

Island Lake Technical Committee

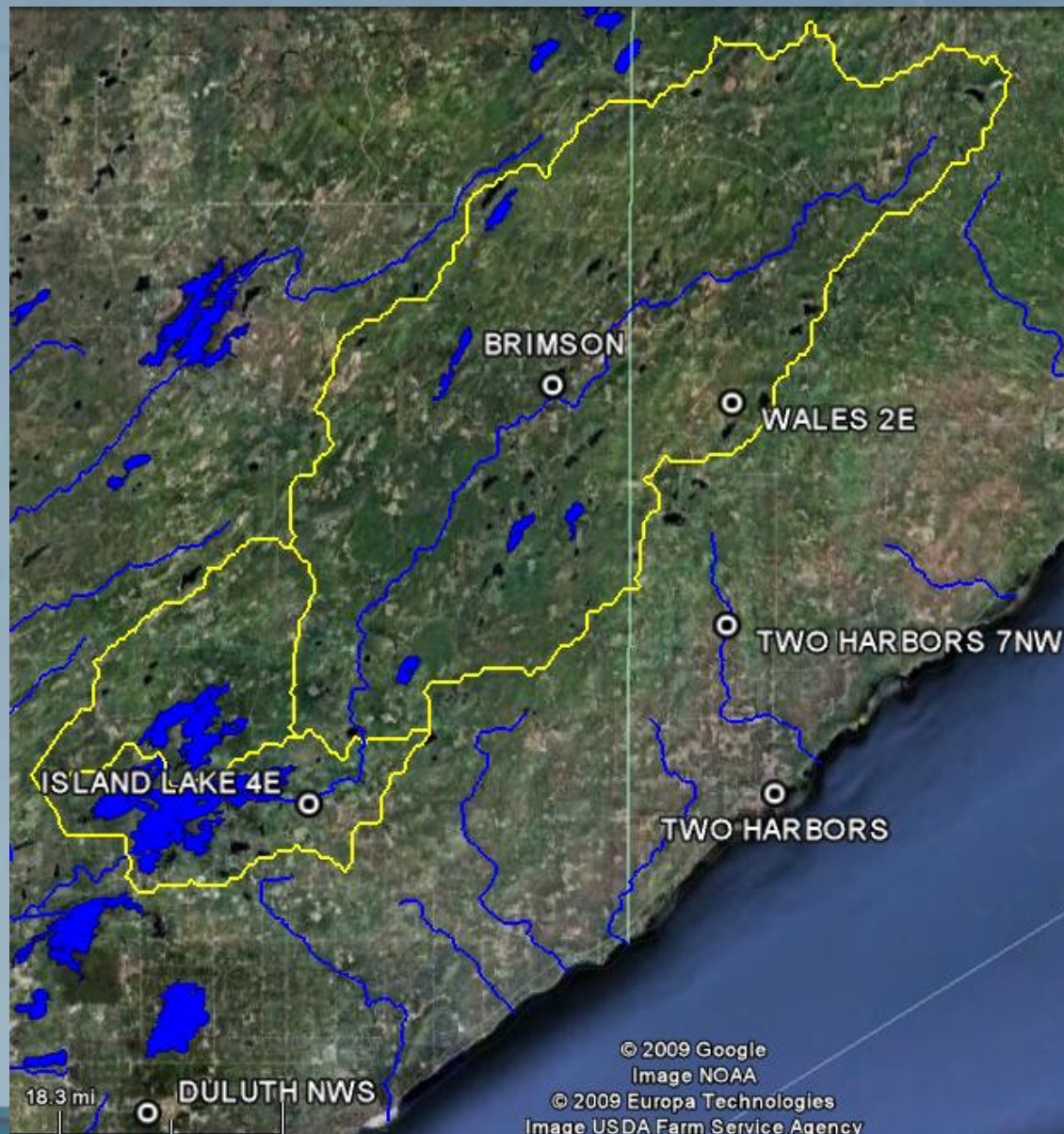
Winter 2021-22

Steve Gohde
National Weather Service
WFO Duluth
Observing Program Leader

Laura Diamond
North Central River Forecast Center
Hydrologic Forecaster

December 31st , 2021

Island Lake Basin



Bottom Line Up Front

- **Drought** conditions improving with recent above normal precipitation. Drought monitor sluggish to change due to Longer term drought.
- **Weather outlooks**
 - Above normal precipitation in near term
 - No strong signal for above or below normal precipitation Jan-Mar

River Forecast Model run 12/21/2021

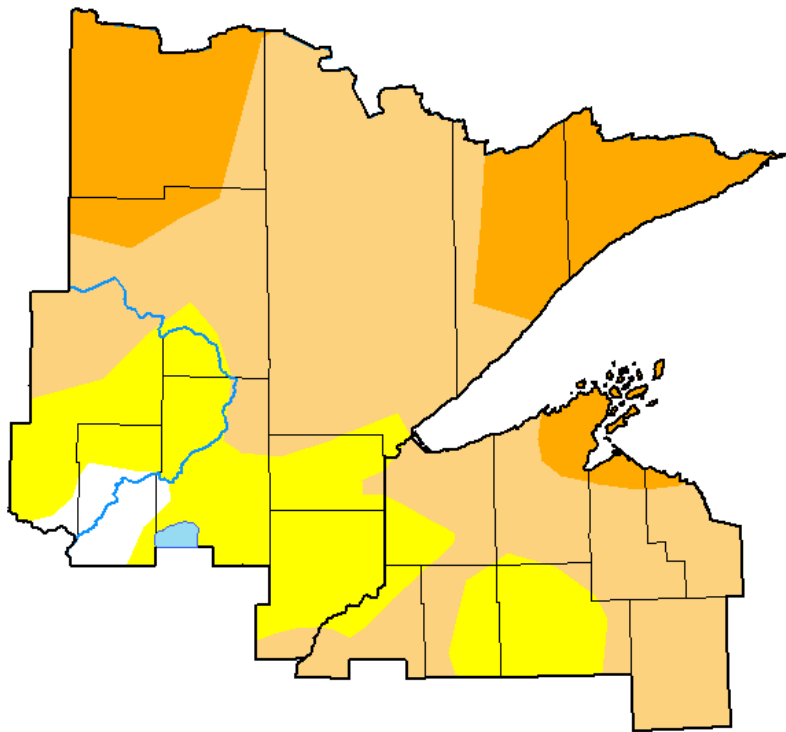
- **96%** Chance of Refill under dry condition
- **78%** Chance of Refill under normal conditions

Setting Up Current Conditions

- A very dry Spring and Summer reduced amount of water being held in storage in the soil
- Stabilization in drought conditions after late Summer and Fall above normal precipitation
- Snowpack developed Nov 10th and melted in lower basin and moved through reservoirs
- Strong start new 2022 water year (10/1/21-9/30/22)

Most Recent Drought Monitor

U.S. Drought Monitor Duluth, MN WFO



December 28, 2021
(Released Thursday, Dec. 30, 2021)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2.49	97.51	73.49	21.11	0.00	0.00
Last Week 12-21-2021	2.47	97.53	80.35	27.89	0.00	0.00
3 Months Ago 09-28-2021	10.29	89.71	77.43	63.57	29.83	0.00
Start of Calendar Year 12-29-2020	7.77	92.23	11.98	0.00	0.00	0.00
Start of Water Year 09-28-2021	10.29	89.71	77.43	63.57	29.83	0.00
One Year Ago 12-29-2020	7.77	92.23	11.98	0.00	0.00	0.00

Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate 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:

