

Probabilistic Hydrologic Outlook
National Weather Service Quad Cities IA IL
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...Above to Well Above Normal Risk for Flooding this Spring...

.2019 Spring Flood and Water Resources Outlook...

This is the second of two planned Spring Flood and Water Resource Outlooks for 2019 for the the 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 late February through May.

.Flood Outlook Overview...

The potential for widespread flooding remains high this spring as soils are nearly saturated and frozen, while cold and active weather has allowed the snowpack to increase across northern Iowa, Minnesota, and Wisconsin in the past 2 weeks. Additionally, the weather pattern is expected to stay active in the near future with two significant storm systems showing signs of bringing some warmer air and rainfall locally, and possibly additional heavy snow across the northern parts of the Upper Mississippi River basin.

Along the Mississippi River, the probabilities for more severe flooding have risen due to the increased snowpack. It is now likely that much of the mainstem Mississippi River will have a high chance of reaching major flood stage levels, with a potential for some locations to reach levels near previous record crests. The occurrence of near record levels will depend on the rate of the snowmelt along with receiving additional spring rains.

On the larger tributaries, the rivers with source regions in the deep snowpack will have well above normal chances for flooding this season. Rivers with higher flood threats include the Cedar, Pecatonica, lower Rock, Iowa above Coralville Reservoir, and the Iowa below the confluence with the Cedar River. The remainder of area rivers will have near or above normal chances for flooding this season.

To note, even a gradual snowmelt with little rainfall this spring assures at least minor flooding for many rivers across the region.

Main Points:

- * Current conditions support a chance for high impact flooding this spring, as well as widespread minor flooding.
- * Saturated soils or frozen ground will contribute to high amounts of runoff from snowmelt and spring-time rains.
- * Due to a deep snowpack across much of the region, snowmelt alone will likely cause most rivers to reach levels near or above flood stage. Confidence is high on widespread minor flooding, with lower confidence on the severity of peak crests.
- * Ice action in the rivers will continue to be a factor in potential flooding as many rivers remain ice covered.
- * The rate of the snowmelt and additional spring rains will be essential to the severity of flooding that occurs this spring. A fast snowmelt and any significant spring rains will increase the potential for high impact flooding this season.

Many factors are considered when determining the overall flood risk for the upcoming spring season. the combination of these influences factor into the final determination. These factors are discussed in detail below.

.Seasonal Precipitation: Above to Well Above Normal

The winter season ended with total precipitation amounts being above to well above normal across the local area as well as the entire Upper Mississippi River basin. A large area from central Iowa into southern Minnesota through northeast Wisconsin had observed total amounts upwards of 200 percent of normal.

Some of the winter precipitation has been rain, but overall, the entire region has also observed above normal snowfall for the season. Portions of the region have received 20 to near 40 inches above normal.

The wet conditions this winter followed a wet autumn season. So overall, conditions across the region have been wetter than normal for much of the last 6 months.

.Snow Cover and Liquid Water Content: Above to Well Above Normal

The snowpack is extensive across the region, with complete coverage extending from southwest Iowa to southeast Wisconsin and all areas north of that line. Snow depths range from a few inches on the southern edge of the snowpack and quickly increase going north, with the majority of the region measuring amounts in excess of one foot. The deepest snow is currently being observed over northern Wisconsin with amounts over 30 inches. These depths are anywhere from 2 to 24 inches above normal for early March.

The water equivalent of in the snow is quite impressive, with widespread amounts of 2 to 6 inches of liquid in the snowpack. There are even some locations in region that exceed 6 inches. Along the southern periphery of the snowpack, liquid water content is generally 1 to 3 inches.

The rate that this snowpack melts will be a primary determination of the severity of flooding that occurs.

.Soil Conditions: Well Above Normal

Little changes have occurred in soil conditions since late February. Soils across all of Iowa into southern Minnesota, Wisconsin and northern Illinois are nearly saturated, ranking in the 90 to 99th percentile of soil moisture rankings. The areal extent of the saturated soils is concerning as it would imply excessive amounts of runoff from snowmelt, rainfall, or a combination of the two will impact most rivers in the area, leading to an enhanced threat for flooding.

.Frost Depth: Near to Above Normal

Frost depths range from 6 to 12 inches from southern Iowa into northeast Illinois to 3 feet in parts of Minnesota and Wisconsin. The frozen ground across the northern parts of the Upper Mississippi River basin will likely cause high snowmelt and rainfall runoff amounts into the Mississippi River system this spring.

Locally, the frozen ground will also play a part to increase runoff and the threat for flooding into tributaries and smaller creeks and streams through March.

.River Conditions: Above Normal

River levels are generally running above normal for this time of year. They have remained at elevated levels since September.

The continuation of cold temperatures across the midwest has kept ice on many area rivers. Ice action has had an impact on river levels and has caused flooding on some rivers through the winter months, helping to keep levels above normal.

