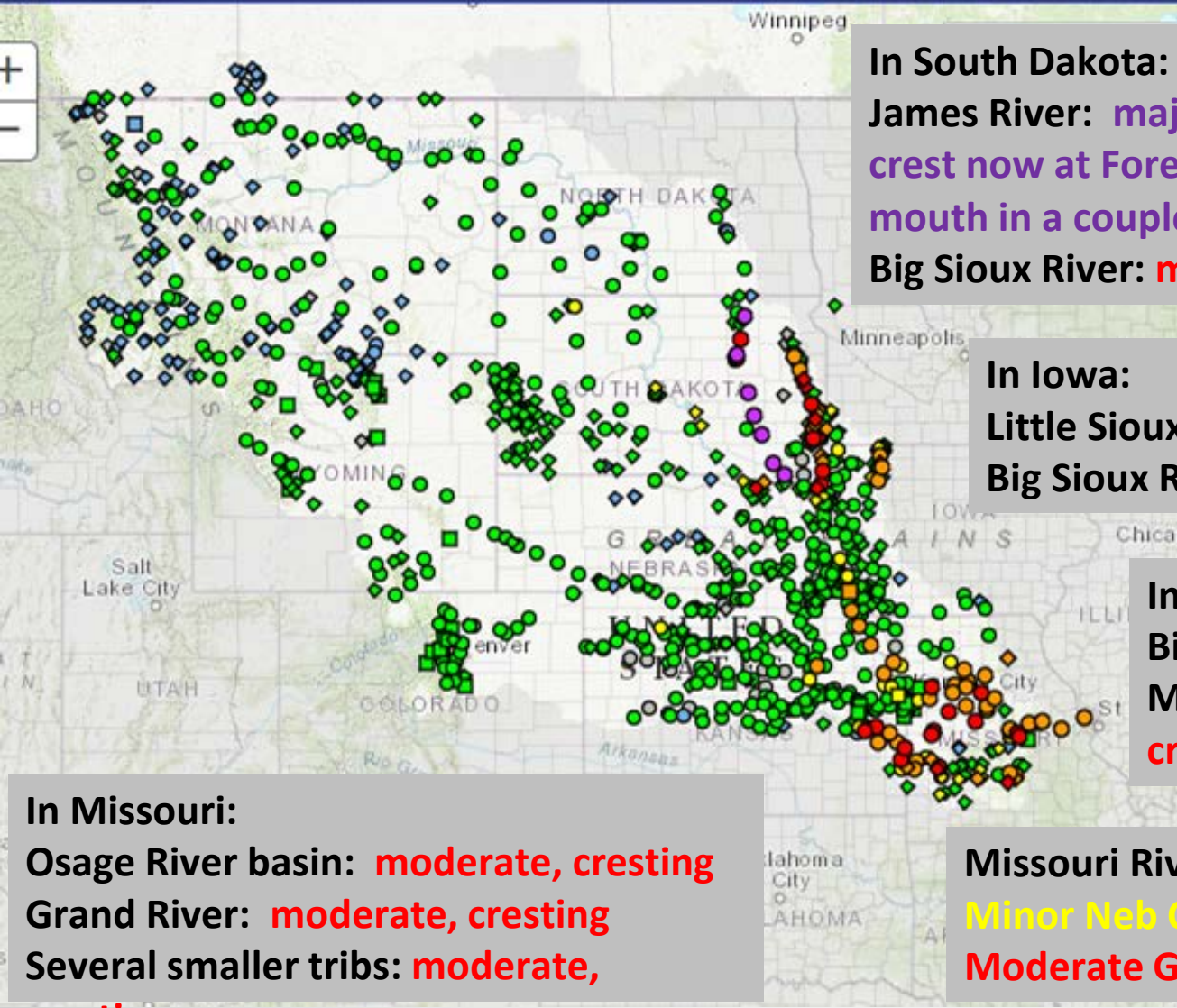
- Higher than Normal flows will continue through May and possibly into July with several peaks in June.
- The river has not had a chance to come back down from spring melt and as widespread spring rains continue, river levels will continue to be high.
- Again, Illinois R. and Missouri R. inputs will keep lower end of NCRFC area in flood during this period along with widespread saturated soils exacerbating conditions even when < 1 inch of rainfall.







