

Drought Advisory Committee Water Year 2009

Water Policy Interim Committee

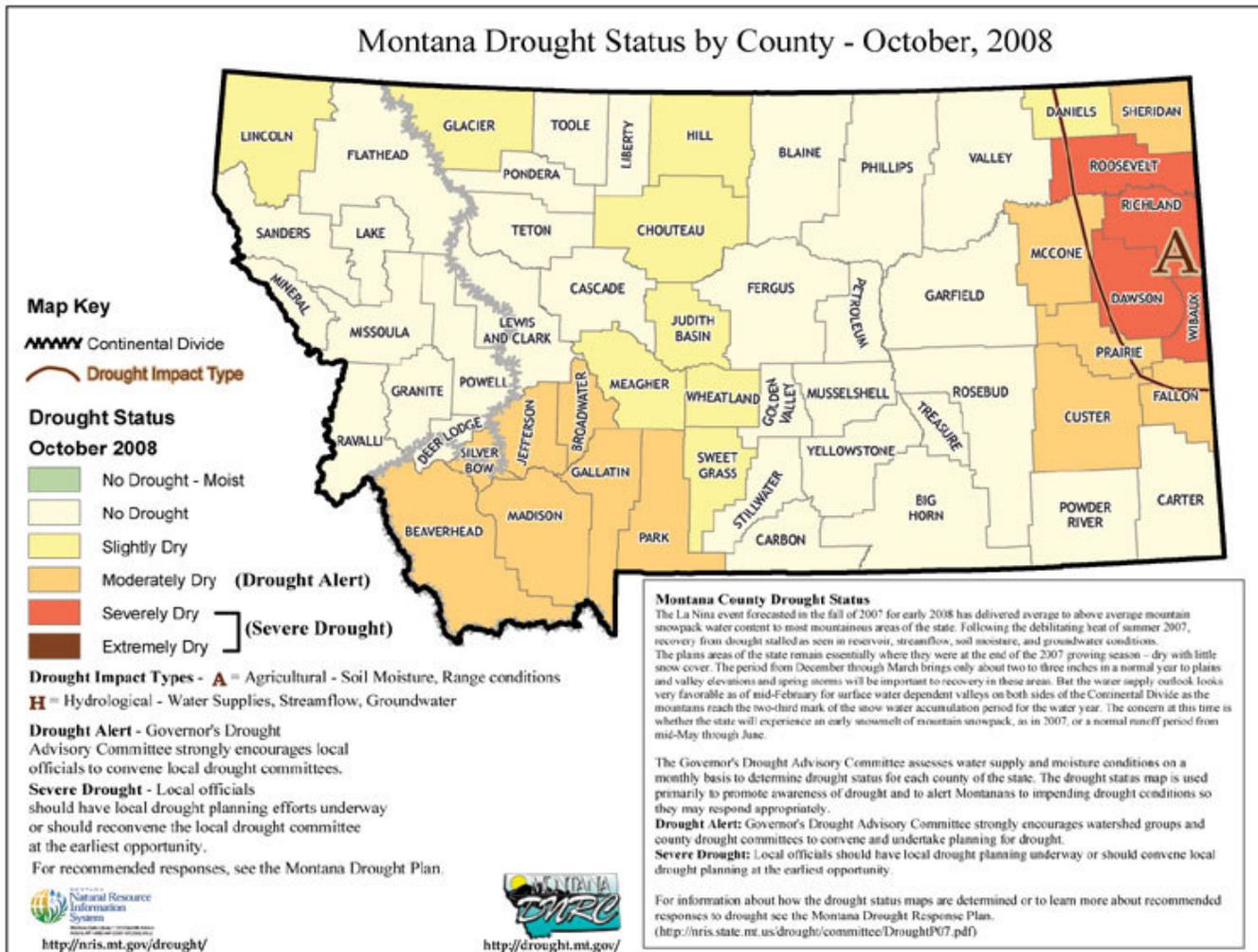
Jesse E. Aber, M.S., DNRC

Drought Committee Staff

September 21, 2009

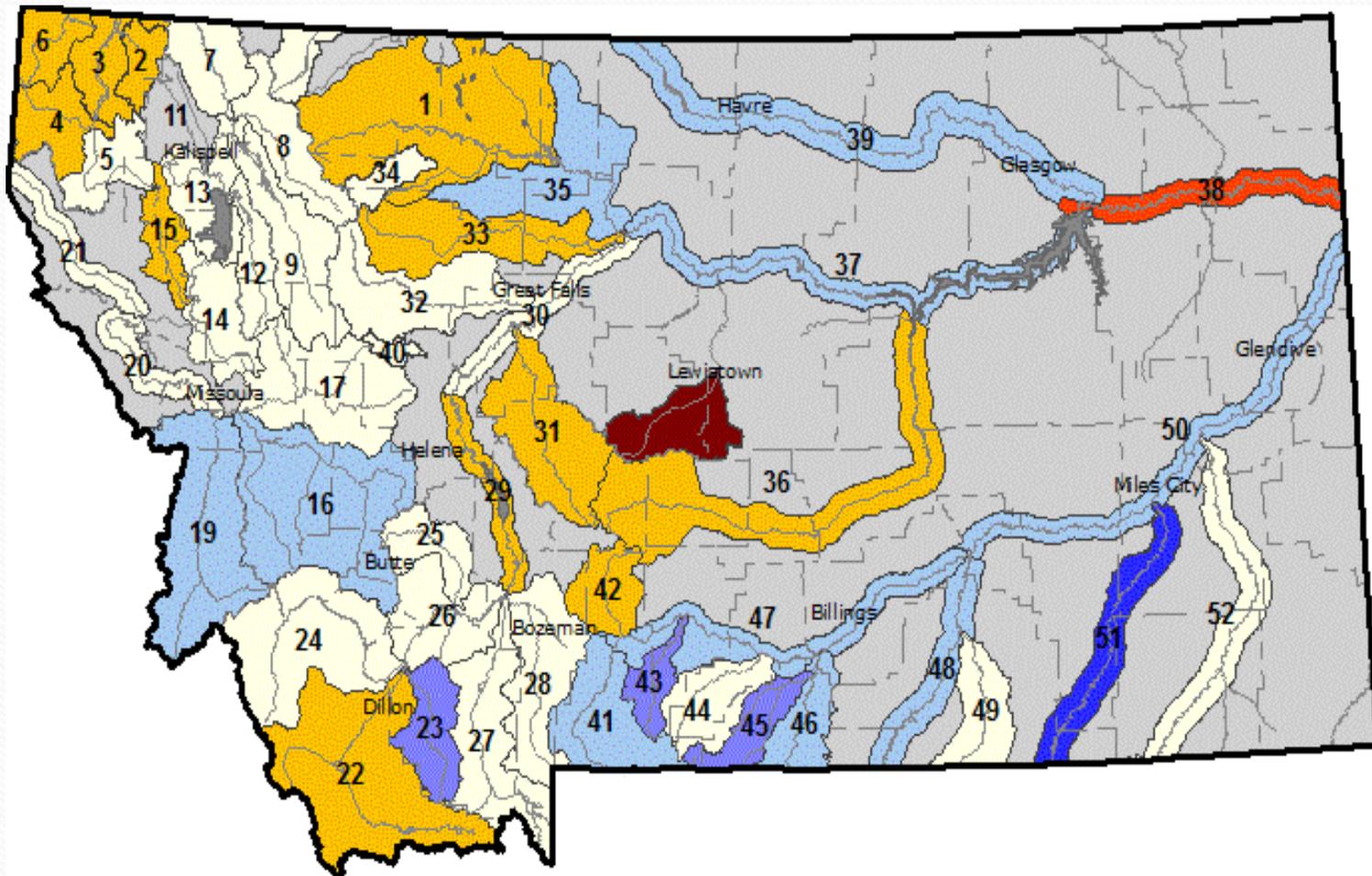
Water Year 2008 ends with residual drought from 2007 El Nino

Montana Drought Status by County - October, 2008



September 2008 NRCS SWSI

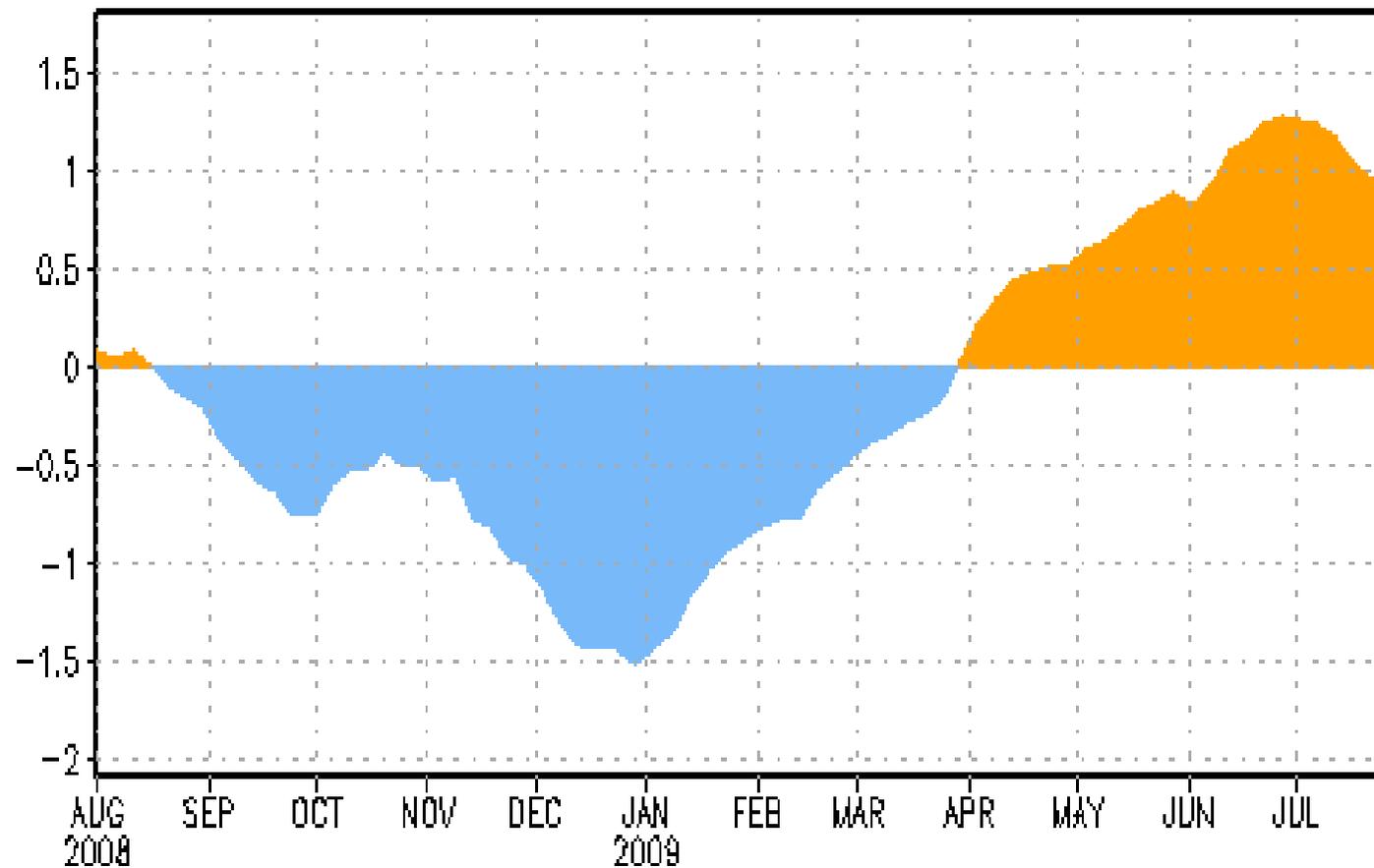
La Nina Winter 2008-2009 begins



ENSO

El Nino / Southern Oscillation

EQ. Upper-Ocean Heat Anoms. (deg C) for 180-100W



average

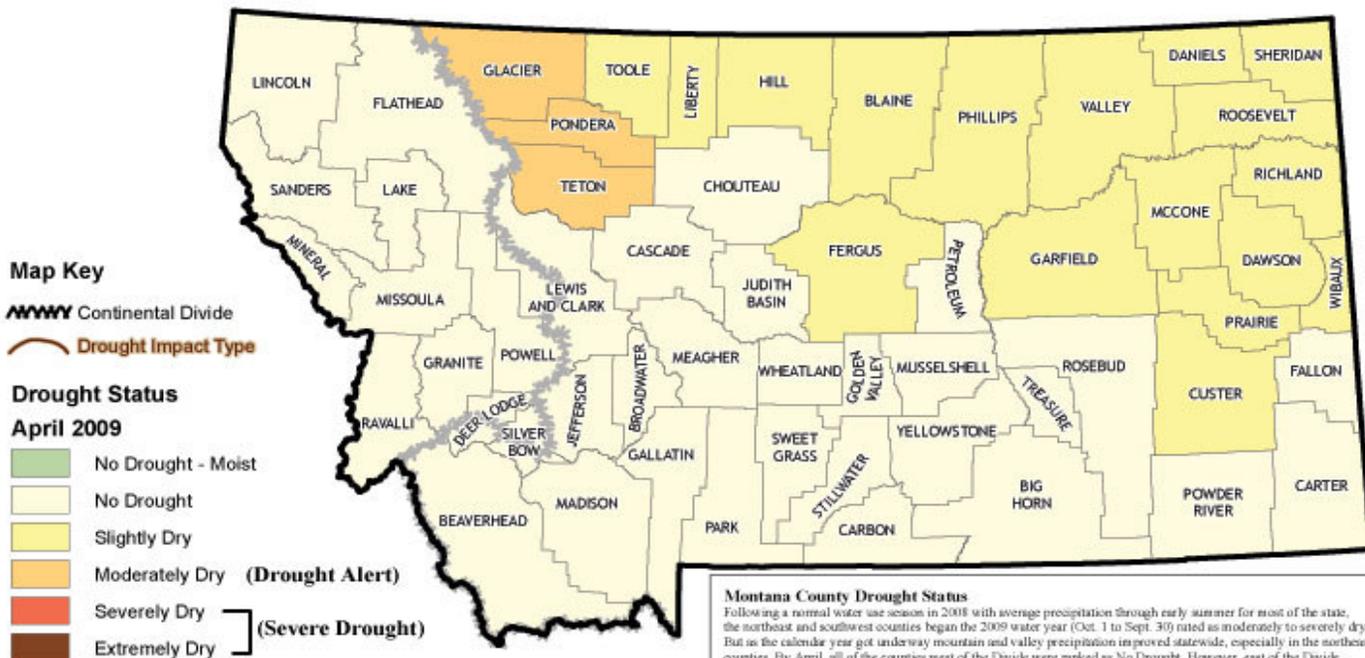
NRCS Snow Survey

As of April 15, 2009:

- the Columbia River Basin snowpack was 97% of average;
- the Missouri Basin was 104% of average; and
- the Yellowstone Basin was 108% of average.

Crop Year 2009 with good start from La Nina winter

Montana Drought Status by County - April, 2009



Map Key

Continental Divide

Drought Impact Type

Drought Status

April 2009

- No Drought - Moist
- No Drought
- Slightly Dry
- Moderately Dry (Drought Alert)
- Severely Dry (Severe Drought)
- Extremely Dry (Severe Drought)

Drought Impact Types - **A** = Agricultural - Soil Moisture, Range conditions
H = Hydrological - Water Supplies, Streamflow, Groundwater

Drought Alert - Governor's Drought Advisory Committee strongly encourages local officials to convene local drought committees.

Severe Drought - Local officials should have local drought planning efforts underway or should reconvene the local drought committee at the earliest opportunity.

For recommended responses, see the Montana Drought Plan.

