Summer of 2009; Will the first few cool days set the stage for the rest of the summer?

Summer 2009 Outlook For Southeast Lower Michigan

(Also Includes Brief Spring 2009 Review)

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June 4th, 2009

Temperatures:

Local monthly (June-Aug) analogue data for the summer indicates summer temperatures to average near normal /or -1.0 to +1.5 degrees of the summer average/. Projections for the upper wind patterns are quite variable but basically involve a general broad ridging west and south with occasional troughing in the Upper Midwest east through the Great Lakes and East Coast (more below). This is a fairly typical summer pattern accompanied with the age old question; which pattern is likely to dominate the Great Lakes… ridge or trough? Indications from past analogue La Nina to Neutral data and upper wind projection suggest a summer similar to the last few summers. As one may recall last summer /2008/ was quite pleasant overall with temperatures around normal but with less than half of our normal /8-12/ 90 degree days. The Summer of 2007 was a bit warmer averaging a solid degree above normal across the region.

Rainfall:

I look for rainfall to average around normal (locally above) across the region. While our Neutral analogue summer months continue to paint a drier than normal summer, I feel enough rain will fall to offset the dry spells that are still expected, mainly in July and/or August.

The convective rain pattern of the summer is always a "bug-a-boo" simply because just a couple of storms can erase a dry statistic that dominated a month or more. This is why it's important to look at the overall rainfall trend (as done in the monthly our write-ups) of the summer and not just the rainfall amount (as gardeners and farmers will attest). The Summer of 2007 is an excellent example of this rainfall trend versus rainfall amount.
Even though the statistics say it was a generally wet summer with ample rainfall (all stations were above normal) one of the most notable items of the summer was in fact, its dry spell. The main period of dry weather hit at one of the worst times for agriculture and garden interests, coming in mid June to mid-late July (only to be followed by a wet and stormy August). The Summer of 2008 brought up another problem with convective rain forecasting, location. Even though normal to locally above normal rain was forecast (and most of the area did see that), the metro Detroit area averaged below normal. The Flint area received normal rainfall, while the Saginaw region was wet with above normal. The past winter and recent spring pattern is in contrast with the main analogue trend for the summer.

Severe Weather:

While the analogue severe weather seasons were about average to slightly above for events, the more notable difference came in timing. The severe weather season was more spread out with a group of events here and there rather than just one or two periods which led to an average season. What was noted in several years was an active period late summer or early fall. The severe season of 2007 was like that in spades, with a very active August.

National Outlook

The national outlook from the Climate Prediction Center (CPC) shows equal chances summer temperatures being above or below normal for Southeast Lower Michigan.
Note our region is basically sandwiched between the higher probability of above normal temperatures to our east and below normal to our northwest (mixed signals nearby – not unlike our local data below).

Broad Scale Discussion

Our cyclical Pacific sea surface temperature /SST/ pattern has been stuck rotating between La Nina and Neutral the last few years, starting with the Summer of 2007. The Neutral pattern of the Summer of 2007 evolved into La Nina as ocean temperatures cooled, which in turn, dominated during the winter and spring of 2008. Later, it faded to Neutral conditions during the summer of 2008, only to have it resurface late last year, lasting through the winter. At last look, La Nina once again faded and Neutral SST's rule. The Neutral conditions are expected through the Summer of 2009 with a possible weak El Nino forming by autumn.

As one can see with Chart-1a and 1b (location of Nino 3.4 and the projected sea surface temperatures /SST/ for the summer), latest May guidance members do continue a slight moderation of the sea surface temperatures /SSTs/ in area Nino 3.4. Under these Neutral conditions little, if any, significant downwind affects are slated for the Great Lakes.

