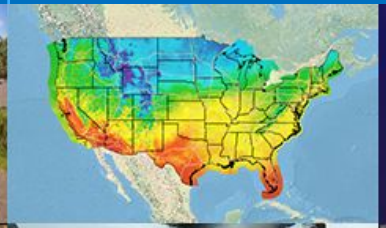
NWS Grand Forks Spring Flood Outlook

Amanda Lee
Service Hydrologist
NWS Grand Forks

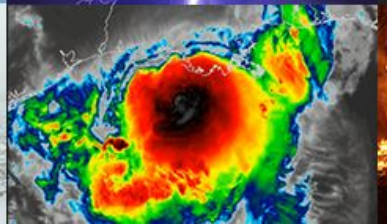
February 9, 2023

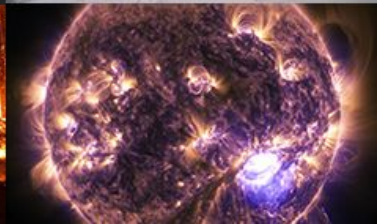
NATIONAL WEATHER SERVICE



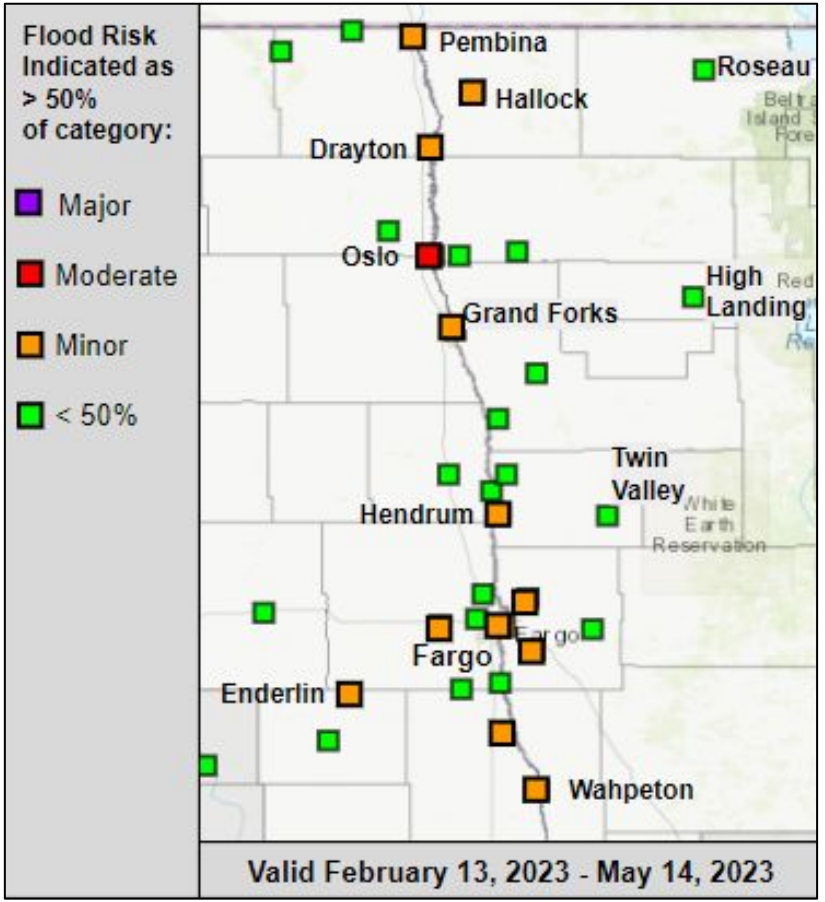






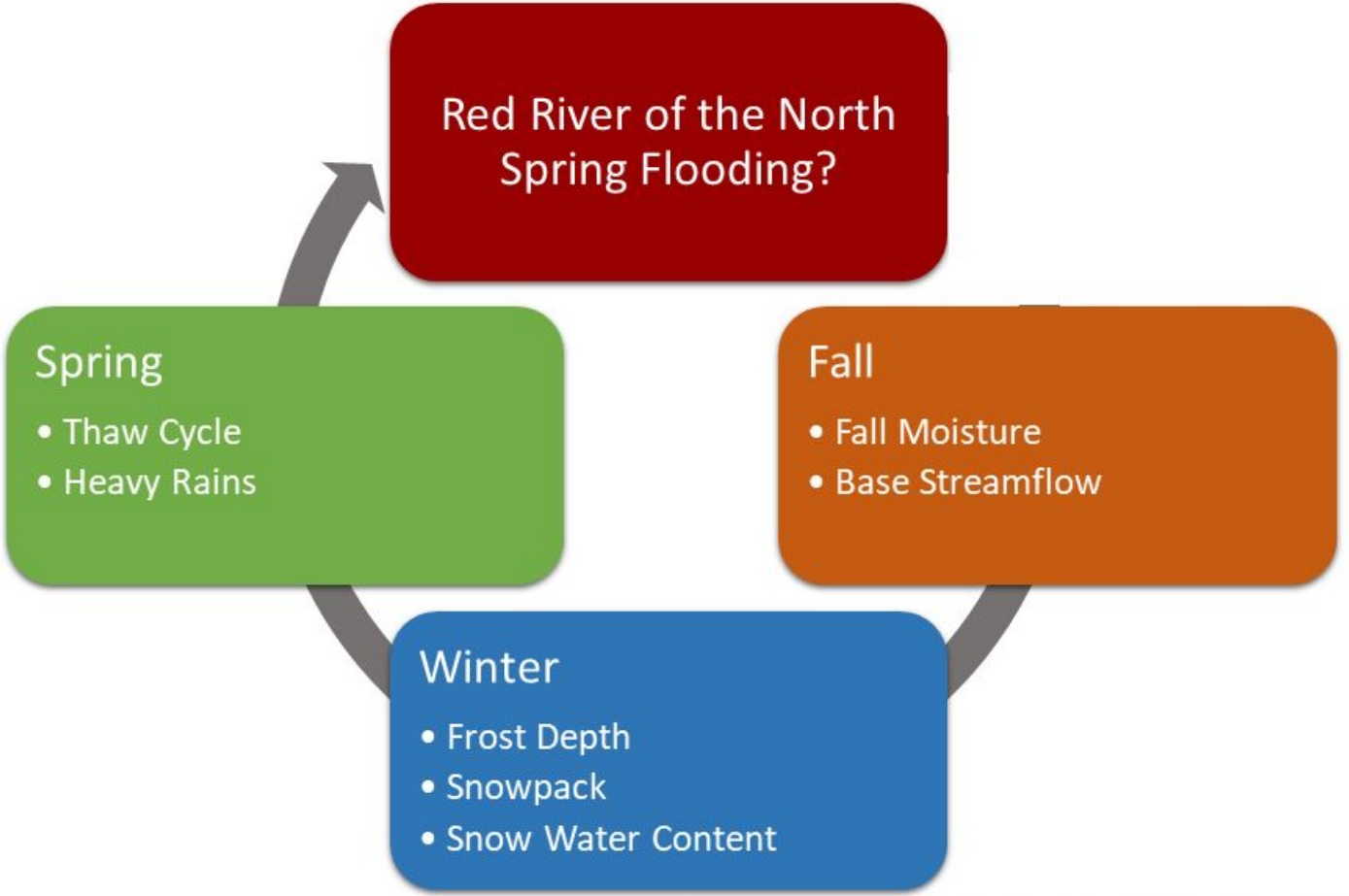
Key Message

The risk for significant (moderate or higher) spring flooding remains low with this outlook issuance, running slightly below long-term historical averages across the Red River Basin.



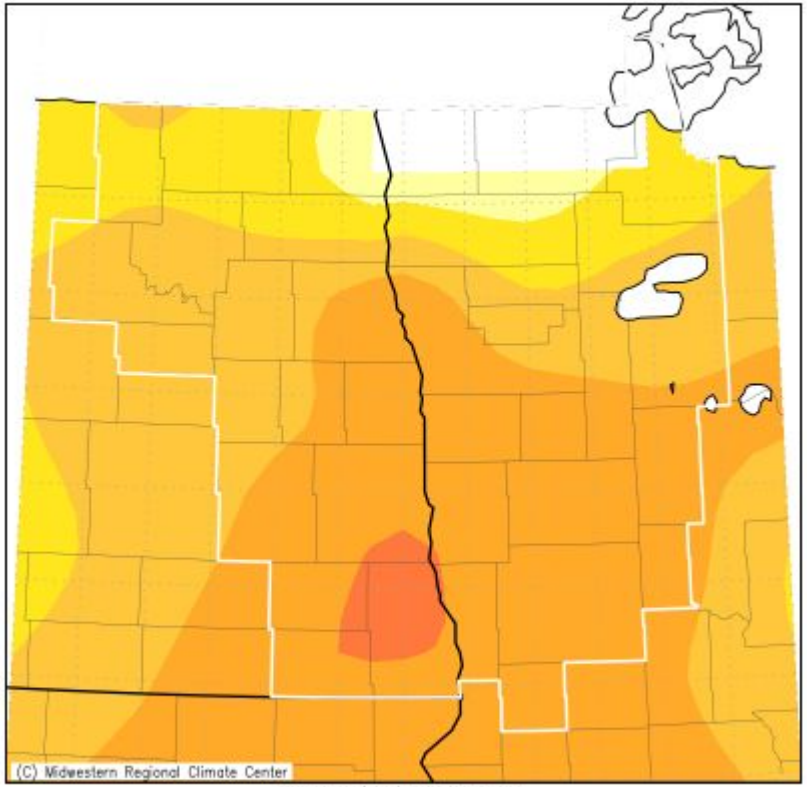
Key Points

- Minor to isolated moderate spring flooding (50% exceedance probability).
- Below normal soil moisture and near normal streamflows heading into freeze-up.
- Although January and the beginning of February have been dry, early winter season storms brought above normal snowfall/precipitation (to date thus far).
- **As always: late winter snowfall, spring precipitation, and snowmelt timing/thaw cycle will be the most important factors for spring flooding.**

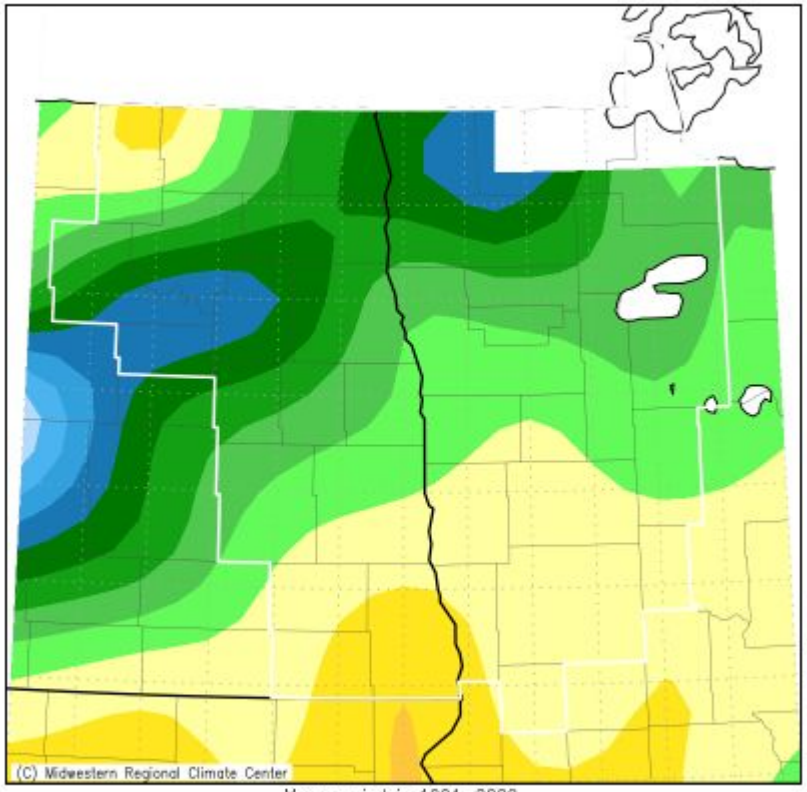


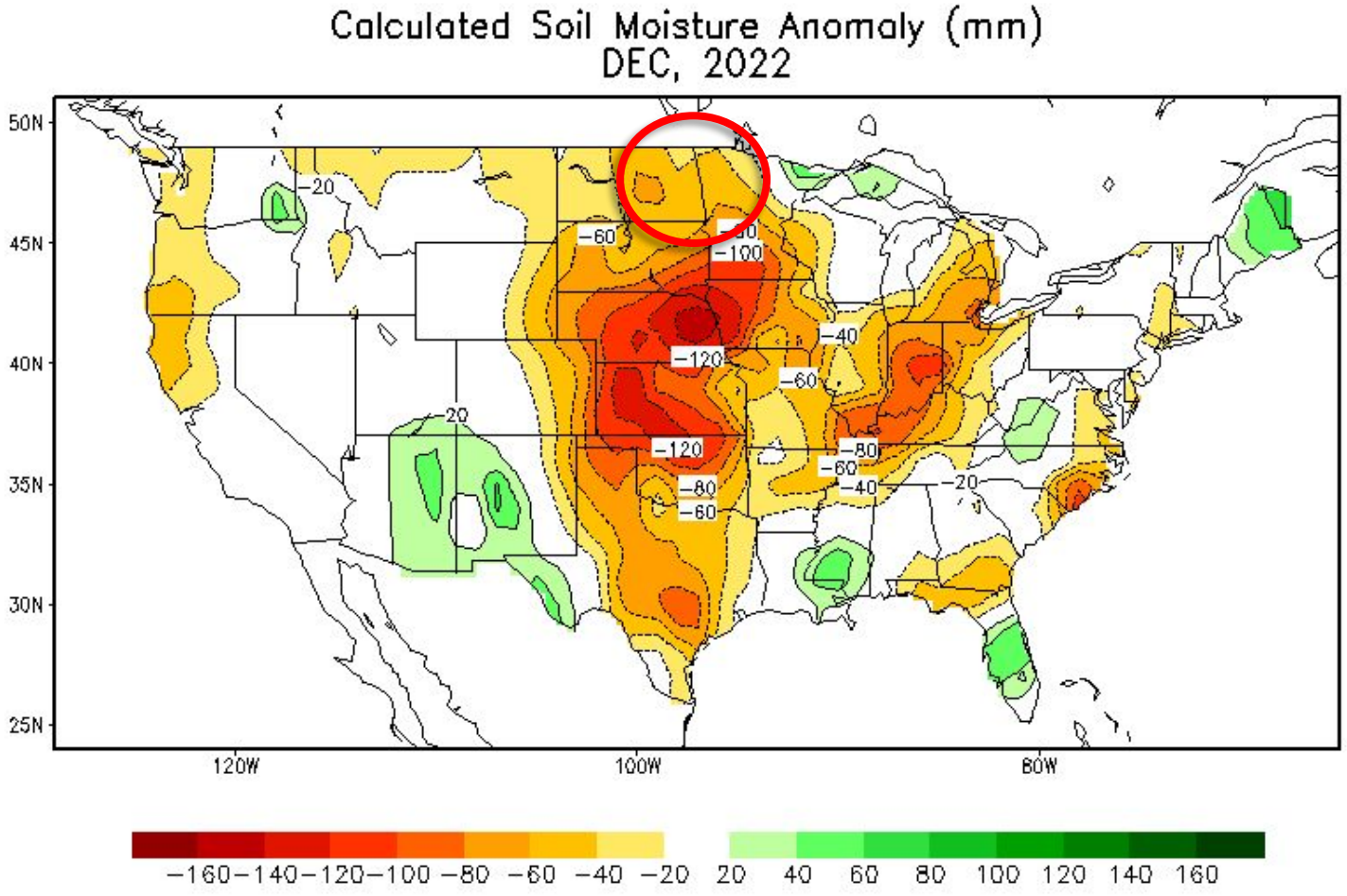
[Bluemle: Factors Affecting Flooding in the Red River Valley, 1997]

