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PROBABILISTIC HYDROLOGIC OUTLOOK
NATIONAL WEATHER SERVICE EASTERN NORTH DAKOTA/GRAND FORKS ND
956 AM CST Thu Mar 11 2021

...SPRING FLOOD AND WATER RESOURCES OUTLOOK...

...RED RIVER BASIN OUTLOOK FOR RIVER FLOOD POTENTIAL...

This outlook covers the Red River of the North
and its Minnesota and North Dakota tributaries.

...LOW RISK OF MINOR FLOODING FOR FEW LOCATIONS ALONG THE MAINSTEM
RED RIVER AND ITS TRIBUTARIES...

* This 90-day outlook covers the period from 3/15/2021 to 6/13/2021.

.OUTLOOK SUMMARY...

* Probabilities for exceeding Major, Moderate, Minor Flood Stage...

Major Flooding...

There is a low risk (below 35 percent) of major flooding
throughout the basin with this outlook issuance.

Moderate Flooding...

There is a low risk (below 35 percent) of moderate flooding
throughout the basin with this outlook issuance.

Minor Flooding...

There is a moderate risk (35 to 65 percent) of minor flooding
at Wahpeton and Fargo on the Red River, at Sabin on the South Branch
Buffalo River, and at Dilworth on the Buffalo River. There is a low
risk of minor flooding across the remainder of the basin.

*Note: With the recent completion of the Grafton Bypass, river
flows will be divided between the main channel and the diversion.
This will significantly reduce the impact on the City of Grafton and
surrounding areas protected by the diversion, and the in town river
gage at Grafton is not likely to reach the stages depicted here.
However, locations outside the protection of the diversion still have
the depicted risk probability associated with historic levels on the
Grafton gage.

.OUTLOOK DISCUSSION...

Hydrologic and climate conditions which affect each of the several

factors that significantly determine the timing and magnitude of spring snowmelt flooding within the Red River of the North are discussed below:

* SNOWPACK CONDITIONS...

Most, if not all, of the aging snowpack across the basin melted during the recent above normal temperatures. However, a system dropped anywhere from one to six or more inches of snow across southern portions of the Red River Valley and into west central Minnesota yesterday (Wednesday). Snow water equivalent with this recent snowfall generally ranged from 0.10 to 0.50 inch.

* SOIL MOISTURE...

Soil moisture continues to be well below normal due to a dry fall and winter season.

* FROST DEPTHS...

Frost depths continue to be deeper than normal, generally ranging from 20 to 40 inches. This is due to the shallow (or non-existent) snowpack across much of the region for most of the winter. However, the recent above normal temperatures have allowed the top layer of soil to begin to thaw very quickly and absorb the melting of our meager snowpack.

* RIVER FLOWS...

Base streamflows are around normal for most locations although just slightly below normal across the far northern basin.

* RIVER ICE...

River ice and lake ice thicknesses are currently around normal values. However, the recent warmth has also begun to melt some of the ice in local rivers and streams.

* FACTORS YET TO BE DETERMINED...

- Further snowpack growth,
- Rate of snowmelt/thaw,
- Heavy rain on snow or frozen ground during thaw or peak flood,
- Heavy rain on ice-covered rivers causing short-term ice jams.

* SHORT TERM WEATHER FORECAST...

Temperatures are expected to continue to be slightly above average in the short term period with no significant weather systems expected.

* LONG TERM CLIMATE OUTLOOK...

Climate outlooks for the month of March and throughout the remainder of the spring indicate near to above normal temperatures with continued below normal precipitation.

.NEXT SPRING FLOOD OUTLOOK...

This will be the last spring flood outlook for the 2021 spring snowmelt season. Regular monthly probabilistic outlooks will resume on Thursday, March 25, 2021.

.FLOOD OUTLOOK PROBABILITIES TABLES...

The following message has two sections: the first gives the current and normal/historical chances of river locations reaching their minor, moderate, and major flood category. The second gives the current chances of river locations rising above river stages listed.

...Red River Long-Range Probabilistic Outlook by Flood Category...

Valid from March 15, 2021 to June 13, 2021

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: 03/15/2021 - 06/13/2021

Location	Categorical			: Current and Historical					
	Flood Stages (FT)			: Chances of Exceeding					
	Minor	Mod	Major	: Flood Categories					
				: as a Percentage (%)					
				: Minor		: Moderate		: Major	
				CS	HS	CS	HS	CS	HS
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Red River of the North.....									
WAHPETON	11.0	13.0	15.0	: 41	64	17	34	<5	18
HICKSON	30.0	34.0	38.0	: 11	28	<5	16	<5	<5
FARGO	18.0	25.0	30.0	: 59	84	17	41	10	27
HALSTAD	26.0	32.0	37.5	: 12	38	<5	20	<5	11
GRAND FORKS	28.0	40.0	46.0	: 18	59	<5	31	<5	11
OSLO	26.0	30.0	36.0	: 27	65	15	57	<5	18
DRAYTON	32.0	38.0	42.0	: 15	62	6	42	<5	16
PEMBINA	39.0	44.0	49.0	: 9	52	<5	43	<5	22