Montana State Library
Natural Resource Information System
<http://nr.is.mt.gov/drought/>



<http://drought.mt.gov/>

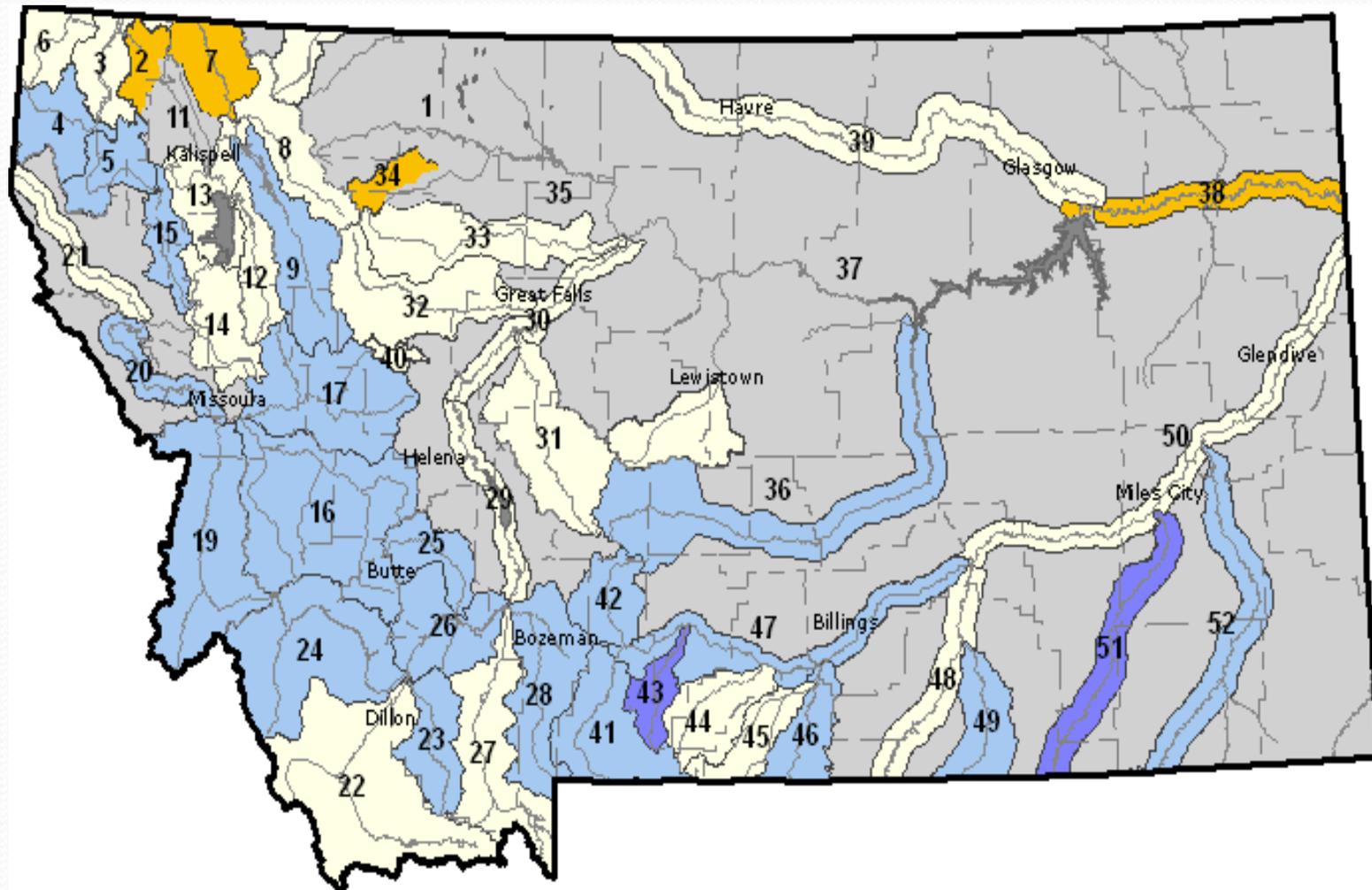
Montana County Drought Status
 Following a normal winter season in 2008 with average precipitation through early summer for most of the state, the northeast and southwest counties began the 2009 water year (Oct. 1 to Sept. 30) noted as moderately to severely dry. But as the calendar year got underway mountain and valley precipitation improved statewide, especially in the northeast counties. By April, all of the counties west of the Divide were marked as No Drought. However, east of the Divide, snowpack was down 20 percent along the Northern Rocky Mountain Front and soil moisture low for the Hi-Line counties from below average precipitation.

At its April 16 meeting, the Drought Advisory Committee heard that both state and federal reservoirs should fill with no shortfalls for water users anticipated due to good carryover storage from 2008 and average runoff expected from the mountain snowpack. The outlook for dryland farming and livestock grazing is good at this time especially across the southern tier of the state and throughout the central region east of the Divide. The NRCS April 1, 2009 Surface Water Supply Index shows all but four of the state's 52 river basins as Slightly Wet to Average.

The April 6, 2009 El Niño / Southern Oscillation (ENSO) status discussion from the Climate Prediction Center (CPC) concludes that the La Niña (cool phase) dating to early 2008 continues to weaken with neutral ENSO conditions expected to continue through the remainder of 2009. A neutral ENSO generally means normal climate conditions for Montana. Climate forecasts from CPC for the period May through July are calling for normal temperatures and a slightly elevated probability (40%) of less than average precipitation for Montana.

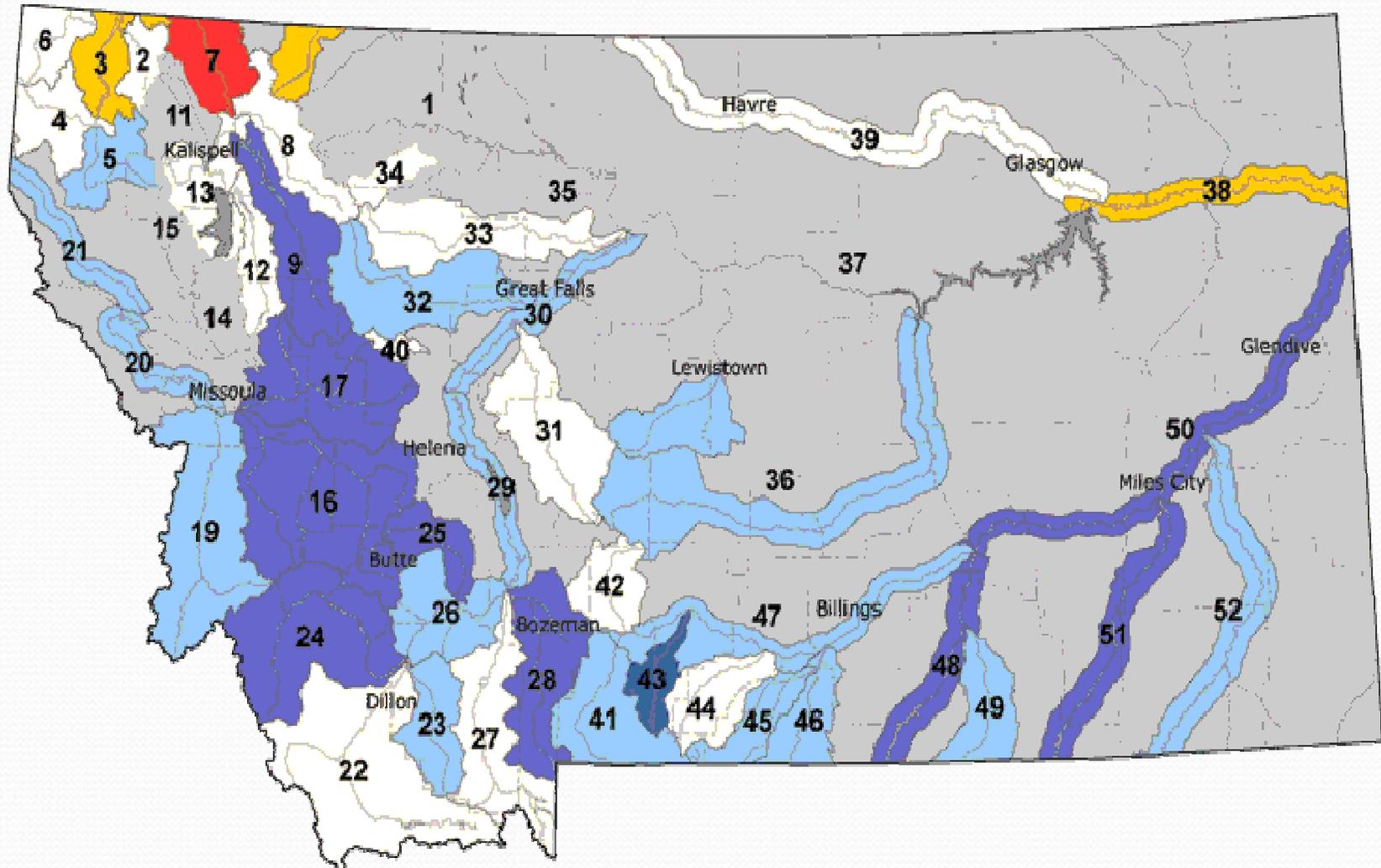
For information about how the drought status maps are determined or to learn more about recommended responses to drought see the Montana Drought Response Plan (<http://nr.is.mt.gov/drought/committee/Drought07.pdf>)

April 1, 2009 NRCS SWSI

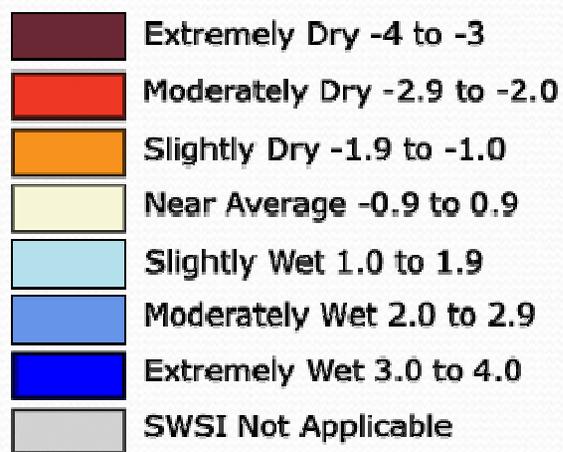


May 1, 2009 SWSI

La Nina Winter delivers



The SWSI is designed for areas that rely primarily on snowmelt runoff as the primary source of surface water. The SWSI accounts for snowpack, mountain precipitation, streamflow, reservoir contents, and soil moisture conditions.



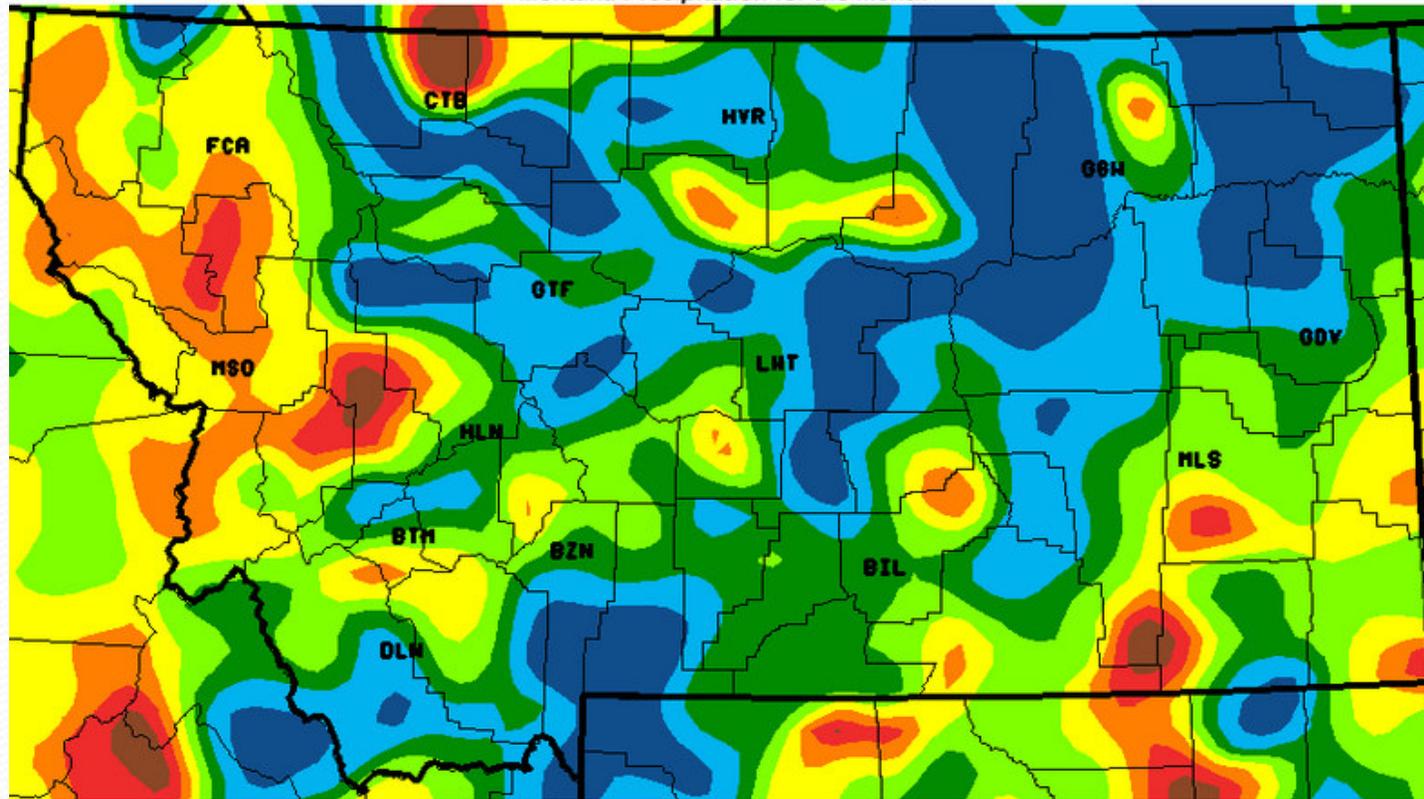
April 2009 Precipitation - NWS



National Weather Service - Great Falls, MT



Montana Precipitation for the Month



April 2009 Percent of Normal Precipitation
Period of Normal: 1971-2000

20 40 60 85 115 150 200

NOTE: Data used to generate this image are
PROVISIONAL AND SUBJECT TO CHANGE.