Accumulated Precipitation (in): Departure from Mean
September 1, 2022 to November 30, 2022



Accumulated Snowfall (in): Departure from Mean
September 1, 2022 to November 30, 2022




Calculated Soil Moisture Anomaly (mm)
DEC, 2022
50N
45N
40N
35N
30N
25N
120W
100W
80W
-20
-60
-100
-40
-120
-60
20
-120
-80
-60
-80
-60
-40
-20
-160 -140 -120 -100 -80 -60 -40 -20 20 40 60 80 100 120 140 160

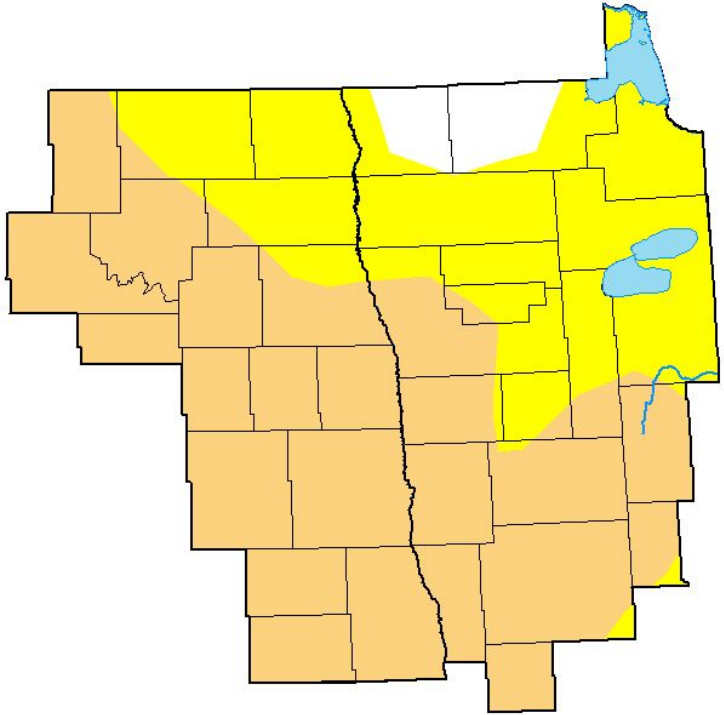
U.S. Drought Monitor

Grand Forks, ND WFO

February 7, 2023

(Released Thursday, Feb. 9, 2023)

Valid 7 a.m. EST



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

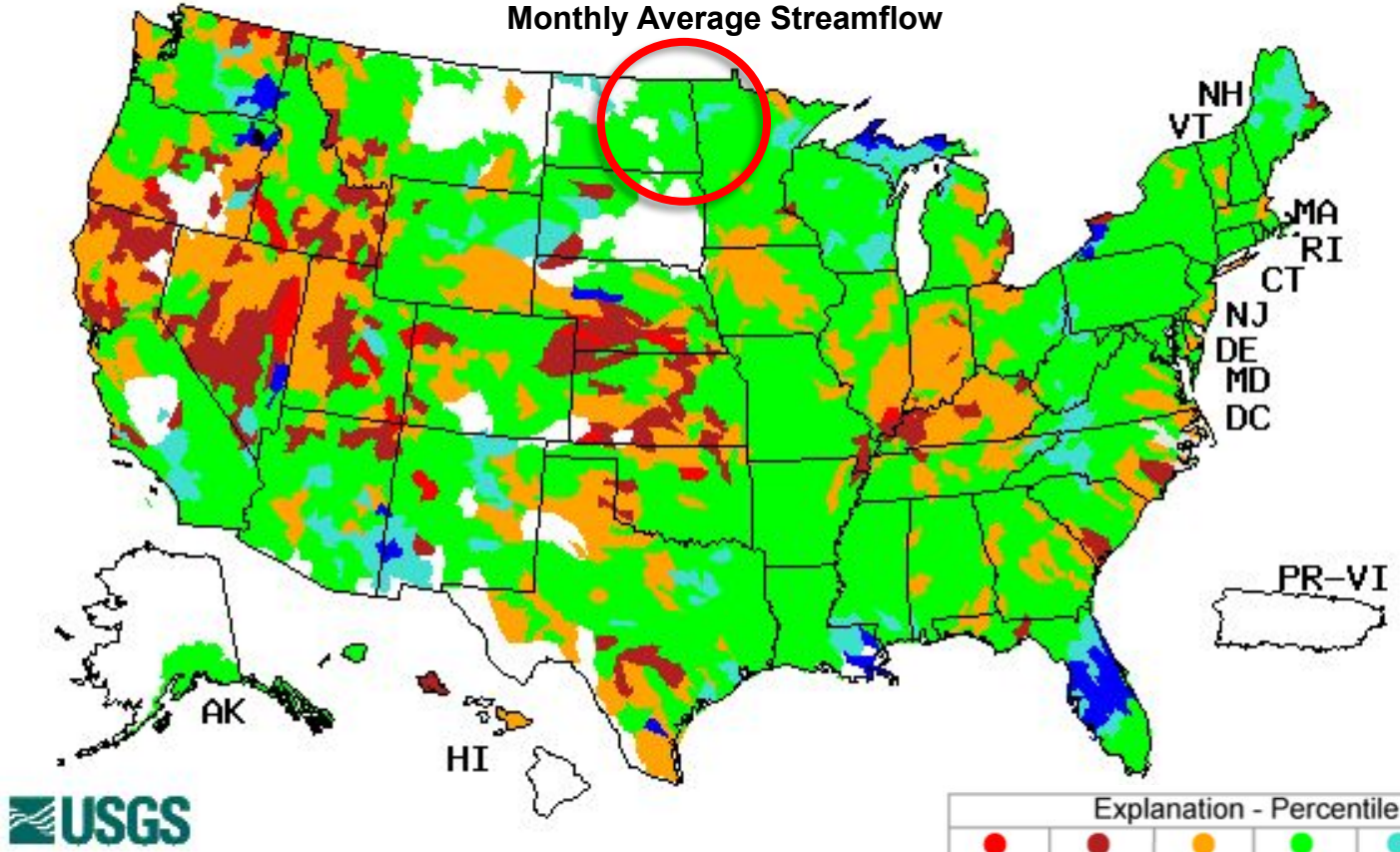
Author:

Brian Fuchs
National Drought Mitigation Center

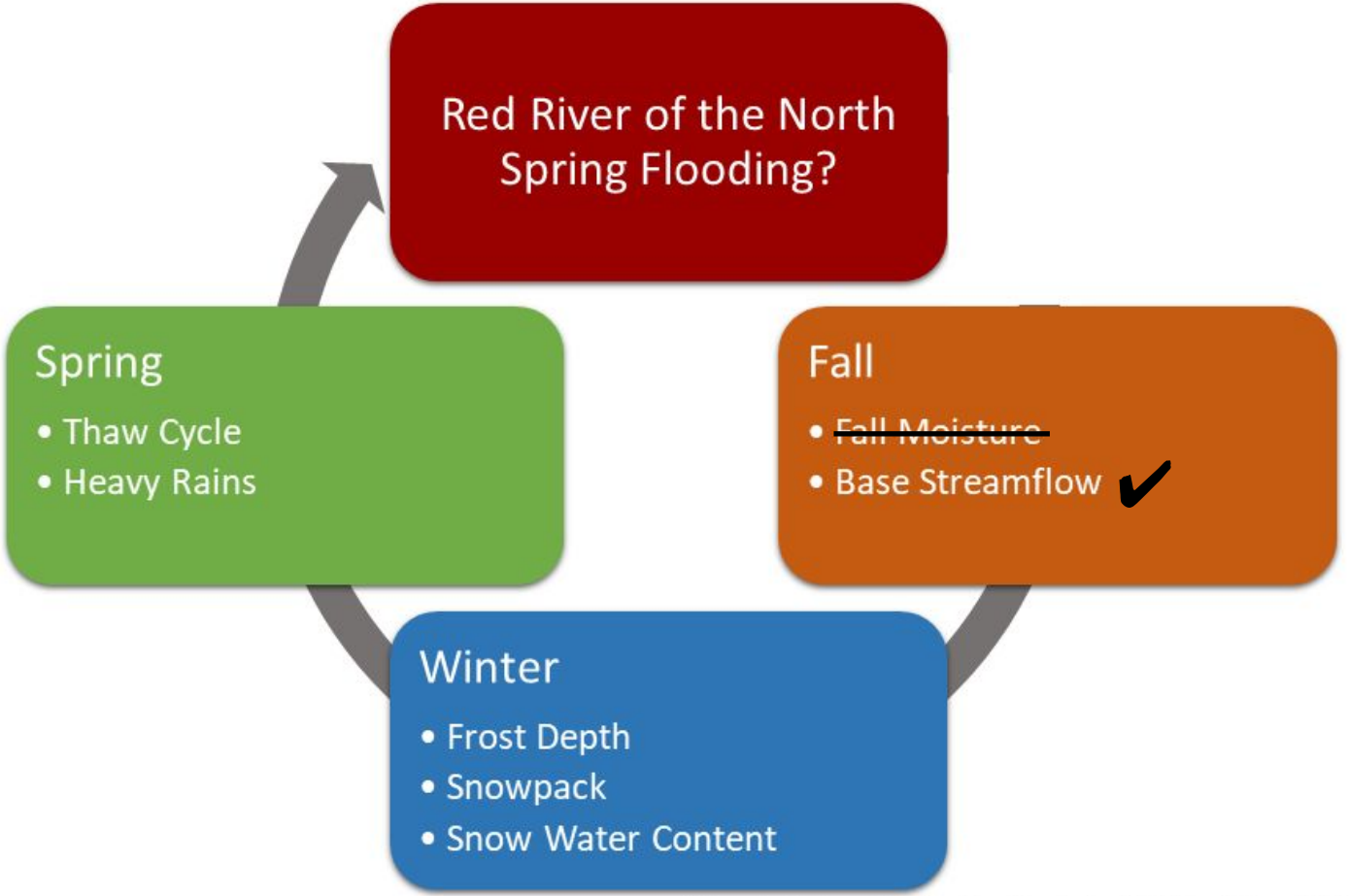
droughtmonitor.unl.edu

November 2022

Monthly Average Streamflow

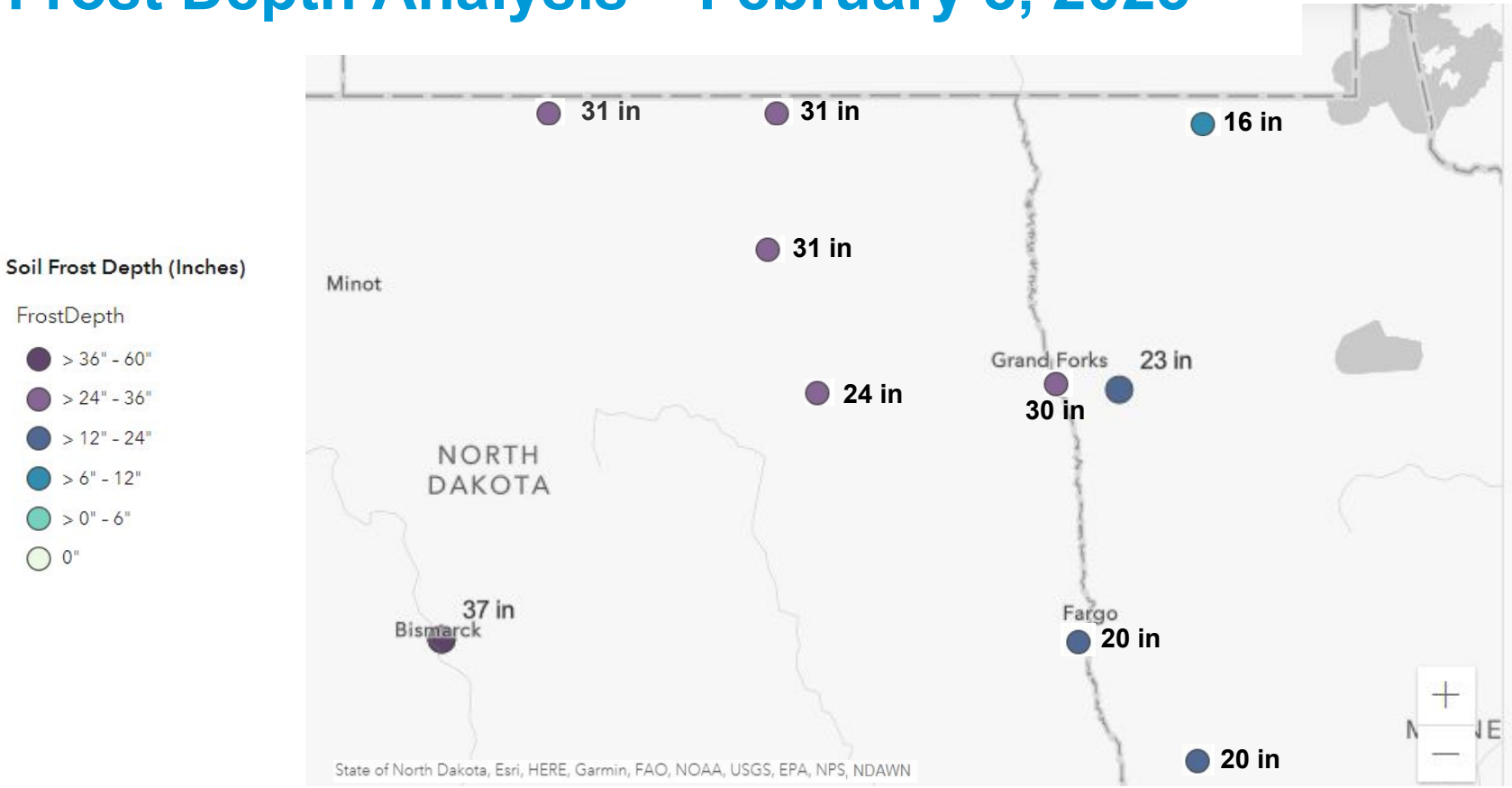


Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

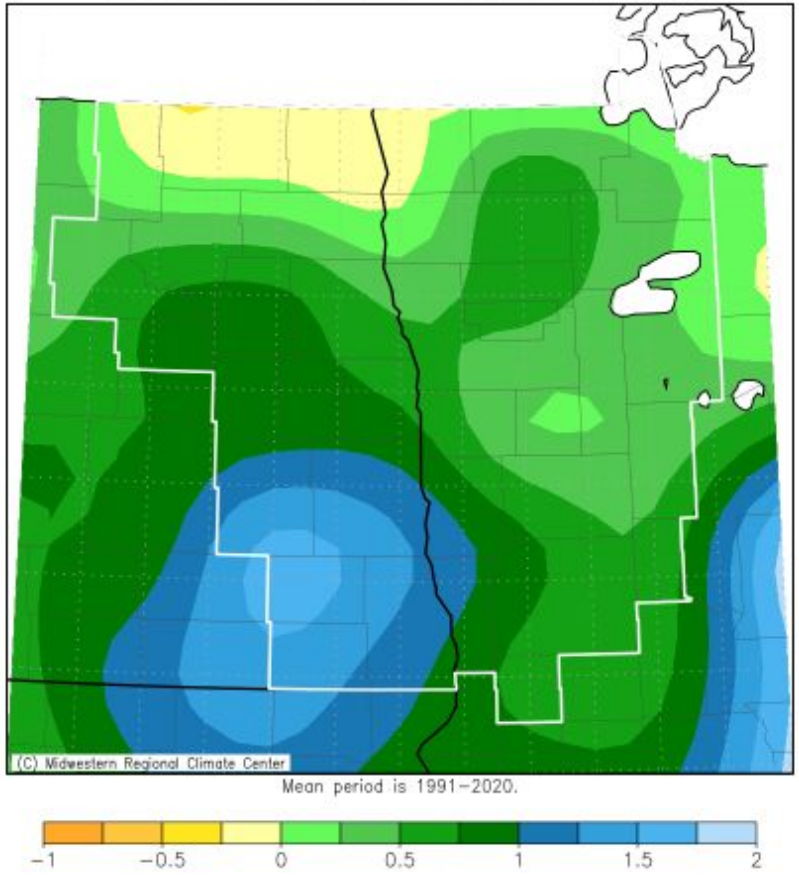


[Bluemle: Factors Affecting Flooding in the Red River Valley, 1997]