# MISSOURI RIVER BASIN CURRENT FLOODING



**In South Dakota:**  
James River: **major, falling** above Forestburg, crest now at Forestburg, expected to crest at mouth in a couple weeks.  
Big Sioux River: **moderate, falling**

**In Iowa:**  
Little Sioux River: **minor, cresting**  
Big Sioux River: **moderate, falling**

**In Kansas:**  
Big Blue: **minor, steady**  
Marais des Cygnes: **moderate, cresting**

**In Missouri:**  
Osage River basin: **moderate, cresting**  
Grand River: **moderate, cresting**  
Several smaller tribs: **moderate, cresting**

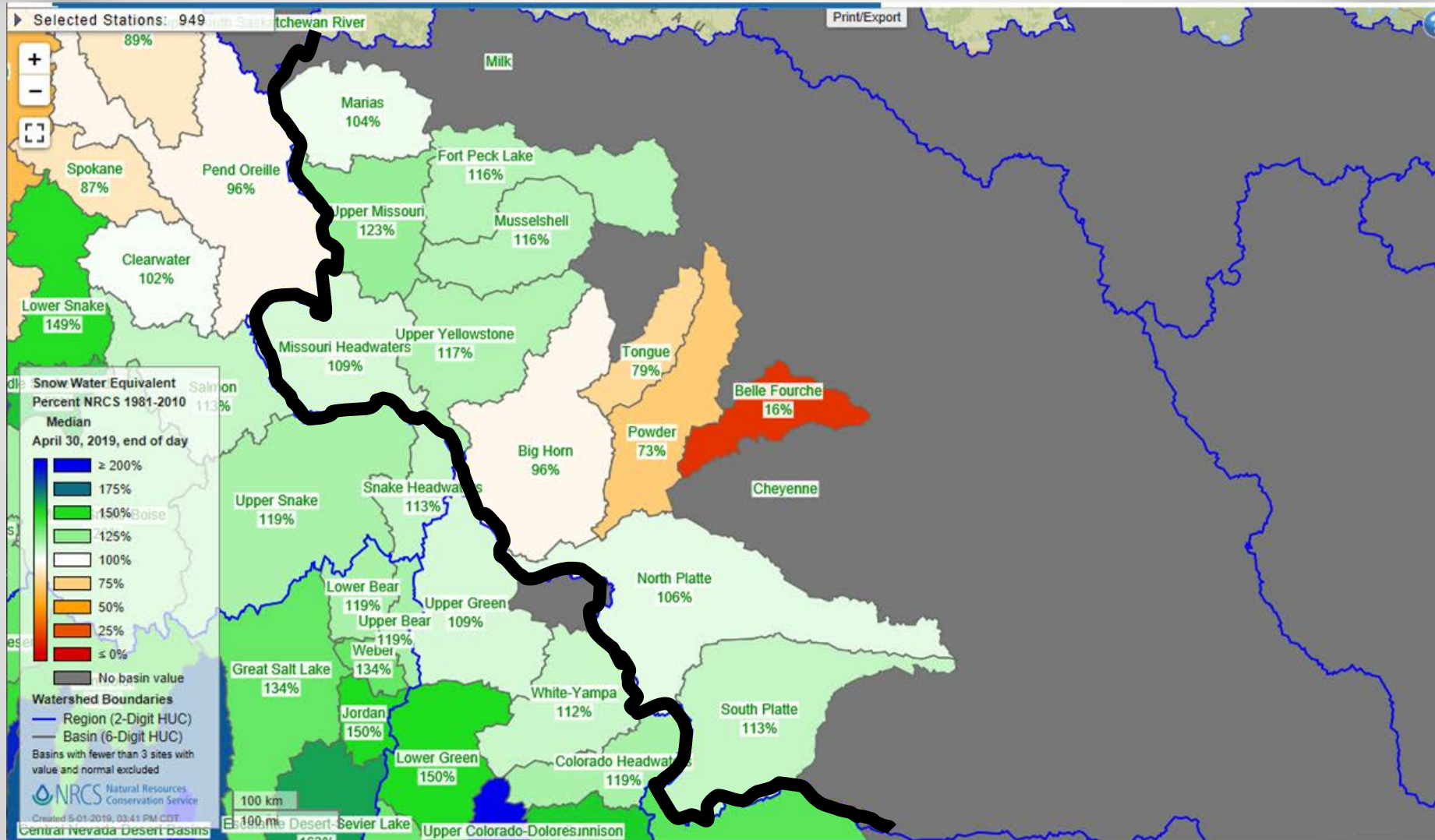
**Missouri River below Gavins:**  
Minor Neb City—Miami ~300 miles  
Moderate Glasgow—mouth ~200 miles