<http://www.wrh.noaa.gov/Greatfalls>

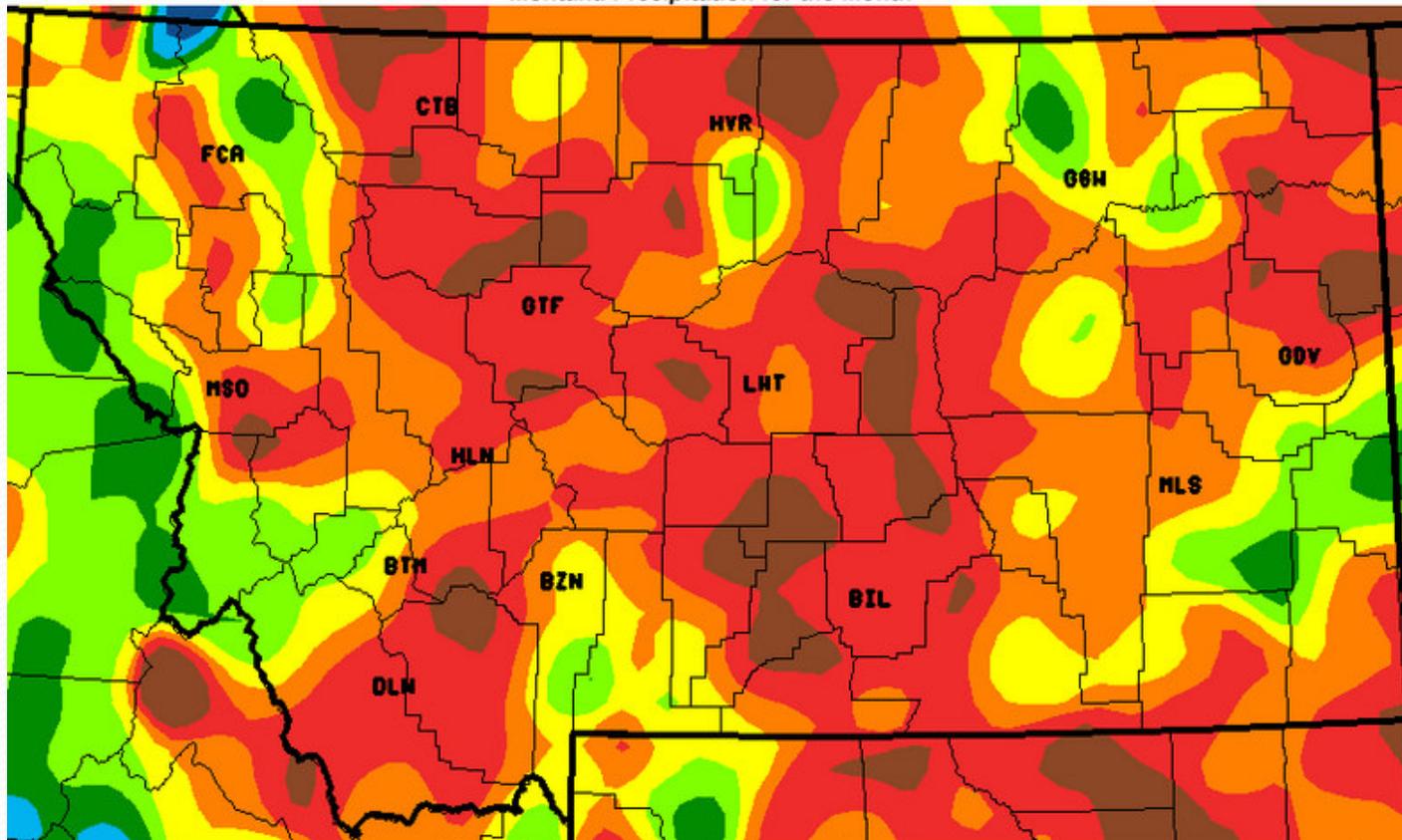
May Precipitation - NWS



National Weather Service - Great Falls, MT



Montana Precipitation for the Month



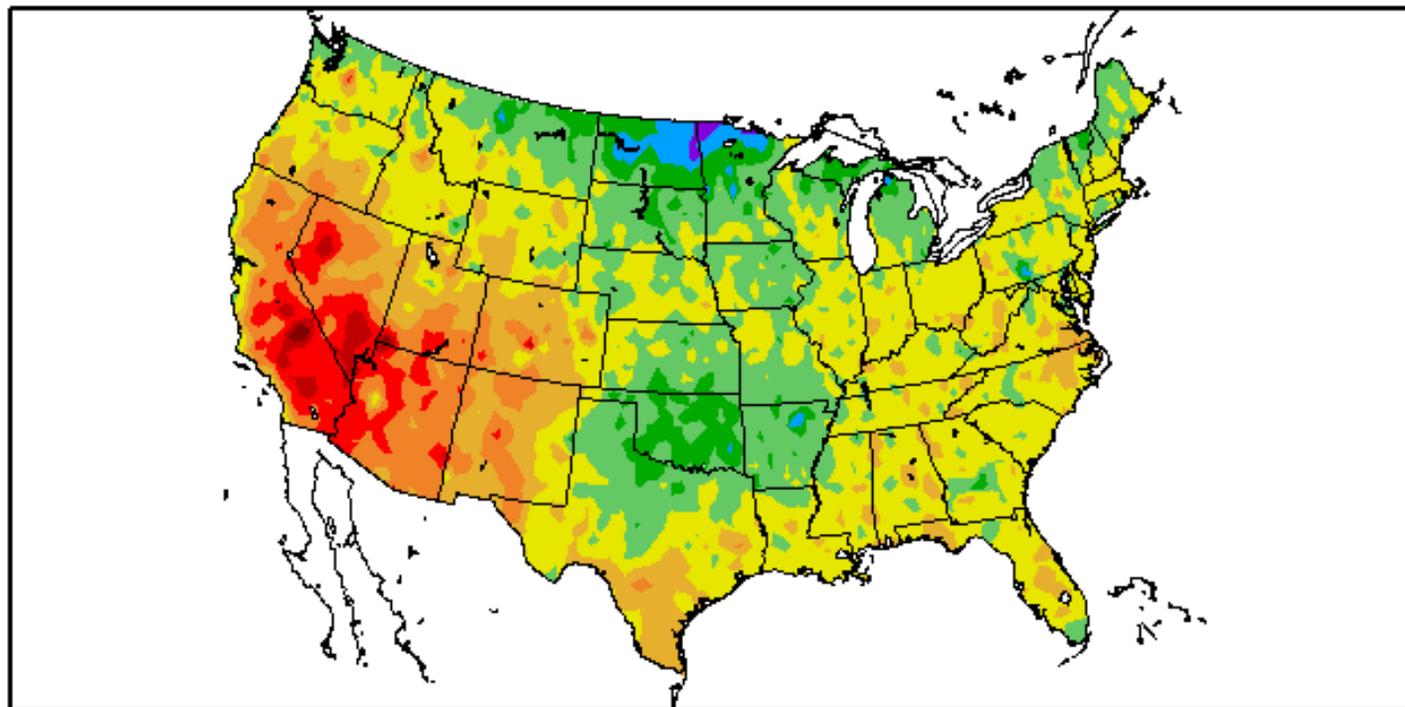
May 2009 Percent of Normal Precipitation
Period of Normal: 1971-2000

20 40 60 85 115 150 200

NOTE: Data used to generate this image are
PROVISIONAL AND SUBJECT TO CHANGE.

<http://www.wrh.noaa.gov/Greatfalls>

Departure from Normal Temperature (F) 5/1/2009 – 5/31/2009



Generated 6/11/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

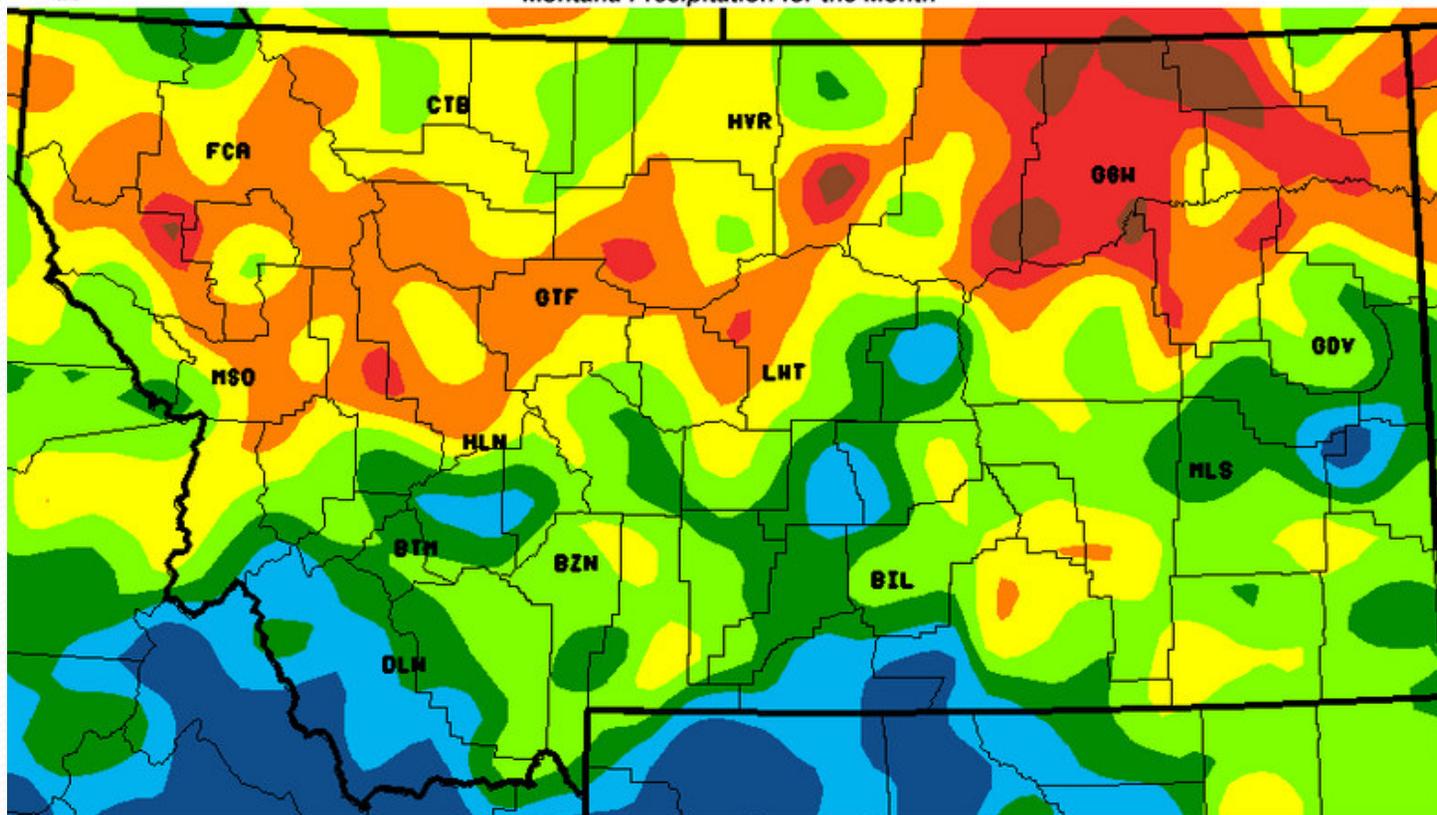
June Precipitation - NWS



National Weather Service - Great Falls, MT



Montana Precipitation for the Month



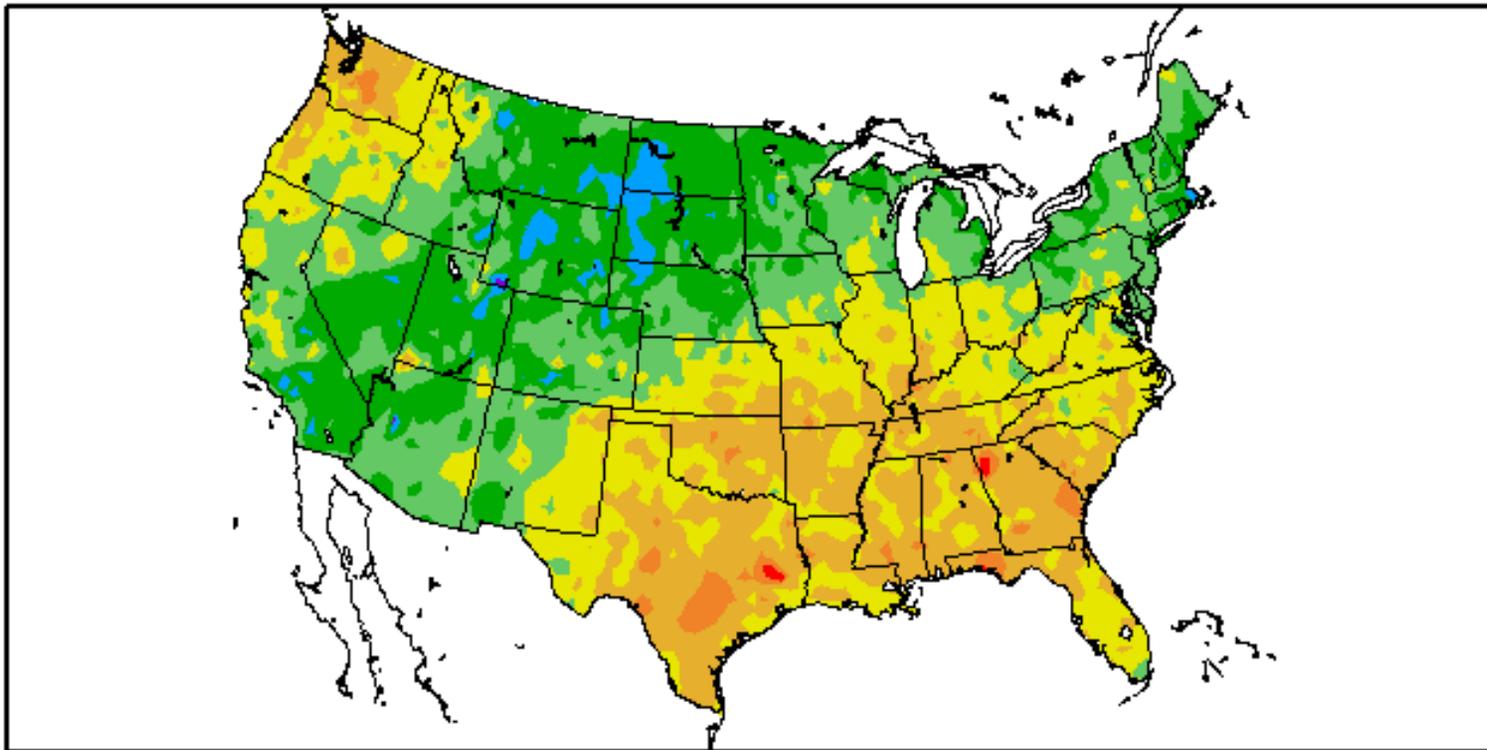
June 2009 Percent of Normal Precipitation
Period of Normal: 1971-2000



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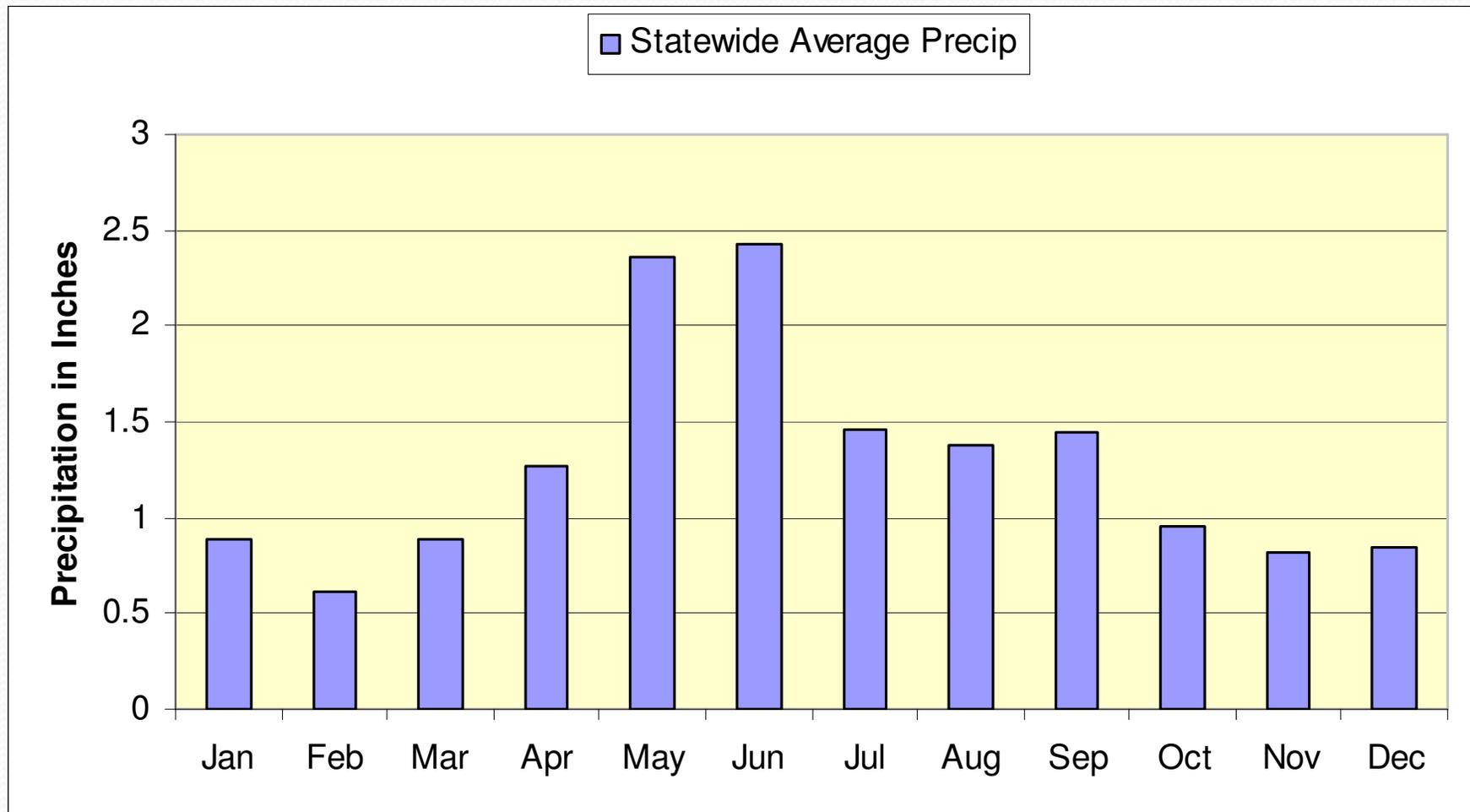
Departure from Normal Temperature (F)
6/1/2009 – 6/30/2009



Generated 7/11/2009 at HPRCC using provisional data.

