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Probabalistic Hydrologic Outlook
National Weather Service Eastern North Dakota/Grand Forks ND
0903 AM CDT Wed Mar 22 2017

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

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

.Discussion...

Early and gentle thaw conditions over the last several weeks continue to ease the overall flood threat across the northern Red River Valley. Although the threat for flooding has been slightly lowered for some locations, the threat remains moderate to high with plenty of frozen water/ice remaining in ditches and fields, mainly across northeast North Dakota and far northwest Minnesota. Conditions further upstream, roughly from Oslo/Grand Forks southward, remain frozen but largely snow-free with only minor to low-end moderate spring flooding expected.

This updated outlook addresses slight reductions in flood risk in the Park River Basin but with continued high risk along both the Park and Pembina Rivers.

Park River: Although the overall flood risk has been lowered for the Park River Basin, the threat remains moderate to high. Slow but progressive melt is expected in the near future with high temperatures increasing to above freezing during the day and dropping back below, or near, freezing at night. Some local runoff near Grafton has already moved downstream with additional runoff from frozen fields and ditches expected to move into the river system in the coming week.

Pembina River: The flood risk along the Pembina River remains moderate to high, even above the historical risk, due to fall and winter precipitation and the expected melt. Little local runoff has been noted as of yet due to colder temperatures this spring than experienced at locations further south. High temperatures warming to above freezing during the day and dropping back below freezing at night will help ease thawing in the near future but flood predictions remain relatively unchanged in the coming weeks.

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 March 26, 2017 to June 24, 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: 03/26/2017 - 06/24/2017

	Categorical Flood Stages (ft)			Current and Historical Chances of Exceeding Flood Categories as s Percentage (%)					
				Minor		Moderate		Major	
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	50	57	21	34	<5	14
HICKSON	30.0	34.0	38.0	14	28	<5	13	<5	<5
FARGO	18.0	25.0	30.0	73	81	31	42	9	26
HALSTAD	26.0	32.0	37.5	25	37	8	19	<5	9
GRAND FORKS	28.0	40.0	46.0	50	60	13	34	<5	10
OSLO	26.0	30.0	36.0	54	65	40	56	6	20
DRAYTON	32.0	38.0	42.0	47	50	24	33	<5	10
PEMBINA	39.0	44.0	49.0	>95	56	54	43	15	23
Minnesota Tributaries.....									
SABIN	13.0	15.0	19.0	49	50	10	17	<5	<5
HAWLEY	8.0	9.0	11.0	17	39	9	25	<5	<5
DILWORTH	13.0	20.0	26.0	55	67	9	22	<5	<5
TWIN VALLEY	10.0	12.0	14.0	11	18	<5	6	<5	<5
HENDRUM	20.0	28.0	32.0	41	57	14	23	<5	6
SHELLY	14.0	20.0	23.0	15	30	<5	11	<5	<5
CLIMAX	20.0	25.0	30.0	8	24	<5	11	<5	7
HIGH LANDING	12.0	12.5	13.0	<5	18	<5	18	<5	16
CROOKSTON	15.0	23.0	25.0	40	55	<5	12	<5	7
ABOVE WARREN	67.0	71.0	75.0	11	14	<5	<5	<5	<5
ALVARADO	106.0	108.0	110.0	38	21	18	16	<5	<5
HALLOCK	802.0	806.0	810.0	>95	66	49	48	<5	17
ROSEAU	16.0	18.0	19.0	12	21	<5	7	<5	<5
Note: The Roseau numbers consider the flow thru its diversion									
North Dakota Tributaries.....									
ABERCROMBIE	10.0	12.0	18.0	39	41	27	36	<5	20
VALLEY CITY	15.0	16.0	17.0	19	9	15	8	8	<5
LISBON	15.0	17.0	19.0	16	10	9	8	7	6
KINDRED	16.0	19.0	20.5	34	18	16	10	9	9
WEST FARGO DVRSN	18.0	20.0	21.0	46	21	22	16	15	11
HARWOOD	884.0	886.0	891.0	28	23	23	21	<5	10
ENDERLIN	9.5	12.0	14.0	14	21	6	10	<5	<5
MAPLETON	905.0	908.0	910.0	30	37	6	14	<5	<5
HILLSBORO	10.0	13.0	16.0	<5	17	<5	10	<5	<5
MINTO	6.0	8.0	11.0	69	26	<5	8	<5	<5
GRAFTON	12.0	13.5	14.5	>95	18	>95	6	93	<5
WALHALLA	11.0	16.0	18.0	>95	19	7	<5	<5	<5
NECHE	18.0	19.0	20.5	>95	30	>95	26	>95	19

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 03/26/2017 to 06/24/2017

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 11.0 feet and only a 10 percent chance that it will rise above 14.1 feet.