# MISSOURI BASIN

## Mountain Snowpack (as of 30 April)



*Building a Weather-Ready Nation*





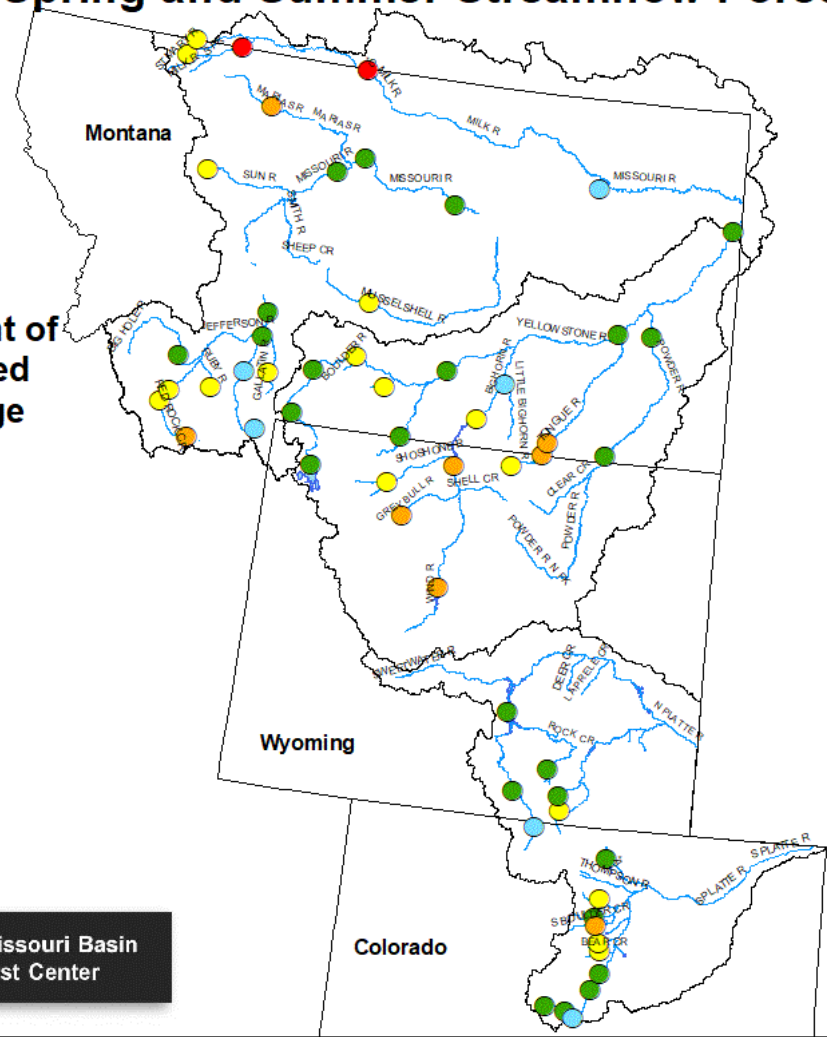
# MISSOURI BASIN 2019 Mountain Runoff



## 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%



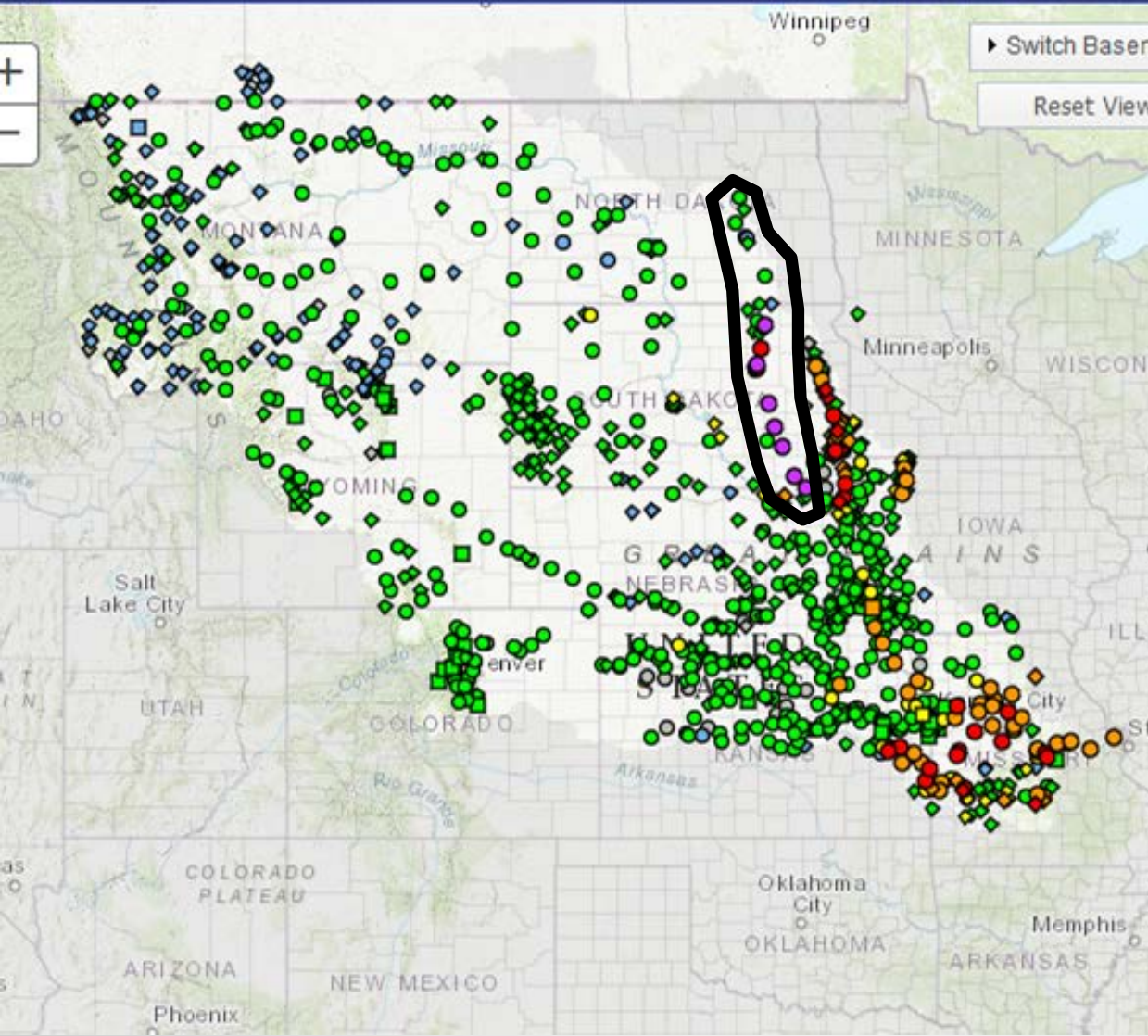
Issued by the Missouri Basin  
River Forecast Center







# MISSOURI BASIN FLOOD POTENTIAL OUTLOOK (90-day)



### James River:

For locations which have already crested, this will likely be the 2019 high.

For locations downstream of Forestburg SD, the expected crests over the next couple of weeks, will likely be the 2019 high.

