Summer Outlook 2017

Southeast Lower Michigan

June, July, and August

Pages 2-6: Forecast reasoning
Page 7: Summer outlook for Southeast Michigan

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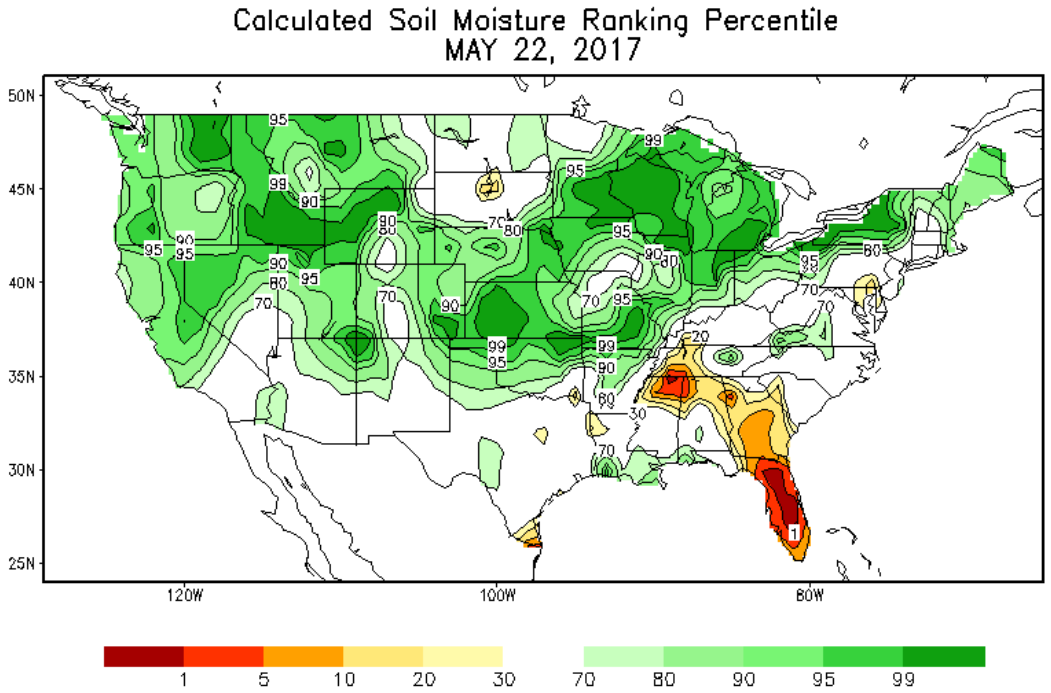
Current Conditions

Current Soil Moisture

Soil moisture is high over much of the US after a wet spring.

While exceptionally dry conditions can beget heat and/or drought, antecedent wet ground conditions can be a harbinger of cooler temperatures ahead.

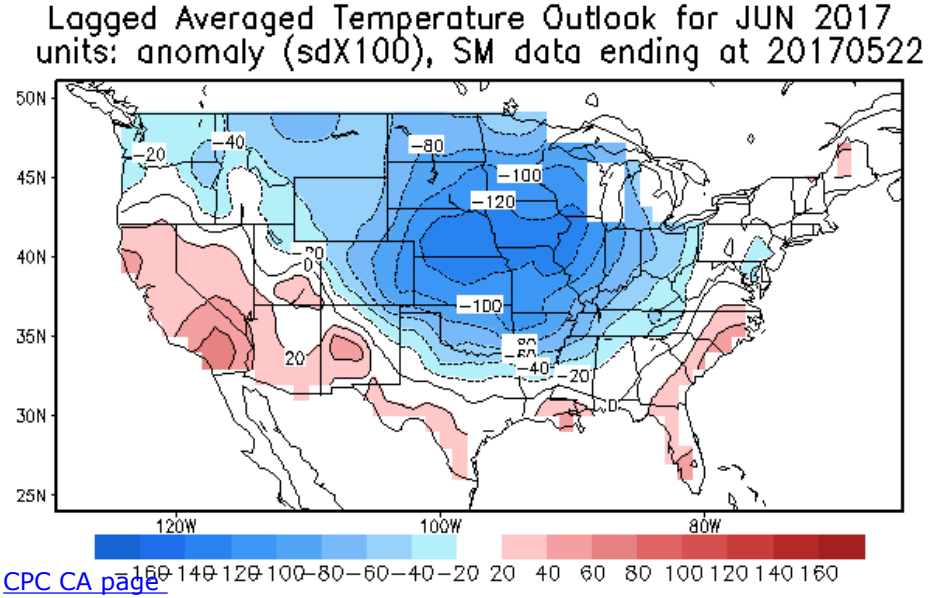
The high moisture content not only exists in Southeast Michigan, but also encompasses much of the Midwest and Central Plains, which are common heat sources for the area.

