North Central U.S. Climate Summary and Outlook Webinar November 21, 2019



Western KS, early November pic provided by Mary Knapp



Frankfort, KY, Chip Zimmer Nov 12 2019



Columbia, MO, P. Guinan October 31, 2019

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General Information

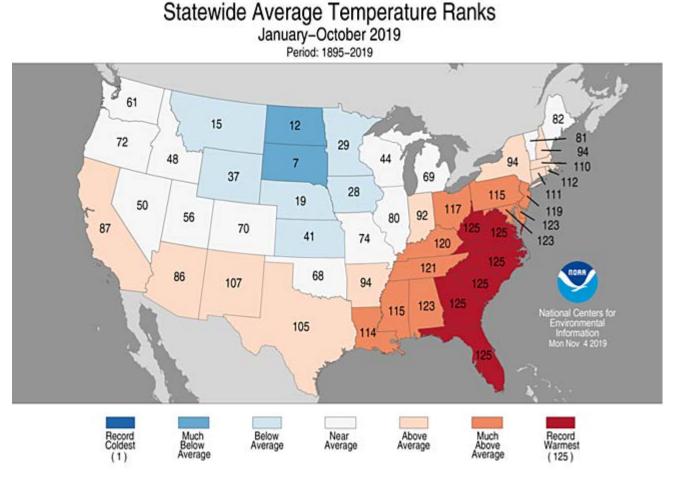
- Providing climate services to the Central Region
 - Collaboration Activity Between:
 - USDA Climate Hubs
 - American Association of State Climatologists
 - Midwest and High Plains Regional Climate Centers
 - NOAA NCEI/NWS/OAR/NIDIS
 - National Drought Mitigation Center
- Next Climate/Drought Outlook Webinar
 - Thursday, Dec 19, 2019, Adnan Akyüz, North Dakota State Climatologist
- Access to Future Climate Webinars & Past Recordings can be found here:
 - http://mrcc.isws.illinois.edu/multimedia/webinars.jsp
 - http://www.hprcc.unl.edu/webinars.php
- Open for questions at the end

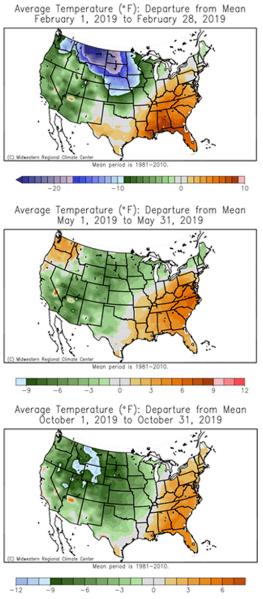
Agenda

- Jan-Oct and October Recap
- November Conditions
- Snow/Water/Flood/Drought
- Agriculture
- State Impacts
- Climate Outlooks
- Questions/Comments

Jan-Oct Recap

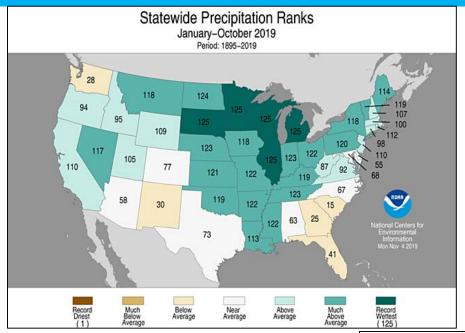
The contiguous U.S. Jan-Oct temperature was 0.5°F above the 20th century average.





https://www.ncdc.noaa.gov/sotc/national/201910

The contiguous U.S. Jan-Oct precipitation was 30.25 inches, or 4.89 inches above the 20th century average, making it the wettest Jan-Oct in the 125-yr POR.



States with wettest

Jan-Oct on record

South Dakota

Minnesota

Wisconsin

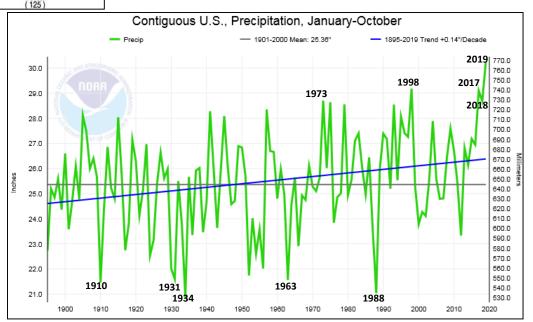
Illinois

Michigan

Contiguous U.S.
Top 5 wettest
Jan-Oct on record

- 1. 2019
- 2. 1998
- 3. 2017
- 4. 1973
- 5. 2018

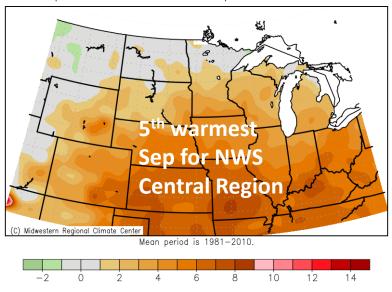
Period of record: 1895-2019



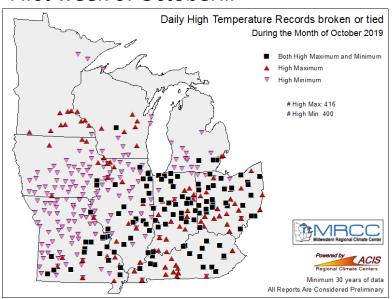
October Recap

Major pattern change from September into October

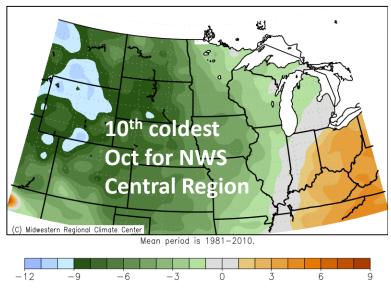
Average Temperature (°F): Departure from Mean September 1, 2019 to September 30, 2019



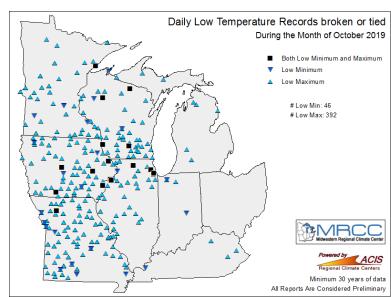
First week of October...



Average Temperature (°F): Departure from Mean October 1, 2019 to October 31, 2019

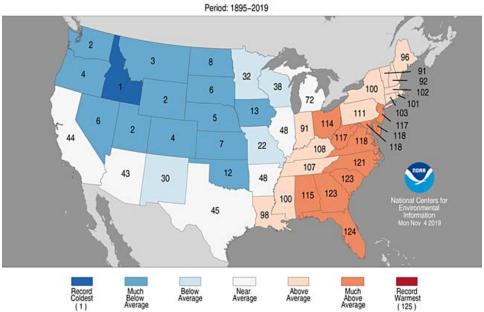


Last week of October...



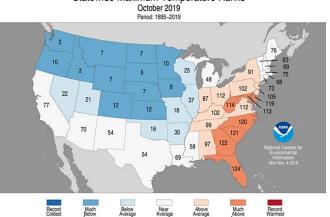
The contiguous U.S. October temperature was 1.8°F below the 20th century average; it was the coolest October since 2009.

