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Probabilistic Hydrologic Outlook
National Weather Service Grand Forks ND
138 PM CST Thu Jan 26 2023

...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.

...MINOR TO ISOLATED MODERATE SPRING FLOODING IS EXPECTED ACROSS THE
RED RIVER OF THE NORTH BASIN...

* This 90-day outlook covers the period from 1/30/2023 to 4/30/2023.

.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 Oslo on the Red River.

There is a medium risk (35 to 65 percent chance) of moderate
flooding at Fargo/Moorhead and Pembina 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 Wahpeton, Fargo/Moorhead, East Grand Forks/Grand Forks,
Oslo, and Pembina on the Red River. In North Dakota, there is a high
risk of minor flooding at Abercrombie on the Wild Rice River and
Enderlin on the Maple River. In Minnesota, there is a high risk of
minor flooding at Sabin on the South Branch Buffalo River and
Dilworth on the Buffalo River.

There is a medium risk (35 to 65 percent chance) of minor flooding
at Halstad and Drayton on the Red River. In North Dakota, there is a
medium risk of minor flooding at Mapleton on the Maple River and
Harwood on the Sheyenne River. In Minnesota, there is a medium risk
of minor flooding at Hendrum on the Wild Rice River, Crookston on the
Red Lake River, and Hallock on the Two Rivers River.

There is a low risk (less than 35 percent) 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 PRECIPITATION AND SOIL MOISTURE...

Fall precipitation was below normal across the basin, driest across the lower Sheyenne basin and southern Red River Valley. Soil moisture heading into freeze-up was lower than normal with severe drought conditions persisting across the lower Sheyenne with abnormally dry to moderate drought conditions elsewhere.

* RIVER FLOWS...

Base streamflows are near normal for this time of year.

* FROST DEPTHS...

Early season snow cover has led to a relatively shallow frost layer for this time of year across much of the basin. However, depths are quite variable (deepest across northeastern ND while shallower elsewhere).

* SNOWPACK CONDITIONS...

The current snowpack and associated water content is above normal. Since December 1, 2022, snowfall has been running above normal (roughly 125 to 300 percent of normal), highest across the Devils Lake and Sheyenne basins. Associated water content ranges from 1.0 to 5.0 inches.

* RIVER ICE...

Lake/river observations indicate ice cover is thinner and less consistent than normal for this time of year, likely due to early snow cover.

* 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...

Much colder conditions are on the horizon for the short term period. No strong storm systems (with a lot of precipitation) are expected but sporadic shots of light precipitation (possibly with gusty winds) are likely over the next two weeks.

* LONG TERM CLIMATE OUTLOOK...

Climate outlooks indicate much colder than normal temperatures are likely to persist. A more active weather pattern is anticipated through the remainder of the winter and into the spring.

.NEXT SPRING FLOOD OUTLOOK...

Minnesota Tributaries.....

Note: The Roseau numbers consider the flow through its diversion

SABIN	13.0	15.0	19.0	:	80	54	10	15	<5	<5
HAWLEY	8.0	9.0	11.0	:	22	35	9	22	<5	<5
DILWORTH	13.0	20.0	26.0	:	82	63	12	18	<5	<5
TWIN VALLEY	10.0	12.0	14.0	:	6	15	<5	<5	<5	<5
HENDRUM	20.0	28.0	32.0	:	63	48	11	18	<5	7
SHELLY	14.0	20.0	23.0	:	18	26	<5	11	<5	6
CLIMAX	20.0	25.0	30.0	:	21	24	9	11	<5	8
HIGH LANDING	12.0	12.5	13.0	:	5	12	<5	8	<5	6
CROOKSTON	15.0	20.0	23.0	:	43	46	11	24	<5	8
ABOVE WARREN	67.0	71.0	75.0	:	<5	8	<5	<5	<5	<5
ALVARADO	106.0	108.0	110.0	:	7	22	<5	14	<5	<5
HALLOCK	802.0	806.0	810.0	:	66	62	28	39	<5	10
ROSEAU	16.0	18.0	19.0	:	7	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	:	61	39	43	34	14	19
VALLEY CITY	15.0	16.0	17.0	:	<5	10	<5	6	<5	<5
LISBON	15.0	17.0	19.0	:	6	10	<5	9	<5	5
KINDRED	16.0	19.0	20.5	:	33	18	11	10	<5	8
WEST FARGO DVRSN	18.0	20.0	21.0	:	12	11	<5	9	<5	8
HARWOOD	84.0	86.0	91.0	:	41	22	28	18	11	9
ENDERLIN	9.5	12.0	14.0	:	66	25	16	8	<5	<5
MAPLETON	18.0	21.0	23.0	:	63	35	26	14	<5	5
HILLSBORO	10.0	13.0	16.0	:	32	19	19	10	<5	<5
MINTO	6.0	8.0	11.0	:	17	23	<5	7	<5	<5
WALHALLA	11.0	16.0	18.0	:	9	20	<5	<5	<5	<5
NECHE	18.0	19.0	20.5	:	19	23	14	22	6	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 30, 2023 to April 30, 2023

