

Island Lake Technical Committee

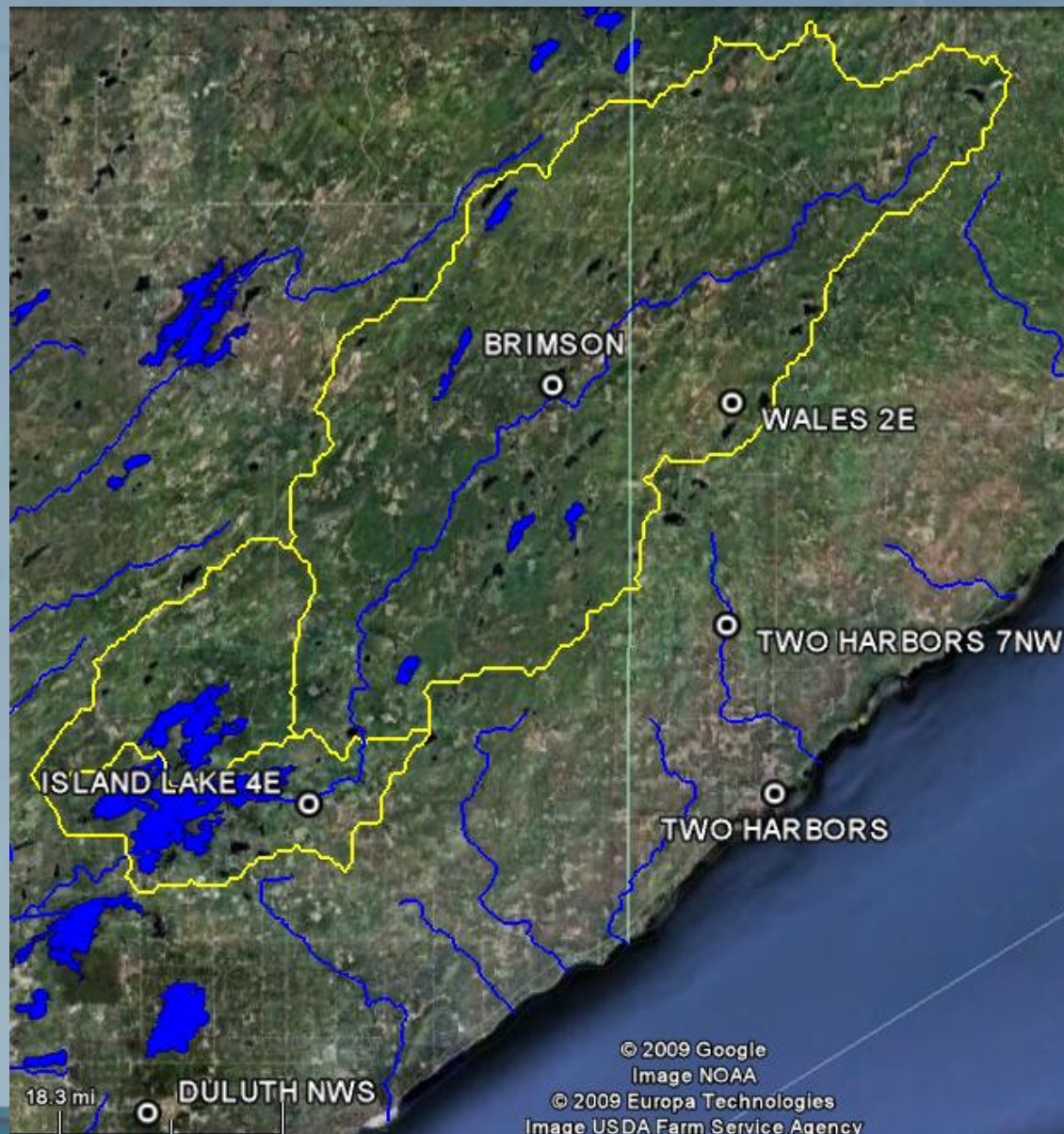
Winter Draw Down 2020-21

Steve Gohde
National Weather Service
WFO Duluth
Observing Program Leader

Andrew Mangham
North Central River Forecast Center
Hydrologic Forecaster

November 4, 2020

Island Lake Basin



Bottom Line Up Front

- 55% Chance of Refill under normal condition
- 85% Chance of Refill under dry condition
- Below normal precipitation starting in late 2019-20
Winter has resulted in regional drought condition
- Soil moisture conditions near to below normal which
is a big shift from 2019 Fall and Spring 2020
- La Niña is present and is driving the Winter forecast
 - Above normal precipitation (Dec-Feb)

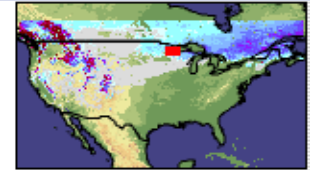
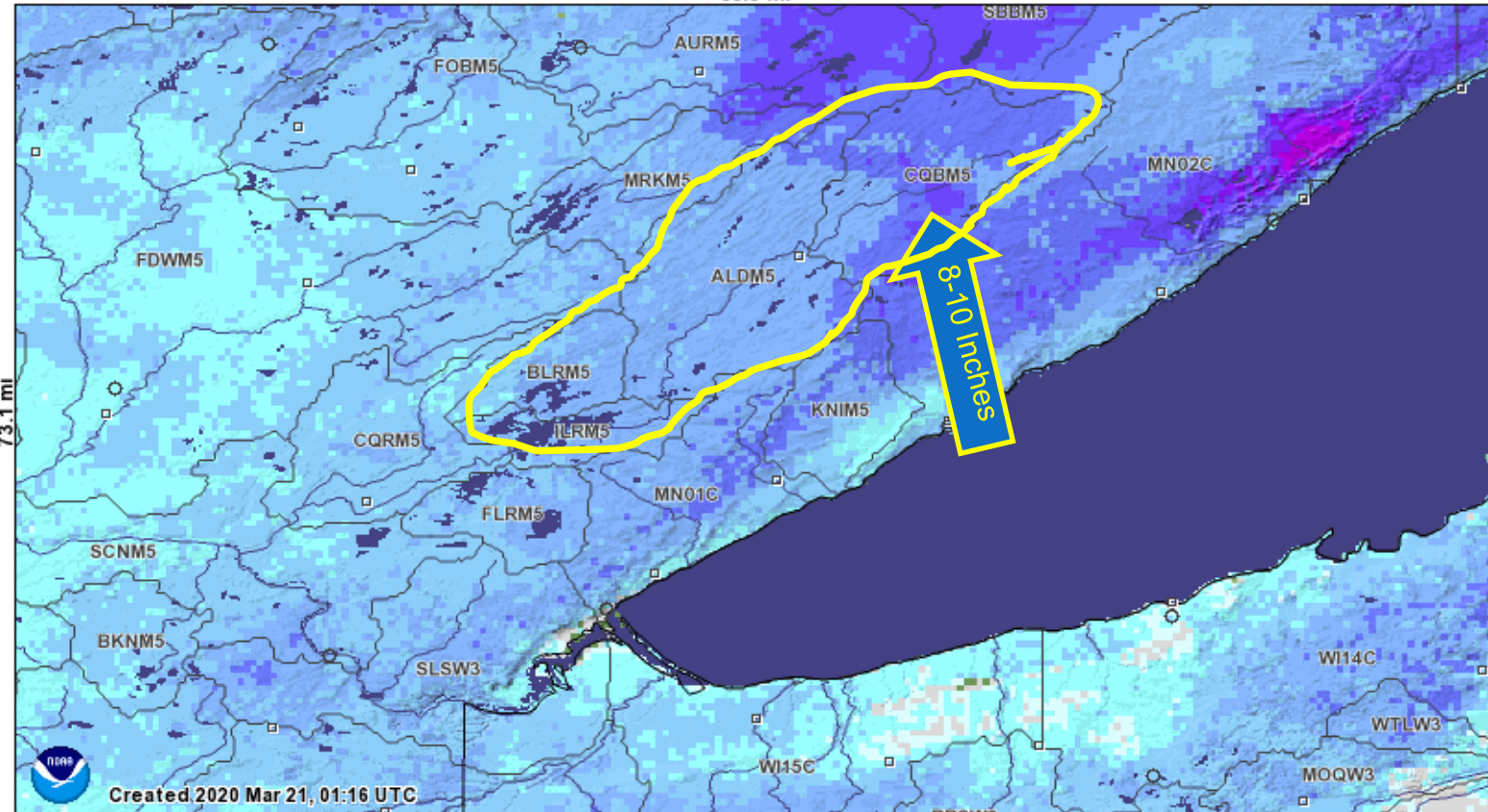
Setting Up Current Conditions

- Great water supply for Spring 2020 thanks to wet Fall 2019 and heavy snowpack
- A very dry Spring and Summer reduced amount of water being held in storage in the soil
- Rainfall was greater in the headwaters of the Cloquet River Basin vs near Island Lake
- Early near record snow in mid-October then record temperatures the first week of November

