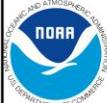


Central Region Drought Outlook 3 July 2012

Corn near Sigel, IL – 23 June 2012
Aaron Gruel, MRCC

Dr. Dennis Todey
South Dakota State Climatologist
President- Amer. Assoc. State. Clim.
South Dakota State University
February 17, 2012
Dennis.todey@sdstate.edu
605-688-5141



Hello and welcome to the next in a series of Missouri Basin specific climate outlook Webinars 2011-2012. My name is Dennis Todey and I am the State Climatologist for the State of South Dakota.

We are taking the opportunity to address some of the longer term weather and climate concerns in the basin to help you all plan a little better in the upcoming months. We hope to deliver information pertinent to your decision making needs. The “we” here is a group of agencies and partners including the USDA NRCS, USGS, National Drought Mitigation Center, USACE, state climatologists and High Plains Regional Climate Center that provide climate relevant information. So thanks to those other agencies and organizations for your input to this presentation.

This Webinar is meant to be an overview of the current climate situation and what we may expect in the coming months. It is also meant primarily for stakeholders and partners in other agencies, tribes, state and local governments, universities and various interests from agriculture, water resources, natural resources and ecosystems.

Let’s start first with a quick look at the map on the first slide. As many of you know March went down as a very warm and record breaking month for the nation. Well over 5,000 records were set. This map shows that out of 118 years of record keeping the ranking by state of how warm it was. You can see how it easily was the warmest March on record.

General Information

Providing climate services to the Central Region

- * Collaboration with Dennis Todey (South Dakota State Climatologist), Doug Kluck (NOAA - RCSD) and John Eise (Climate Service Program Manager), State Climatologists and the Midwest Regional Climate Center, High Plains Regional Climate Center, NOAAs Climate Prediction Center, Iowa State University

- * **Next Climate/Drought Outlook Webinar**

- * July 19th, 2012 (1 PM CDT)

- * Hosted by National Drought Mitigation Center

- * **Access to Climate/Drought Webinars and information**

- * <http://mrcc.isws.illinois.edu/webinars.htm>

- * <http://www.hprcc.unl.edu>

- * **Operator Assistance for questions at the end**

- 1) Our first central region climate/drought Outlook of this series responding to building drought conditions in the central part of the country including the Corn Belt and Great Plains. We will continue as conditions warrant to address issues with the drought and fires.
- 2) The next webinar will occur on July 19th at 1 PM CDT. The webinar presenter is from the National Drought Mitigation Center (actual presenter is TBD).
- 3) A recording of this webinar will be available within 1-2 days at the links listed below at the Midwest Regional Climate Center and the High Plains Regional Climate Center
- 4) At the end of this presentation we have an operator that will organize the Q & A's.
- 5) We will appreciate your feedback on these and other climate services at that time or at any time. We will provide contact information at the end.

Agenda

- * **Current conditions & historical context**
- * **Current impacts**
- * **Predictions**
- * **Questions/Comments**

Grasslands in Fall River County, SD –
29 June 2012 Susan Sanders, NWS



The structure of the webinars is to review current climate conditions and put them in some historical context. We will look back at what has led up to the situation we are in and then look ahead using the Climate Prediction Center Outlooks and Drought Monitor Outlooks. Pictured here is a grassland in Fall River County (far Southwest South Dakota) showing the condition of grass/rangeland and why there is great concern about fire. Actually several fires (some natural some human) have initiated in this area in the last few days.

Key Points

- * **Current Conditions**

- * Dry generally (wet northern MN/WI)
- * Warmer than average temperatures since spring
- * Warmth and lower dewpoints – plant water use (ET)
- * Fires initiating over most prone areas

- * **Predictions**

- * This week – warmth continues
- * Warmth likely to continue through summer
- * Precipitation – some improvement possible in spots
- * Currently ENSO-neutral. Return to El Nino possible in the fall

Current situation has generally dry conditions over nearly the whole central part of the country except for far northern areas of MN and WI. Part of the issue been associated with dry conditions. We have some stations which have set record low precipitation totals for the last month to several months. Or they have been on the low end of the precipitation distribution. What has really impacted the dryness over much of the spring has been the heat. Warm temperatures have been very common and persistent. This condition has helped to move crop development. But it has also increased crop water use.

Generally drier conditions in the west along with very low relative humidity (and limited snowpack) has led to the fires in throughout the front range of the Rockies.

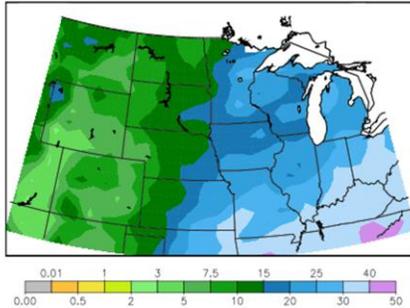
Looking ahead for this current week, much of the central part of the country is in a heat advisory because of heat and now higher dew points. This will help crops a little in reducing water use. From a human perspective it will be uncomfortable. We should remind livestock and pet owners about the potential for stress on livestock.

All indications seem to agree that warmth will continue throughout the summer most likely. Precipitation changes are not as clear-cut. We'll talk a little more about that later. With the overall dry soil and ridge of high pressure we expect no major changes in the near term.

We are currently in ENSO-neutral conditions with a potential change to El Nino in the fall. There are conversations about the possibility of the shift to El Nino helping shift conditions. This shift does not seem to be likely in enough time to change the status for crop issues.

