Midwest and Great Plains Climate-Drought Outlook
October 15, 2015

Nolan Doesken
Colorado State Climatologist
Colorado State University
nolan@atmos.colostate.edu
General Information

- Providing climate services to the Central Region
  - Collaboration Activity Between:
    - State Climatologists
    - Doug Kluck & John Eise (NOAA)
    - American Association of State Climatologists
    - Midwest and High Plains Regional Climate Centers
    - National Drought Mitigation Center/USDA

- Next Regular Climate/Drought Outlook Webinar
  - November 19, 2015 (1 PM CDT)

- Access to Future Climate Webinars and Information
  - [http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars](http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars)
  - [http://mrcc.isws.illinois.edu/webinars.htm](http://mrcc.isws.illinois.edu/webinars.htm)
  - [http://www.hprcc.unl.edu/webinars.php](http://www.hprcc.unl.edu/webinars.php)

- Open for questions at the end
Agenda

- Background Climate
- Current Conditions
- Impacts
  - Missouri River
  - Great Lakes
  - General Fall Ag
- Outlooks
  - El Niño
  - Anything Else?
Our Climate Background
But don’t expect our “weather” to follow those nice, smooth seasonal averages

No two years are ever the same

Note: These data are REAL!!
Review/Current Conditions
September Temperature Departure from Normal

Departure from Normal Temperature (F)
9/1/2015 – 9/30/2015
September U.S. Average Temp

Contiguous U.S., Average Temperature, September

1901-2000
Avg: 64.86°F

Avg Temperature

Sept 2015, 68.54F
(3.68F above average)
2nd warmest on record
September Temperature Recap

Statewide Average Temperature Ranks
September 2015
Period: 1895-2015

National Centers for Environmental Information
Wed Oct 7 2015

Temperature (F)  
9/14/2015 - 10/13/2015

Departure from Normal Temperature (F)  
9/14/2015 - 10/13/2015

http://www.hprcc.unl.edu/maps/current/  
HPRCC – Regional Climate Centers
Past 7 days departure from normal Temperatures

Departure from Normal Temperature (°F)
10/7/2015 - 10/13/2015
And then there was Sunday!

<table>
<thead>
<tr>
<th>Location</th>
<th>High</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norfolk</td>
<td>98</td>
<td>89 in 1956</td>
</tr>
<tr>
<td>Broken Bow</td>
<td>98</td>
<td>87 in 1910</td>
</tr>
<tr>
<td>Grand Island</td>
<td>97</td>
<td>93 in 1928</td>
</tr>
<tr>
<td>Hastings</td>
<td>97</td>
<td>89 in 1940</td>
</tr>
<tr>
<td>Imperial</td>
<td>96</td>
<td>89 in 1989</td>
</tr>
<tr>
<td>McCook</td>
<td>95</td>
<td>90 in 1962</td>
</tr>
<tr>
<td>Lincoln</td>
<td>94</td>
<td>89 in 1989</td>
</tr>
<tr>
<td>North Platte</td>
<td>94</td>
<td>89 in 1989</td>
</tr>
<tr>
<td>Valentine</td>
<td>94</td>
<td>89 in 1995</td>
</tr>
<tr>
<td>Sidney</td>
<td>92</td>
<td>90 in 1996</td>
</tr>
<tr>
<td>Omaha</td>
<td>91</td>
<td>87 in 1956</td>
</tr>
<tr>
<td>Chadron</td>
<td>91</td>
<td>87 in 1975</td>
</tr>
<tr>
<td>Alliance</td>
<td>88</td>
<td>87 in 1997</td>
</tr>
</tbody>
</table>
Very late first freeze this fall

http://mrcc.isws.illinois.edu/VIP/frz_maps/freeze_maps.html

MRCC Experimental Freeze Guidance:
These experimental maps may be utilized as a guide to local and regional freeze conditions but should NOT be used by themselves for decision processes.
Climatological Date of Median First 32°F Freeze
For the years from 1980-81 to 2009-10
Median Defined as 50th Percentile

http://mrcc.isws.illinois.edu/VIP/frz_maps/freeze_maps.html
But the Freeze is Coming!!
Now let’s talk about precipitation
An interesting September event