Chart 1a

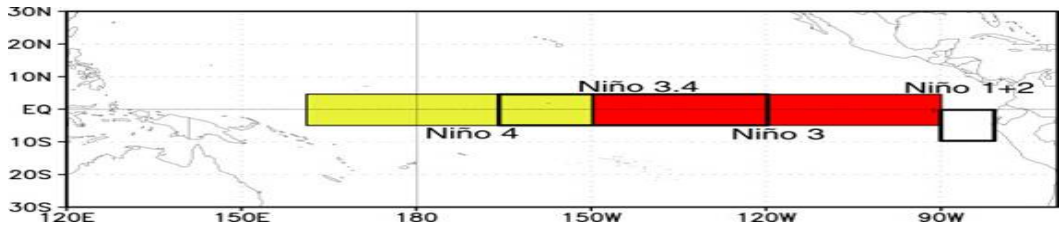
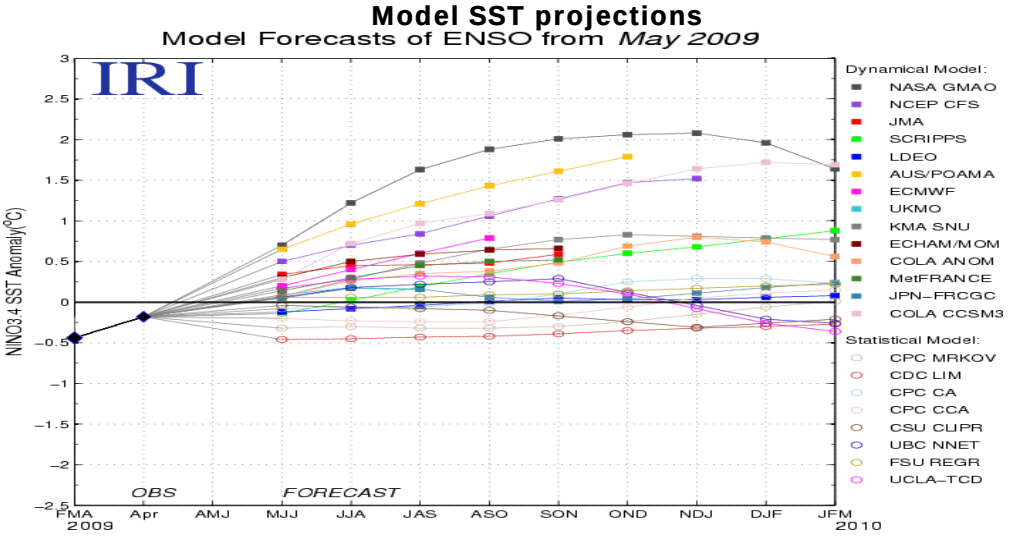
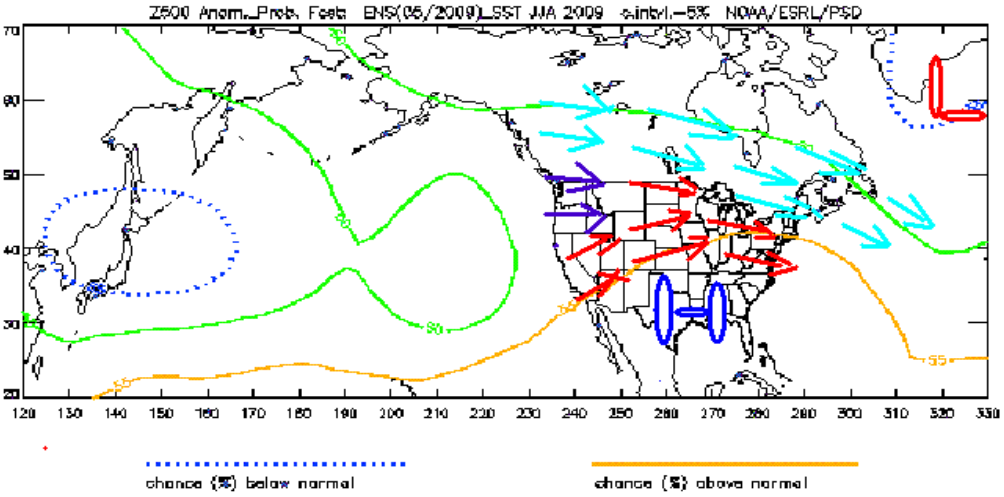