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

Chance of Exceeding Stages
at Specific Locations
Valid Period: 03/26/2017 - 06/24/2017

LOCATION	95%	90%	75%	50%	25%	10%	05%
Red River of the North.....							
WAHPETON	8.1	8.2	9.4	11.0	12.8	14.1	14.6
HICKSON	15.0	15.3	17.6	21.8	27.4	30.8	32.8
FARGO	16.6	16.7	17.3	20.6	26.1	29.1	32.9
HALSTAD	12.9	13.2	14.8	19.2	25.9	30.5	33.3
GRAND FORKS	20.1	20.4	21.6	27.9	35.0	42.3	43.9
OSLO	17.8	18.4	20.6	28.6	33.6	35.5	36.2
DRAYTON	27.7	28.0	29.6	31.6	37.9	40.2	41.3
PEMBINA	40.5	41.0	42.5	44.1	47.6	49.8	51.4

Minnesota Tribs:	95%	90%	75%	50%	25%	10%	05%
South Fork Buffalo River.....							
SABIN	8.6	9.1	10.4	12.8	13.9	15.0	15.4
Buffalo River.....							
HAWLEY	5.1	5.1	5.3	5.8	7.4	8.9	9.3
DILWORTH	8.1	8.3	9.7	14.1	17.9	19.8	21.4
Wild Rice River.....							
TWIN VALLEY	4.5	4.8	5.2	6.3	8.3	10.2	10.5
HENDRUM	11.0	11.6	14.5	18.5	23.7	28.4	29.3
Marsh River.....							
SHELLY	5.3	5.3	6.5	8.8	11.2	15.1	15.9
Sand Hill River.....							
CLIMAX	6.5	7.1	7.9	10.3	12.7	19.5	22.0
Red Lake river.....							
HIGH LANDING	5.0	5.0	5.2	6.0	7.8	9.2	9.8
CROOKSTON	9.8	10.0	11.4	13.6	16.5	20.9	22.1
Snake River.....							
ABOVE WARREN	63.4	63.5	63.9	64.7	65.5	67.2	67.9
ALVARADO	103.3	103.3	104.0	105.2	107.2	108.8	109.3
Two Rivers River.....							
HALLOCK	804.7	804.8	804.9	806.0	807.4	808.0	808.9
Roseau River..... considering the flow thru the Roseau diversion							
ROSEAU	12.0	12.2	12.5	13.2	14.5	16.2	17.2

North Dakota Tribs:	95%	90%	75%	50%	25%	10%	05%
Wild Rice River.....							
ABERCROMBIE	2.2	2.2	2.9	7.2	12.7	16.3	17.3
Sheyenne River.....							
VALLEY CITY	10.9	11.0	11.6	11.8	13.5	16.8	19.8
LISBON	10.4	10.6	11.3	11.7	13.0	16.8	19.6
KINDRED	12.7	13.0	13.9	14.9	16.3	20.4	21.1
WEST FARGO DVRSN	16.1	16.2	16.4	17.4	19.4	22.8	23.1
HARWOOD	876.8	877.0	877.6	879.7	885.8	890.1	890.7
Maple River.....							

ENDERLIN	3.3	4.2	5.2	6.5	7.9	10.1	12.1
MAPLETON	897.0	897.5	897.8	900.7	906.1	907.7	908.4
Goose River.....							
HILLSBORO	2.8	2.8	3.0	4.1	5.8	9.0	10.0
Forest River.....							
MINTO	5.5	5.7	5.9	6.2	6.6	7.1	7.3
Park River.....							
GRAFTON	14.0	15.0	15.4	15.6	16.1	16.7	17.7
Pembina River.....							
WALHALLA	12.7	13.0	13.7	14.5	15.0	15.5	16.3
NECHE	21.2	21.3	21.4	21.5	21.5	21.5	21.6

.Probabilities for Falling Below Listed River Stages...
from 03/26/2017 to 06/24/2017

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 5.1 feet and only a 10 percent chance that it will fall below 4.4 feet.