Statewide Average Temperature Ranks October 2019

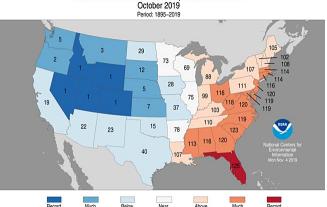


- Cooler than average from **Pacific Northwest to generally** west of the Mississippi River
- Warmer than average generally east of the Mississippi River.
- Top 10 Coldest for NW quarter U.S. vs Top 10 Warmest for Mid-Atlantic/SE U.S.
- Coldest Oct on record for Idaho

Statewide Maximum Temperature Ranks



Statewide Minimum Temperature Ranks



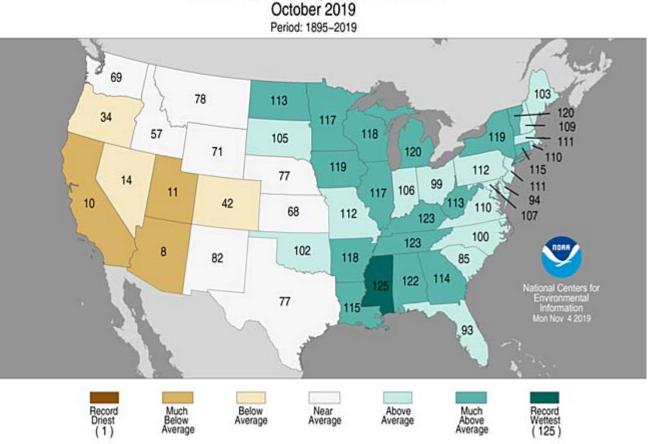
- Record cold min temps: ID, NV, WY, **UT and CO**
- Record warm min temp: Florida

of Oct Daily Records

Max Temp Min Temp 2,620 4.479

https://www.ncdc.noaa.gov/temp-and-precip/us-maps/3/201910#us-maps-select

The contiguous U.S. October precipitation was 3.14 inches, or 0.98 inches above the 20th century average, making it the 8th wettest October in the 125-yr POR.

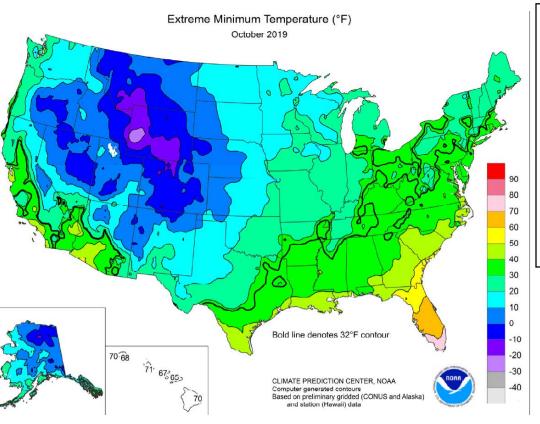


Statewide Precipitation Ranks

- Above average precipitation across the eastern half of U.S. including the Dakotas & OK.
- Below average precipitation across the western U.S. including OR, CA, NV, UT, AZ and CO.
- Top 10 driest October for CA and AZ vs Top 10 wettest October for several states in eastern half of U.S. and wettest October on record for MS.

https://www.ncdc.noaa.gov/temp-and-precip/us-maps/3/201910#us-maps-select

An early-season snowstorm across the Rockies and Midwest was accompanied by bitter cold temperatures during the last week of October. All-time low temperature records for October were set across the West with many locations from MT to NM dipping below zero.



All-time State Daily Minimum Temperature Records for October

State Location Date Min Temp (°F)

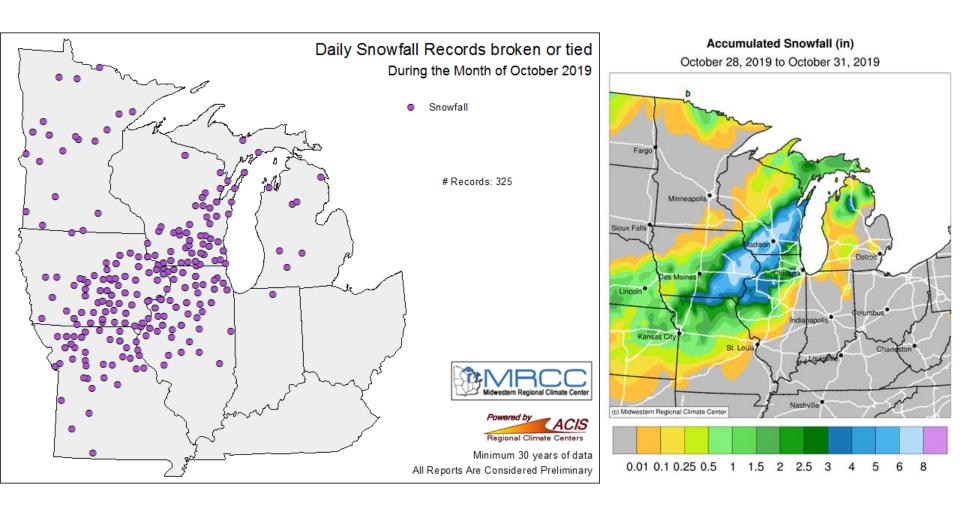
Utah Peter Sink 30 -46*

Idaho Daniel Fish Hatchery 30 -34

*Contiguous U.S. record for October

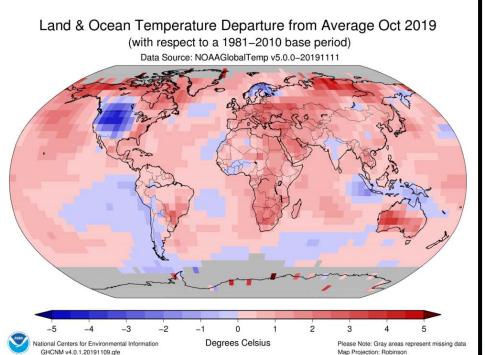
PUT SNOW PICTURE FROM WEST HERE!!

Unusual late October snowstorm across the Midwest



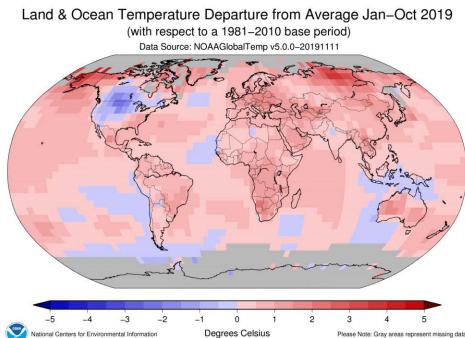
Global Recap

Global Temperature Departure from Average for October 2019



- 2nd warmest October on record for the globe (+1.76°F); 2015 is the warmest.
- The most notable cooler-than-average temperatures were found across the western half of the contiguous U.S. and southwestern Canada. (≤ -2.7°F)

Global Temperature Departure from Average for January-October 2019

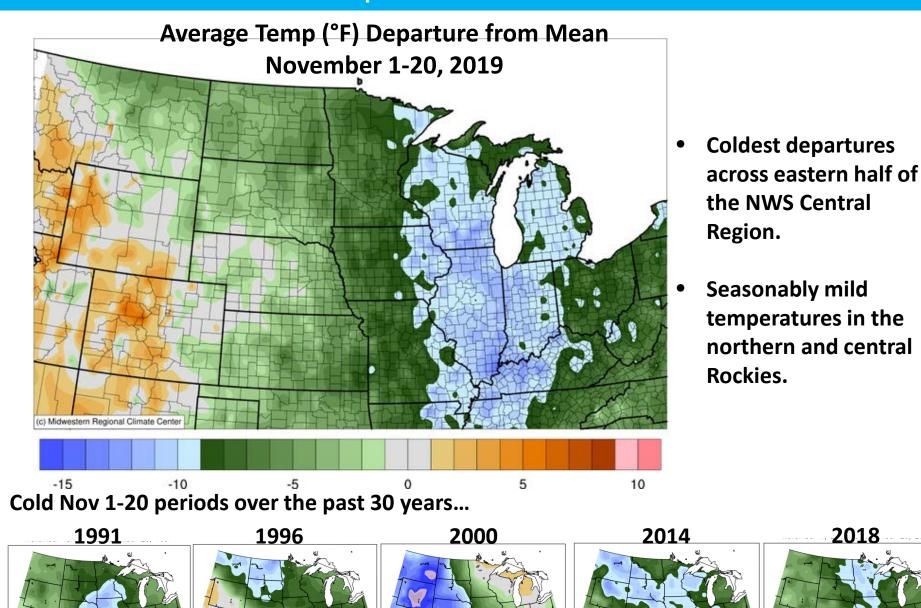


- 2nd warmest Jan-Oct on record for the globe (+1.69°F); 2016 is the warmest.
- The most notable cooler-than-average temperatures were found across the north central U.S. and south central Canada. (≤ -1.8°F)

