

THE TWO-FACED WINTER OF 2006-07
AVAILABLE WINTER STATISTICS AND SPRING 2007 OUTLOOK
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TEMPERATURES

When the phrase is used “the normals are just the averages of the extremes” the Winter of 2006-07 could be used as a prime example. The first half of the winter was exceptionally mild while the second half was notably cold. When all was said and done, the warm temperatures won out over the cold in regards to the winter average temperature, but the *entire winter was anything but just above normal*. Southeast Lower Michigan saw some of its warmest winter weather and some of it’s coldest in the same season, somewhat uncommon but certainly not unheard of. The first six weeks of the winter season (through mid January) was downright balmy for any winter with average temperatures holding in the mid to upper 30s. This was a good 10-12 degrees above the normal for the winter. If the mild weather and subsequent average temperatures had held the rest of the winter, it would have been the warmest winter on record. Detroit’s warmest winter on record averaged 37 degrees, well over a century ago, in 1881-82. Flint’s warmest winter occurred in the El Nino season of 1982-83 with a 32.2 average temperature. At Saginaw, the warmest winter was recognized back in 1931-32 with 33.2 degrees (it was Detroit’s second warmest winter that season with 35.6). In the chart below, that warm six-week period was whittled down further to show Mother Nature’s “warm hands” at the opening of the Winter of 2006-07.

WARM HANDS OF OUR TWO-FACED WINTER

| DATES (#DAYS) | DETROIT AVE TEMP | FLINT AVE TEMP | SAGINAW AVE TEMP |
|-----------------------|-----------------------------|---------------------------|-----------------------------|
| 12/10/06-1/09/07 31d | 40.4 | 38.8 | 38.1 |
| 12/11/06-12/31/06 21d | 41.1 | 41.2 | 38.2 |
| 12/11/06-12/17/06 7d | 44.6 | 42.1 | 41.3 |
| 12/11/06-12/13/06 3d | 45.0 | 43.7 | 42.7 |
| 01/04/07- 01/06/07 3d | 44.7 | 44.3 | 44.3 |

By mid January, Mother Nature pretty much gave some of the inhabitants of Southeast Lower Michigan a false sense of security that the winter, as a whole, would turn out exceptionally mild. Others, however, wondered when the time would come and we would have to “pay” for all this unusual balmy winter weather (and they didn’t have to wait long).

The second half of the three winter months brought a rude awakening to some, while fulfilling forebodings of others. As though right on cue in mid-season, the jet stream shifted from a dominant southwest flow to northwest, bringing down all the Arctic cold that had stored up in the Polar Region for so long. Temperatures across the region plummeted down to normal and then below, so much so, that the second half of January averaged down in the lower 20s (about a 15 degree plunge from the first half). Some,

but not all of the above normal departures established early in the month was wiped out with all locations (Detroit, Flint and Saginaw) still averaging 4-5 degrees above normal at the close.

Then, one of the colder periods the region has experienced in a winter extended from mid January through mid February. The cold along with its persistence were noteworthy, especially coming after such early winter warmth (also, along with its persistence). The core of the cold arrived the first half of February with temperatures averaging about half of what they should have. In fact, through the 18th, temperatures across Southeast Lower Michigan averaged about 12 ½ -13 ½ degrees, or about 12 degrees below normal! And like the warm period earlier in the winter, no records are available for the intra-month cold periods (mid Jan – mid Feb). However, if one eyes the **top 20 coldest months** for Southeast Lower Michigan and compares it to the 31 day interval /31d/ cold experienced from mid January to mid February, one can at least get an idea of the strength of the cold.

First see how cold it was this winter in that 31 day period and then, check out the “Top 20 Coldest Months” chart below to see how it compared to the coldest months at each city. That cold period (January 20th – February 19th) was whittled down further to expose the *cold heart* of Mother Nature during the Winter of 2006-07. As you will see, the exceptional cold experienced would have placed all locations in the **Coldest Months** listings. As it stands, **Flint’s February average temperature of 17.3 degrees** did “make” the monthly list!

COLD HEART OF OUR TWO-FACED WINTER

| DATES (#DAYS) | DETROIT AVE TEMP | FLINT AVE TEMP | SAGINAW AVE TEMP |
|----------------------------|-------------------------------|------------------------------|-------------------------------|
| 1/20/07-2/19/07 31d | 17.3 /19th/ | 14.8 /7th/ | 14.3 /14th/ |
| 1/29/07-2/18/07 21d | 14.1 | 12.5 | 12.1 |
| 2/02/07-2/08/07 7d | 9.3 | 7.4 | 6.7 |
| 2/04/07-2/06/07 3d | 4.0 | 1.3 | 1.0 |