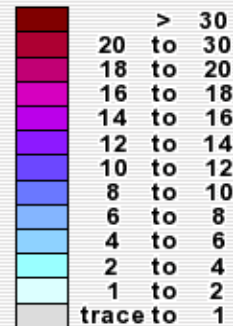
Water Supply- Heavy Spring Snowpack

Modeled Snow Water Equivalent for 2020 March 20, 15:00 UTC

88.0 mi

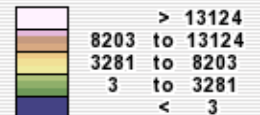


Inches of water equivalent



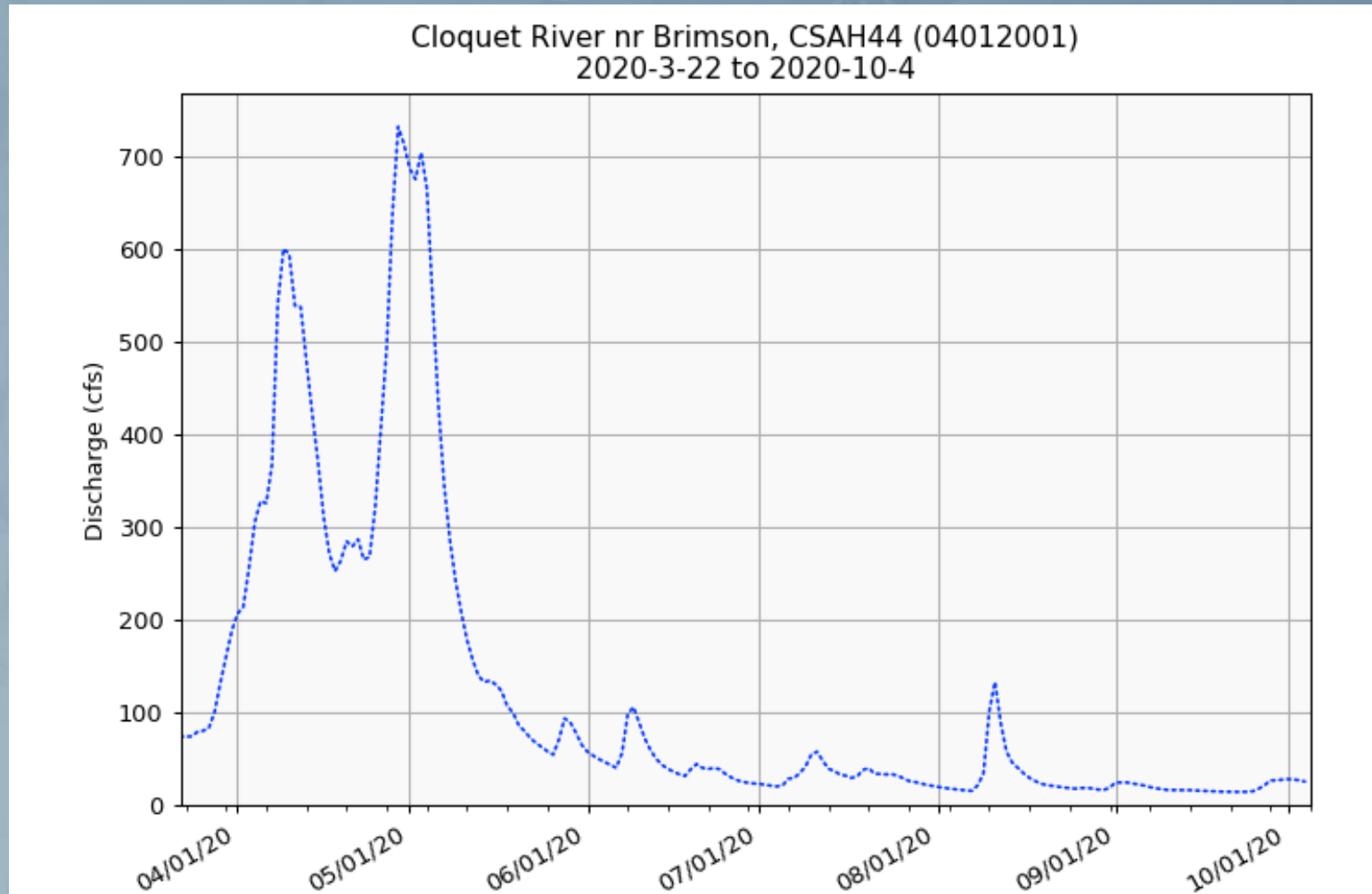
Not Estimated

Elevation in feet



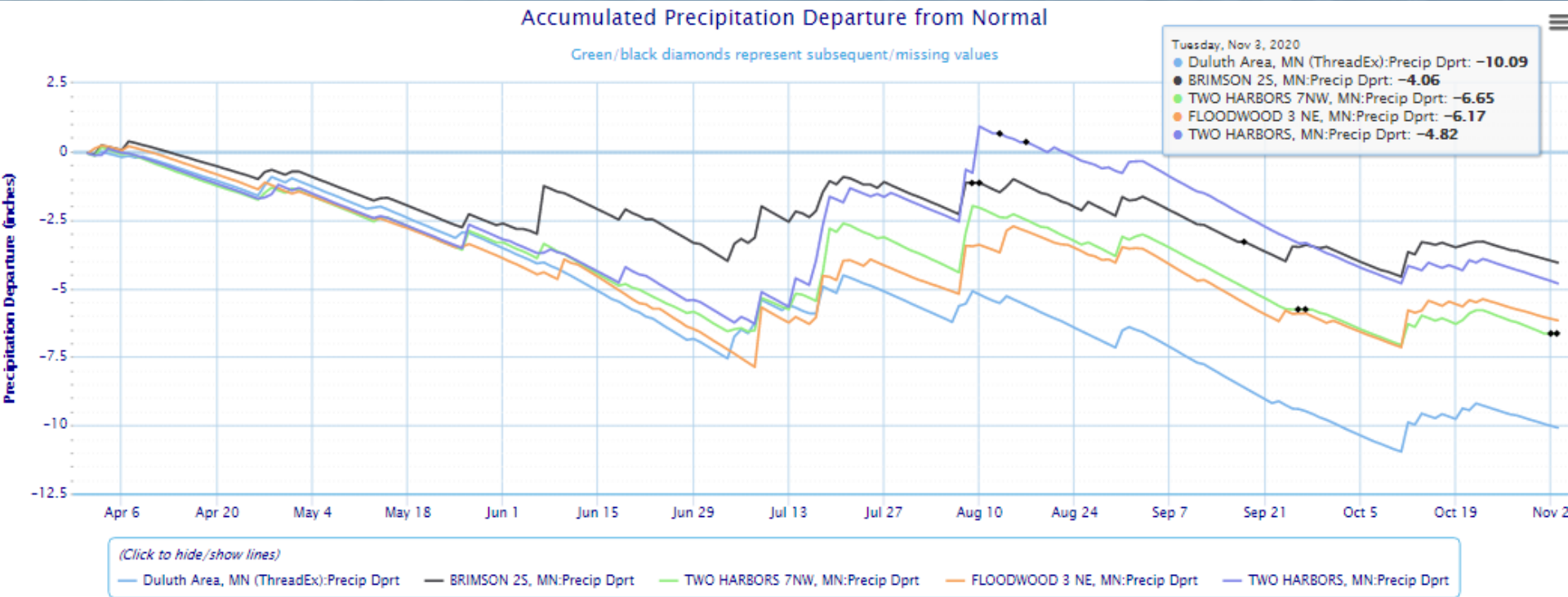
Water stored in Snow measured 8-10" in Highland/Wales March 2020