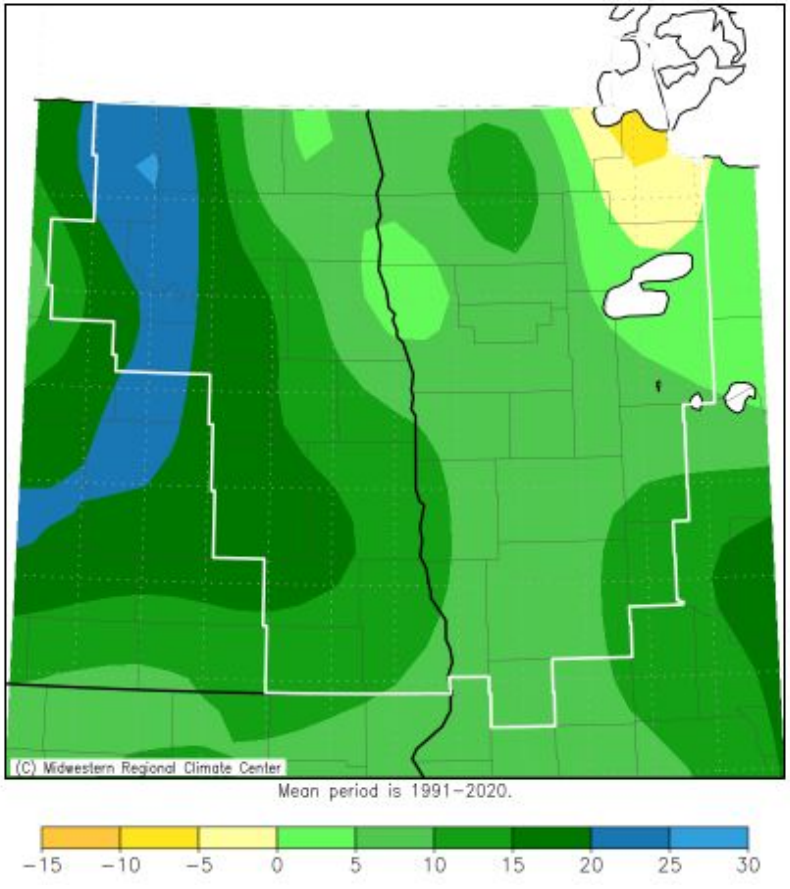
Frost Depth Analysis – February 8, 2023



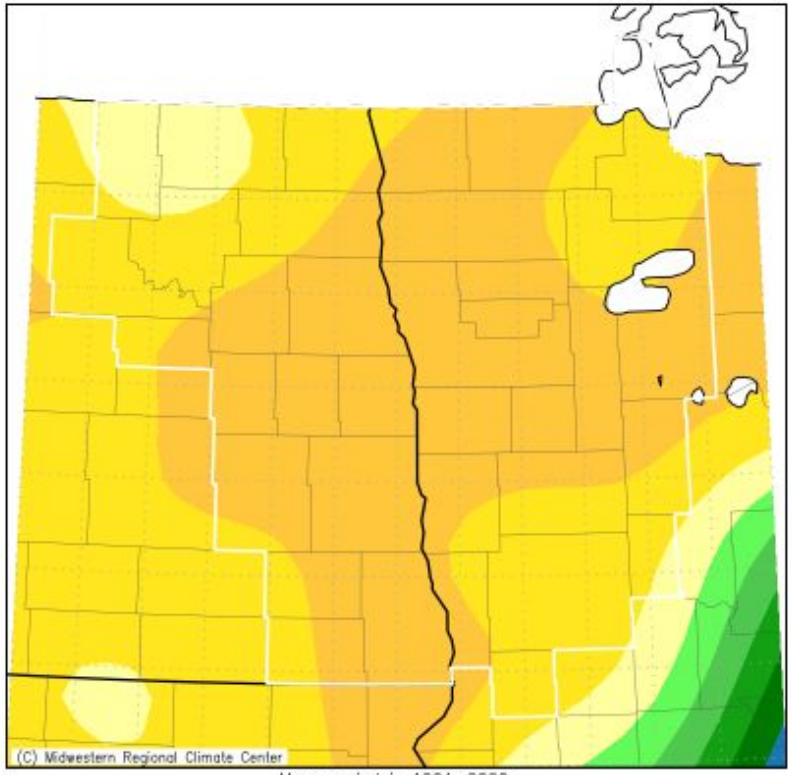
Accumulated Precipitation (in): Departure from Mean
December 1, 2022 to February 8, 2023



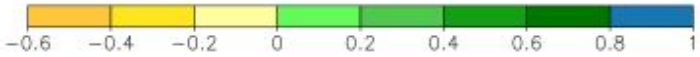
Accumulated Snowfall (in): Departure from Mean
December 1, 2022 to February 8, 2023



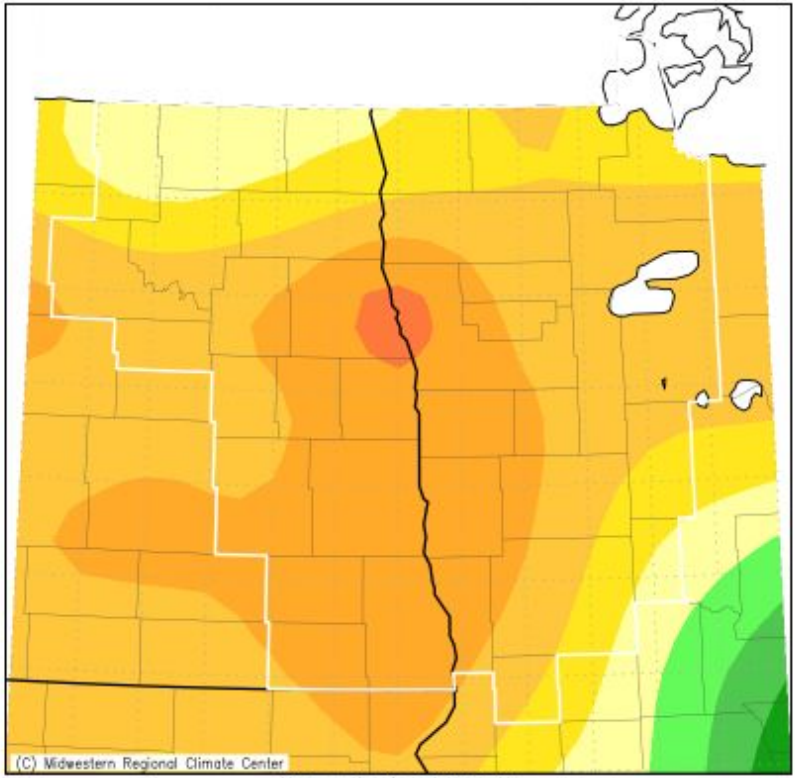
Accumulated Precipitation (in): Departure from Mean
January 1, 2023 to February 8, 2023



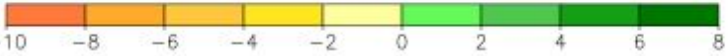
Mean period is 1991–2020.



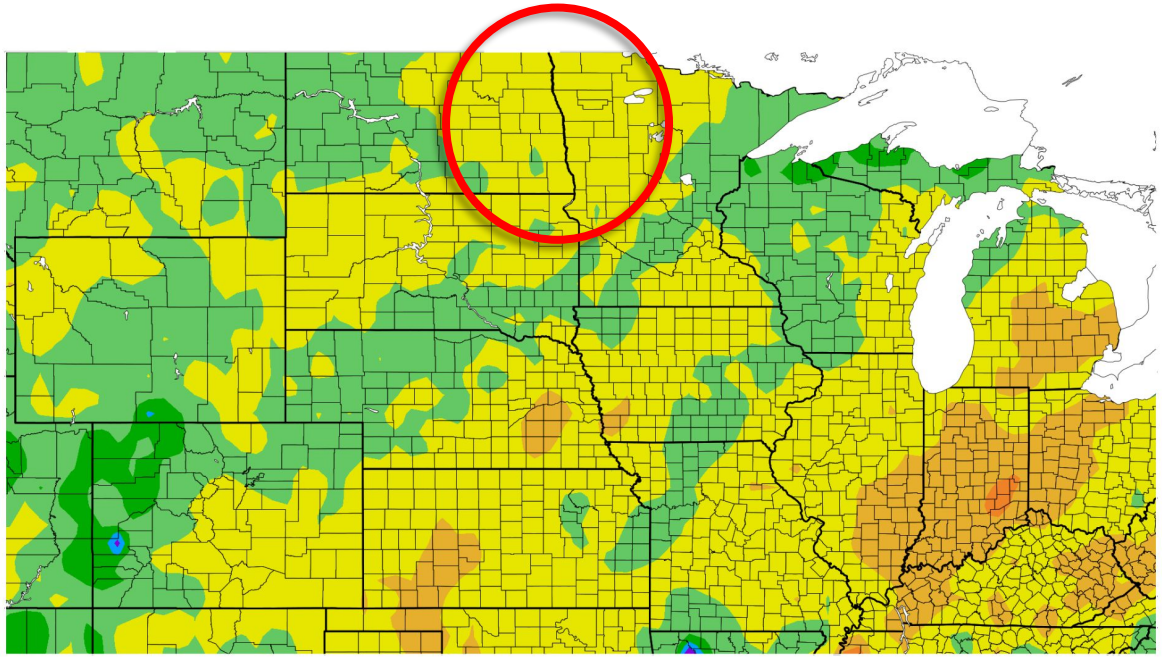
Accumulated Snowfall (in): Departure from Mean
January 1, 2023 to February 8, 2023



Mean period is 1991–2020.