GHCNM v4 0 1 20191109 afe

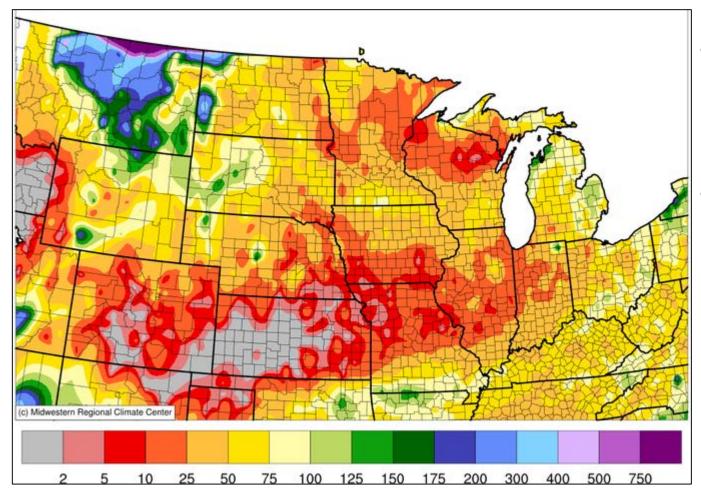
November Conditions

The cold October conditions spilled into November across the North Central U.S.



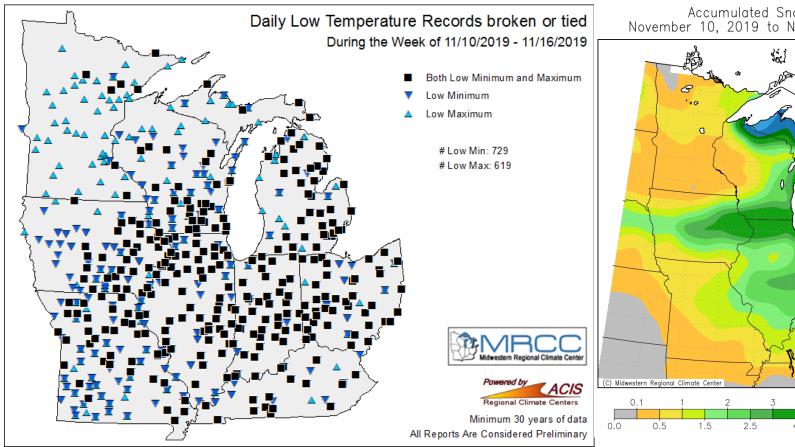
Dry conditions have prevailed in November across the North Central Region.

Precipitation Percent of Mean November 1-20, 2019

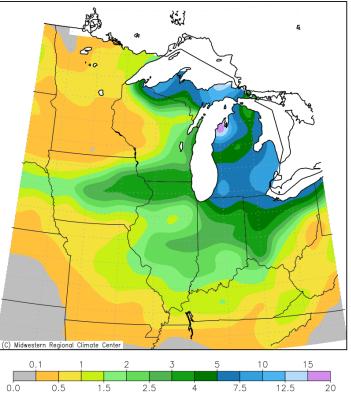


- Below average precipitation over much of the North Central Region.
- Pockets of wetter conditions in MT, north central WY, western ND

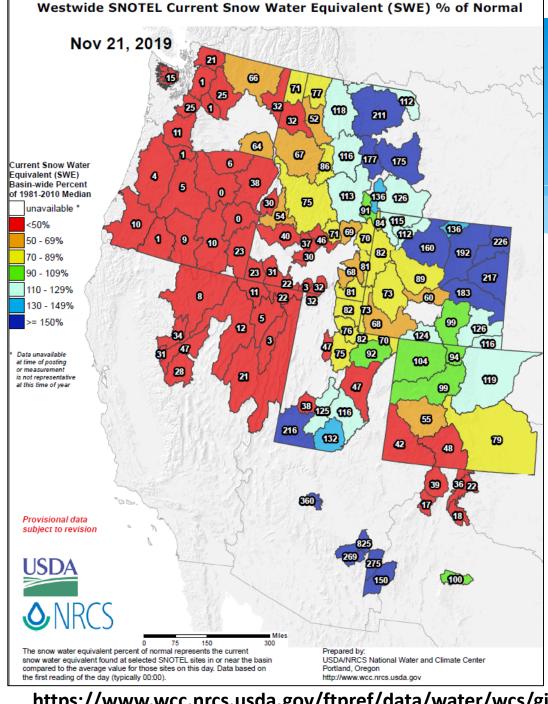
Cold and Snowy November period



Accumulated Snowfall (in) November 10, 2019 to November 16, 2019



Snow/Water

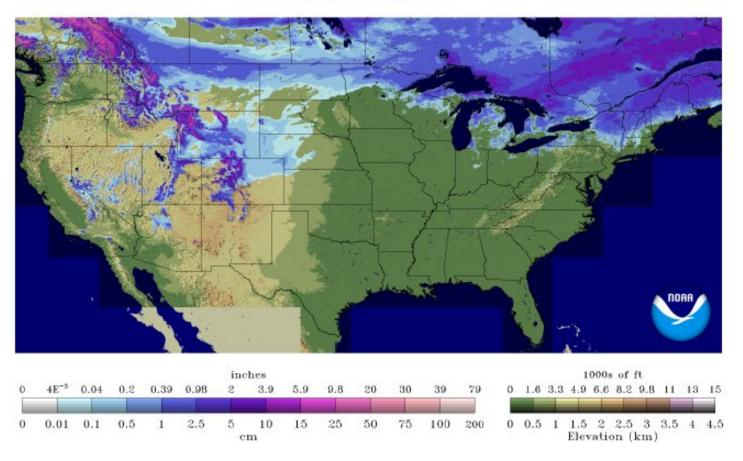


NRCS Snow Water Equivalent

- * Some watersheds in western MT, northern and eastern WY and north central CO are in excess of 100% SWE
- * Less than 50% SWE for the Pac NW, Great Basin, and southwestern Colorado

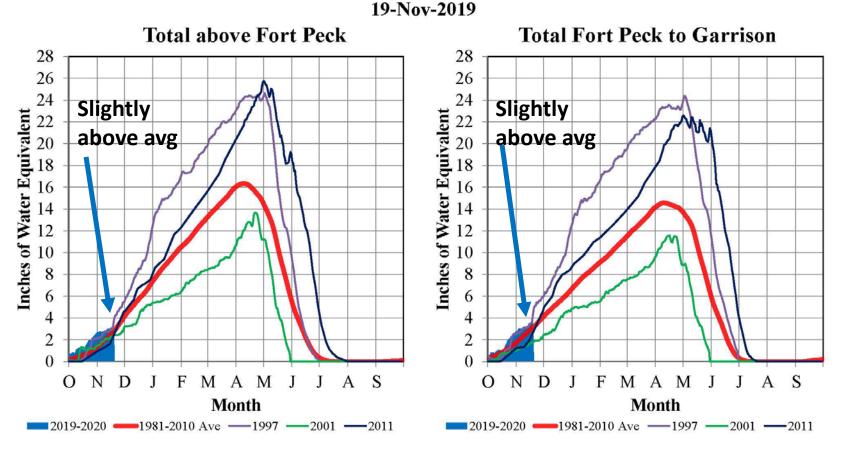
Current Snow Water Equivalent November 21, 2019