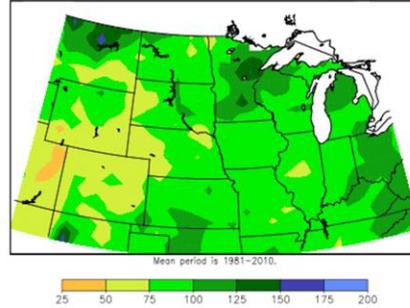
Precipitation – since October 1

Accumulated Precipitation (in)
October 1, 2011 to July 2, 2012



Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Accumulated Precipitation: Percent of Mean
October 1, 2011 to July 2, 2012



Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign



<http://mrcc.isws.illinois.edu/>

Now we will look at the precipitation conditions since October 1st and other time periods. The goal here is to set the stage for what has occurred leading to the season.

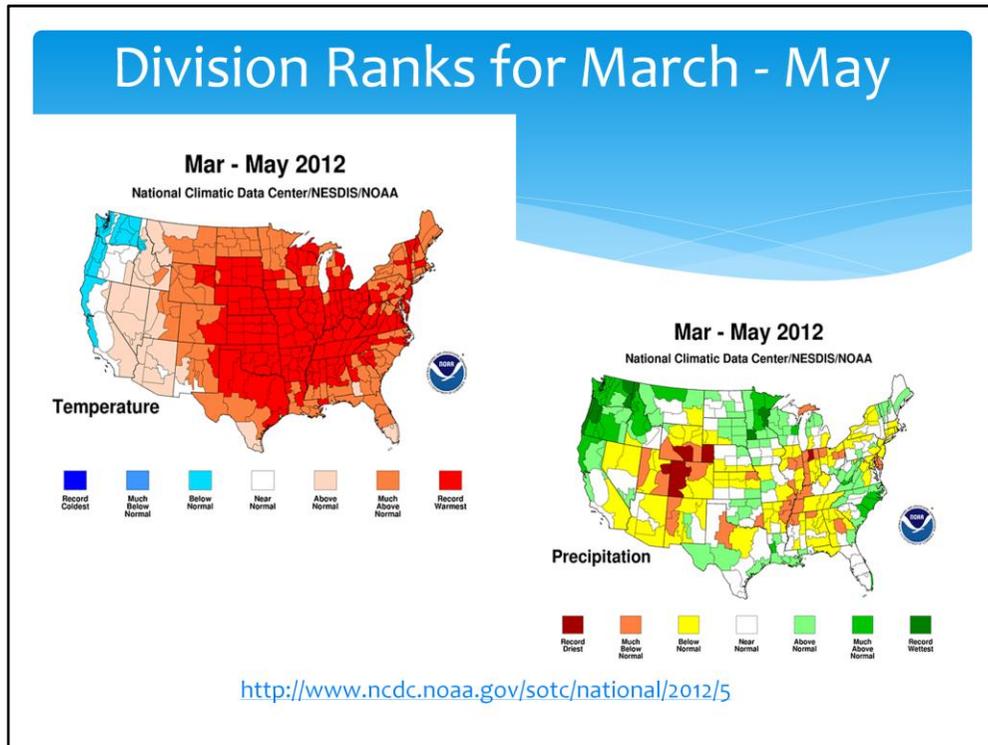
The roots of the current situation go back to the fall. Note that over much of the corn belt precipitation is 75-100% of average going back to October 1 (includes soil moisture recharge time). While this is not always a killer for the following season, it does increase the risk because of dry soils.

Also not even drier conditions in the western plains. Fall is not a peak precipitation time there. But it does help to maintain wetness for the spring.

Not shown, but remember that winter was warmer and likely allowed some additional loss of moisture in surface soils where snow cover often is. The lack of snow pack in the Rockies was a direct leader to the current fire situation.

The overall lack of snow during the winter also probably allowed some drying of surface soils exposed to the air throughout the winter – without being frozen for much of the time. This is somewhat speculative, but seems reasonable.

Division Ranks for March - May

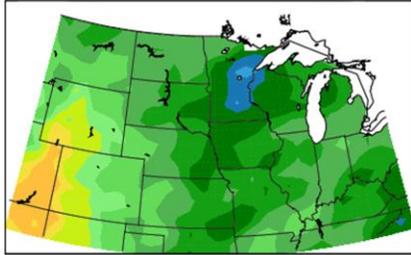


Skipping ahead to spring conditions – looking at seasonal plots from the National Climatic Data Center.... Spring temperatures were record or near-record warm across all of the Corn Belt into the Plains, particularly in March. Many places were actually warmer during March than April. This helped to push along crop development and made for a possible earlier planting season over many areas. It also introduced an early dormancy break, which along with a normal April freeze caused a great deal of damage in Michigan and some in surrounding states. (The Central Region Climate Response Team, which is helping with this webinar, is in final editing of a document reporting some of the impacts of the freeze. Note the overall rankings for climate divisions in March being record or near-record warm.

The 2nd map indicates spring precipitation ranking. There was a great deal of variability across the Corn Belt with northern areas actually being a little wet. Some of the east and south was quite dry. Overall this would not be indicative of serious conditions. The Rockies were also very dry in the spring. Combining dry conditions with warm temperatures dries surfaces and plants even more quickly.

