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

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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.
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

http://waterwatch.usgs.gov/
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
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.
• 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.

Frost depths generally 18” - 60” due to shallow snow insulating ground cover before deep freeze in late January.
Precipitation Forecasts for April 4-11
Days 1-3, Days 4-5, Days 6-7

Days 1-3

Days 4-5

Days 6-7
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.

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

Building a Weather-Ready Nation
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

Missouri River mainstream: 43.2%

Upper Mississippi River: 28.3%

Ohio River: 2%

Barkley Reservoir: 13%

Kentucky Reservoir: 1.8%

Cumberland River: 6.6%

Tennessee River: 8%

Yazoo River: 67.1%

Arkansas River: 4.3%

Red River: 1.2%

Flood Storage Capacity Used
3 Apr 2019

Building a Weather-Ready Nation
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

Latest Observed Stages

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

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

Again, uncertainty continues beyond this weekend, if we transition into a more wet pattern.
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.
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
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
April 2019 Spring and Summer Streamflow Forecast

Forecast as Percent of 1979-2001 Modeled Historical Average:
- > 100%
- 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)
Long term wetness:
• U.S. wettest in 124 years of record (March 2018 – Feb 2019)
• Wettest Dec 2018 – Feb 2019

https://www.ncdc.noaa.gov/sotc/
February Temperature and Precipitation Rankings

- February - 2nd wettest in 125 years
- Colder than normal Plains portions of the Midwest

https://www.ncdc.noaa.gov/sotc/national/201902
Late Winter/Early Spring Temperatures

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

Much colder than normal temperatures last 60 and 30 days
Winter/Early Spring Precipitation

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

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

Percent of Normal Precipitation (%)

Last 90 days continued wet over most of the area.

https://hprcc.unl.edu/maps.php?map=ACISClimateMaps
Winter snowfall: above normal (since Nov. 1st, 2018)

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

Current Conditions

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

Mountain Snowpack Current Conditions

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

Shifting to Outlooks

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

Risk of Heavy Precipitation
Valid: 04/11/2019-04/17/2019

https://www.cpc.ncep.noaa.gov/
• 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/
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/
- Enhanced chances for above normal precipitation continues (except for northernmost areas)
- Enhanced area of below normal temperatures centered in the Central Plains
• 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

Building a Weather-Ready Nation
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)

Normal Flood Risk and Inflow continues for Devils Lake area

Higher Flood Risk area

Above to Much Above Normal Flood Risk in the Red River Basin (more so in lower ~half of basin)
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
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.
MISSOURI BASIN
FLOOD POTENTIAL OUTLOOK

Floyd: Minor flooding likely.

Little Sioux: Moderate level flooding likely.

Big Sioux: Expect to see moderate.
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.
• 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.
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

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

http://www.weather.gov