.Ice Jam Flooding:

Where rivers are still ice covered, high amounts of runoff from either snowmelt or moderate to heavy rain could cause ice to break-up and form ice jams. Any ice jams will have the potential to cause flooding. This will remain a threat until all area rivers are ice free.

.Looking ahead:

Active weather is expected through the middle of March with the potential for several large storm systems to impact the region with both rain and snow. This could further build up the snowpack in some areas, promote melting across the southern fringe of the snowpack, and if soils are able to thawed, will further saturate the ground. Looking to the second half of March, a drier weather pattern is favored, with below normal temperatures looking to continue through the remainder of March. Of note, average temperatures rise considerably through the month of March. By the end of the month, normal temperatures for most areas are above freezing. Therefore a forecast of near normal temperatures will be promoting snowmelt.

The longer into the spring that the snow remains, the higher the potential for a rapid snowmelt. A faster snowmelt will promote an increased chance for a higher degree of flooding.

.Summary:

All factors in consideration for flooding potential are indicating the probabilities are high for spring flooding along the Mississippi River, as well as tributary rivers in eastern Iowa and western Illinois. A lesser probability for flooding exists for smaller rivers in northeast Missouri and west central Illinois. These factors would also indicate that the potential does exist for high impact flooding to occur. The occurrence of significant flooding will be dependent on how fast the snowpack melts, as well as if the region receives additional heavy rains this spring. A gradual melt with little additional precipitation would cause flooding to be much less severe.

Ice jam flooding will be a possibility as long as ice remains in the rivers and cold air is anticipated across the area.

.Numerical Weather Outlooks...

The numerical weather 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: 03/11/2019 - 06/09/2019

Location	Categorical Flood Stages (ft)			: Current and Historical Chances of Exceeding Flood Categories as a Percentage (%)					
	Minor	Mod	Major	: Minor		Moderate		Major	
	Minor	Mod	Major	CS	HS	CS	HS	CS	HS
:Mississippi River									
Dubuque LD11	16.0	17.0	20.5	>95	40	>95	32	>95	10
Dubuque	17.0	18.0	21.5	>95	49	>95	39	>95	11
Bellevue LD12	17.0	18.0	20.0	>95	32	>95	19	>95	10
Fulton LD13	16.0	18.0	20.0	>95	48	>95	27	>95	11

Camanche	17.0	18.5	20.5	:	>95	42	>95	28	>95	11
Le Claire LD14	11.0	12.0	13.5	:	>95	46	>95	30	>95	12
Rock Island LD15	15.0	16.0	18.0	:	>95	57	>95	46	>95	19
Ill. City LD16	15.0	16.0	18.0	:	>95	56	>95	42	>95	19
Muscatine	16.0	18.0	20.0	:	>95	59	>95	42	>95	19
New Boston LD17	15.0	16.5	18.5	:	>95	61	>95	48	>95	23
Keithsburg	14.0	15.5	17.0	:	>95	61	>95	46	>95	24
Gladstone LD18	10.0	12.0	14.0	:	>95	62	>95	45	>95	21
Burlington	15.0	16.5	18.0	:	>95	61	>95	44	>95	25
Keokuk LD19	16.0	17.5	19.0	:	>95	31	>95	23	90	10
Gregory Landing	15.0	18.0	25.0	:	>95	62	>95	37	38	<5
:Maquoketa River										
Manchester Hwy 20	14.0	17.0	20.0	:	50	22	21	16	12	8
Maquoketa	24.0	26.0	28.5	:	67	18	48	13	26	8
:Wapsipinicon River										
Independence	12.0	13.0	15.0	:	27	8	13	7	7	<5
Anamosa Shaw Rd	14.5	18.0	21.5	:	89	26	25	12	7	<5
De Witt 4S	11.0	11.5	12.5	:	>95	68	>95	64	>95	45
:North Skunk River										
Sigourney	16.0	18.0	21.0	:	78	55	51	40	12	11
:Skunk River										
Augusta	15.0	17.0	20.0	:	65	46	50	32	18	14
:Cedar River										
Vinton	15.0	18.0	19.0	:	>95	20	50	8	36	6
Palo Blairs Ferry	12.5	15.5	17.0	:	>95	30	44	7	23	<5
Cedar Rapids	12.0	14.0	16.0	:	>95	32	93	19	66	9
Cedar Bluff	16.0	20.0	26.0	:	>95	32	61	9	6	<5
Conesville	13.0	15.0	16.5	:	>95	56	>95	22	52	8
:Iowa River										
Marengo	15.0	17.0	19.0	:	>95	67	>95	48	38	6
Iowa City	23.5	24.5	26.0	:	21	6	16	<5	<5	<5
Lone Tree	16.0	18.5	22.0	:	30	14	8	6	<5	<5
Columbus Jct	23.0	25.0	26.5	:	74	14	36	5	20	<5
Wapello	21.0	25.0	27.5	:	>95	53	42	7	16	<5
Oakville	11.0	15.0	20.0	:	>95	51	39	7	<5	<5
:English River										
Kalona	14.0	16.0	18.0	:	>95	48	31	33	9	13
:Des Moines River										
Keosauqua	22.0	25.0	27.0	:	17	9	7	<5	<5	<5
St Francisville	18.0	22.0	25.0	:	71	43	9	6	<5	<5
:Fox River										
Wayland	15.0	18.0	20.0	:	32	28	9	10	<5	<5
:Pecatonica River										
Freeport	13.0	14.0	16.0	:	>95	43	91	23	24	<5
:Rock River										
Como	12.5	15.5	18.0	:	86	24	25	8	<5	<5
Joslin	12.0	14.0	16.5	:	>95	57	>95	38	66	17
Moline	12.0	13.0	14.0	:	>95	56	>95	32	82	23
:Green River										
Geneseo	15.0	16.5	18.0	:	46	25	28	16	14	9