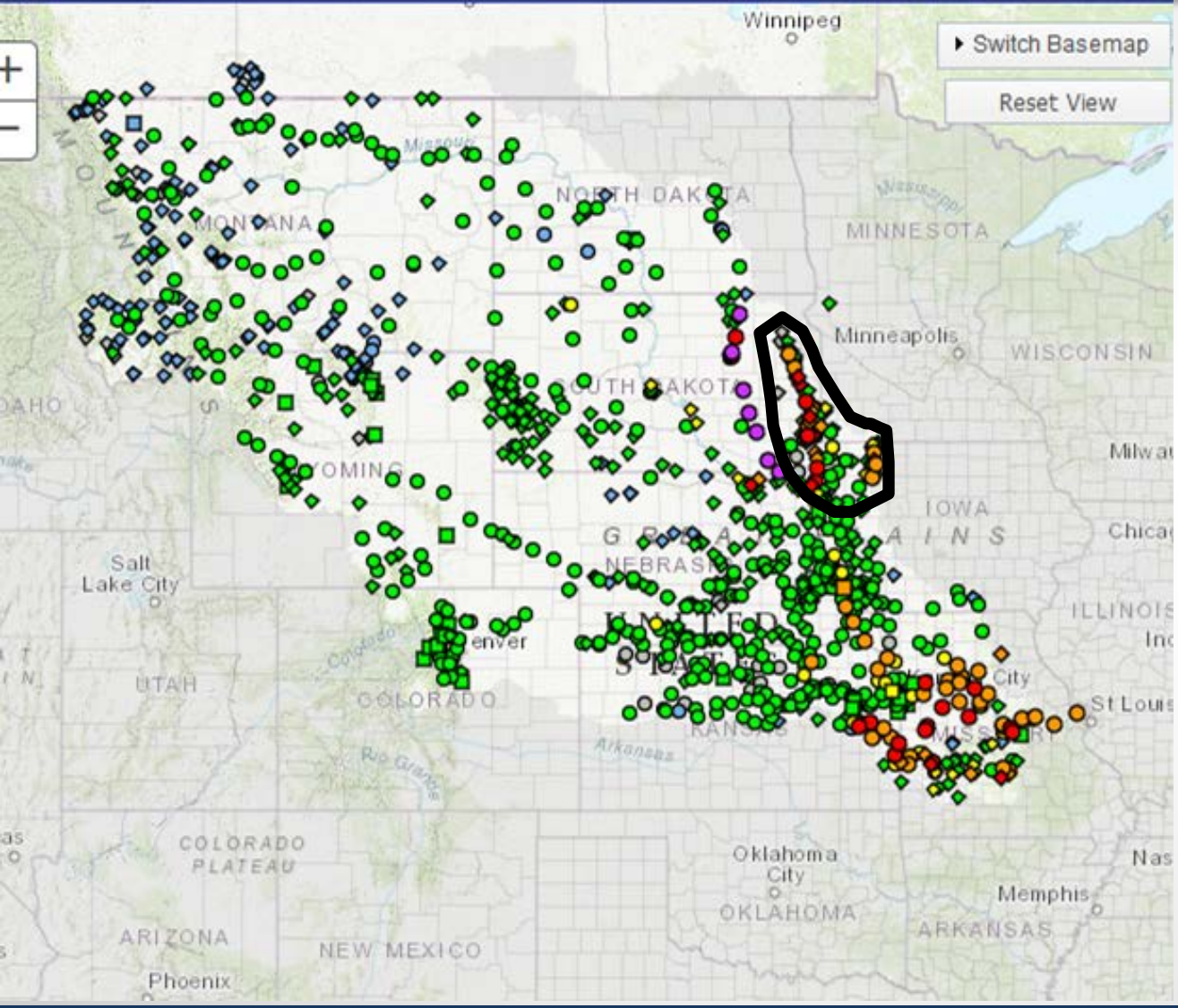
Some locations will not fall below minor flood stage for several weeks (couple of months).

**Take-home Point:** While streams within the James basin remain high for the next several weeks, the likelihood of exceeding what has already happened (or is about to happen over the next couple of weeks) is very unlikely.





# MISSOURI BASIN FLOOD POTENTIAL OUTLOOK (90-day)



Floyd: **Minor** flooding likely.

