



# Current and Future Impacts of Precipitation in Northeast Wisconsin

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**STORM**  
**TEAM**  
**5**

The logo features the words "STORM" and "TEAM" in white, bold, sans-serif capital letters, stacked vertically. To the right, a large, stylized number "5" is rendered in a metallic, brushed-silver finish with a blue and yellow flame-like shape at its base. The entire logo is set against a background of blue and yellow curved lines, suggesting motion or a storm.



# Agenda

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- Issues caused by high precipitation events
- Recent record setting years for precipitation
- Looking further back
- WI changes in 30-year precip. avg.
- Frequency of high precipitation events (0.01", 1", 2" days)
- Lake Michigan Water Levels
- Long Range Forecasts
- Questions



**STORM**  
**TEAM**

The logo features the words "STORM" and "TEAM" in a bold, sans-serif font. "STORM" is white with a blue shadow, and "TEAM" is blue with a white shadow. The text is set against a background of dynamic, swirling blue and yellow lines that create a sense of motion and energy.

# Issues related to increased precipitation

- Heavier rain events -> urban flooding
- Rising water levels creating lakeshore flooding concerns
- Erosion along lakeshore, structural damage
- Agriculture
- Snowmelt runoff, ice jams with high water levels



# Top 10 wettest years on record

- Green Bay has seen a very above average stretch of annual precip. totals
- Top two wettest years on record in the last three years
- Four of the top ten in the last 11 years
- Precipitation ends up in Lake Michigan = higher water levels
- 1981-2010 Normal Annual Precip. = **29.52in**

## Maximum 1-Year Total Precipitation for GREEN BAY A S INTL AP, WI

Click column heading to sort ascending, click again to sort descending.

| Rank | Value | Ending Date | Missing Days |
|------|-------|-------------|--------------|
| 1    | 48.63 | 2019-12-31  | 0            |
| 2    | 39.21 | 2018-12-31  | 0            |
| 3    | 38.36 | 1985-12-31  | 0            |
| 4    | 38.15 | 2010-12-31  | 0            |
| 5    | 38.03 | 1914-12-31  | 0            |
| 6    | 37.90 | 1906-12-31  | 0            |
| 7    | 37.85 | 2011-12-31  | 0            |
| 8    | 36.65 | 1990-12-31  | 0            |
| 9    | 36.23 | 1890-12-31  | 0            |
| 10   | 36.20 | 1984-12-31  | 0            |

Period of record: 1886-09-01 to 2021-01-11

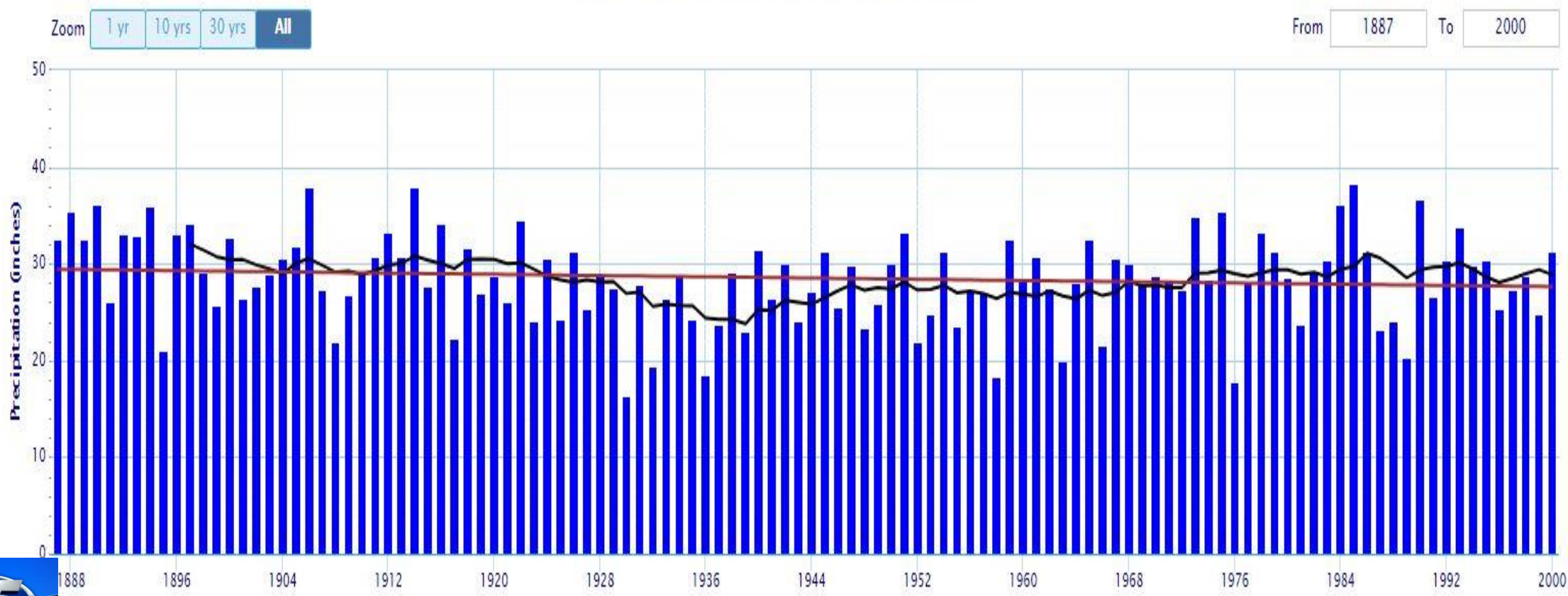


# Annual Precipitation 1887-2000

Total Precipitation - Jan through Dec - GREEN BAY A S INTL AP, WI



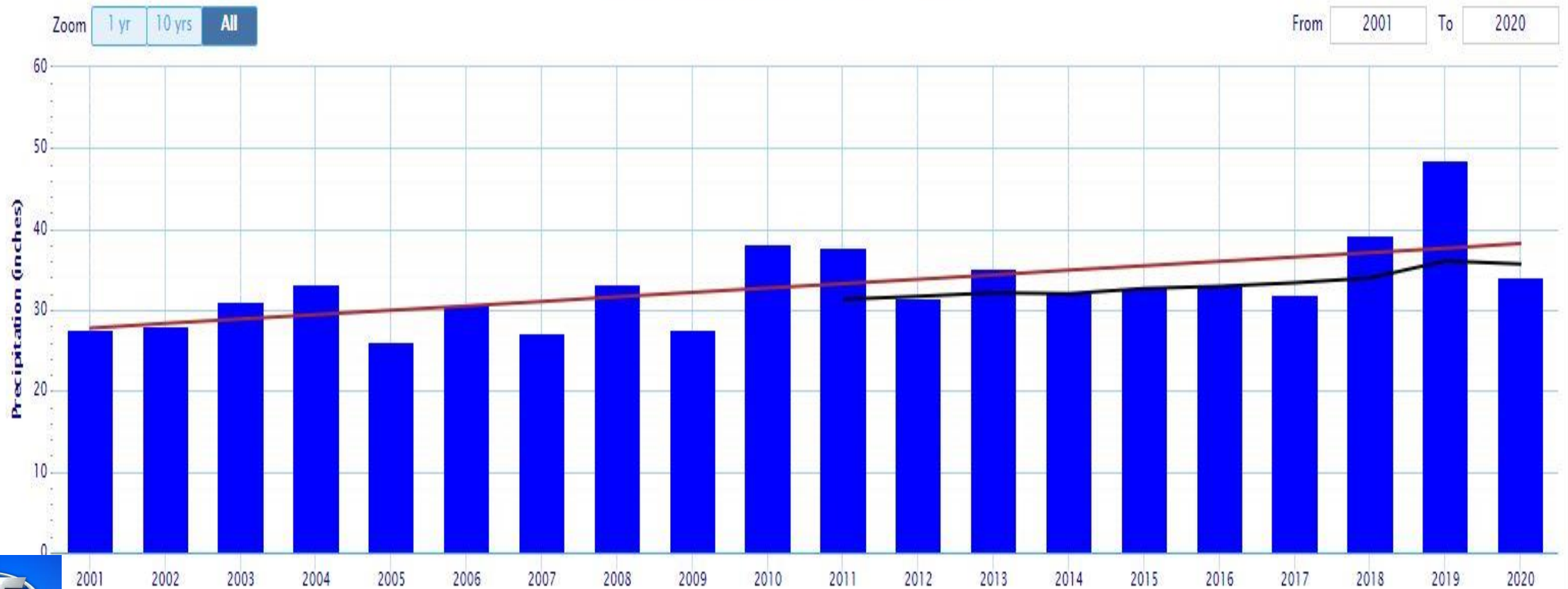
Use navigation tools above and below chart to change displayed range