:La Moine River
 Colmar 20.0 22.0 24.0 : >95 64 54 43 22 19

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: 03/11/2019 - 06/09/2019						
	95%	90%	75%	50%	25%	10%	5%
:Mississippi River							
Dubuque LD11	21.2	21.6	22.5	24.4	26.2	28.6	29.5
Dubuque	23.0	23.5	24.5	26.1	27.5	29.8	30.6
Bellevue LD12	20.6	20.9	21.6	23.1	24.2	26.0	26.5
Fulton LD13	21.2	21.5	22.4	24.2	25.8	28.3	29.3
Camanche	21.8	22.2	23.1	24.8	26.3	28.8	29.8
Le Claire LD14	15.0	15.3	16.1	17.8	19.5	22.2	23.4
Rock Island LD15	20.1	20.4	21.2	22.6	24.3	26.5	27.5
Ill. City LD16	20.5	20.8	22.2	24.1	25.8	27.8	28.6
Muscatine	22.2	22.4	23.8	25.2	26.8	28.6	29.4
New Boston LD17	21.3	21.6	22.6	23.9	25.6	27.3	28.0
Keithsburg	18.3	19.0	20.0	21.0	23.2	25.1	25.7
Gladstone LD18	15.0	15.9	17.0	18.3	20.7	22.7	23.3
Burlington	19.1	19.9	21.2	22.3	24.7	26.0	26.2
Keokuk LD19	18.1	19.0	20.3	21.5	24.2	26.2	26.9
Gregory Landing	20.3	21.2	22.6	23.9	26.1	27.6	28.3
:Maquoketa River							
Manchester Hwy 20	10.1	10.5	11.5	13.9	15.8	20.7	21.3
Maquoketa	19.6	20.6	22.9	25.7	28.6	30.2	32.6
:Wapsipinicon River							
Independence	9.1	9.5	9.9	10.8	12.1	13.4	15.7
Anamosa Shaw Rd	13.7	14.3	15.1	16.2	18.0	19.9	22.2
De Witt 4S	12.5	12.7	12.9	13.3	13.5	13.9	13.9
:North Skunk River							
Sigourney	14.5	15.0	16.5	18.0	19.6	21.5	21.8
:Skunk River							
Augusta	12.8	12.9	13.5	17.0	19.4	21.2	23.4
:Cedar River							
Vinton	15.1	15.3	16.3	18.0	19.9	21.0	21.3
Palo Blairs Ferry	13.2	13.3	14.0	15.3	16.9	17.8	18.2
Cedar Rapids	13.8	14.0	15.2	17.7	20.6	22.4	23.3
Cedar Bluff	17.2	17.6	18.7	21.1	23.8	25.4	26.2
Conesville	15.0	15.2	15.6	16.6	17.6	18.3	18.7
:Iowa River							
Marengo	17.7	17.9	18.3	18.8	19.2	19.6	19.7
Iowa City	19.4	19.4	19.5	19.7	22.9	25.3	25.9
Lone Tree	13.2	13.4	14.0	14.4	16.8	18.3	19.0
Columbus Jct	21.0	21.2	22.6	24.5	26.0	27.3	28.1