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

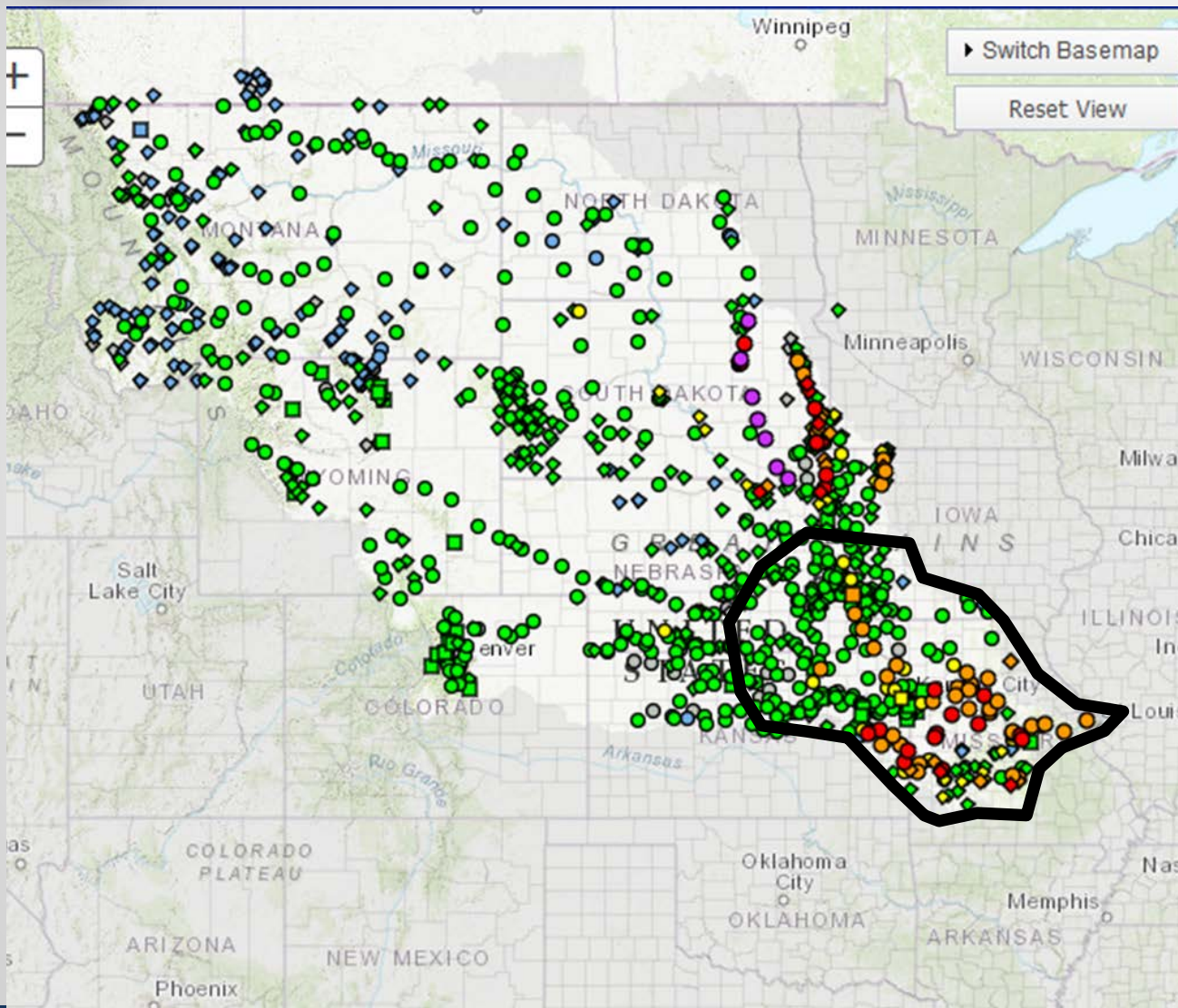
Big Sioux: Expect to see **moderate**.







# MISSOURI BASIN FLOOD POTENTIAL OUTLOOK (90-day)



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.







# MISSOURI BASIN SPRING FLOOD SUMMARY



- **Mountain snowpack has (hopefully!!!) attained its 2019 peak accumulation (mid-April). No significant flooding from mountain melt is expected. (Well, keeping an eye on the Bighorn Basin.)**
- **Plains snowpack no longer a factor.**
- **Eastern portion of the Missouri River basin still has ENHANCED RISK for flooding.**
- **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 conditions, the region is vulnerable to future storm systems.**

- **Above to Much Above Normal Flood Risk** – Mississippi basin (including main-stem Mississippi River) and eastern Missouri 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.





The recording can be found here: <https://hprcc.unl.edu/webinars.php> or <http://mrcc.illinois.edu/multimedia/webinars.jsp>

Next Webinar: May 16<sup>th</sup> – Martha Shulski – Nebraska State Climatologist







# NWS RFC

## Contact Information



NCRFC – [Corey.Loveland@noaa.gov](mailto:Corey.Loveland@noaa.gov)

MBRFC – [Kevin.Low@noaa.gov](mailto:Kevin.Low@noaa.gov)

Climate – [Doug.Kluck@noaa.gov](mailto:Doug.Kluck@noaa.gov)

USDA - [Dennis.Todey@ars.usda.gov](mailto:Dennis.Todey@ars.usda.gov)

**Long-Range River Outlook can be found at:**

[http://water.weather.gov/ahps/region\\_long\\_range.php?rfc=mvrfc&percent=50](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 May 16, 2019**

