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PROBABILISTIC HYDROLOGIC OUTLOOK
NATIONAL WEATHER SERVICE EASTERN NORTH DAKOTA/GRAND FORKS ND
1108 AM CST Thu Jan 25 2024

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

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

...MINOR TO ISOLATED MODERATE SPRING FLOODING IS EXPECTED FOR SOME
LOCATIONS IN THE RED RIVER OF THE NORTH BASIN...

* This 90-day outlook covers the period from 1/29/24 to 4/28/24.

.OUTLOOK SUMMARY...

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

Major Flooding...

There is a low risk (less than 35 percent chance) of major
flooding across the basin.

Moderate Flooding...

There is a high risk (greater than 65 percent chance) of moderate
flooding at Abercrombie on the Wild Rice River.

There is a medium risk (35 to 65 percent chance) of moderate
flooding at Fargo/Moorhead and Oslo on the Red River.

There is a low risk (less than 35 percent chance) of moderate
flooding elsewhere across the basin.

Minor Flooding...

There is a high risk (greater than 65 percent chance) of minor
flooding at Wahpeton, Fargo/Moorhead, and Oslo on the Red River. In
North Dakota, there is a high risk of minor flooding at Abercrombie
on the Wild Rice River. In Minnesota, there is a high risk of minor
flooding at Dilworth on the Buffalo River.

There is a medium risk (35 to 65 percent chance) of minor flooding
at Halstad, Grand Forks/East Grand Forks, Drayton, and Pembina on the
Red River. In North Dakota, there is a medium risk of minor flooding
at Mapleton on the Maple River. In Minnesota, there is a medium risk
of minor flooding at Sabin on the South Branch Buffalo River, Hawley
on the Buffalo River, Hendrum on the Wild Rice River, and Hallock on
the Two Rivers River.

There is a low risk (less than 35 percent chance) of minor
flooding elsewhere across the basin.

.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:

* FALL AND DECEMBER PRECIPITATION AND SOIL MOISTURE...

Fall precipitation was below normal for much of the basin while December brought much above normal precipitation, especially to the southern half of the basin. Soil moisture remains much lower than normal across the northern third of the basin with moderate to severe drought conditions while slightly lower to near average elsewhere.

* RIVER FLOWS...

At the end of December, base streamflows were flowing higher than normal on the Red River mainstem and its tributaries.

* FROST DEPTHS...

The recent January cold has allowed for a deeper frost layer to finally form across much of the basin. The northern half of the area currently has frost depths of 20 to 30 inches with locations farther south slightly lower. Lake and river observations indicate ice cover is thinner and less consistent than normal due to relatively mild temperatures.

* SNOWPACK CONDITIONS...

The current snowpack and associated water content is much below normal. Since December 1, 2023, snowfall has been running roughly 25 to 50 percent of normal across the southern two-thirds of the basin. Associated water content is minimal, highest near the international border (up to 1 inch). However, rain/freezing rain from late December still remains in the soils and on the landscape for runoff into the river system.

* RIVER ICE...

Lake/river observations indicate ice cover is thinner and less consistent than normal due to relatively mild temperatures over the course of the winter.

* 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...

Dry conditions with above to well above normal temperatures are expected to continue for the end of January and into the first week of February.

* LONG TERM CLIMATE OUTLOOK...

Climate outlooks indicate continued above normal temperatures for the remainder of the winter and into spring. This could allow for some early melting of the snowpack but also introduce the possibility of precipitation falling as rain rather than snow in late winter and early spring.

.NEXT SPRING FLOOD OUTLOOK...

The next 2024 spring flood outlook will be issued on Thursday, February 15, 2024.

.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 29, 2024 to April 28, 2024

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.

...Probabilities for Minor, Moderate, and Major Flooding...
Valid from January 29, 2024 to April 28, 2024

				: Current and Historical : Chances of Exceeding : Flood Categories : as a Percentage (%)							
				: Categorical : Flood Stages (FT)							
Location	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	: 67	55	22	26	6	14		
HICKSON	30.0	34.0	38.0	: 20	24	7	13	<5	<5		
FARGO	18.0	25.0	30.0	: >95	77	53	35	22	23		
HALSTAD	26.0	32.0	37.5	: 38	32	14	18	7	11		
GRAND FORKS	28.0	40.0	46.0	: 62	55	18	28	<5	10		
OSLO	26.0	30.0	36.0	: 70	61	60	53	9	18		
DRAYTON	32.0	38.0	42.0	: 45	44	23	30	<5	11		
PEMBINA	39.0	44.0	49.0	: 50	50	26	39	9	21		

: Current and Historical
: Chances of Exceeding
: Flood Categories
: as a Percentage (%)
Categorical
: Flood Stages (FT) : Minor Moderate Major

Location	Minor	Mod	Major	:	CS	HS	CS	HS	CS	HS
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Minnesota Tributaries.....										
Note: The Roseau numbers consider the flow through its diversion										
SABIN	13.0	15.0	19.0	:	39	54	9	15	<5	<5
HAWLEY	8.0	9.0	11.0	:	35	35	17	22	<5	<5
DILWORTH	13.0	20.0	26.0	:	70	63	11	18	<5	<5
TWIN VALLEY	10.0	12.0	14.0	:	6	15	<5	8	<5	<5
HENDRUM	20.0	28.0	32.0	:	55	48	11	18	<5	7
SHELLY	14.0	20.0	23.0	:	16	26	7	11	5	6
CLIMAX	20.0	25.0	30.0	:	12	23	<5	10	<5	8
HIGH LANDING	12.0	12.5	13.0	:	<5	11	<5	8	<5	6
CROOKSTON	15.0	20.0	23.0	:	22	46	6	24	<5	8
ABOVE WARREN	67.0	71.0	75.0	:	<5	7	<5	<5	<5	<5
ALVARADO	106.0	108.0	110.0	:	19	22	8	14	<5	<5
HALLOCK	802.0	806.0	810.0	:	50	62	19	38	<5	10
ROSEAU	16.0	18.0	19.0	:	<5	21	<5	12	<5	8