# Annual Precipitation 2001-2020

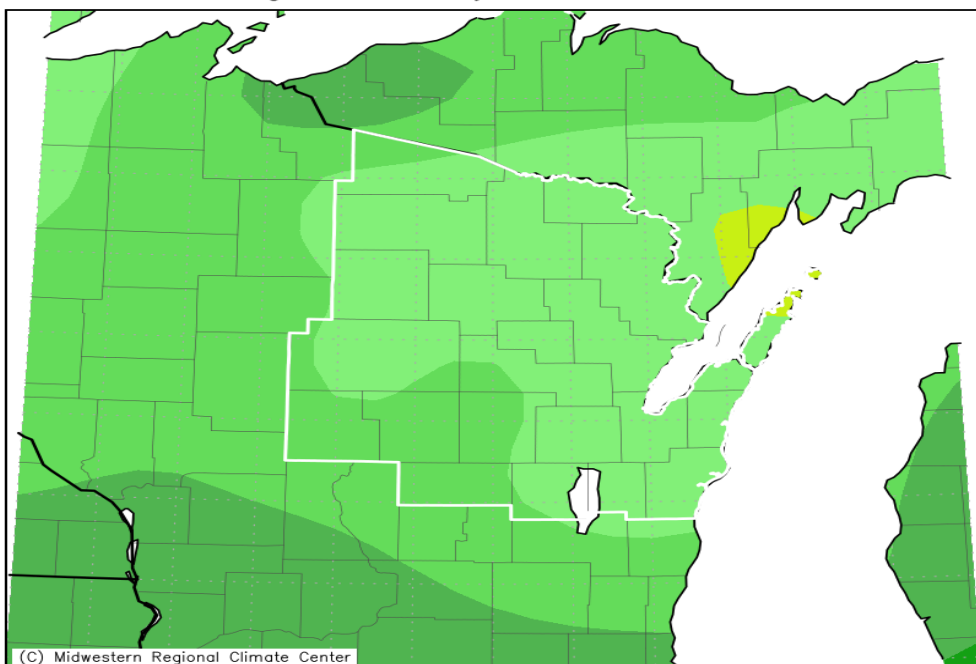
Total Precipitation - Jan through Dec - GREEN BAY A S INTL AP, WI

Use navigation tools above and below chart to change displayed range



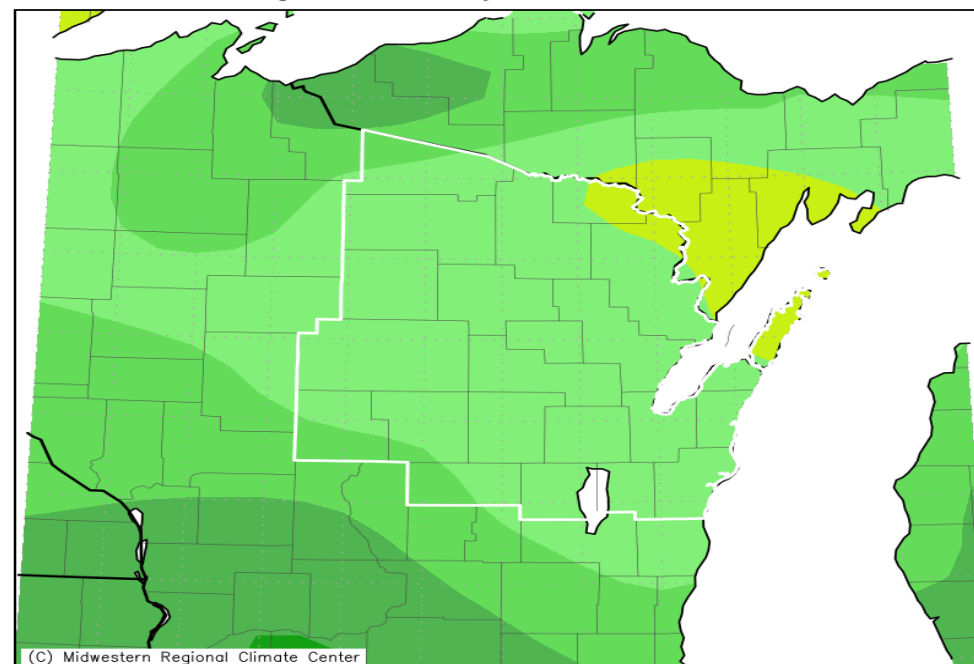
# Changes in 30-year precipitation average

Accumulated Precipitation (in): January 1 to December 31  
Averaged over 30 years: 1981 to 2010 **29.52"**



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
Generated at: 1/27/2021 10:12:20 AM CST

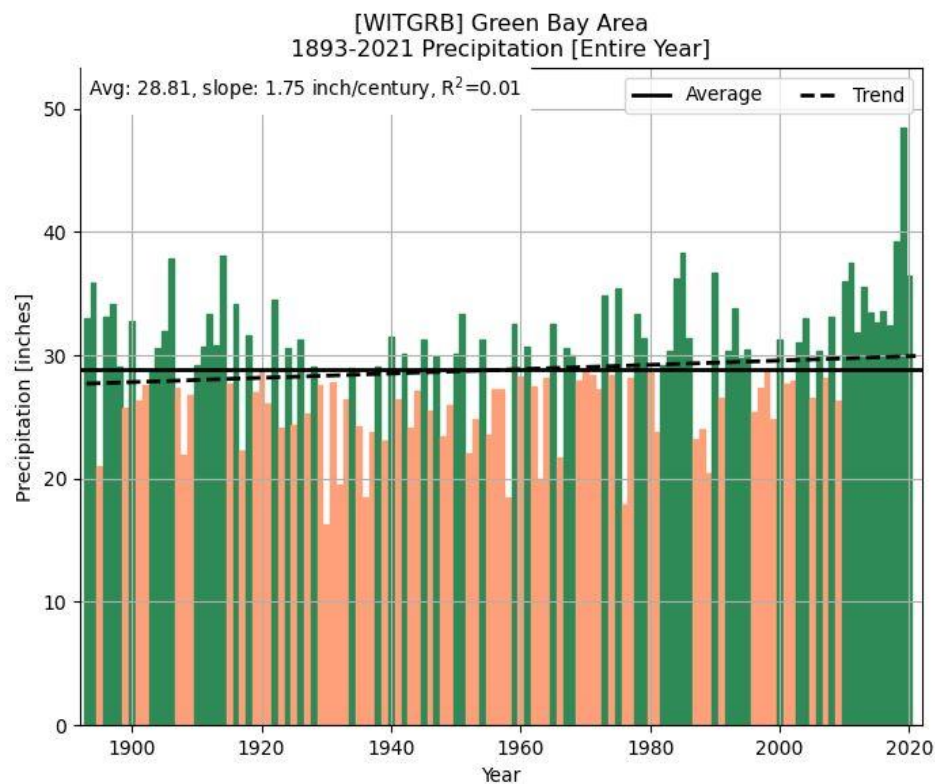
Accumulated Precipitation (in): January 1 to December 31  
Averaged over 30 years: 1991 to 2020 **31.60"**



Midwestern Regional Climate Center  
cli-MATE: MRCC Application Tools Environment  
Generated at: 1/27/2021 10:13:44 AM CST



# Precipitation totals & frequency



Generated at 12 Jan 2021 9:40 PM CST in 0.83s

IEM Autoplot App #75

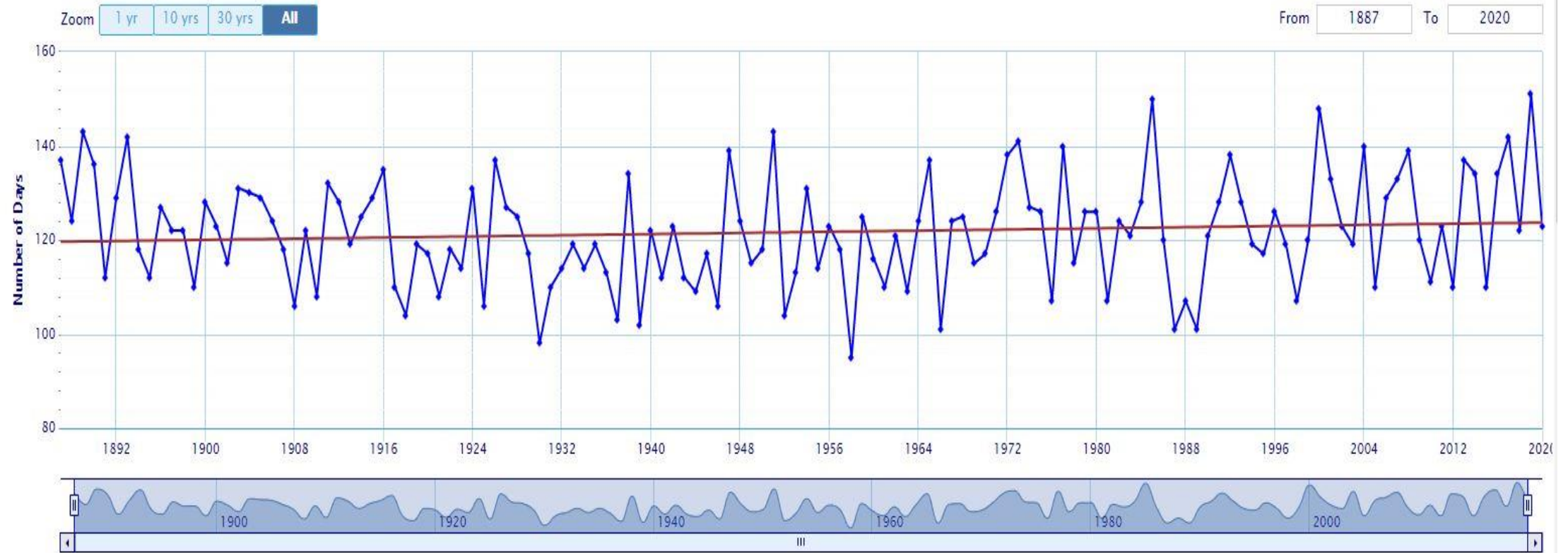
- Annual precip. compared to the 100+ year avg.
- Avg. annual precip. increasing 1.75in/century
- Most recent years precip. well above average



