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PROBABILISTIC HYDROLOGIC OUTLOOK

NATIONAL WEATHER SERVICE EASTERN NORTH DAKOTA/GRAND FORKS ND

1125 AM CST Thu Feb 16 2017

...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,
from February 19th to May 20th 2017.

...RISK OF SNOW MELT FLOODING MOSTLY NORTH OF HILLSBORO/HALSTAD...

. 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 High Landing MN on the Red Lake River, and at Hallock MN on the Two Rivers River.

Moderate Flooding...

A high risk of Moderate Flooding is expected at Oslo, Drayton and Pembina on the Red River...In Minnesota, at High Landing on the Red Lake River, and at Hallock on the Two Rivers River...In North Dakota, at Grafton on the Park River, and at Neche on the Pembina River.

A medium risk of Moderate Flooding is expected at Fargo/Moorhead and Grand Forks on the Red River...In Minnesota, at Alvarado on the Snake River...In North Dakota, at Abercrombie on the Wild Rice River, on the West Fargo Diversion, at Hillsboro on the Goose River, and at Minto on the Forest River.

Minor Flooding...

A low risk (less than 35%) of Minor Flooding at Dickson on the Red River. On the Minnesota tributaries, at Twin Valley on the Wild Rice River, at Climax on the Sandhill River, at Warren on the Snake River, and at Roseau on the Roseau River. On the North Dakota tributaries, at Valley City and Lisbon on the Sheyenne River.

Otherwise there is a high to medium risk of Minor Flooding for the rest of the forecast locations in the Red River of the North's basin.

* This 90-day Outlook covers the period from Feb 19 to May 20 2017.

. 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...

A foot and a half to two feet of snow is still on the ground in the Devils Lake Basin and the extreme northern part of the Red River Basin, especially west of North Dakota's Pembina escarpment; in the Grafton, Pembina to Hallock regions of the valley proper; and over portions of Kittson, Marshall, Roseau, Beltrami and Lake of the Woods counties in Northwest Minnesota.

Elsewhere, the snowpack depth tapers off to near nothing just south of a Valley City to Mayville-Portland line in North Dakota and then south of a Halstad to Ada and Lake Park line in Minnesota... throughout much of the southern Red River Valley drainage area.

Significant snowpack still remains in the upper Sheyenne River Basin, above Valley City and Cooperstown.

Snow Water Equivalent range from 3 to 6 inches of water in the deepest snowpack northeast from Devils Lake into Pembina... then decreasing to around 2 inches near Grand Forks... to less than an inch in scattered snow south of Hillsboro.

For the most current snowpack information, refer to the National Operational Hydrologic Remote Sensing Center (NOHRSC) snow interactive snow information web site at:

www.nohrsc.noaa.gov/interactive/html/map.html

* SOIL MOISTURE AND FROST DEPTHS...

The warm and moist fall weather extending into the early winter months have kept the soil moistures high going into freeze-up. As of February 12th, the soil moistures in Eastern North Dakota and Northwestern Minnesota are peaking into the 90th percentile rank.

Due to the warm autumn and deeper snowpack on the ground before the very cold temperatures, frost depths are less than normal ranging from 8 to 20 inches with about 18" in the Grand Forks area.

* RIVER FLOWS...

The USGS indicates that the rivers and streams in the basin are running two to six times their normal flow for this time of the

year. High flows are attributed to high late summer and fall rainfalls, very moist soils, and recent thaw conditions.

* RIVER ICE...

There is little to no solid ice cover on the rivers and streams in the southern Red River Basin, with upwards of a foot to 18 inches of ice evident in the northern basin. Be aware that there will be thinner ice in more turbulent water, and especially near rock-7riffle dams.

* 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 (and Riverine Response)... - A prolonged late winter thaw is expected to continue through this weekend and into early next week. Temperatures are expected to rise well above freezing for several hours each day... with temperatures remaining above freezing for at least a couple of nights. In addition, widespread light rain is expected to move across the region from Sunday night into Monday.

- In the South Basin (Halstad and points south)... widespread snowmelt and melt water runoff is expected to develop across the southern valley early in this period. A largely snow-free landscape there will help to increase overall warming and allow remaining snowmelt runoff to move from local ditch networks into larger streams and tributaries.