Snowmelt Runoff – High Volume Long Duration



Snowmelt was the main driver of Spring refill. Few > 1.0" rain events

Below Normal Precipitation



Duluth and Island Lake area driest. Less deficit in basin headwaters

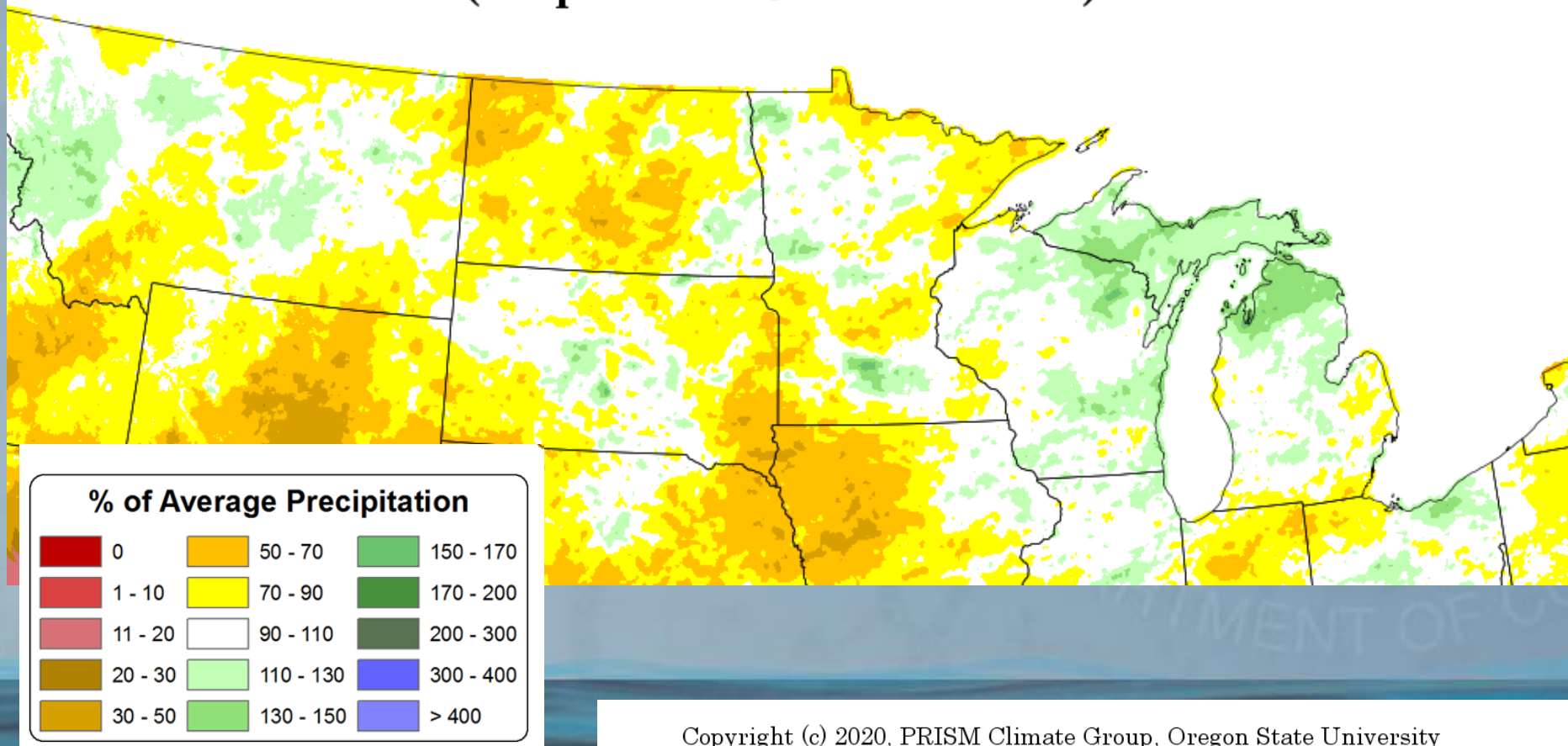
Below Normal Precipitation

Total Precipitation Anomaly: Apr 2020 - 04 Nov 2020

Period ending 7 AM EST 04 Nov 2020

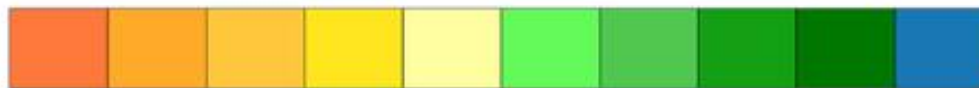
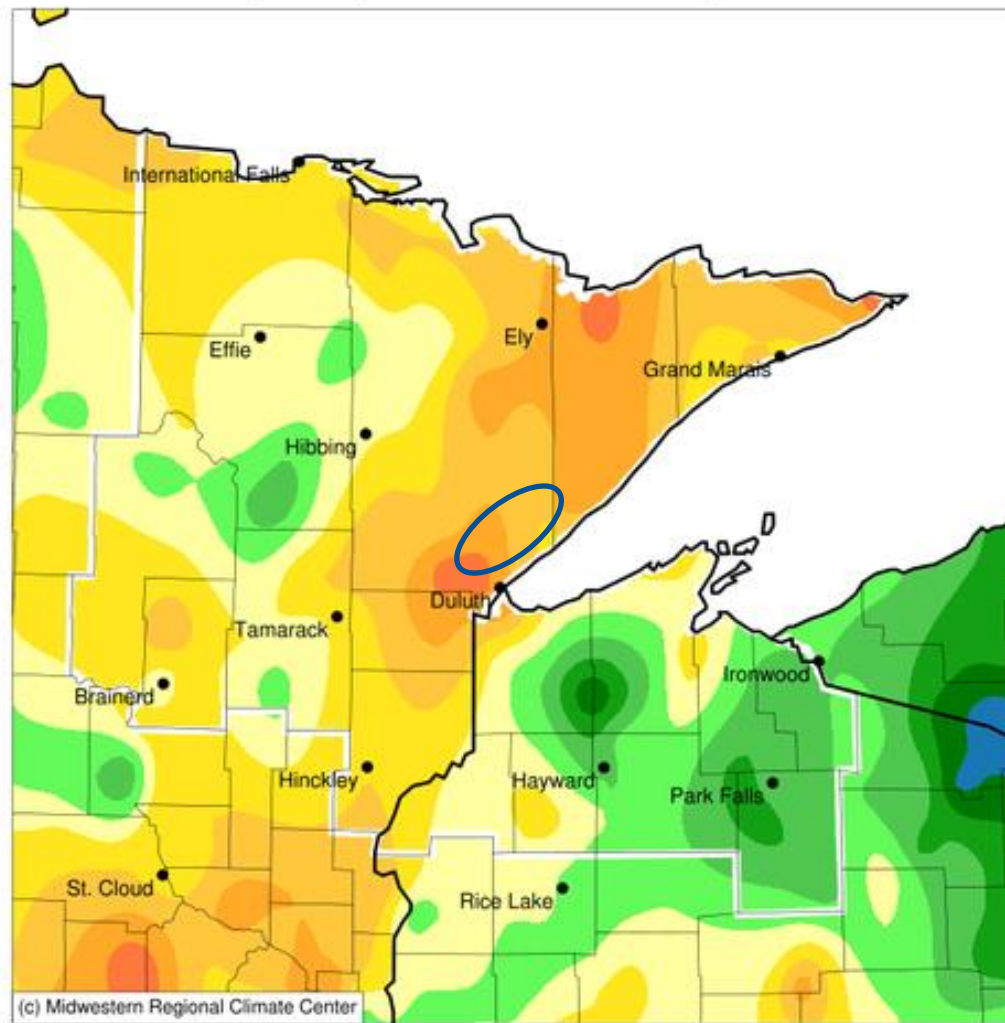
Base period: 1981-2010

(Map created 05 Nov 2020)



Accumulated Precipitation (in): Departure from 1981-2010 Normals

April 01, 2020 to November 05, 2020



-8 -6 -4 -2 0 2 4 6 8
Stations from the following networks used: WBAN, COOP, FAA, GHCN, ThreadEx, CoCoRaHS, WMO, ICAO, NWSLI,
Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 11/5/2020 9:51:19 AM CST

- Sporadic rainfall patterns in our region
- The Southern 1/3 of the basin 8-10 inches below normal
- The Northern portion of the basin 3 to 6 inches below

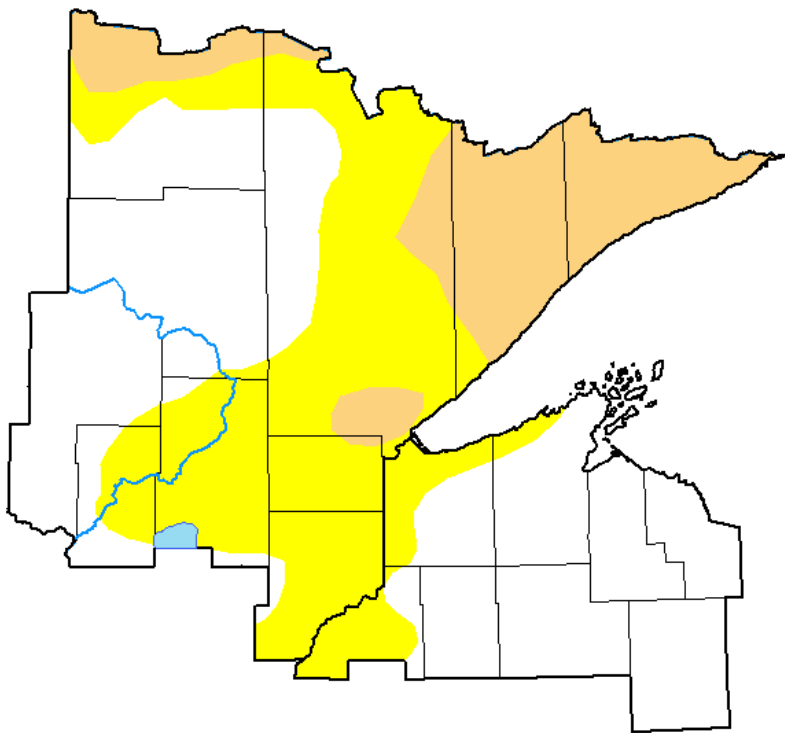
Below Normal Precipitation

Not Evenly Distributed

- Dry 2020 Spring and Summer conditions
 - Duluth 5th driest(148 years) April 1st-Nov 3rd. 14.53”
 - 10.02” Below Normal
 - Brimson 8th driest(60 years) April 1st-Nov 3rd 18.87”
 - 4.34” Below Normal
- Drought conditions present
- Drought first reported in May

Drought Monitor

U.S. Drought Monitor Duluth, MN WFO



November 3, 2020

(Released Thursday, Nov. 5, 2020)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	49.32	50.68	16.93	0.00	0.00	0.00
Last Week 10-27-2020	49.15	50.85	16.93	0.00	0.00	0.00
3 Months Ago 08-04-2020	52.33	47.67	10.49	0.00	0.00	0.00
Start of Calendar Year 12-31-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-29-2020	54.35	45.65	10.39	0.00	0.00	0.00
One Year Ago 11-05-2019	100.00	0.00	0.00	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:

David Miskus
NOAA/NWS/NCEP/CPC



droughtmonitor.unl.edu

- D1 and D0 Drought conditions

Drought Monitor

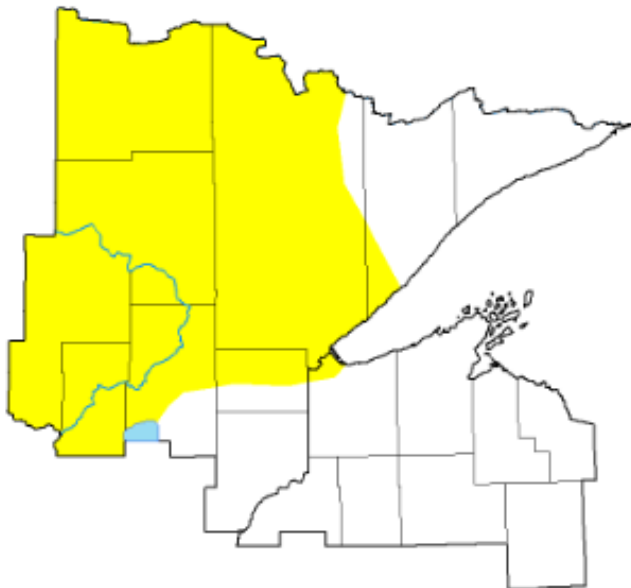
Compare Two Weeks

Maps > Compare Two Weeks

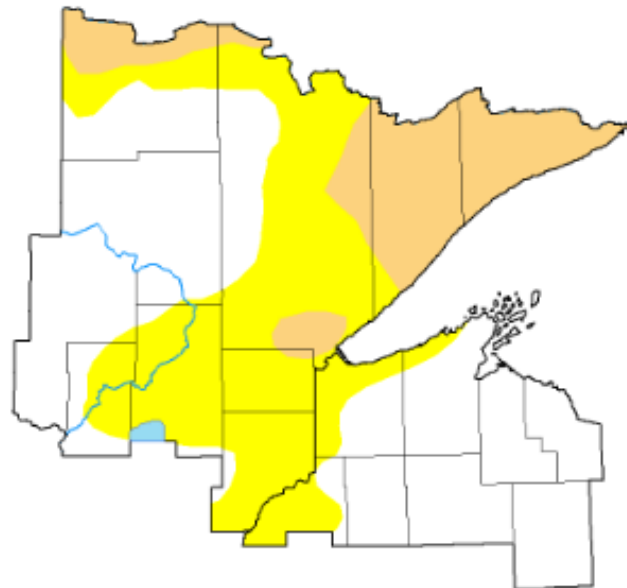
Area type: NWS Weather Forecast ... Area: Duluth, MN (DLH) Statistics type: Cumulative Percent Area

Drought Classification

- ☐ None
- ☐ D0 (Abnormally Dry)
- ☐ D1 (Moderate Drought)
- ☐ D2 (Severe Drought)
- ☐ D3 (Extreme Drought)
- ☐ D4 (Exceptional Drought)
- ☐ No Data