# Days with measurable precipitation

Number of Days Precipitation  $\geq .01$  - Jan through Dec - GREEN BAY A S INTL AP, WI

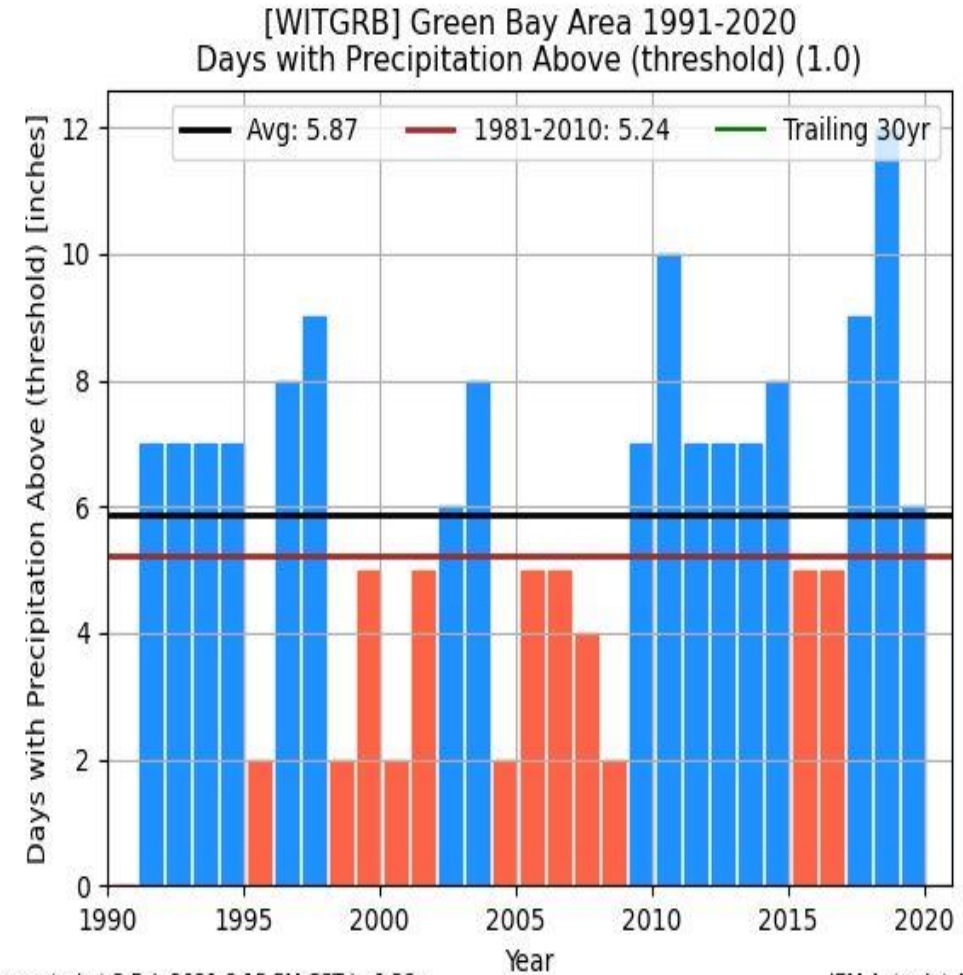
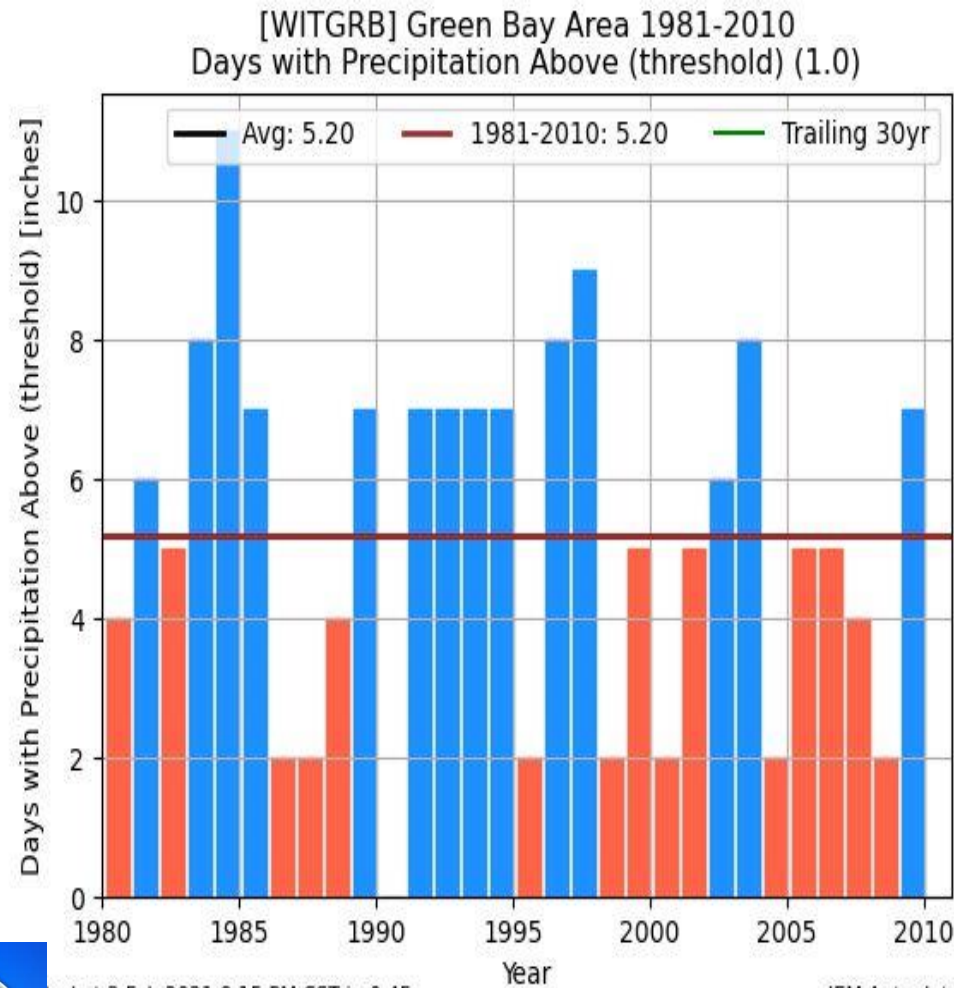
Use navigation tools above and below chart to change displayed range



