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PROBABILISTIC HYDROLOGIC OUTLOOK
NATIONAL WEATHER SERVICE EASTERN NORTH DAKOTA/GRAND FORKS ND
230 PM CST Thu Jan 27 2022

...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.

...RISK OF FLOODING HEADLINE...

* This 90-day outlook covers the period from 1/31/22 to 5/1/22.

.OUTLOOK SUMMARY...

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

Major Flooding...

There is a medium risk (35 to 65 percent chance) of major flooding
at Fargo/Moorhead, Oslo, and Pembina on the Red River. In North
Dakota, there is a medium risk of major flooding at the West Fargo
Diversion and Harwood on the Sheyenne River.

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

Moderate Flooding...

There is a high risk (greater than 65 percent chance) of moderate
flooding at Fargo/Moorhead, Grand Forks/East Grand Forks, Oslo,
Drayton, and Pembina on the Red River. In North Dakota, there is a
high risk of moderate flooding at Abercrombie on the Wild Rice River,
Enderlin and Mapleton on the Maple River, Harwood on the Sheyenne
River, and Hillsboro on the Goose River.

There is a medium risk (35 to 65 percent chance) of moderate
flooding at Wahpeton and Halstad on the Red River. In North Dakota,
there is a medium risk of moderate flooding at Valley City, Kindred,
and the West Fargo Diversion on the Sheyenne River. In Minnesota,
there is a medium risk of moderate flooding at Sabin on the South
Branch Buffalo River, Dilworth on the Buffalo River, Hendrum on the
Wild Rice River, Crookston on the Red Lake River, and Hallock on the
Two Rivers River.

Minor Flooding...

There is a high risk (greater than 65 percent chance) of minor
flooding at Wahpeton and Halstad on the Red River. In North Dakota,
there is a high risk of minor flooding at Kindred and the West Fargo
Diversion on the Sheyenne River. In Minnesota, there is a high risk
of minor flooding at Sabin on the South Branch Buffalo River,

Dilworth on the Buffalo River, Hendrum on the Wild Rice River, Crookston on the Red Lake River, and Hallock on the Two Rivers River.

There is a medium risk (35 to 65 percent chance) of minor flooding at Hickson on the Red River. In North Dakota, there is a medium risk of minor flooding at Lisbon on the Sheyenne River and Minto on the Forest River. In Minnesota, there is a medium risk of minor flooding at Hawley on the Buffalo River and Climax on the Sand Hill River.

.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...

The current snowpack and associated water content is near to above normal. Since December 1, 2021, snowfall has been running near normal to above normal in some locations (roughly 90 to 125 percent of normal). This has been the case for the majority of the basin this winter season. However, there is some unevenness of the snowpack (and associated water content) due to numerous recent blowing snow and blizzard events redistributing the current snow on the ground.

* SOIL MOISTURE

At the time of freeze-up, soil moisture was generally near normal across the basin (just slightly above normal across the far south to slightly below normal across the far north). Timely precipitation last fall allowed for some recharging of the soil following months of drought conditions.

* FROST DEPTHS...

Current frost depth values are near normal to slightly deeper than normal in some locations. A fairly extended period of cold conditions has allowed for deep frost penetration in most areas. Frost depth values range from 12 to 30 inches across most of the basin with slightly shallower depths across portions of northwestern Minnesota where the snow depth is slightly higher.

* RIVER FLOWS...

Base streamflows are near normal for this time of year. The Red River and most of its tributaries are currently flowing at 25 to 75 percent of normal. Slightly higher than normal flows are seen in the far southern basin with slightly lower than normal flows near the International border.

* RIVER ICE...

River ice and lake ice thicknesses are generally near normal due to the recent cold conditions.

* 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...

The next few weeks will bring a roller coaster of temperatures (alternating between above normal and below normal values) with minimal appreciative precipitation. Minor snow events (regarding precipitation amounts) will continue to come and go with sporadic strong winds lending to the potential for impactful blowing snow and reduced visibility.

* LONG TERM CLIMATE OUTLOOK...

Climate outlooks for February, March, and April indicate generally near normal temperatures and precipitation for the remainder of the winter and heading into the spring snowmelt season.

.NEXT SPRING FLOOD OUTLOOK...

The next 2022 spring flood outlook will be issued, Thursday, February 10, 2022.

.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 January 31, 2022 to May 01, 2022

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: 01/31/2022 - 05/01/2022

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
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Red River of the North.....

WAHPETON	11.0	13.0	15.0	:	>95	56	47	26	16	15
HICKSON	30.0	34.0	38.0	:	44	25	15	13	<5	<5
FARGO	18.0	25.0	30.0	:	>95	78	90	37	51	23
HALSTAD	26.0	32.0	37.5	:	82	32	43	17	18	10
GRAND FORKS	28.0	40.0	46.0	:	>95	56	72	30	20	10
OSLO	26.0	30.0	36.0	:	>95	61	>95	53	44	18
DRAYTON	32.0	38.0	42.0	:	93	44	78	32	21	11
PEMBINA	39.0	44.0	49.0	:	94	50	83	42	48	21

: Current and Historical
: Chances of Exceeding
: Flood Categories
: as a Percentage (%)