Precipitation - 90 Day

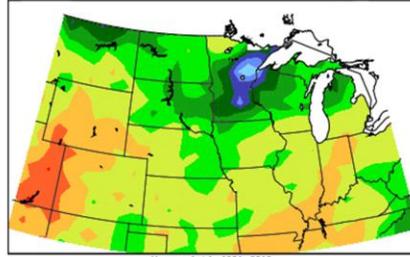
Accumulated Precipitation (in)
April 1, 2012 to July 2, 2012



0.01 0.5 1 2 3 5 7.5 10 15 20 25 30 40 50

Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Accumulated Precipitation: Percent of Mean
April 1, 2012 to July 2, 2012



5 10 25 50 75 100 125 150 175 200 300
Mean period is 1981-2010.

Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign



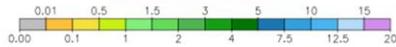
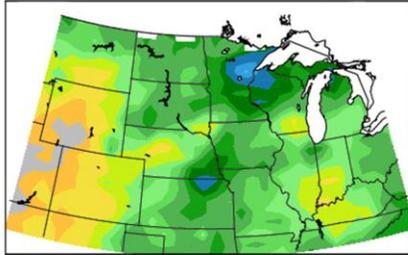
MRCC
Midwestern Regional Climate Center

<http://mrcc.isws.illinois.edu/>

Looking at precipitation for a slightly updated time frame to get a more current picture of precipitation. The image on the left is observed precipitation. The image on the right is percent of average since April 1. Similar patterns are very apparent with wetter conditions in eastern SD to MN where over 20" has fallen during this time. Much of the southern part of the corn belt less than 75% or even less than half average precipitation. This is the peak precipitation time of year and critical to crop development.

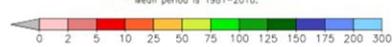
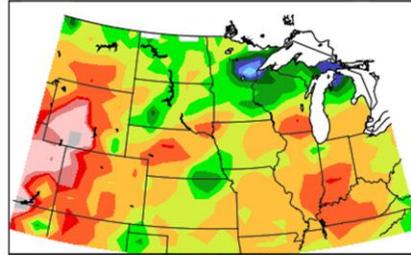
Precipitation - 30 Day

Accumulated Precipitation (in)
June 2, 2012 to July 2, 2012



Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Accumulated Precipitation: Percent of Mean
June 2, 2012 to July 2, 2012



Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

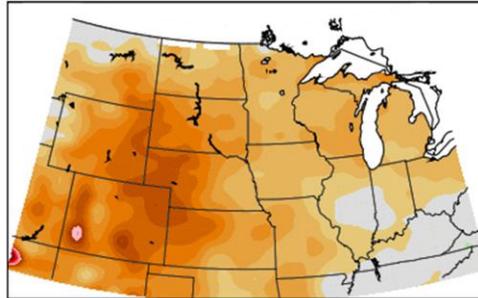


<http://mrcc.isws.illinois.edu/>

Moving to an even more immediate picture we drop to the last 30 days. It is during this time that precipitation has dropped off greatly leading to rapidly worsening drought conditions (termed flash droughts) in much of the Midwest. In some places of NE, SD, WI and IL-IN-KY there has been 10% of average precipitation or less. For corn this is a very critical time leading up to tasseling – the reproductive stage of the plant. Crop stress at this time can cause large yield losses.

Temperature - 30 Day Departure

Average Temperature (*F): Departure from Mean
June 1, 2012 to July 1, 2012



Mean period is 1981-2010.



Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

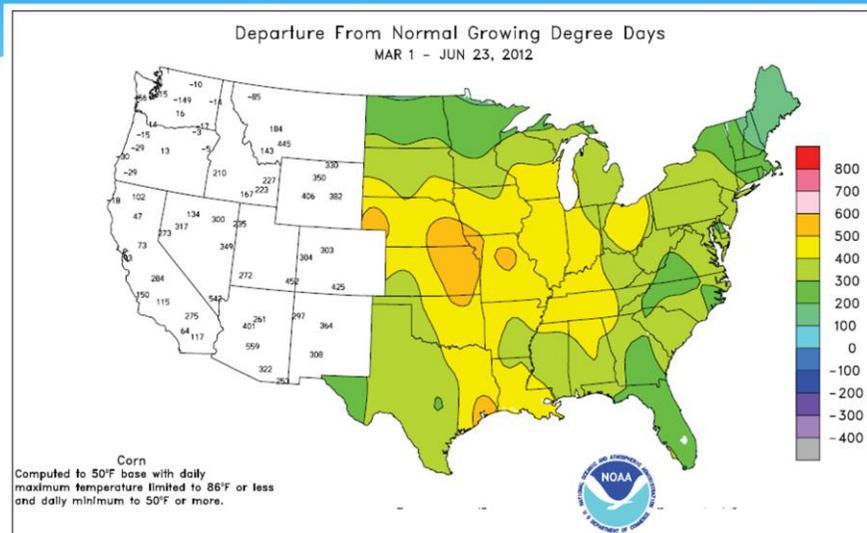


<http://mrcc.isws.illinois.edu/>

In conjunction with the dryness we have had very warm temperatures. Over the last 30 days temperatures have been well above average over most of the region. They have been warmest most significantly over the plains where temperatures during June were 6-9 F above average in the plains. During dry conditions, warm and dry in the plains usually go hand-in-hand because of surface processes. The main part of the corn belt has been warm, though not to the extent of the plains.

While temperatures may not be running above average crops under stress cannot handle high temperatures. Climatological averages during this time of year are near potential stress levels. When a plant has reduced water available, it experiences stress and tries to accommodate for that stress by curling leaves (for corn) or turning over leaves (for soybeans).