Chart 1b

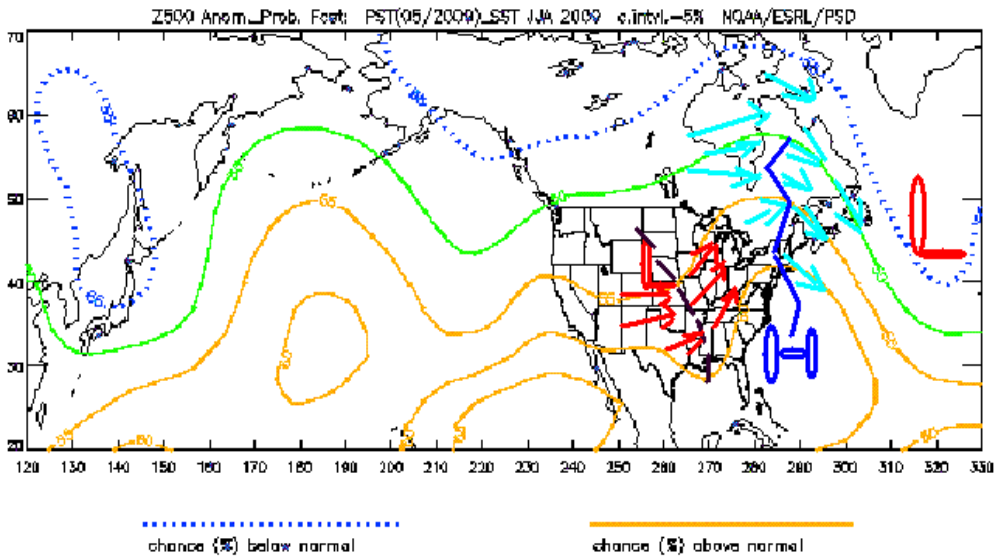


Projected upper wind data from CDC (Average)

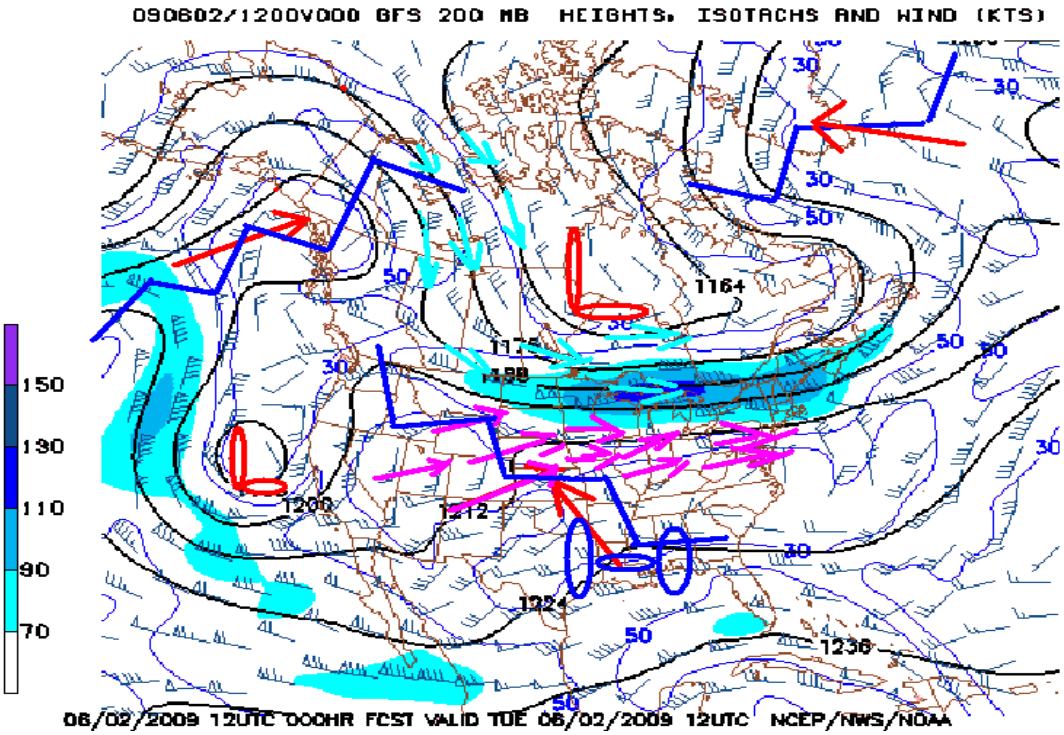
The maps below (annotated with wind flow arrows, done locally) is the average of the experimental 500 MB computer models projection from CDC as of May.