Departure from Normal Precipitation (in)
10/1/2022 – 2/7/2023

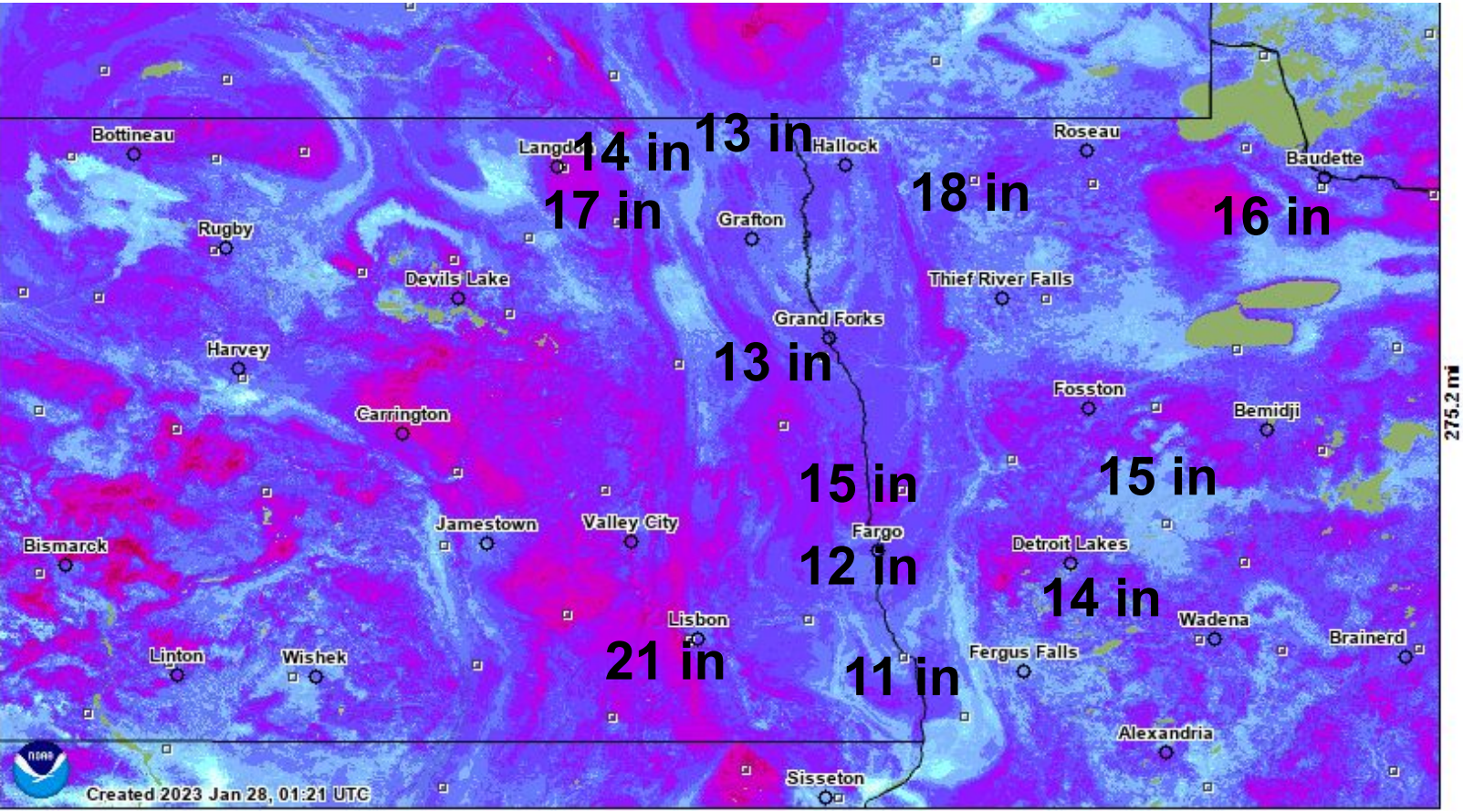


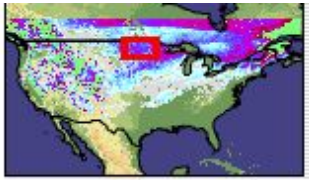
−15 −12 −9 −6 −3 0 3 6 9 12 15

Generated 2/8/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

Modeled Snow Depth - January 27, 2023





Inches of depth

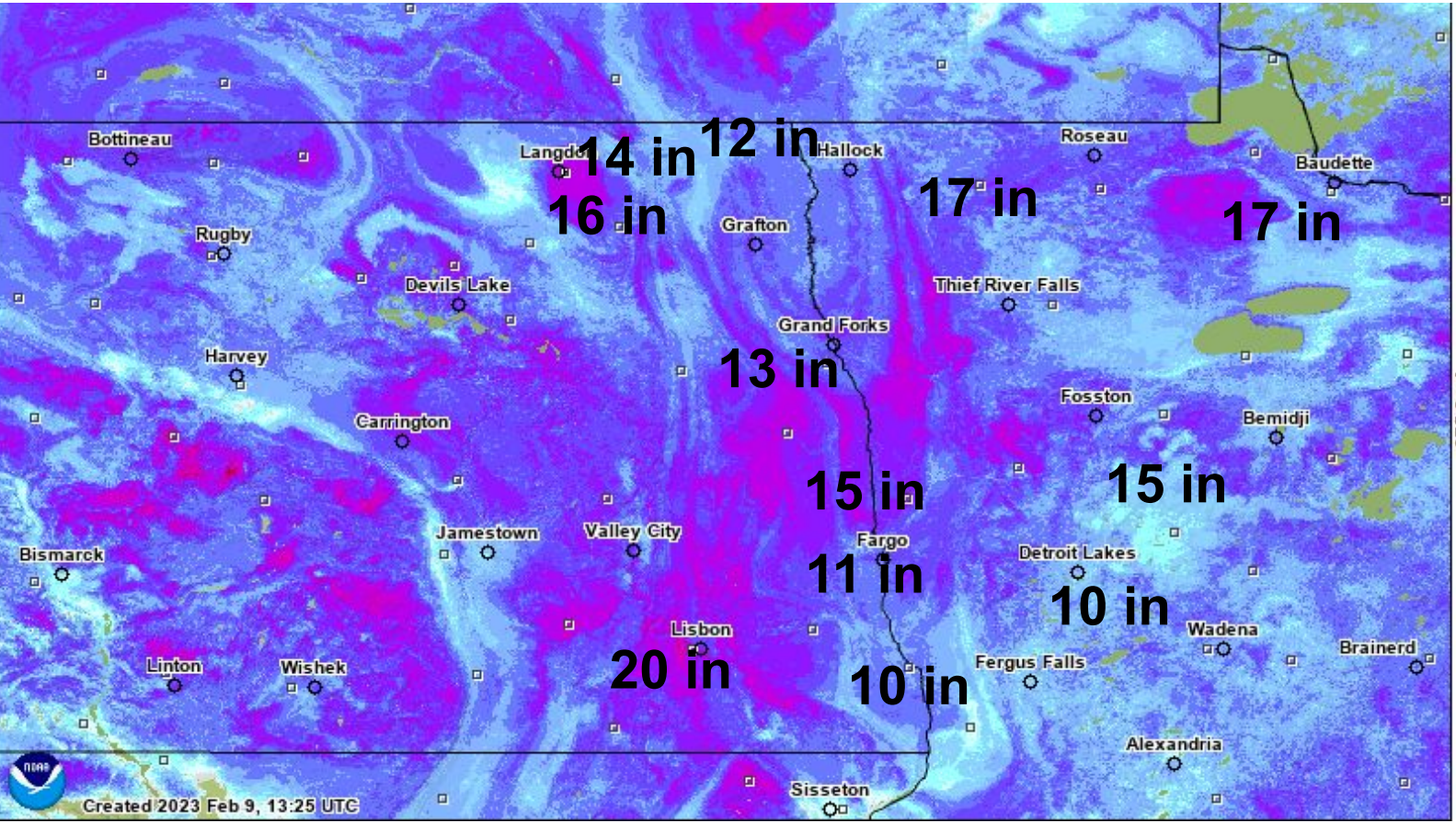
	>	24	
22	to	24	
20	to	22	
18	to	20	
16	to	18	
14	to	16	
12	to	14	
10	to	12	
8	to	10	
6	to	8	
4	to	6	
2	to	4	
trace	to	2	

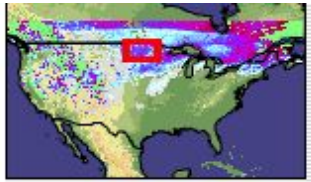
Not Estimated

Elevation in feet

>	13124	
8203	to	13124
3281	to	8203
3	to	3281
<	3	

Modeled Snow Depth - February 9, 2023





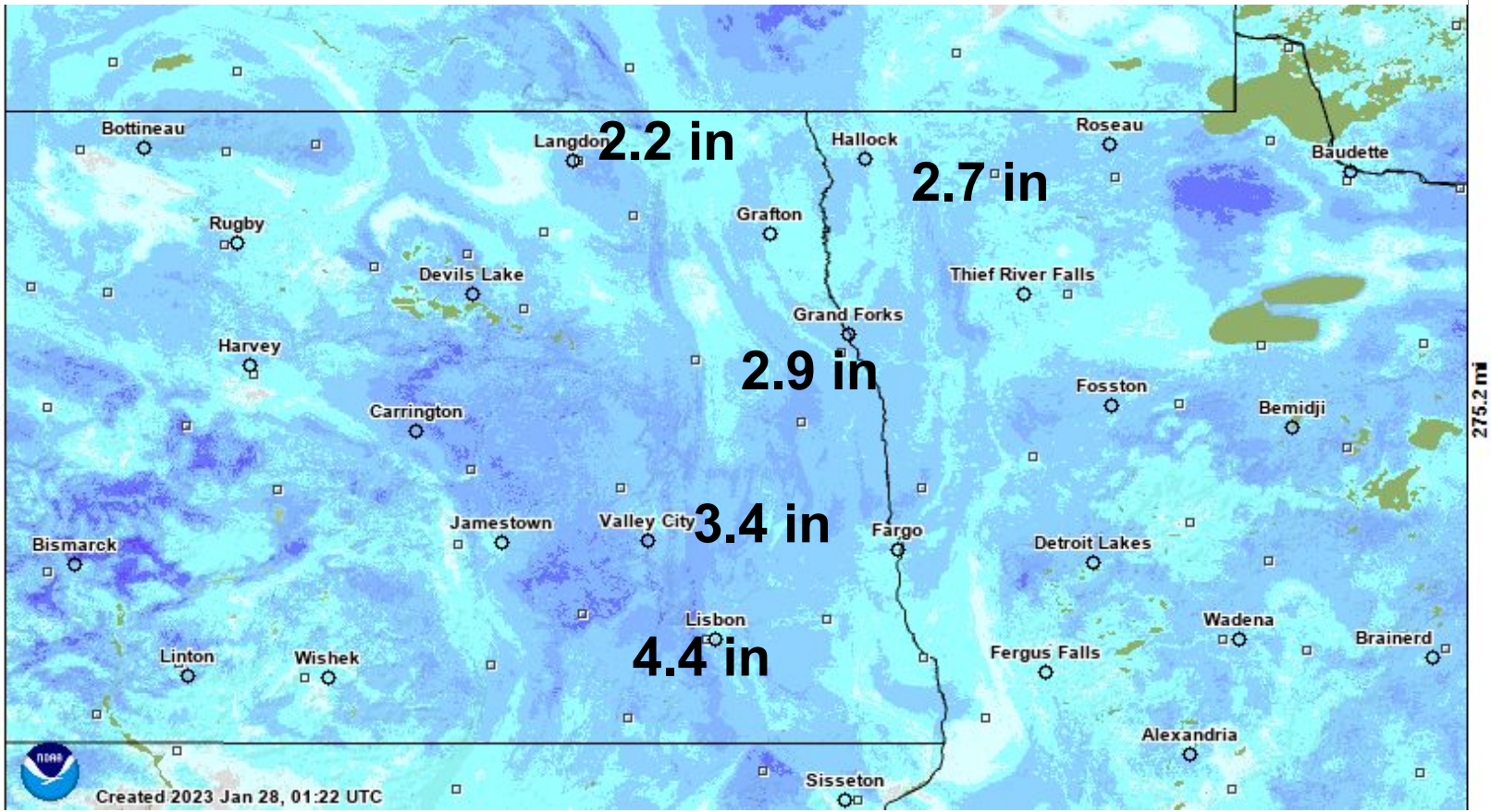
Inches of depth

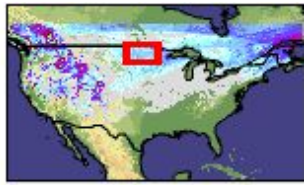
	>	24	
22	to	24	
20	to	22	
18	to	20	
16	to	18	
14	to	16	
12	to	14	
10	to	12	
8	to	10	
6	to	8	
4	to	6	
2	to	4	
trace	to	2	
	Not Estimated		

Elevation in feet

	>	13124	
8203	to	13124	
3281	to	8203	
3	to	3281	
	<	3	

Modeled Snow Water Equivalent - January 27, 2023





Inches of water equivalent

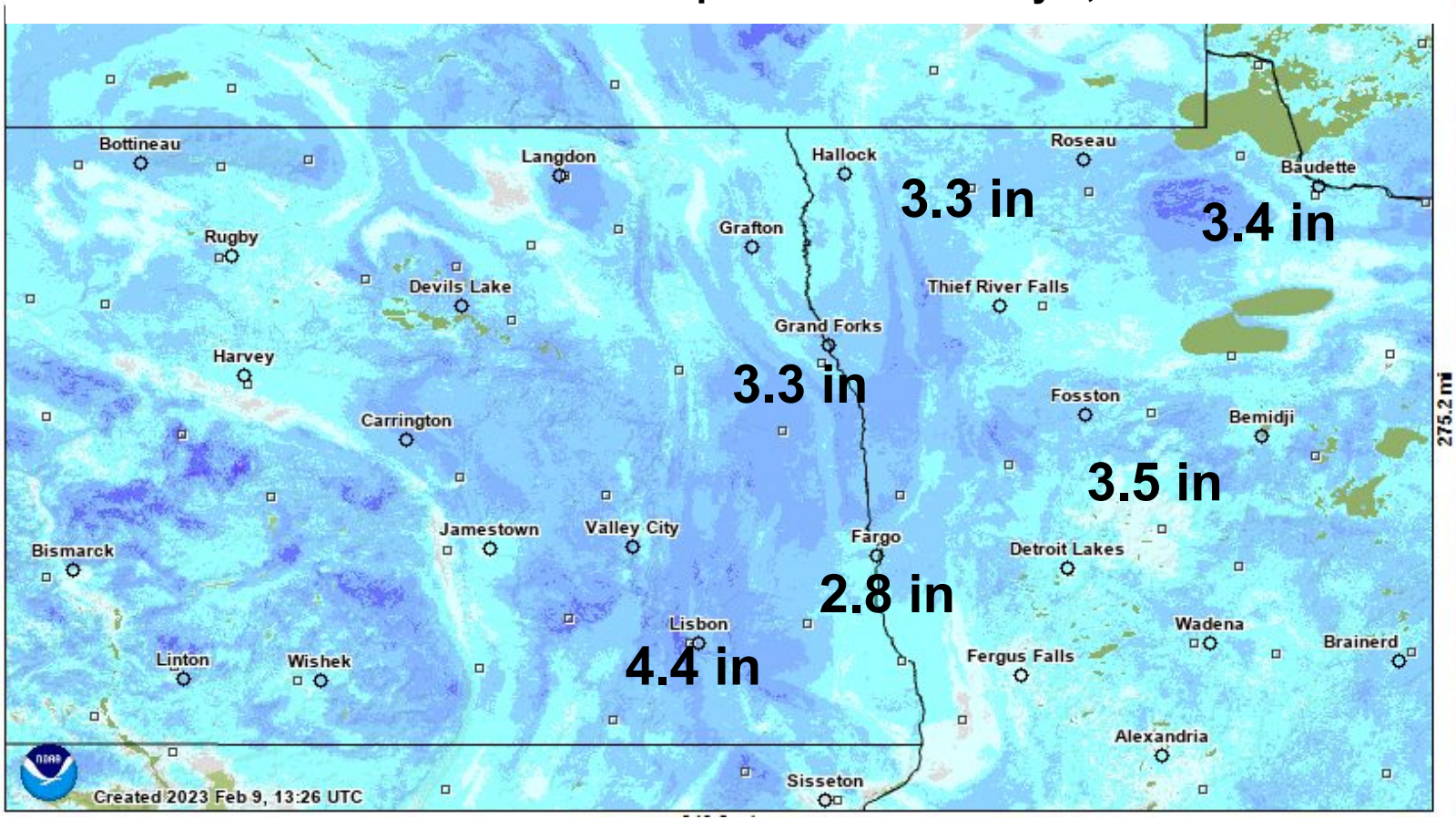
	>	18	
16	to	18	
14	to	16	
12	to	14	
10	to	12	
8	to	10	
6	to	8	
5	to	6	
4	to	5	
3	to	4	
2	to	3	
1	to	2	
trace	to	1	

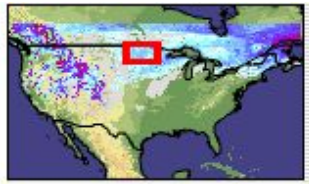
Not Estimated

Elevation in feet

>	13124	
8203	to	13124
3281	to	8203
3	to	3281
<	3	

Modeled Snow Water Equivalent - February 9, 2023





Inches of water equivalent

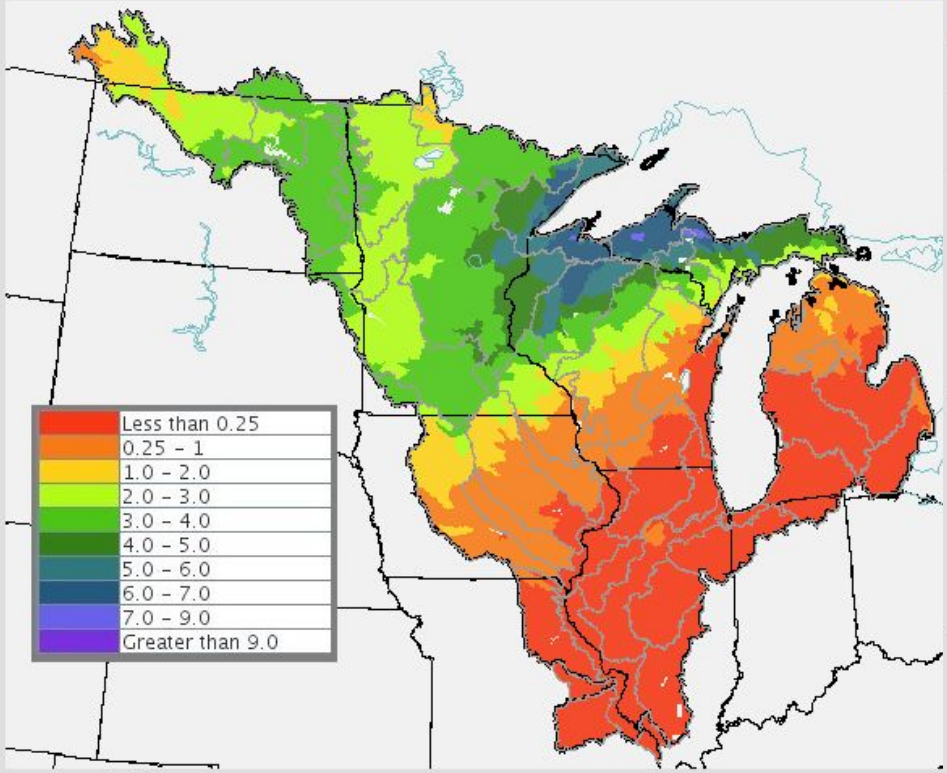
	>		18
16	to		18
14	to		16
12	to		14
10	to		12
8	to		10
6	to		8
5	to		6
4	to		5
3	to		4
2	to		3
1	to		2
trace	to		1