-- Expect areas of open water flow to develop in the lower Sheyenne, lower Maple and the Wild Rice Rivers in southeast North Dakota.

-- Likewise, expect the Rabbit and Ottertail Rivers in west central Minnesota and the Buffalo River, north and south branches, to develop areas of open water flow in Wilkin and Clay Counties.

-- The Red River south of Fargo could see small patches of open water developing by early next week.

- In the Central Basin (Halstad through Grand Forks)... widespread snowmelt and melt water runoff is also expected in the central portions of the Red River Basin. However... remaining snowpack will reduce the rate of warming and melt water runoff. Through the middle of next week... large expanses of farmland will become snow-free with most of the runoff parking in area ditch networks and smaller streams. Only limited, localized runoff is expected to advance into tributaries and the main stem Red River.

-- The Elm, Goose, Wild Rice (MN), and the Sandhill Rivers could see half or more of their runoff reaching those tributaries.

-- The Red River should see slight rises due to increased flow from the south, yet remain largely ice-covered.

- In the North Basin (north of Grand Forks to the border)... snowmelt will lead to further compaction of the snow mass and patchy areas of open ground. Most melt water will remain either in the snowpack or at the top of the soil.

- Melt water may pool on top of ice in streams and rivers.
- Open water river flow is not expected.

* SPRING SEASON CLIMATE OUTLOOK...

- The NWS Climate Prediction Center continues to expect a March through May period of slightly below normal temperatures combined with a slightly above normal precipitation regime. National Climate details are at:

www.cpc.noaa.gov

. NEXT SPRING FLOOD OUTLOOK...

The second spring flood outlook for this year will be issued on the morning of Thursday, March 2nd of 2017, when the accompanying graphics will be posted to the NWS FGF AHPS web page at:

<https://water.weather.gov/ahps2/index.php?wfo=FGF>

This is the best estimate at this time applying 60 plus years of past weather to current basin conditions. These estimates will be recomputed for the next spring flood outlook, so the numbers will change as hydrologic conditions in the Red River basin change and the span of the valid period changes.

. 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 February 19, 2017 to May 20, 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: 02/19/2017 - 05/20/2017

: Current and Historical
: Chances of Exceeding

Location	Flood Categories as s Percentage (%)								
	Categorical Flood Stages (FT)			Minor		Moderate		Major	
	Minor	Mod	Major	CS	HS	CS	HS	CS	HS
Red River of the North.....									
WHPETON	11.0	13.0	15.0	70	50	22	26	7	13
HICKSON	30.0	34.0	38.0	20	20	<5	10	<5	<5
FARGO	18.0	25.0	30.0	>95	76	39	37	21	22
HALSTAD	26.0	32.0	37.5	47	33	24	17	6	9
GRAND FORKS	28.0	40.0	46.0	>95	57	62	32	16	10
OSLO	26.0	30.0	36.0	>95	63	>95	55	38	19
DRAYTON	32.0	38.0	42.0	>95	48	>95	33	28	11
PEMBINA	39.0	44.0	49.0	>95	56	>95	43	88	22
Minnesota Tributaries.....									
SABIN	13.0	15.0	19.0	69	47	14	13	<5	<5
HAWLEY	8.0	9.0	11.0	50	36	22	25	<5	<5
DILWORTH	13.0	20.0	26.0	90	66	21	19	<5	<5
TWIN VALLEY	10.0	12.0	14.0	14	18	<5	6	<5	<5
HENDRUM	20.0	28.0	32.0	77	52	21	21	<5	6
SHELLY	14.0	20.0	23.0	31	31	<5	11	<5	6
CLIMAX	20.0	25.0	30.0	22	23	6	11	<5	7
HIGH LANDING	12.0	12.5	13.0	85	46	78	43	55	33
CROOKSTON	15.0	23.0	25.0	>95	52	12	13	6	8
ABOVE WARREN	67.0	71.0	75.0	27	14	<5	<5	<5	<5
ALVARADO	106.0	108.0	110.0	82	19	57	15	9	<5
HALLOCK	802.0	806.0	810.0	>95	63	>95	43	30	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	50	35	37	32	13	19
VALLEY CITY	15.0	16.0	17.0	39	8	35	7	26	<5
LISBON	15.0	17.0	19.0	37	9	27	8	15	6
KINDRED	16.0	19.0	20.5	85	18	42	10	24	9
WEST FARGO DVRSN	18.0	20.0	21.0	90	21	54	16	39	11
HARWOOD	884.0	886.0	891.0	55	23	43	21	12	10
ENDERLIN	9.5	12.0	14.0	67	21	16	10	<5	<5
MAPLETON	905.0	908.0	910.0	70	30	18	14	<5	<5
HILLSBORO	10.0	13.0	16.0	86	17	57	10	7	<5
MINTO	6.0	8.0	11.0	>95	26	41	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	13	<5	<5	<5
NECHE	18.0	19.0	20.5	>95	28	>95	26	>95	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 February 19, 2017 to May 20, 2017