This upper air projection below (based on persistence of the present pattern) shows the ridge more along the East Coast and troughing to our west (and thus a warmer, stormier pattern).



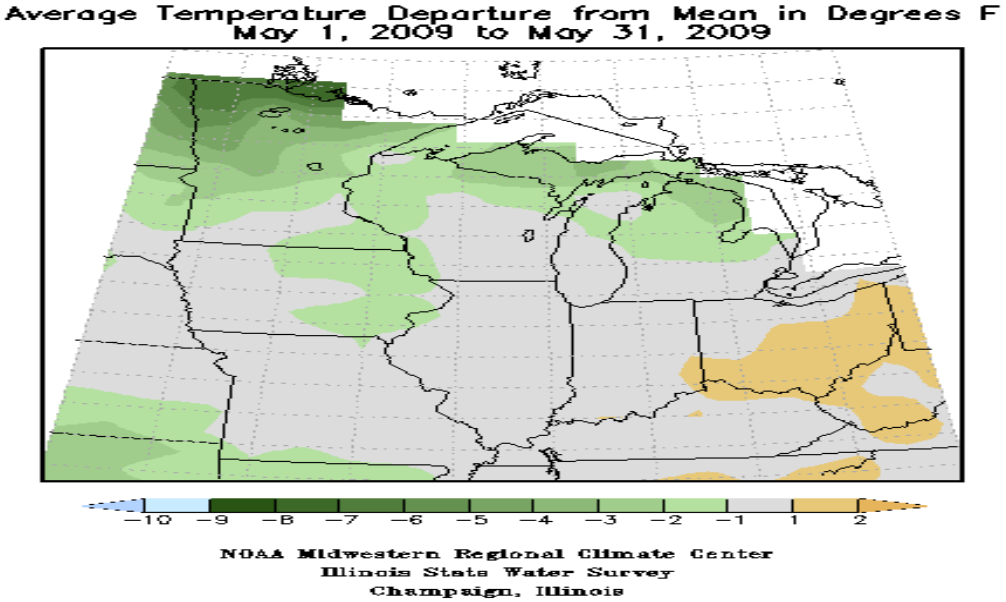
Considering the past winter and spring weather, both of these model patterns seem somewhat realistic (especially the first). With the Southeast Michigan being so close to Eastern Canadian trough (with ridging support over northwest Canada), it is thought a more pronounced (than displayed in either map) Eastern Canadian upper low will continue to be a main influence in our weather. Actually, the main features I feel that are worth watching this summer are nicely displayed in the present upper air pattern /as of 6/2/09-200 MB/ these first few days of June (map below).



First off, the fairly persistent upper level high pressure ridge located over Alaska and the Northwest Canadian Territories (see above red arrow) has been a "tough bird" to dislodge. Second, an occasional blocking ridge over Greenland (red arrow) has acted in conjunction to help deliver cool Polar air well south through eastern Canada and in the upper Midwest streaking across the Lakes. Finally, the third

important player will be how well the summer 500 MB ridge (and subsequent warm southwest winds streaking northeast across the Midwest and Lakes Region) develops.