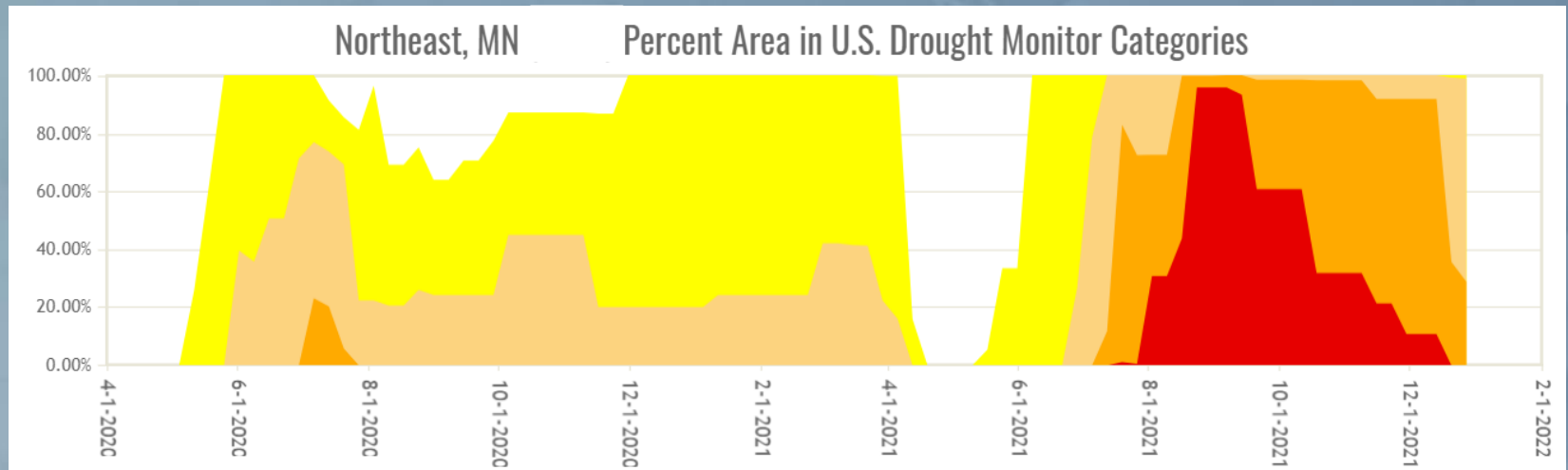
Brad Pugh
CPC/NOAA



droughtmonitor.unl.edu

- D1 and D0 Drought conditions
- Improvement expected

Drought Historical Context



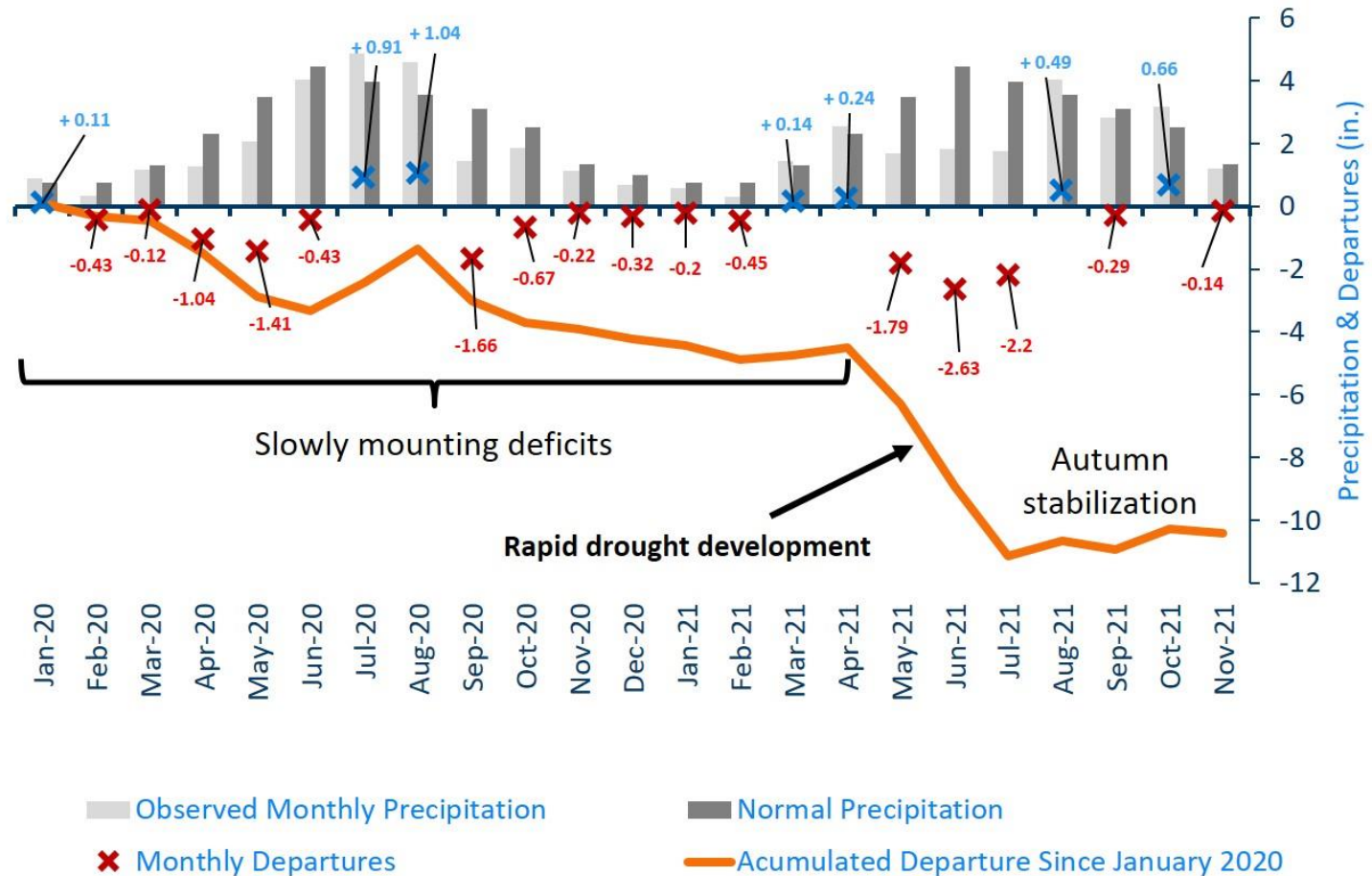
Intensity



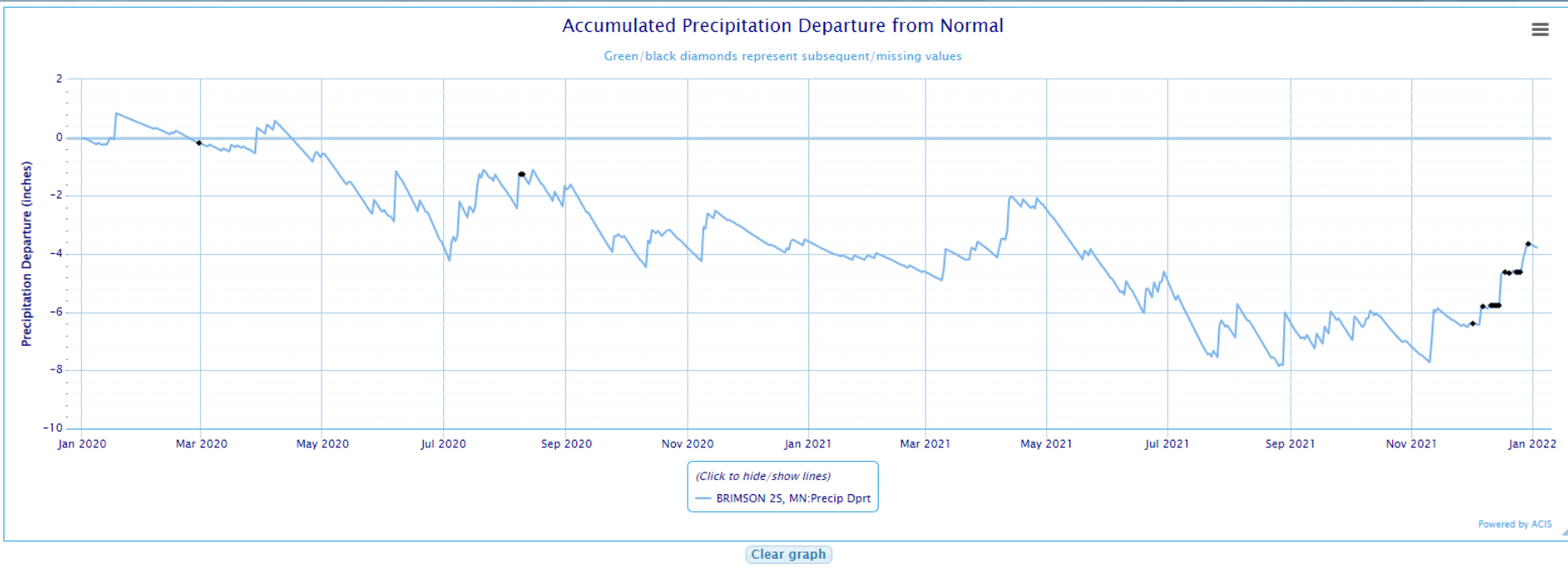
- Accelerated drought condition May 2021
- D₁ – Moderate Drought and D₀ – Abnormally Dry conditions persist.

Minnesota Drought Progression

Monthly Precipitation and Departures, Minnesota
January 2020 - November 2021

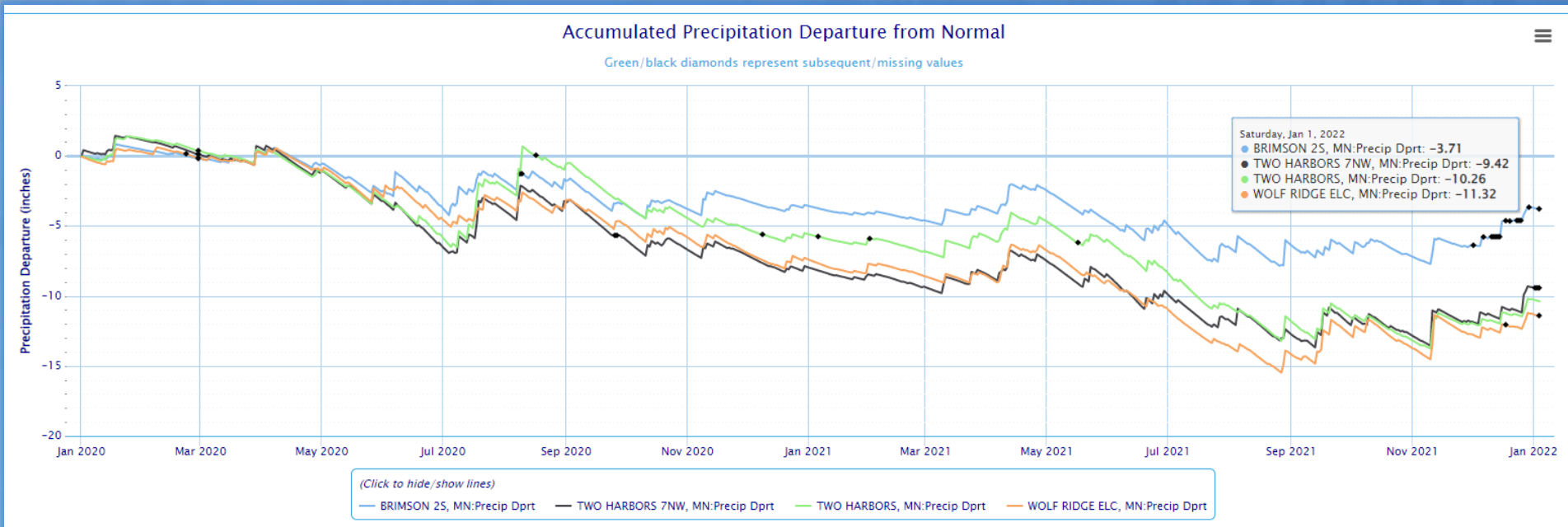


Brimson Precipitation Departure (2020-2021)



- Brimson is most representative of the Cloquet River Basin.