Location	Categorical			: Current and Historical					
	Flood Stages (FT)			: Chances of Exceeding					
	Minor	Mod	Major	: Flood Categories		: as a Percentage (%)			
	Minor	Mod	Major	: Minor		: Moderate		: Major	
				CS	HS	CS	HS	CS	HS
Minnesota Tributaries.....									
Note: The Roseau numbers consider the flow through its diversion									
SABIN	13.0	15.0	19.0	51	56	10	16	<5	<5
HAWLEY	8.0	9.0	11.0	10	39	<5	23	<5	<5
DILWORTH	13.0	20.0	26.0	56	69	9	21	<5	<5
TWIN VALLEY	10.0	12.0	14.0	<5	17	<5	<5	<5	<5
HENDRUM	20.0	28.0	32.0	24	54	<5	22	<5	7
SHELLY	14.0	20.0	23.0	<5	28	<5	11	<5	6
CLIMAX	20.0	25.0	30.0	<5	25	<5	12	<5	8
HIGH LANDING	12.0	12.5	13.0	<5	8	<5	<5	<5	<5
CROOKSTON	15.0	20.0	23.0	11	53	<5	28	<5	9
ABOVE WARREN	67.0	71.0	75.0	<5	11	<5	<5	<5	<5
ALVARADO	106.0	108.0	110.0	<5	28	<5	17	<5	<5
HALLOCK	802.0	806.0	810.0	14	63	<5	42	<5	10
ROSEAU	16.0	18.0	19.0	<5	24	<5	14	<5	9

Location	Categorical			: Current and Historical					
	Flood Stages (FT)			: Chances of Exceeding					
	Minor	Mod	Major	: Flood Categories		: as a Percentage (%)			
	Minor	Mod	Major	: Minor		: Moderate		: Major	
				CS	HS	CS	HS	CS	HS
North Dakota Tributaries.....									
ABERCROMBIE	10.0	12.0	18.0	22	42	17	34	<5	21
VALLEY CITY	15.0	16.0	17.0	<5	10	<5	7	<5	6
LISBON	15.0	17.0	19.0	<5	11	<5	10	<5	7
KINDRED	16.0	19.0	20.5	5	22	<5	11	<5	10
WEST FARGO DVRSN	18.0	20.0	21.0	<5	12	<5	11	<5	10
HARWOOD	84.0	86.0	91.0	8	26	7	21	<5	10
ENDERLIN	9.5	12.0	14.0	8	21	<5	11	<5	<5
MAPLETON	18.0	21.0	23.0	18	42	9	18	<5	5
HILLSBORO	10.0	13.0	16.0	<5	19	<5	10	<5	<5
MINTO	6.0	8.0	11.0	<5	25	<5	7	<5	<5
GRAFTON	12.0	13.5	14.5	<5	18	<5	7	<5	<5
WALHALLA	11.0	16.0	18.0	<5	23	<5	<5	<5	<5
NECHE	18.0	19.0	20.5	<5	27	<5	26	<5	20

LEGEND:

- CS = Conditional Simulation (Outlook for current conditions)
- HS = Historical Simulation (" " normal conditions)
- FT = Feet (above gage zero datum)

...Red River Long-Range Probabilistic Outlook by River Stage...

Valid from March 15, 2021 to June 13, 2021

LOCATION	95%	90%	75%	50%	25%	10%	05%

Red River of the North.....							
WAHPETON	8.6	8.6	8.7	10.6	12.2	13.9	14.3
HICKSON	17.9	18.0	18.1	20.9	25.4	30.4	33.4
FARGO	17.6	17.6	17.6	18.7	23.4	30.2	32.8
HALSTAD	12.7	12.8	12.8	14.2	20.7	28.7	30.7
GRAND FORKS	18.6	18.6	18.6	19.6	26.1	34.7	38.2
OSLO	13.4	13.5	13.5	16.0	26.1	33.4	34.3
DRAYTON	15.5	15.5	15.5	17.8	28.1	36.7	39.2
PEMBINA	18.6	18.6	18.7	22.2	30.7	38.3	43.2

