

Probabilistic Hydrologic Outlook
National Weather Service Quad Cities IA IL
1048 AM CDT Thu Mar 12 2020

...Spring Flood Risk Remains Elevated for the Mississippi River...

.Updated 2020 Spring Flood Outlook 3 of 3...

This is the final planned Spring Flood Outlook for 2020 for the NWS Quad Cities Hydrologic Service Area, which covers portions of eastern Iowa, northwest and west central Illinois, and extreme northeast Missouri. Rivers included in this outlook are the Mississippi River and its tributaries from above Dubuque, Iowa to below Gregory Landing, Missouri. The primary tributary systems include the Maquoketa, Wapsipinicon, Cedar, Iowa, Skunk, North Skunk, and Des Moines Rivers in Iowa; the Fox River in Missouri; and the Pecatonica, Rock, Green, and La Moine Rivers in Illinois. This outlook is for the time period from mid March through mid June.

.Flood Outlook Overview...

Overall, there has been noticeable improvement in the latest probabilities for flooding compared to the outlook issued on February 28th, especially along the Mississippi River. Here, probabilities of reaching major flood stage have dropped with this outlook issuance (e.g. KHBI2 probability of exceeding major flood stage has dropped from 94% to 59%). This drop was due to a prolonged period of dry weather across much of the Mississippi River Valley and a favorable snow melt. However, it remains important to note that the overall risk of flooding remains high through the spring.

The severity of any flooding will depend on additional rain and snow that falls this Spring. A higher flood risk will extend through the spring if soil moisture remains anomalously high.

Key Points:

- * The highest concern for flooding this spring remains on the Mississippi River. The risk of major flooding is above normal for the entire reach of the river from Dubuque, IA through Gregory Landing, MO, but has dropped compared to the previous outlook. Confidence continues to be low in exactly how severe flooding would be at specific locations.
- * Potential for widespread flooding is near normal for all rivers in the area, but is dependent on additional spring precipitation.
- * Additional snowfall and heavy spring rains would increase the threat for more severe flooding. Conversely, little to no additional snowfall and lighter spring rains would decrease the flood threat.

Many factors have been considered when evaluating the overall flood risk for the upcoming spring season. The combination of these influences factor into the final determination. The primary factors leading to the flood risk this year are:

- * A large portion of the Upper Mississippi River watershed continues to observe extremely wet soil conditions. The flood risk will

remain elevated until soils dry out.

* There is no snow in the watersheds of all local tributary rivers, which lowers the risk for flooding on rivers across Iowa, Illinois, and northeast Missouri. However, snowpack does remain in the upper portions of Mississippi River watershed, which may lead to additional rises on the Mississippi River as it melts.

For further details on all factors considered, see below.

.Seasonal Precipitation Summary:

Little to no measurable precipitation fell across the Midwest and portions of the Mississippi River Valley from the end of Meteorological Winter to mid March, giving the soils a chance to dry out and for snow to melt at a favorable pace. Only recently did the area see a period of long duration moderate rainfall, with three quarters to one inch of rain observed on March 09. This generally led to in-bank rises along rivers. Otherwise, precipitation across the area has generally been below normal.

As mentioned in previous outlooks, the primary driver for our Spring flood potential is the above normal precipitation observed in the upper Mississippi River Valley over the winter. That precipitation plays a part in raising the risk for flooding on the Mississippi River, while having lesser influence on local rivers.

.Snow Cover and Liquid Water Content:

Mississippi River - Increased Risk
Local Rivers - Decreased Risk

The latest analysis shows snowpack remaining in Minnesota and Wisconsin mainly north of Interstate 94. Much of the snow along and south of Interstate 94 that was present in the previous outlook melted over the past week thanks to warm temperatures in the Mississippi River Valley region. This snowmelt is working through rivers in Minnesota, Wisconsin and northeast Iowa per latest forecasts. In the snowpack that remains, liquid water content generally ranges from 3 to 6 inches. Isolated pockets of 8 inches or greater were still observed in northern Wisconsin around the upper basin of the Wisconsin River.

The rapid melt that occurred last week with the dry weather and warm temperatures will bring rises through March, with many locations expected to experience some degree of flooding. The rate at which the remaining snowpack melts may contribute to the severity of flooding that occurs.

The watersheds for the local rivers have no snow cover, which lessens the risk for additional flooding concerns. Unless local snowpack builds significantly, any local river flooding will be the result of spring rains.