Growing Degree Day Deviation



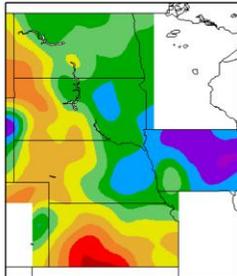
<http://www.usda.gov/oce/weather/pubs/Weekly/Wwcb/index.htm>

The warm temperatures have had some positive effect. Often producers (especially in northern states) become concerned about the amount heat accumulated to push their crop along during the season to get to maturity before potential freeze in the fall. In this map from the USDA-JAWF from the Weekly Weather and Crop Bulletin last week, you see departure from average growing degree days. The additional accumulation has pushed most crops along very early this year. The deviation from average GDDs puts crops ahead by 2-3 weeks in some places.

Wheat harvest is moving along at near record pace. Crops are developing much earlier than some years.

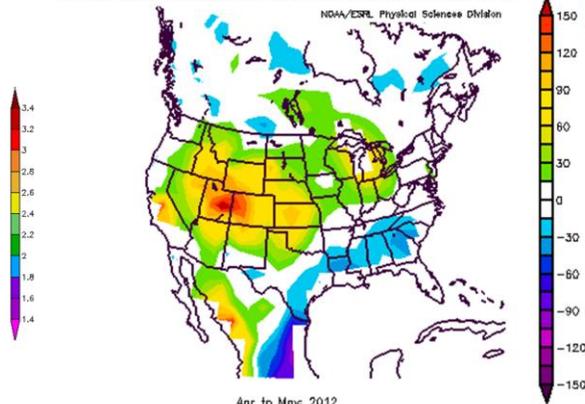
April – May water use (recent)

Potential Evapotranspiration (in)
6/25/2012 – 7/1/2012



High Plains Regional Climate Center
Generated 7/2/2012 using AWDN data.

NCEP/NCAR Reanalysis
Surface Potential Evaporation (W/m^2) Composite Anomaly 1981–2010 climo
NOAA/ESRL Physical Science Division



Apr to May: 2012

<http://www.esrl.noaa.gov/psd/cgi-bin/data/composites/printpage.pl>
<http://www.hprcc.unl.edu/awdn/maps/index.php?product=PET&type=&day=7d&action=viewmap>

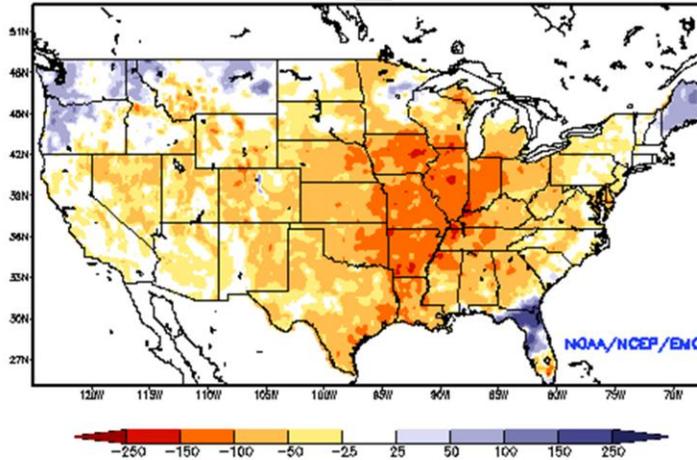
The off-side of the warm temperatures we will talk about here. As mentioned conditions this spring have been somewhat to very dry depending on location, but very warm over the whole region. An additional impact of warm temperatures is to change the crop water use dynamic. The map on the right shows a large scale deviation from average for potential evaporation. Warmer temperatures in conjunction with lower relative humidity place more atmospheric demand on a plant for water. In response to the demand the plant uses more water. The areas in green to red in the right map show where more water could be used by the crop during the April-May period. June data are not available, yet. This crop water use is combined in a single term (evapo-transpiration) combining evaporation from the bare ground and transpiration from the plant.

The issue this year is that soils over much of the corn belt we likely somewhat drier. Some places were quite dry. Others were not as bad. But with increased ET, more water is used from dry soils and plant stress conditions occur earlier than we expect.

Widespread maps of ET are not usually available because of the difficulty in assessing and measuring it. The High Plains Regional Climate Center does have daily and weekly maps potential ET (shown on the lower left). This map shows that during the last week a fully grown plant with enough water could be using as much 2" for the week. With limited water available and more being demanded by the atmosphere you can see why some issues have occurred this year.

Current Soil Moisture

Ensemble-Mean - Current Total Column Soil Moisture Anomaly (mm)
NCEP NLDAS Products Valid: JUN 28, 2012

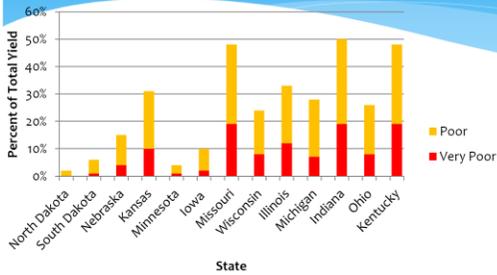


<http://www.emc.ncep.noaa.gov/mmb/nldas/drought/>

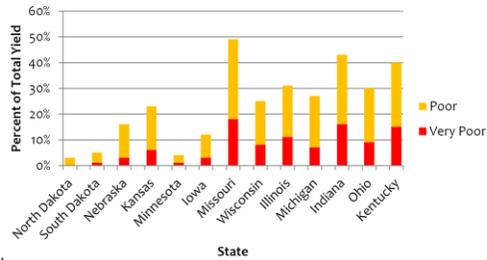
Following on from the previous slide we need to talk about soil moisture. There are not widespread soil moisture measurements across states. A few states run their own networks. Thus, we are left with modeling the situation, which is difficult to do because of the issue with balancing precipitation and water use for various crops and conditions. This is one version of a soil moisture model from NLDAS through NOAA. The deviations are listed in mm (divide by roughly 25 to get inches). 4-5"+ deviations are apparent in the orange to red colors.

