

058

FGUS73 KFGF 262111

ESFFGF

MNC005-007-027-029-051-057-069-077-087-089-107-111-113-
119-125-135-159-167-NDC003-005-017-019-027-035-039-063-
067-071-073-077-081-091-095-097-099-301200-

Probabalistic Hydrologic Outlook

National Weather Service Eastern North Dakota/Grand Forks ND

0310 PM CST Thu Jan 26 2017

...MODERATE SPRING FLOODING IS EXPECTED IN THE RED RIVER OF THE
NORTH BASIN...

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

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

* This 120-day Outlook covers the period from...
January 29, 2017 to April 29, 2017.

. OUTLOOK SUMMARY...

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

Major Flooding...

A high risk (greater than 65%) of Major Flooding is expected at
Pembina ND on the Red River, Grafton ND on the Park River, and Neche
ND on the Pembina river.

A medium risk (35 to 65%) of Major Flooding is expected at
Fargo/Moorhead and Oslo MN on the Red River, High Landing MN on the
Red Lake River, and on the West Fargo Diversion in North Dakota.

Moderate Flooding...

A high risk of Moderate Flooding is expected at Fargo/Moorhead,
Grand Forks, Oslo, Drayton and Pembina on the Red River...In
Minnesota, at Dilworth on the Buffalo River, High Landing on the Red
Lake River, and at Hallock on the Two Rivers River...In North
Dakota, at Abercrombie on the Wild Rice River, on the West Fargo
Diversion, at Grafton on the Park River, and at Neche on the Pembina
River.

A medium risk of Moderate Flooding is expected at Wahpeton and
Halstad on the Red River...In Minnesota, at Sabin and Hawley on the
Buffalo River, at Hendrum on the Wild Rice River, and Alvarado on the
Snake River...In North Dakota, at Kindred and Harwood on the Sheyenne
River, at Hillsboro on the Goose River, and at Minto on the Forest
River.

Minor Flooding...

A low risk (less than 35%) risk of Minor Flooding at Twin Valley
MN on the Wild Rice River, at Warren MN on the Snake River, and at

Roseau on the Roseau River. Otherwise there is a high to medium risk of Minor Flooding for the rest of the forecast locations in the Red River 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:

* SNOWPACK CONDITIONS...

Accumulated winter precipitation (rain, sleet and snow) thus far was about twice normal for most of the basin leaving two to three inches of water equivalent in the snowpack north of Fargo. Some of the snow water from the recent thaw in the southern part of the basin went into the soil while some did make it into the rivers and streams.

* SOIL MOISTURE AND FROST DEPTHS...

Soil moisture ranges from near normal for most of the Red River Valley to above normal in the northern third. Frost depths range from one to two feet, deeper where snowpack is thin.

* RIVER FLOWS...

For the few river flow sampling sites in the Red River basin, the flows are characterized as much above normal by the USGS.

* RIVER ICE...

Most of the rivers and streams are still ice covered.

* 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.

. NEXT SPRING FLOOD OUTLOOKS...

This is the first of the monthly AHPS Hydrologic Probabilistic Outlooks that covers Spring Snowmelt flooding for this year. The next outlooks are scheduled to be issued on Thursday, 16 February 2017 and Thursday, 02 March 2017.

Probabilistic Hydrologic Outlooks now use 64 years (1949-2012) of past weather...temperature and precipitation...for the ensemble predictive hydrographs used in calculating the probabilities of exceeding a river level for the valid period of the outlook.

Outlook Schedule - The National Weather Service in Grand Forks, North Dakota will be providing the Advanced Hydrologic

Prediction Services (AHPS) Long-Range Probabilistic Hydrologic Outlooks for the Red River of the North and its Minnesota and North Dakota tributaries according to the following schedule:

- near the end of the month throughout the year, except for...
- The Spring Flood and Water Resources Outlooks that will be issued at least twice a month during the spring snow-melt season beginning in mid-to-late February or early-March.

The following message has three river data sections...

- The first (Table 1) gives the current and normal/historical chances of river locations reaching their Minor...Moderate and Major flood category.
- The second (Table 2) gives the current chances of river locations rising above the river stages listed.
- The third (Table 3) gives the current chances of river locations falling below the river stages listed.