Snow Water Equivalent



http://www.nohrsc.noaa.gov/nsa/

Missouri River Basin – Mountain Snowpack Water Content 2019-2020 with comparison plots from 1997*, 2001*, and 2011



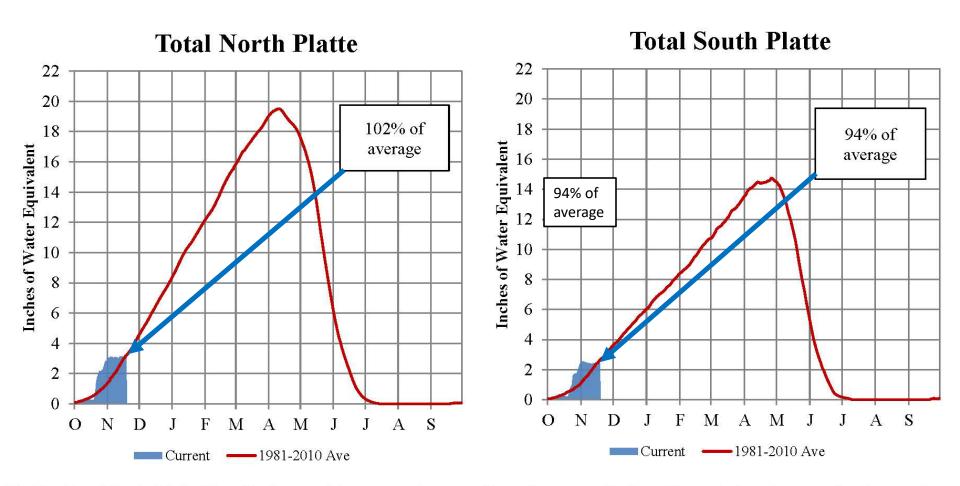
The Missouri River Basin mountain snowpack normally peaks near April 15. On November 19, the mountain Snow Water Equivalent (SWE) in the "Total above Fort Peck" reach was 3.3 inches. On November 19, the mountain SWE in the Fort Peck to Garrison reach was 3.5 inches.

Provisional data. Subject to revision.

^{*}Generally considered the high and low year of the last 20-year period, respectively

Platte River Basin - Mountain Snowpack Water Content Water Year 2018-2019

November 19, 2019



The North and South Platte River Basin mountain snowpacks normally peak near April 15 and the end of April, respectively. As of November 18, 2019, the mountain snowpack SWE in the "Total North Platte" reach is currently 3.2", 102% of average. The mountain snowpack SWE in the "Total South Platte" reach is currently 2.5", 94% of average.

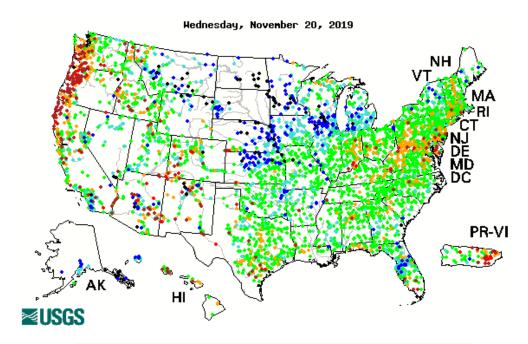
7-Day Average Streamflow

Map of 7-day average streamflow compared to historical streamflow for the day of the year (United States)



Wednesday, Nov 20, 2019

- Generally above to much above average streamflows across the Missouri and Upper Mississippi River Basins.
- Near to below average streamflows in Colorado SW NE, and the Ohio River Basin.
- Several ongoing record streamflows from MT to NE to WI.



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

https://waterwatch.usgs.gov/?id=pao7d

Disclaimer

Weather.gov > Missouri Basin, Pleasant Hill

Weather Observations and Forecasts River Observations and Forecasts Water Supply Climate and History Seasonal Interest Local Information Print this map Auto Refresh: OFF Maximum Forecast Flood Category Through: 11/30/2019 15:13:23 UTC Entire Period River Observations • River Forecasts All Locations Regina Click on the map or select one of the data views Switch Basemap Winnipeg below: November 21, 2019 Reset View United States **NWS Weather Forecast Offices** Missouri Basin River Forecast Center V 0 0 8 Water Resources Regions O Probability and forecasts available □ Forecasts available 470 total gauges Minneapotis Show all locations in flood (14) 3 Gauges: Major Flooding 1 Gauges: Moderate Flooding 10 Gauges: Minor Flooding Milwaukee Grand Rapids 8 Gauges: Near Flood Stage Detroit 14 Gauges: No Flooding 0 Flood Category Not Defined Chicago & 0 At or Below Low Water Threshold 428 Gauges: Forecasts Are Not Current 0 Gauges: No forecast within selected Colun timeframe Indianapotis 6 Gauges: Out of Service GELORAD Show all locations Louisville Last map update: KENTUCKX 11/21/2019 at 10:11:44 am EST 11/21/2019 at 15:11:44 UTC COLORADO What is UTC time? Nashville O Knoxville & PLATEAU

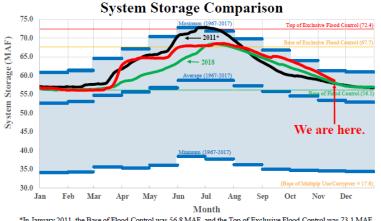
https://www.weather.gov/mbrfc/

Missouri River Basin – Update – 19 November 2019

Mainstem Reservoir Status:

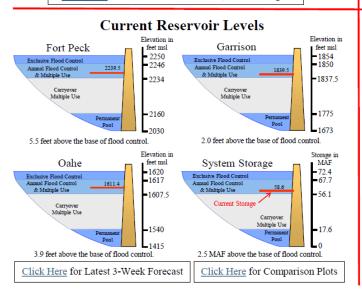
- System storage is 58.6 MAF; 2.5 MAF of the 16.3 MAF of flood control storage is occupied. About 15% of the flood control storage remains to be evacuated over the next 3 weeks and the winter.
- Gavins Point releases are currently 80,000 cfs, and are expected to remain at that level until the weekend, when the drawdown to the winter release rate begins. The drawdown schedule is shown in the bottom right quadrant. Basin and river conditions will continue to be monitored, and System regulation will be adjusted as necessary.
- Refer to the 3-Week Forecast (<u>click here</u>) for the most up-todate System information – pool levels, inflows and releases.
- The Gavins Point release schedule and forecasted Missouri River flows and stages can be found here:

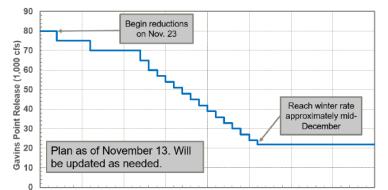
Click Here for Missouri River releases, flows & stages



*In January 2011, the Base of Flood Control was 56.8 MAF, and the Top of Exclusive Flood Control was 73.1 MAF.

Gavins Point Release Forecast





The Corps is slightly ahead of schedule in evacuating the flood control storage of the Missouri River Mainstem System. This is allowing the Corps to reduce releases slightly at the end of November (lower right of attachment). Even with the slightly reduced reservoir releases, the Corps will evacuate all stored floodwaters by the beginning of the next runoff season (approximately March 1), and the flood storage capacity will be available (emptied) for the 2020 runoff season.