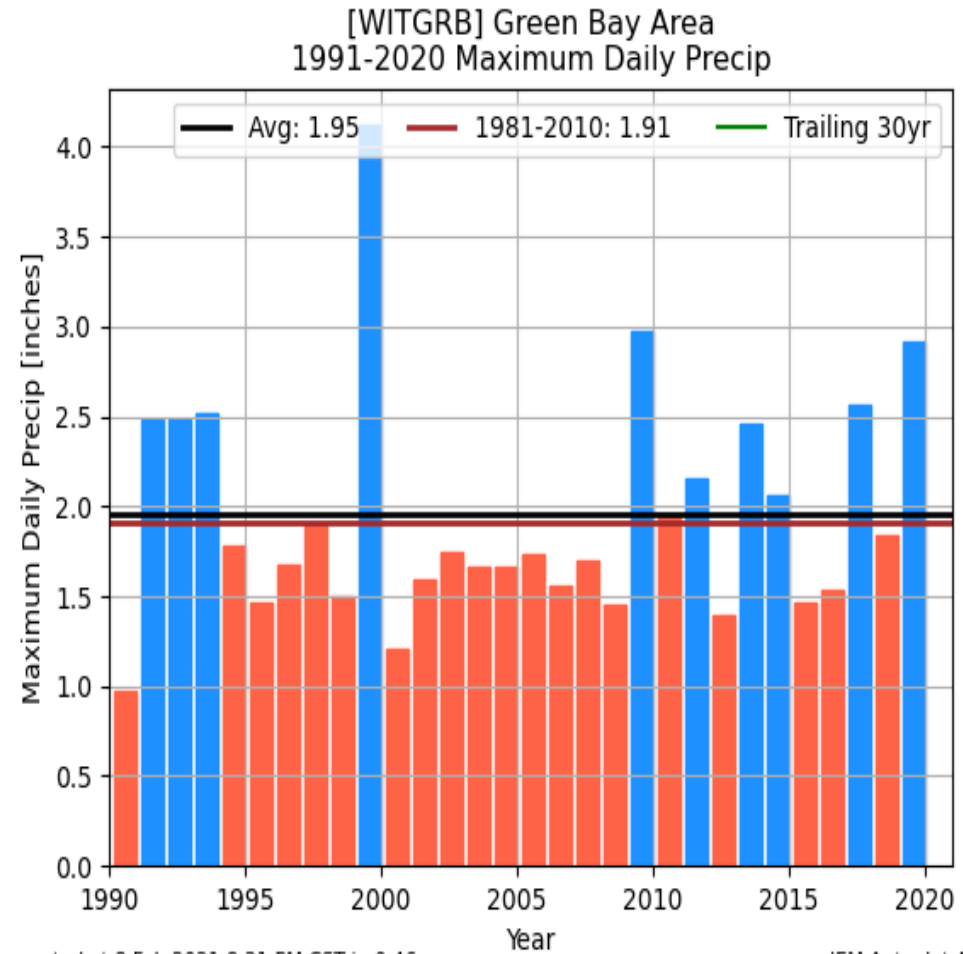
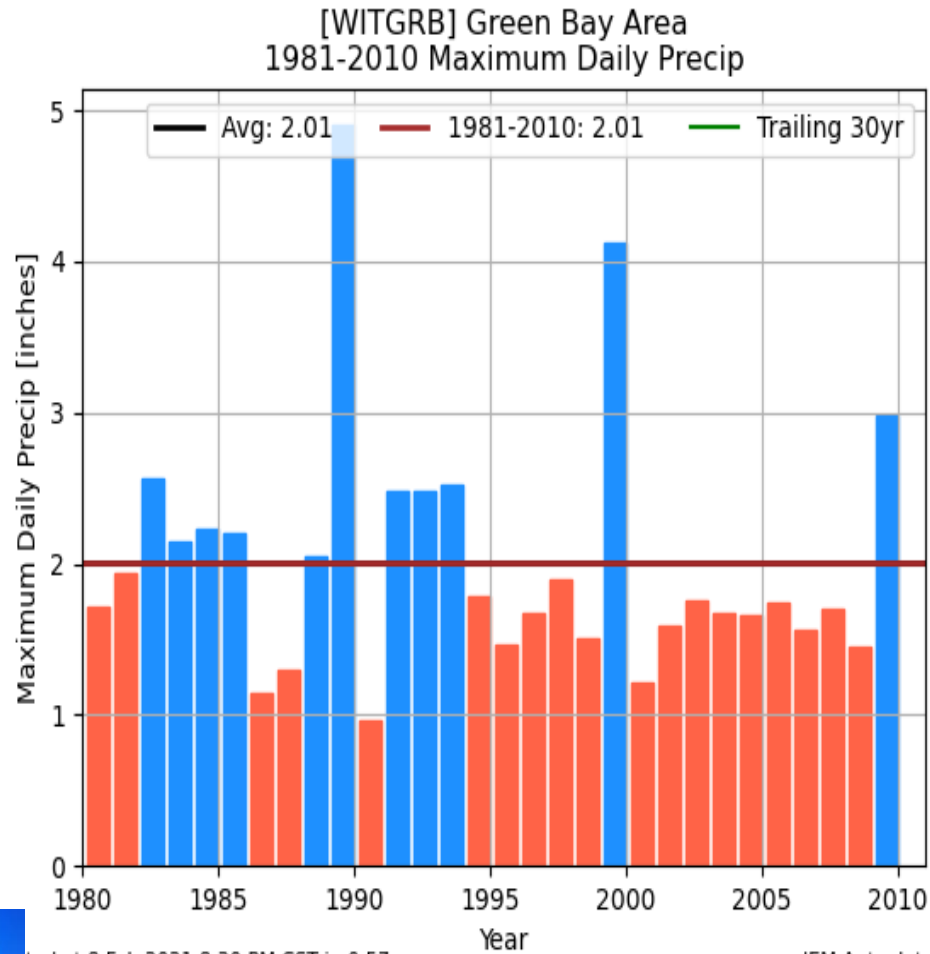
Powered by ACIS