.Red River Long-Range Probabilistic Outlook by Flood Category...
Valid from January 29, 2017 to April 29, 2017.

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 more 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: 01/29/2017 - 04/29/2017

Location	Categorical			: Current and Historical					
	Flood Stages (ft)			: Chances of Exceeding					
	Minor	Mod	Major	: Flood Categories					
				: as s Percentage (%)					
	Minor	Mod	Major	Minor	Moderate	Major			
	CS	HS	CS	HS	CS	HS	CS	HS	
Red River of the North.....									
WHPETON	11.0	13.0	15.0	92	48	39	22	15	11
HICKSON	30.0	34.0	38.0	40	18	12	10	<5	<5
FARGO	18.0	25.0	30.0	>95	73	85	32	49	20

HALSTAD	26.0	32.0	37.5	:	85	31	39	15	10	8
GRAND FORKS	28.0	40.0	46.0	:	>95	56	74	31	20	9
OSLO	26.0	30.0	36.0	:	>95	62	>95	54	44	19
DRAYTON	32.0	38.0	42.0	:	>95	48	91	31	34	9
PEMBINA	39.0	44.0	49.0	:	>95	56	>95	40	84	22
Minnesota Tributaries.....										
SABIN	13.0	15.0	19.0	:	>95	41	53	13	<5	<5
HAWLEY	8.0	9.0	11.0	:	88	32	55	22	<5	<5
DILWORTH	13.0	20.0	26.0	:	>95	61	69	16	<5	<5
TWIN VALLEY	10.0	12.0	14.0	:	21	15	5	6	<5	<5
HENDRUM	20.0	28.0	32.0	:	93	48	41	17	7	6
SHELLY	14.0	20.0	23.0	:	48	30	5	11	<5	6
CLIMAX	20.0	25.0	30.0	:	45	23	23	9	5	7
HIGH LANDING	12.0	12.5	13.0	:	82	43	77	40	60	33
CROOKSTON	15.0	23.0	25.0	:	87	49	11	14	6	7
ABOVE WARREN	67.0	71.0	75.0	:	24	10	<5	<5	<5	<5
ALVARADO	106.0	108.0	110.0	:	83	17	56	14	6	<5
HALLOCK	802.0	806.0	810.0	:	>95	63	88	42	15	15
ROSEAU	16.0	18.0	19.0	:	27	19	<5	5	<5	<5
Note: The Roseau numbers consider the flow thru its diversion										
North Dakota Tributaries.....										
ABERCROMBIE	10.0	12.0	18.0	:	88	32	84	30	33	18
VALLEY CITY	15.0	16.0	17.0	:	42	8	33	<5	27	<5
LISBON	15.0	17.0	19.0	:	40	8	25	6	13	<5
KINDRED	16.0	19.0	20.5	:	89	15	45	8	17	7
WEST FARGO DVRSN	18.0	20.0	21.0	:	91	18	67	13	40	9
HARWOOD	884.0	886.0	891.0	:	68	20	54	17	14	8
ENDERLIN	9.5	12.0	14.0	:	82	18	24	7	<5	<5
MAPLETON	905.0	908.0	910.0	:	82	28	28	11	<5	<5
HILLSBORO	10.0	13.0	16.0	:	88	17	63	10	8	<5
MINTO	6.0	8.0	11.0	:	>95	25	57	8	<5	<5
GRAFTON	12.0	13.5	14.5	:	>95	16	92	6	81	<5
WALHALLA	11.0	16.0	18.0	:	>95	16	9	<5	<5	<5
NECHE	18.0	19.0	20.5	:	>95	22	>95	20	82	17

LEGEND:

CS = Conditional Simulation (Outlook for current conditions)
 HS = Historical Simulation (" " normal conditions)
 ft = feet (above gage zero datum)

.Probabilities for Rising Above Listed River Stages...
 from 01/29/2017 to 04/29/2017

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 at the location listed.

Interpretation Aid...The flood stage for Wahpeton on the Red River of the North is 11 feet. There is a 50 percent chance that it will rise above 12.4 feet and only a 10 percent chance that it will rise above 16.0 feet.

...Table 2--Exceedance Probabilities...