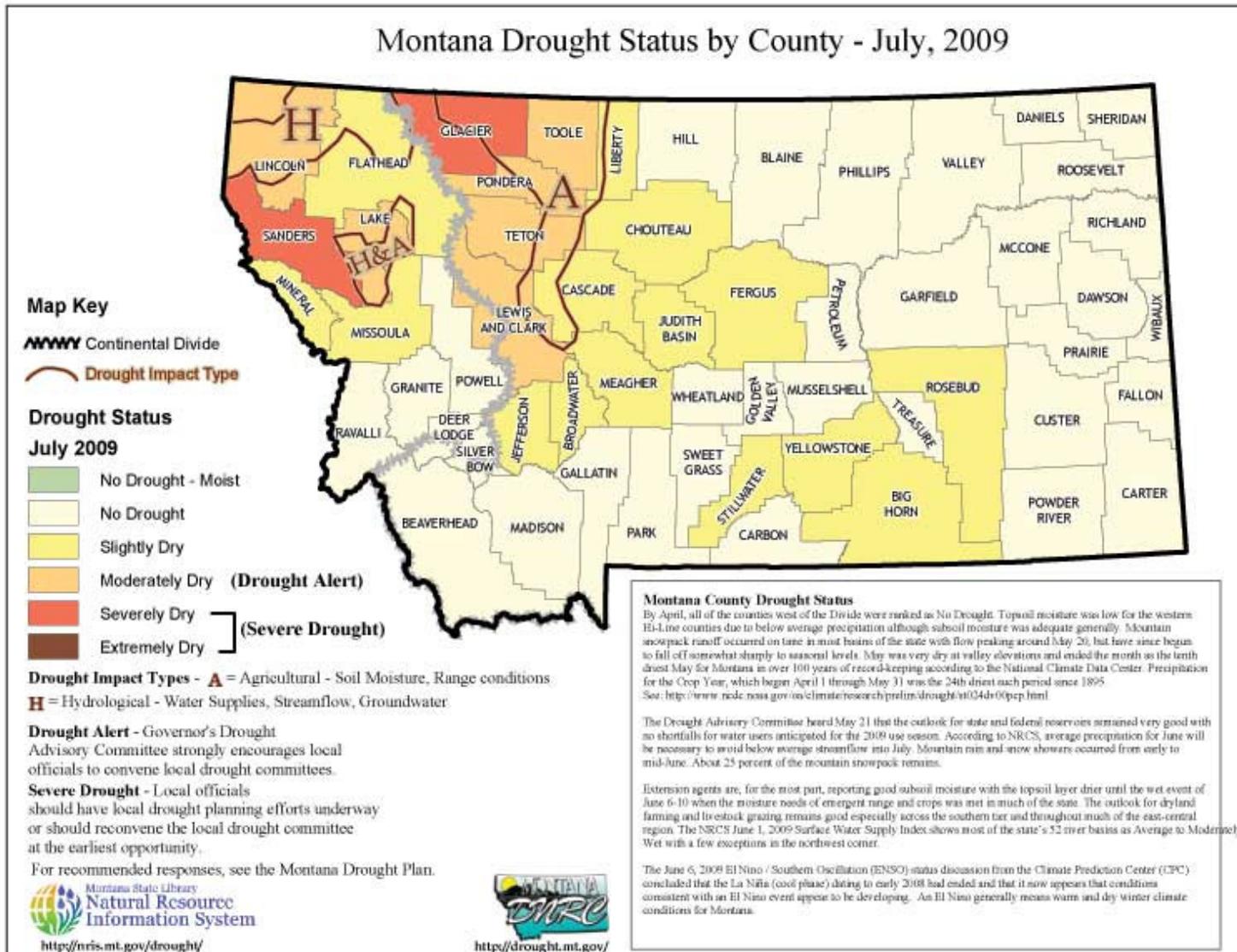
NOAA Regional Climate Centers

May & June are critical for valley-elevation moisture



Results of May & June Precip.

Montana Drought Status by County - July, 2009



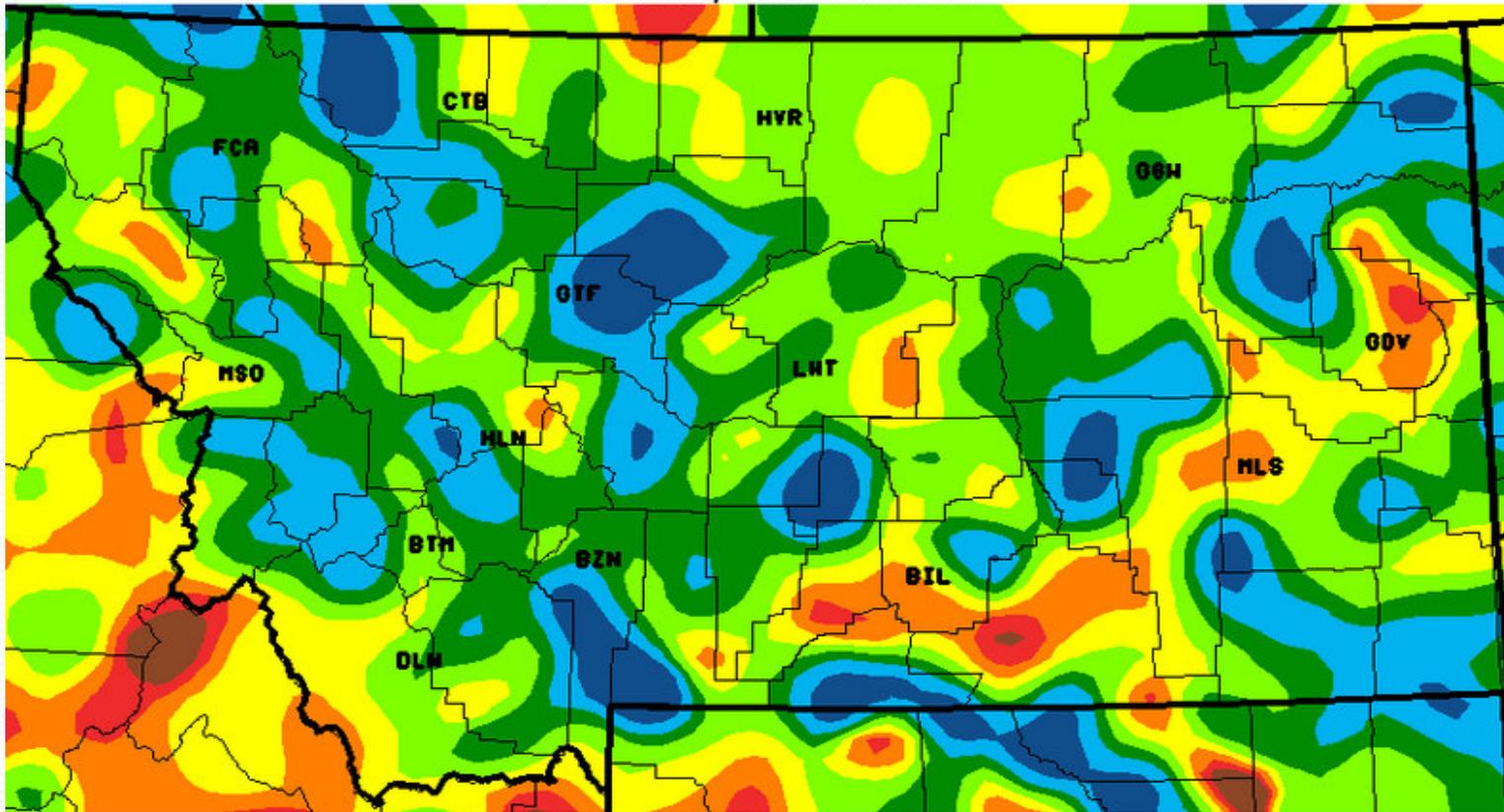
July Precipitation - NWS



National Weather Service - Great Falls, MT



Montana Precipitation for the Month



July 2009 Percent of Normal Precipitation
Period of Normal: 1971-2000



NOTE: Data used to generate this image are
PROVISIONAL AND SUBJECT TO CHANGE.

<http://www.wrh.noaa.gov/Greatfalls>

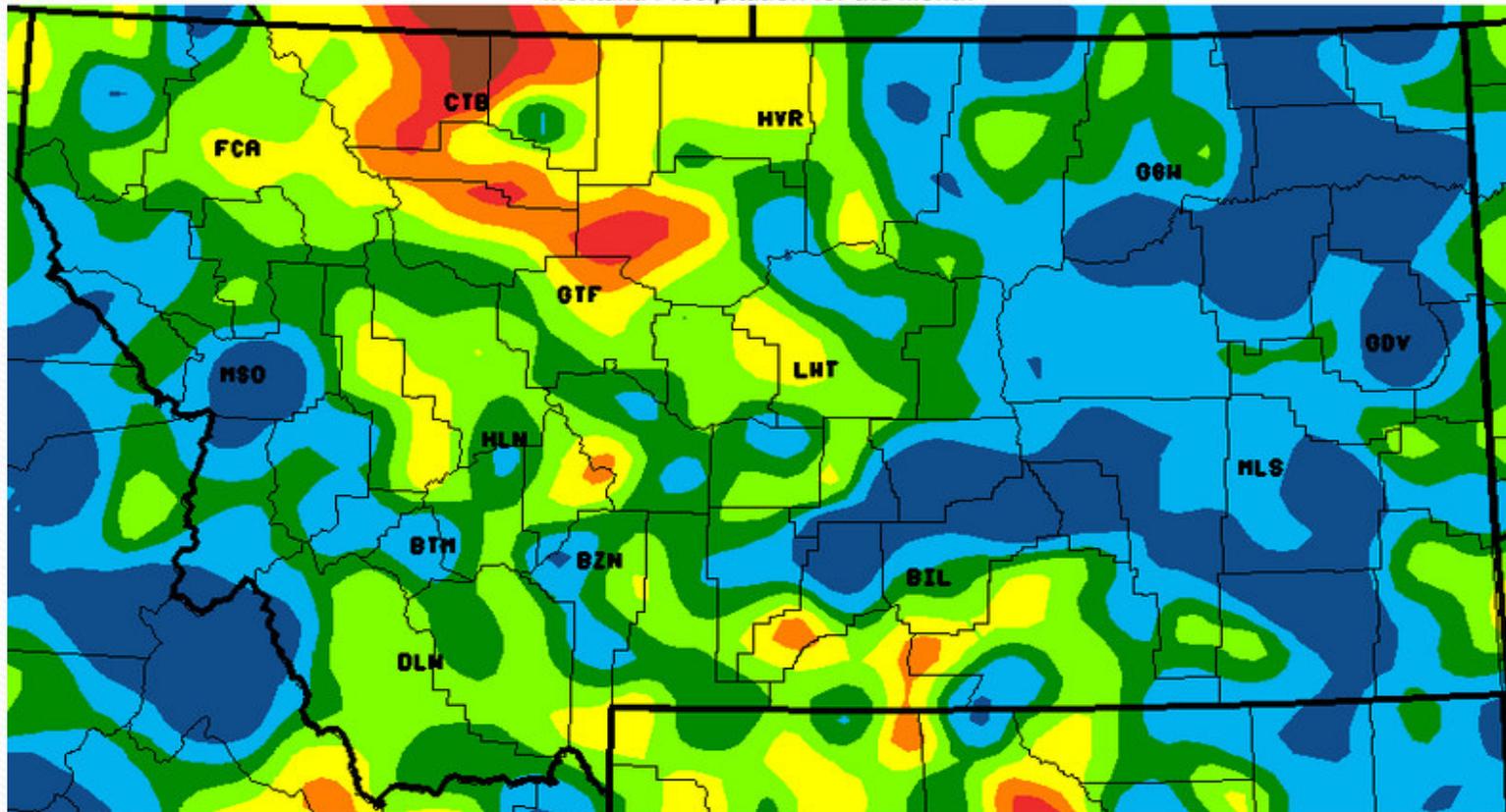
August Precipitation - NWS



National Weather Service - Great Falls, MT



Montana Precipitation for the Month



August 2009 Percent of Normal Precipitation
Period of Normal: 1971-2000

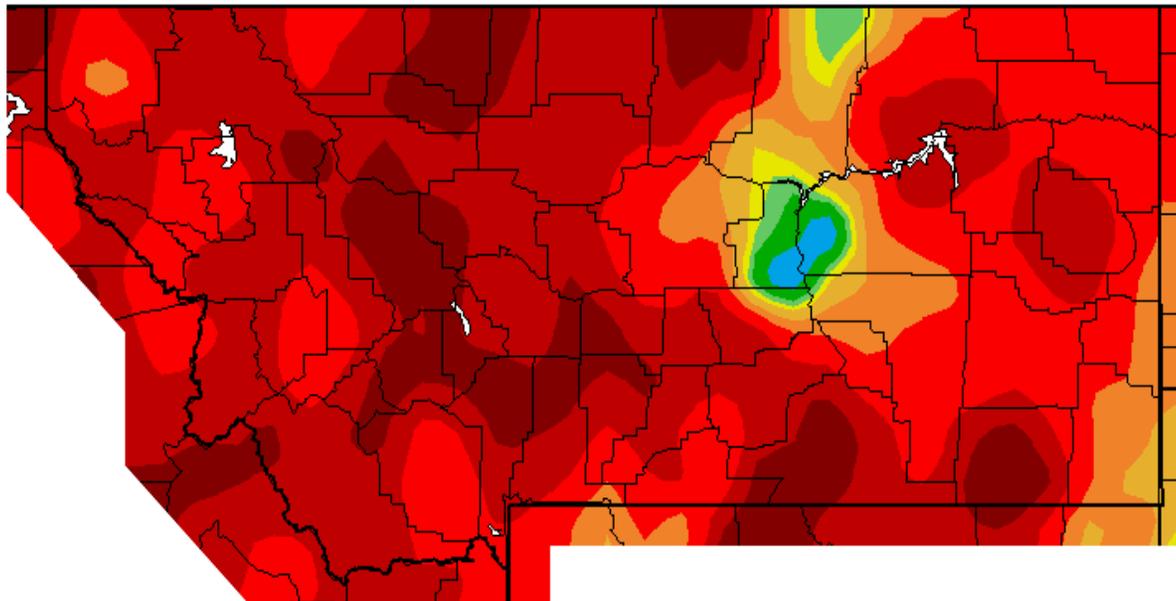


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Precipitation 9/1-9/16

Percent of Average Precipitation (%)
9/1/2009 – 9/16/2009

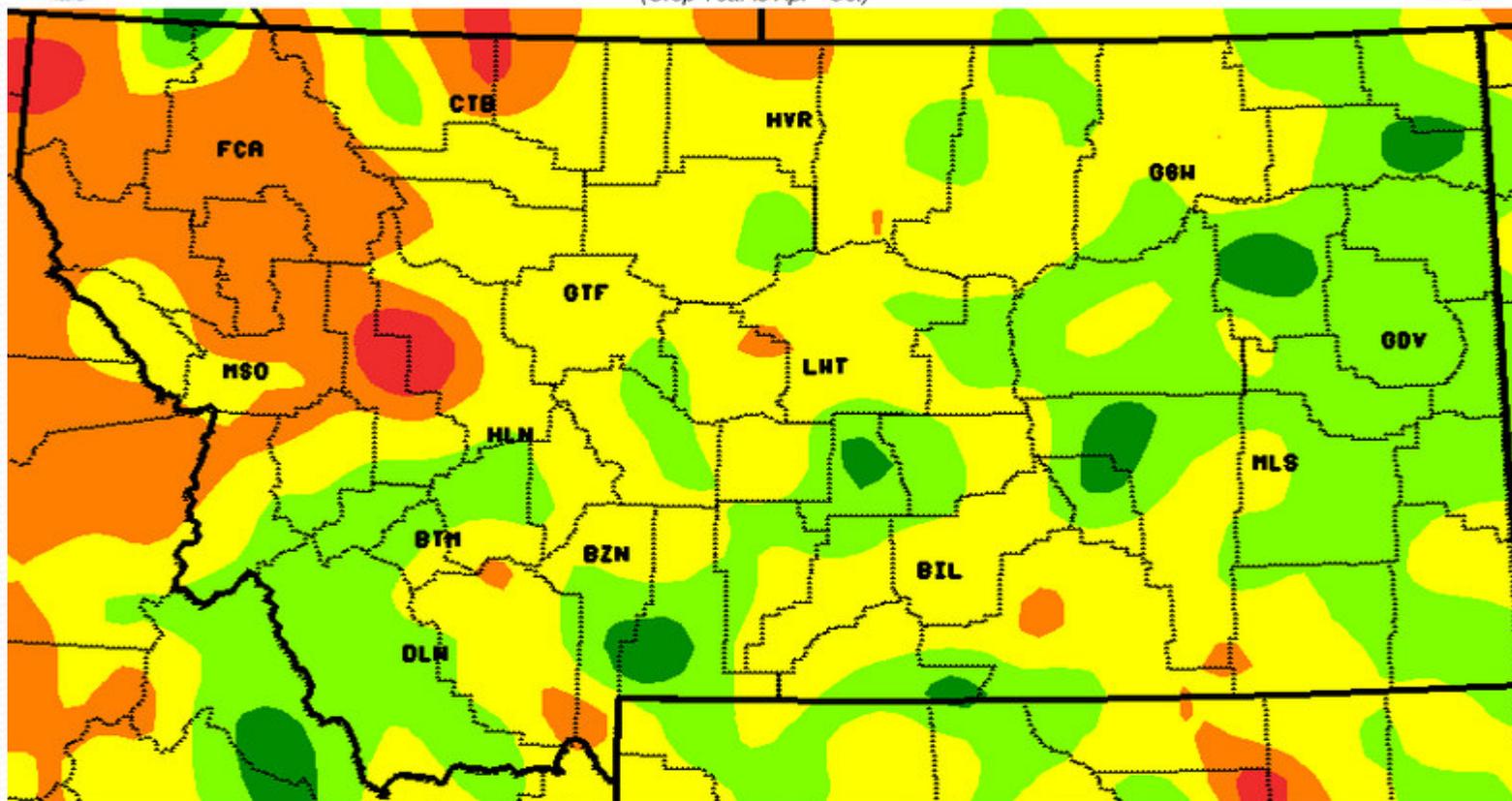


Generated 9/17/2009 at WRCC using provisional data.
NOAA Regional Climate Centers

Crop Year precip. April 1 – Aug 31



National Weather Service - Great Falls, MT
Montana Precipitation for the Crop Year
(Crop Year is Apr - Oct)