LOCATION	95%	90%	75%	50%	25%	10%	05%
Red River of the North.....							
WHPETON	10.2	10.7	11.2	11.9	13.4	14.8	15.6
HICKSON	18.3	19.8	21.4	24.5	29.6	33.5	35.4
FARGO	19.1	20.6	21.5	24.5	28.9	34.0	36.2
HALSTAD	15.7	18.1	20.6	23.5	28.6	33.9	37.6
GRAND FORKS	22.3	25.2	27.6	35.0	40.0	42.7	47.5
OSLO	19.4	24.6	27.8	33.6	34.8	35.6	37.7
DRAYTON	22.2	26.1	29.4	34.6	39.4	40.2	42.1
PEMBINA	29.0	32.7	37.3	42.2	47.5	49.7	51.0

Minnesota Tribs:	95%	90%	75%	50%	25%	10%	05%
South Fork Buffalo River.....							
SABIN	12.0	12.5	13.1	13.7	14.3	15.1	16.7
Buffalo River.....							
HAWLEY	4.6	4.7	5.4	6.3	7.8	8.8	9.8
DILWORTH	11.0	12.0	13.5	16.3	18.2	20.6	22.1
Wild Rice River.....							
TWIN VALLEY	4.7	5.1	5.7	6.7	7.8	8.9	10.2
HENDRUM	15.0	16.3	18.6	21.7	25.4	28.2	31.2
Marsh River.....							
SHELLY	7.6	8.1	9.1	10.4	12.5	15.2	16.2
Sand Hill River.....							
CLIMAX	9.8	10.9	11.5	14.2	17.8	23.3	27.9
Red Lake River.....							
HIGH LANDING	5.2	5.6	6.4	8.0	9.4	10.4	12.1
CROOKSTON	9.6	10.1	11.6	14.5	17.4	20.2	22.7
Snake River.....							
ABOVE WARREN	62.3	62.5	62.8	63.4	64.3	65.3	66.2
ALVARADO	98.0	98.6	99.0	101.0	103.1	105.1	107.1
Two Rivers River.....							
HALLOCK	799.2	800.1	801.4	804.2	806.6	808.3	808.6
Roseau River..... considering the flow through the Roseau diversion							
ROSEAU	7.8	8.2	9.3	10.3	12.7	15.3	16.7
North Dakota Tribs:	95%	90%	75%	50%	25%	10%	05%
Wild Rice River.....							
ABERCROMBIE	4.6	6.1	7.6	11.4	15.0	19.4	22.0
Sheyenne River.....							
VALLEY CITY	7.6	7.9	8.9	10.9	12.1	13.6	14.1
LISBON	7.3	7.8	9.0	11.2	12.6	13.9	15.4
KINDRED	9.9	10.6	12.2	14.4	16.7	19.4	19.8
WEST FARGO DVRSN	10.9	11.6	13.0	14.4	16.2	19.1	19.3
HARWOOD	77.1	77.6	78.7	83.1	87.9	91.1	91.5
Maple River.....							
ENDERLIN	7.6	8.0	8.9	10.2	11.4	12.2	13.5
MAPLETON	14.1	15.0	16.6	18.9	21.2	22.3	22.6
Goose River.....							
HILLSBORO	3.9	4.4	6.0	8.4	11.5	13.6	14.5
Forest River.....							
MINTO	3.1	3.3	3.9	4.5	5.5	6.4	6.6
Pembina River.....							
WALHALLA	4.8	5.3	5.9	6.9	8.8	10.8	12.6
NECHE	7.1	8.0	9.4	12.1	17.2	19.9	21.1

.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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