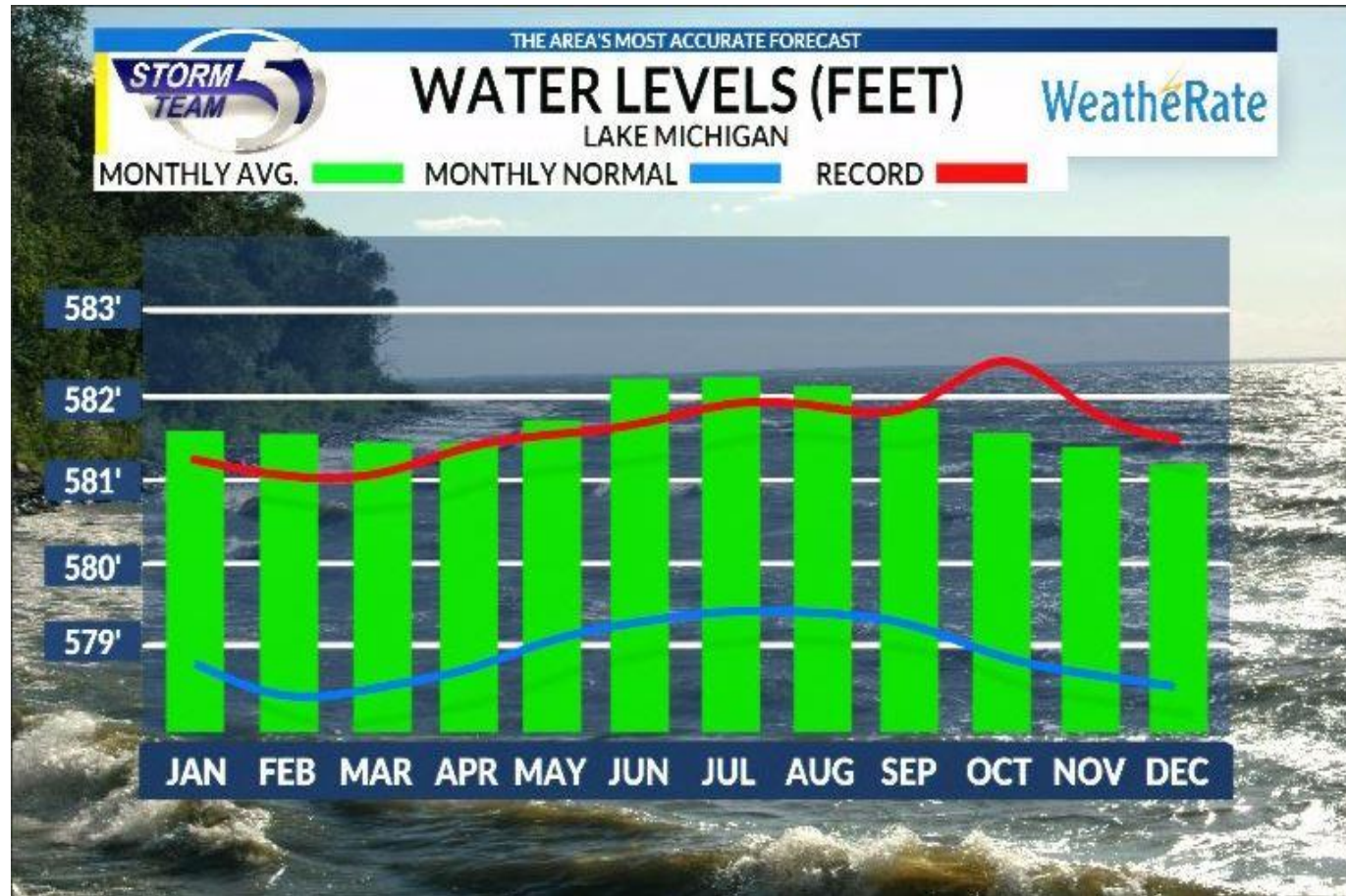
# Frequency of 1" + precipitation days



# Frequency of 2" + precipitation days



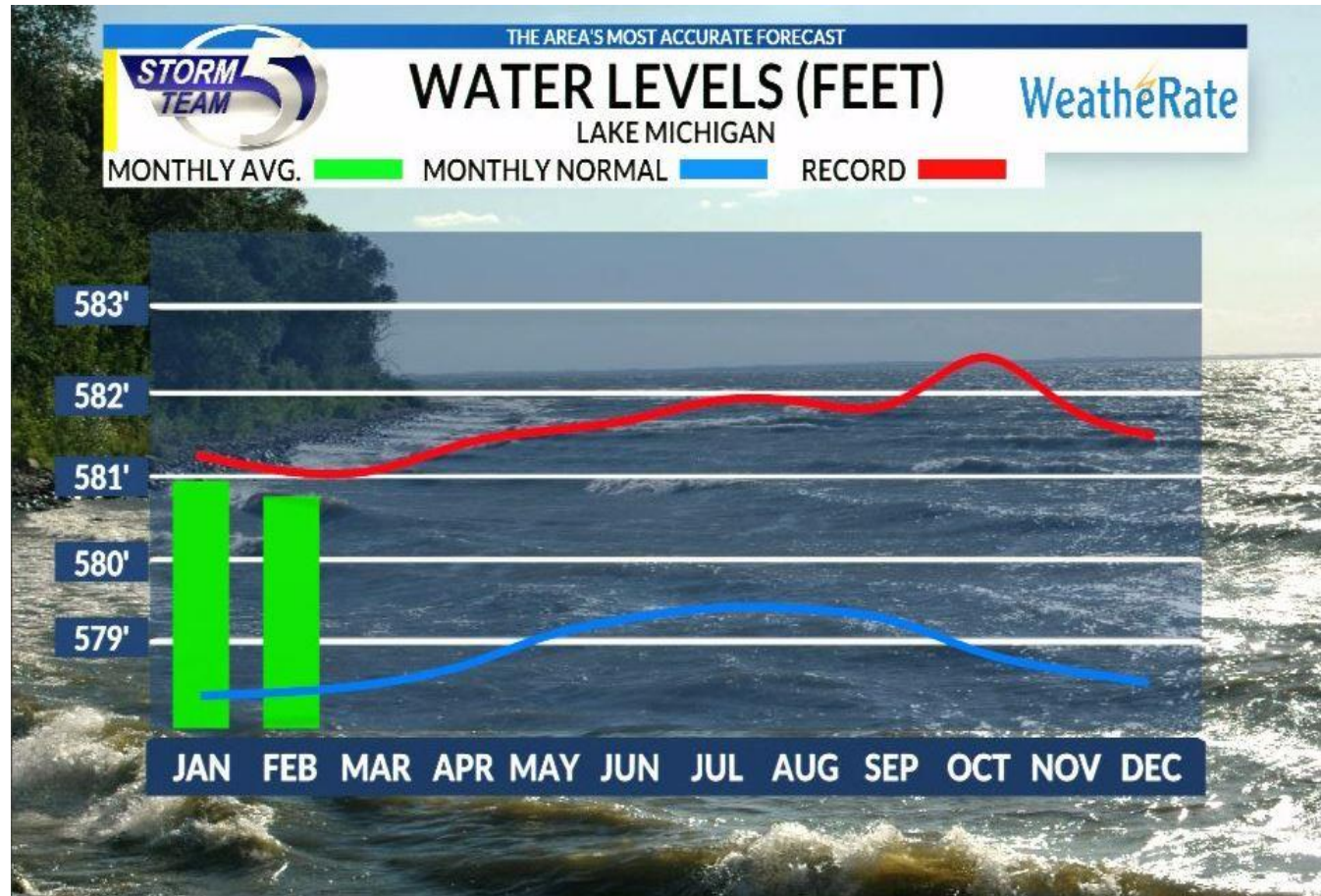
# 2020 Lake Michigan Water Data



- Several months set new records
- Dry stretch late in 2020
- Levels still remain 2' or more above normal



# 2021 Lake Michigan Water Data



- Winter brings the lowest water levels due to evaporation (lake effect snow)
- January & February both below records
- Ice formation will slow the decrease in water levels



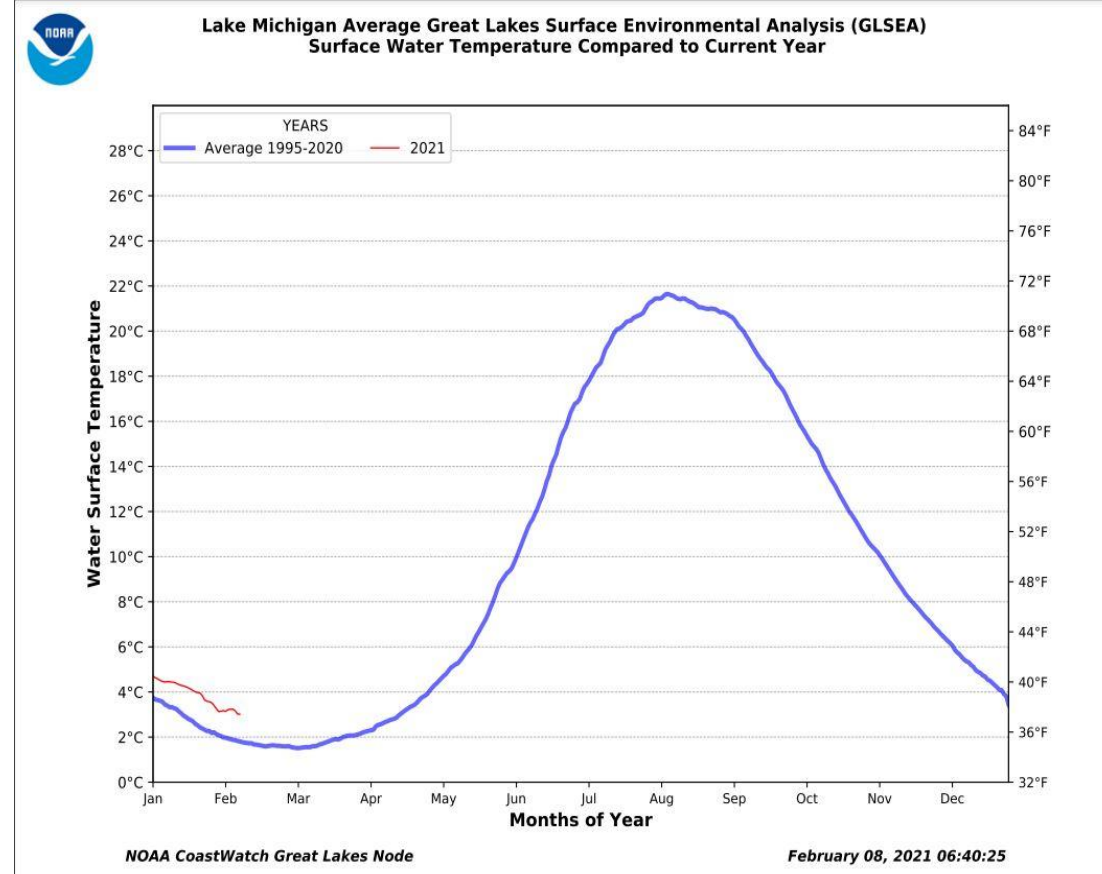
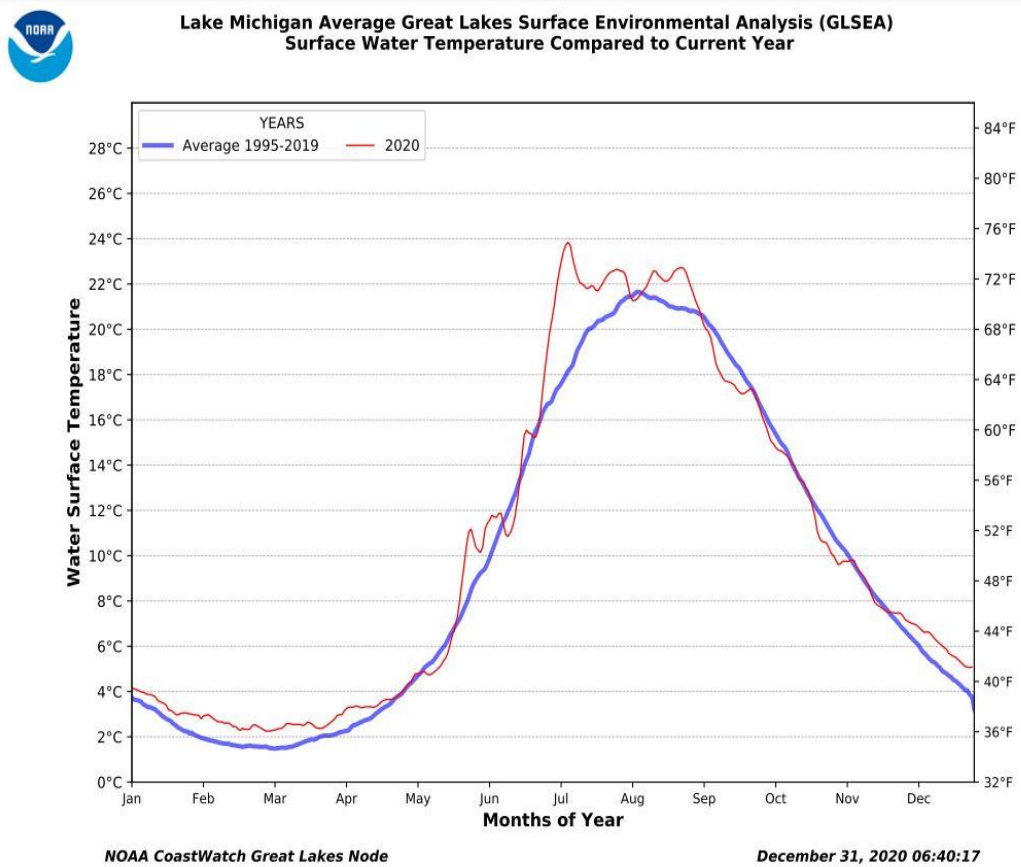
# Lake Michigan February stats