Apr-Aug 2009 Percent of Normal Precipitation
Period of Normal: 1971-2000



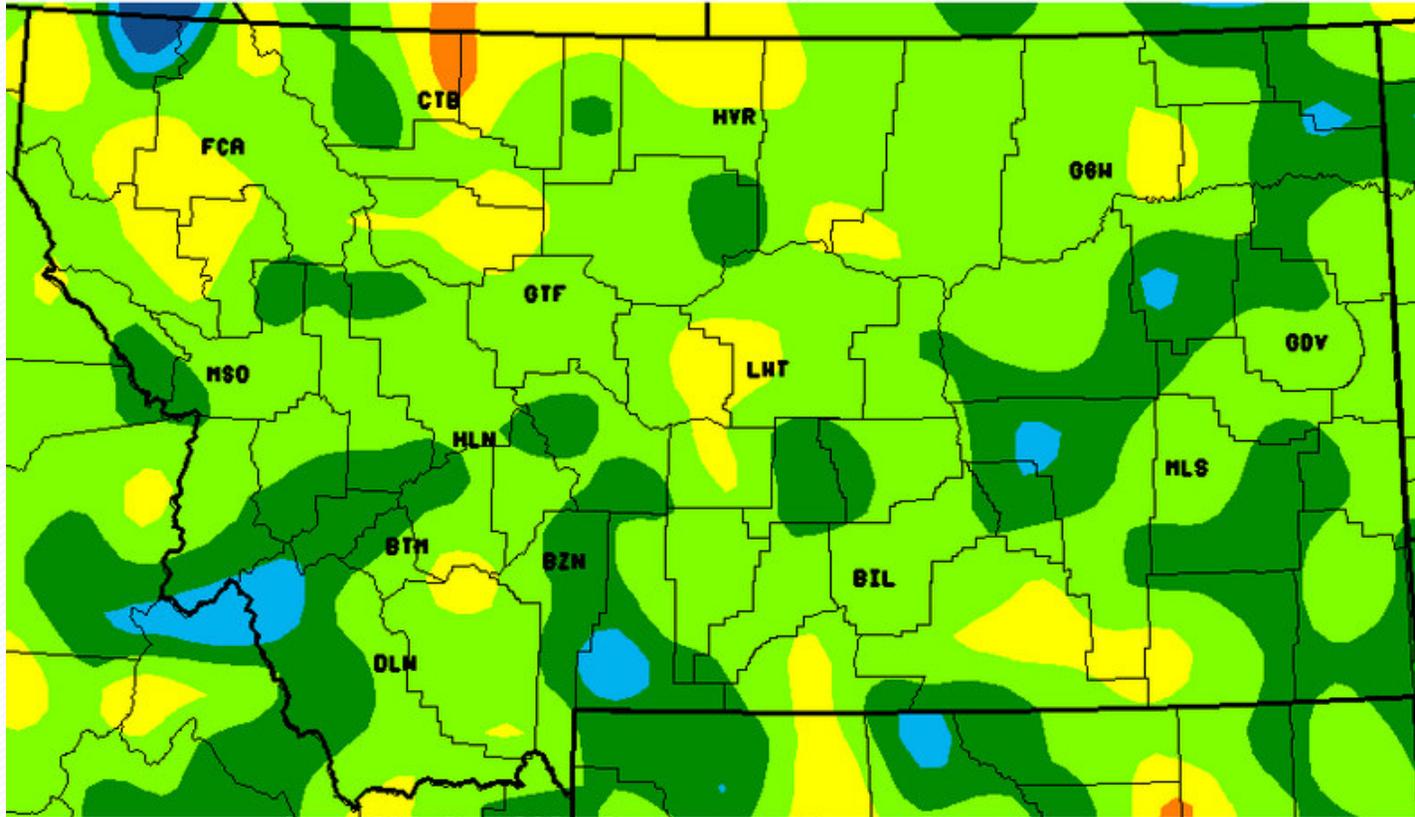
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<http://www.wrh.noaa.gov/Greatfalls>

Water Year Precip. through Aug.



National Weather Service - Great Falls, MT
Montana Precipitation for the Water Year
(Water Year is Oct-Sept)



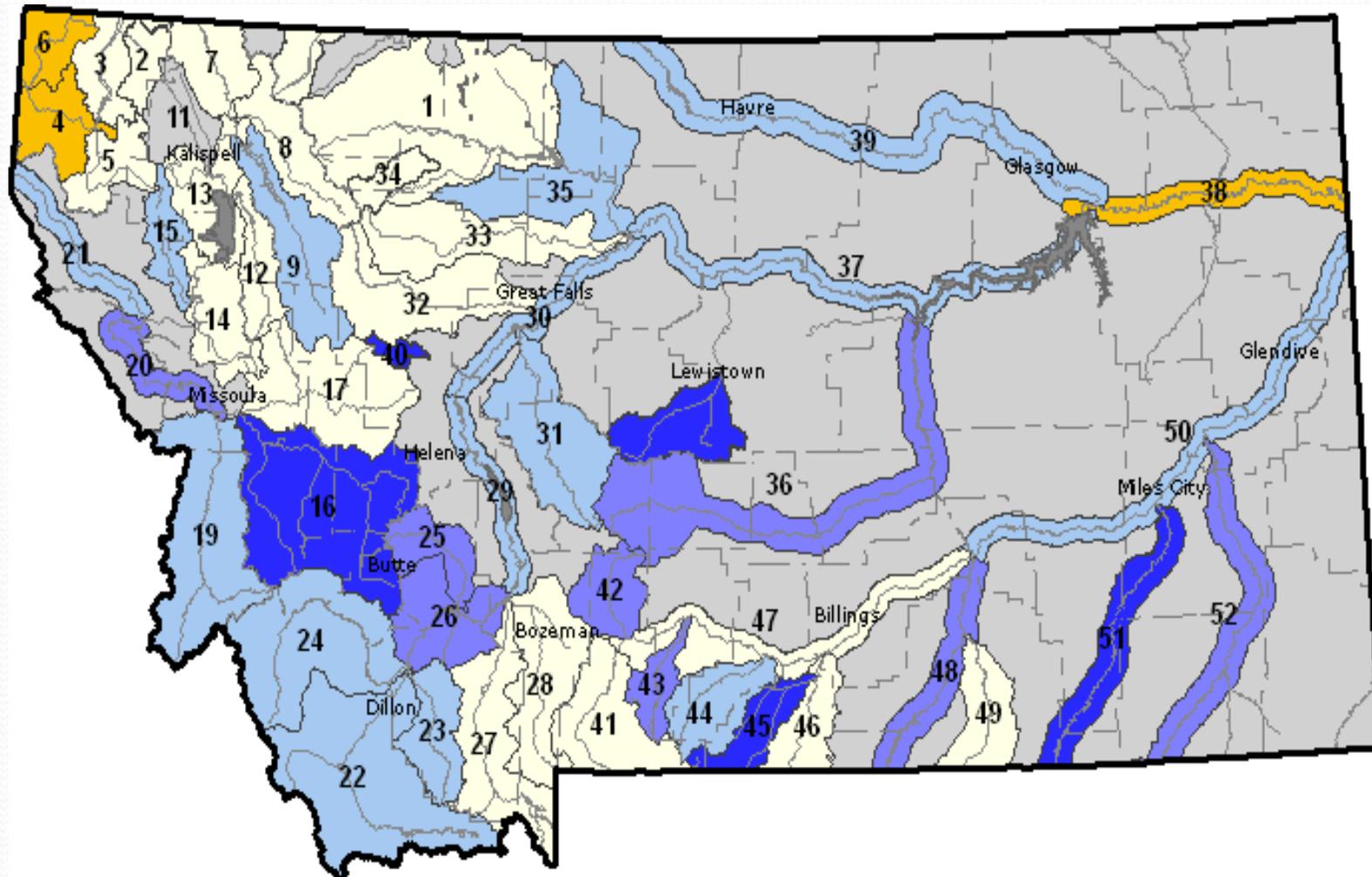
Oct 2008-Aug 2009 Percent of Normal Precipitation
Period of Normal: 1971-2000

20 40 60 85 115 150 200

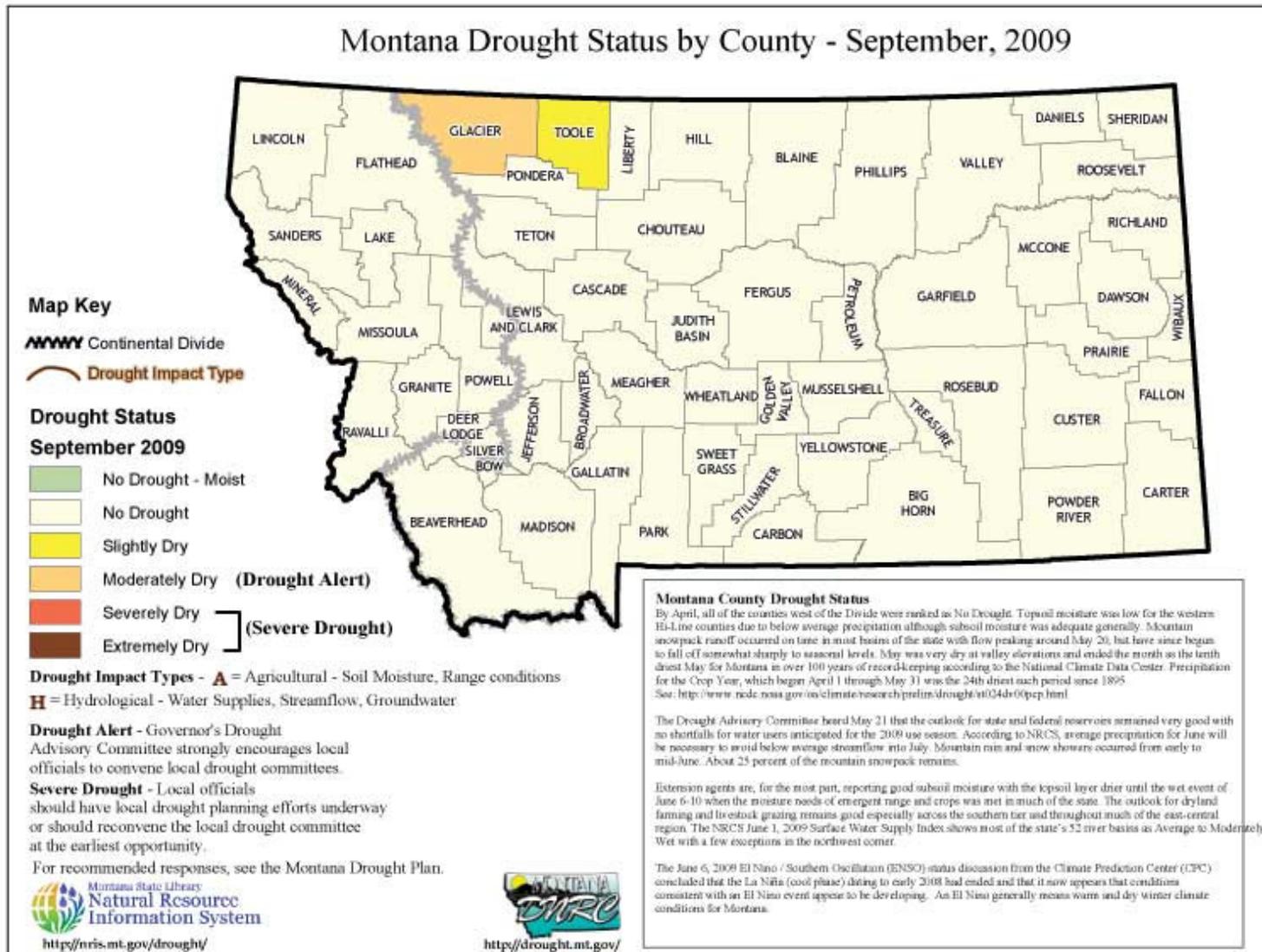
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September 1, 2009 SWSI - NRCS



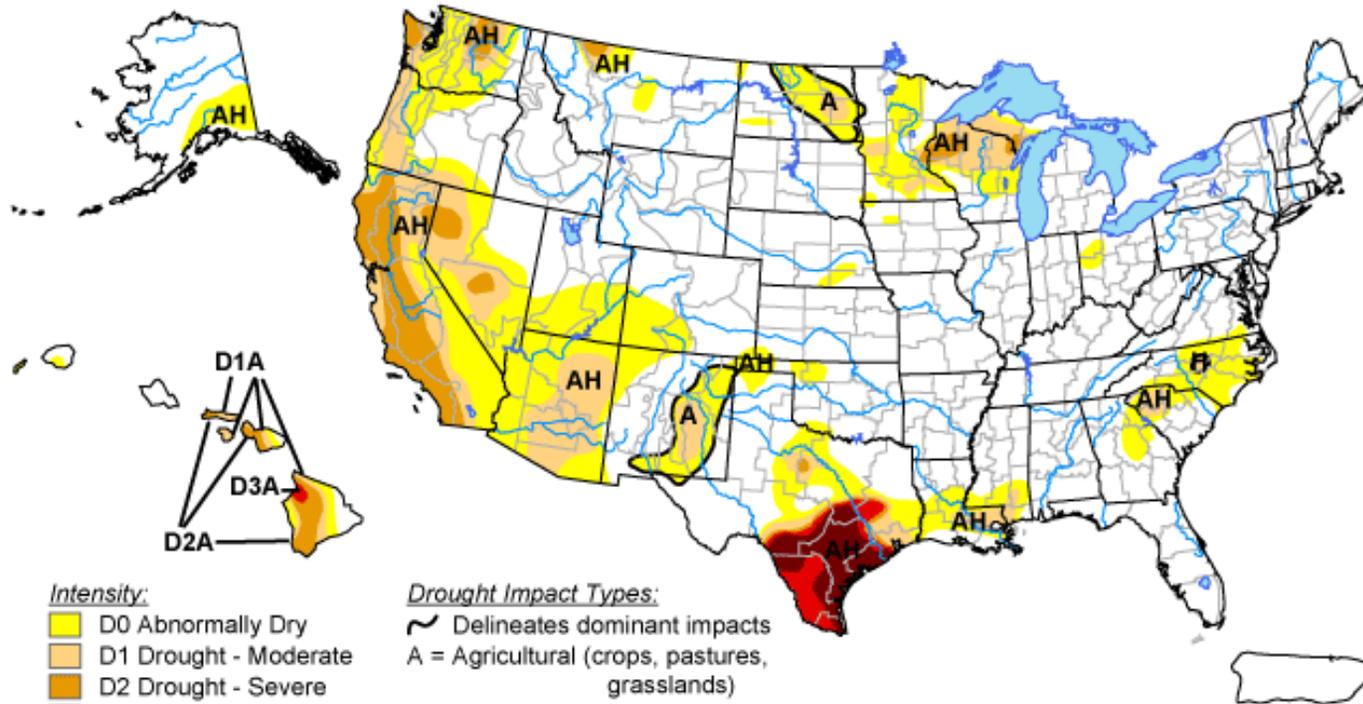
Drought Status – September 2009



Drought relief in Northern Great Plains

U.S. Drought Monitor

September 1, 2009
Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, September 3, 2009

Author: Brad Rippey, U.S. Department of Agriculture

NASS Crop Weather Report

Week Ending September 13, 2009

- **Spring wheat** harvest almost caught up to last year's pace with yields **forecast at 28 bushels per acre**, ahead of the five-year average of 26.4.
- **Winter wheat** crop harvested with forecast yield **37 bu. per acre**, behind five-year average of 41.2.

Harvest running late; now catching up

- **Durum wheat** harvest well behind last year and the five-year average, but **forecast yield of 26 bushels per acre** ahead of the five-year average of 24.2.
- **Barley** harvest has caught up to the previous year, and state **yields of 50 bushels per acre** are off slightly from the five-year average of 52.

Where does WY 2009 leave us?

- Reservoir contents strong carryover;
- Hydrologic recovery good 2008-2009;
- Good subsoil moisture most areas;
- Seeding ahead of 5-year average;
- Some hay shortages, but price

Natural Disaster Determination

Requests for drought -9/18

- Glacier
- Teton
- Chouteau
- Richland
- Dawson
- McCone
- Valley
- Garfield

Other reasons cited for 2009 NDDs:

Hail, snowstorms, sawflies,
grasshoppers.

New Big Hole real-time flow gauges Reclamation Drought Relief Act



Between Jackson and Wisdom



Mrs. Jackson & Mike Roberts, DNRC



What about emergent El Nino?