Top 20 Coldest/Warmest Months in Southeast Lower Michigan

| Rank | Detroit Area* | | | | Flint Bishop** | | | | Saginaw Area*** | | | |
|------|---------------|----------|---------|----------|----------------|----------|---------|----------|-----------------|----------|---------|----------|
| | Coldest | | Warmest | | Coldest | | Warmest | | Coldest | | Warmest | |
| | Temp | Year | Temp | Year | Temp | Year | Temp | Year | Temp | Year | Temp | Year |
| 1 | 12.3 | Feb-1875 | 79.1 | Jul-1955 | 10.9 | Jan-1977 | 76.0 | Aug-1947 | 9.4 | Jan-1912 | 77.5 | Jul-1921 |
| 2 | 12.8 | Jan-1977 | 79.0 | Jul-1921 | 12.8 | Feb-1979 | 75.6 | Jul-1987 | 10.4 | Jan-1918 | 76.8 | Jul-1916 |
| 3 | 13.1 | Jan-1912 | 77.9 | Jul-1916 | 13.1 | Jan-1963 | 75.5 | Jul-1955 | 11.6 | Jan-1963 | 76.3 | Jul-1935 |
| 4 | 13.2 | Jan-1918 | 77.6 | Jul-1931 | 13.4 | Feb-1978 | 75.2 | Jul-1988 | 11.8 | Feb-1904 | 76.1 | Jul-1931 |

| | | | | | | | | | | | | |
|----|------|----------|------|----------|--------------|--------------------|------|----------|------|----------|------|----------|
| 5 | 14.8 | Feb-1934 | 77.1 | Aug-1995 | 13.8 | Jan-1994 | 75.0 | Jul-2002 | 12.1 | Jan-1994 | 75.9 | Jul-1955 |
| 6 | 15.3 | Jan-1875 | 77.1 | Jul-1988 | 14.4 | Jan-1984 | 74.5 | Jul-1949 | 12.1 | Feb-1979 | 75.9 | Jul-1936 |
| 7 | 15.4 | Jan-1893 | 76.8 | Jul-1999 | 15.0 | Feb-1963 | 74.3 | Aug-1995 | 12.7 | Jan-1920 | 75.8 | Jul-1988 |
| 8 | 16.1 | Feb-1936 | 76.8 | Jul-1901 | 15.1 | Jan-1970 | 74.0 | Jul-1983 | 12.8 | Jan-1977 | 75.6 | Jul-1901 |
| 9 | 16.1 | Feb-1904 | 76.6 | Jul-2002 | 15.9 | Jan-1979 | 73.8 | Jul-1977 | 13.0 | Feb-1914 | 75.5 | Jul-1934 |
| 10 | 16.3 | Feb-1978 | 76.5 | Jul-1952 | 15.9 | Jan-1959 | 73.7 | Aug-1955 | 13.2 | Feb-1963 | 75.5 | Jul-1933 |
| 11 | 16.4 | Feb-1901 | 76.5 | Aug-1947 | 16.0 | Jan-1945 | 73.7 | Aug-1952 | 13.5 | Feb-1934 | 75.1 | Aug-1937 |
| 12 | 16.5 | Feb-1979 | 76.3 | Aug-1959 | 16.1 | Dec-1989 | 73.6 | Jul-1952 | 13.6 | Feb-1936 | 75.1 | Aug-1900 |
| 13 | 16.6 | Jan-1970 | 76.2 | Jul-1949 | 16.4 | Jan-1982 | 73.3 | Aug-1983 | 13.7 | Feb-1978 | 74.8 | Aug-1947 |
| 14 | 16.9 | Jan-1920 | 76.2 | Jul-1935 | 16.5 | Jan-1948 | 73.3 | Aug-1959 | 14.3 | Jan-1982 | 74.2 | Jul-1983 |
| 15 | 17.1 | Jan-1982 | 76.1 | Jul-1987 | 16.6 | Dec-2000 | 73.0 | Jul-1999 | 14.4 | Feb-1917 | 74.2 | Aug-1959 |
| 16 | 17.2 | Feb-1885 | 76.0 | Jul-1964 | 17.3 17.4 | Feb2007 Dec1976 | 72.9 | Jul-1993 | 14.6 | Jan-1904 | 74.2 | Jul-1930 |
| 17 | 17.2 | Jan-1963 | 75.9 | Jul-1887 | 17.6 | Jan-1957 | 72.7 | Jul-1943 | 14.8 | Jan-1979 | 74.1 | Aug-1955 |
| 18 | 17.2 | Jan-1881 | 75.8 | Jul-1977 | 17.8 | Jan-1962 | 72.6 | Aug-1988 | 14.8 | Jan-1970 | 74.1 | Jul-1937 |
| 19 | 17.3 | Jan-1994 | 75.7 | Aug-1955 | 17.8 | Dec-1958 | 72.4 | Jul-1995 | 15.7 | Jan-1945 | 73.9 | Jul-1987 |
| 20 | 17.6 | Feb-1914 | 75.6 | Jul-1934 | 18.1 | Jan-1981 | 72.3 | Jul-1944 | 15.8 | Feb-1905 | 73.9 | Jun-1933 |

*Detroit Area temperature records date back to November 1870.