.Frost Depth: Decreased Risk

Temperatures were above normal across the region this winter into early March, with only limited periods of extreme cold. This led to

little to no frost depth over much of the mid-Mississippi River Valley. Further into northern Iowa, Wisconsin and Minnesota, frost depths ranged from 6 to as much as 22 inches where colder temperatures and snowpack have persisted.

The depth of frozen ground contributes to the flood risk by implying any frozen ground will cause efficient runoff from snowmelt or rainfall. The depth of frozen ground is also a factor to how long it might take for the ground to thaw. Shallower frozen ground leads to an early thaw, allowing the ground to dry out and infiltration of runoff.

.River Conditions: Increased Risk

River levels remain near to well above normal across the majority of the Upper Mississippi River watershed. While dry conditions over the second half of February and early March did allow for river levels to recede slightly, recent rainfall, snow melt and subsequent runoff have caused rises on many rivers.

The significance of high streamflows to flood risk is that a river with higher water levels will have less space for additional water. As a result, flood levels can be reached with lesser runoff than it would take given normal river levels for late winter/early spring.

.Soil Moisture: Increased Risk

Wet soils have persisted through the winter months as moisture from last fall was locked into the soils during the cold season.

The wettest soils are currently observed across Minnesota, Wisconsin, northern Iowa and northern Illinois as of early March. To the south, ground thawing contributed to soils drying out across much of Iowa and Illinois. However, recent rains have introduced additional saturation.

The threat for river rises from snowmelt or spring rainfall runoff due to very wet soils remains high for the Mississippi River as the entire watershed is experiencing wet to nearly saturated soils. Where soils are saturated, little runoff will be able to be absorbed by the soils, so water from both snowmelt and rainfall would efficiently move into the river system. Local watersheds have a slightly elevated risk for high runoff from spring rains as these watersheds are observing wetter than normal soils.

.Ice Jam Flooding: Low Risk

The warmer weather this winter into early March has limited river ice. As of mid March, there is little to no ice cover on area rivers, thus diminishing the threat for ice jam flooding.

It is possible that cold air will return still, but without a long period of extreme cold, the risk for development of thick river ice is low. This keeps the risk for spring ice jams low.

.Weather Outlooks:

The latest outlook from the Climate Prediction Center favors a high probability of below normal temperatures and above normal precipitation in the upper Mississippi River Valley through the end of March.

Looking at the outlook through May, temperatures across the Upper Midwest look to have equal chances for Above, Near, or Below normal. This may mean a similar pattern which has been observed through winter will continue, with changes from warmer to colder occurring frequently.

Normal high temperatures are now above freezing. The impact to the remaining snowpack will depend on how warm daily highs get, and if lows drop below freezing during the overnight hours.

Precipitation outlooks for the next three months do indicate higher potential for above normal precipitation, but keep the highest risk for above normal precipitation generally to the south and east of the region. This indicates a more active weather pattern could come into play later in the spring.

.Summary:

- * Mississippi River - High confidence on flooding this spring. Despite the probability of major flooding trending lower in this outlook, the risk of seeing all categories of flooding remains above normal. Confidence on flood severity remains low and is dependent on where spring rains fall.
- * Local rivers - Near to above normal risk for minor flooding, with near normal risk for reaching higher severity flood levels.
- * Soils are wet, but snow cover is limited so the flooding risk will depend on additional snows or heavy rains this season.
- * A scenario to further reduce the flood risk this spring would be little additional snow, a gradual snowmelt, followed by above normal temperatures and below normal precipitation.
- * Any of the following scenarios would increase the flood risk: additional heavy snows, a cool and wet spring and wet conditions continuing through spring.

.Numerical River Outlooks...

This outlook provides long-range probabilistic river outlooks for river basins in the NWS Quad Cities service area. This outlook is divided into three parts, the first part for the probabilities of minor, moderate and major flooding, the second part for high water and the final part for low water.

In Table 1 below, the current (CS) and historical (HS) or normal probabilities of exceeding minor, moderate and major flood stages are listed for the valid time period.

CS values indicate the probability of reaching a flood category based on current conditions.

HS values indicate the probability of reaching a flood category

based on historical or normal conditions.

When the value of CS is greater than HS, the probability of exceeding that level is higher than normal. When the value of CS is less than HS, the probability of exceeding that level is lower than normal.