Swiftcurrent gauge – 11/07/06



Many Glacier 11/10/07

Temperatures moderate at last



El Niño 2006-2007 Building

El Niño / La Niña

- ◆ El Niño conditions (above normal sea surface temperatures) dominated during autumn and early winter
- ◆ El Niño conditions disappeared from eastern Pacific during February... currently in neutral phase
- ◆ Transition from neutral to La Niña conditions (below normal sea surface temperatures) possible during next 2-3 months



El Nino lifespan & effects

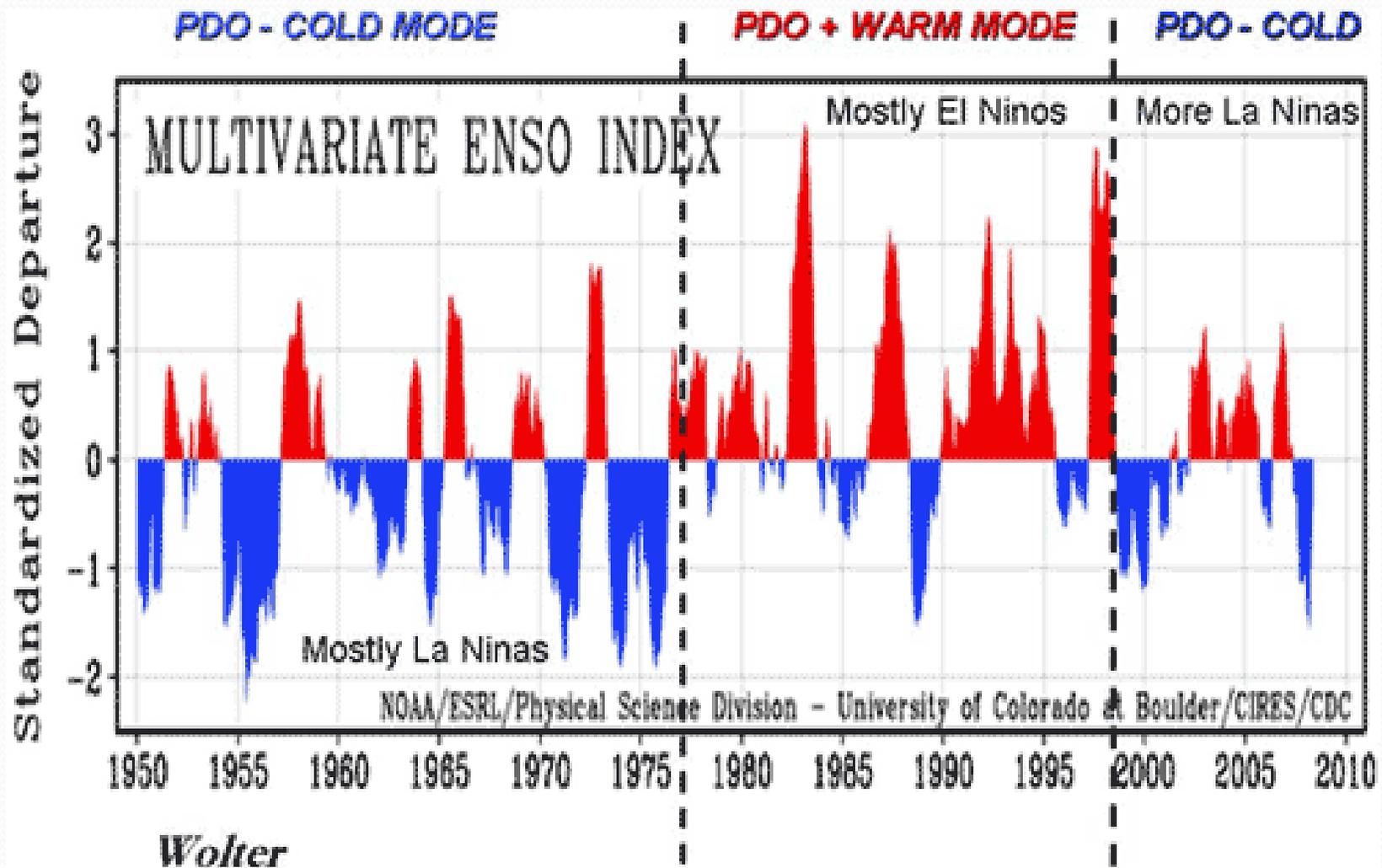
- Begins forming in June, peaks December, and ends in spring; but effects to come..
- Temperature anomaly more predictable than precipitation anomaly;
- Tends to bring rain instead of snow in early months of Water Year (Oct – Dec);
- Mountain snowpack can be small

MORE than EL Niño going on.....

- Natural wide range of climate variability;
- Climate warming more pronounced in Northern latitudes and in winter;
- “First Pulse” spring snowmelt comes earlier & anomalous events last longer;
- Decadal climate anomalies provide over-arching background influence –

ENSO-2008-2009 La Nina and cool PDO

PDO

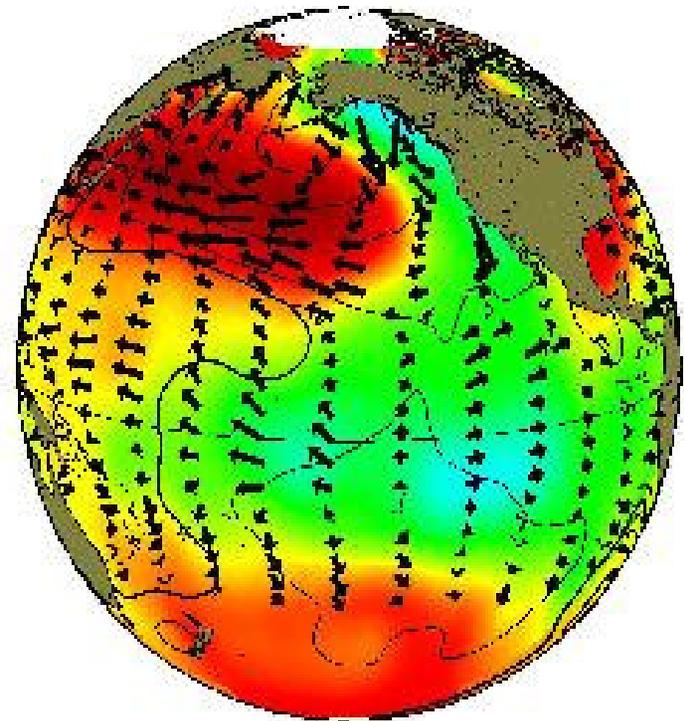
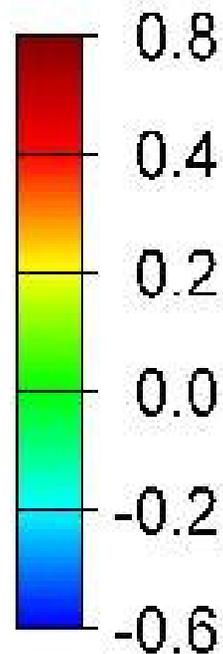
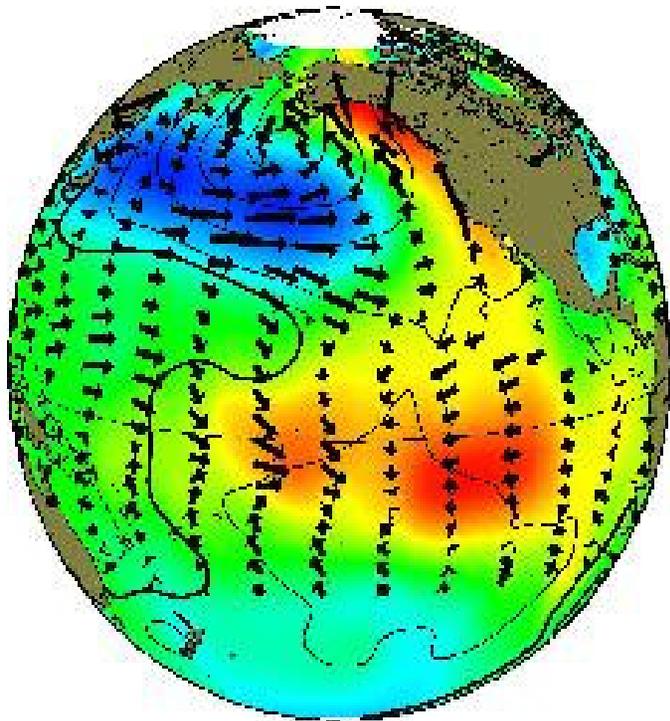


Last long cool phase of PDO

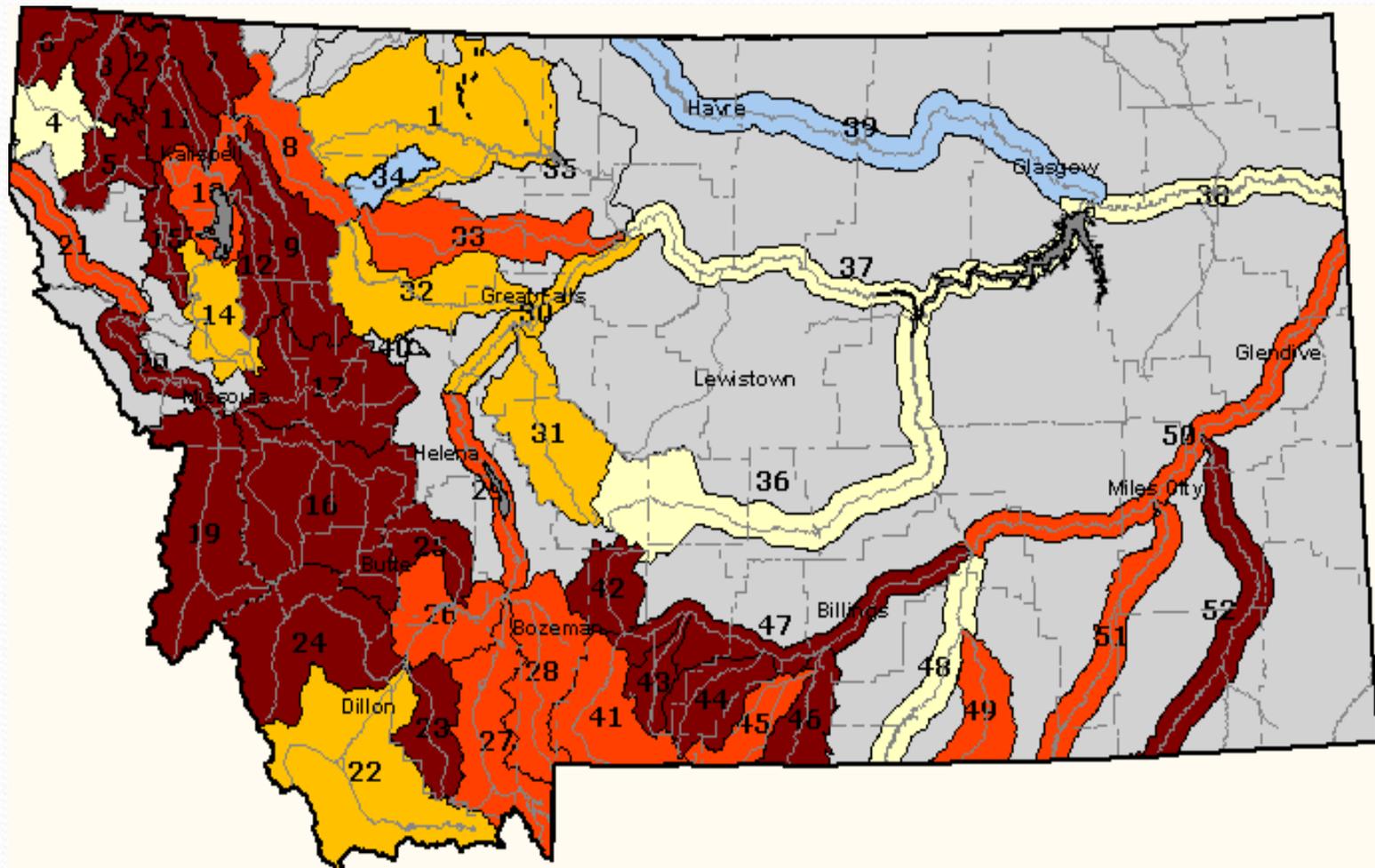
1947-1976 (30 years)