Not Estimated

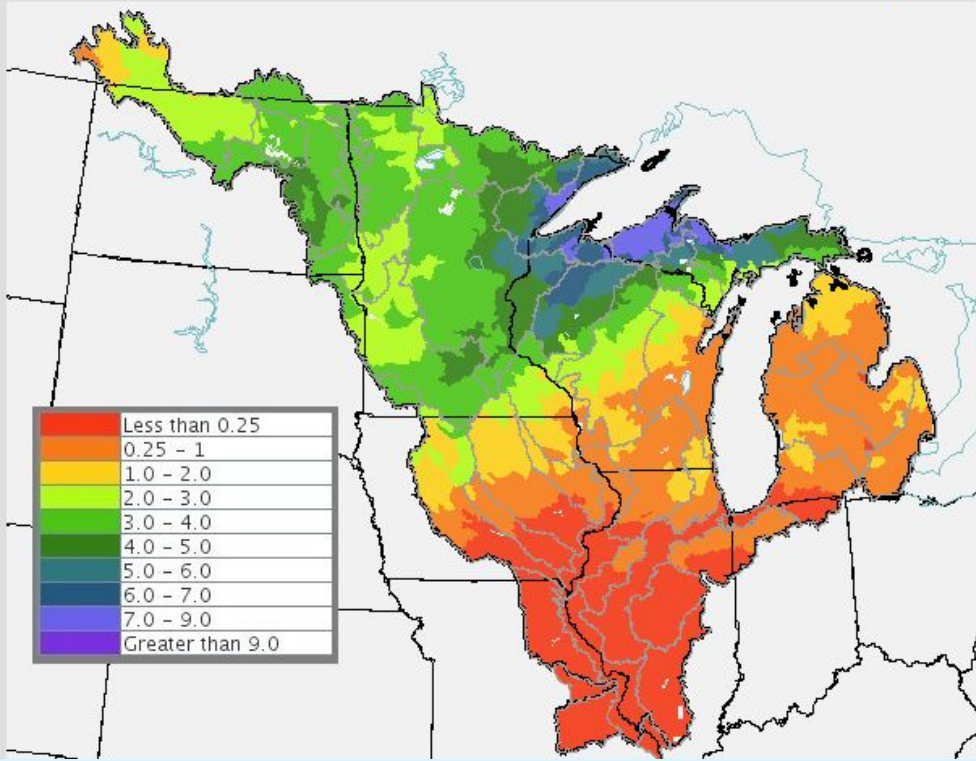
Elevation in feet

	>		13124
8203	to		13124
3281	to		8203
3	to		3281
	<		3

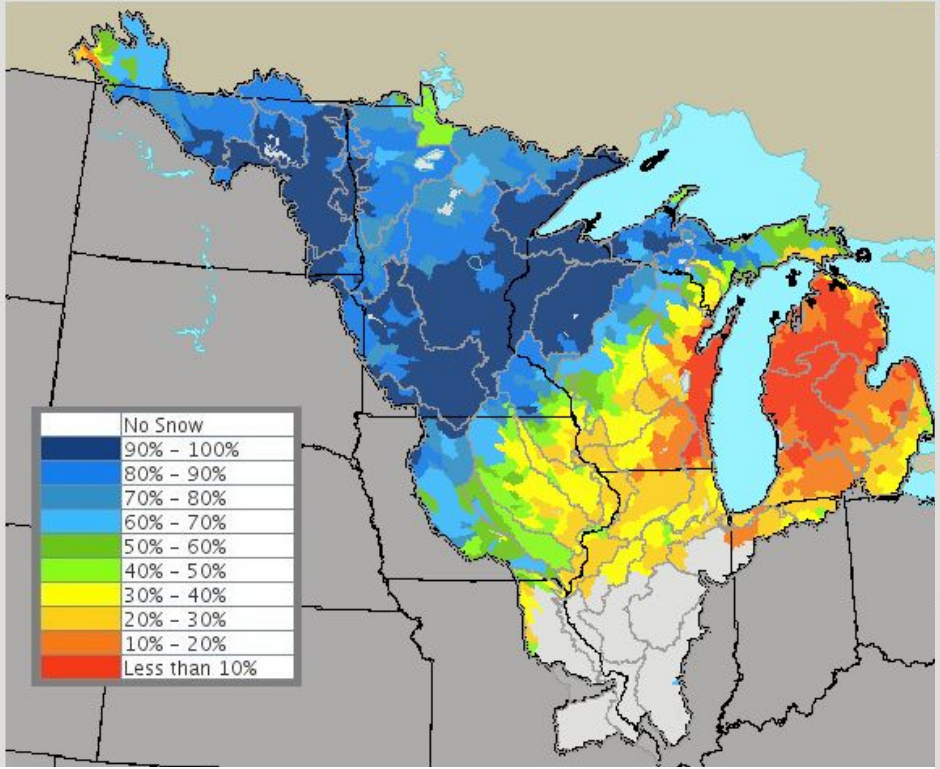
North Central River Forecast Center
Model Simulated Snow Water Equivalent
Valid for 01/23/2023 12 GMT



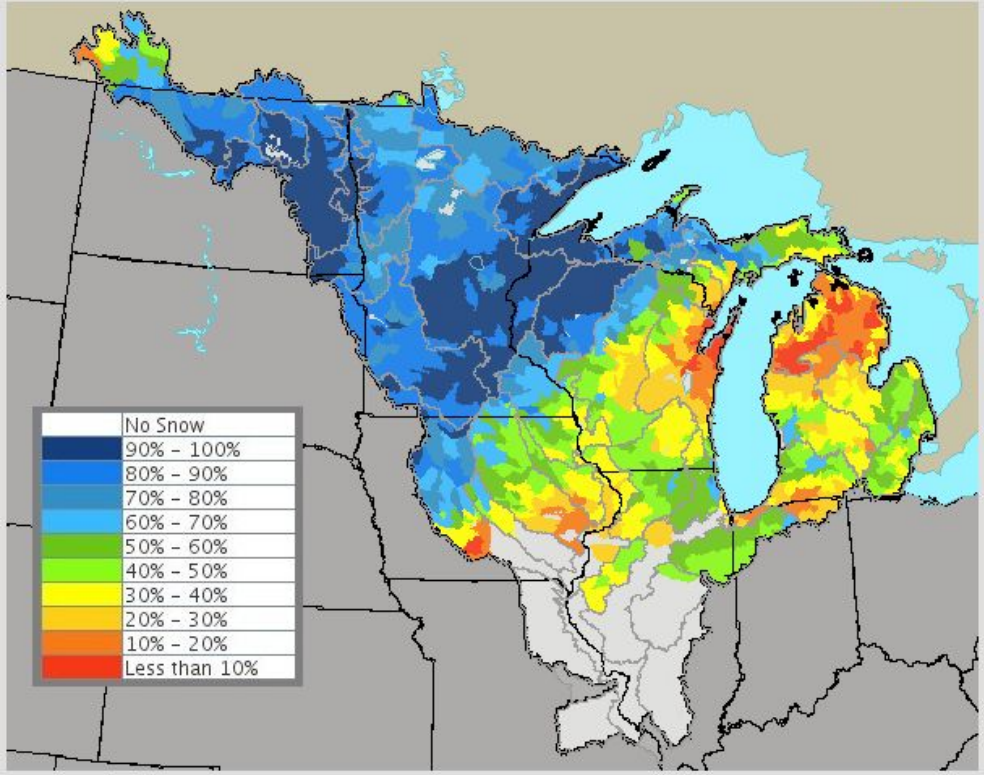
North Central River Forecast Center
Model Simulated Snow Water Equivalent
Valid for 02/06/2023 12 GMT

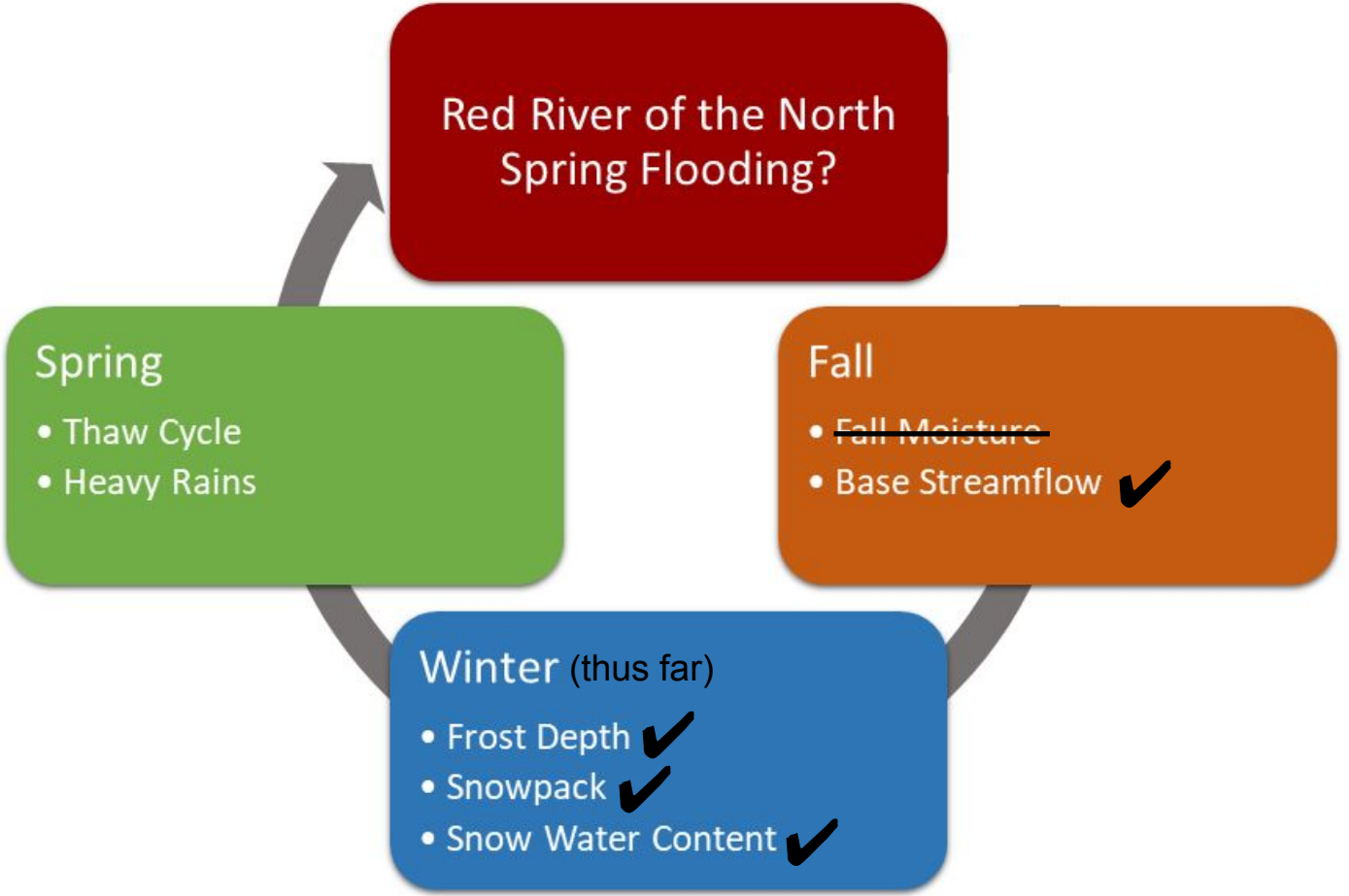


North Central River Forecast Center
Ranked Simulated Snow Water Equivalent
Valid for 01/23/2023 12 GMT



North Central River Forecast Center
Ranked Simulated Snow Water Equivalent
Valid for 02/06/2023 12 GMT

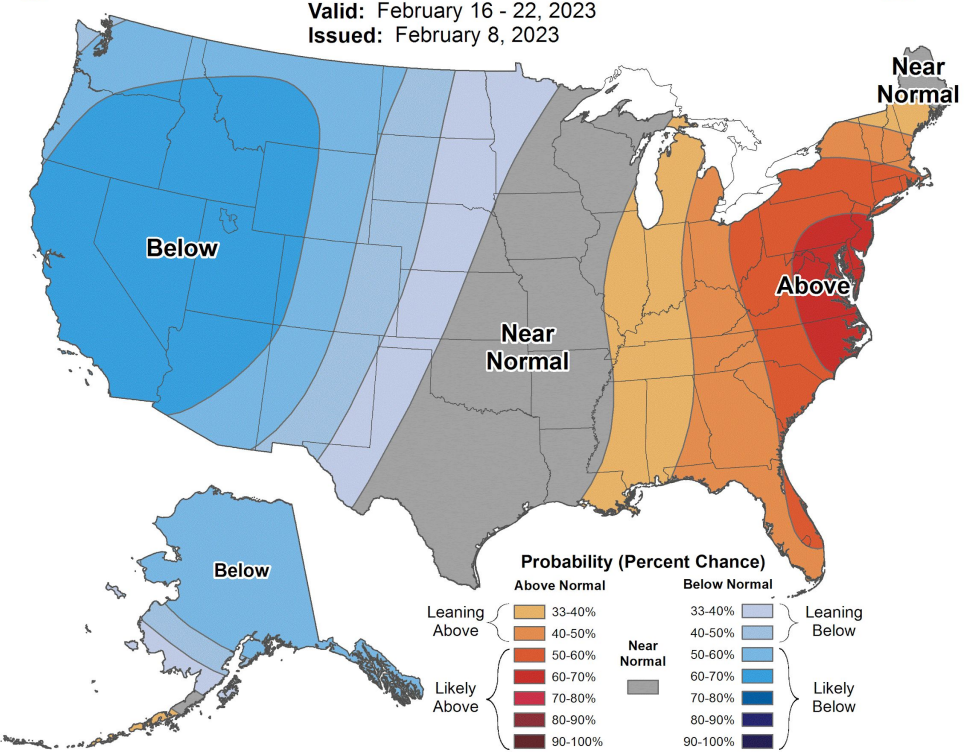




[Bluemle: Factors Affecting Flooding in the Red River Valley, 1997]