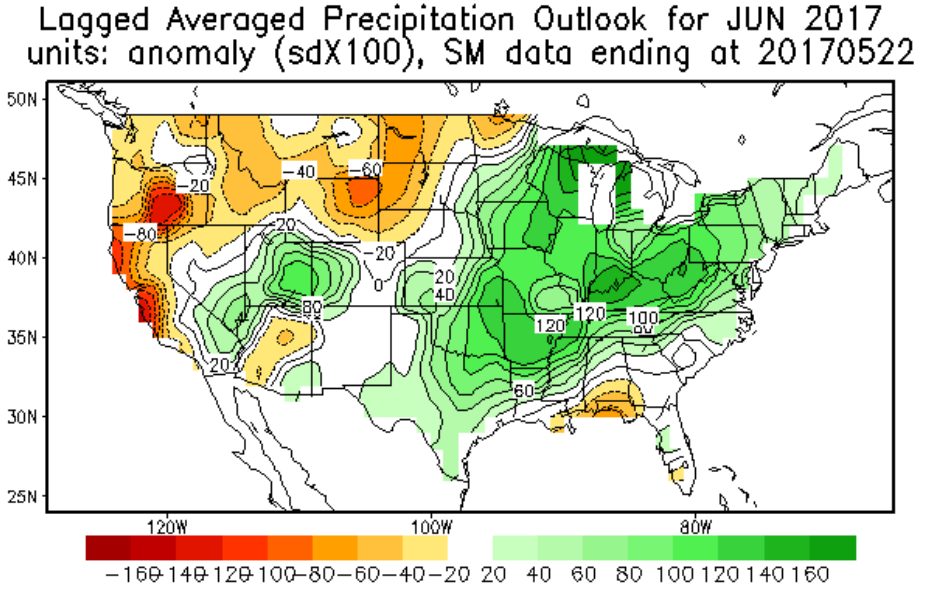


CPC SM page

What it Could Mean

CPC Soil Moisture Constructed Analog Outlook for June





CPC CA page

Pictured above is output from the NWS Climate Prediction Center's *Soil Moisture Constructed Analog Outlook* for June. By analyzing years with similar soil moisture qualities as this year, it provides a statistically-based outlook for future temperatures and precipitation. The output for June closely resembles the output for the entire June-July-August period as well (not shown).

Left
Analogs strongly favor cooler conditions over the part of the country that serve as our primary source of heat.

Right
The analogs also favor increased precipitation. This is a common outcome because high soil moisture can favor an increase in daytime thunderstorm activity in the summer months.