Precipitation Departure (2020-2021)



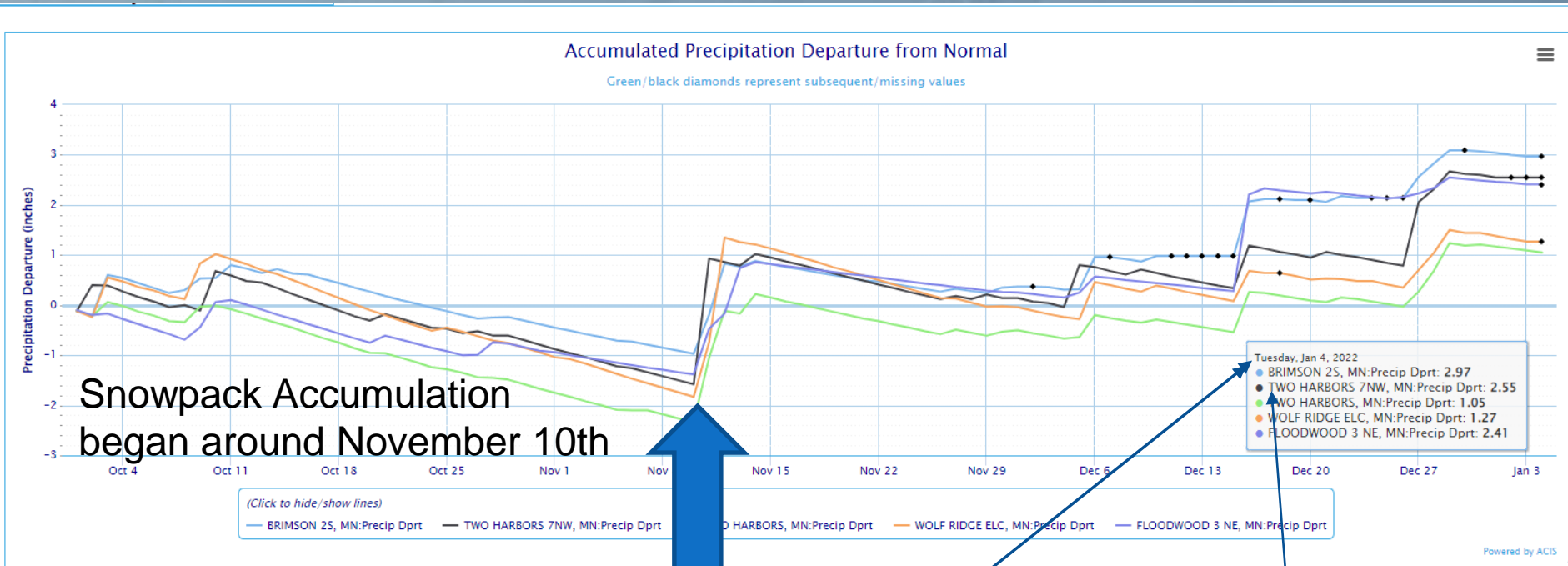
- Brimson shows it is not as far below normal as surrounding stations.

2021 Water Year Precipitation

Starting Oct 2021

- Relatively good start to WY 2021.
 - November 10th snow started snow accumulation season
 - Heavy rain on snow event December 5th generated snowmelt. Flash freeze followed.
 - Above normal precipitation since Oct. 1st

2021 Water Year Precipitation Departure



Brimson is most representative of Cloquet R. Basin

Two Harbors 7NW not within basin. But might reflect NE headwaters. .

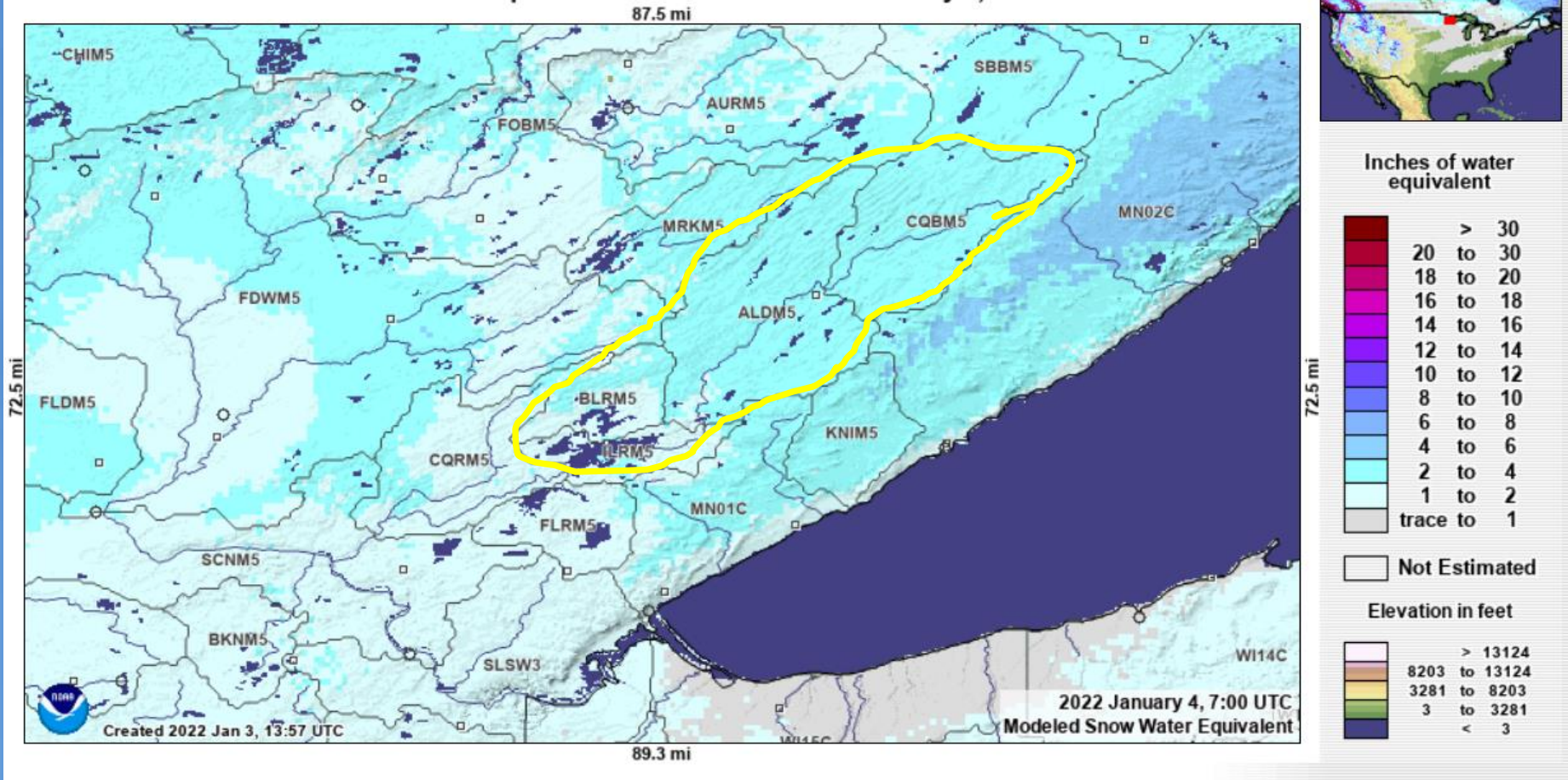
Area Precipitation Summary

For the period ending January 4th

Name	ID	State	Station Type	Latitude	Longitude	Last 30 Days	Last 60 Days	Last 90 Days	Last 180 Days	Since Jan 1	Since Oct 1
TWO HARBORS 7NW	218421	MN	COOP	47.13	-91.71	3.40	7.65	9.36	18.62	0.00	10.14
TWO HARBORS 9.7 NNE	MNLK0005	MN	CoCoRaHS	47.17	-91.62	4.10	7.63	9.17	18.66	M	9.81
WOLF RIDGE ELC	219134	MN	COOP	47.38	-91.20	3.33	6.99	8.59	17.60	T	9.62
TWO HARBORS 2.1 NW	MNLK0019	MN	CoCoRaHS	47.05	-91.71	3.08	6.31	7.63	16.27	M	8.29
BRIMSON 2S	210989	MN	COOP	47.25	-91.86	3.34	5.91	7.29	17.03	0.00	8.26
DULUTH 7.4 NNE	MNSL0076	MN	CoCoRaHS	46.88	-92.03	2.97	5.72	7.66	16.82	M	8.22
TWO HARBORS	218419	MN	COOP	47.03	-91.67	3.13	6.62	7.55	15.32	0.00	7.98
COTTON 5.7 ESE	MNSL0115	MN	CoCoRaHS	47.15	-92.36	2.95	4.80	6.69	13.42	M	7.79
DULUTH 17.6 NNW	MNSL0107	MN	CoCoRaHS	46.99	-92.31	3.54	5.28	7.01	15.03	M	7.67
DULUTH 4.6 NE	MNSL0175	MN	CoCoRaHS	46.84	-92.05	2.27	5.17	7.11	15.65	M	7.55
DULUTH 11.8 NNE	MNSL0105	MN	CoCoRaHS	46.95	-92.04	3.41	5.93	7.50	19.09	M	7.50
DULUTH 15.4 NNW	MNSL0129	MN	CoCoRaHS	46.99	-92.24	2.52	4.22	6.44	14.90	M	7.28
TWO HARBORS 3.6 WNW	MNLK0004	MN	CoCoRaHS	47.04	-91.75	4.01	4.71	6.49	16.02	M	7.27
DULUTH INTLAP	14913	MN	WBAN	46.84	-92.18	2.14	4.56	6.27	15.06	T	6.56
DULUTH NWS	212250	MN	COOP	46.84	-92.21	2.19	4.14	5.92	15.43	T	6.24