Check out May's streak of below average temperature departures below>>>

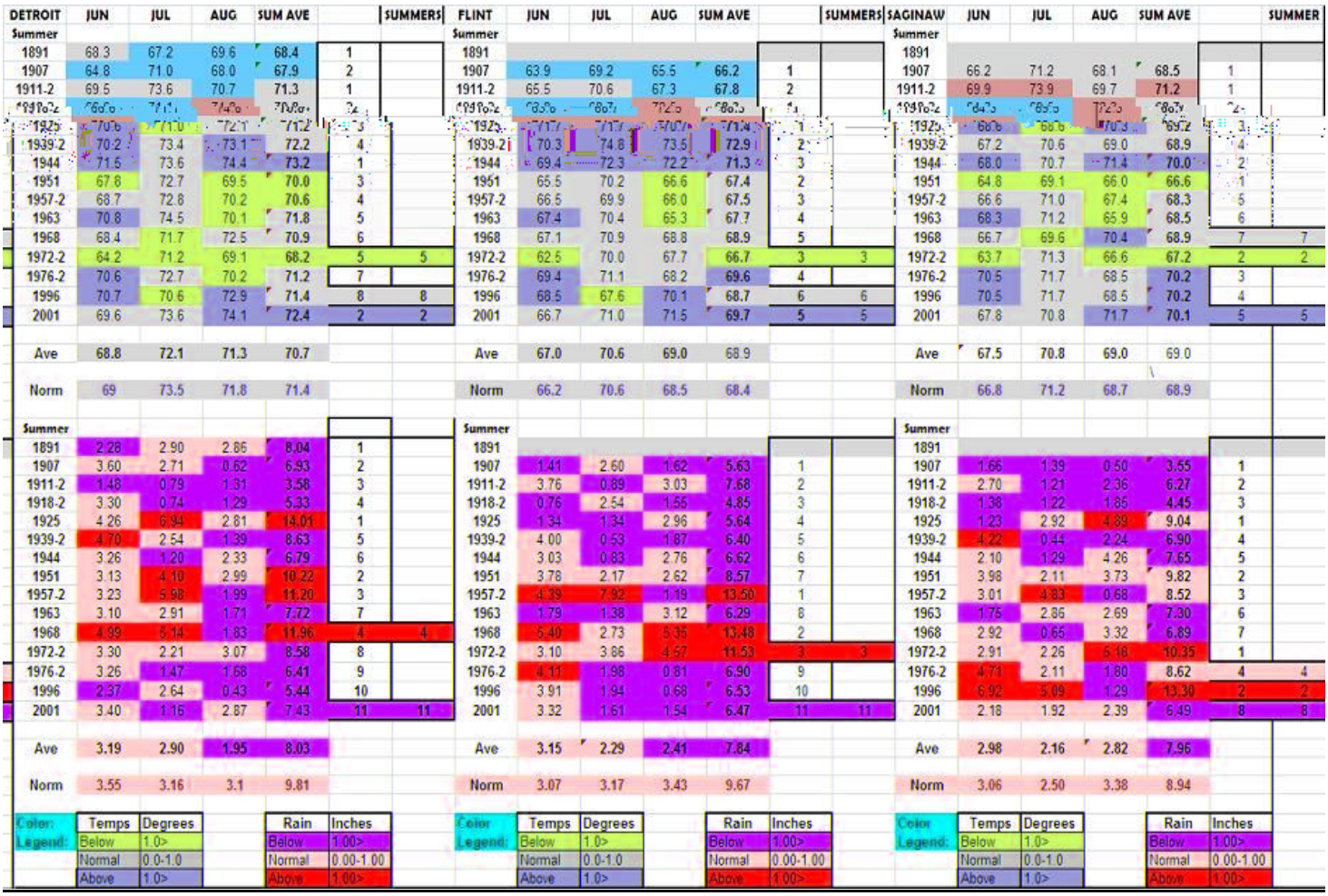


It is believed that these three players mentioned above should make for an interesting summer. The aforementioned strong blocking pattern remaining over Canada late this spring, routinely delivered some impressive cold shots south into the northern third of the country (just take a look at the temperature departure up in Minnesota for May). However, at the same time, our selected analogue years do tend to imply a building ridge axis over the center part of the country, shifting from west to east and flattening with some of the more potent cold shots from Canada. Therefore, something's got to give. While some seasonal weakening of the Canadian trough can be expected, it still should be a competent competitor much of the summer.