...Table 1--Probabilities for minor, moderate and major flooding...
Valid Period: 03/16/2020 - 06/14/2020

Location	Categorical			Current and Historical Chances of Exceeding Flood Categories as a Percentage (%)					
	Flood Stages (ft)			Minor		Moderate		Major	
	Minor	Mod	Major	CS	HS	CS	HS	CS	HS
:Mississippi River									
Dubuque LD11	16.0	17.0	20.5	>95	45	83	36	35	11
Dubuque	17.0	18.0	21.5	>95	51	>95	43	51	13
Bellevue LD12	17.0	18.0	20.0	82	33	65	26	34	10
Fulton LD13	16.0	18.0	20.0	>95	50	74	31	50	13
Camanche	17.0	18.5	20.5	>95	44	74	31	50	13
Le Claire LD14	11.0	12.0	13.5	>95	50	82	32	56	15
Rock Island LD15	15.0	16.0	18.0	>95	59	>95	50	59	22
Ill. City LD16	15.0	16.0	18.0	>95	57	>95	44	59	20
Muscatine	16.0	18.0	20.0	>95	60	>95	44	59	20
New Boston LD17	15.0	16.5	18.5	>95	62	>95	54	72	27
Keithsburg	14.0	15.5	17.0	>95	61	93	47	59	24
Gladstone LD18	10.0	12.0	14.0	>95	62	91	44	51	21
Burlington	15.0	16.5	18.0	>95	61	91	45	55	25
Keokuk LD19	16.0	17.5	19.0	79	46	65	33	47	21
Gregory Landing	15.0	18.0	25.0	>95	63	69	40	7	<5
:Maquoketa River									
Manchester Hwy 20	14.0	17.0	20.0	19	22	14	16	8	8
Maquoketa	24.0	26.0	28.5	10	11	5	9	<5	6
:Wapsipinicon River									
Independence	12.0	13.0	15.0	8	8	7	7	5	<5
Anamosa Shaw Rd	14.5	18.0	21.5	24	26	9	10	<5	<5
De Witt 4S	11.0	11.5	12.5	84	65	76	63	47	45
:North Skunk River									
Sigourney	16.0	18.0	21.0	49	57	35	43	5	11
:Skunk River									
Augusta	15.0	17.0	20.0	47	48	26	37	10	16
:Cedar River									
Vinton	15.0	18.0	19.0	8	19	<5	7	<5	<5
Palo Blairs Ferry	12.5	15.5	17.0	9	22	<5	7	<5	<5
Cedar Rapids	12.0	14.0	16.0	13	28	7	15	<5	8
Cedar Bluff	16.0	20.0	26.0	12	28	<5	9	<5	<5
Conesville	13.0	15.0	16.5	>95	56	10	26	<5	8

:Iowa River										
Marengo	15.0	17.0	19.0	:	75	68	45	52	<5	6
Iowa City	23.5	24.5	26.0	:	<5	6	<5	<5	<5	<5
Lone Tree	16.0	18.5	22.0	:	8	13	<5	7	<5	<5
Columbus Jct	23.0	25.0	26.5	:	6	13	<5	5	<5	<5
Wapello	21.0	25.0	27.5	:	23	47	<5	7	<5	<5
Oakville	11.0	15.0	20.0	:	25	47	<5	6	<5	<5
:English River										
Kalona	14.0	16.0	18.0	:	52	50	21	32	8	12
:Des Moines River										
Keosauqua	22.0	25.0	27.0	:	8	9	<5	<5	<5	<5
St Francisville	18.0	22.0	25.0	:	49	43	5	6	<5	<5
:Fox River										
Wayland	15.0	18.0	20.0	:	28	30	9	10	<5	<5
:Pecatonica River										
Freeport	13.0	14.0	16.0	:	>95	37	22	18	<5	<5
:Rock River										
Como	12.5	15.5	18.0	:	30	22	8	9	<5	<5
Joslin	12.0	14.0	16.5	:	>95	53	47	30	17	16
Moline	12.0	13.0	14.0	:	70	55	53	32	26	22
:Green River										
Geneseo	15.0	16.5	18.0	:	19	18	7	8	<5	<5
:La Moine River										
Colmar	20.0	22.0	24.0	:	73	69	56	49	24	21

Legend

CS = Conditional Simulation (Current Outlook)

HS = Historical Simulation

ft = Feet

In Table 2 below, the 95 through 5 percent columns indicate the probability of exceeding the listed stage levels (ft) for the valid time period.

...Table 2--Exceedance Probabilities...