** Flint Bishop temperature records date back to January 1942.

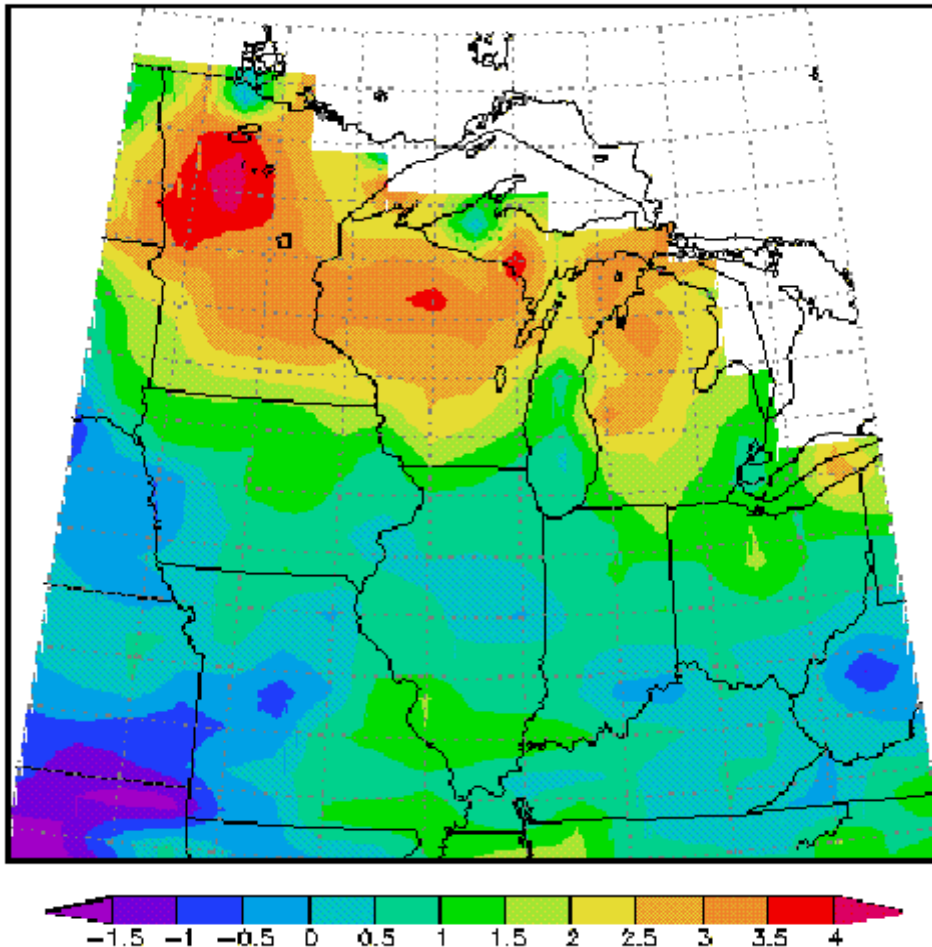
*** Saginaw Area temperature records date back to January 1900.

WINTER 2006-07 TEMPERATURES

| SITE | DEC | JAN | FEB | WINTER TEMP | |
|----------------|------|------|------|-------------|------|
| | | | | AVE | DEP |
| DETROIT | 37.4 | 29.6 | 19.3 | 28.8 | +1.7 |
| FLINT | 35.4 | 26.1 | 17.3 | 26.3 | +2.4 |
| SAGINAW | 34.4 | 25.4 | 16.8 | 25.5 | +1.4 |
| NWS WHITE LAKE | 34.2 | 25.4 | 16.3 | 25.3 | + |
| DEPART FROM | MA | A | MB | A | |

NORM

Average Temperature Departure from Mean in Degrees F December 1, 2006 to February 28, 2007



Midwestern Regional Climate Center

To see the how cold the entire US average temperature stood in February, check out: <http://climvis.ncdc.noaa.gov/cgi-bin/cag3/hr-display3.pl>