Minnesota Tribs:	95%	90%	75%	50%	25%	10%	05%

South Fork Buffalo River.....							
SABIN	11.2	11.2	11.3	13.0	14.1	15.1	15.4
Buffalo River.....							
HAWLEY	3.6	3.8	4.7	5.4	6.8	7.9	8.9
DILWORTH	10.8	10.8	11.0	13.7	18.6	19.6	21.5
Wild Rice River.....							
TWIN VALLEY	2.8	3.0	3.5	4.5	6.3	7.8	9.1
HENDRUM	7.9	8.0	8.2	13.1	19.9	25.3	26.1
Marsh River.....							
SHELLY	4.7	4.7	4.8	6.9	8.9	11.8	13.0
Sand Hill River.....							
CLIMAX	5.5	5.5	6.6	7.4	9.3	15.2	17.3
Red Lake River.....							
HIGH LANDING	3.0	3.1	3.9	5.2	6.6	8.6	9.0
CROOKSTON	5.6	5.7	6.5	8.0	9.9	15.2	18.6
Snake River.....							
ABOVE WARREN	60.6	60.8	61.2	61.9	62.8	63.9	64.5
ALVARADO	96.1	96.3	96.8	97.8	100.2	102.5	104.0
Two Rivers River.....							
HALLOCK	794.8	794.8	795.0	796.8	799.5	803.3	805.8
Roseau River..... considering the flow through the Roseau diversion							
ROSEAU	5.8	5.8	6.2	7.0	8.1	11.5	14.8

North Dakota Tribs:	95%	90%	75%	50%	25%	10%	05%

Wild Rice River.....							
ABERCROMBIE	2.1	2.2	2.5	4.4	9.8	14.9	17.4
Sheyenne River.....							
VALLEY CITY	4.6	4.6	4.6	4.6	5.2	7.2	8.3
LISBON	3.3	3.3	3.3	3.7	4.6	7.4	10.4
KINDRED	11.4	11.4	11.4	11.4	11.4	11.4	16.3
WEST FARGO DVRSN	12.9	12.9	12.9	12.9	12.9	12.9	15.9
HARWOOD	75.4	75.4	75.4	75.4	77.2	79.5	89.2
Maple River.....							
ENDERLIN	1.5	1.5	1.5	4.7	7.0	9.2	10.8
MAPLETON	8.7	8.7	9.6	12.5	16.4	20.4	21.9
Goose River.....							

HILLSBORO	1.7	1.7	1.8	1.9	3.5	4.5	5.0
Forest River.....							
MINTO	1.3	1.3	1.6	1.8	2.7	3.9	4.7
Park River.....							
GRAFTON	7.6	7.6	7.6	7.6	8.4	9.0	9.5
Pembina River.....							
WALHALLA	1.3	1.3	1.8	2.5	4.1	6.1	7.1
NECHE	1.9	1.9	2.7	3.8	6.6	10.2	12.5

.THE OUTLOOK PRODUCTION PROCESS...

This long range probabilistic outlook is based on a series of peak river levels or crests taken from the forecast hydrograph results of the NWS Community Hydrologic Prediction System (CHPS). The model is run for multiple scenarios starting at current river levels and soil conditions using 69 years (1949-2018) of past precipitation and temperature conditions that were experienced for those past years during the time-frame of the outlook period. These crests can then be ranked from lowest to highest and assigned an exceedance probability. For example, for a series of 50 years, the lowest ranked crest has 49 crests above it and since 95 percent of the crests are above it, it is assigned a 95 percent probability of exceedance (POE).

A YouTube video on "How to Interpret River Outlook Products" is at:

www.youtube.com/watch?v=pSoEgvsnpv4

The probabilities can be used for risk management by using them as an indication of the range of crests that may be expected during the valid period of the outlook. By providing a range of peak river level probabilities, the NWS is contributing to the area's Decision Support Services that help with long-range flood planning and response readiness. This outlook is a part of NOAA's National Weather Service's AHPS (Advanced Hydrologic Prediction Services).

.ADDITIONAL INFORMATION SOURCES...

The AHPS Long-Range Probabilistic Hydrologic Outlooks are issued each month typically between the first and second Friday after mid-month. However, Spring Flood and Water Resources Outlooks are issued several times leading up to the spring melt period, usually on Thursdays beginning in late February or early March and ending in early April, depending on the spring flooding conditions.

This outlook is also presented as graphs of the probability of stage exceedance for the full period and for weekly intervals during the period. These graphs, along with explanations for interpreting them, are available from the NWS Grand Forks AHPS web page:

www.weather.gov/grandforks or www.weather.gov/fgf

then click on the "Rivers and Lakes" tab above the map.

Current river conditions for all river forecast points in the Red River of the North and Devils/Stump Lake basins are also available

on our website, as well as 7-day forecasts when river levels at
forecast points are in or near flood.

Additional Probabilistic Hydrologic Outlooks will be issued monthly
throughout the rest of the year during the later part of the month
or as conditions warrant.

Refer to the separate Devils Lake Probabilistic Hydrologic Outlook
for Devils and Stump Lakes Probability of Exceedance levels and
low-water non-exceedance levels.

If you have any questions, contact the NWS at 701-772-0720.

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