May 19, 2020

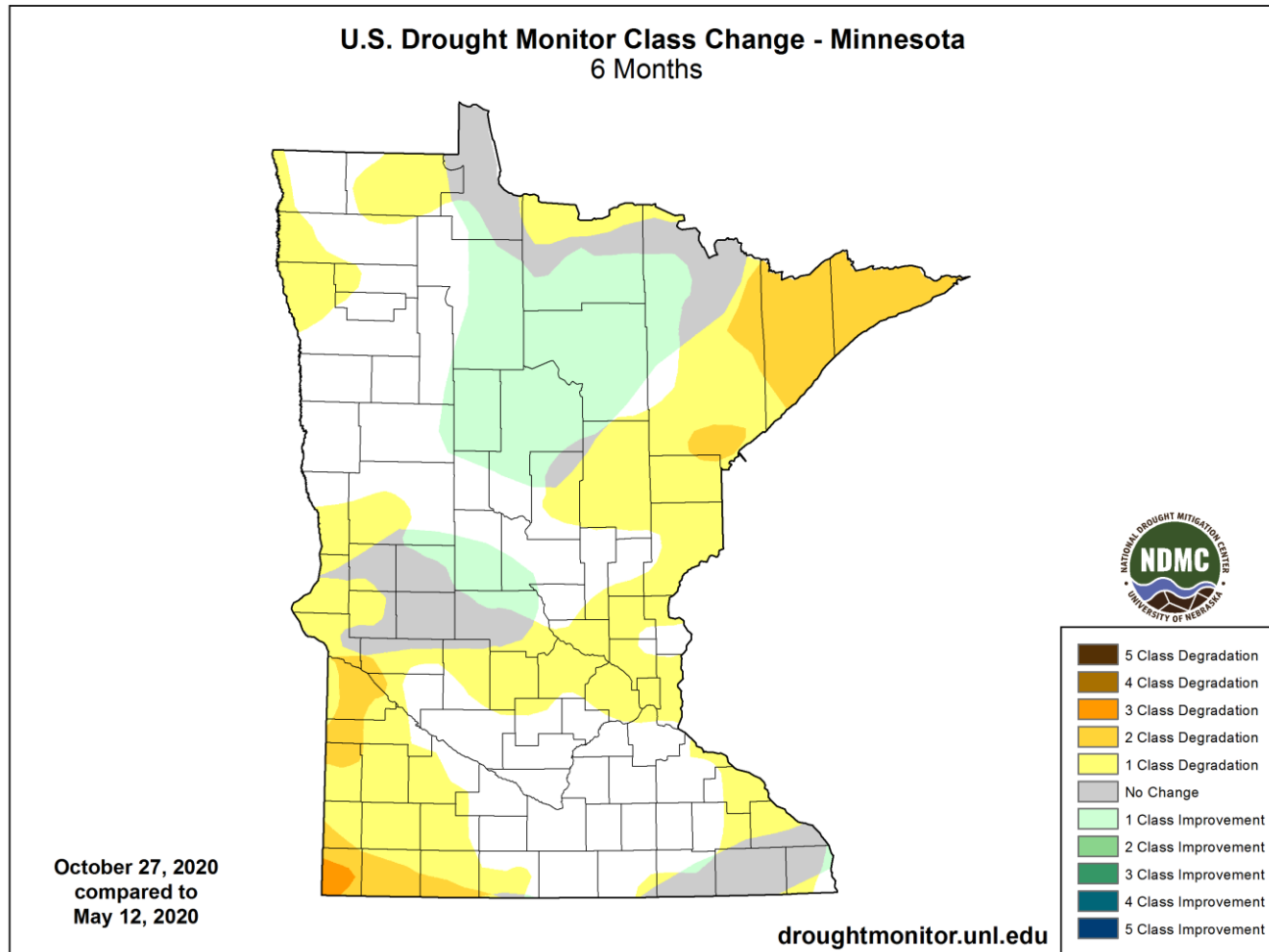


October 20, 2020



- Abnormally Dry conditions declared in May
- D1 and D0 Drought conditions persist

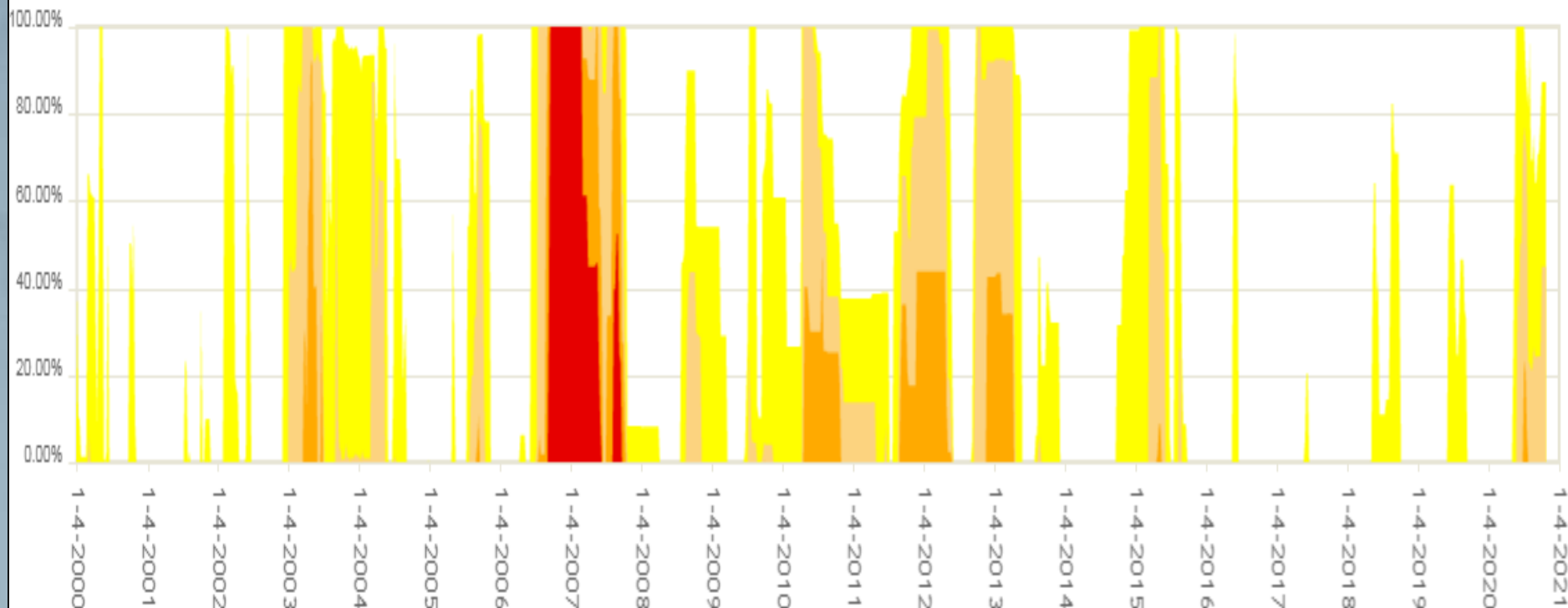
Drought Monitor – Change



- Sporadic rainfall patterns in our region mirror drought
- Drought conditions have ranged from Do to D2 the last 6 Mo.