WINTER PRECIPITATION

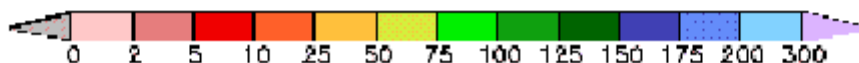
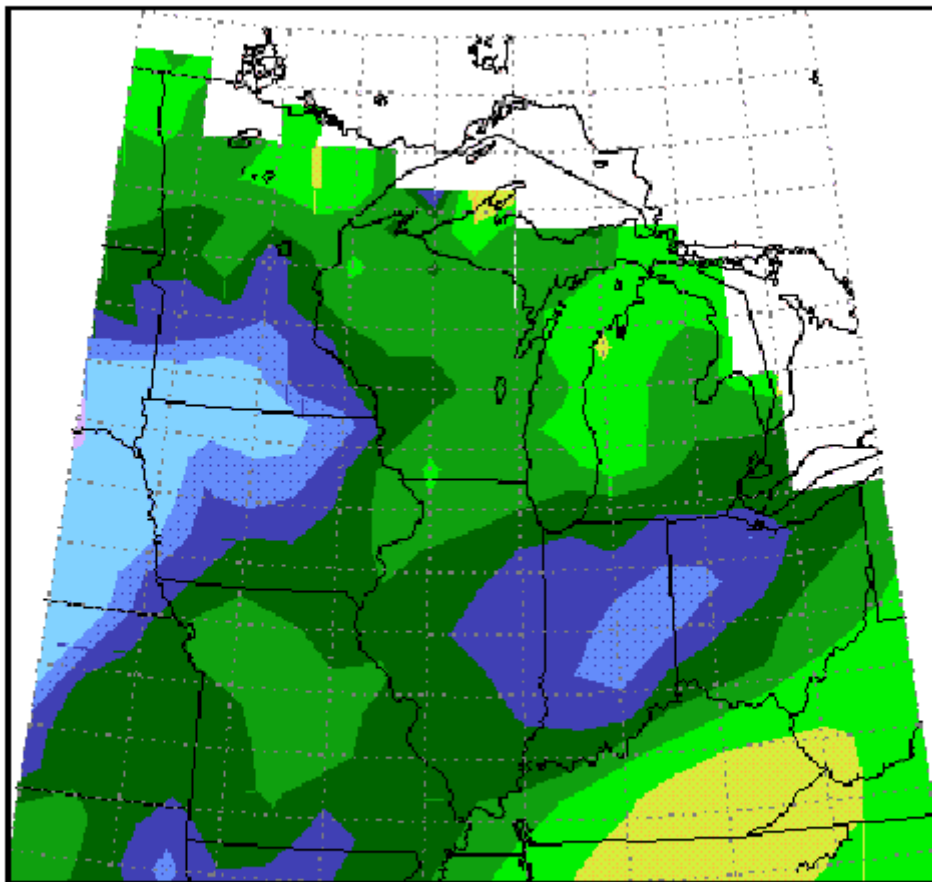
Overall, precipitation continued the streak of above normal from the fall with frequent periods of rain, sometimes heavy, throughout the winter over Extreme Southeast Lower Michigan **with lesser amounts further north in the Saginaw Valley and Thumb Region**. With the extreme cold of much of February, the precipitation “faucet” briefly shut off (however, March 1st saw record heavy rains in some areas across Southeast Lower Michigan). Finally, snowfall has been averaging below normal thus far into early

March across much of the region. **Note**, total snowfall will be sent in the **Updated Winter Review** when the snow ceases to fall.

WINTER 2006-07 PRECIPITATION

| SITE | DEC | JAN | FEB | WINTER TOTAL PRECIP/DEPART |
|------------------------|------|------|------|-------------------------------|
| DETROIT | 3.65 | 3.02 | 0.82 | 7.49 / +1.19 |
| FLINT | 2.81 | 2.01 | 0.29 | 5.11 / +0.01 |
| SAGINAW | 2.97 | 1.12 | 0.42 | 4.51 / -0.94 |
| NWS WHITE LK | 3.50 | 3.36 | 0.65 | 7.51/ + |
| DEPART FROM NORM | A | A-B | B | A-B |

**Total Precipitation Percent of Mean
December 1, 2006 to February 28, 2007**



Midwestern Regional Climate Center

SPRING 2007 OUTLOOK – MIXED PICTURE AS EL NINO BIDS ADIEU

The El Nino that commenced quickly in August, left (or faded) just as quickly late in the winter. For all practical purposes, the above normal Pacific Ocean water temperatures reflecting El Nino have reverted back to normal or Neutral conditions as of March. It should be noted that there is the possibility of La Nina forming later this spring into summer. Under Neutral conditions, there tends to be little, if any, Pacific influence on our Spring of 2007 weather. Therefore, other influences (and past analogue years) must be researched to spot any sort of prevailing trends (see below). The CPC latest update to the spring outlook (temperature and rainfall) for the country is available at:

<http://www.noaanews.noaa.gov/stories2007/s2818.htm>

SPRING

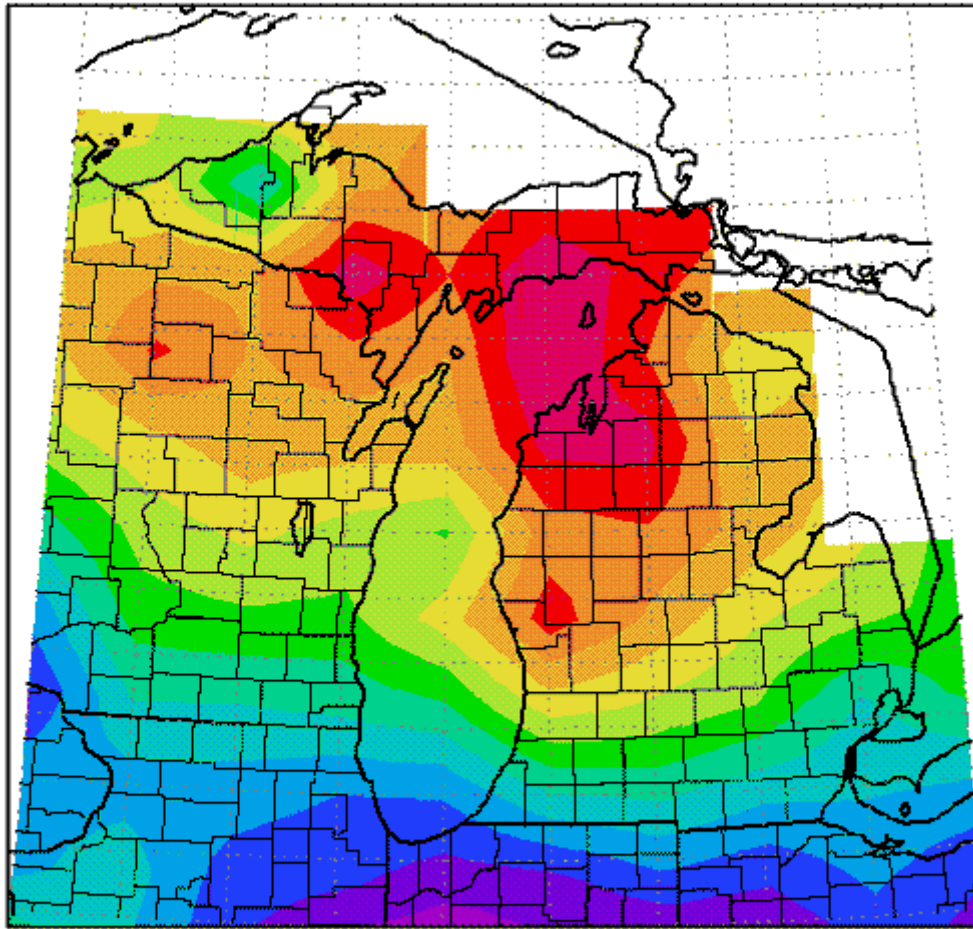
Temperatures: Look for temperatures to average around normal to below.

Precipitation: At this time, near normal rainfall (but will watch for a potential drier trend developing during the spring).

CONDITONS AS OF EARLY MARCH 7TH

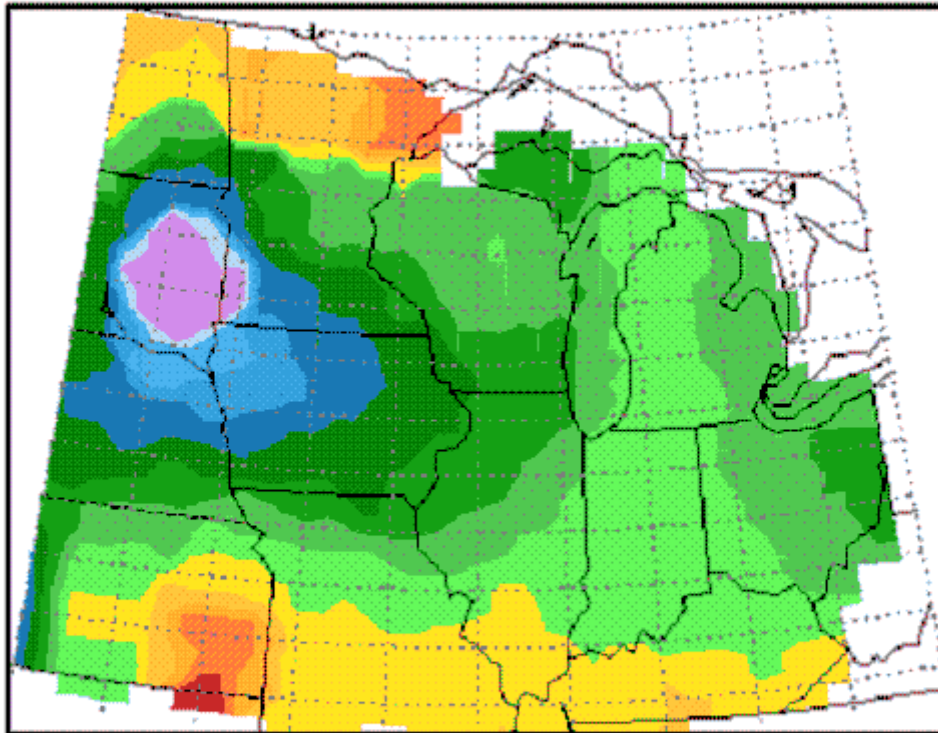
Starting with weather/soil conditions at the onset of spring, colder than normal temperatures dominated while wetter than normal conditions hold true for ground moisture (of course, both are subject to change). Note, here in the charts below, a **deficiency of warmth and surplus of moisture is seen across much of the upper Midwest and Great Lakes. The ground moisture surplus is between the surface and 72" /6'.**

Average Temperature Departure from Mean in Degrees F
February 6, 2007 to March 7, 2007