Location	Categorical Flood Stages (FT)			:	Minor		Moderate		Major	
	Minor	Mod	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	:	>95	54	40	15	<5	<5
HAWLEY	8.0	9.0	11.0	:	38	35	25	22	<5	<5
DILWORTH	13.0	20.0	26.0	:	>95	65	44	18	<5	<5
TWIN VALLEY	10.0	12.0	14.0	:	7	15	<5	<5	<5	<5
HENDRUM	20.0	28.0	32.0	:	93	48	39	18	6	7
SHELLY	14.0	20.0	23.0	:	27	26	<5	11	<5	6
CLIMAX	20.0	25.0	30.0	:	56	23	27	10	9	8
HIGH LANDING	12.0	12.5	13.0	:	<5	7	<5	<5	<5	<5
CROOKSTON	15.0	20.0	23.0	:	78	46	37	24	11	8
ABOVE WARREN	67.0	71.0	75.0	:	5	7	<5	<5	<5	<5
ALVARADO	106.0	108.0	110.0	:	25	22	13	14	<5	<5
HALLOCK	802.0	806.0	810.0	:	81	62	39	39	<5	10
ROSEAU	16.0	18.0	19.0	:	13	21	<5	12	<5	8

: Current and Historical
: Chances of Exceeding
: Flood Categories
: as a Percentage (%)

Location	Categorical Flood Stages (FT)			:	Minor		Moderate		Major	
	Minor	Mod	Major		CS	HS	CS	HS	CS	HS

North Dakota Tributaries.....

ABERCROMBIE	10.0	12.0	18.0	:	93	39	88	34	37	19
VALLEY CITY	15.0	16.0	17.0	:	44	10	38	6	33	<5
LISBON	15.0	17.0	19.0	:	54	10	34	9	25	5
KINDRED	16.0	19.0	20.5	:	90	18	64	10	33	8
WEST FARGO DVRSN	18.0	20.0	21.0	:	73	11	48	9	45	8
HARWOOD	84.0	86.0	91.0	:	86	23	82	18	44	9
ENDERLIN	9.5	12.0	14.0	:	>95	19	82	9	18	<5
MAPLETON	18.0	21.0	23.0	:	94	34	66	13	12	5
HILLSBORO	10.0	13.0	16.0	:	85	19	68	10	8	<5
MINTO	6.0	8.0	11.0	:	56	23	<5	7	<5	<5
WALHALLA	11.0	16.0	18.0	:	11	21	<5	<5	<5	<5
NECHE	18.0	19.0	20.5	:	24	23	18	22	9	19

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 January 31, 2022 to May 01, 2022

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

Red River of the North.....							
WAHPETON	11.2	11.7	11.9	12.6	14.3	16.0	16.4
HICKSON	22.6	24.8	26.8	28.3	32.6	34.9	36.0
FARGO	21.9	25.1	27.0	30.1	33.6	36.5	39.0
HALSTAD	22.4	24.0	27.8	31.2	35.5	38.6	39.3
GRAND FORKS	31.2	35.4	39.3	42.9	45.2	47.6	50.3
OSLO	31.5	33.7	34.5	35.7	36.7	37.8	38.8
DRAYTON	30.5	34.0	38.2	40.5	41.8	42.5	43.4
PEMBINA	36.9	41.6	45.8	48.8	51.0	52.2	52.7

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

South Fork Buffalo River.....							
SABIN	13.1	13.9	14.2	14.8	15.5	16.4	17.9
Buffalo River.....							
HAWLEY	5.5	5.9	6.8	7.5	9.0	9.6	10.6
DILWORTH	14.4	16.6	17.4	19.3	21.2	22.6	24.2
Wild Rice River.....							
TWIN VALLEY	5.3	5.4	5.8	7.1	8.3	9.3	10.7
HENDRUM	18.7	20.4	23.3	26.9	29.6	31.5	32.3
Marsh River.....							
SHELLY	8.3	9.0	10.3	11.4	14.4	16.6	18.5
Sand Hill River.....							
CLIMAX	11.9	14.5	17.0	21.5	25.5	29.4	31.6
Red Lake River.....							
HIGH LANDING	4.8	5.6	6.7	8.2	9.8	11.5	11.8
CROOKSTON	12.5	13.9	15.1	18.8	21.1	23.8	29.0
Snake River.....							
ABOVE WARREN	63.4	63.5	63.8	64.4	65.4	66.2	67.0
ALVARADO	100.7	100.9	101.5	103.6	106.0	108.1	108.5
Two Rivers River.....							
HALLOCK	800.8	801.6	802.4	804.9	807.3	808.6	809.1
Roseau River..... considering the flow through the Roseau diversion							
ROSEAU	10.0	10.1	11.1	12.4	14.3	16.5	17.2

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

Wild Rice River.....							
ABERCROMBIE	7.6	11.6	13.8	16.4	19.9	23.6	25.2
Sheyenne River.....							
VALLEY CITY	11.6	12.1	13.0	14.1	18.6	20.6	22.4
LISBON	11.7	12.5	13.9	15.4	19.0	22.1	23.4
KINDRED	14.7	16.0	17.9	20.0	21.1	21.2	21.2
WEST FARGO DVRSN	15.1	15.9	17.2	19.4	21.3	21.3	21.3
HARWOOD	82.0	82.9	87.1	90.7	91.4	92.1	92.1
Maple River.....							
ENDERLIN	10.3	11.5	12.1	12.7	13.5	14.4	15.4
MAPLETON	17.9	19.2	20.3	21.6	22.3	23.4	23.7
Goose River.....							
HILLSBORO	7.6	9.0	12.0	13.8	14.7	15.6	16.3
Forest River.....							
MINTO	4.4	5.0	5.3	6.3	7.1	7.5	7.6

Pembina River.....

WALHALLA	4.6	5.2	6.0	7.3	9.4	11.6	12.8
NECHE	8.7	9.5	10.6	13.3	17.9	20.1	21.2

.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 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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