USDA crop reports (7/2)

Corn Conditions Across the Midwest (7/2)



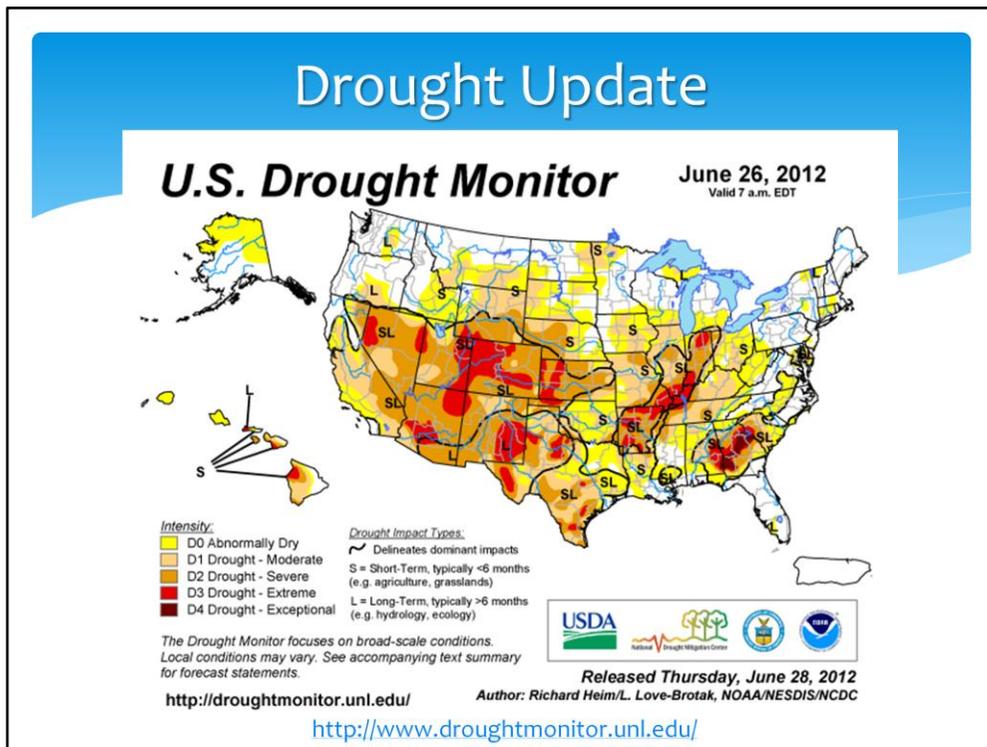
Soybean Conditions Across the Midwest (7/2)



http://www.nass.usda.gov/Statistics_by_State/

Crop reports released yesterday highlight the agricultural impacts. Corn and soybean and shown here. Also reporting in bad conditions are pasture and hay ground. For corn, MO, IN and KY are near 50% poor to very poor. IL and KS are above 30 %

Soybeans – not as bad at the current time. MO still nearly 50% P to VP. IN and KY near 40%.



Combining all the previous discussion we get to the current situation on the US Drought Monitor from last week. This map updates on Thursday mornings at 7 AM EDT. Conditions are shown from D0 (yellow- abnormally dry) to D4 (brown exceptional drought). It is very apparent the issues across the corn belt, great plains and across the country. The mid-section has up to D3 currently. The wetter areas from the spring in the north are not included, yet. Conditions continue to be very fluid with rapid changes. The new map this week will likely show additional worsening.

Note that there are several categories on the USDM which have some specific guidelines. These are included on the link on the slide. What is most important is local input. We encourage everyone on the webinar to pass on location-specific comments observations to your state climatologist, regional climate centers or directly to the National Drought Mitigation Center. These reports are necessary to track local conditions.

Drought Update – regional views

U.S. Drought Monitor

June 26, 2012
Valid 7 a.m. EST

High Plains

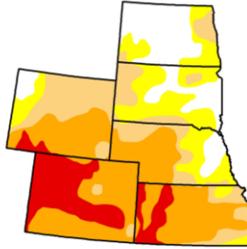
	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	16.07	83.93	66.51	46.80	13.10	0.00
Last Week (06/19/2012 msa)	18.53	81.47	59.11	21.59	6.35	0.00
3 Months Ago (03/27/2012 msa)	39.82	60.18	19.85	4.02	0.09	0.00
Start of Calendar Year (12/27/2011 msa)	81.86	38.34	18.12	7.22	2.07	0.04
Start of Water Year (09/27/2011 msa)	70.09	29.91	17.44	11.97	6.22	2.96
One Year Ago (06/21/2011 msa)	79.88	20.12	14.64	10.70	4.67	0.50

Intensity:

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

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

<http://droughtmonitor.unl.edu>



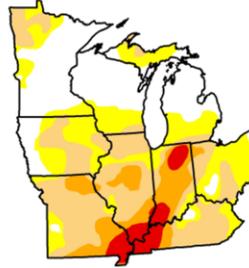
Released Thursday, June 28, 2012
Richard Heim, National Climatic Data Center, NOAA

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

<http://droughtmonitor.unl.edu>

onitor

June 26, 2012
Valid 7 a.m. EST



Released Thursday, June 28, 2012
Richard Heim, National Climatic Data Center, NOAA

<http://www.droughtmonitor.unl.edu/>

Included here are the regional views for most of NOAA's Central Region. The USDM also has state views with county boundaries to help guide where the category lines are and place at the county level.