January 2022 - Snowpack

Modeled Snow Water Equivalent forecasted for 2022 January 4, 7:00 UTC



Snow contains 2-4 inches of water. Higher amounts in NE Basin

<https://www.nohrsc.noaa.gov/>

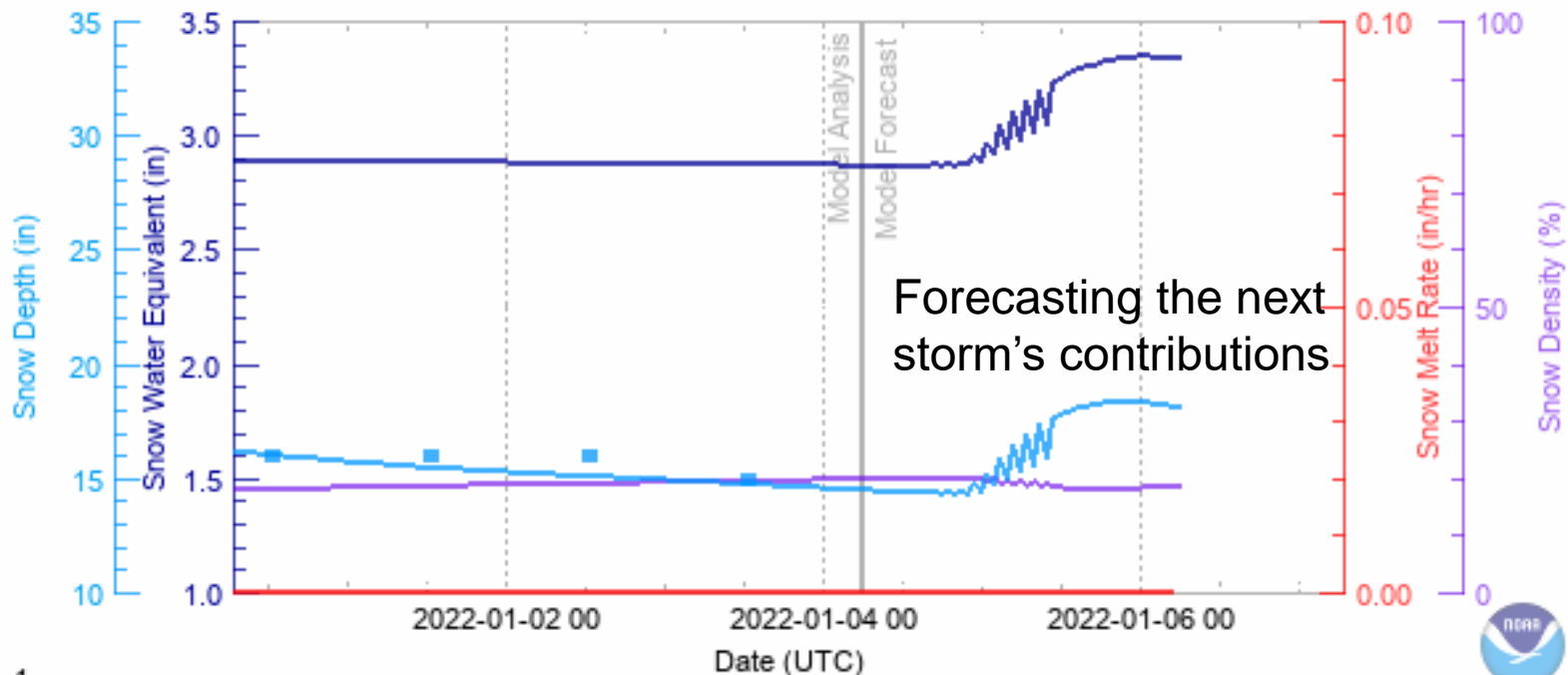
Brimson Modeled Snowpack

Snow Water Equivalent, Snow Depth, and Snow Melt

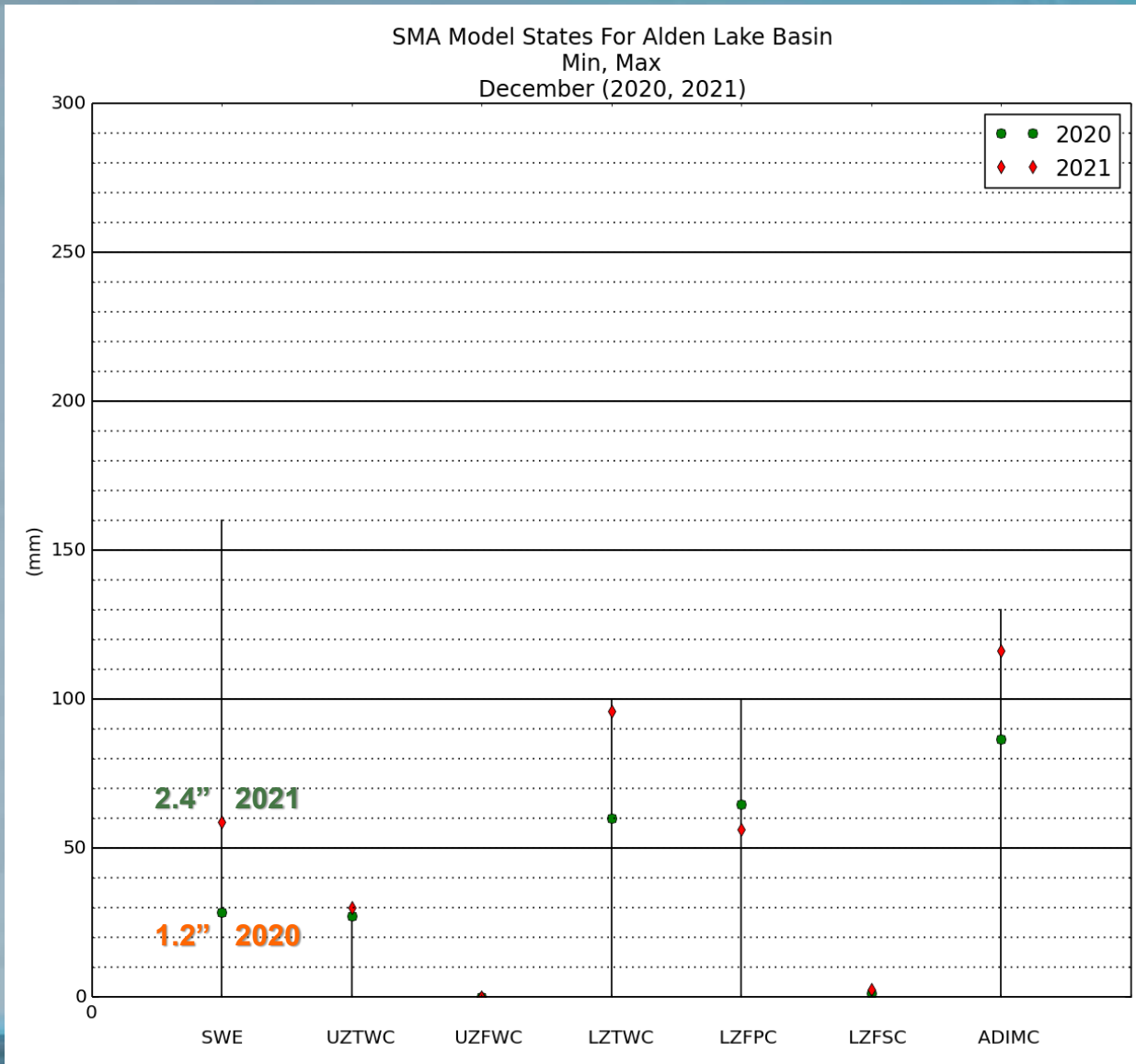
Modeled and Observed

Station: BRMM5 - BRIMSON 2S
Latitude: 47.2472 N
Longitude: 91.8624 W
Elevation: 1499 Feet
Start Date: 2021-12-31 07 UTC
Stop Date: 2022-01-07 07 UTC
Forest Density: 90%
Land Use: Cool Mixed Forest

	(Modeled)	(Observed)
Snow Water Equivalent	—	◆
Snow Depth	—	■
Snow Density	—	+
Snow Melt Rate	—	—
Assimilation	—	—



Soil Moisture - Modeled

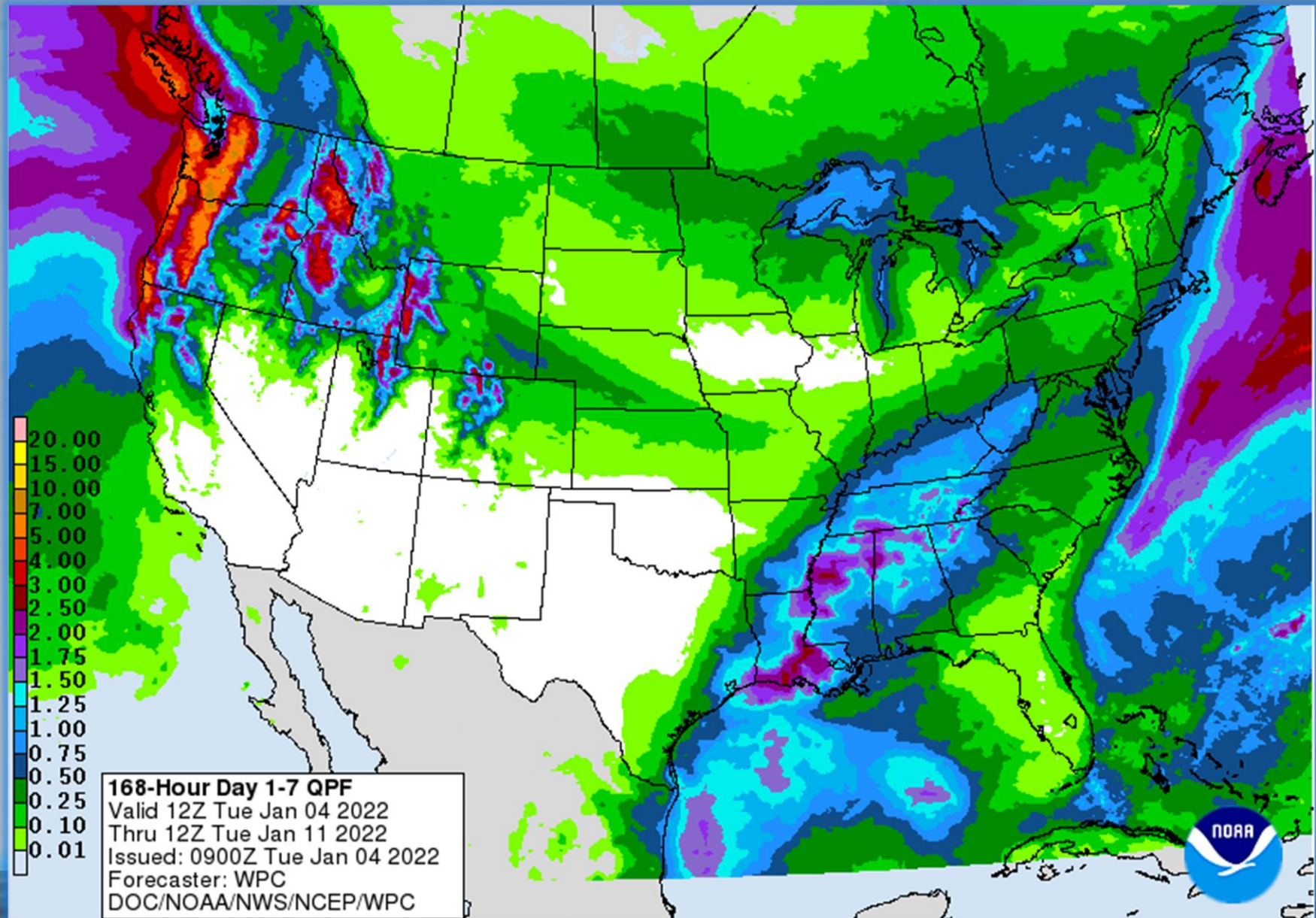


- River model moisture contents appear strong
- Likely a response to above normal Fall precipitation

Weather Outlook

- Near-term
 - Precipitation expected starting January 4th and 5th
 - Lake Effect Snow could impact Cloquet River Basin
 - Drier than normal next week
- January Precipitation Outlook
 - Equal chance of above or below normal
- 3-Month Precipitation OUTLOOK(Jan-Mar):
 - Equal Chance of above or below normal

Near-term Outlook 7 Day Precip.