- Current level: 580.74'
- Down 4" from this time in January
- Down 10" from this time in 2020
- Still above by 28" from long-term monthly average
- Expected to fall 1" by early March

|                                                                      | SUPERIOR | MICH-HURON | ST. CLAIR | ERIE   | ONTARIO |
|----------------------------------------------------------------------|----------|------------|-----------|--------|---------|
| Forecasted Water Level for Feb 5, 2021 (feet)                        | 602.00   | 580.74     | 576.18    | 573.03 | 244.69  |
| Chart Datum (feet)                                                   | 601.10   | 577.50     | 572.30    | 569.20 | 243.30  |
| Difference from chart datum (inches)                                 | +11      | +39        | +47       | +46    | +17     |
| Difference from average water level for Jan 5, 2021 (inches*)        | -3       | -4         | -2        | -2     | -4      |
| Difference from average water level for Feb 5, 2020 (inches*)        | -7       | -10        | -9        | -10    | -22     |
| Difference from long-term monthly average of Feb (inches)            | +9       | +28        | +32       | +26    | -1      |
| Difference from highest monthly average of record for Feb (inches)** | -6       | -4         | -7        | -5     | -27     |
| Year of highest recorded monthly mean**                              | 1986     | 1986       | 1986      | 1987   | 1952    |
| Difference from lowest monthly average of record for Feb (inches)    | +29      | +56        | +68       | +58    | +31     |
| Year of lowest recorded monthly mean                                 | 1926     | 1964       | 1926      | 1936   | 1936    |
| Projected net change in levels by Mar 5, 2021 (inches)               | -3       | -1         | 0         | +1     | 0       |

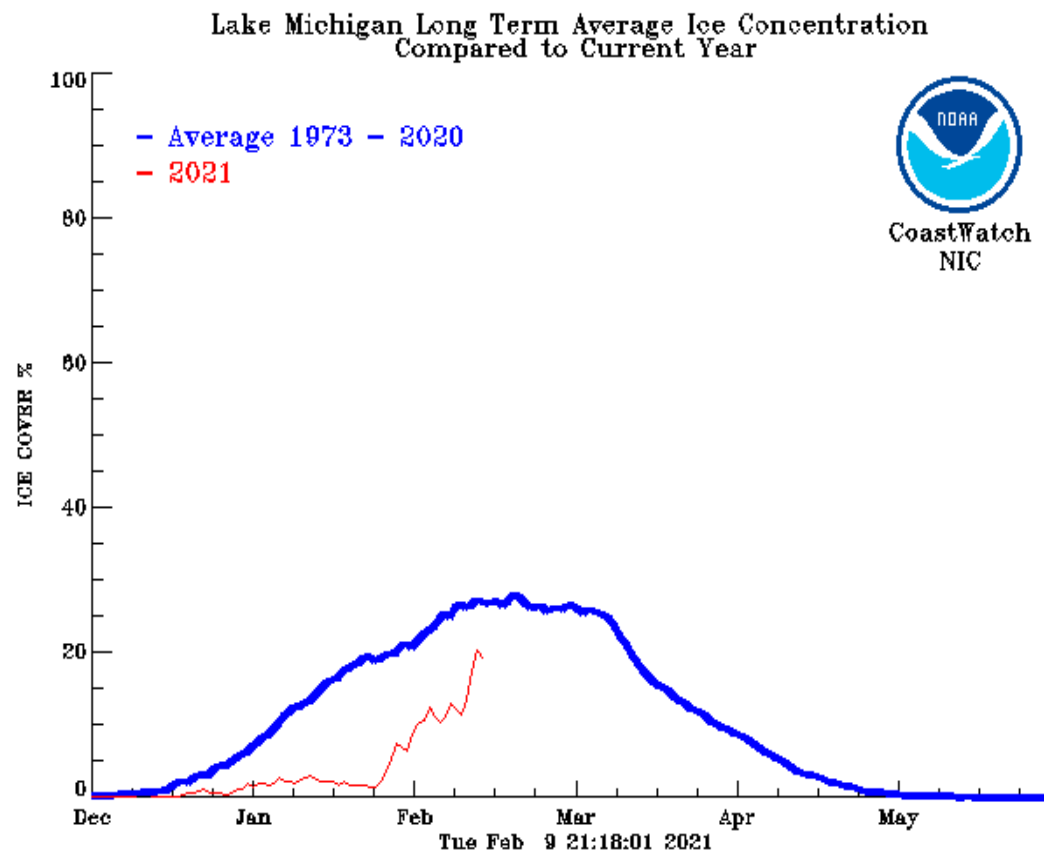


# Lake Michigan Water Temperature

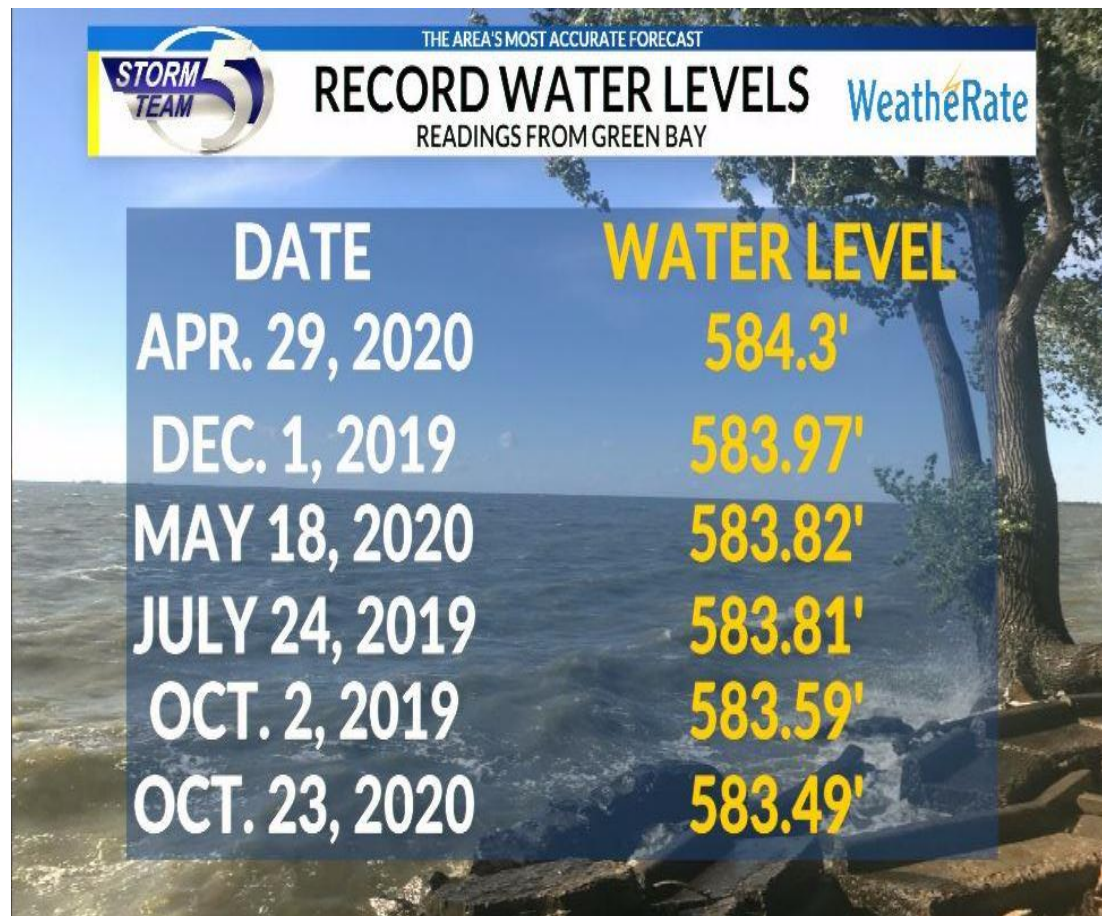


# Lake Michigan Ice Coverage

- Ice cover well below average
- Current Ice Concentration: 18.0%
- More open water should increase evaporation
- Dependent on supply of cold air