Drought Historical Context

Northeast, MN (2103) Percent Area

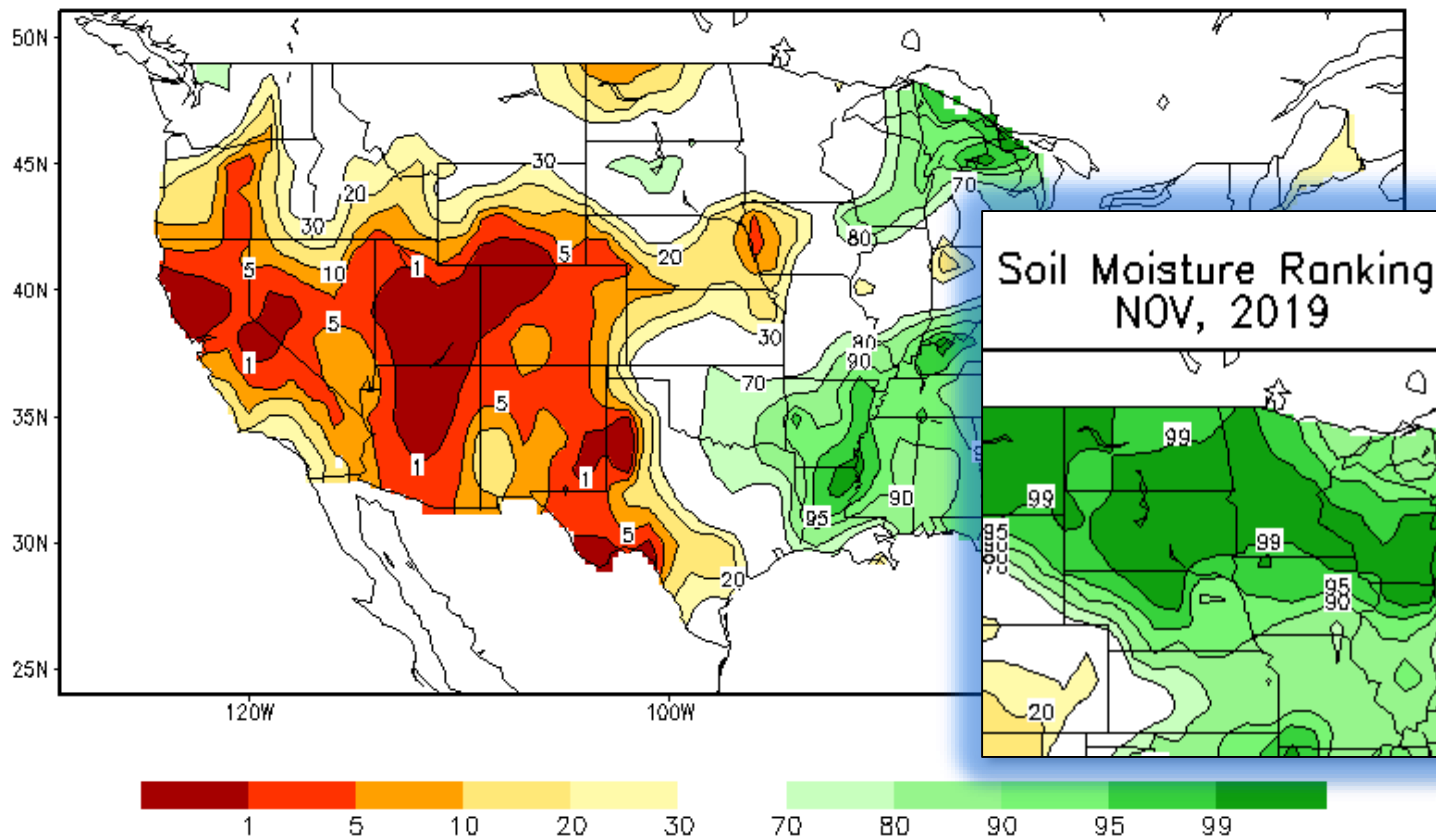


Intensity

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

Soil Moisture

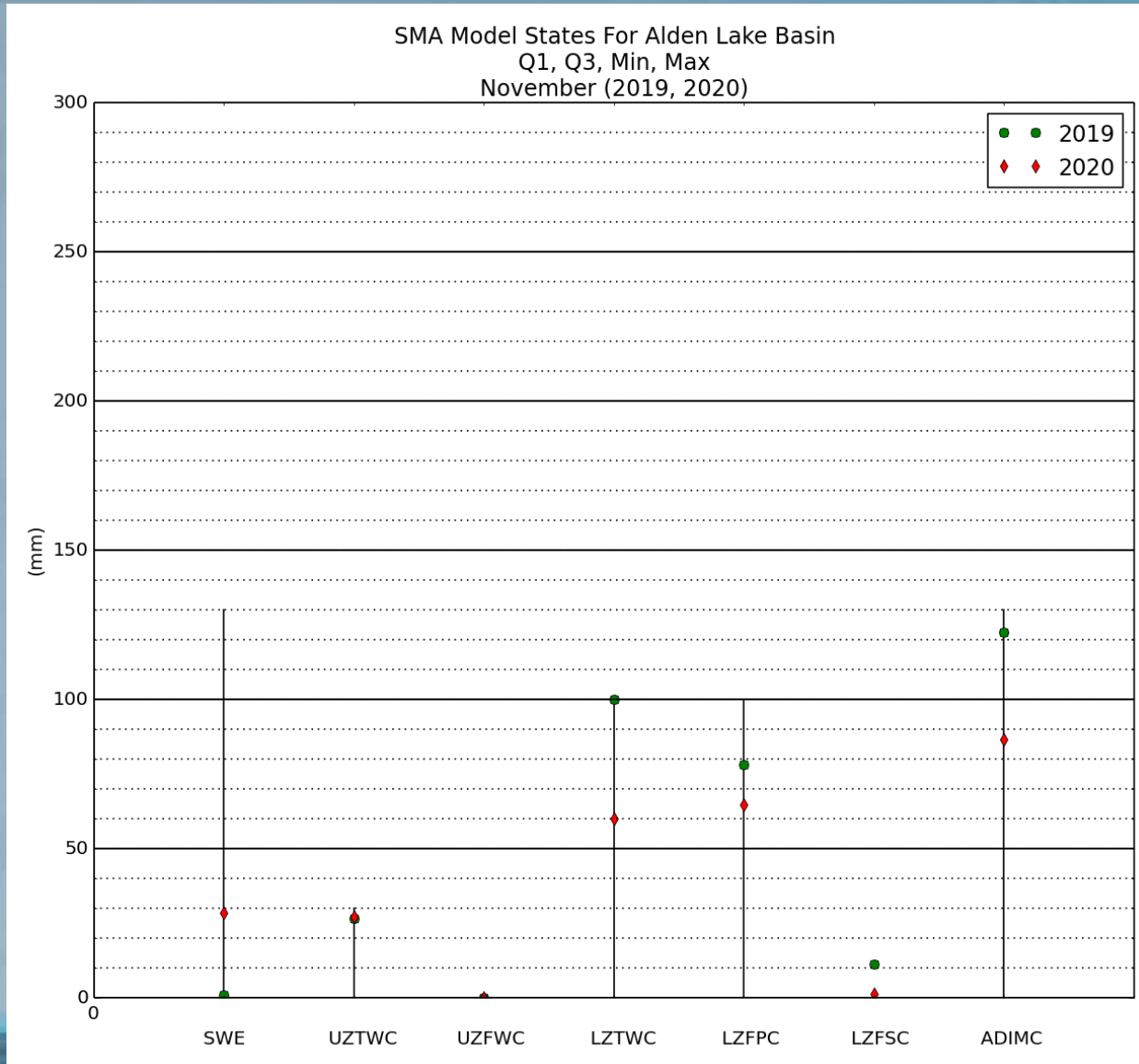
Soil Moisture Ranking Percentile Last day of OCT, 2020



Slightly below
normal soil
moisture

Notable
change from
November
2019 and April
2020

Soil Moisture - Modeled

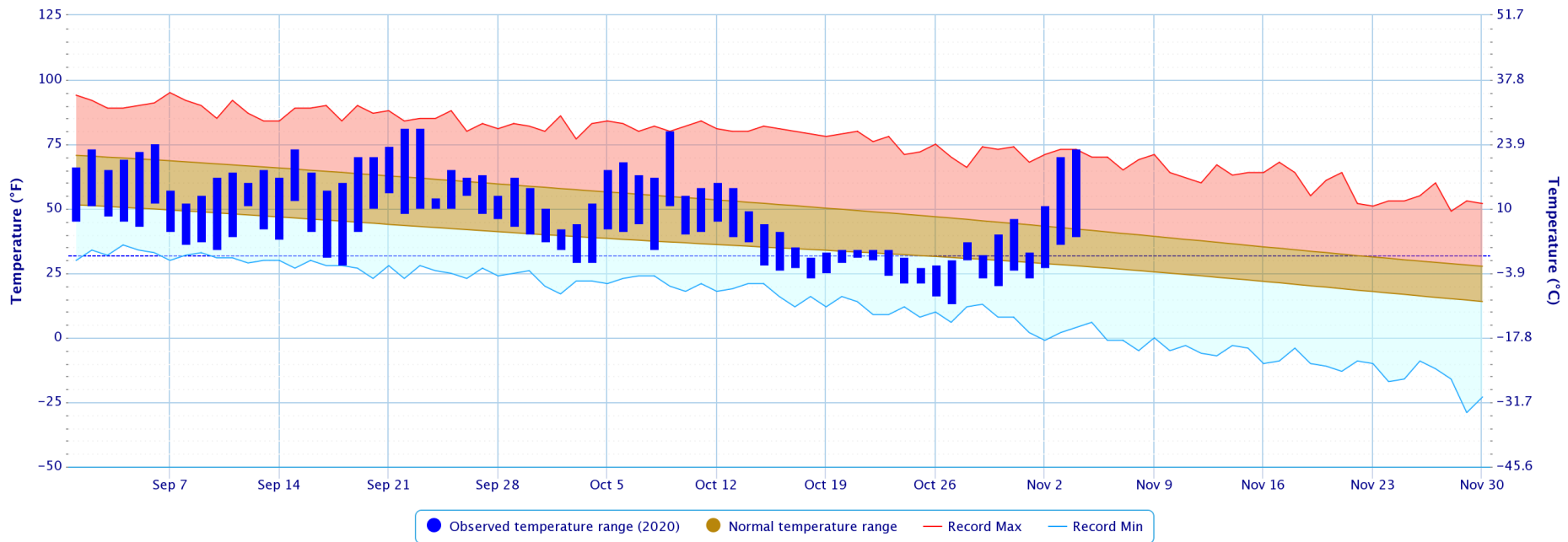


- Dry Spring and Summer have reduced soil moisture components compared to 2019
- Reduction in Lower Zone contents results in lower base flow

Autumn Temperatures

Daily Temperature Data – Duluth Area, MN (ThreadEx)

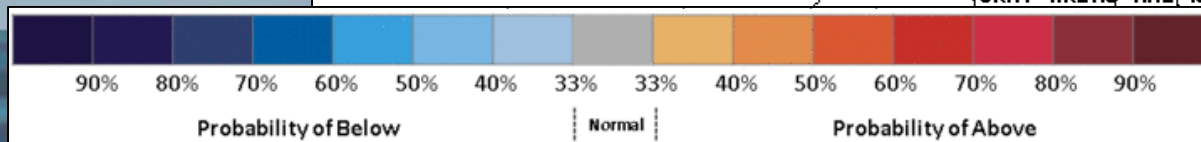
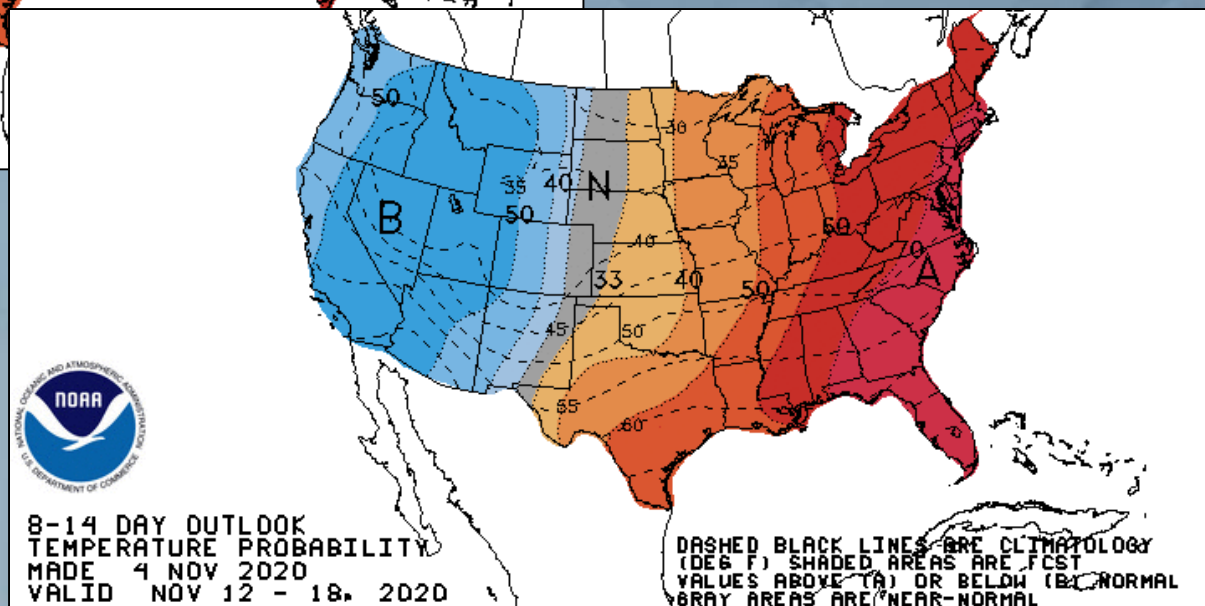
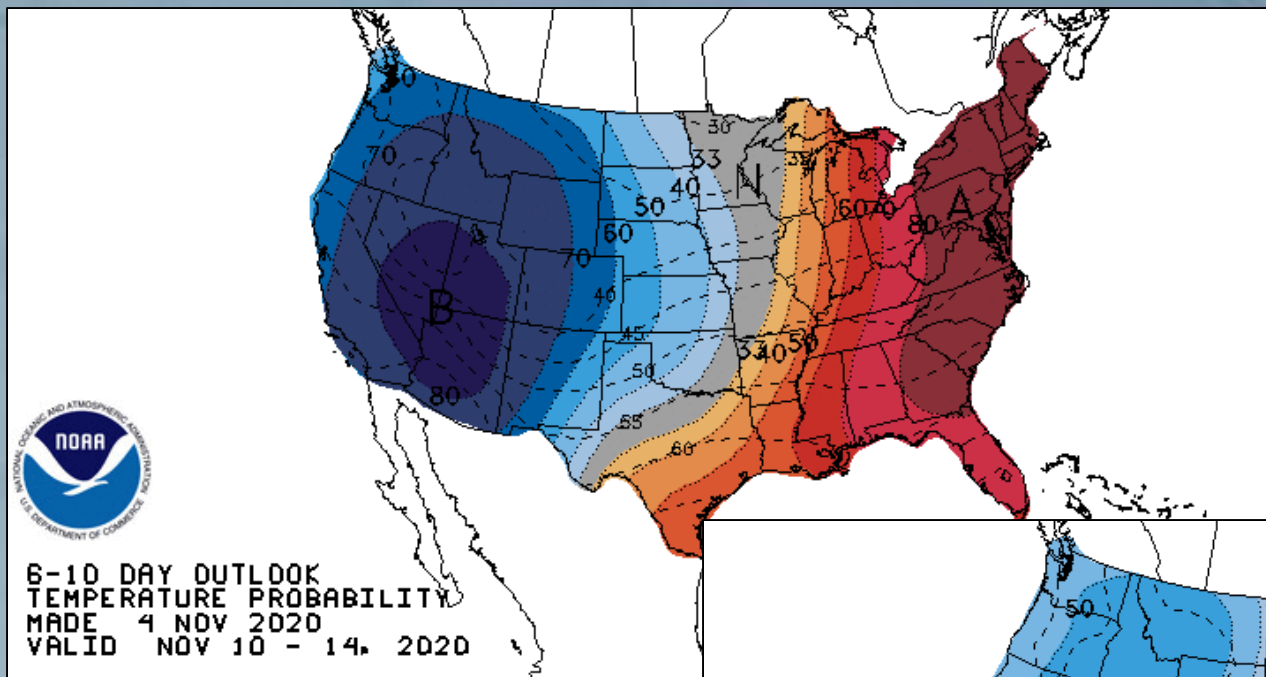
Period of Record – 1874-05-13 to 2020-11-04. Normals period: 1981-2010. Click and drag to zoom chart.