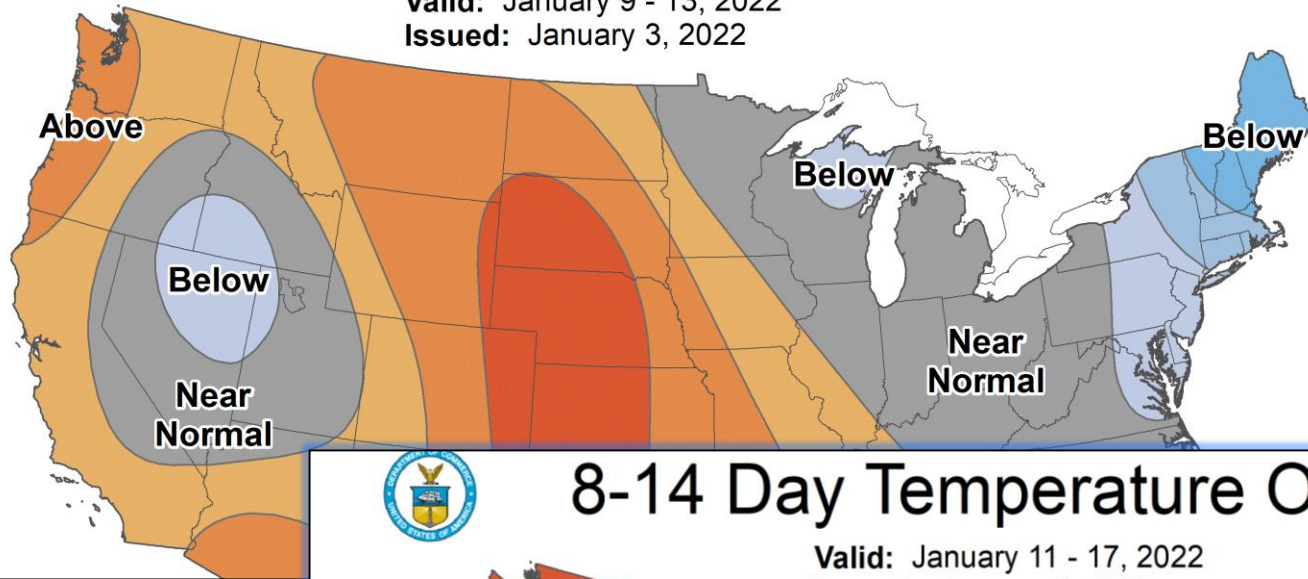
Near-term Outlook - Temperature



6-10 Day Temperature Outlook



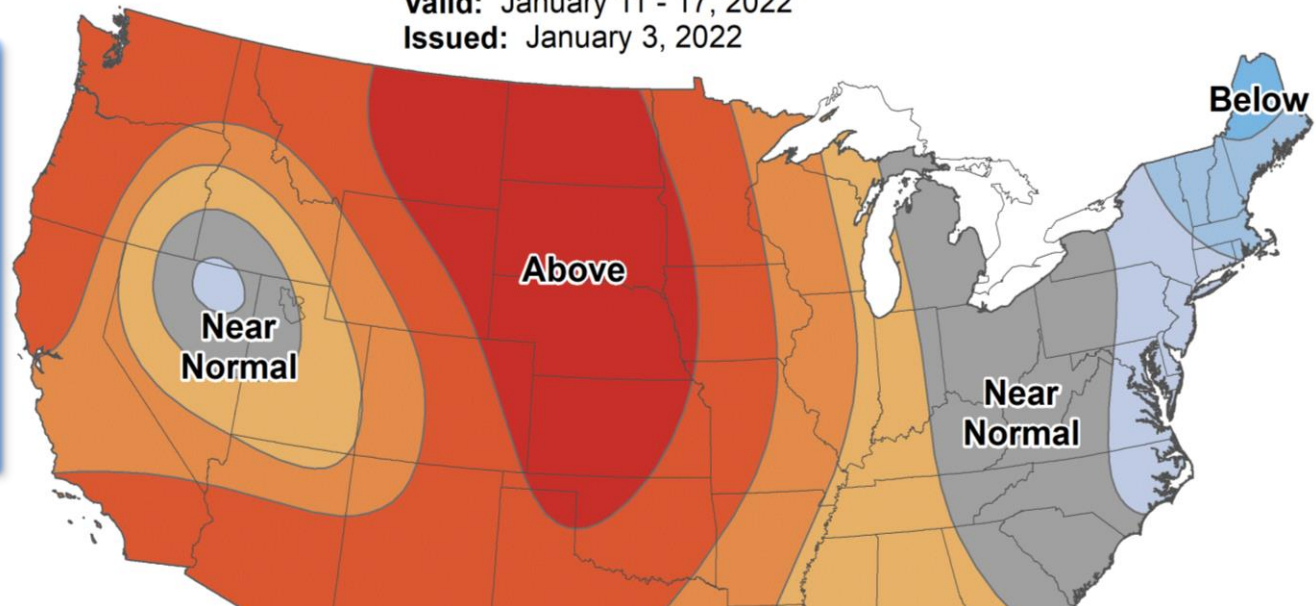
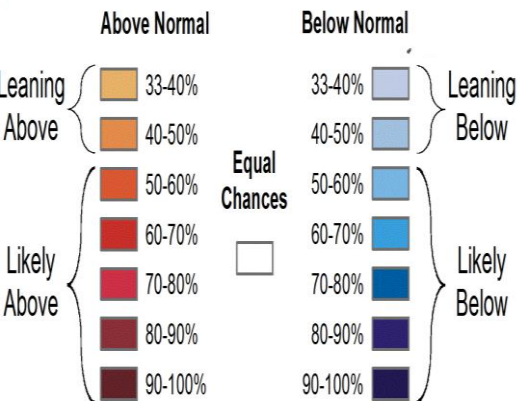
Valid: January 9 - 13, 2022
Issued: January 3, 2022