Sept. 22-25 -- help from the tropics

Data from CoCoRaHS
Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
USA 9/23/2015
Total Precipitation Anomaly: September 2015
Period ending 30 Sep 2015
Base period: 1981-2010
(Map created 02 Oct 2015)
Statewide Precipitation Ranks
January–September 2015

Year to Date and Water Year Precipitation

http://www.ncdc.noaa.gov/cag/mapping/us
30-Day Departure from normal precipitation

Departure from Normal Precipitation (in)
9/15/2015 – 10/14/2015

Generated 10/15/2015 at HPRCC using provisional data. Regional Climate Centers
Soil Moisture

Soil Moisture Anomaly in millimeters

http://www.emc.ncep.noaa.gov/mmb/nldas/drought/
2015 drought evolution – or lack thereof
U.S. Drought Monitor

October 13, 2015
(Released Thursday, Oct. 15, 2015)
Valid 8 a.m. EDT

Drought Impact Types:

∽ Delineates dominant impacts
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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

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

Author:
David Miskus
NOAA/NWS/NCEP/CPC

http://droughtmonitor.unl.edu/
Impacts
Current Large Incidents
October 09, 2015

Fire Activity

USDA Forest Service
http://activefiremaps.fs.fed.us/current.php
Fire Issues

* Until late summer, not much going on – but very touchy recently
  * Fires are not uncommon in fall
  * Plenty of dry grass
  * Rapid late-season drying
  * Recent extreme warmth and high winds
* Numerous high wind and red flag warnings recently N. Plains
* Several fires, some damage

In this Oct. 12, 2015 photo, five horses huddle in a charred pasture after a fire with gusts up to 60 mph blew a fire into Cannon Ball, N.D. About 875 residents had to evacuate from the blaze that scorched 2.5 square miles. (Tom Stromme/The Bismarck Tribune via AP) (Tom Stromme/AP)
Autumn Foliage
Colorado foliage this past weekend
Current Fall Foliage Map

The Fall Foliage Prediction Map

2015 Edition

October 10, 2015

http://smokymountains.com/fall-foliage-map/
Current Fall Foliage Map

October 17, 2015 Prediction

http://smokymountains.com/fall-foliage-map/
Impacts

Great Lakes
Great Lakes

- Surface temperatures have returned to near average after an exceptionally cool 2014 and early 2015 -- now a bit warm but still cooler than 2010-2012
- Lake levels dropping now as expected, but still high, and dramatically above 2011-2013
Lake Superior

Lake Michigan

Lake Superior Average Great Lakes Surface Environmental Analysis (GLSEA) Surface Water Temperature Compared to Current Year

Average 1992 - 2014
- 2015

Lake Michigan Average Great Lakes Surface Environmental Analysis (GLSEA) Surface Water Temperature Compared to Current Year

Average 1992 - 2014
- 2015

Lake Superior Average GLSEA (1024) Surface Water Temperature

2010
- 2011
- 2013
- 2015
- 2016

Lake Michigan Average GLSEA (1024) Surface Water Temperature

2010
- 2011
- 2013
- 2014
- 2016

(from Great Lakes Surface Environmental Analysis)
Edmund Fitzgerald – 40 years ago

November 10, 1975

Will the gales of November come early this year?
Impacts

Missouri River/Streams
Missouri River at Hermann, MO Daily Streamflow
Water Year 2015

Data source: http://waterdata.usgs.gov/mo/nwis/
South Platte River at Kersey, CO Daily Streamflow

Data source: http://www.dwr.state.co.us/SurfaceWater/

Discharge (mean daily flow) vs Average Discharge (CFS)

Discharge (cubic feet per second)

10/1 11/1 12/1 1/1 2/1 3/1 4/1 5/1 6/1 7/1 8/1 9/1
Overall, streamflows and surface water supplies have held up well.

Drying out with low flows in parts of Kansas and the Michigan U.P.

No significant impacts reported.
Impacts

Fall Ag Activity
Dry / warm fall has had more advantages than disadvantages for most.

Crops have matured nicely, even those that got off to late starts.

Harvest is underway – and ahead of schedule in many areas.