# Record Water Levels

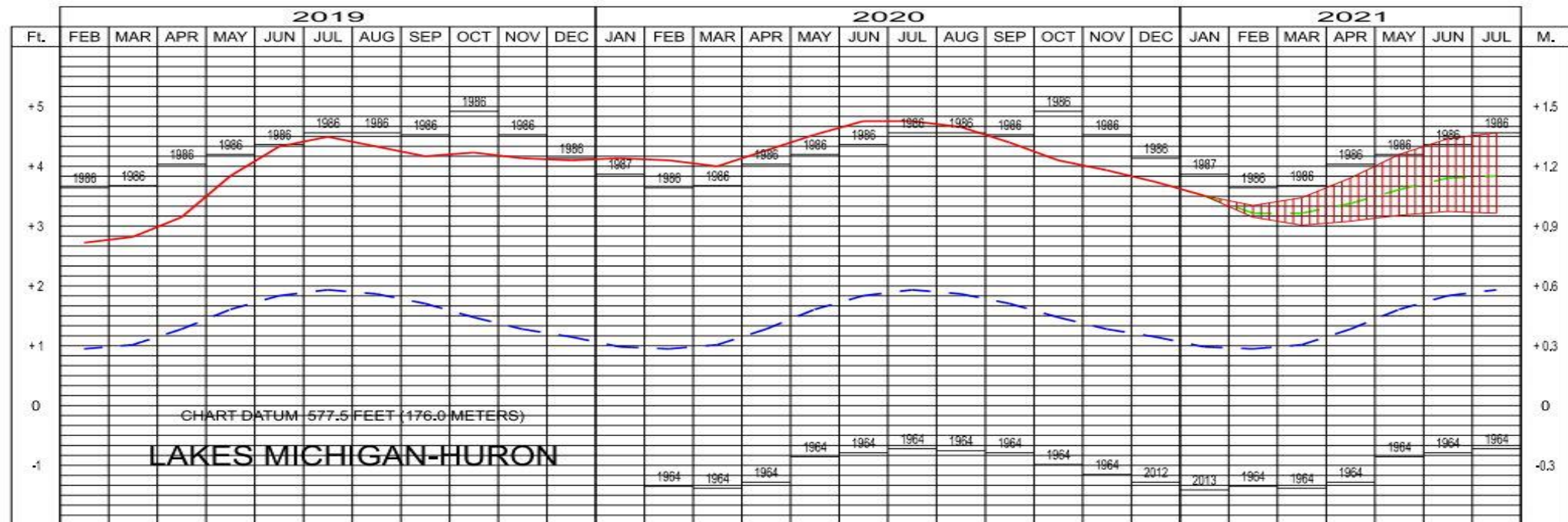


- Highest water levels all in the last few years
- NE winds most common to rising water – winds work against current of Fox/East River
- Peak early spring & late fall with larger storm systems
- Top event occurred with 58 mph wind gust



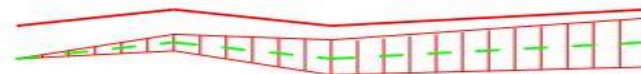
# Lake Michigan Water Level Forecast

LAKES MICHIGAN-HURON WATER LEVELS - FEBRUARY 2021

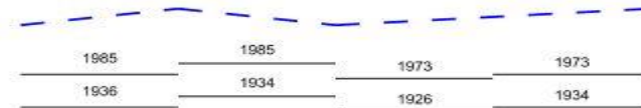


**LEGEND**  
LAKE LEVELS

RECORDED  
PROJECTED



AVERAGE \*\*  
MAXIMUM \*\*  
MINIMUM \*\*

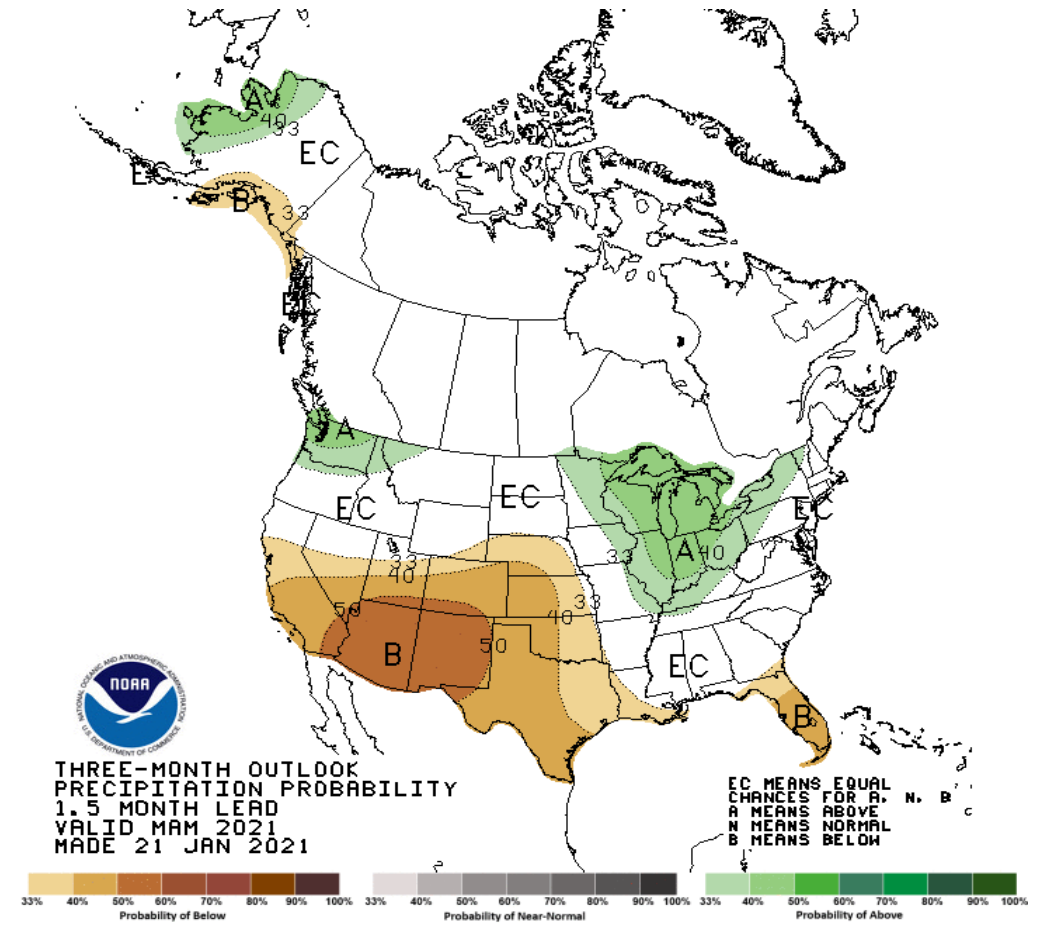
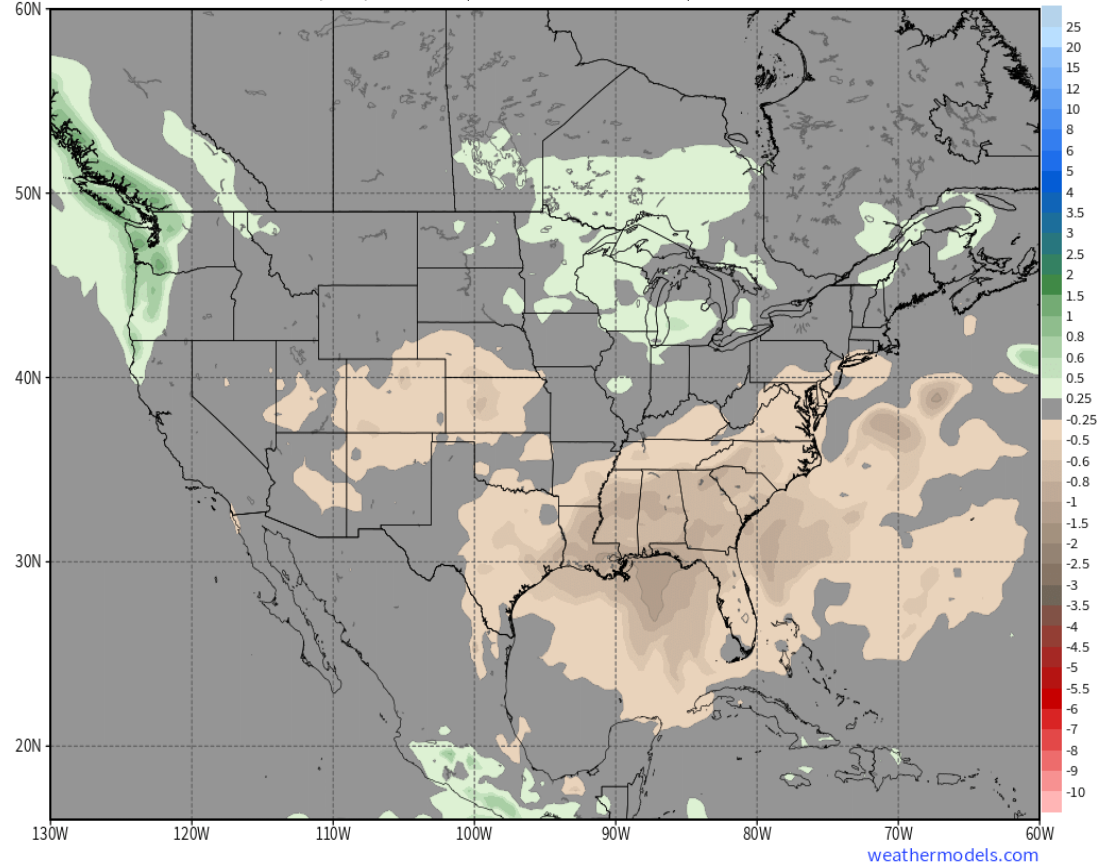