8-14 Day Temperature Outlook



Valid: January 11 - 17, 2022
Issued: January 3, 2022



Near-term Outlook - Precipitation

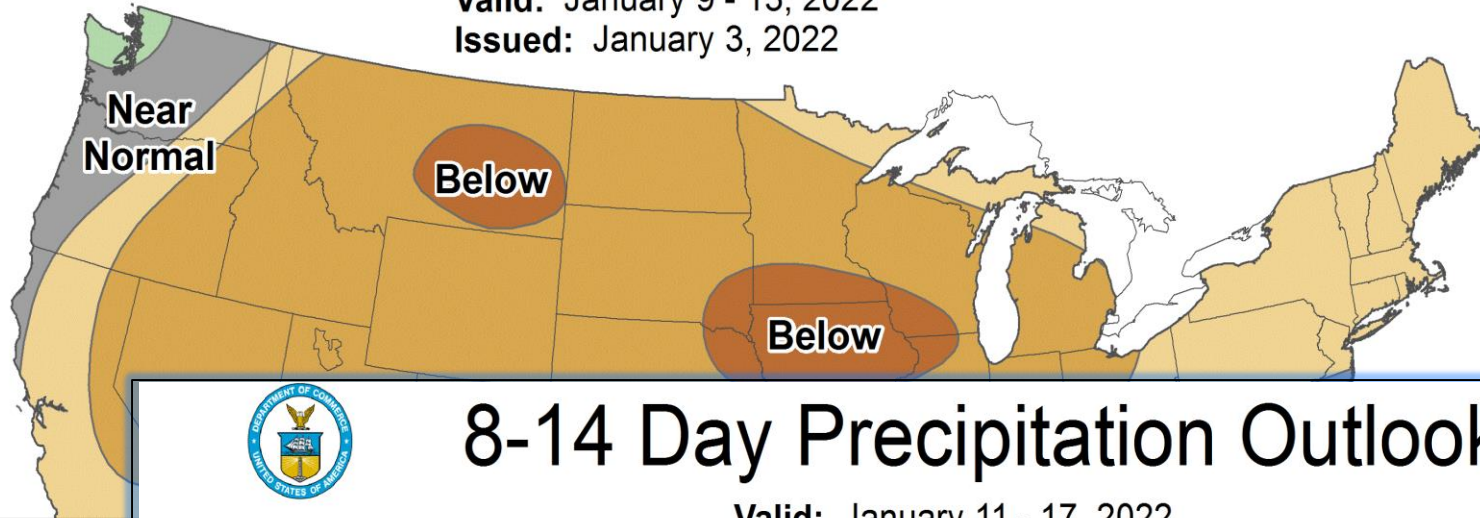


6-10 Day Precipitation Outlook



Valid: January 9 - 13, 2022

Issued: January 3, 2022

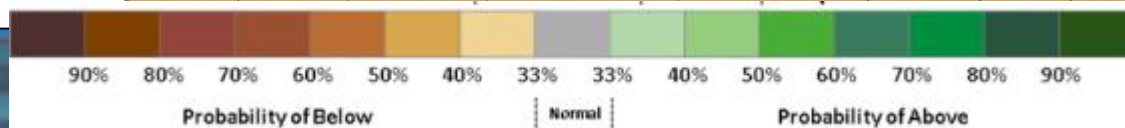
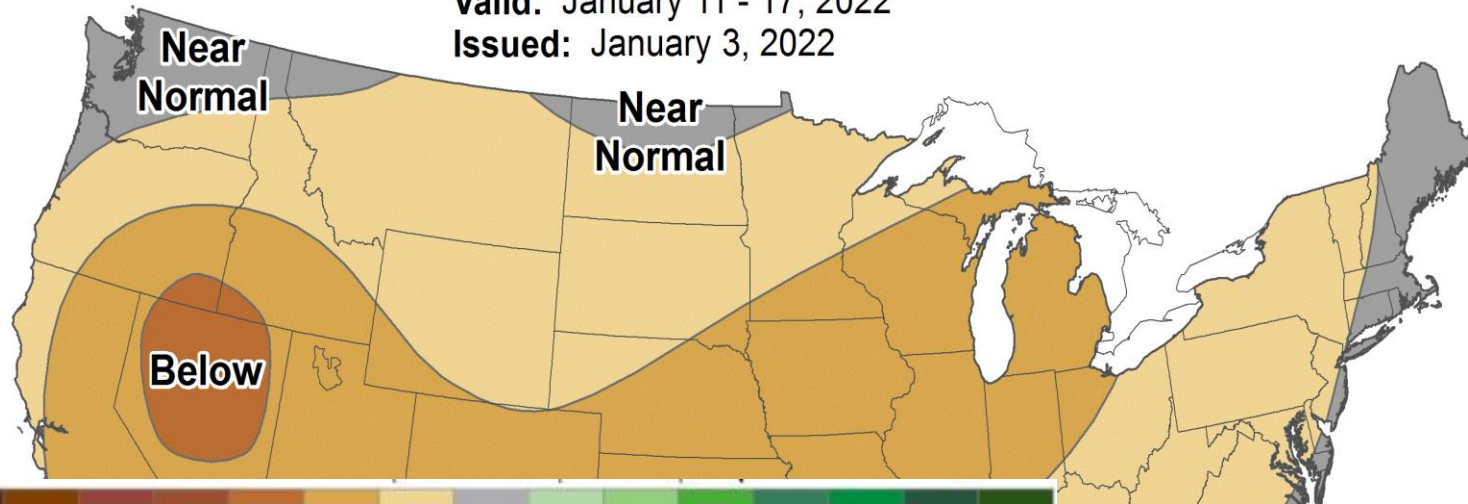


8-14 Day Precipitation Outlook



Valid: January 11 - 17, 2022

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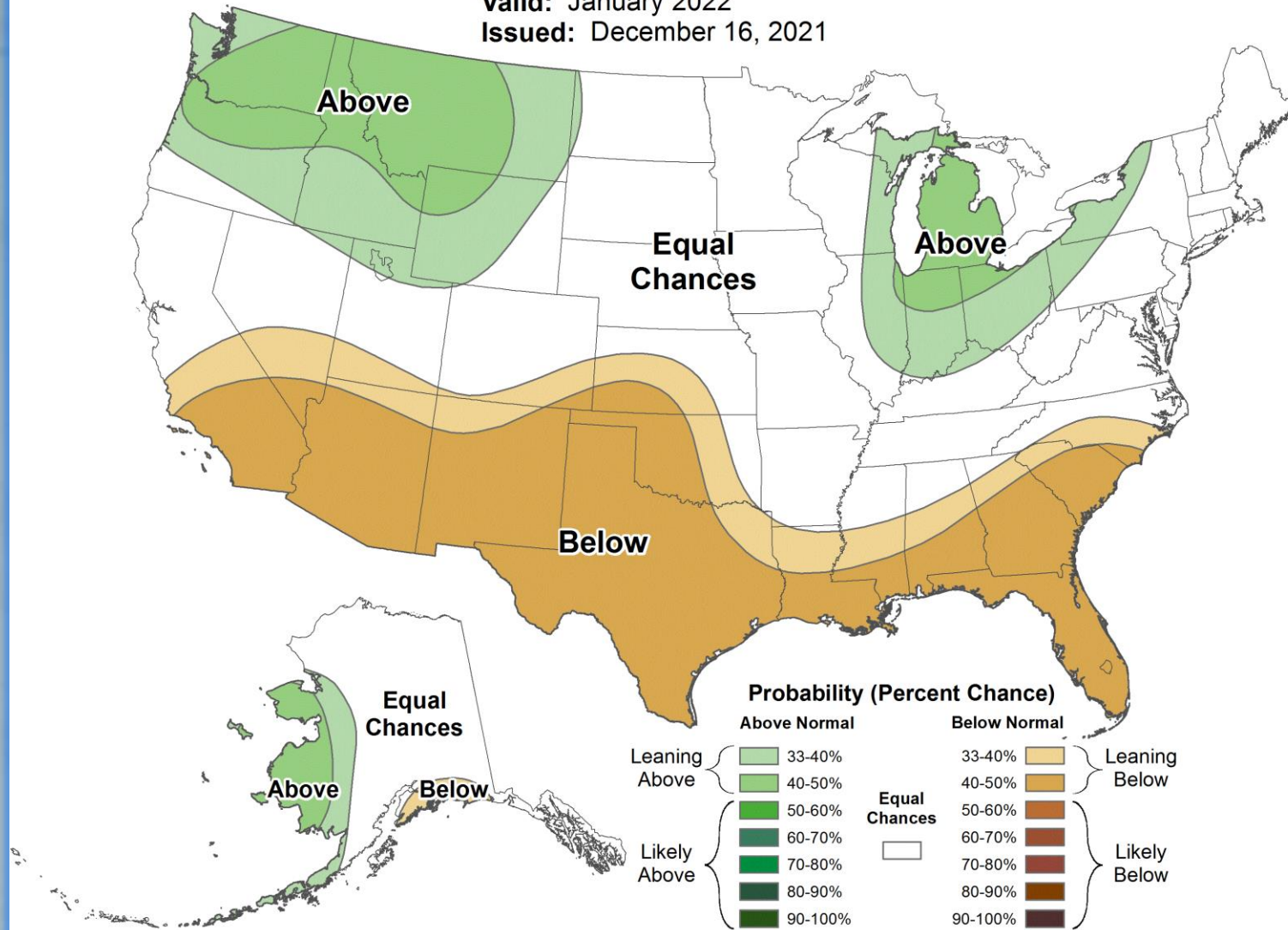