Michigan State Climate Office

**Current Soil Moisture Deviation (inches), Depth = 0-72
March-8-2007**



Midwestern Regional Climate Center

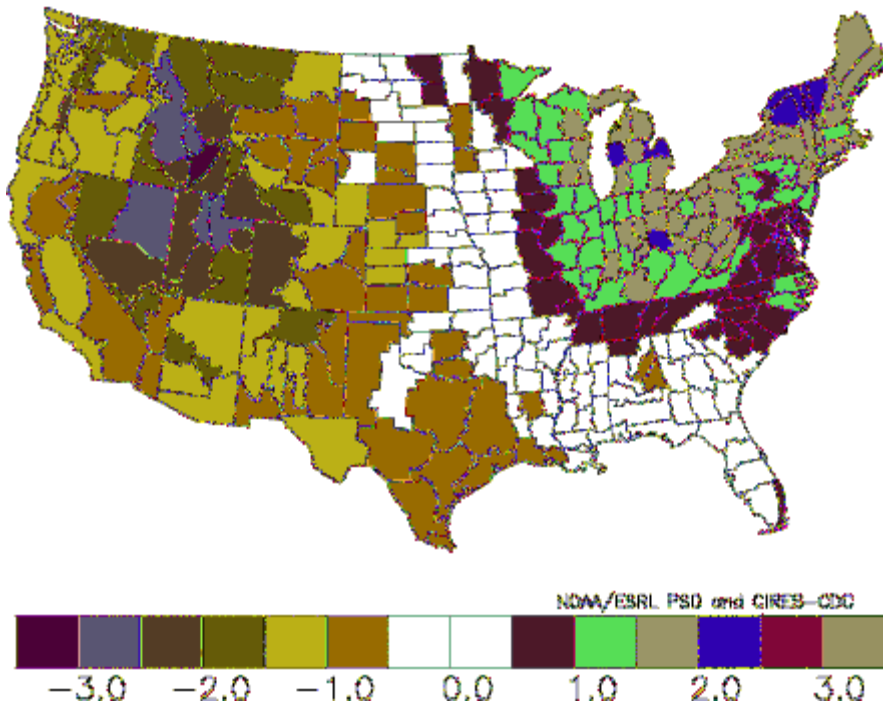
NEUTRAL SPRINGS /ANALOGUE TREND SPRING PROJECTIONS

TEMPERATURES

Scenario 1

Since the El Nino has faded, one pattern one might check for in the original 18 weak-moderate El Nino analogue years would be the those years that also showed **El Nino weakening greatly or ending by the spring**. Unfortunately, out of the original 18 winters, there were only four, 1885, 1903, 1952 and 1964 (three of which are plotted below). **As you can see below, the springs here were warmer than normal around the Lakes with temperatures averaging a couple of degrees above normal.**

Composite Temperature Anomalies (F)
Mar to May 1903, 1952, 1984
Versus 1895–2000 Longterm Average

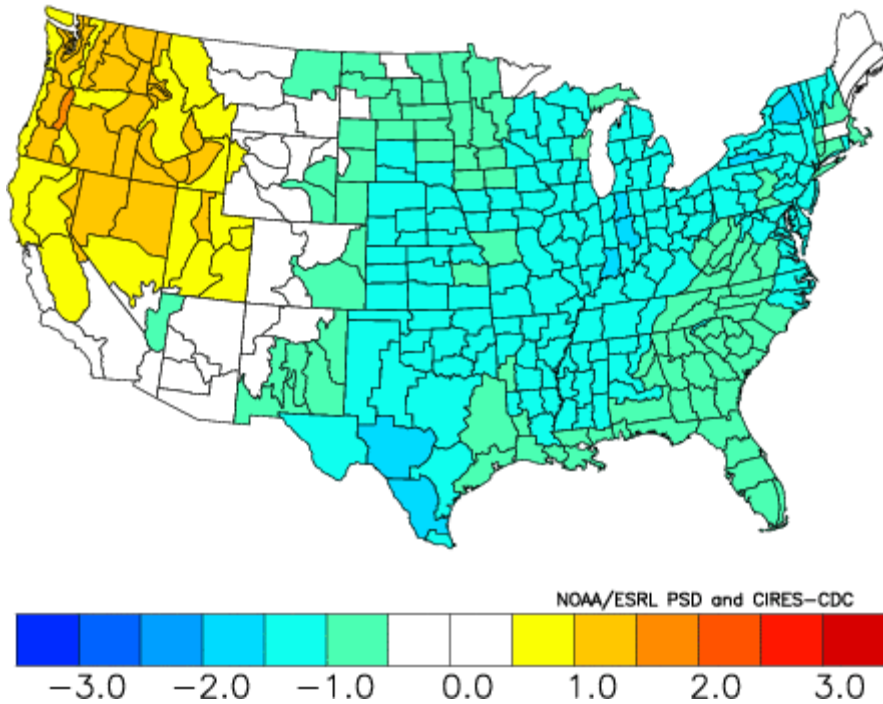


However, the absent spring (Spring of 1885 - which also displayed a close winter temperature analogue) turned out to be different than the above normal springs above with **below normal temperatures** (not unlike the following **Scenario 2** below, I might add).