Warm phase

Cool phase

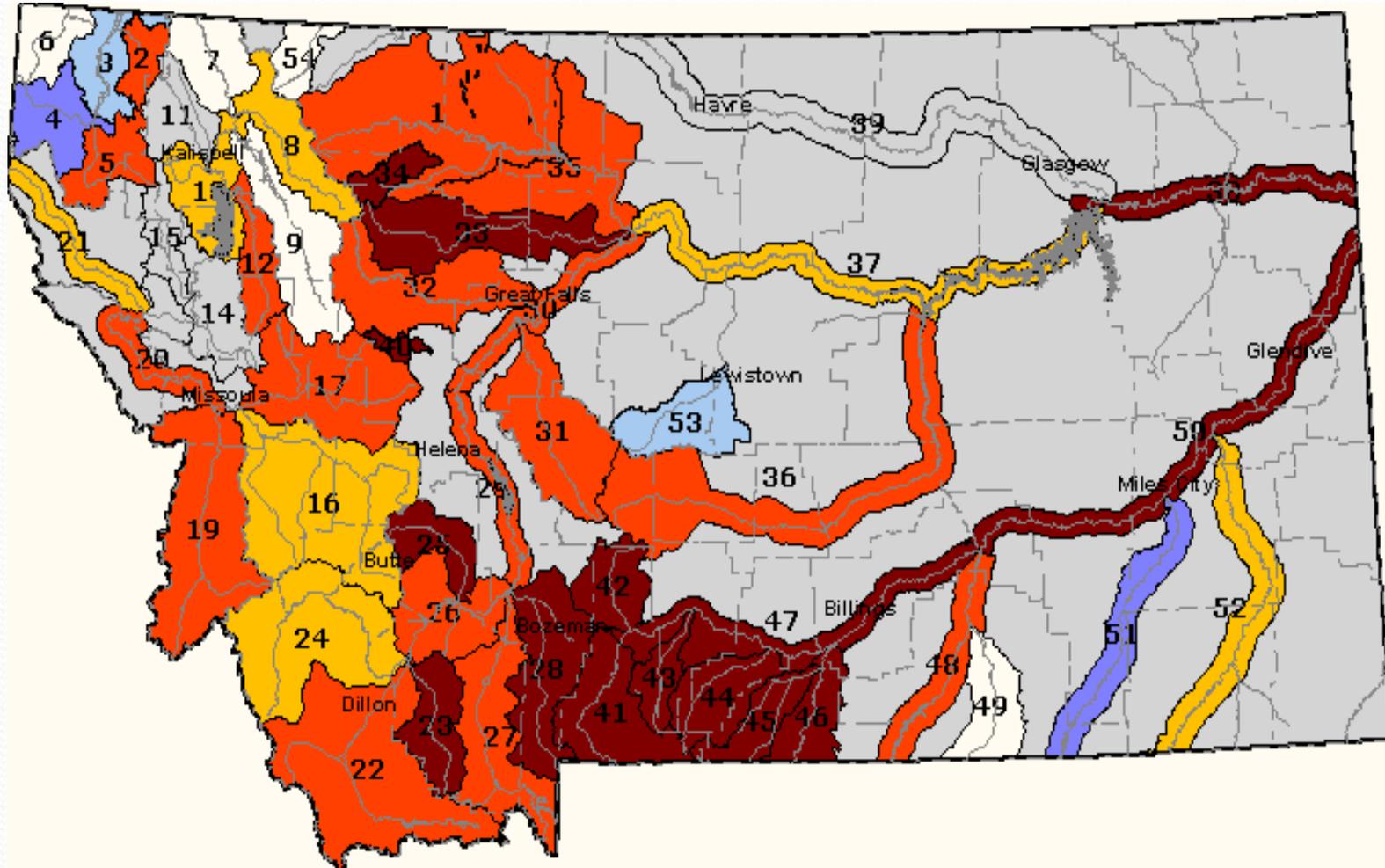


El Nino of 1993 leads to streamflow trouble of July-Sept 1994



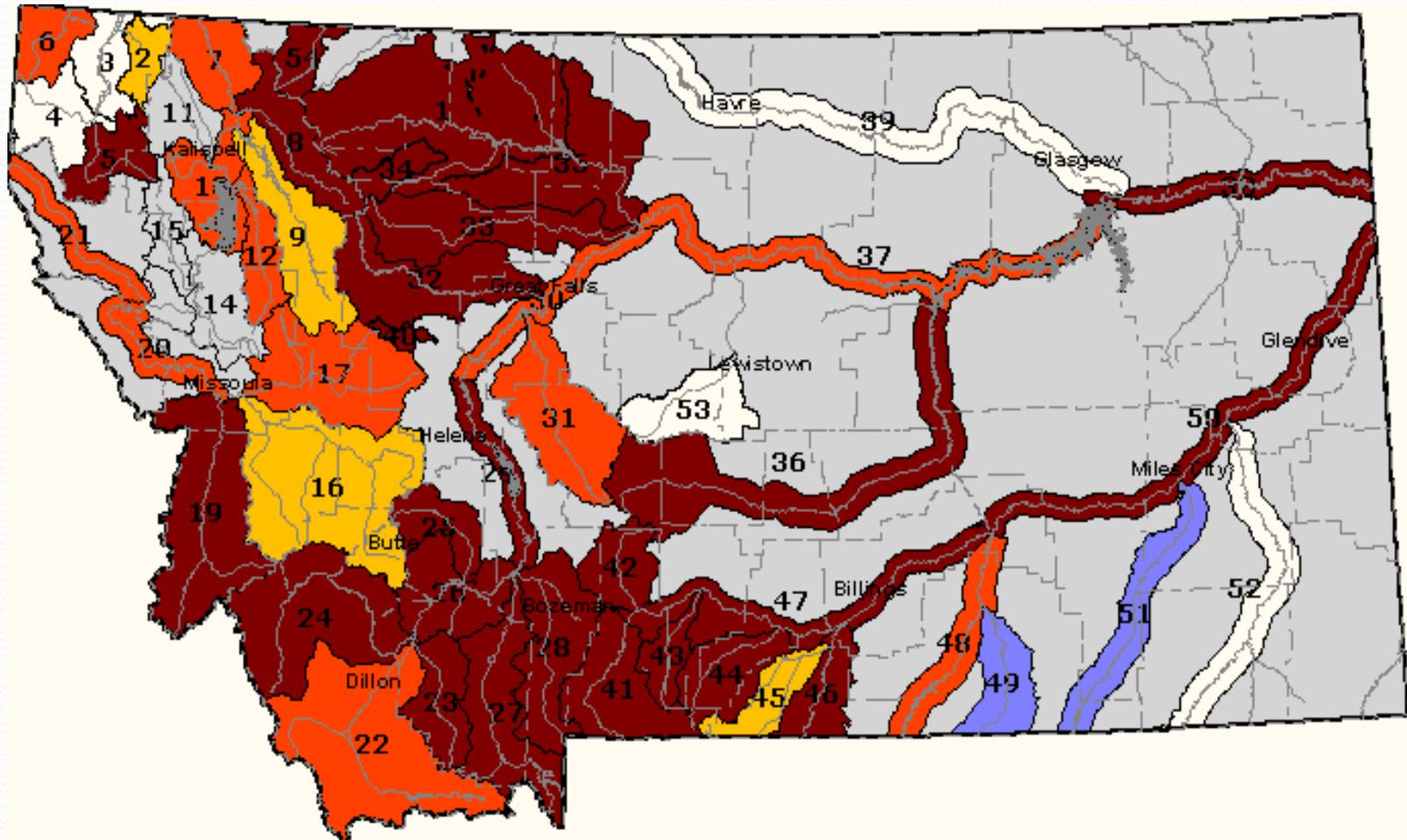
SWSI June 1, 2007

Following '06-'07 weak El Nino Winter

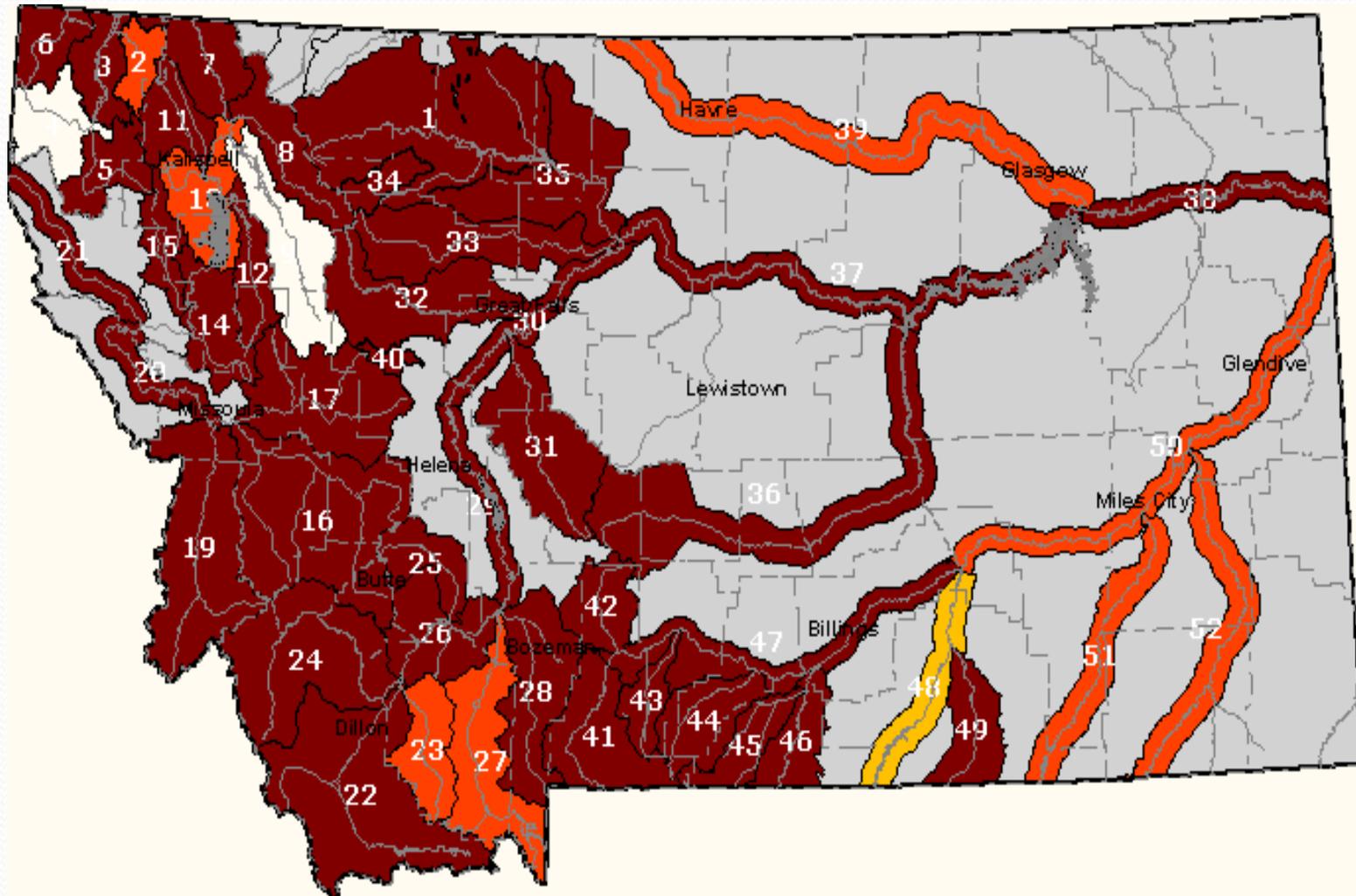


SWSI August 1, 2007

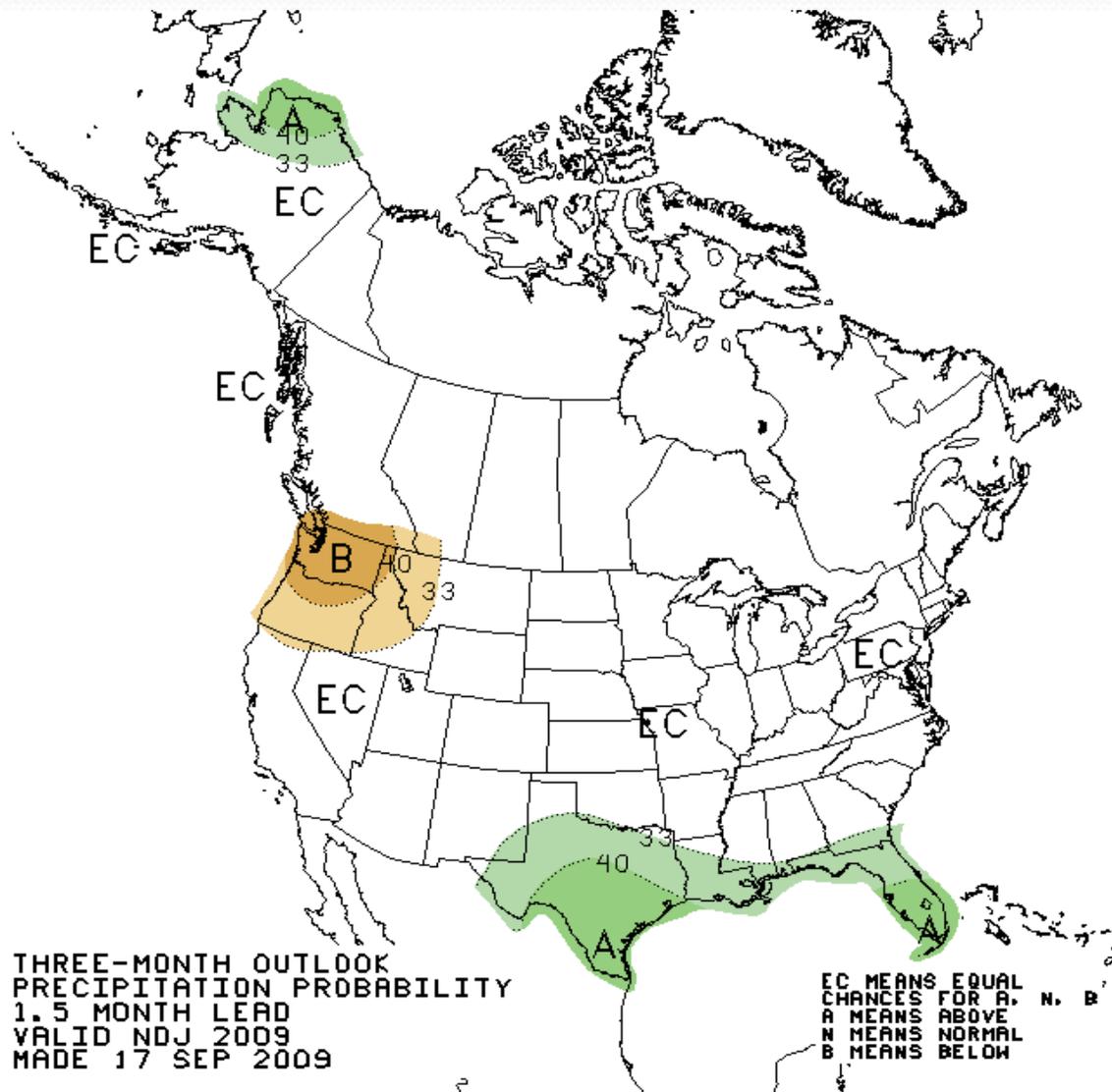
Following record heat wave of July



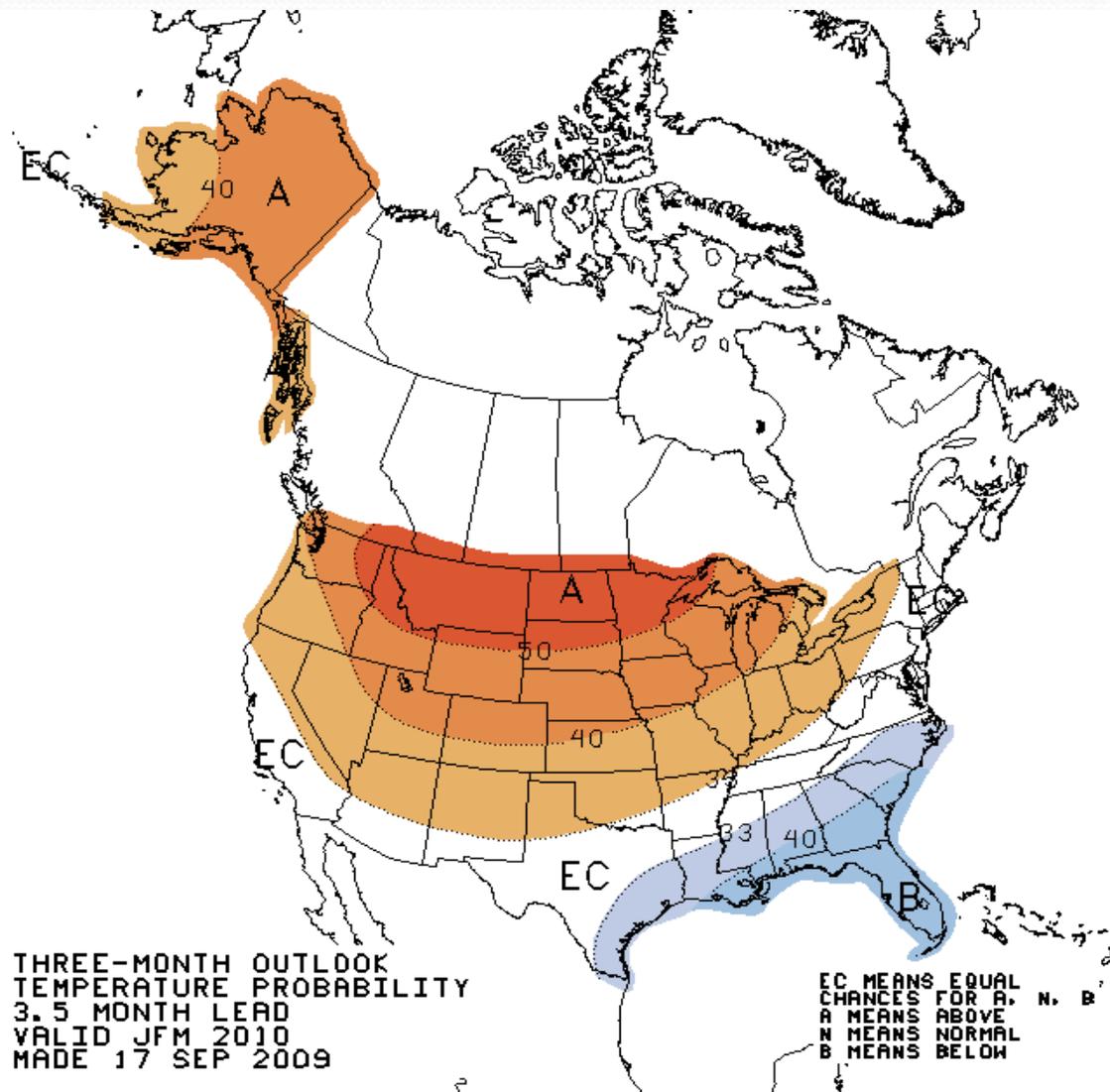
The El Nino of 2004 – 2005 Led to (SWSI) - April 2005