\*\* Average, Maximum and Minimum for period 1918-2019



# March, April, May Precipitation Outlook ECMWF & CPC guidance

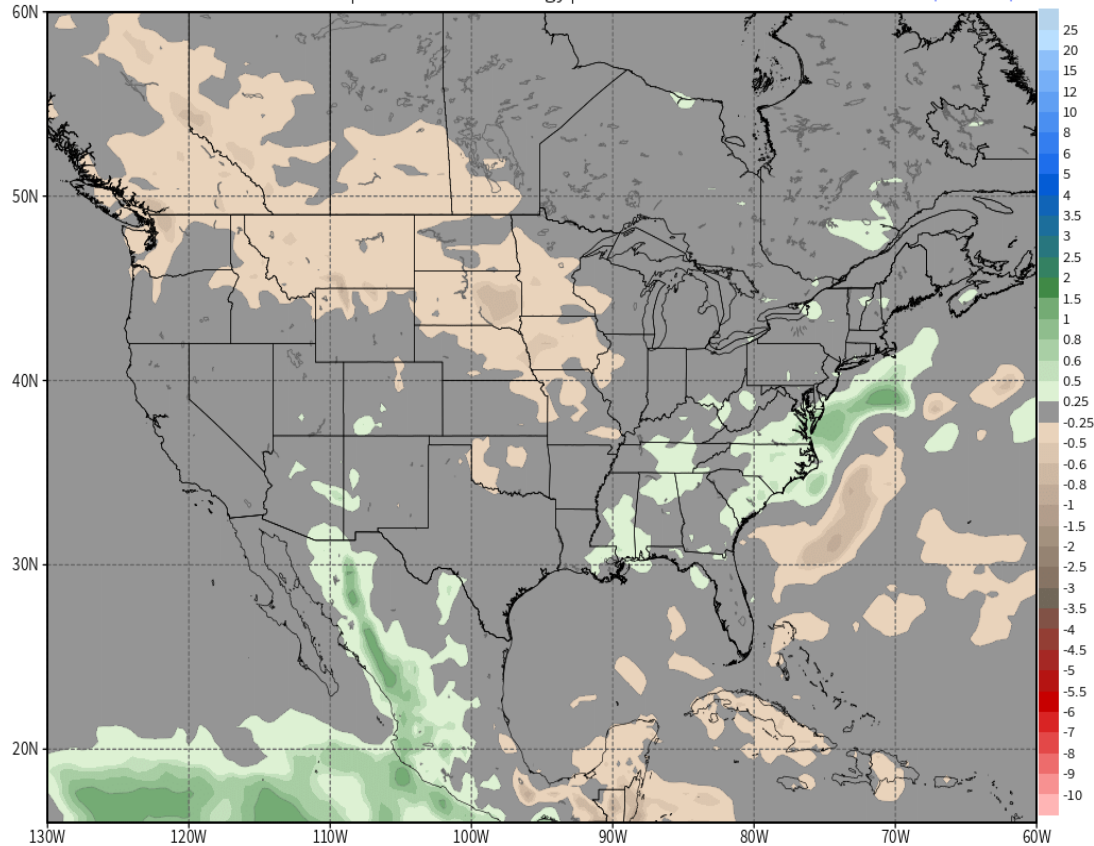
ECMWF SEAS-5 | Precipitation Anomaly [inch] | Seasonal Ensemble Mean  
Forecast Init: 20210201 --> MAR/APR/MAY 2021 | 1993-2016 Climatology | 51 Ensembles  
MIN|MAX: -1.3 | 1.2 INCH



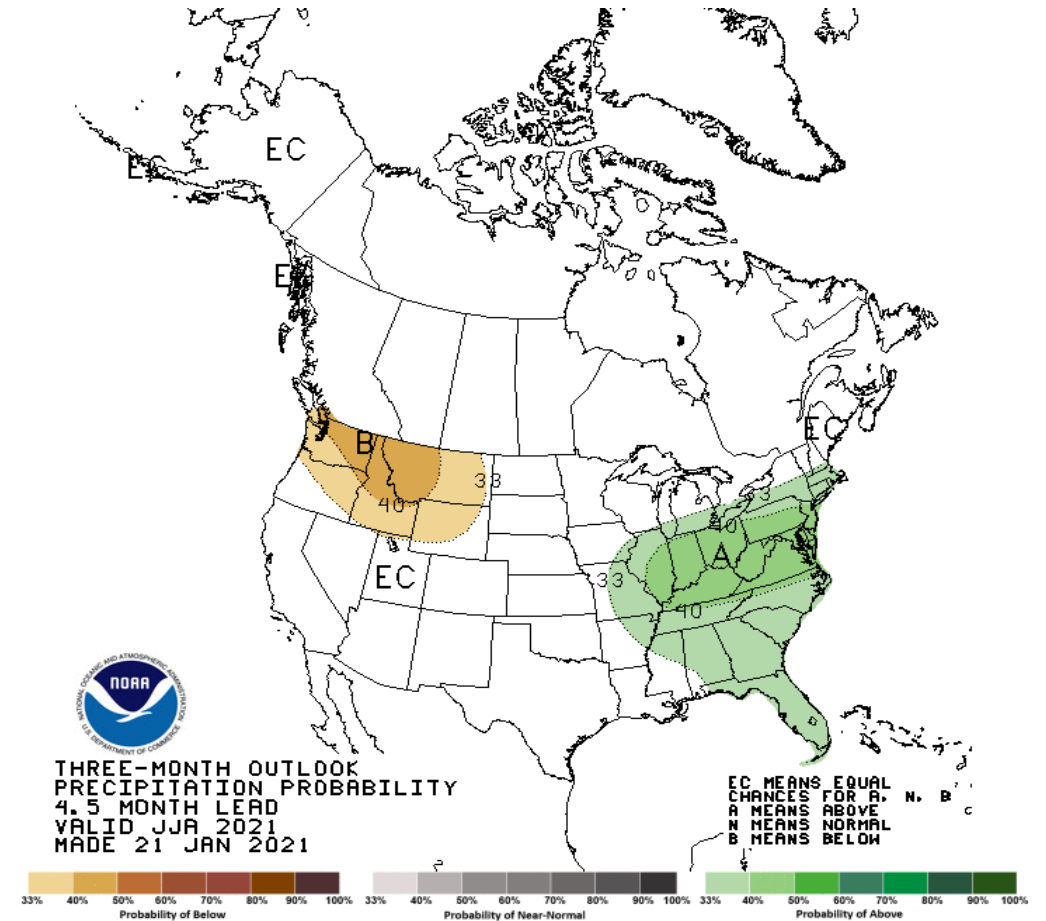
# June, July, August Precipitation Outlook ECMWF & CPC guidance

ECMWF SEAS-5 | Precipitation Anomaly [inch] | Seasonal Ensemble Mean  
Forecast Init: 20210201 --> season | 1993-2016 Climatology | 51 Ensembles

MIN|MAX: -1.0 | 1.5 INCH



weathermodels.com



# References

- Climate Prediction Center
- Iowa Environmental Mesonet
- Midwest Regional Climate Center
- Great Lakes Environmental Research Laboratory
- NOAA Coast Watch
- US Army Corps of Engineers



# Thank you!

Questions?