Monthly Precipitation Outlook



Valid: January 2022

Issued: December 16, 2021



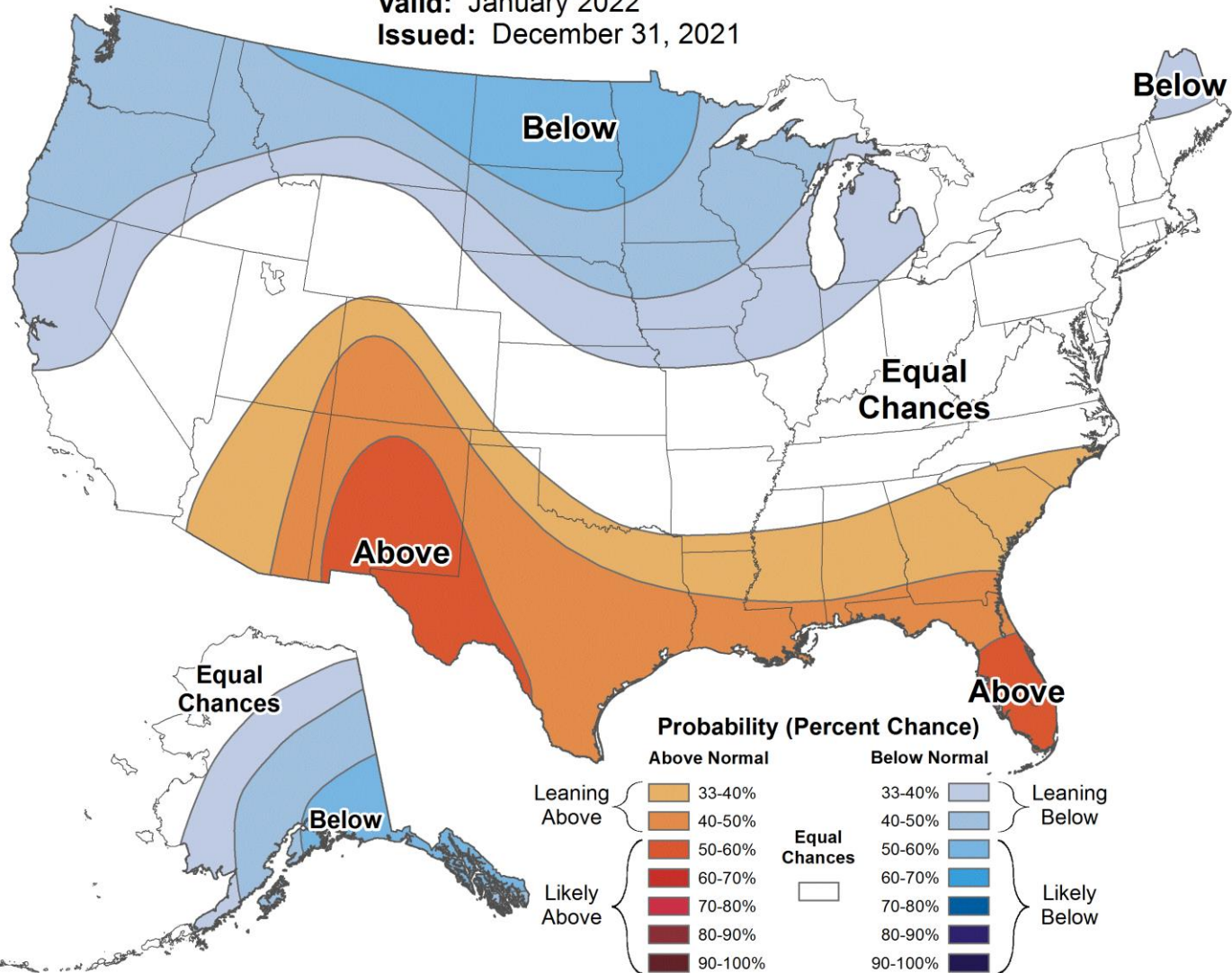


Monthly Temperature Outlook



Valid: January 2022

Issued: December 31, 2021





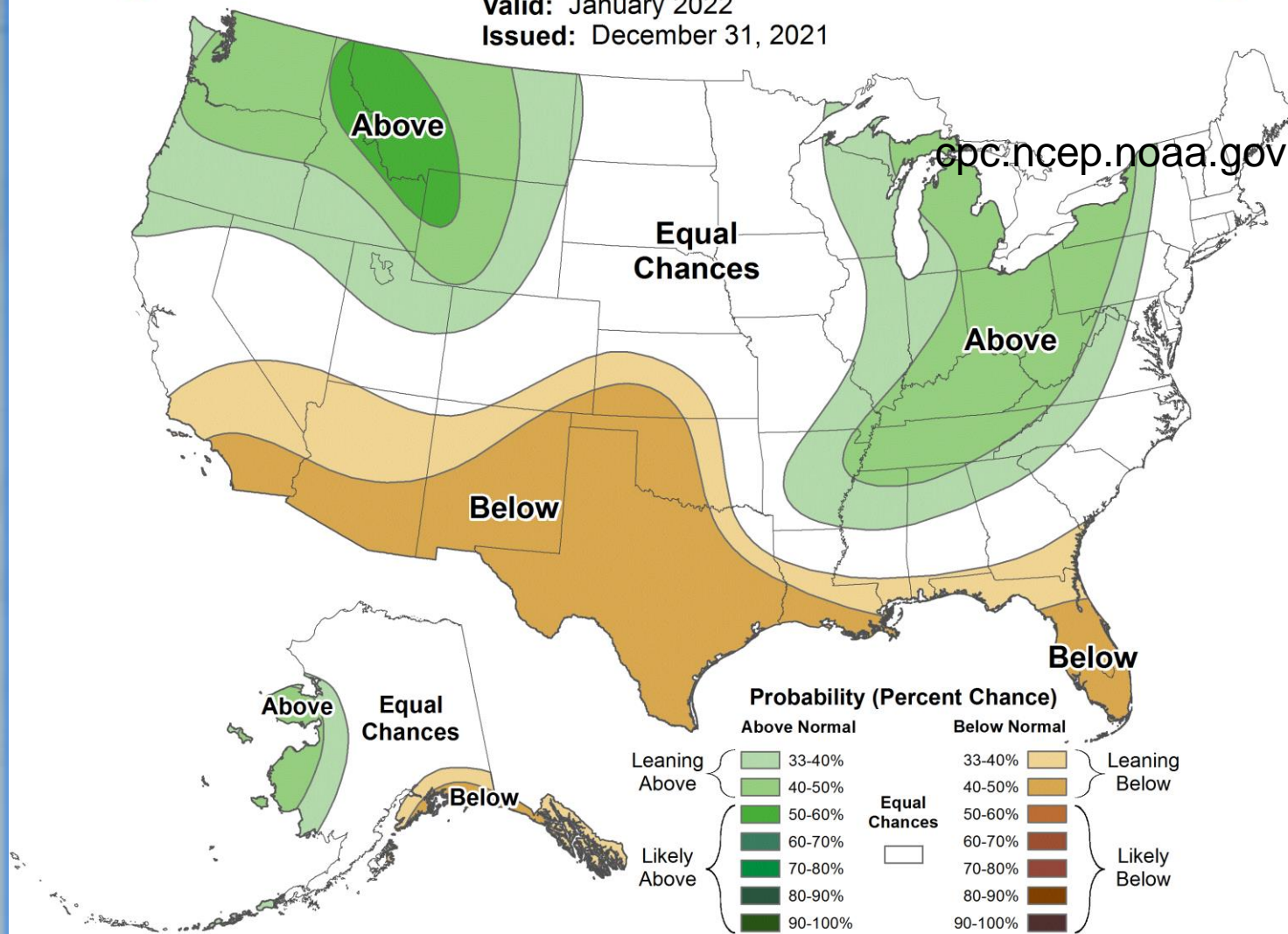
Monthly Precipitation Outlook



Valid: January 2022

Issued: December 31, 2021

epc.ncep.noaa.gov





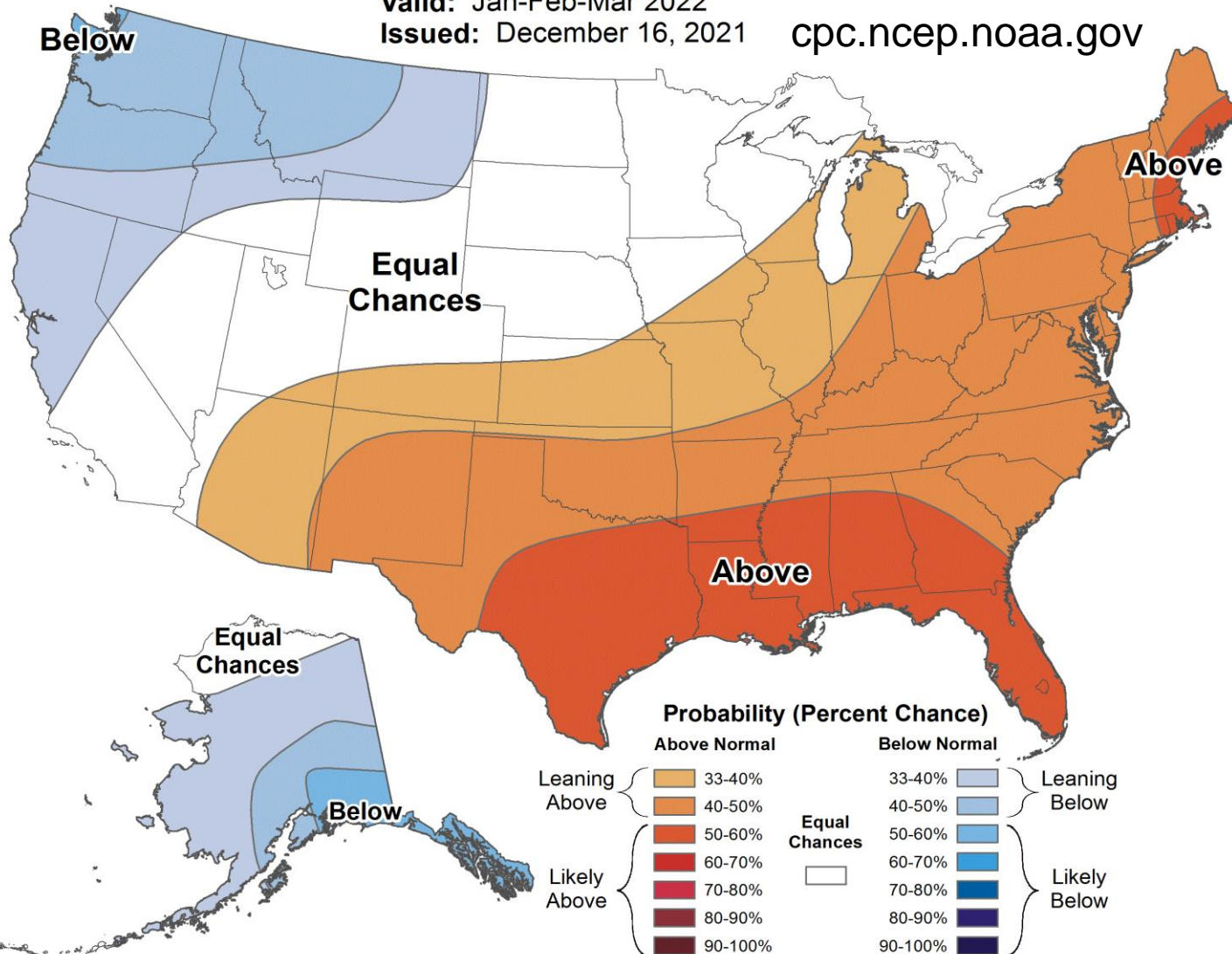
Seasonal Temperature Outlook



Valid: Jan-Feb-Mar 2022

Issued: December 16, 2021

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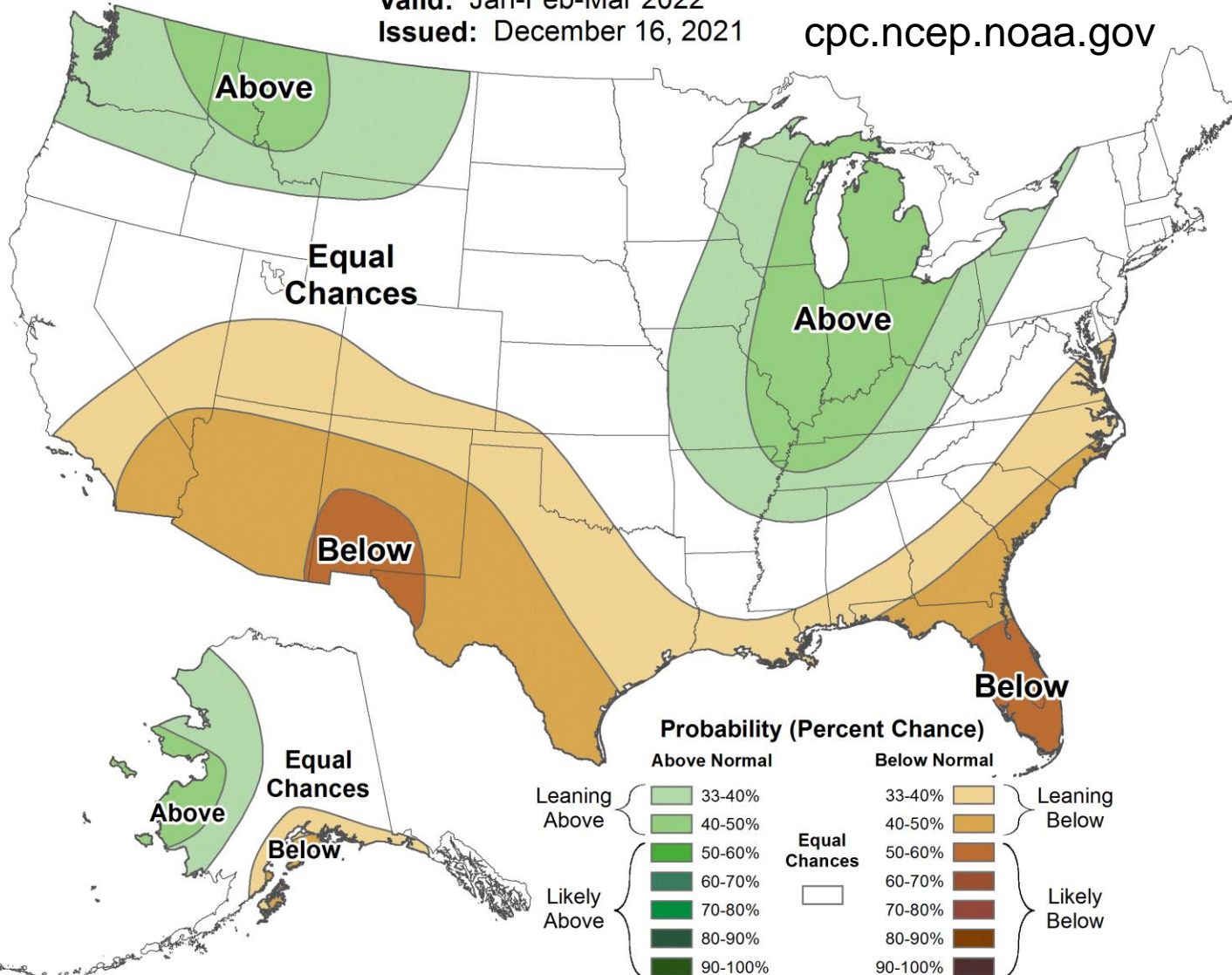
Seasonal Precipitation Outlook