The forecasted calendar year runoff as of the Nov. 1 forecast is 60.2 million acre feet (238%) and will be the second highest runoff year in the upper Missouri Basin above Sioux City (1898-2018), behind 61.0 million acre feet in 2011

NWS North Central River Forecast Center

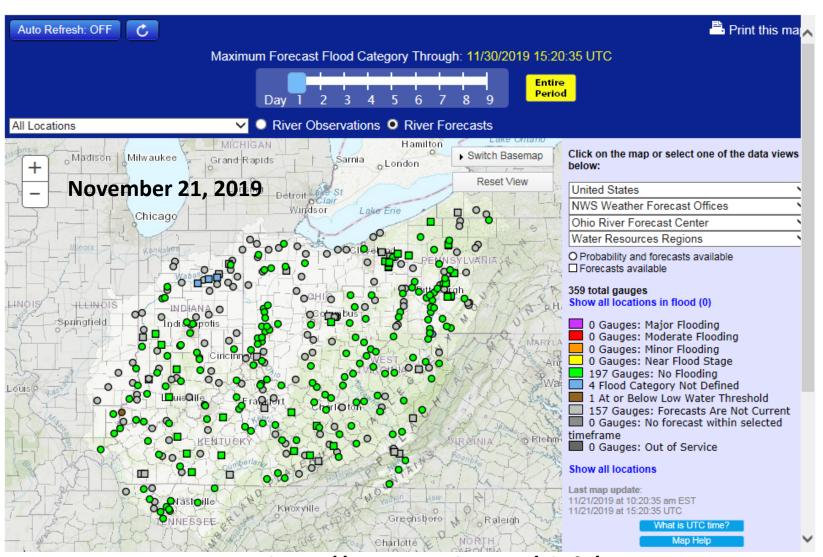
North Central River Forecast Center River Forecast Center

Weather.gov > North Central River Forecast Center

River Observations and Forecasts Weather Observations and Forecasts Water Supply Climate and History Seasonal Interest Local Information Print this map Auto Refresh: OFF Maximum Forecast Flood Category Through: 11/30/2019 15:16:52 UTC Entire Period River Observations
 River Forecasts All Locations Click on the map or select one of the data views Switch Basemap + below: na Reset View November 21, 2019 United States NWS Weather Forecast Offices V North Central River Forecast Center V Water Resources Regions O Probability and forecasts available ☐ Forecasts available 465 total gauges Show all locations in flood (0) Ottawa 0 Gauges: Major Flooding 0 Gauges: Moderate Flooding SOUTH DAKOTA 0 Gauges: Minor Flooding 41 Gauges: Near Flood Stage Toronto o Lake Ontario-64 Gauges: No Flooding o Rochester 0 Flood Category Not Defined Buffalo. 0 At or Below Low Water Threshold 354 Gauges: Forecasts Are Not Current 5 Gauges: No forecast within selected Cleveland of timeframe Pittsburgh & 1 Gauges: Out of Service U-N-ITED Columbus **Show all locations** OWashingt Last map update: 11/21/2019 at 10:16:32 am EST Louisville What is UTC time? Richmond Map Help Nashville o Knoxville Disclaimer

https://www.weather.gov/ncrfc/

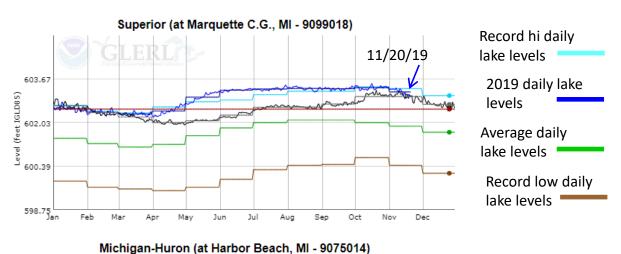
River Observations and Forecasts Weather Observations and Forecasts Water Supply Climate and History Seasonal Interest Additional Info

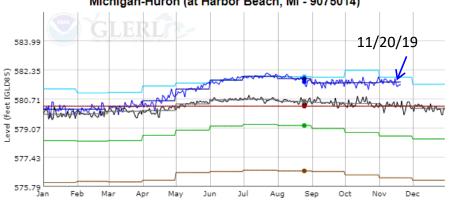


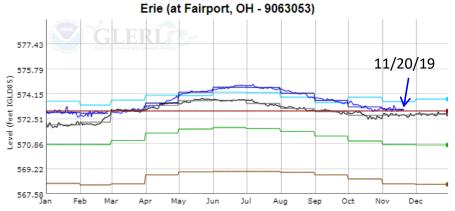
https://www.weather.gov/ohrfc/

Great Lakes Water Level





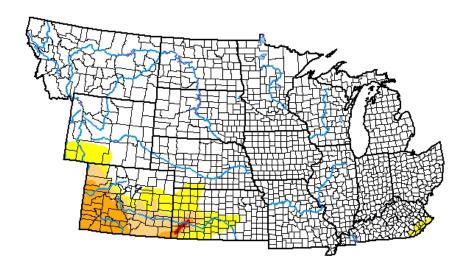




https://www.glerl.noaa.gov/data/wlevels/levels.html#observations

US Drought Monitor

U.S. Drought Monitor NWS Central Region



November 19, 2019

(Released Thursday, Nov. 21, 2019) Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	88.39	11.61	6.18	3.23	0. 11	0.00
Last Week 11-12-2019	89.27	10.73	5.70	3.08	0.00	0.00
3 Month's Ago 08-20-2019	81.89	18.11	2.04	0.04	0.00	0.00
Start of Calendar Year 01-01-2019	85.98	14.02	8. 17	5.23	2.44	1.01
Start of Water Year 10-01-2019	79.05	20.95	8.02	2.19	0.14	0.00
One Year Ago 11-20-2018	82.70	17.30	9.22	5.22	3.08	1.20

Intensity:

None

D2 Severe Drought

D0 Abnormally Dry

D1 Moderate 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:

Brad Rippey

U.S. Department of Agriculture





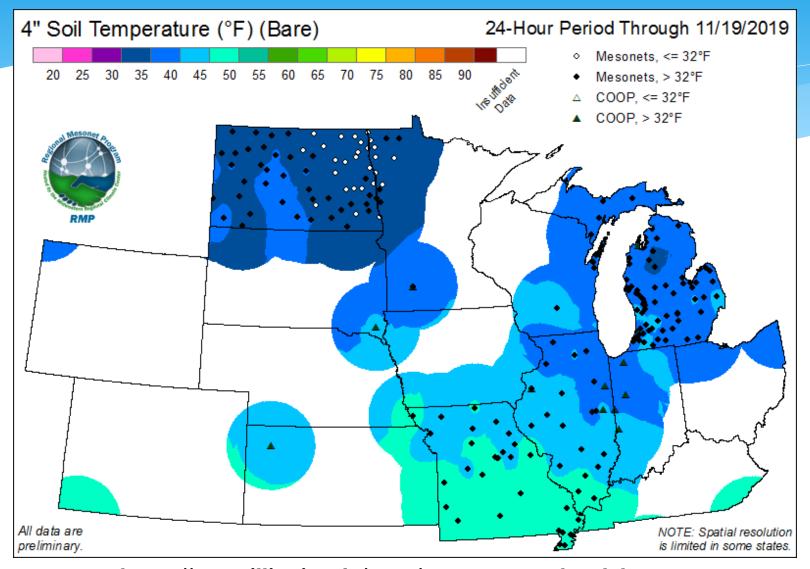




droughtmonitor.unl.edu

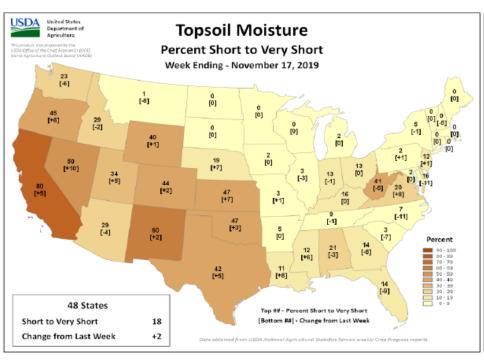
Agriculture

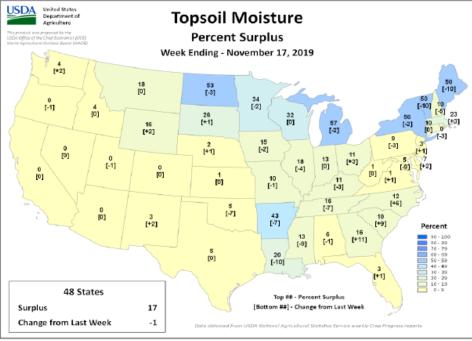
4-in Bare Soil Temperatures



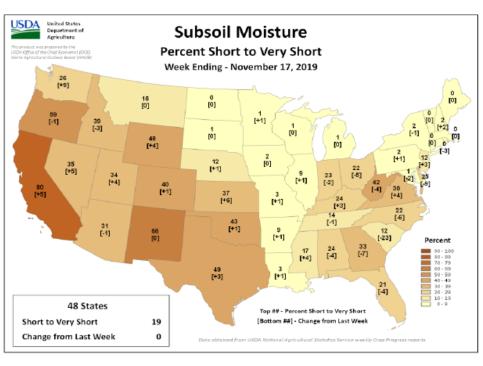
https://mrcc.illinois.edu/RMP/currentMaps.html#banner