Location	Chance of Exceeding Stages at Specific Locations						
	Valid Period: 03/16/2020 - 06/14/2020						
	95%	90%	75%	50%	25%	10%	5%

:Mississippi River							
Dubuque LD11	16.3	16.5	17.6	19.8	21.1	23.6	26.2
Dubuque	18.1	18.2	19.4	21.5	22.9	25.5	27.6
Bellevue LD12	16.2	16.4	17.4	19.3	20.5	22.6	24.1
Fulton LD13	16.6	16.8	17.9	20.0	21.1	23.6	25.7
Camanche	17.2	17.3	18.4	20.5	21.7	24.2	26.2
Le Claire LD14	11.3	11.4	12.3	13.9	15.0	17.4	19.2

Rock Island LD15	16.4	16.6	17.5	18.9	20.2	22.5	23.9
Ill. City LD16	16.1	16.4	17.3	18.8	20.7	24.1	25.3
Muscatine	18.1	18.4	19.3	20.6	22.4	25.2	26.3
New Boston LD17	17.2	17.5	18.4	19.9	21.5	23.9	25.1
Keithsburg	15.4	15.8	16.4	17.5	19.1	21.5	22.6
Gladstone LD18	11.7	12.2	12.8	14.1	15.9	18.9	20.1
Burlington	16.2	16.6	17.2	18.3	20.4	23.0	24.2
Keokuk LD19	14.6	14.9	16.4	18.7	21.0	23.4	24.8
Gregory Landing	16.1	16.4	17.7	19.8	22.3	24.4	25.8
:Maquoketa River							
Manchester Hwy 20	7.2	8.1	9.1	10.1	12.8	19.1	20.6
Maquoketa	13.7	14.0	15.8	17.6	19.7	24.0	26.7
:Wapsipinicon River							
Independence	6.7	6.9	7.6	8.2	9.4	11.9	15.1
Anamosa Shaw Rd	10.2	10.3	11.2	12.5	14.4	17.6	21.0
De Witt 4S	10.9	11.0	11.6	12.4	13.0	13.6	13.8
:North Skunk River							
Sigourney	8.8	9.4	13.4	16.0	18.5	19.7	21.2
:Skunk River							
Augusta	6.4	7.7	10.6	14.7	17.2	20.0	22.9
:Cedar River							
Vinton	10.5	10.5	10.5	11.8	13.3	14.5	16.2
Palo Blairs Ferry	9.4	9.4	9.5	10.3	11.5	12.4	13.8
Cedar Rapids	8.4	8.4	8.4	9.3	11.0	12.2	14.4
Cedar Bluff	11.8	11.8	11.9	12.7	14.8	16.2	18.2
Conesville	13.5	13.5	13.5	13.5	14.3	15.1	15.6
:Iowa River							
Marengo	12.6	12.6	15.0	16.6	17.5	18.3	18.9
Iowa City	15.4	15.4	16.4	18.3	19.5	19.6	19.6
Lone Tree	11.2	11.2	12.3	13.5	14.4	14.9	18.1
Columbus Jct	18.5	18.5	18.6	19.0	19.9	22.0	23.1
Wapello	19.8	19.8	19.9	20.2	21.0	22.7	23.6
Oakville	10.0	10.0	10.0	10.4	11.0	12.5	13.4
:English River							
Kalona	7.4	7.7	11.4	14.0	15.7	17.4	19.0
:Des Moines River							
Keosauqua	15.8	16.0	18.1	19.5	20.5	21.6	22.3
St Francisville	13.6	13.9	16.2	18.0	19.2	20.6	22.4
:Fox River							
Wayland	5.0	6.4	8.0	11.9	15.2	17.7	19.1
:Pecatonica River							
Freeport	13.0	13.0	13.0	13.1	13.8	15.2	16.0
:Rock River							
Como	10.2	10.2	10.3	11.2	12.9	14.9	17.2
Joslin	12.6	12.6	12.7	13.9	15.5	17.8	19.8
Moline	11.9	11.9	11.9	13.2	14.0	15.8	17.9

:Green River							
Geneseo	6.9	7.0	9.5	12.4	14.3	15.4	17.9
:La Moine River							
Colmar	13.0	16.6	19.4	22.3	23.8	25.5	26.1

In Table 3 below, the 95 through 5 percent columns indicate the probability of falling below the listed stage levels (ft) for the valid time period.

...Table 3--Non-Exceedance Probabilities...