Scenario 2

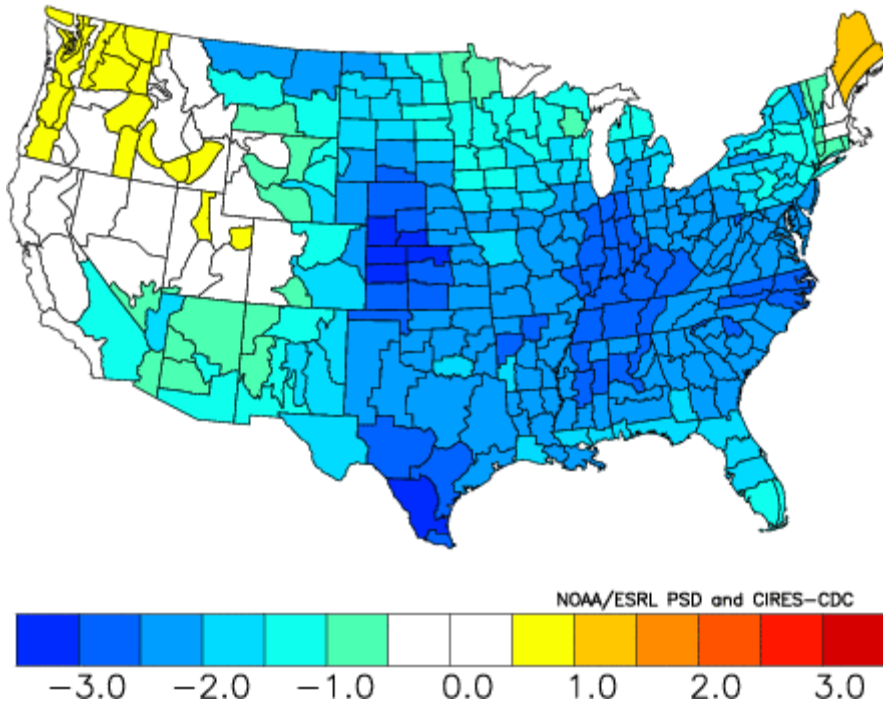
On the other hand, if we look at our recent overall temperature pattern since the beginning of the winter –warm to cold- and reflect on those analogue winters that followed closely to the same pattern, one may also forecast a possible scenario for the spring. In all these winters, the winter weather started our warm (record warmth) and turned cold mid and/or late winter. Fortunately, there were several of those types of winters in our analogue years. **Important: Pay attention at the suggested trend and not necessarily the actual below/above normal numbers as no two seasons are ever exactly alike. This map does not take into account the past several year trends, which have been warmer than normal. It does display, however, the type of temperature pattern that happened in the past, in those noted spring years.**

Composite Temperature Anomalies (F)
Mar to May 1912,1914,1919,1940,1958,1966
Versus 1895–2000 Longterm Average



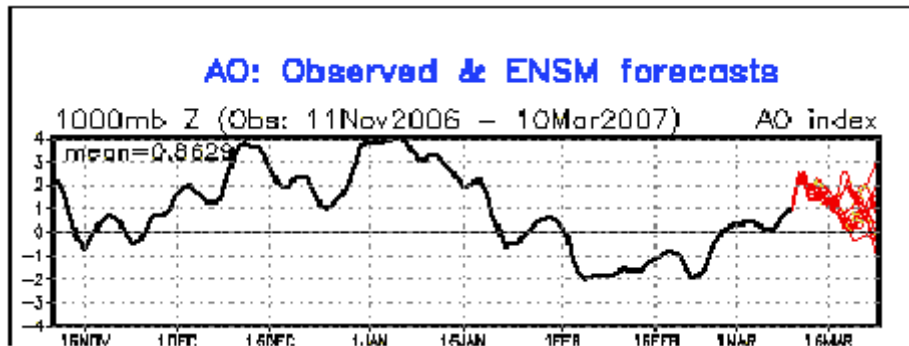
Since we have somewhat two conflicting projected trends, we prefer to stay the most dominant analogue projection which suggests a cooler than normal spring (or at least normal to below). History has shown that this isn't **always** the right decision but with the lack of skill under Neutral conditions, the direction of the preferred analogue years has been helpful, more often than not, in projected trends for Southeast Michigan. Note, the month of March's departures alone in the dominant years and the trend so far this March (which will vary since only 10 days have past). Again we want to look at the **suggested trend** and not necessarily the **actual** below/above normal numbers as no two months are exactly alike.

Composite Temperature Anomalies (F)
 Mar 1912,1914,1919,1940,1958,1966
 Versus 1895–2000 Longterm Average



RECENT AO PATTERN

The overall Arctic Oscillation pattern /AO/ has been mainly negative since mid-late January and reflects well our seven week colder than normal weather. Note how the AO is expected to go positive the second week of March and bring some welcome spring-like temperatures to the region. However, the latest trajectory of AO is also suggesting trending negative once again by mid month (at least as of March 10th), and **how long and if it will lock there** is not known as there notable “noise” that far out.