Records

* Records

- * McCook, NE 115 F – state record June temperature
- * Buffalo, SD 111 F highest state temp. since 7/2007
- * Norfolk, NE 4th driest June on record
- * Bowling Green, KY 109 F – hottest ever for station
- * Vermillion, SD driest June on record
- * MO 6th driest June – driest since 1988



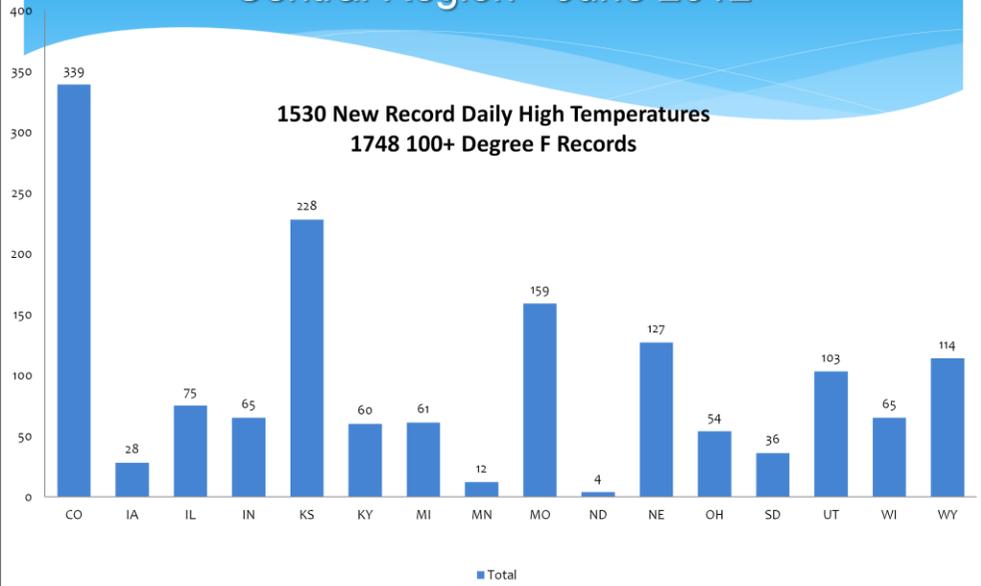
There are a large number of records being set from daily to monthly to seasonal. What is apparent is that the warm temperatures we are seeing are not only warm for this time of year, they are warm overall. Records are being set for daily highs, monthly highs and even a few all time state monthly and all time overall highs. The overall highs are usually more in July than June showing how anomalous this pattern is.

Records

Temperature records

Record High Temperatures

Central Region - June 2012



Impacts

* Impacts

- * Reduced hay amounts and dried in mid-summer (MO)
- * Corn chopping for silage (MO)
- * Numerous fires (western areas)
- * Crop reports (already listed)
- * Hull, IA water restrictions
- * Fireworks cancelations or restrictions
- * Widespread heat advisories

Missouri Pasture – Paul Horstman
St. Louis, MO



Impacts

Hay bales 2/3 to 3/4 weight – color like fall in MO

Impacts - fires

* Impacts

- * High Park - Ft. Collins 85K+acres
- * Waldo Canyon – Col. Springs 350 homes
- * Fontenelle – WY 47K acres (oil/gas)
- * Arapaho – WY 75K+ acres
- * Camp 5 – Nebraska National Forest
- * White Draw – SD 4200K+ acres lost C-130 and crew member
- * Major Disaster Declaration for the State of Colorado signed June 28th



Above: Waldo Canyon Fire as seen from the Chapel Hills Mall in Colorado Springs, Colorado on June 26, 2012.
Photograph courtesy Ashley Murphy.

Arapahoe 0% containment

Some inkling that this could be a bad fire year. Dry conditions coming on the end of a wetter period. Lots of fuels.

These are likely outdated already as conditions continue to be very fluid with the main part of the fire season ahead of us.

Climate Outlooks

- * 2 weeks out (8-14 days)
- * July
- * 3 Months (July – August - September)
- * www.cpc.ncep.noaa.gov
- * Drought Monitor Outlook

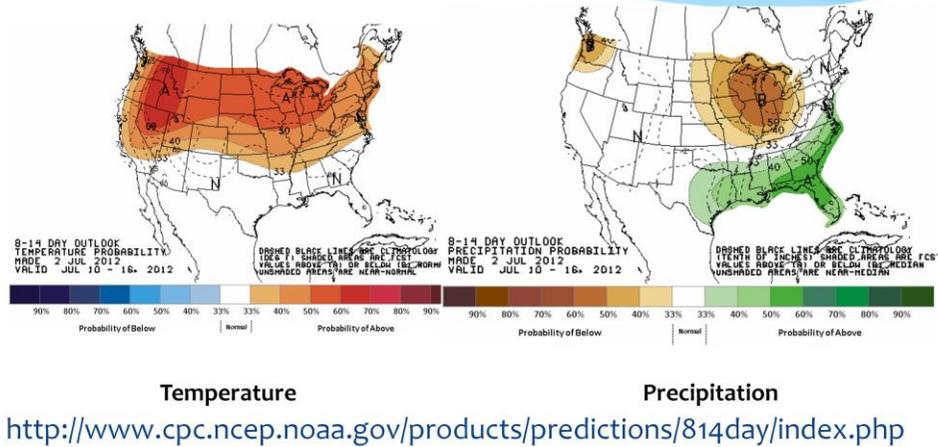
- * Released Thursday 6/21/2012

Now let's turn our attention to the outlooks. In the next few slides we will look at outlooks that are routinely issued as part of NOAA's operations. These figures come from the Climate Prediction Center. As we go through them you will see that they all use the same method and colors to describe the forecast.