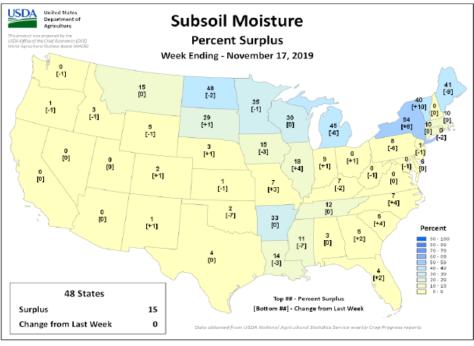
NASS Topsoil moisture



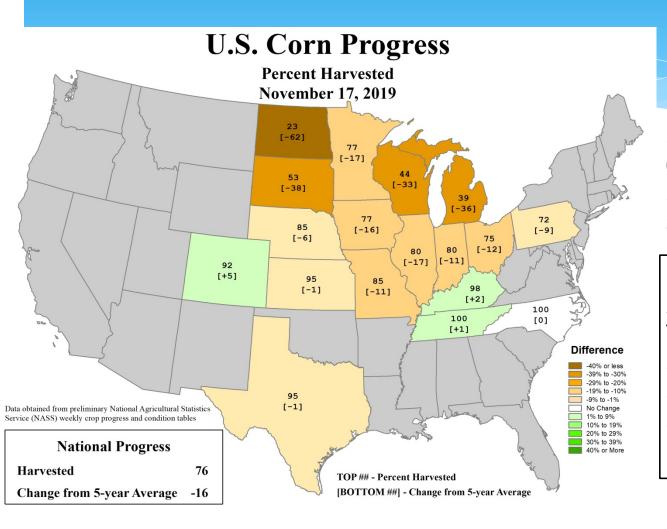


NASS Subsoil moisture





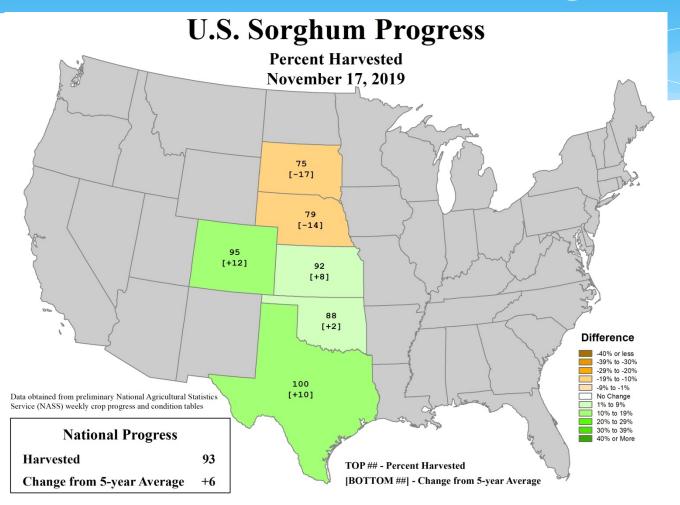
Corn Progress



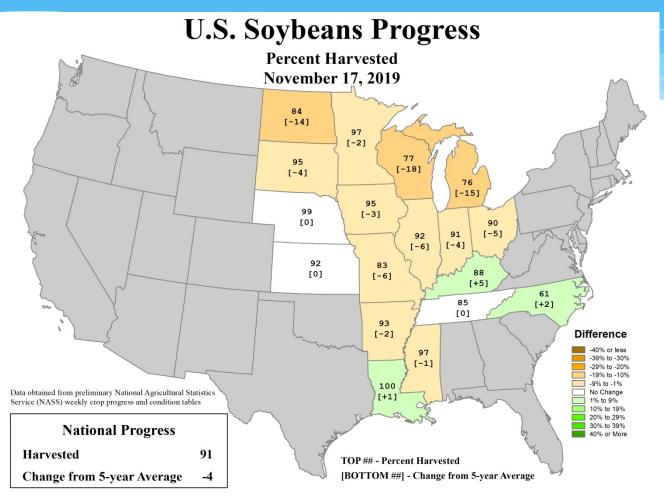
2nd slowest corn harvest (through Nov. 17) in the last 25 years. Only 2009 was slower.

Least Amount of U.S. Corn Harvested by Nov. 17
Year Percent
2009 58%
2019 76%
2008 80%
Period: 1995-2019