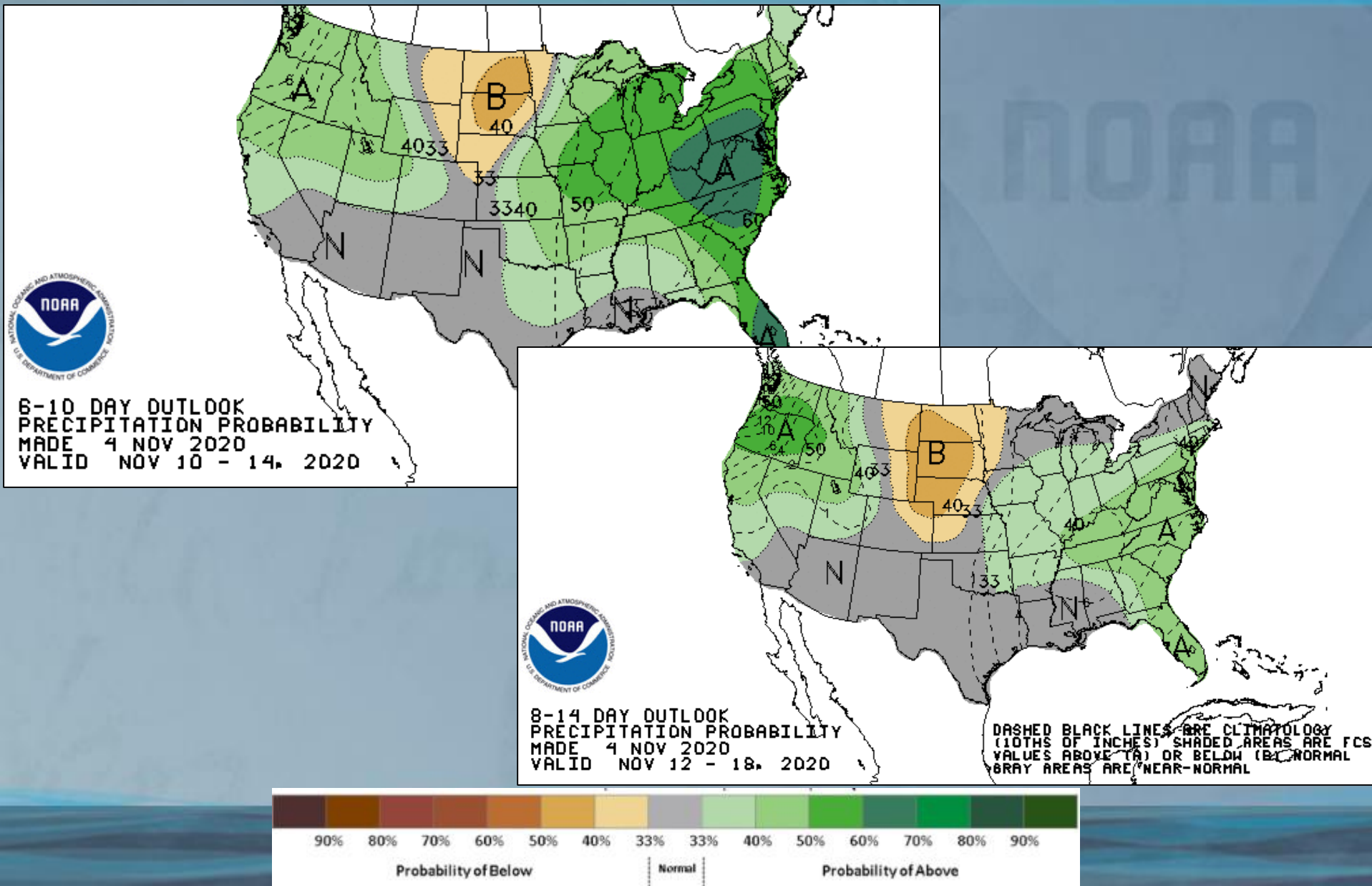
Powered by ACIS

- September freeze, October record warm then snow. Record warmth the first week of November

Near-term Outlook - Temperature



Near-term Outlook - Precipitation



Winter Outlook

- No strong signal for above or below normal temperatures. However, below normal signal just to our west
- Probability leaning to above normal precipitation for December, January and February
- La Niña is present and is the driver for the
- 2020-2021 Winter outlook