No early freezes this year –

Fantastic year in MN and northern IA

Sorry about IL pie pumkins 😞

2016 winter wheat – shaky start so far –poor surface moisture especially for no-till
Impacts

Wheat Belt
Winter wheat

* 2015 crop – OK
* Soil moisture coming in short at time of planting this fall (2015)
* Late/spotty emergence W. Kansas and Colorado
* Temperature pushing growth and water demand emerging crop
* “Iffy” now, but wheat is a resilient crop
Winter Wheat Production
United States

Billion Bushels

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
<th>2003</th>
<th>2005</th>
<th>2007</th>
<th>2009</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.55</td>
<td>1.47</td>
<td>1.69</td>
<td>1.56</td>
<td>1.35</td>
<td>1.14</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.52</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.88</td>
<td>1.85</td>
<td>1.72</td>
<td>1.29</td>
<td>1.89</td>
<td>1.49</td>
<td>1.63</td>
<td>1.54</td>
<td>1.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

USDA-NASS
9-30-15
Outlooks
Climate Outlooks

* 7-day precipitation forecast
* 8-14 day outlook
* November
* El Nino
* 3 Month outlooks
* Seasonal Drought Outlooks
7-day Quantitative Precipitation Forecast
Valid: 7 AM Thu 15 Oct– 7 AM Thu 22 Oct

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

Temperature

Precipitation

El Niño

*Alive and Well*
Weekly Sea Surface Temperature Anomalies

7-day Average Centered on 07 October 2015
The MEI monitors ENSO based on all observed fields over the tropical Pacific (pressure, wind, temperatures, and cloudiness). El Niño events can reach up to +3 standard deviations, while La Niña events may dip down to -2 standard deviations. The current El Niño has already reached +2.53, the largest MEI value since 1998. Even if does not grow any further, I would call it a ‘Big Boy’ now!

http://www.esrl.noaa.gov/psd/enso/mei
The ECMWF March 2015 forecast (left) was very bullish, with over 90% of the ensemble members exceeding +1.0 °C by June! The median forecast was actually right on target thru July, while the last two months have tracked even higher than that!

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/
Our northern mountains from the Elk to the Park Range are favored this fall under strong El Niño conditions (8 of 10 above median), NOT favored during winter (ALL 10 below 30%ile), and only slightly favored during spring (6 of 10 above median). The fall season is critical – only the 3rd driest fall (1994) managed to stage a huge comeback in spring, while the two driest falls (‘57 and ‘87) ended up below the median for winter & spring as well.
A closer look at Southwest Colorado (1905-2011)

The San Juans and SW Colorado are more favored during strong El Niño than further north, especially lopsided in the fall (10 of 11 above 60%ile), about equal chances during winter, and slightly favored during spring (none below 20%ile). On average, a strong El Niño gives this region a wetter outcome than a weaker one, especially during fall and spring. The lonely dry fall (‘30) was followed by a dry winter and near-normal spring.
3 Month Temperature and Precipitation Probabilities
(February - April)

Temperature
Precipitation

http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1
Drought Outlook through Jan 31, 2016

U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period

Valid for October 15 - January 31, 2016
Released October 15, 2015

Author:
Adam Allgood
NOAA/NWS/NCEP/Climate Prediction Center


http://go.usa.gov/3eZ73
Summary - Conditions

* It’s been really warm and fairly dry
* Dry recent weather great for harvest and all outdoor fall activities – very few complaints
* Cooler weather coming soon, but not cold
Summary - Outlooks

Evidence that El Nino Outlook is on track – several S. California precip events already
Further Information - Partners

- Today’s and Past Recorded Presentations and:
  - http://mrcc.isws.illinois.edu/webinars.htm
  - http://www.hprcc.unl.edu
- NOAA’s National Climatic Data Center: www.ncdc.noaa.gov
- NOAA’s Climate Prediction Center: www.cpc.ncep.noaa.gov
- Climate Portal: www.climate.gov
- 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:
  * **Climate:**
  * Dennis Tody: dennis.tody@sdsstate.edu, 605-688-5141
  * 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
  * Brian Fuchs: bfuchs2@unl.edu 402 472-6775

* **Weather:**
  * crhroc@noaa.gov