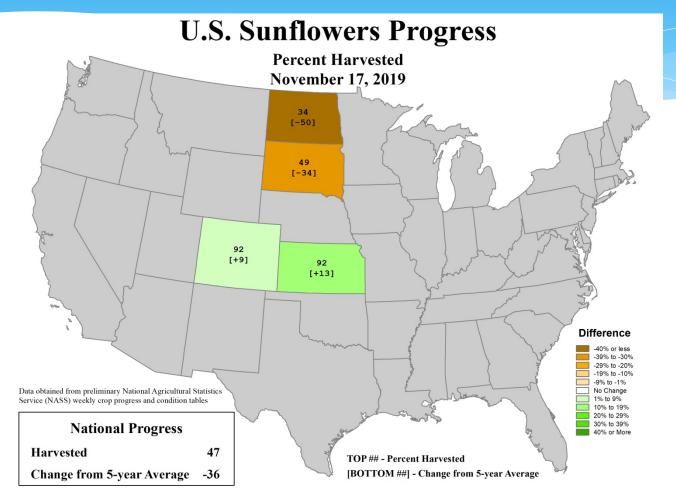
Sorghum Progress



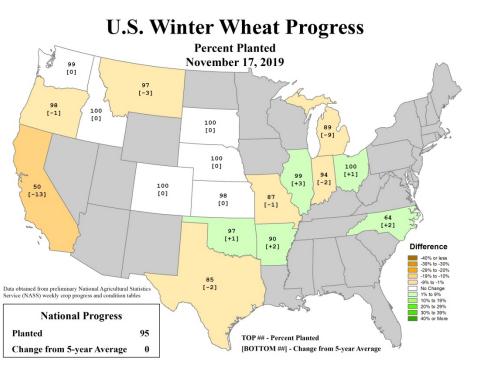
Soybean Progress

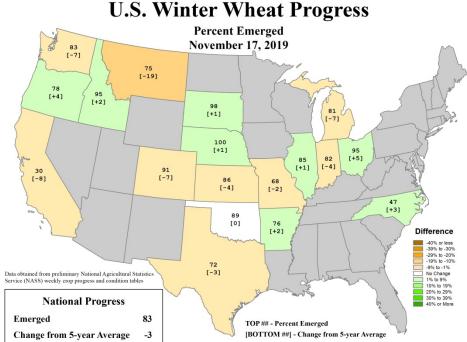


Sunflower Progress

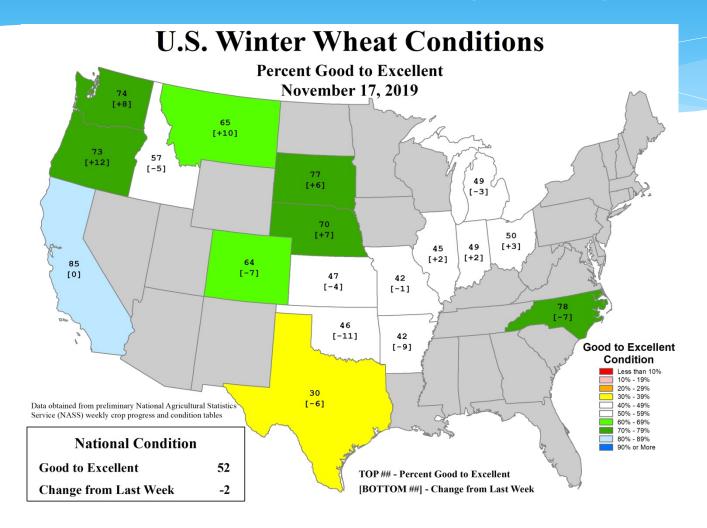


Winter Wheat Progress





Winter Wheat Conditions



Impacts

Cold Oct-Nov conditions across the region in combination with wet and snowy periods have made it challenging for farmers this year. Crop harvest was running several weeks behind normal across the region and the extreme wetness was creating other problems related to crop disease, grain dry down, stalk lodging, winter wheat planting, compaction, and fieldwork preparation for next year.

Reports of propane shortages and propane distribution problems in region with grain drying and livestock in some states. Cold and wet conditions have led to high moisture content in seed, and slowing natural drydown in fields.

State Impacts

^{3rd} coldest Oct on record with record cold and snow reported in Oct and Nov.

> Cold was the watchword for October with several hundred daily record lows broken and dozens of station monthly records. Only 1919 was colder statewide. A state monthly minimum temp record occurred when Daniel Fish Hatchery fell to -34°F on 10/30. Nov milder

> > A cold & snowy start to winter season in north central CO led to drought improvement, but dry conditions worsening in western & southern CO due to weak monsoon season, particularly in SW quarter of state & low elevation areas. Hydrologically, reservoirs in good shape & upcoming snow season brings plenty of time for recovery in high elevations. 4th coldest Oct on record after 1st warmest Sen

Some drying in Nov, finally, but conditions still very wet. Soil moisture high. Red River is at 99 percentile. State pursuing disaster declaration for fall flooding. Concern for spring flooding. Only 23% of corn harvested and 34% of sunflower as of 11/17.

Difficult harvest season for corn & soy harvest due to snow & cold, high seed moisture content and drying demand. Propane shortages reported. Drier Nov weather & frozen soils in early Nov have thawed. Anhydrous application resuming. Record 2019 wetness reduced pheasant pepulation as well as hunting licenses.

5th coldest Oct on record, MO Basin remail near full, increasing risk for spring flooding. Cold & damp in some areas led to limited drying opportunities. Some late planted corn didn't make black layer & corn declines reported. Dryness emerging in SW NE making grasses fire prone.

> Drought coverage increasing & intensifying across western KS. Fall sown grains, pasture & rangeland stressing due to dryness & cold snap. Winter wheat rated 18% very poor to poor on 11/17, up from 13% at the end of Oct. Statewide topsoil moisture was 47% very short to short on 11/17.

Difficult harvest season for corn and soybean due to snow and cold, high seed moisture content and drying demar Coldest arctic outbreak in decades for a few Nov days brought record cold. Small and medium ponds frozen down to border, ice rescues reported.

Difficult harvest

season for corn and

and cold, high seed

moisture content.

soybean due to snow

Drought

eliminated in

southern IL.

demand. Rec-

snow

ord cold &

Record cold and Difficult harvest season for snow in Oct & Nov corn and soy due to snow & cold with high seed moisture content & drying demand, propane shortages. Coldest outbreak in decades fora few Nov days. Record cold & Difficult harvest snow. 5th snowiest Oct. season for corn

Drought eliminated in and soybean due SE MO. Difficult harto snow and cold, vest season for corn high seed moisture content and drying and soybean due to snow and cold. Record cold for a few days & coldest Nov temps since 1991. Small ponds freezing over forcing livestock producers to chop ice for

rattle

Record cold &snow for in Oct and Nov.

Great Lakes water levels running near record high

No drought, moist soils, slow harvest, cold &snowv Nov, high dry demand for corn outpacing propane supply.

Drought eliminated statewide, soil moist. recovering, streamflow back to normal. Slow harvest season for corn & soybean due to snow & cold.

3rd wettest Oct after 1st driest Sep No drought but hay supplies short due to Sep heat

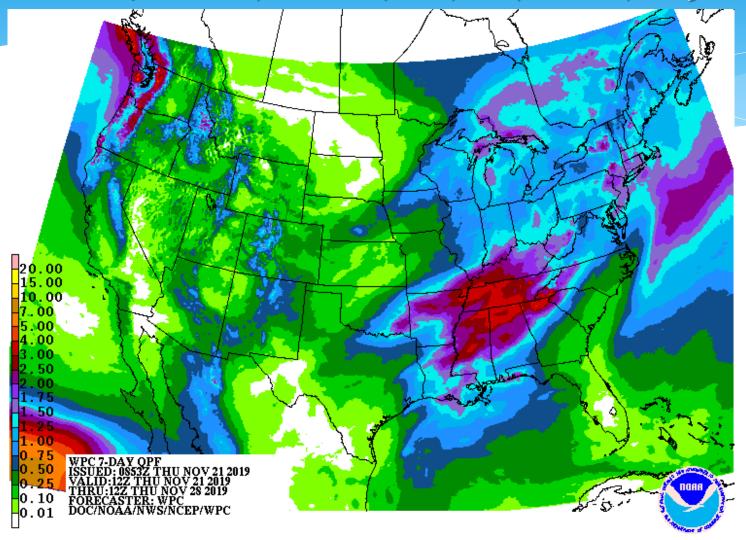
& dryness. Record cold and snow for a few days in Nov.

Climate Outlooks

- * 7-day precipitation forecast
- * 6-10 day outlook
- * ENSO Predictions
- * December
- * Dec-Jan-Feb
- * Jan-Feb-Mar

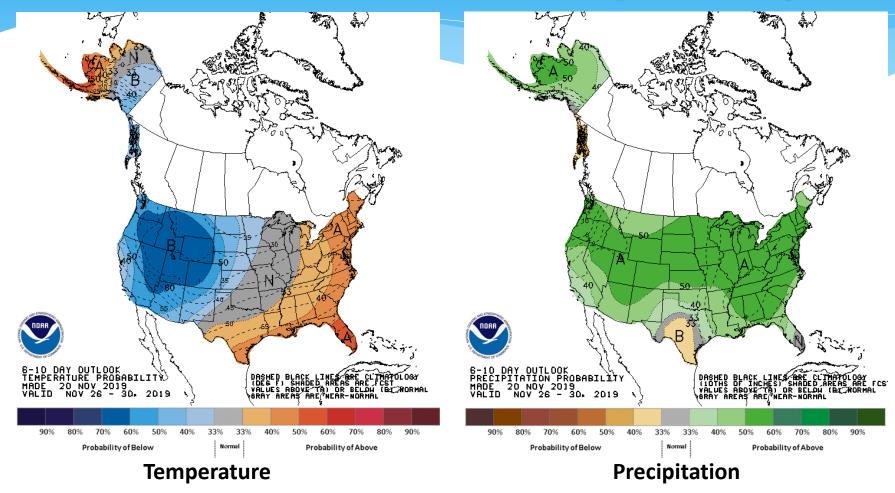
7-day Quantitative Precipitation Forecast