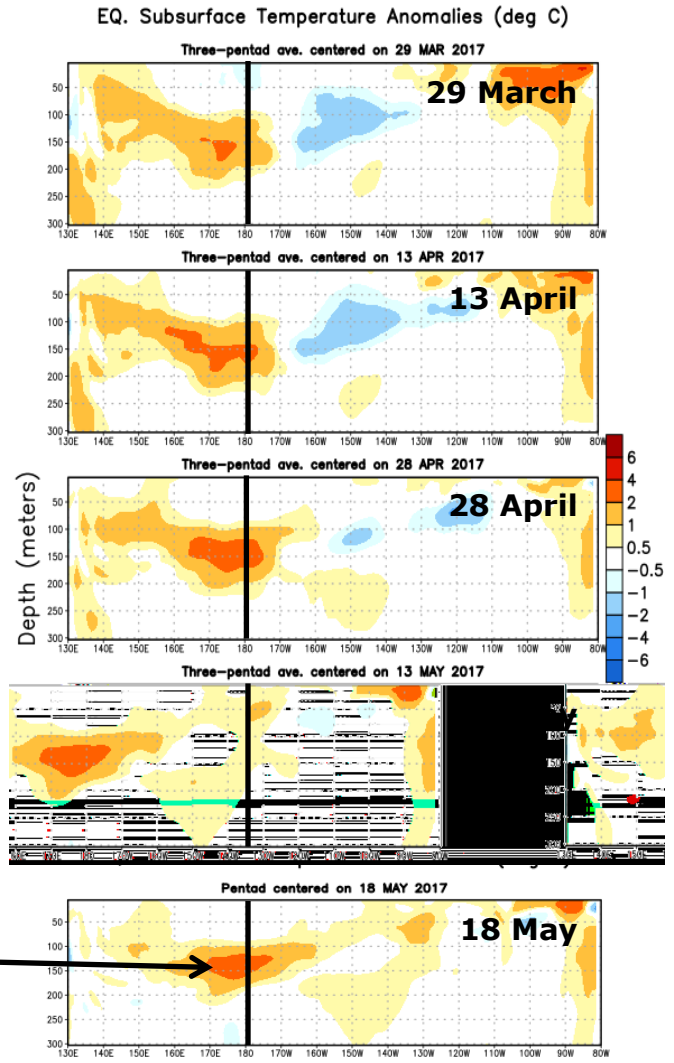
Current Conditions

ENSO

Subsurface ocean temperatures in the tropics offer a glimpse into the potential support that an emerging la Nina or el Nino might have.

Warm temperatures below the surface have stagnated near the International Dateline (thick black line).

Forecast models mainly indicate a neutral or weak el Nino condition. The information on the right supports that idea, and further suggests that any emerging el Nino would most likely arise in the central Pacific.



Warm water approximately 150 meters beneath the surface in the Equatorial Tropical Pacific.