The maps all are based on probabilities. These probabilities show increased chances toward below or above average conditions at various locations or equal chances where there is not enough skill to change the outlook. More about understanding these outlook will occur in future webinars.

One other note is that predictive skill during the warmer times of the year tend to be based less on large ocean connections like El Nino/La Nina and more on regional and even local conditions like soil moisture, elevation and many other effects. We can also look at trends over regions to help us determine if temperatures and precipitation has tended to rise or fall over time.

Temperature and Precipitation Probabilities for 7/10- 7/16/12

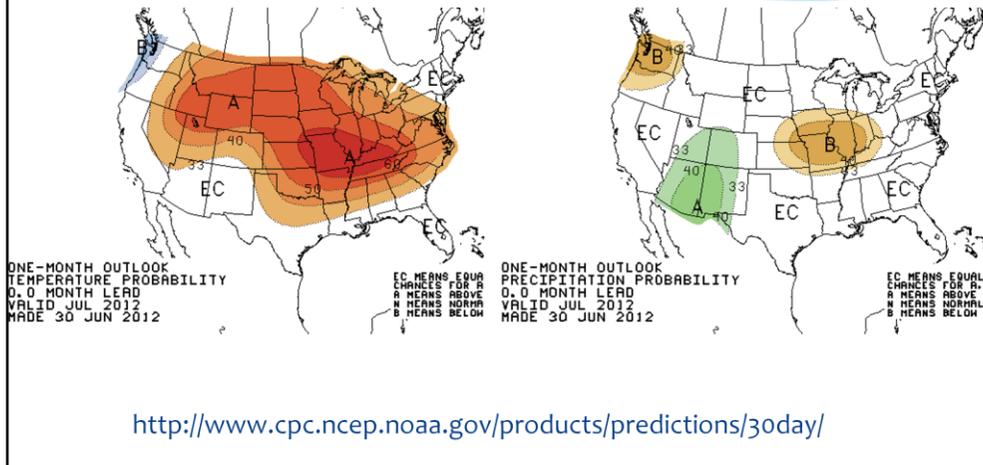


Here is a depiction of temperature, on the left, and precipitation probabilities on the right. For the temperature map the brownish colors indicate better chances for warmer conditions and blue colder. On the precipitation map the brown colors mean better chances of drier conditions and green wetter. White indicates near normal conditions most likely. The timing as you can see is for the week after next or days 8 through 14 in the future.

The warmer conditions seem very likely to continue across the whole corn belt into the first part of July. Dry conditions and a ridge of high pressure parked in the southern US will continue to lead to warmer temperatures all across the northern part of the country.

The precipitation pattern indicates more likely drier than average over much of the corn belt – more likely in the eastern corn belt and Great Lakes.

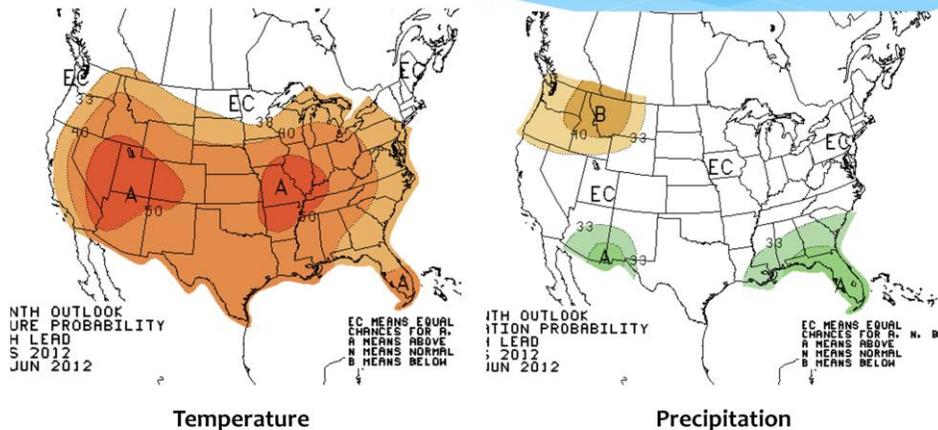
July Temperature and Precipitation Probabilities



July outlook, temperatures probabilities (left) precipitation probabilities (right). Temperatures are likely to continue warm throughout the month over nearly all the central US. Given the warmth in early July will likely dominate, that is most likely how the month would end up.

Drier than average indications are maintained just still in a main part of the corn belt. There is a greatly reduced area of dryness than depicted in the 8-14 day outlook because of the overall uncertainty in precipitation. Warmth is still the most likely bet and impact producer.