Valid: 7 AM Thu, Nov 21– 7 AM, Thu, Nov 28, 2019



http://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml

Temperature and Precipitation Probabilities for Nov 26-30, 2019



ENSO Forecast

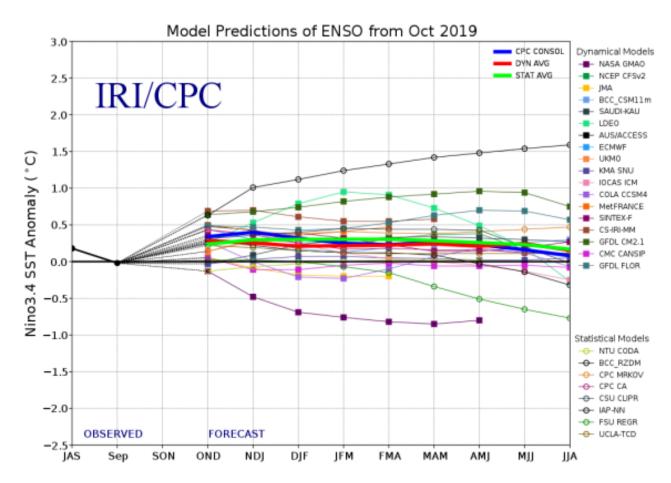


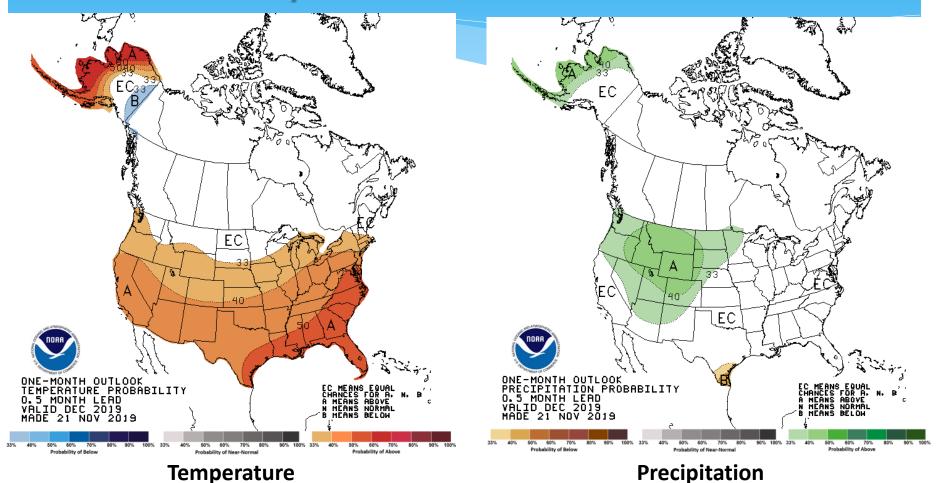
Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 18 October 2019.

ENSO Diagnostic
Discussion updated on
November 14, 2019

CPC/NCEP/NWS and IRI

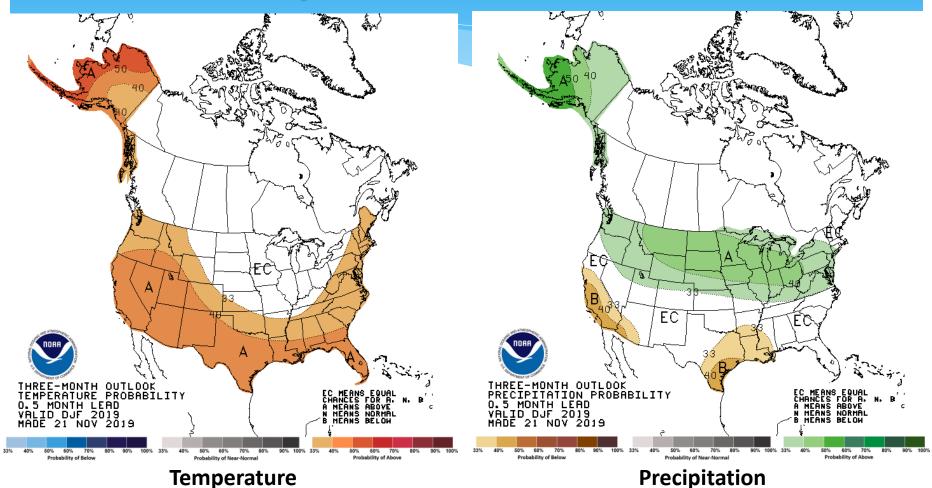
- ENSO Alert System: Not Active
- ENSO-neutral is favored during the Northern Hemisphere winter 2019-20 (~70% chance), continuing through spring 2020 (60 to 65% chance)
- -The majority of models in the IRI/CPC plume (Fig. 6) continue to favor ENSOneutral (Niño-3.4 index between -0.5°C and +0.5°C) through the Northern Hemisphere spring.

December Temperature and Precipitation Probabilities



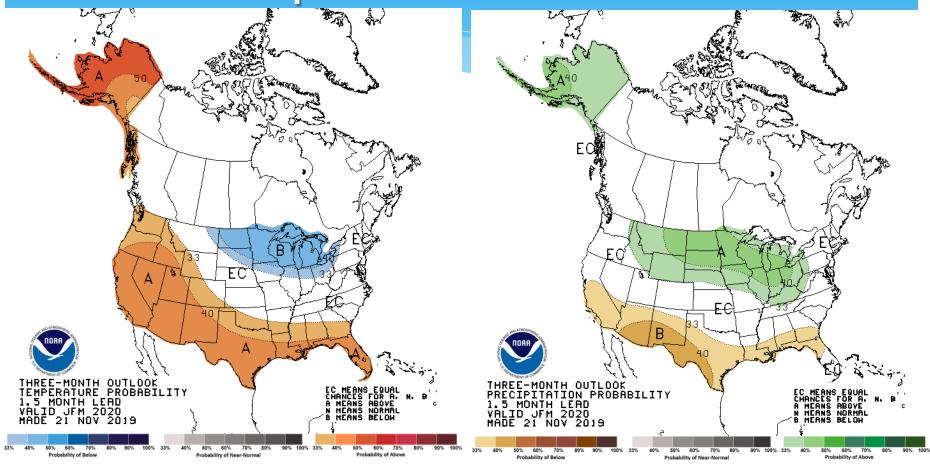
http://www.cpc.ncep.noaa.gov/products/predictions/30day

Dec-Jan-Feb Temperature and Precipitation Probabilities



http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=2

Jan-Feb-Mar Temperature and Precipitation Probabilities



Temperature

Precipitation

Summary

- * Much of the region experienced cold and wet October and first half of November making it very challenging for agriculture.
- * Concerns for rivers freezing above flood stage as we go into winter;
- * Ice jams;
- * Dryness concerns for SW WY, CO, western KS, southwestern NE
- * Spring flood concerns for Missouri & Mississippi River Basins and potential delay in spring fieldwork preparation and planting.

Further Information - Partners

- Today's and Past Recorded Presentations and :
- * http://mrcc.illinois.edu/multimedia/webinars.jsp
 http://hprcc.unl.edu/webinars.php
- NOAA's National Centers for Environmental Information: www.ncdc.noaa.gov
 - Monthly climate reports (U.S. & Global): www.ncdc.noaa.gov/sotc
- NOAA's Climate Prediction Center: www.cpc.ncep.noaa.gov
- Climate Portal: <u>www.climate.gov</u>
- U.S. Drought Portal: <u>www.drought.gov</u>
- National Drought Mitigation Center: http://drought.unl.edu
- State climatologists
 - * http://www.stateclimate.org
- Regional climate centers
 - * http://mrcc.isws.illinois.edu
 - * http://www.hprcc.unl.edu

Thank You and Questions?

* Questions:

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