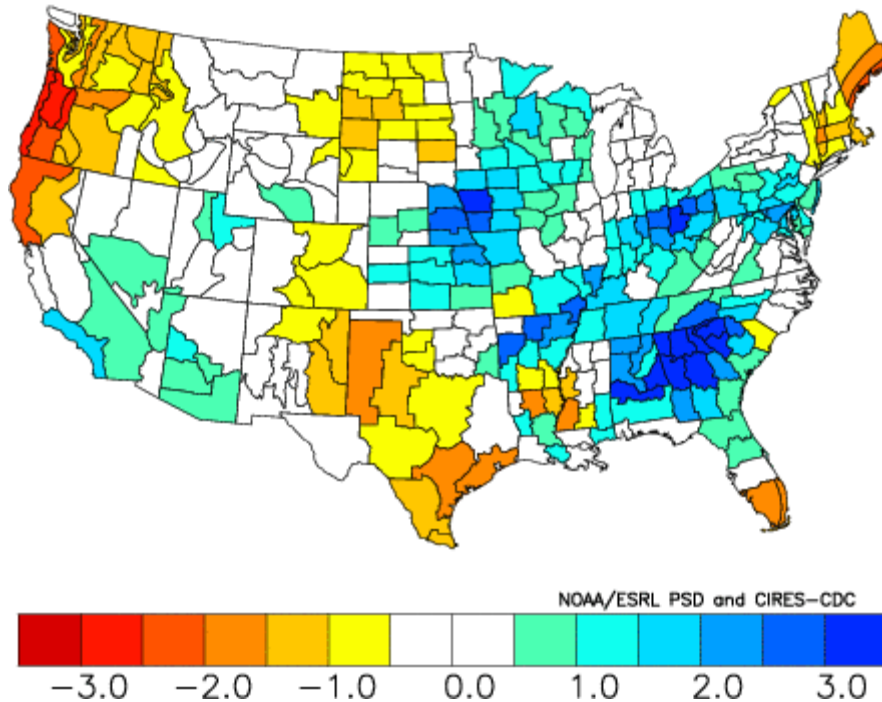


SPRING PRECIPITATION

Precipitation trends are difficult to call, especially in the spring and summer when convective rains dominant. The dominant precipitation trend since October has been generally wetter than normal (however February **was below normal** so whether or not this is a beginning of a trend change remains to be seen). Obviously it's too early to say but after months of above normal precipitation (since October and last year on the whole, was wet) it would be a change to watch for. Interesting, where it is generally wetter in the Midwest and Northern Ohio Valley with the El Nino-Neutral data, the other data set (trend or persistence), reveals drier spring weather can be expected in those same areas.

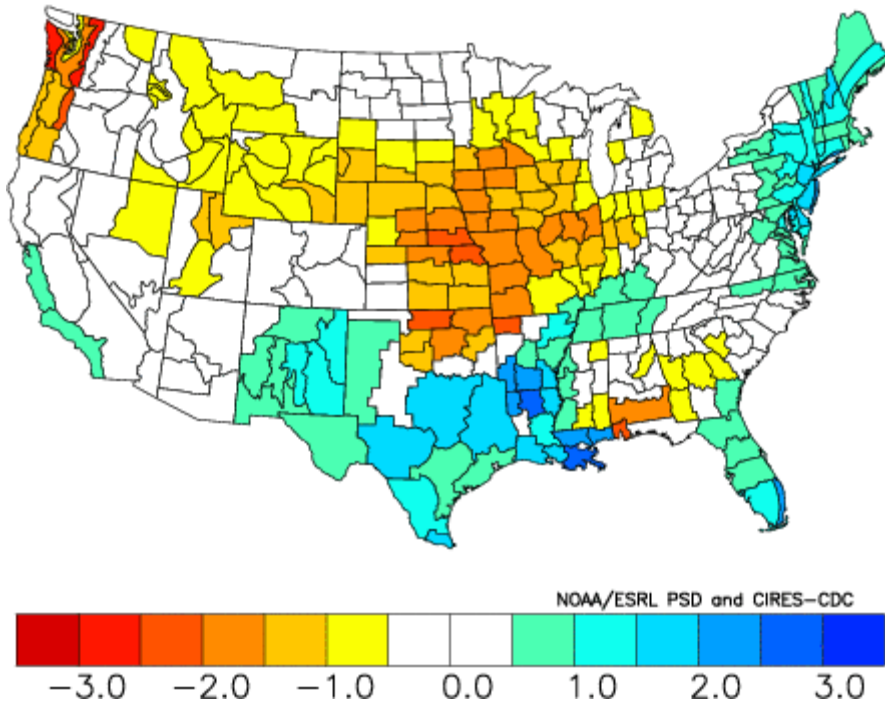
Here, again are the limited number of El Nino winters - Neutral spring years

Composite Precipitation Anomalies (inches)
Mar to May 1903,1952,1964
Versus 1895-2000 Longterm Average



And here is what the persistence trend years are intimating for the spring rains.

Composite Precipitation Anomalies (inches)
Mar to May 1912,1914,1919,1940,1958,1966
Versus 1895–2000 Longterm Average



In our neck of the woods both still imply **around normal precipitation**. With such variances around the Southeast Lower Michigan Region in the Midwest and Ohio Valley, near normal looks reasonable but will watch for any possible drier trend developing.

Again, look for the full Winter Review once the snow ceases to fly, along with the comparison to our analogue winters and trends.

SPRING BEGINS: March 20th at 807 PM EDT