CPC ENSO page

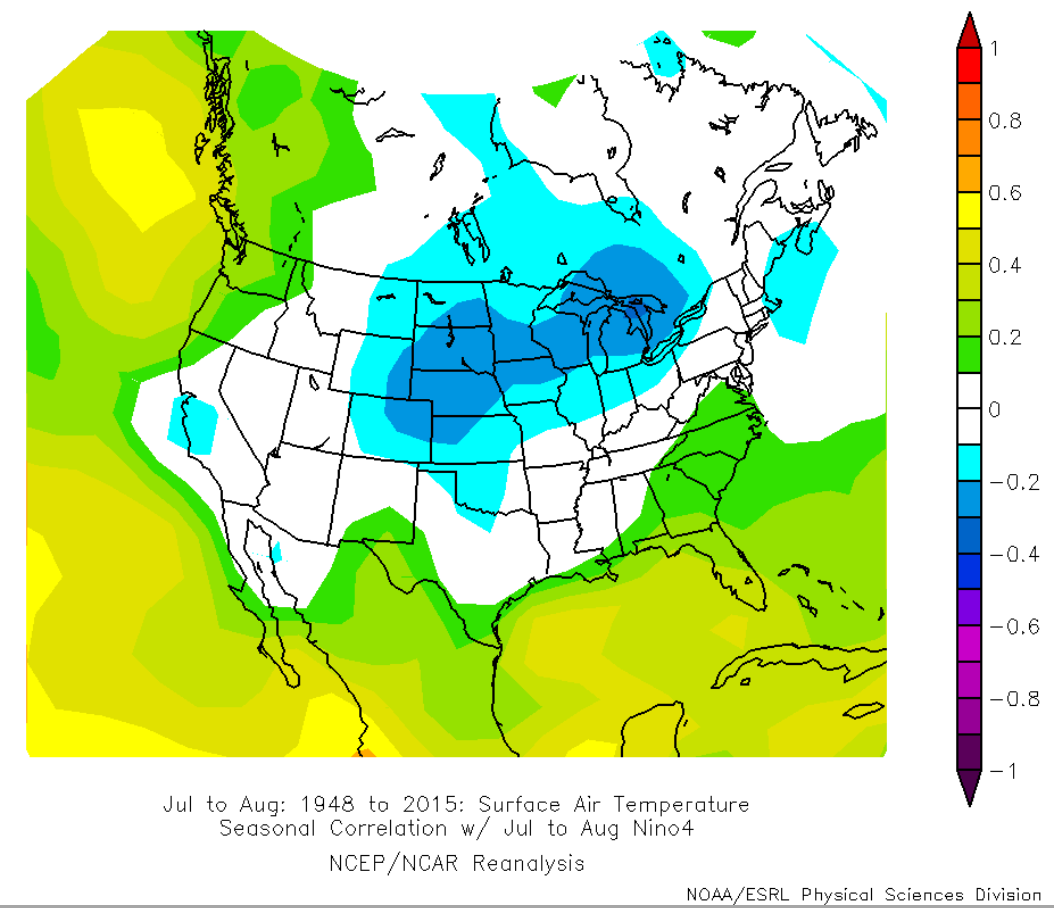
What it Could Mean

ENSO

If a weak el Nino emerges, it will most likely not be until mid or late summer.

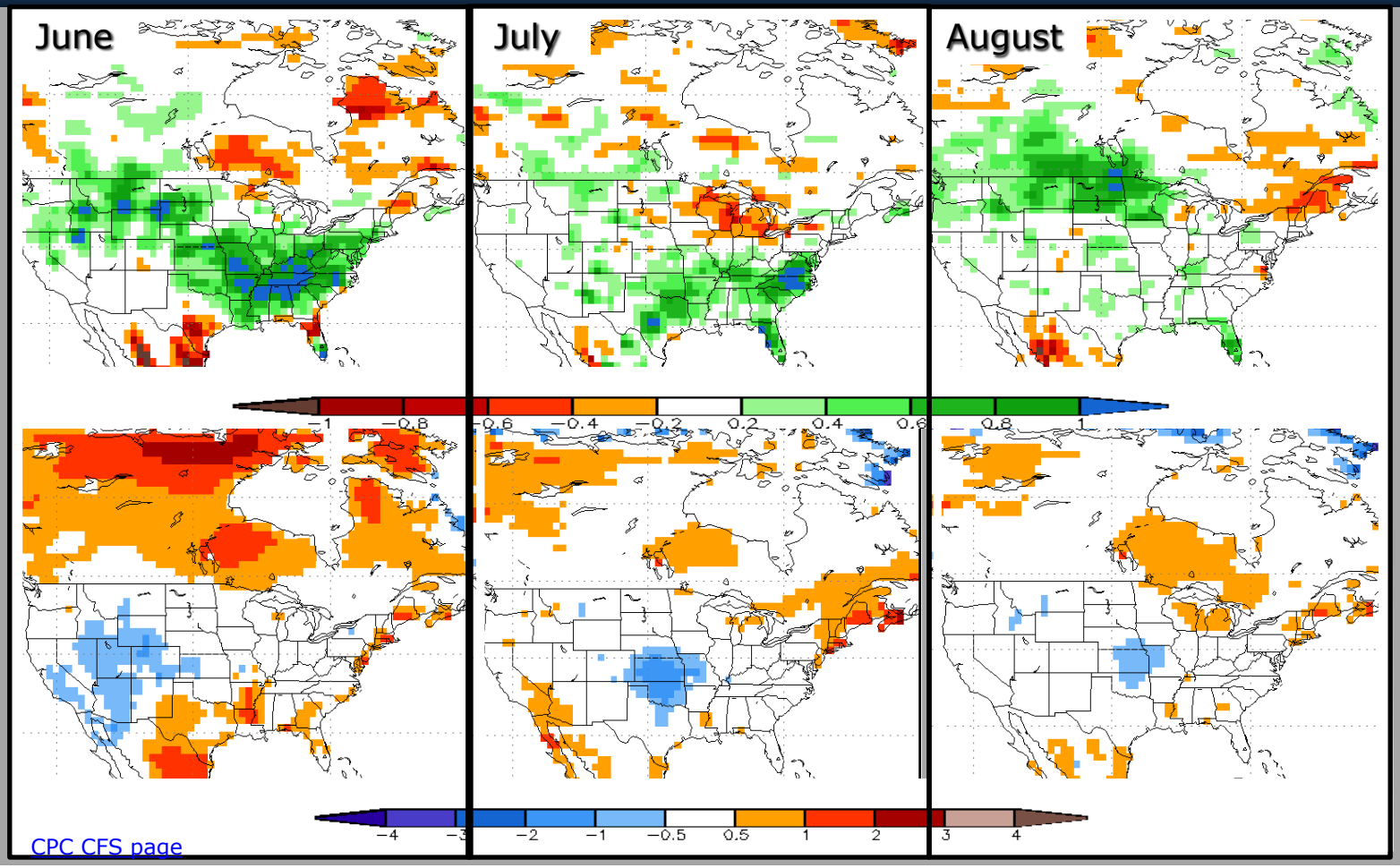
Pictured on the right is the correlation between sea surface temperature in the central portion of the Tropical Pacific and the temperature over the United States for mid-late summer (Jul-Aug).