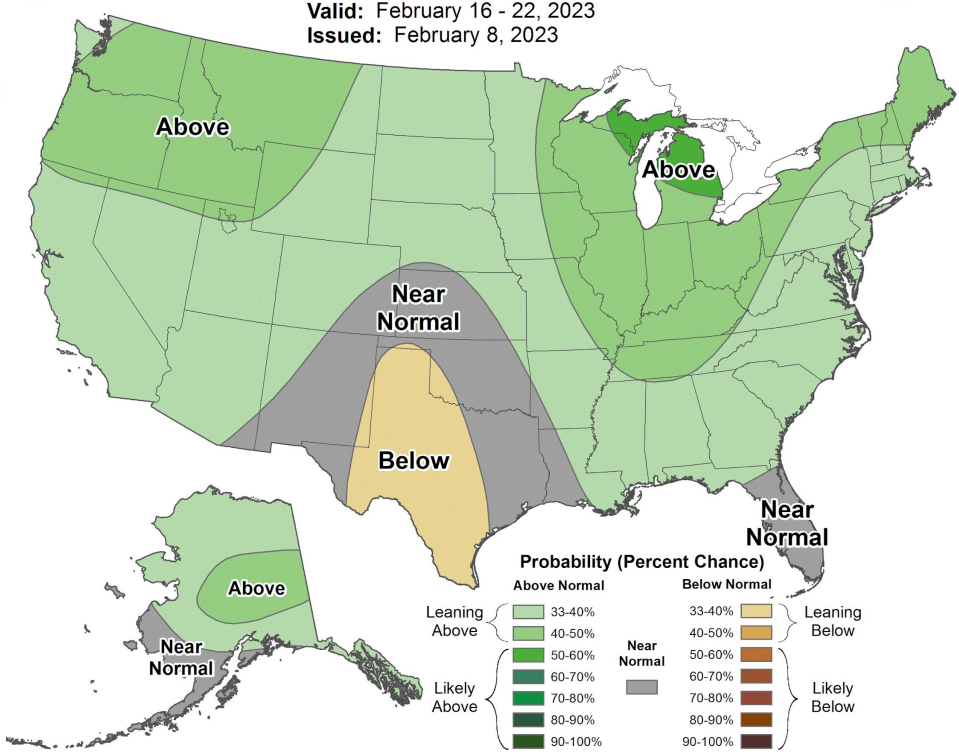
8-14 Day Temperature Outlook

Valid: February 16 - 22, 2023
Issued: February 8, 2023



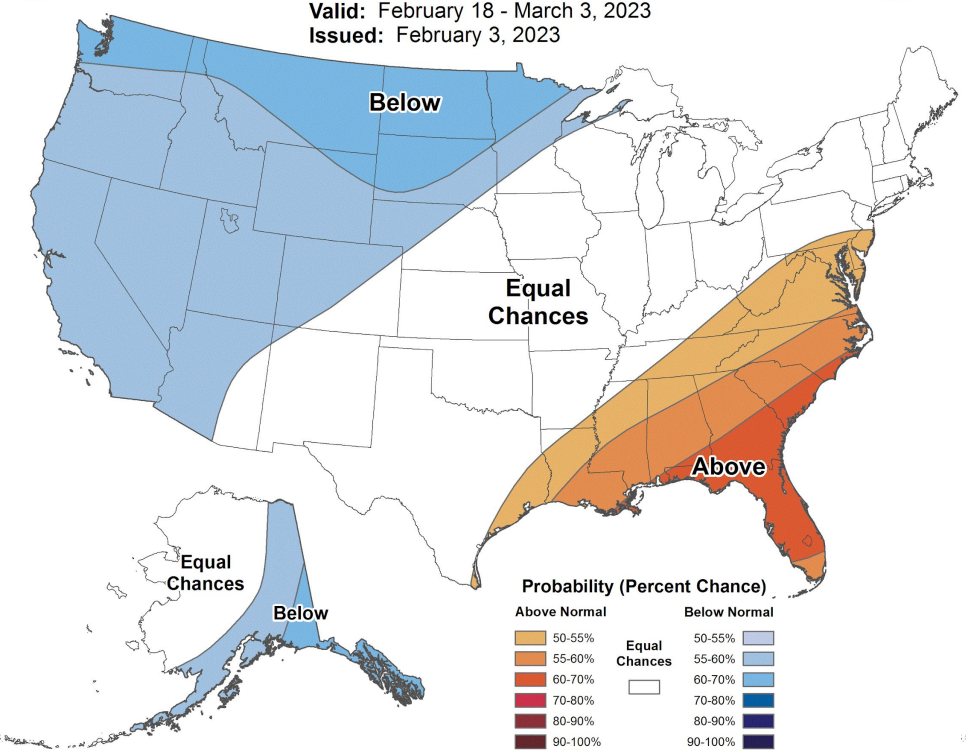
8-14 Day Precipitation Outlook

Valid: February 16 - 22, 2023
Issued: February 8, 2023



Weeks 3-4 Temperature Outlook

Valid: February 18 - March 3, 2023
Issued: February 3, 2023



Weeks 3-4 Precipitation Outlook

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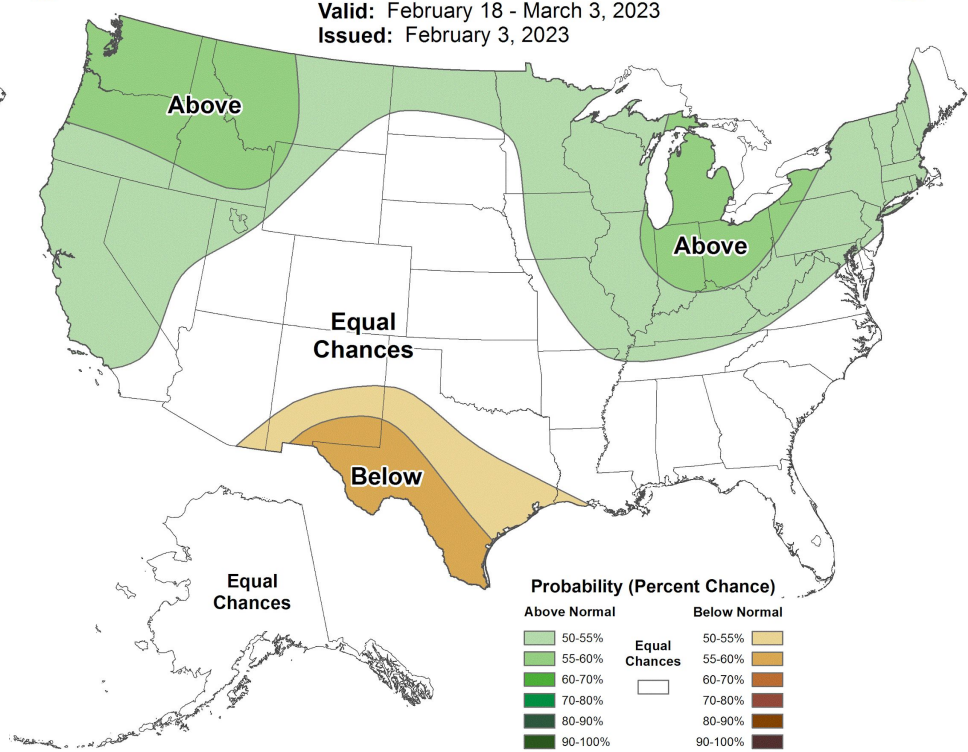
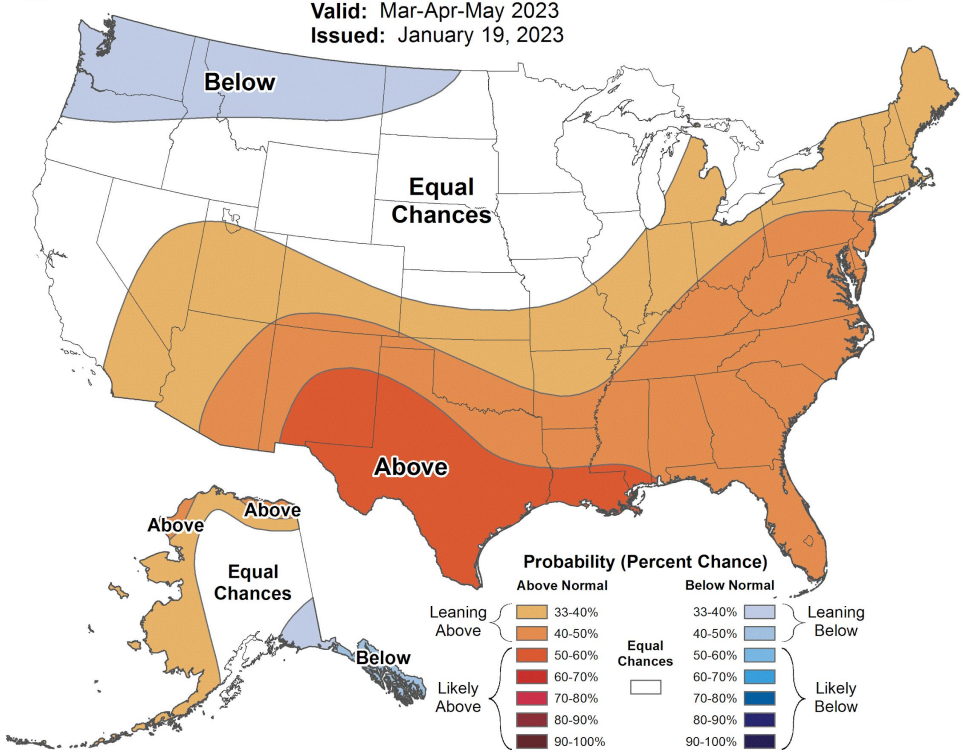
Issued: February 3, 2023



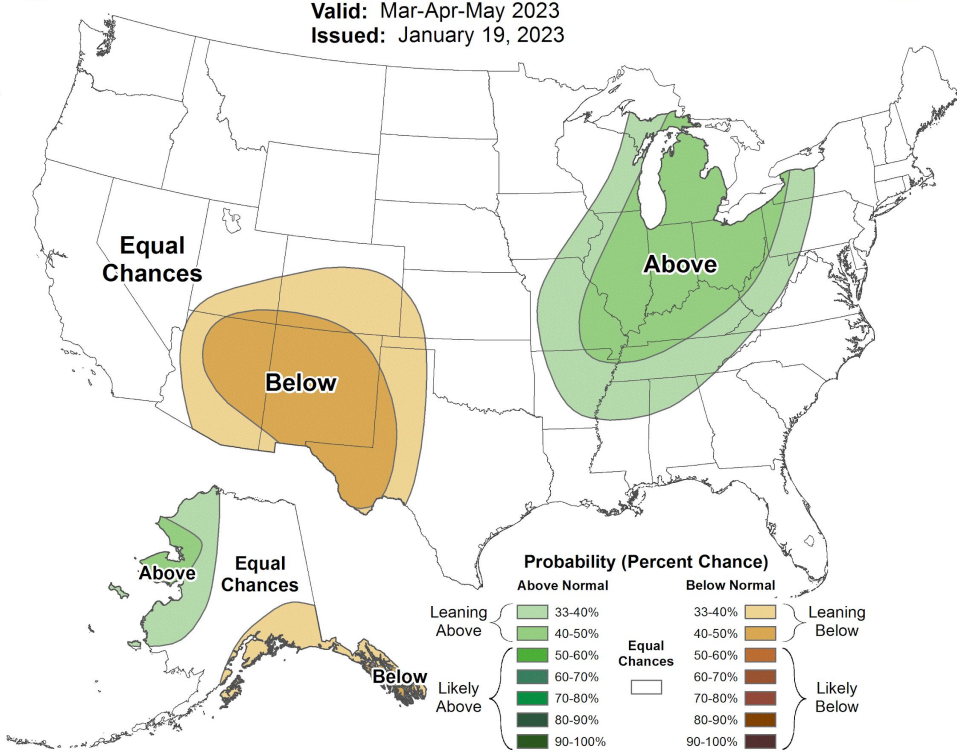
Seasonal Temperature Outlook

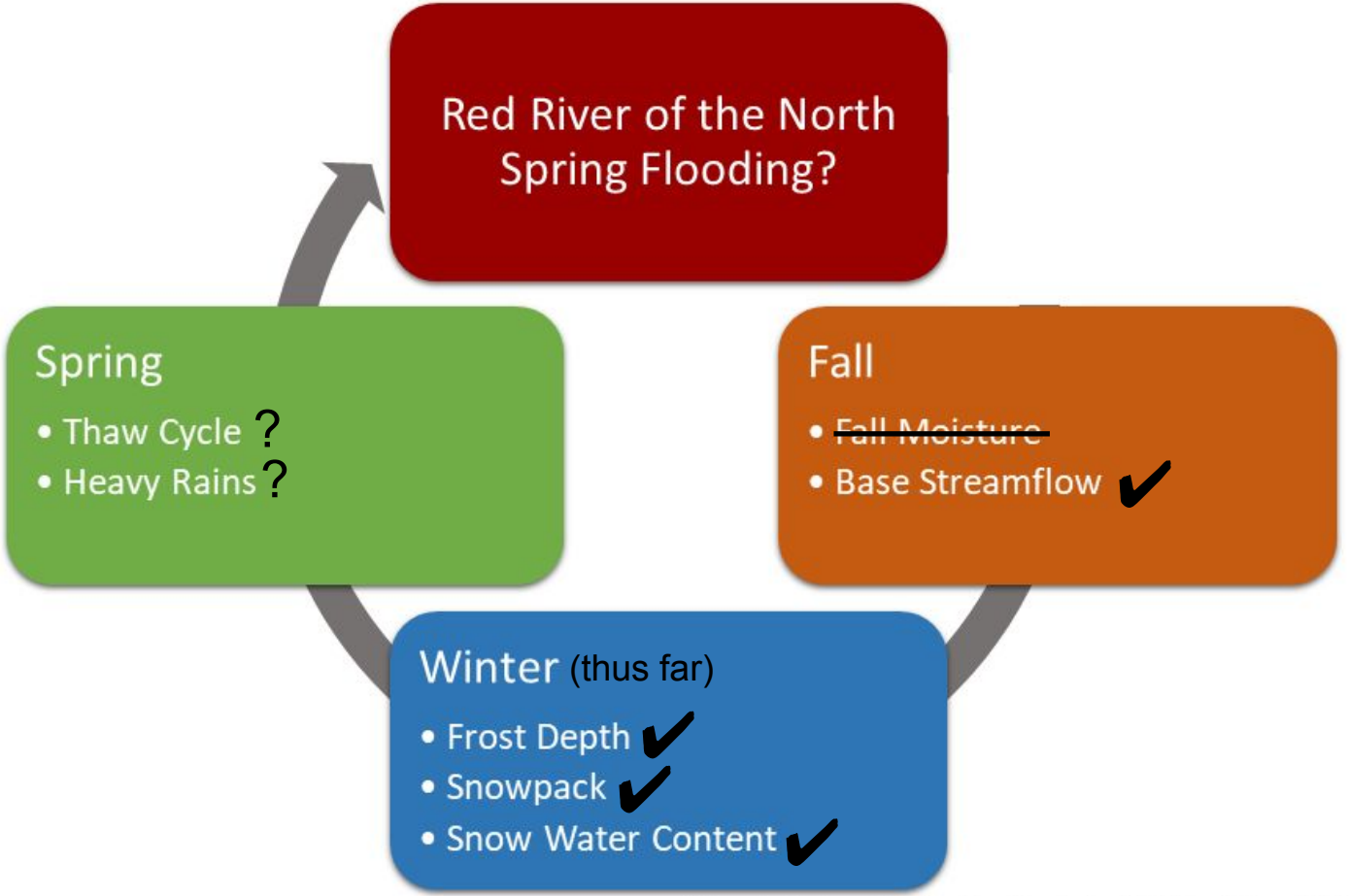
Valid: Mar-Apr-May 2023
Issued: January 19, 2023