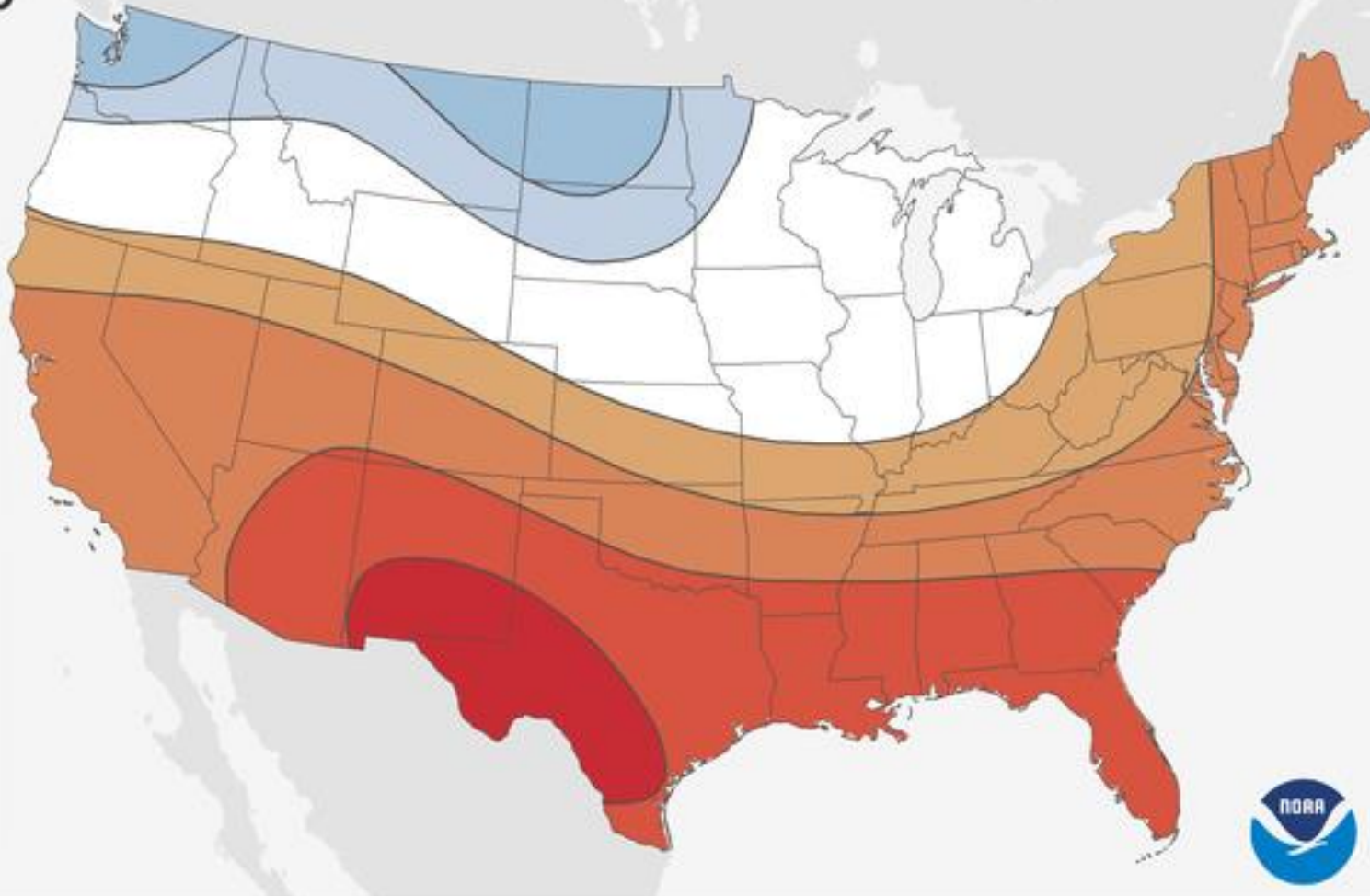
Winter Outlook - Temperature

Winter 2020

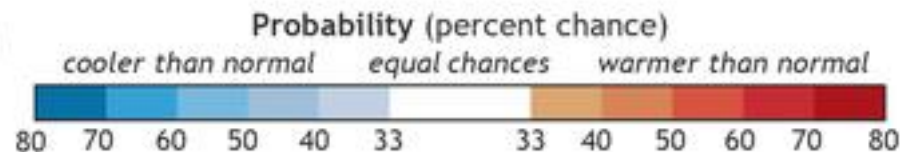
U.S.
Temperature
Outlook



AK and HI not to scale



Temperature Outlook
for December 2020 - February 2021
Issued 15 October 2020



NWS Climate Prediction Center
Map by NOAA Climate.gov

- Near area of below normal Temperatures Dec 2020-Feb 2021

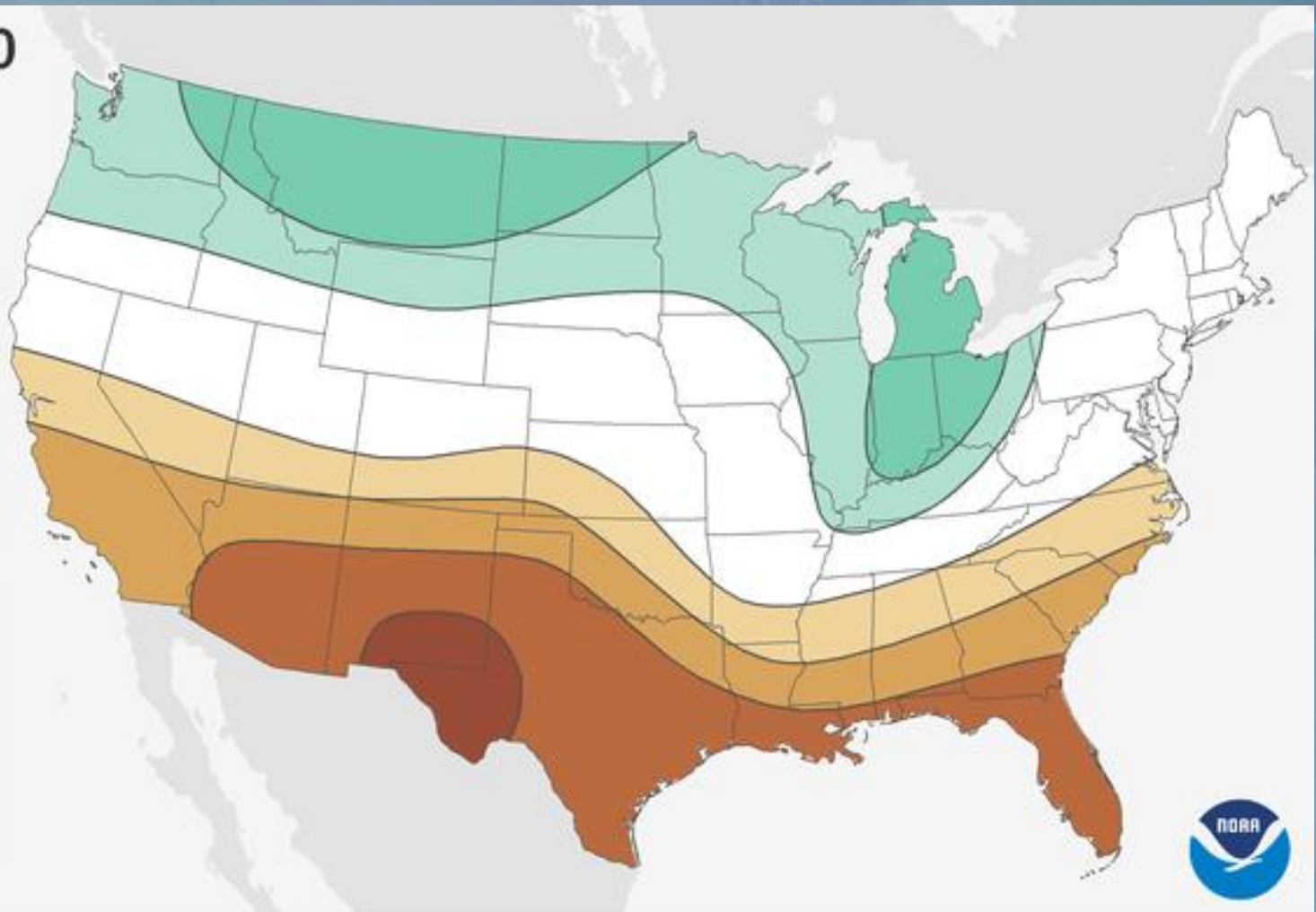
Winter Outlook - Precipitation

Winter 2020

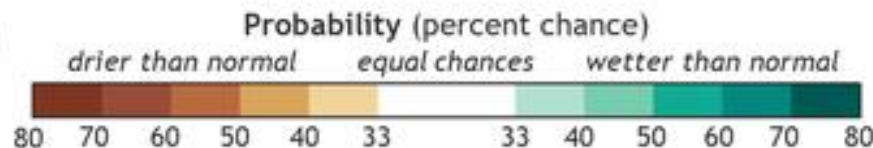
U.S.
Precipitation
Outlook



AK and HI not to scale



Precipitation Outlook
for December 2020 – February 2021
Issued 15 October 2020



NWS Climate Prediction Center
Map by NOAA Climate.gov

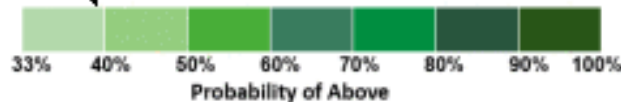
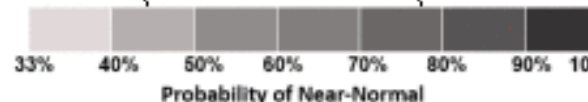
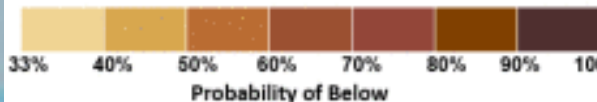
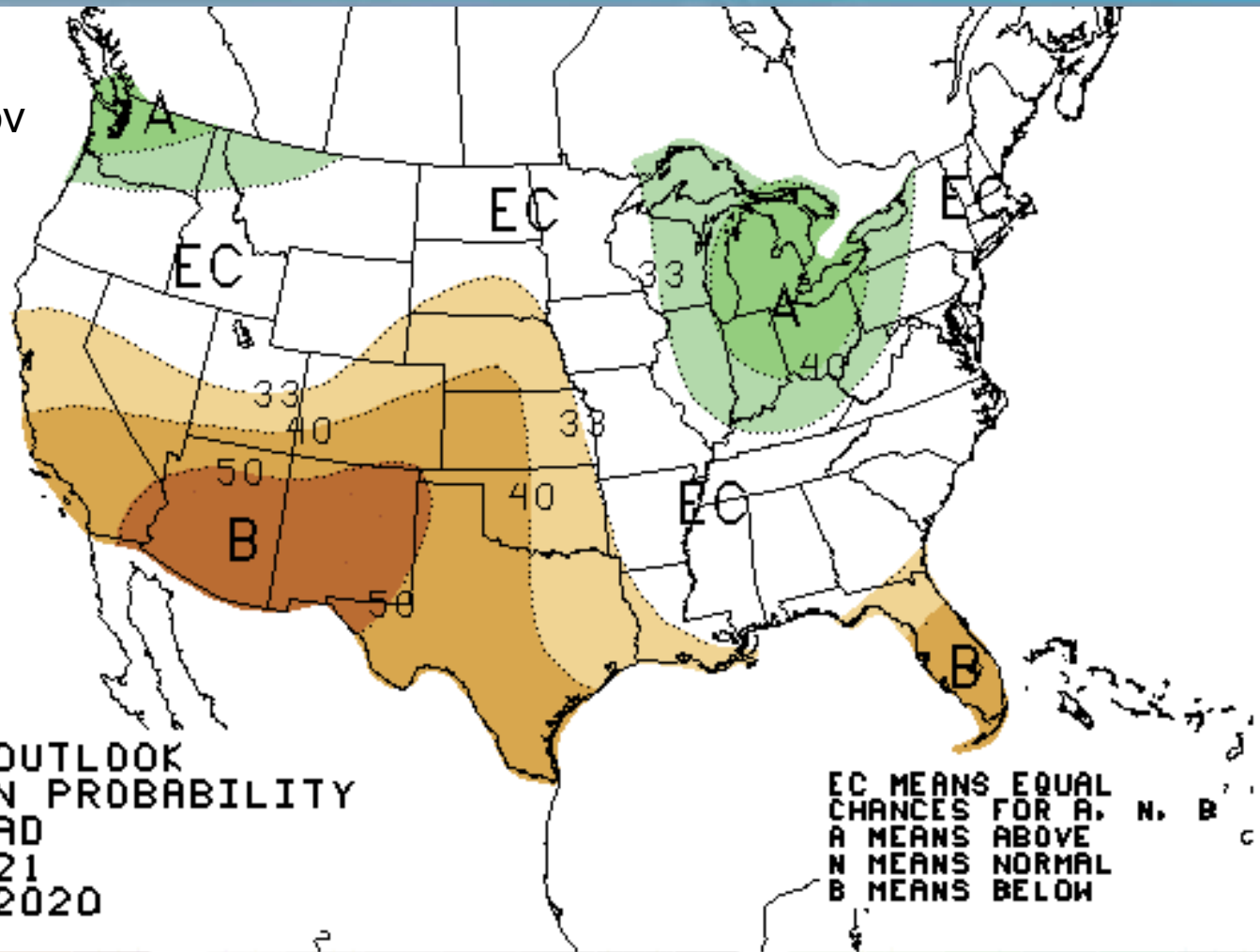
- Above Normal Precipitation Dec 2020-Feb 2021

Spring Outlook - Precipitation

cpc.ncep.noaa.gov



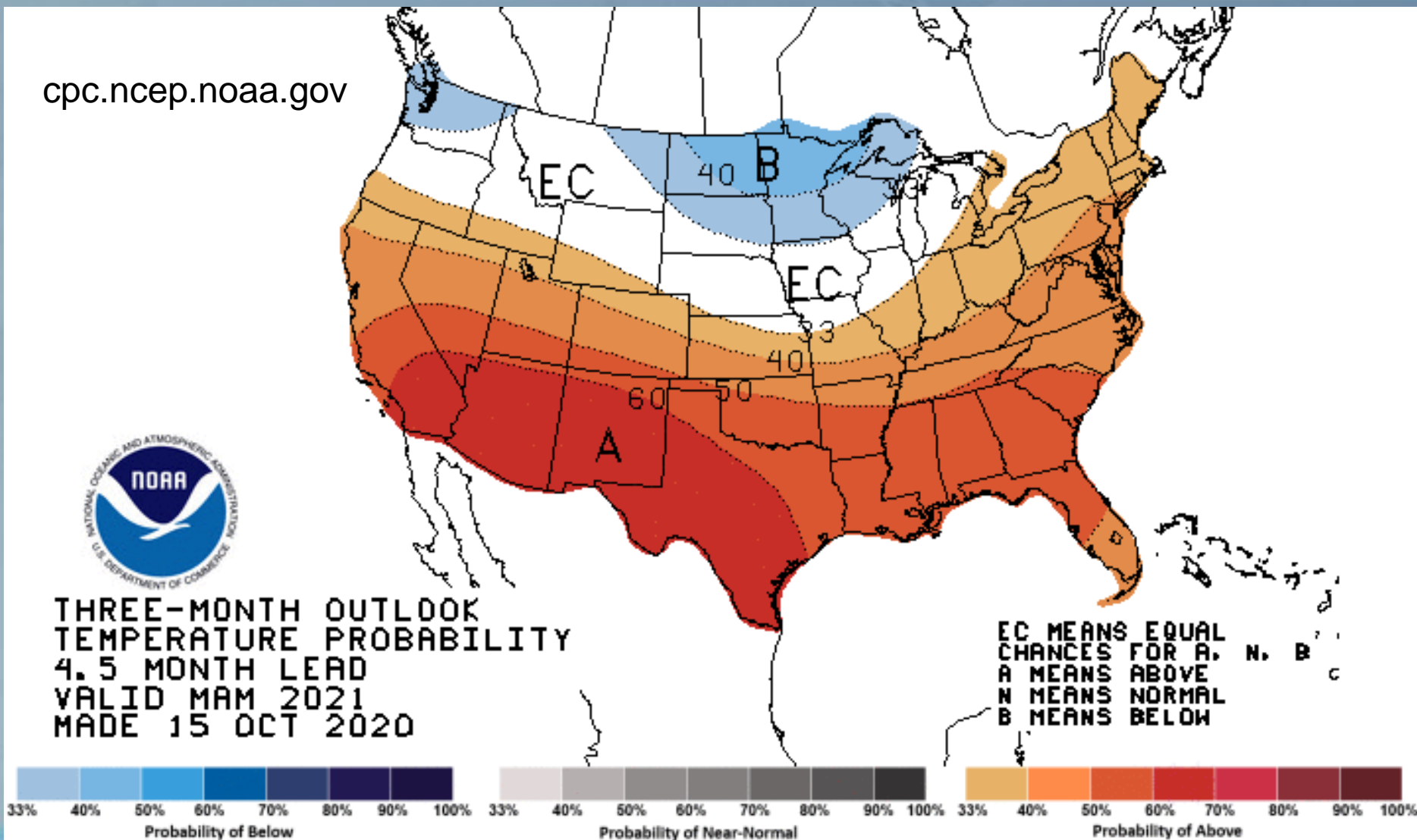
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
4.5 MONTH LEAD
VALID MAM 2021
MADE 15 OCT 2020