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

Chance of Not Exceeding Stages
at Specific Locations
Valid Period: 03/26/2017 - 06/24/2017

LOCATION	95%	50%	75%	50%	25%	10%	05%
Red River of the North.....							
WAHPETON	6.6	6.4	5.8	5.1	4.7	4.4	4.2
HICKSON	12.9	12.6	12.0	11.3	10.9	10.7	10.5
FARGO	15.9	15.6	15.4	14.9	14.7	14.5	14.4
HALSTAD	9.4	9.3	7.7	6.2	5.6	5.0	4.7
GRAND FORKS	19.2	17.9	17.4	16.6	16.3	16.0	15.9
OSLO	15.8	11.8	10.3	8.6	8.0	7.3	7.1
DRAYTON	18.0	15.3	14.1	13.1	12.8	12.3	12.1
PEMBINA	26.0	24.7	19.8	16.4	14.7	13.5	12.5

Minnesota Tribs:	95%	90%	75%	50%	25%	10%	05%
South Fork Buffalo River.....							
SABIN	6.5	6.0	5.7	5.3	5.2	5.0	4.9
Buffalo River.....							
HAWLEY	4.0	3.9	3.8	3.6	3.5	3.5	3.5
DILWORTH	5.1	4.9	4.6	4.2	3.9	3.8	3.7
Wild Rice River.....							
TWIN VALLEY	3.3	3.2	3.0	2.8	2.7	2.7	2.6
HENDRUM	7.8	5.7	4.3	3.4	2.9	2.7	2.6
Marsh River.....							
SHELLY	4.7	4.4	4.2	4.0	4.0	3.9	3.9
Sand Hill River.....							

CLIMAX	5.4	5.2	5.0	4.8	4.7	4.6	4.6
Red Lake river.....							
HIGH LANDING	3.2	3.1	2.5	2.0	1.7	0.8	0.7
CROOKSTON	6.5	6.3	5.5	5.1	4.7	4.2	4.1
Snake River.....							
ABOVE WARREN	62.0	61.9	61.7	61.6	61.5	61.4	61.4
ALVARADO	98.8	98.6	98.2	97.9	97.7	97.5	97.4
Two Rivers River.....							
HALLOCK	795.6	795.5	795.0	794.8	794.5	794.3	794.1
Roseau River..... considering the flow thru the Roseau diversion							
ROSEAU	6.2	6.1	6.0	5.9	5.8	5.8	5.7

North Dakota Tribs:	95%	90%	75%	50%	25%	10%	05%
Wild Rice River.....							
ABERCROMBIE	1.1	0.9	0.6	0.4	0.1	-0.2	-0.3
Sheyenne River.....							
VALLEY CITY	5.1	5.0	4.3	3.5	3.5	3.5	3.5
LISBON	4.1	4.0	3.5	2.5	2.4	2.4	2.4
KINDRED	4.6	4.4	3.9	2.7	2.5	2.5	2.5
WEST FARGO DVRSN	11.1	10.9	10.3	9.8	9.7	9.6	9.6
HARWOOD	871.4	870.7	870.2	868.6	867.6	867.3	867.2
Maple River.....							
ENDERLIN	2.3	2.2	2.0	1.9	1.9	1.9	1.8
MAPLETON	895.4	895.3	895.0	894.8	894.7	894.7	894.7
Goose River.....							
HILLSBORO	2.4	2.2	2.0	1.9	1.8	1.8	1.8
Forest River.....							
MINTO	1.8	1.8	1.7	1.6	1.6	1.6	1.6
Park River.....							
GRAFTON	7.8	7.7	7.6	7.6	7.5	7.5	7.5
Pembina River.....							
WALHALLA	3.6	3.5	3.2	3.1	3.0	2.8	2.7
NECHE	7.0	6.8	6.5	6.1	5.5	5.1	5.0

.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.

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