Chance of Exceeding Stages
 at Specific Locations

Valid Period: 01/29/2017 - 04/29/2017

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

Red River of the North.....							
WAHPETON	10.4	11.2	11.5	12.4	14.1	16.0	17.1
HICKSON	21.7	23.9	26.1	27.7	32.1	34.9	36.1
FARGO	21.0	23.5	26.4	29.6	32.9	36.4	38.2
HALSTAD	20.1	24.0	27.1	31.0	35.6	37.5	39.0
GRAND FORKS	33.1	35.7	39.7	43.0	45.1	47.5	49.4
OSLO	33.0	33.9	34.8	35.9	36.9	37.7	38.6
DRAYTON	35.6	38.2	40.4	41.3	42.6	43.3	43.8
PEMBINA	46.3	47.7	50.0	51.3	52.9	53.6	53.8

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

South Fork Buffalo River.....							
SABIN	13.2	13.7	14.6	15.2	15.9	16.8	18.4
Buffalo River.....							
HAWLEY	7.5	7.9	8.6	9.2	9.9	10.4	11.0
DILWORTH	16.4	18.0	19.6	21.0	22.2	23.0	24.8
Wild Rice River.....							
TWIN VALLEY	6.3	6.6	7.1	8.6	9.7	11.0	12.1
HENDRUM	19.8	21.1	24.0	27.3	29.6	31.2	32.5
Marsh River.....							
SHELLY	10.0	10.6	12.2	13.8	16.6	18.6	20.1
Sand Hill River.....							
CLIMAX	11.8	12.1	15.8	19.9	24.8	26.8	30.5
Red Lake river.....							
HIGH LANDING	10.0	10.7	12.6	13.1	13.3	13.3	13.6
CROOKSTON	13.6	14.5	16.4	19.2	21.7	23.2	25.1
Snake River.....							
ABOVE WARREN	64.7	64.8	65.0	65.9	66.9	68.2	68.5
ALVARADO	105.2	105.5	106.5	108.6	109.4	109.8	110.3
Two Rivers River.....							
HALLOCK	805.4	805.9	807.5	808.2	809.2	810.3	811.0
Roseau River..... considering the flow thru the Roseau diversion							
ROSEAU	11.7	12.3	13.3	14.7	16.1	17.0	17.4

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

Wild Rice River.....							
ABERCROMBIE	7.1	9.6	13.0	16.3	19.4	22.9	24.4
Sheyenne River.....							
VALLEY CITY	12.2	12.7	13.5	14.2	17.5	19.5	20.7
LISBON	12.0	12.4	13.2	14.3	17.1	19.5	20.4
KINDRED	15.1	15.7	17.1	18.4	20.3	21.1	21.1
WEST FARGO DVRSN	17.7	18.3	18.9	20.5	22.7	23.1	23.2
HARWOOD	879.7	881.2	883.2	887.5	890.2	891.6	892.0
Maple River.....							
ENDERLIN	8.4	9.0	10.0	10.8	12.0	12.9	13.9
MAPLETON	902.1	904.3	905.7	906.7	908.1	908.7	909.3
Goose River.....							
HILLSBORO	8.2	9.5	12.0	13.6	14.5	15.9	16.4

Forest River.....							
MINTO	6.5	6.7	7.4	8.1	9.0	9.6	9.9
Park River.....							
GRAFTON	12.8	13.7	14.7	16.2	17.8	18.8	20.0
Pembina River.....							
WALHALLA	11.0	11.3	12.5	13.6	15.1	15.8	16.4
NECHE	19.8	20.0	21.1	21.4	21.5	21.6	21.6

.Probabilities for Falling Below Listed River Stages...
from 01/29/2017 to 04/29/2017

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 at the location listed.

Interpretation Aid...The flood stage for Wahpeton on the Red River of the North is 11 feet. There is a 50 percent chance that it will fall below 4.3 feet and only a 10 percent chance that it will fall below 4.1 feet.

...Table 3--Non-Exceedance Probabilities...