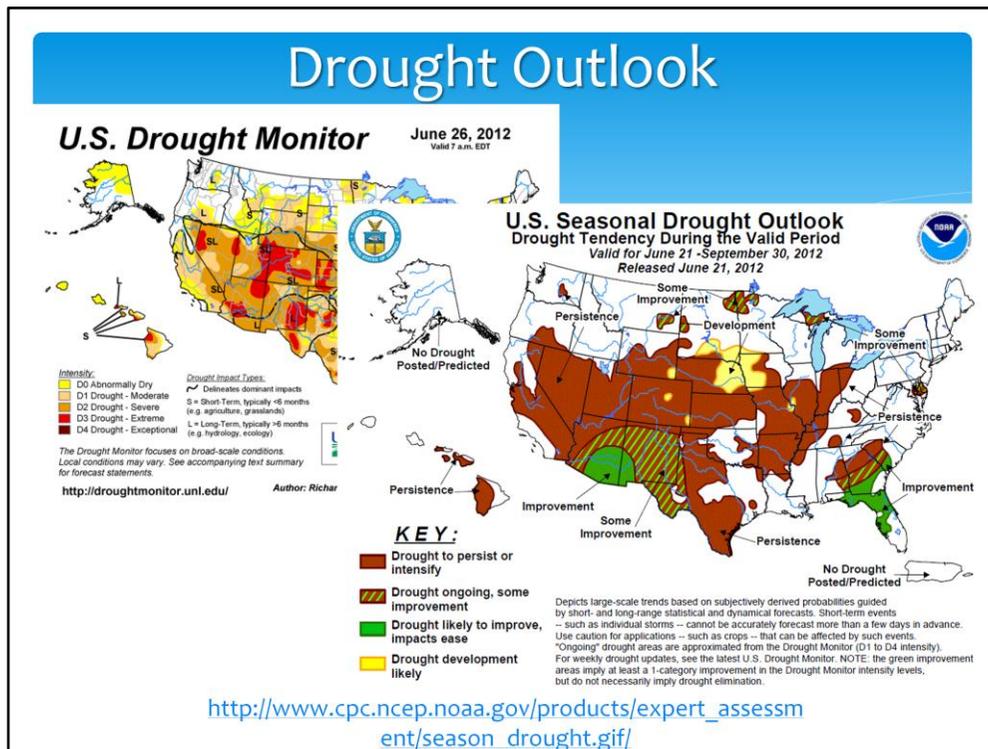
3 Month Temperature and Precipitation Probabilities (July - August - September)



http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1

The same color scheme applies again as with the previous maps.

Warm temperatures are likely again through early fall. Dry soil moisture and no pattern change are the main culprits. Precipitation is not showing any specific indications. Once we reach fall, many things can change with changing atmospheric patterns which occur during the summer fall transition. The problem for the agricultural community is that the damage is already done by the time we reach fall.



Another product of the US Drought Monitor and the Climate Prediction Center is the Seasonal Drought Outlook. This map shows expected changes in areas that are already D1 or worse or expected to enter D1. The bulk of the region in drought is expected to stay in D-level conditions throughout the summer. Some changes are possible in far southern areas and northern areas where better precipitation chances exist.

On the north end of the current drought areas, development is expected. Given the current situation large changes would have to occur immediately to resolve the current soil moisture and precipitation deficits. This is not likely.

This would be the case over the whole corn belt. Deficits are very large with tasseling coming soon. The damage to crops is going to continue. The only question now is how severe will it be ongoing and how will newer varieties handle them.

Summary

- * **Current Conditions**

- * Dry generally (wet northern MN/WI)
- * Warmer than average temperatures since spring
- * Warmth and lower dewpoints – plant water use (ET)
- * Fires initiating over most prone areas

- * **Predictions**

- * This week – warmth continues
- * Warmth likely to continue through summer
- * Precipitation – some improvement possible in spots
- * Currently ENSO-neutral. Return to El Nino possible in the fall

To recap some of the main issues. Dry conditions and warmer temperatures are forming a double-whammy on much of the central region.

Whenever years such as this come around people search for similar years on comparison. From a crop standpoint the comparison to 1988 has been passed around because it was the last major corn belt drought. We will have to see how we compare to 1988 and other years as we go along. One difference for 1988 was a little earlier onset of drought conditions.

Discussion among several modelers who contributed to this webinar from NOAA and Iowa State compared this to 1980 as a later onset pattern. We will continue these comparison and may talk more about them in a later webinar.

The main point in the outlook is that in the bulk of the corn belt little change is seen. Some indications of an early onset of the monsoon could bring some needed precipitation to the western part of the region.

Further Information

Today's Recorded Presentation:

• <http://mrcc.isws.illinois.edu/webinars.htm>
<http://www.hprcc.unl.edu>

- NOAA's National Climatic Data Center: 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: www.climate.gov
- U.S. Drought Monitor: www.drought.gov
- State climatologists
 - * <http://www.stateclimate.org>
- Regional climate centers
 - * <http://mrcc.isws.illinois.edu>
 - * <http://www.hprcc.unl.edu>

We will load the recorded Webinar as quickly as we can at the web site mentioned on this slide.

Several other links are included here as were emailed after the webinar last month.

Thank You and Questions?

- * Questions:

- * **Climate:**

- * Dennis Todey: dennis.todey@sdstate.edu, 605-688-5678

- * Doug Kluck: doug.kluck@noaa.gov, 816-994-3008

- * John Eise: john.eise@noaa.gov, 816-268-3144

- * Mike Timlin: mtimlin@illinois.edu; 217-333-8506

- * Natalie Umphlett: numphlett2@unl.edu ; 402 472-6764

Thank you for coming everyone. What questions do you have at this point?

I/We would like your feedback on the Webinar and it's worth to you. Please do not hesitate to email your suggestions or questions to me at dennis.todey@sdstate.edu or doug.kluck@noaa.gov.

We will now open it up to questions