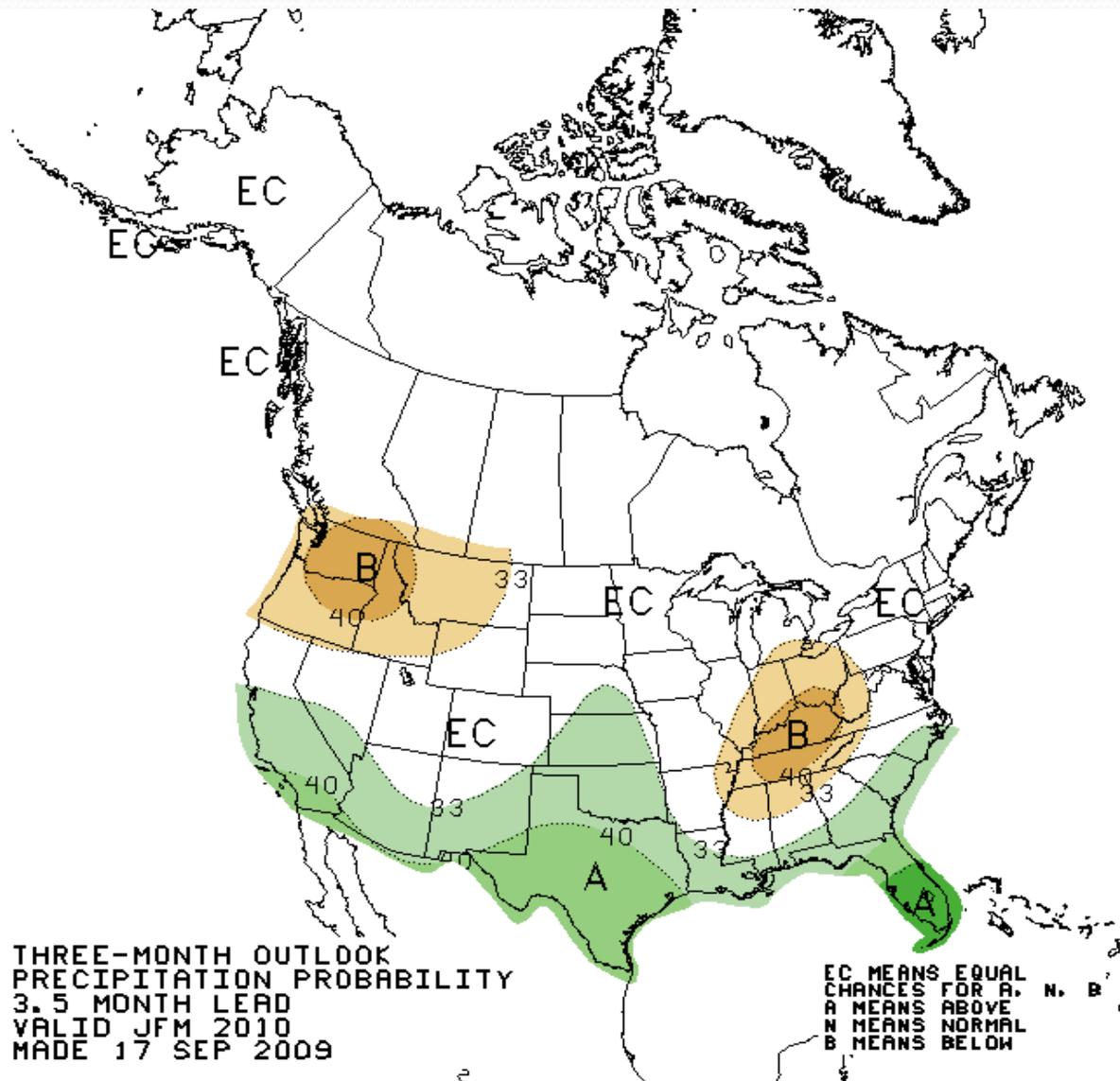
CPC Nov-Jan Precip. Outlook



CPC Jan-March temperatures

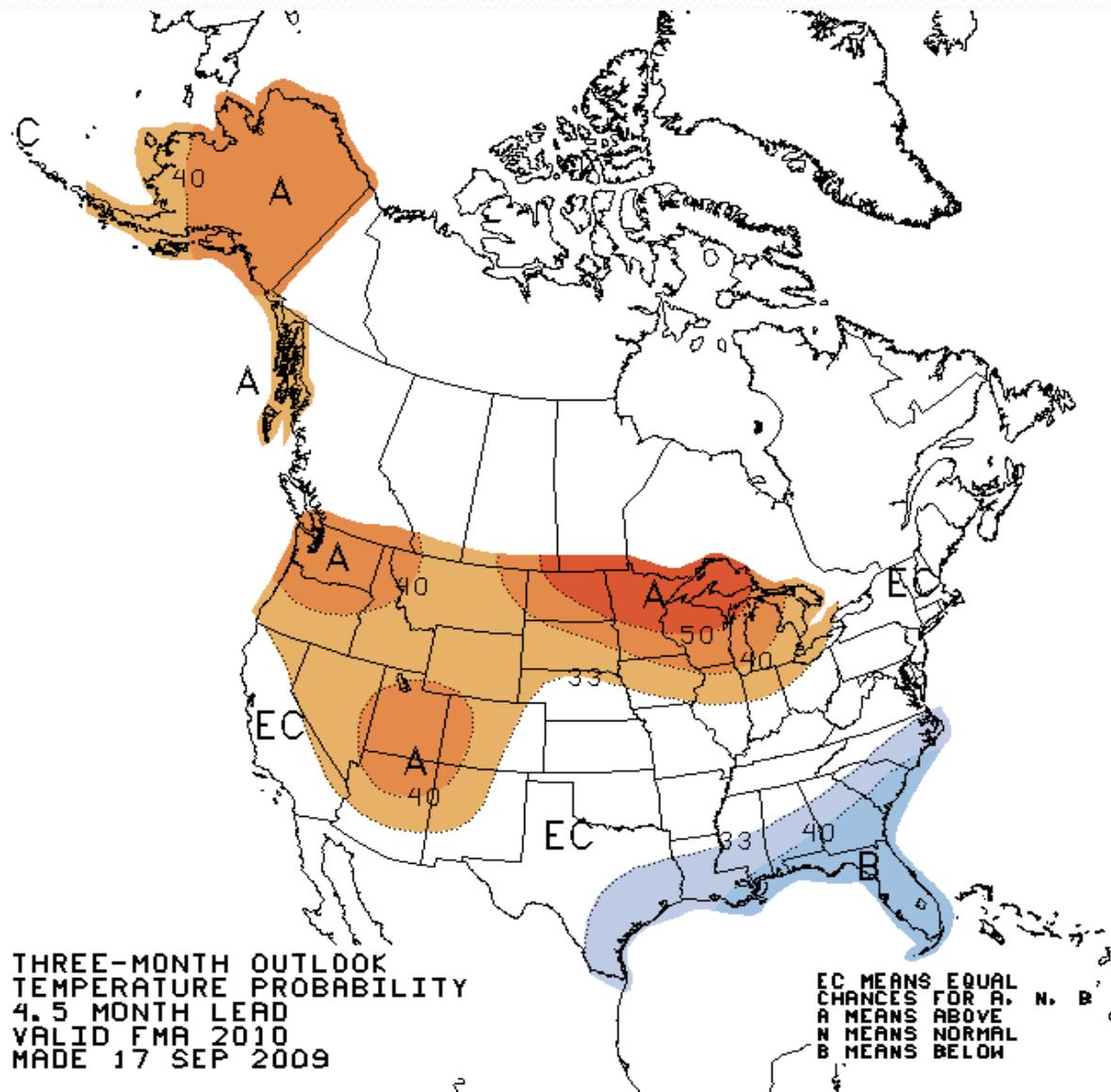


CPC Jan-March Precipitation

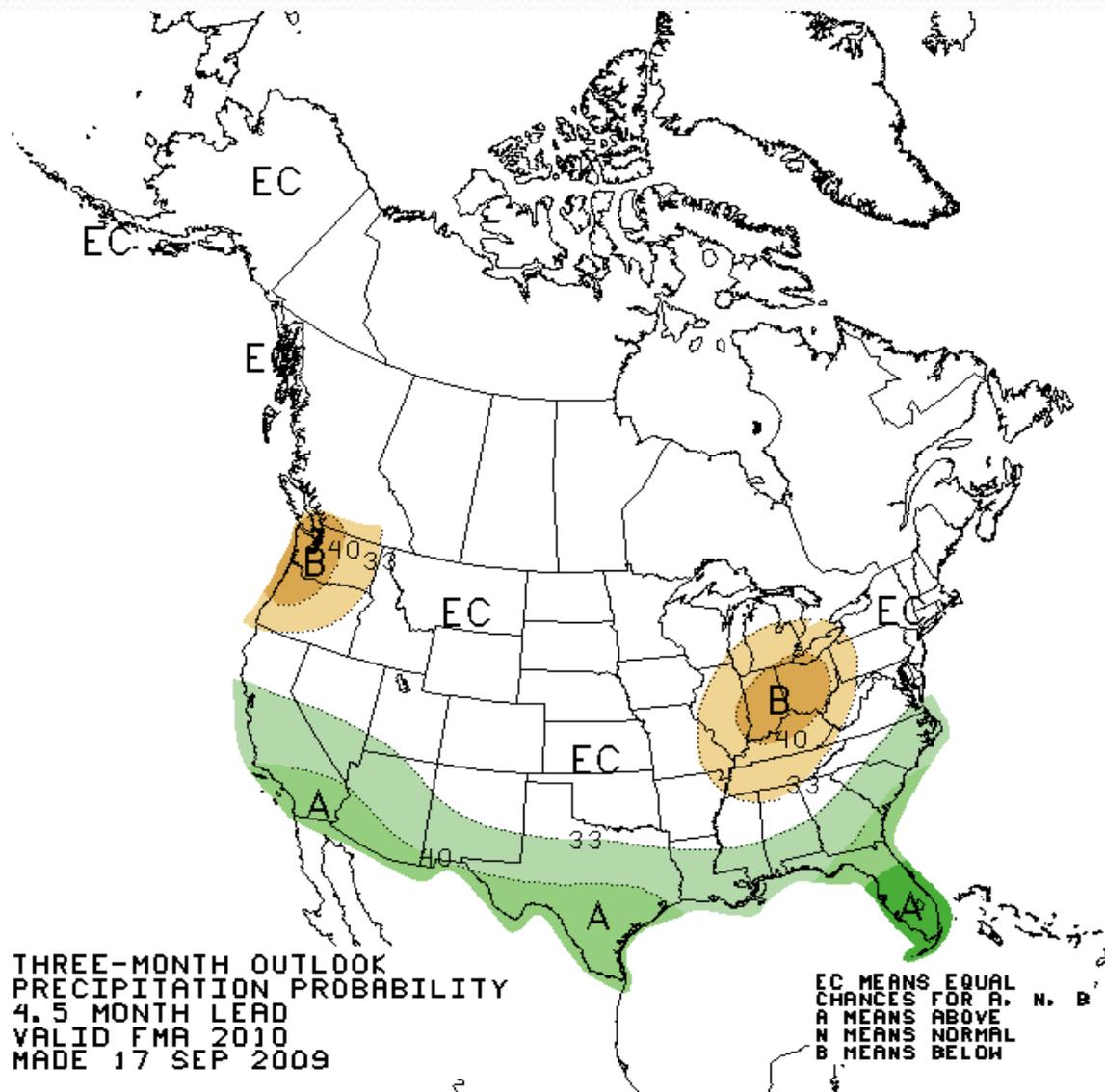


THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
3.5 MONTH LEAD
VALID JFM 2010
MADE 17 SEP 2009

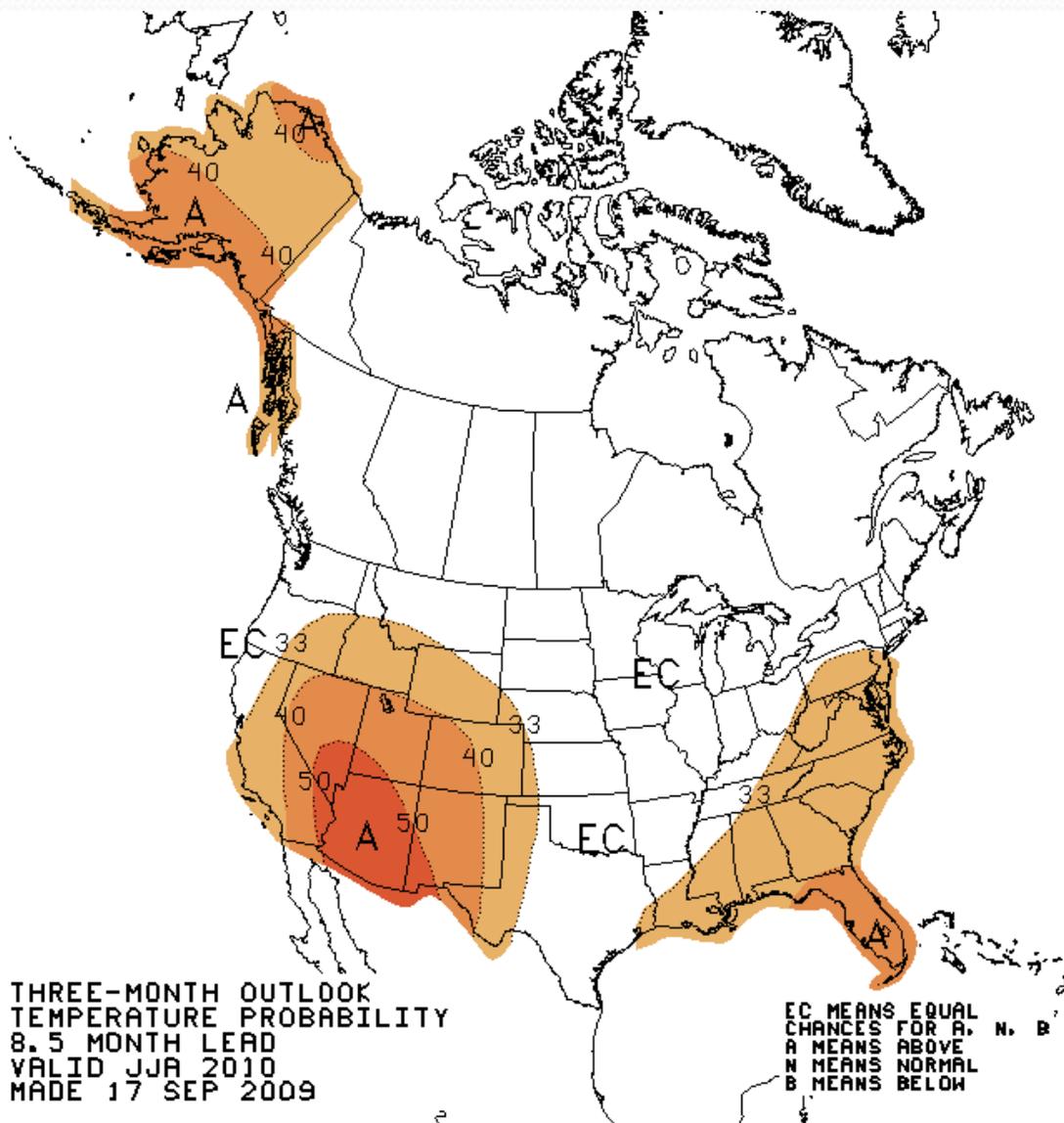
Temperatures Feb-April 2010



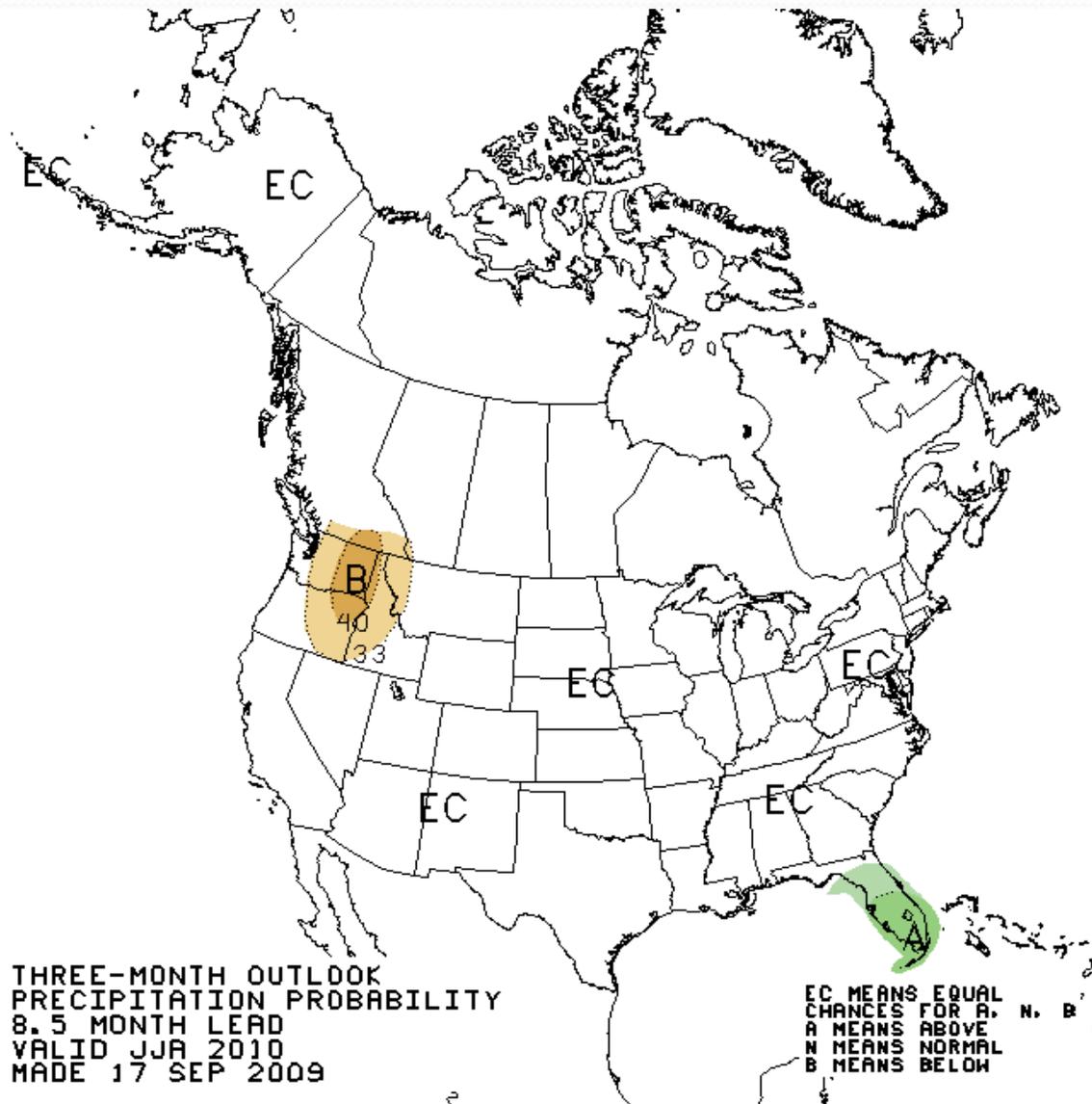
Precipitation Feb-April 2010



Temperatures June-Aug 2010



Precipitation - June-Aug 2010



The End

Thank you
Drought.mt.gov