- Above Normal Precipitation Mar-May

Spring Outlook - Temperature

cpc.ncep.noaa.gov



- Higher confidence in Below Normal Temperatures Mar-May

Hydrologic Outlook - Refill

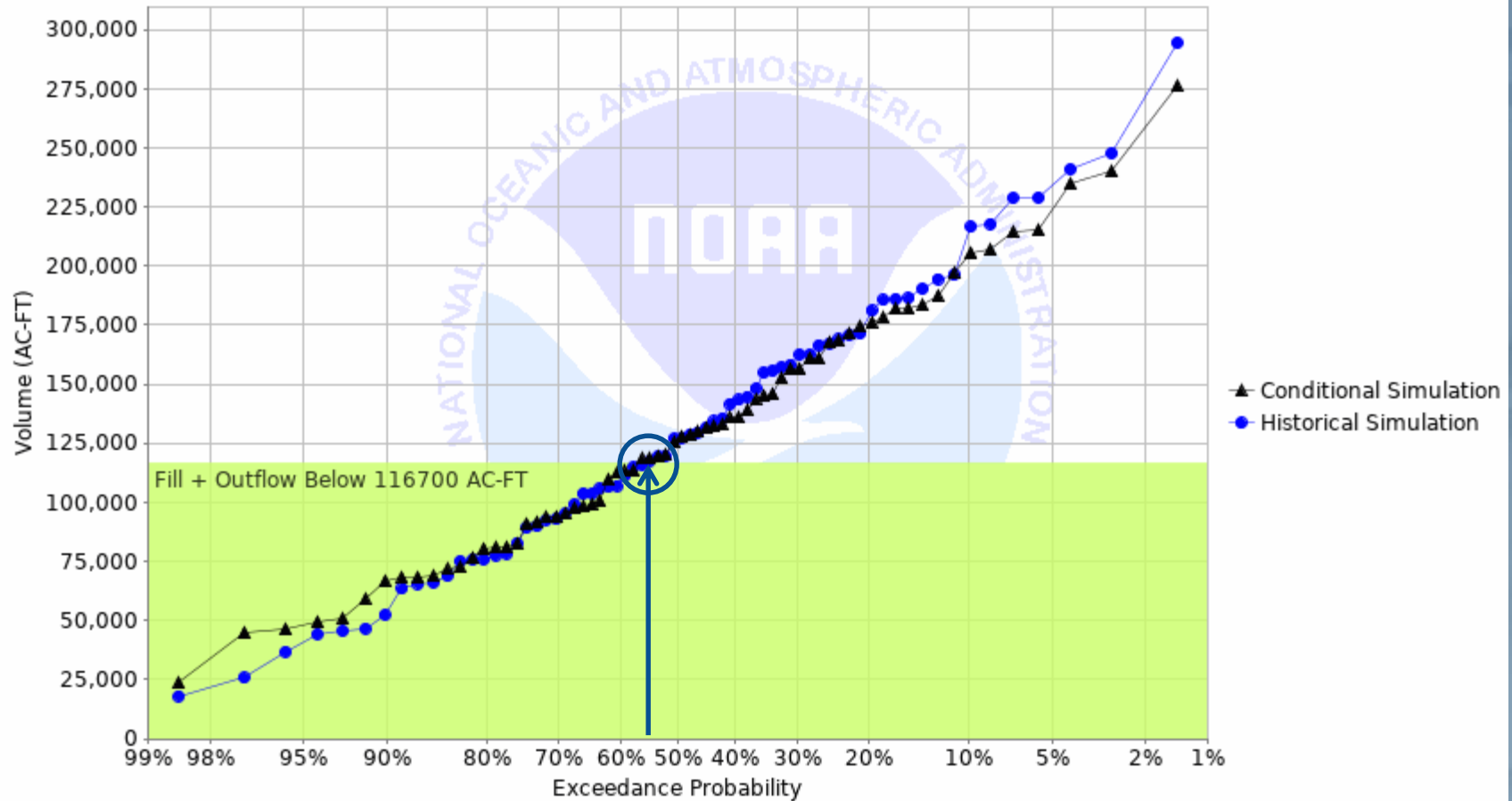
- 55% Chance of Refill Under Normal Conditions
- 85% Chance of Refill under Dry Conditions

55 Percent Chance of Refill - Normal

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

Forecast for the period 04/01/2021 - 06/01/2021

This is a conditional simulation based on the conditions as of 11/02/2020

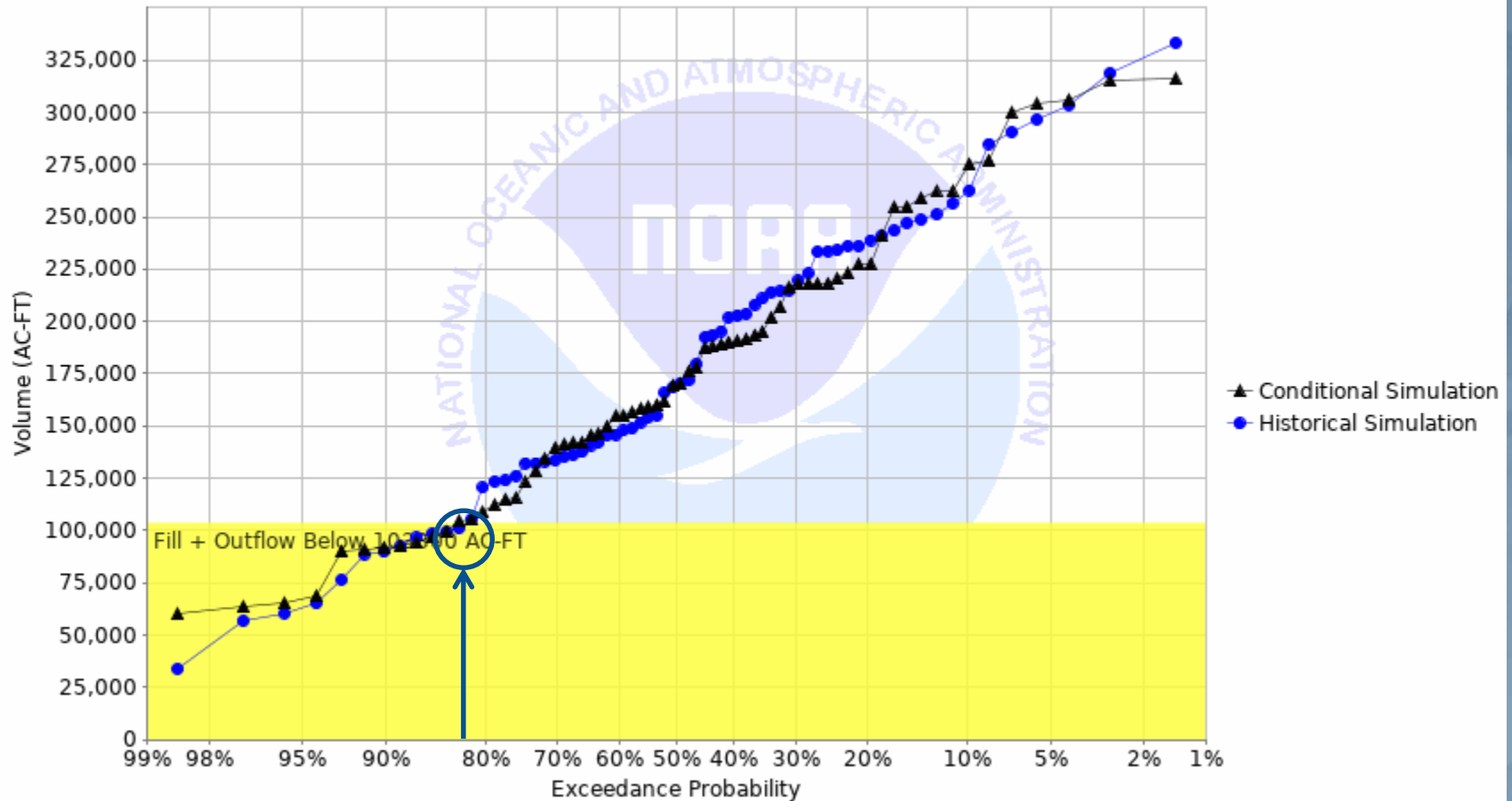


85 Percent Chance of Refill - Dry

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

Forecast for the period 04/01/2021 - 07/15/2021

This is a conditional simulation based on the conditions as of 11/02/2020



2020 Refill - Summary

- Below normal precipitation across the basin. Less impact on headwater areas of the Cloquet River Basin
- Normal to slightly below normal soil moisture
- Notable drop in soil water contents since spring
- Weather Outlook
 - Signal for above normal precipitation Dec-Feb
 - Equal chances of above or below normal Mar-May
- Hydrologic Outlook
 - 55% chance of refill under normal draw down
 - 85 % chance of refill under dry draw down
- Chances of refill will change. These changes will reflect above or below normal observed precipitation