Location	Chance of Falling Below Stages at Specific Locations						
	Valid Period: 03/16/2020 - 06/14/2020						
	95%	90%	75%	50%	25%	10%	5%
:Mississippi River							
Dubuque LD11	10.8	10.0	8.8	7.1	6.4	5.7	5.3
Dubuque	12.6	11.8	10.9	9.5	8.8	8.3	8.0
Bellevue LD12	11.6	10.8	9.7	8.1	7.1	5.7	5.2
Fulton LD13	11.7	10.4	9.3	7.8	6.8	5.4	5.0
Camanche	13.1	12.3	11.6	10.4	9.9	9.4	9.2
Le Claire LD14	8.7	8.2	7.2	6.2	5.7	5.1	4.9
Rock Island LD15	11.7	11.2	10.0	8.4	7.0	5.8	5.4
Ill. City LD16	11.4	10.7	8.8	6.9	5.5	4.6	4.3
Muscatine	12.9	12.2	10.6	8.6	7.4	6.7	6.5
New Boston LD17	12.9	12.3	10.5	8.4	6.5	5.0	4.6
Keithsburg	11.8	11.7	10.7	9.2	7.6	6.5	6.1
Gladstone LD18	7.9	7.7	6.3	4.5	3.1	2.2	1.9
Burlington	13.1	12.9	11.8	10.4	9.2	8.4	8.2
Keokuk LD19	11.4	10.5	9.2	7.3	5.5	4.6	4.0
Gregory Landing	13.0	12.1	10.7	8.7	6.9	6.6	6.5
:Maquoketa River							
Manchester Hwy 20	4.8	4.7	4.6	4.4	4.3	4.2	4.2
Maquoketa	11.7	11.5	11.1	10.8	10.5	10.3	10.3
:Wapsipinicon River							
Independence	5.5	5.5	5.3	5.2	5.1	4.9	4.9
Anamosa Shaw Rd	7.0	6.8	6.4	6.1	5.8	5.5	5.3
De Witt 4S	7.4	7.2	6.8	6.4	5.9	5.6	5.4
:North Skunk River							
Sigourney	6.1	5.9	5.2	4.8	4.5	4.1	4.0
:Skunk River							
Augusta	4.8	4.5	3.8	3.2	2.7	2.3	2.2
:Cedar River							
Vinton	4.8	4.5	3.8	3.3	2.9	2.6	2.5
Palo Blairs Ferry	5.0	4.8	4.2	3.7	3.3	3.0	2.9
Cedar Rapids	5.0	4.9	4.6	4.3	4.1	3.9	3.9
Cedar Bluff	6.0	5.8	5.3	4.8	4.5	4.1	4.1
Conesville	7.8	7.7	7.1	6.6	6.2	5.9	5.8

:Iowa River							
Marengo	8.6	8.3	7.6	7.0	6.5	6.3	6.1
Iowa City	11.1	10.8	10.6	10.2	9.1	8.8	8.8
Lone Tree	7.4	7.0	6.2	5.5	4.5	4.0	4.0
Columbus Jct	12.6	12.0	11.1	10.3	9.7	9.3	9.2
Wapello	14.6	13.9	13.1	12.1	11.5	10.9	10.8
Oakville	5.1	4.5	3.9	3.1	2.6	2.1	2.1
:English River							
Kalona	5.0	4.8	4.4	4.1	3.9	3.6	3.6
:Des Moines River							
Keosauqua	14.4	14.0	12.5	11.7	11.3	11.0	10.8
St Francisville	12.1	11.5	9.5	8.3	7.7	7.3	7.1
:Fox River							
Wayland	2.2	2.0	1.9	1.8	1.7	1.6	1.6
:Pecatonica River							
Freeport	7.5	7.0	5.8	5.3	4.8	4.5	4.4
:Rock River							
Como	5.9	5.2	4.8	4.2	3.8	3.5	3.5
Joslin	8.3	7.6	7.0	6.2	5.6	5.2	5.1
Moline	9.5	9.2	8.9	8.6	8.3	8.1	8.1
:Green River							
Geneseo	4.2	4.0	3.8	3.6	3.3	3.0	2.8
:La Moine River							
Colmar	5.8	5.1	4.7	3.9	3.5	3.3	3.2

These long-range probabilistic outlooks contain forecast values that are calculated using multiple season scenarios from 30 or more years of climatological data, including current conditions of the river, soil moisture, snow cover, and 30 to 90 day long-range outlooks of temperature and precipitation. By providing a range of probabilities, the level of risk associated with long-range planning decisions can be determined. These probabilistic forecasts are part of the National Weather Service's Advanced Hydrologic Prediction Service.

Visit our web site at <http://www.weather.gov/dvn> for more weather and water information.

This is the final Spring Flood and Hydrologic Resource Outlook. The next outlook will be issued near the end of April.

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Brooks/Speck