Chance of Not Exceeding Stages
at Specific Locations
Valid Period: 01/29/2017 - 04/29/2017

LOCATION	95%	50%	75%	50%	25%	10%	05%
Red River of the North.....							
WAHPETON	4.8	4.7	4.7	4.3	4.1	4.1	4.1
HICKSON	11.1	11.0	10.9	10.6	10.4	10.4	10.4
FARGO	14.8	14.7	14.7	14.6	14.3	14.3	14.3
HALSTAD	5.4	4.9	4.4	4.4	4.3	4.3	4.2
GRAND FORKS	17.0	16.9	16.7	16.7	15.8	15.5	15.5
OSLO	9.1	9.1	8.7	8.7	7.0	6.4	6.3
DRAYTON	12.7	12.7	12.7	12.7	12.1	11.5	11.4
PEMBINA	11.9	11.9	11.9	11.9	10.3	8.2	8.1
Minnesota Tribs:	95%	90%	75%	50%	25%	10%	05%
South Fork Buffalo River.....							
SABIN	5.2	5.1	5.1	5.1	5.0	5.0	5.0
Buffalo River.....							
HAWLEY	3.5	3.5	3.4	3.4	3.4	3.4	3.4
DILWORTH	3.8	3.7	3.7	3.6	3.6	3.5	3.5
Wild Rice River.....							
TWIN VALLEY	2.0	2.0	2.0	2.0	1.9	1.9	1.9
HENDRUM	1.9	1.9	1.9	1.9	1.8	1.8	1.8
Marsh River.....							
SHELLY	4.0	3.9	3.9	3.9	3.9	3.9	3.9
Sand Hill River.....							
CLIMAX	3.9	3.9	3.9	3.8	3.7	3.7	3.7
Red Lake river.....							
HIGH LANDING	4.9	3.8	2.6	1.2	0.4	0.4	0.4
CROOKSTON	7.1	7.1	6.6	5.0	3.5	3.2	3.2

Snake River.....							
ABOVE WARREN	60.7	60.7	60.7	60.7	60.7	60.6	60.6
ALVARADO	96.4	96.4	96.3	96.3	96.3	96.2	96.2
Two Rivers River.....							
HALLOCK	793.4	793.3	793.3	793.3	793.2	793.2	793.2
Roseau River..... considering the flow thru the Roseau diversion							
ROSEAU	5.2	5.2	5.1	5.0	5.0	5.0	4.9
North Dakota Tribs:	95%	90%	75%	50%	25%	10%	05%
-----	-----	-----	-----	-----	-----	-----	-----
Wild Rice River.....							
ABERCROMBIE	0.5	0.5	0.4	0.3	0.2	0.2	0.2
Sheyenne River.....							
VALLEY CITY	3.9	3.9	3.9	3.9	3.7	3.6	3.5
LISBON	2.6	2.6	2.6	2.6	2.6	2.6	2.5
KINDRED	2.6	2.6	2.6	2.6	2.6	2.6	2.6
WEST FARGO DVRSN	9.7	9.7	9.7	9.7	9.7	9.7	9.7
HARWOOD	867.2	867.2	867.2	867.2	867.2	867.2	867.2
Maple River.....							
ENDERLIN	1.7	1.7	1.7	1.7	1.7	1.6	1.6
MAPLETON	894.6	894.6	894.5	894.5	894.5	894.5	894.5
Goose River.....							
HILLSBORO	1.8	1.8	1.8	1.8	1.7	1.7	1.7
Forest River.....							
MINTO	1.4	1.4	1.3	1.3	1.3	1.3	1.3
Park River.....							
GRAFTON	7.2	7.2	7.2	7.2	7.1	7.1	7.1
Pembina River.....							
WALHALLA	1.8	1.8	1.8	1.8	1.8	1.8	1.7
NECHE	2.7	2.6	2.6	2.6	2.5	2.5	2.5

.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, low and soil conditions and using over 60 years 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 then be 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).

This outlook was produced using precipitation and temperatures for the years 1949 through 2012.

.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 during the critical 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, together with explanations that help in interpreting them are available from the NWS Grand Forks AHPS web page on the internet at:

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

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

Current river conditions for all river forecast points in the Red River of the North and Devils/Stump Lake conditions are also available on our web site, as well as the 7-day forecasts when the river at the forecast point is in or near flood.

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

Also, 7-day deterministic forecasts will be issued at least once a day when the river forecast locations will be at flood during that period.

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.

You can follow us on Facebook at: www.facebook.com/NWSGrandForks and on Twitter at: @NWSGrandForks.

\$\$

weather.gov/fgf

NNNN