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

Categorical										
Flood Stages (FT)										
Location	Minor	Mod	Major	:	Minor	Moderate	Major	Minor	Moderate	Major
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North Dakota Tributaries.....										
ABERCROMBIE*	20.0	22.0	28.0	:	88	38	71	34	22	19
VALLEY CITY	15.0	16.0	17.0	:	<5	10	<5	6	<5	<5
LISBON	15.0	17.0	19.0	:	<5	10	<5	9	<5	5
KINDRED	16.0	19.0	20.5	:	10	15	<5	10	<5	8
WEST FARGO DVRSN	18.0	20.0	21.0	:	<5	11	<5	9	<5	8
HARWOOD	84.0	86.0	91.0	:	24	22	20	18	7	9
ENDERLIN	9.5	12.0	14.0	:	33	25	9	8	<5	<5
MAPLETON	18.0	21.0	23.0	:	54	33	18	14	<5	5
HILLSBORO	10.0	13.0	16.0	:	18	19	6	10	<5	<5
MINTO	6.0	8.0	11.0	:	15	23	5	7	<5	<5
WALHALLA	11.0	16.0	18.0	:	<5	19	<5	<5	<5	<5
NECHE	18.0	19.0	20.5	:	<5	23	<5	22	<5	19

*Abercrombie flood stages increased 10.0 ft October 2023

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 29, 2024 to April 28, 2024

LOCATION	95%	90%	75%	50%	25%	10%	05%
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Red River of the North.....							
WHPETON	9.3	9.9	10.6	11.7	12.7	14.8	15.5
HICKSON	17.3	18.3	20.3	24.0	27.3	33.1	34.2
FARGO	18.8	19.9	21.1	25.1	28.9	35.0	36.5
HALSTAD	13.9	16.1	18.6	23.6	28.9	36.0	38.7
GRAND FORKS	19.6	21.7	23.9	31.1	36.5	42.5	44.6
OSLO	16.1	19.6	23.8	31.7	34.0	35.6	36.5
DRAYTON	17.9	20.8	23.3	30.8	36.6	40.5	41.2
PEMBINA	23.9	27.4	32.7	39.0	45.3	48.9	50.0

Minnesota Tribs:	95%	90%	75%	50%	25%	10%	05%
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South Fork Buffalo River.....							
SABIN	9.8	10.2	11.4	12.6	13.4	14.8	16.2
Buffalo River.....							
HAWLEY	5.6	5.9	6.5	7.5	8.4	9.4	10.1
DILWORTH	10.2	10.6	12.3	15.4	17.8	20.8	23.1
Wild Rice River.....							
TWIN VALLEY	4.2	4.3	4.6	6.3	7.5	8.4	10.4
HENDRUM	10.5	13.8	16.9	20.8	24.4	28.2	30.9
Marsh River.....							
SHELLY	5.9	6.1	7.2	8.8	11.5	15.7	23.1
Sand Hill River.....							
CLIMAX	6.8	7.6	8.0	11.6	14.9	22.2	24.8
Red Lake River.....							
HIGH LANDING	2.9	3.2	3.7	4.5	6.0	7.8	8.3
CROOKSTON	7.5	7.8	9.1	12.0	14.6	17.8	20.6
Snake River.....							
ABOVE WARREN	62.6	62.7	63.2	63.9	64.8	65.4	66.4
ALVARADO	99.3	99.9	100.7	102.8	105.5	107.4	108.5
Two Rivers River.....							
HALLOCK	797.3	798.5	799.7	802.1	805.3	807.0	807.7
Roseau River..... considering the flow through the Roseau diversion							
ROSEAU	7.3	7.8	8.6	10.1	11.7	13.7	15.7
North Dakota Tribs:	95%	90%	75%	50%	25%	10%	05%
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Wild Rice River.....							
ABERCROMBIE	18.1	19.0	21.5	24.7	27.6	32.4	34.4
Sheyenne River.....							
VALLEY CITY	6.2	6.4	6.8	8.1	10.0	11.5	13.1
LISBON	5.4	5.7	6.3	8.0	9.9	11.5	12.9
KINDRED	7.4	7.9	8.9	10.8	12.5	15.8	18.0
WEST FARGO DVRSN	10.6	10.8	10.9	12.7	13.0	15.2	17.1
HARWOOD	74.9	75.6	77.3	80.2	83.8	90.1	91.6
Maple River.....							
ENDERLIN	5.6	6.2	7.1	8.4	10.0	11.5	12.7
MAPLETON	12.6	13.0	15.0	18.6	20.6	22.1	22.8
Goose River.....							
HILLSBORO	3.6	4.0	4.7	5.8	8.2	12.5	13.4
Forest River.....							
MINTO	2.2	2.3	2.8	3.4	4.8	6.7	8.1
Pembina River.....							
WALHALLA	3.0	3.3	3.6	4.2	5.5	7.7	8.6
NECHE	4.8	5.0	5.8	7.4	10.1	15.8	17.9

.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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