This suggests that an emerging weak el Nino would tend to have a negative contribution to temperatures.



Climate Model Output

CFS Model Simulation of Summer



Pictured above are modeled rainfall anomalies for each month this summer (top) and modeled temperature anomalies for each month (bottom).

The prominent wet signal over the Midwest and South through much of summer increases confidence that high soil moisture content will be an important player. Meanwhile, the temperature output from this model suggest temperatures most likely to remain near normal.

Summer Outlook for Southeast Michigan

Temperature Outlook

There do not appear to be any appreciable signals for warmer than normal temperatures while soil moisture, ENSO, and various types of model output suggest near or cooler than normal temperatures. Of note: since the cold "Pinatubo Summer" in 1992, SE Michigan has had only 4 summers out of 24 that averaged more than 1° degree below the 1981-2010 normal compared to 10 that averaged more than 1° above. When considering both forecast and background climate characteristics, the summer forecast for SE Michigan is:

June through August: Normal

Precipitation Outlook

Warm season precipitation is dominated by thunderstorm activity and is notoriously difficult to predict at seasonal time scales. However, the potential for increased troughiness and positive feedback due to higher regional ground moisture nudges the forecast upward from normal.

June through August: Slightly wetter than normal

Summer Trivia for Southeast Michigan

Warmest temperature: **Tri-Cities: 111F** (7/13/1936), **Flint: 108F** (7/13/1936), **Detroit: 105F** (7/24/1934)
Warmest month: **Tri-Cities**: **77.5F** (Jul 1921), **Flint: 78.0F** (Jul 1921), **Detroit: 79.3F** (Jul 2011)
Warmest summer: **Tri-Cities: 73.0F** (1931), **Flint: 74.2F** (1933), **Detroit: 74.9F** (2016)

Coldest temperature: **Tri-Cities**: **33F** (6/8/1949), **Flint: 33F** (6/4/1998), **Detroit: 36F** (6/11/1972)
Coldest month: **Tri-Cities**: **60.6F** (Jun 1982), **Flint: 60.1F** (Jun 1969), **Detroit: 62.8F** (Jun 1985)
Coldest summer: **Tri-Cities**: **64.8F** (1915), **Flint: 65.4F** (1992), **Detroit: 66.5F** (1915)

Wettest month: **Tri-Cities: 9.43”** (Aug 2012), **Flint: 11.18”** (Aug 1937), **Detroit: 8.76”** (Jul 1878)
Wettest summer: **Tri-Cities: 16.28”** (1928), **Flint: 18.39”** (1937), **Detroit: 16.96”** (1896)

Driest month: **Tri-Cities: 0.27”** (Aug 1927), **Flint: 0.16”** (Jul 1939), **Detroit: 0.16”** (Aug 1894)
Driest summer: **Tri-Cities: 3.54”** (1927), **Flint: 3.76”** (1930), **Detroit: 3.58”** (1911)

Average first 90 degree temperature: **Tri-Cities:** Jun 18th , **Flint:** Jun 18th, **Detroit:** Jun 19th
Climatological chance of reaching 100 degrees: Approx. 14%, or about 1 in every 7 years.