Wapello	22.1	22.3	23.3	24.8	26.2	28.3	29.6
Oakville	11.8	12.0	13.0	14.4	15.8	17.8	19.1
:English River							
Kalona	14.1	14.3	14.9	15.4	16.3	17.9	19.2
:Des Moines River							
Keosauqua	17.7	18.3	19.3	20.3	21.5	22.5	26.1
St Francisville	16.0	16.6	17.8	19.2	20.6	21.8	24.6
:Fox River							
Wayland	11.4	11.7	12.1	12.5	15.8	17.8	19.2
:Pecatonica River							
Freeport	13.8	14.1	14.4	15.1	16.0	16.5	17.0
:Rock River							
Como	12.0	12.5	13.2	14.1	15.5	16.5	16.7
Joslin	14.7	15.2	16.3	17.5	19.1	19.9	20.3
Moline	13.2	13.5	14.2	15.3	16.4	17.3	18.0
:Green River							
Geneseo	13.5	13.5	13.8	14.7	17.0	18.7	21.2
:La Moine River							
Colmar	20.7	20.9	21.0	22.3	23.6	25.3	25.9

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: 03/11/2019 - 06/09/2019						
	95%	90%	75%	50%	25%	10%	5%
:Mississippi River							
Dubuque LD11	5.1	5.0	4.9	4.7	4.7	4.6	4.5
Dubuque	8.0	7.9	7.8	7.7	7.7	7.6	7.6
Bellevue LD12	5.2	5.0	4.8	4.6	4.5	4.3	4.3
Fulton LD13	6.2	5.9	5.6	5.0	4.9	4.8	4.8
Camanche	9.6	9.5	9.4	9.2	9.2	9.1	9.0
Le Claire LD14	5.6	5.6	5.3	5.1	4.9	4.8	4.8
Rock Island LD15	8.2	8.1	7.9	7.4	6.9	6.0	5.7
Ill. City LD16	6.6	6.5	6.4	6.2	5.6	4.8	4.7
Muscatine	8.2	8.1	8.0	7.8	7.5	6.8	6.7
New Boston LD17	8.2	8.1	7.9	7.5	6.6	5.4	5.0
Keithsburg	9.4	9.3	9.3	9.1	8.0	6.9	6.8
Gladstone LD18	3.8	3.8	3.7	3.7	3.5	2.6	2.5
Burlington	10.1	10.0	10.0	10.0	9.7	8.6	8.6
Keokuk LD19	6.0	5.9	5.9	5.9	5.7	4.9	4.8
Gregory Landing	8.8	8.7	8.6	8.4	7.5	6.9	6.8
:Maquoketa River							
Manchester Hwy 20	4.5	4.5	4.4	4.2	4.1	4.0	4.0
Maquoketa	12.5	12.3	11.8	11.5	11.2	11.0	11.0
:Wapsipinicon River							
Independence	5.6	5.5	5.4	5.3	5.1	5.0	5.0
Anamosa Shaw Rd	6.9	6.8	6.4	6.1	5.8	5.5	5.3
De Witt 4S	8.1	7.9	7.4	7.0	6.5	6.1	6.0

:North Skunk River							
Sigourney	6.6	6.4	5.8	5.2	4.9	4.6	4.6
:Skunk River							
Augusta	4.9	4.6	3.9	3.0	2.5	2.1	2.0
:Cedar River							
Vinton	4.3	4.2	4.0	3.7	3.3	3.1	2.9
Palo Blairs Ferry	5.2	5.1	4.7	4.2	4.0	3.6	3.5
Cedar Rapids	5.1	4.9	4.7	4.4	4.3	4.1	4.0
Cedar Bluff	6.8	6.7	6.2	5.6	5.4	5.1	4.9
Conesville	7.9	7.8	7.5	7.0	6.5	6.2	6.1
:Iowa River							
Marengo	9.3	9.1	8.6	8.1	7.6	7.3	7.2
Iowa City	11.0	10.9	10.7	10.6	10.3	9.7	9.6
Lone Tree	8.4	7.6	6.7	5.9	5.3	4.7	4.6
Columbus Jct	13.7	13.6	13.1	11.2	10.5	10.1	9.9
Wapello	15.2	15.1	15.1	14.0	13.2	12.7	12.6
Oakville	5.0	4.9	4.9	4.2	3.4	3.1	3.0
:English River							
Kalona	5.0	5.0	4.6	4.4	4.2	4.0	4.0
:Des Moines River							
Keosauqua	15.4	14.9	14.1	12.7	12.0	11.4	11.2
St Francisville	13.1	12.7	11.8	10.0	9.0	8.0	7.7
:Fox River							
Wayland	2.4	2.3	2.2	2.0	1.9	1.9	1.8
:Pecatonica River							
Freeport	8.1	7.8	6.7	5.8	5.1	4.8	4.7
:Rock River							
Como	6.6	6.1	5.6	4.8	4.3	4.0	4.0
Joslin	9.4	8.7	8.0	7.1	6.3	5.9	5.9
Moline	10.0	9.7	9.4	8.9	8.5	8.3	8.3
:Green River							
Geneseo	4.7	4.6	4.5	4.3	4.0	3.7	3.7
:La Moine River							
Colmar	5.5	5.3	4.6	3.8	3.5	3.2	3.1

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.

The next outlook will be issued near the end of March.

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