LOCATION	95%	90%	75%	50%	25%	10%	05%
Red River of the North.....							

WAHPETON	10.3	10.5	10.8	11.5	12.7	14.6	15.5
HICKSON	20.9	21.5	22.4	24.6	27.6	32.2	33.8
FARGO	20.0	20.8	21.5	23.8	29.0	33.2	34.0
HALSTAD	16.3	18.9	22.0	25.8	31.7	35.8	38.1
GRAND FORKS	31.7	34.0	38.9	40.8	44.4	47.2	49.7
OSLO	32.4	33.5	34.5	35.2	36.5	37.6	38.7
DRAYTON	38.1	38.9	40.2	41.2	42.2	42.9	43.9
PEMBINA	47.7	48.7	50.1	51.5	52.6	53.4	53.9

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

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South Fork Buffalo River.....							
SABIN	11.8	12.3	12.8	13.6	14.4	15.3	15.5
Buffalo River.....							
HAWLEY	6.2	6.5	7.3	8.0	8.8	9.8	10.3
DILWORTH	12.5	12.9	15.0	18.0	19.5	21.4	22.3
Wild Rice River.....							
TWIN VALLEY	5.6	6.0	6.5	7.9	9.2	10.9	11.9
HENDRUM	15.6	17.8	20.6	22.7	27.4	29.7	31.1
Marsh River.....							
SHELLY	8.7	9.4	10.9	12.2	14.8	18.0	19.1
Sand Hill River.....							
CLIMAX	11.2	11.5	12.0	15.7	19.7	23.1	28.2
Red Lake river.....							
HIGH LANDING	10.6	11.4	12.8	13.0	13.2	13.4	13.6
CROOKSTON	15.1	15.6	17.1	19.7	21.7	23.7	25.6
Snake River.....							
ABOVE WARREN	64.6	64.8	65.1	66.0	67.1	68.3	70.3
ALVARADO	105.2	105.7	106.5	108.6	109.3	109.9	110.5
Two Rivers River.....							
HALLOCK	807.2	807.6	808.5	809.1	810.1	811.1	811.9
Roseau River..... considering the flow thru the Roseau diversion.							
ROSEAU	11.8	12.4	13.2	14.5	16.1	16.8	17.1

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

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Wild Rice River.....							
ABERCROMBIE	5.7	6.4	7.5	10.1	15.2	18.4	20.1
Sheyenne River.....							
VALLEY CITY	11.9	12.6	13.4	14.2	17.5	19.8	20.6
LISBON	11.5	12.3	13.1	13.9	17.2	19.7	20.5
KINDRED	14.3	15.3	16.5	18.0	20.5	21.1	21.1
WEST FARGO DVRSN	16.6	17.9	18.5	20.4	22.8	23.1	23.2
HARWOOD	879.6	880.1	881.2	884.6	889.3	891.2	892.1
Maple River.....							
ENDERLIN	7.4	7.8	9.2	9.9	11.2	12.4	13.6
MAPLETON	900.8	901.9	904.6	906.1	907.6	908.6	909.4
Goose River.....							
HILLSBORO	8.3	9.2	11.2	13.6	14.1	15.7	16.3
Forest River.....							
MINTO	6.5	7.0	7.4	7.9	8.4	9.0	9.2
Park River.....							
GRAFTON	14.3	15.1	15.9	17.2	18.6	19.3	20.0
Pembina River.....							
WALHALLA	11.8	12.0	13.2	14.3	15.2	16.4	16.6
NECHE	20.7	20.8	21.4	21.4	21.5	21.6	21.7

.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 www.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 in 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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