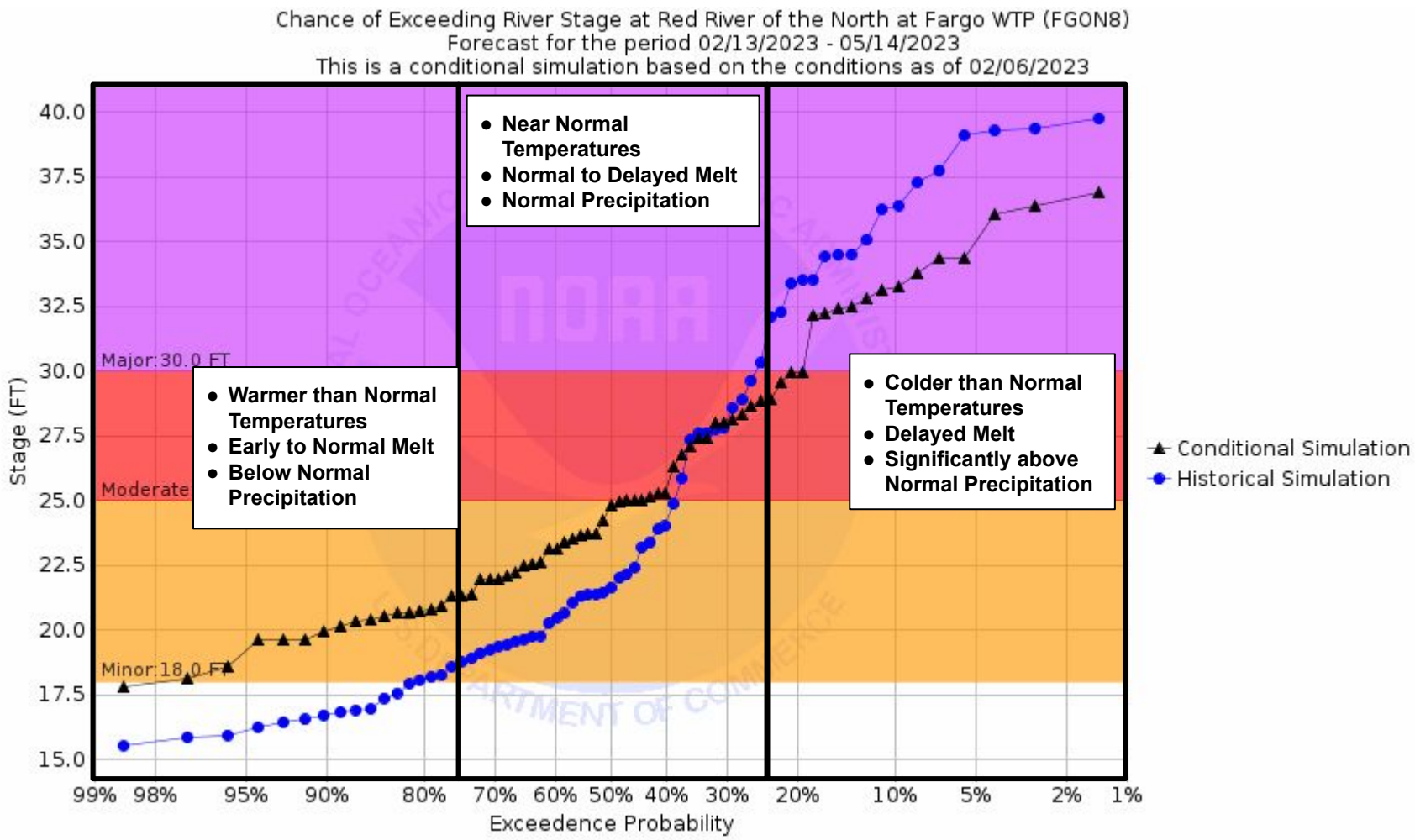
Seasonal Precipitation Outlook

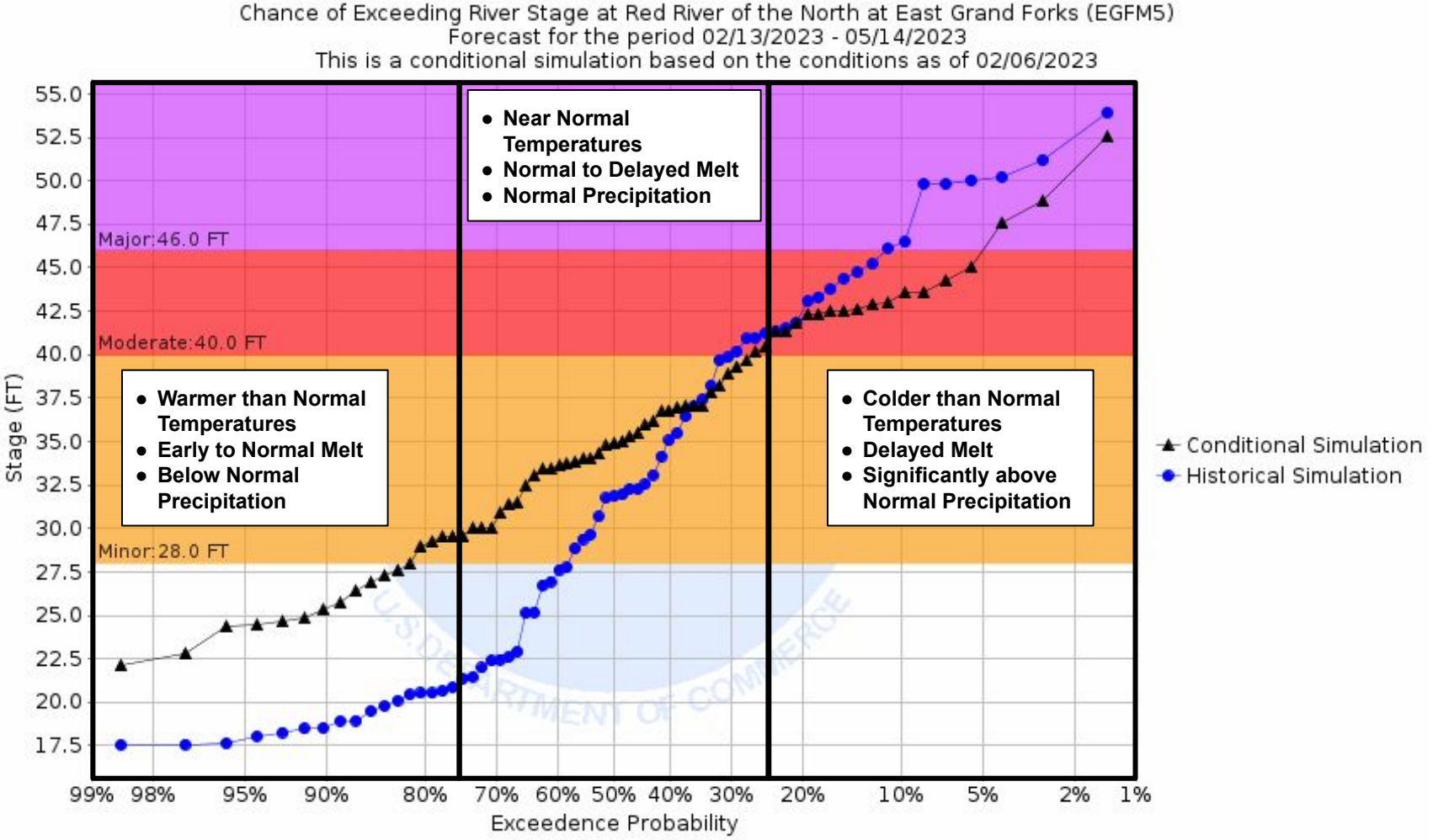
Valid: Mar-Apr-May 2023
Issued: January 19, 2023





[Bluemle: Factors Affecting Flooding in the Red River Valley, 1997]


Chance of Exceeding River Stage at Red River of the North at Fargo WTP (FGON8)
Forecast for the period 02/13/2023 - 05/14/2023
This is a conditional simulation based on the conditions as of 02/06/2023
Stage (FT)
40.0
37.5
35.0
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
Major: 30.0 FT
Moderate
Minor: 18.0 FT
• Near Normal Temperatures
• Normal to Delayed Melt
• Normal Precipitation
• Warmer than Normal Temperatures
• Early to Normal Melt
• Below Normal Precipitation
• Colder than Normal Temperatures
• Delayed Melt
• Significantly above Normal Precipitation
99% 98% 95% 90% 80% 70% 60% 50% 40% 30% 20% 10% 5% 2% 1%
Exceedence Probability
Conditional Simulation
Historical Simulation


Chance of Exceeding River Stage at Red River of the North at East Grand Forks (EGFM5)
Forecast for the period 02/13/2023 - 05/14/2023
This is a conditional simulation based on the conditions as of 02/06/2023
Major:46.0 FT
Moderate:40.0 FT
Minor:28.0 FT
• Near Normal Temperatures
• Normal to Delayed Melt
• Normal Precipitation
• Warmer than Normal Temperatures
• Early to Normal Melt
• Below Normal Precipitation
• Colder than Normal Temperatures
• Delayed Melt
• Significantly above Normal Precipitation
Conditional Simulation
Historical Simulation
Stage (FT)
55.0
52.5
50.0
47.5
45.0
42.5
40.0
37.5
35.0
32.5
30.0
27.5
25.0
22.5
20.0
17.5
99% 98% 95% 90% 80% 70% 60% 50% 40% 30% 20% 10% 5% 2% 1%
Exceedence Probability