Valid: Jan-Feb-Mar 2022

Issued: December 16, 2021

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Hydrologic Outlook - Refill

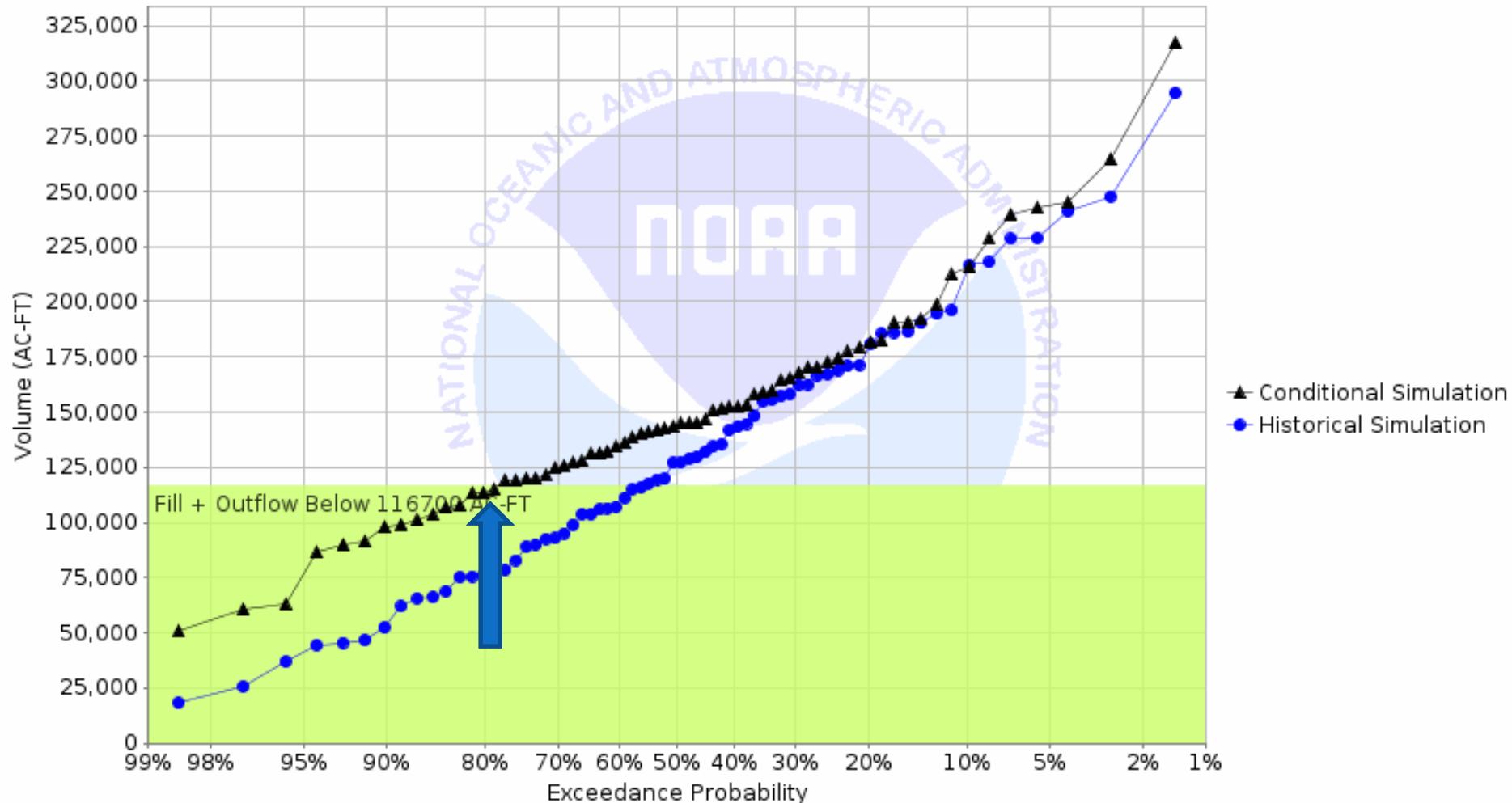
- 78% Chance of Refill Under Normal Conditions
- 96% Chance of Refill under Dry Conditions

78 Percent Chance Refill - Normal

Chances of Exceeding River Volume at Cloquet River at Fredenberg 1NNW-Island Lake (ILRM5)

Forecast for the period 04/01/2022 - 06/01/2022

This is a conditional simulation based on the conditions as of 12/20/2021

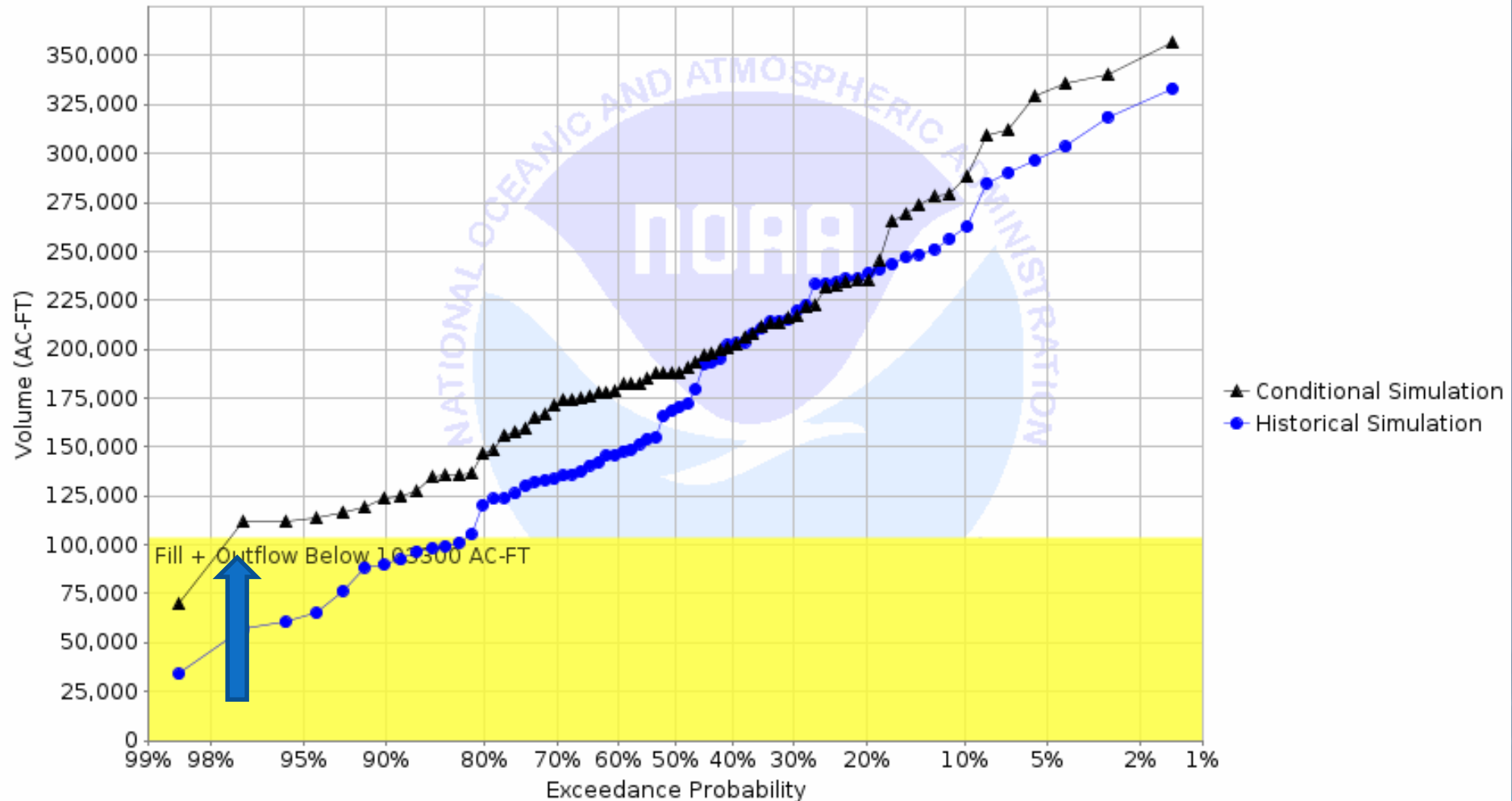


98 Percent Chance Refill - Dry

Chances of Exceeding River Volume at Cloquet River at Fredenberg 1NNW-Island Lake (ILRM5)

Forecast for the period 04/01/2022 - 07/15/2022

This is a conditional simulation based on the conditions as of 12/20/2021



2021-22 Weather/Hydro Outlook - Summary

- Antecedent conditions
 - Long term drought
 - Above normal precipitation Fall and since freeze up
 - Some snowpack melted and move through the basin while most remained on the landscape
- Weather Outlook
 - Short term forecast shows above normal precipitation
 - Long term forecasts not leaning one way or another
- Hydrologic Outlook
 - 78% Chance for refill under Normal condition
 - 96% Chance for refill under Dry condition

Resources

- <https://www.weather.gov/media/dlh/DssPacket.pdf>
- <https://cpc.ncep.noaa.gov>
- <https://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml>
- <https://prism.oregonstate.edu/comparisons/drought.php>
- <https://www.nohrsc.noaa.gov/interactive/html/map.html>
- <https://droughtmonitor.unl.edu/>
- weather.gov/forecastpoints
- <https://weather.gov/mpx/islandlake>