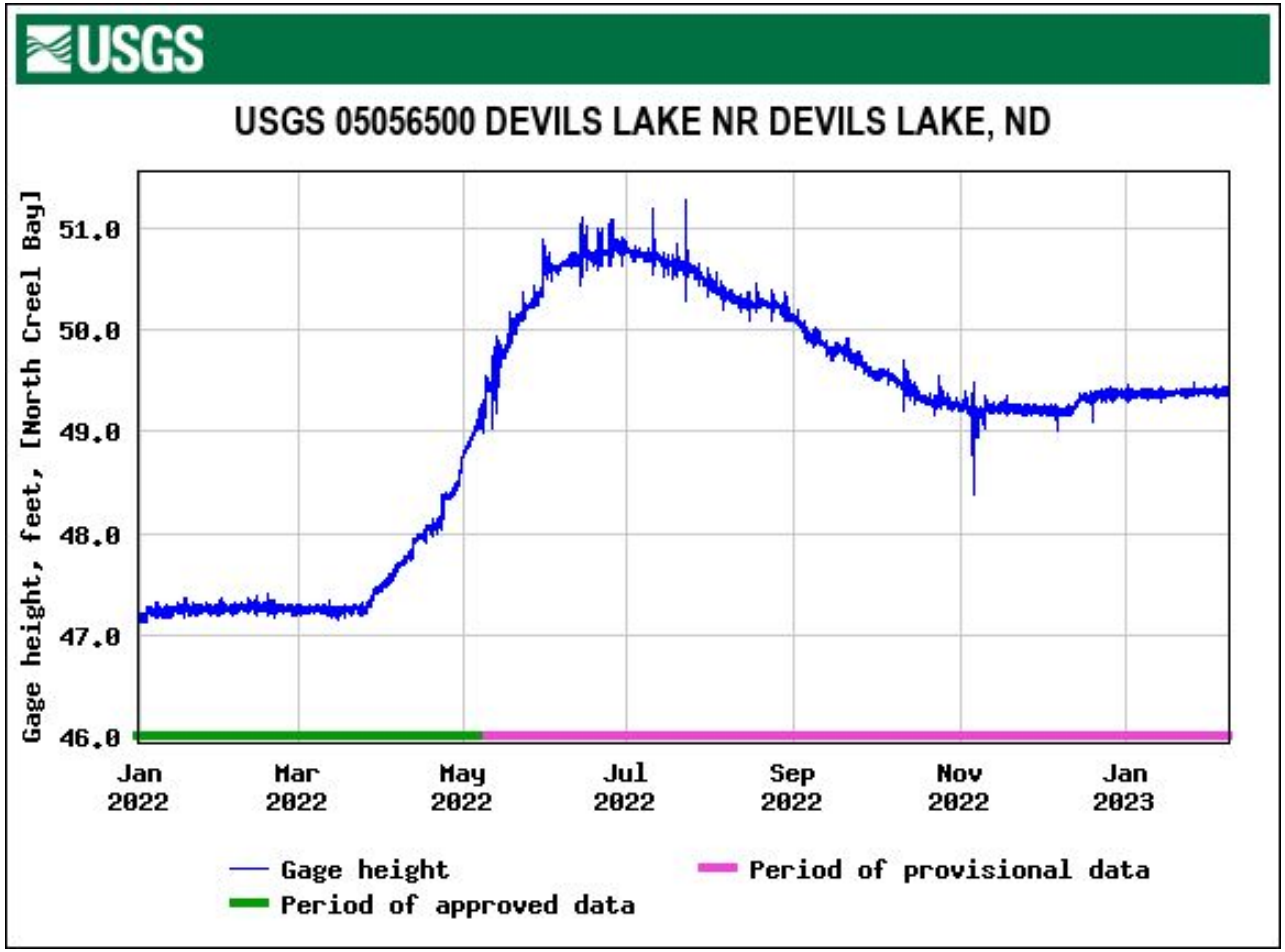
Valid February 13, 2023 - May 14, 2023

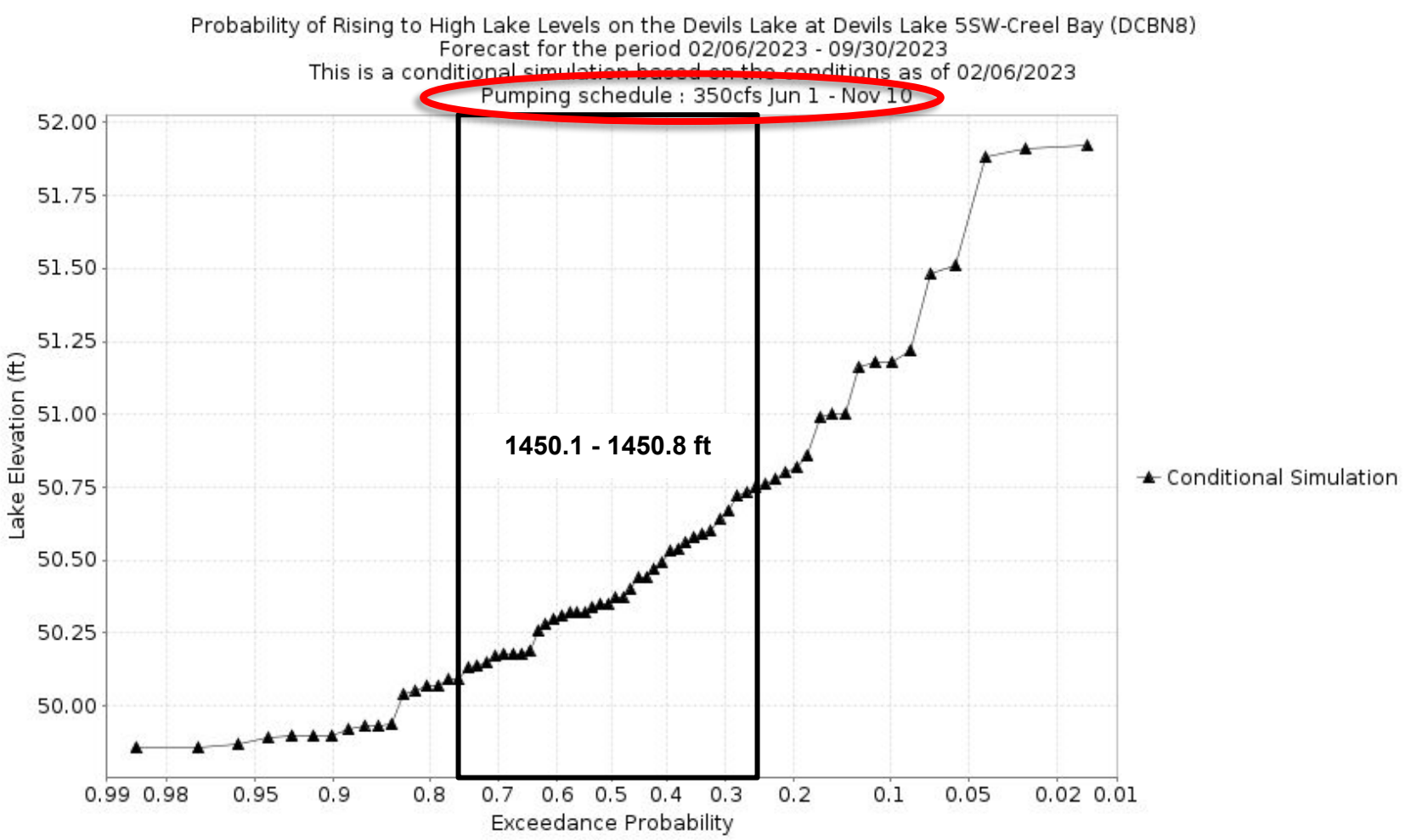
RED RIVER MAINSTEM	95%	90%	75%	50%	25%	10%	5%
Wahpeton	9.7	10.1	10.8	11.7	12.8	14.3	15.0
Hickson	17.7	18.7	20.1	24.1	28.4	32.2	34.2
Fargo	19.2	20.0	21.3	24.8	28.8	33.2	35.1
Halstad	16.3	18.0	21.2	24.8	29.3	35.3	37.7
Grand Forks	24.5	25.4	29.6	34.9	40.5	43.4	46.1
Oslo	24.2	25.4	30.2	33.5	34.9	35.9	37.1
Drayton	24.1	25.5	29.3	33.9	39.2	40.3	41.5
Pembina	32.3	33.5	38.4	43.4	47.5	49.3	50.7

NORTH DAKOTA TRIBUTARIES	95%	90%	75%	50%	25%	10%	5%
Wild Rice River							
Abercrombie	6.0	6.7	8.2	11.3	15.3	17.7	20.7
Sheyenne River							
Valley City	7.4	8.1	9.2	11.3	12.4	13.4	13.8
Lisbon	7.2	8.1	9.1	11.4	13.0	14.4	17.2
Kindred	10.4	11.0	12.6	14.9	17.1	19.5	20.7
West Fargo Diversion	11.2	12.1	13.0	15.1	17.1	19.3	21.3
Harwood	77.3	78.0	79.0	82.0	88.3	91.0	91.5
Maple River							
Enderlin	8.2	8.7	9.4	10.4	11.4	12.6	13.5
Mapleton	14.7	15.5	16.7	19.0	21.0	22.1	22.6
Goose River							
Hillsboro	4.5	5.1	6.2	8.3	11.5	13.6	14.3
Forest River							
Minto	3.4	3.6	3.9	4.7	5.4	6.2	6.7
Pembina River							
Walhalla	4.8	5.0	5.6	6.3	8.2	11.6	12.6
Neche	7.6	8.2	9.5	11.6	16.1	20.6	21.0

Valid February 13, 2023 - May 14, 2023

MINNESOTA TRIBUTARIES	95%	90%	75%	50%	25%	10%	5%
South Fork Buffalo River							
Sabin	12.1	12.9	13.4	13.8	14.4	15.0	15.9
Buffalo River							
Hawley	5.0	5.2	5.9	6.7	8.0	9.2	9.7
Dilworth	11.7	13.0	15.0	17.1	18.8	21.3	21.7
Wild Rice River							
Twin Valley	5.1	5.2	5.9	6.9	8.3	9.7	10.5
Hendrum	16.4	17.8	19.4	22.3	25.6	28.4	30.3
Marsh River							
Shelly	8.1	8.6	9.5	11.0	12.7	14.7	16.1
Sand Hill River							
Climax	10.6	11.3	11.8	15.1	17.7	22.1	25.2
Red Lake River							
High Landing	5.6	6.0	6.9	8.2	9.4	10.8	11.9
Crookston	10.0	10.7	12.3	14.8	17.9	21.0	22.1
Snake River							
Above Warren	62.3	62.5	62.8	63.5	64.4	65.1	66.4
Alvarado	98.0	98.5	99.0	101.1	103.0	104.8	106.5
Two Rivers River							
Hallock	799.1	799.6	800.6	803.8	806.4	808.0	808.7
Roseau River							
Roseau	7.6	7.9	8.7	10.1	12.0	14.8	15.6


USGS
USGS 05056500 DEVILS LAKE NR DEVILS LAKE, ND
Gage height, feet, [North Creel Bay]
51.0
50.0
49.0
48.0
47.0
46.0
Jan 2022
Mar 2022
May 2022
Jul 2022
Sep 2022
Nov 2022
Jan 2023
Gage height
Period of provisional data
Period of approved data

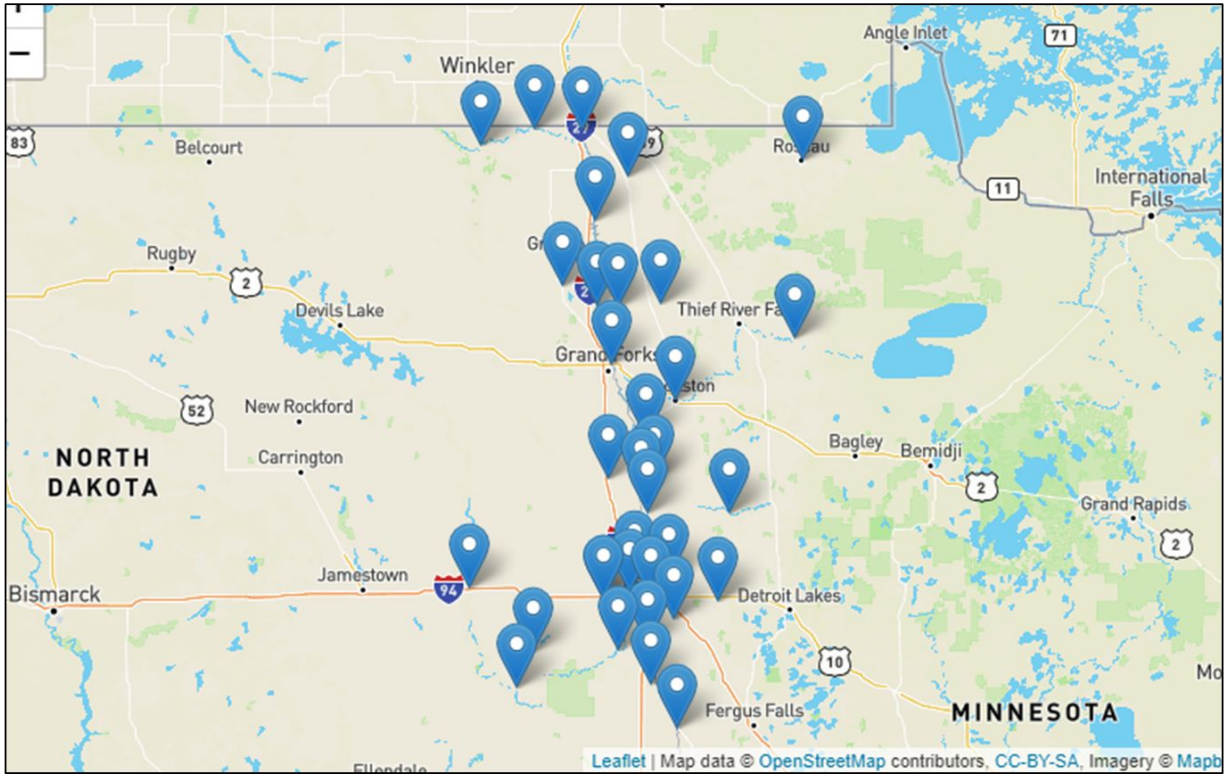

Probability of Rising to High Lake Levels on the Devils Lake at Devils Lake 5SW-Creel Bay (DCBN8)
Forecast for the period 02/06/2023 - 09/30/2023
This is a conditional simulation based on the conditions as of 02/06/2023
Pumping schedule : 350cfs Jun 1 - Nov 10
1450.1 - 1450.8 ft
Lake Elevation (ft)
52.00
51.75
51.50
51.25
51.00
50.75
50.50
50.25
50.00
0.99 0.98 0.95 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.05 0.02 0.01
Exceedance Probability
Conditional Simulation

Probabilistic Flood Outlook Summary (PFOS)

- Same probabilistic data, just in a different format
- Includes all Red River mainstem and tributary forecast points
- At a glance, relates current risk to:
  - flood categories
  - recent crests
  - floods of record

Use the map below to view forecast point PFOS Graphics

(click a site marker below, then click on the image to expand)



www.weather.gov/fgf/PFOS

Probabilistic Flood Outlook Summary (PFOS)

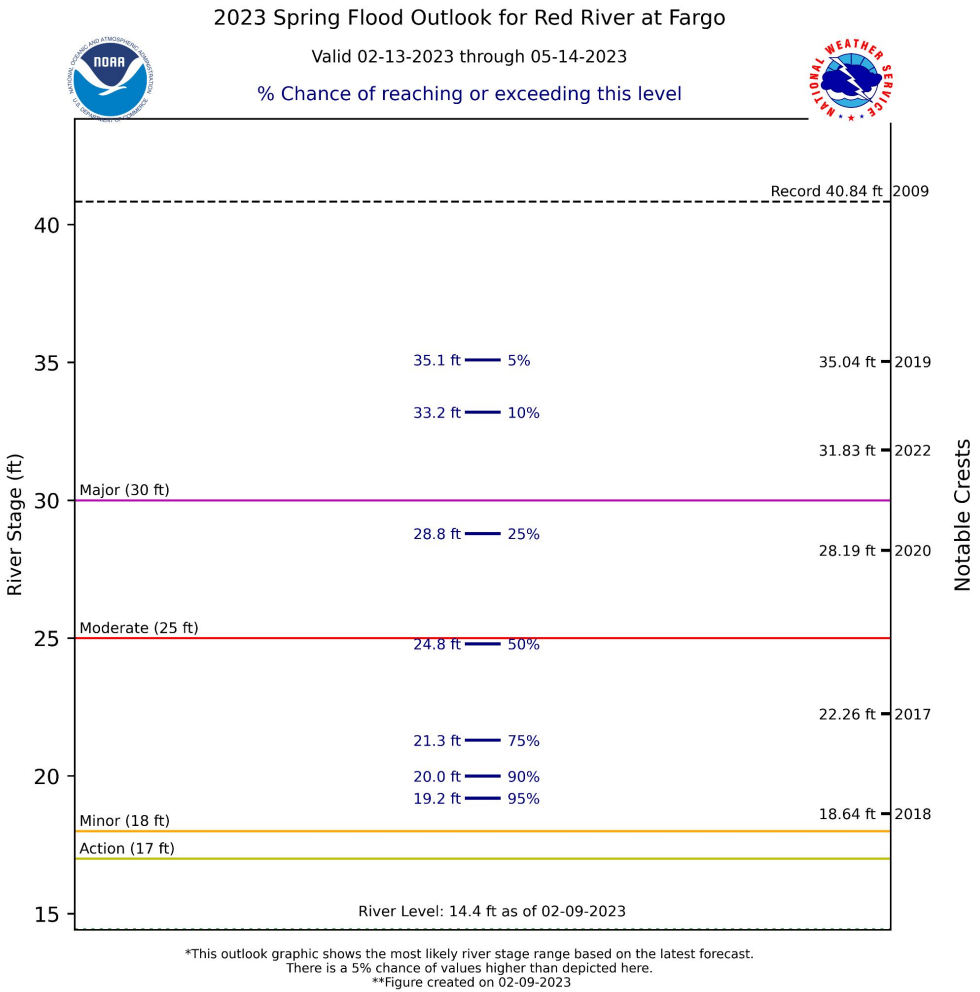
Please provide feedback!

amanda.lee@noaa.gov

or

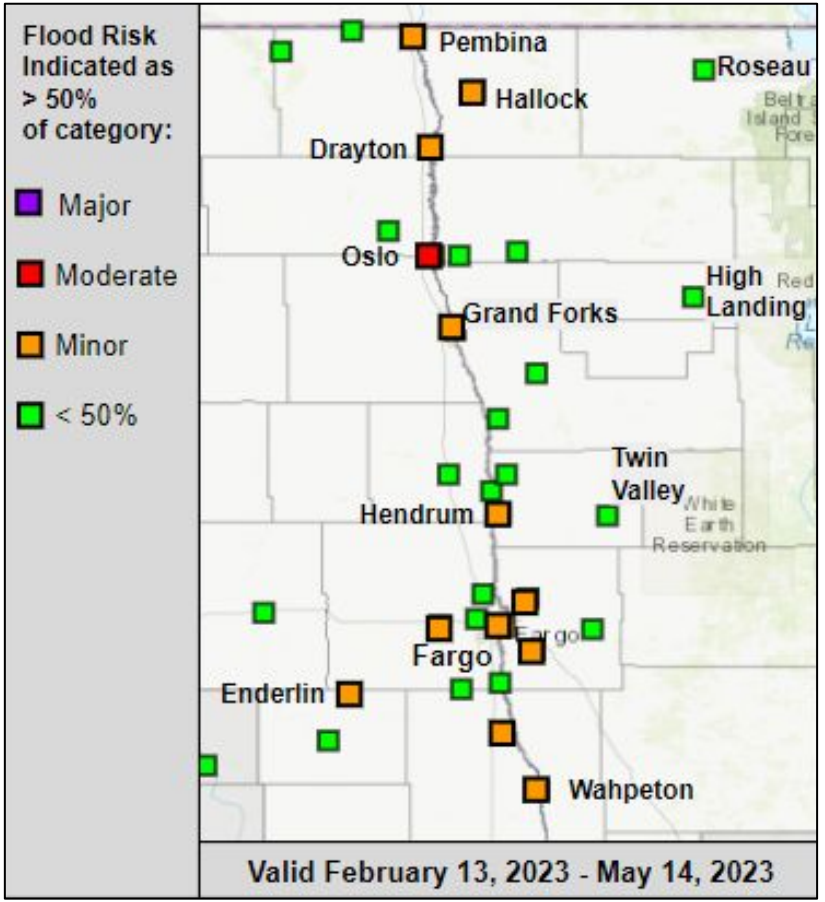
Survey link via website

www.weather.gov/fgf/PFOS



Key Message

The risk for significant (moderate or higher) spring flooding remains low with this outlook issuance, running slightly below long-term historical averages across the Red River Basin.



Upcoming 2023 Probabilistic Outlooks:

Thursday, February 23rd
Thursday, March 9th

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Service Hydrologist
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