Analogue Summers

Researching as far back as the early 1890s, 15 summers were chosen for our analogue summers this go-around (see Analogues; La Nina to Neutral Summers 2009 chart below). These summers are an average, or composite of what happened in the past and were chosen based on similar broad-scale conditions. No two summers are ever exactly
alike and it are the past trends, especially locally are focused on for some guidance. These selected summers followed a similar sequence of events seen recently over the Eastern Pacific the past few seasons. A La Nina was in full swing the previous winter (or two) which faded toward Neutral conditions during the summer months in the first and /or second summer. Note, on the chart in the year column, those summers that were second in the sequence (La Nina to Neutral), meaning the years that are annotated with
2 (in other words, it is this large scale pattern matched up closest with this summer being it was the second go-around for the La Nina-Neutral pattern).

La Nina to Neutral Summers 2009



DETROIT	JUN	JUL	AUG	SUM AVE		SUMMERS
Summer						
1891	68.3	67.2	69.6	68.4	1	
1907	64.8	71.0	68.0	67.9	2	
1911-2	69.5	73.6	70.7	71.3	1	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
1925	70.6	[illegible]	[illegible]	[illegible]	[illegible]	
1939-2	70.2	73.4	73.1	72.2	4	
1944	71.5	73.6	74.4	73.2	1	
1951	67.8	72.7	69.5	70.0	3	
1957-2	68.7	72.8	70.2	70.6	4	
1963	70.8	74.5	70.1	71.8	5	
1968	68.4	71.7	72.5	70.9	6	
1972-2	64.2	71.2	69.1	68.2	5	5
1976-2	70.6	72.7	70.2	71.2	7	
1996	70.7	70.6	72.9	71.4	8	8
2001	69.6	73.6	74.1	72.4	2	2
Ave	68.8	72.1	71.3	70.7		
Norm	69	73.5	71.8	71.4		
Summer						
1891	2.28	2.90	2.86	8.04	1	
1907	3.60	2.71	0.62	6.93	2	
1911-2	1.48	0.79	1.31	3.58	3	
1918-2	3.30	0.74	1.29	5.33	4	
1925	4.26	6.94	2.81	14.01	1	
1939-2	4.70	2.54	1.39	8.63	5	
1944	3.26	1.20	2.33	6.79	6	
1951	3.13	4.10	2.99	10.22	2	
1957-2	3.23	5.98	1.99	11.20	3	
1963	3.10	2.91	1.71	7.72	7	
1968	4.99	5.14	1.83	11.96	4	4
1972-2	3.30	2.21	3.07	8.58	8	
1976-2	3.26	1.47	1.68	6.41	9	
1996	2.37	2.64	0.43	5.44	10	
2001	3.40	1.16	2.87	7.43	11	11
Ave	3.19	2.90	1.95	8.03		
Norm	3.55	3.16	3.1	9.81		

Color Legend:	Temps	Degrees
	Below	1.0>
	Normal	0.0-1.0
	Above	1.0>

	Rain	Inches
	Below	1.00>
	Normal	0.00-1.00
	Above	1.00>

FLINT	JUN	JUL	AUG	SUM AVE		SUMMERS
Summer						
1891						
1907	63.9	69.2	65.5	66.2	1	
1911-2	65.5	70.6	67.3	67.8	2	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
1925	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
1939-2	70.3	74.8	73.5	72.9	2	
1944	69.4	72.3	72.2	71.3	3	
1951	65.5	70.2	66.6	67.4	2	
1957-2	66.5	69.9	66.0	67.5	3	
1963	67.4	70.4	65.3	67.7	4	
1968	67.1	70.9	68.8	68.9	5	
1972-2	62.5	70.0	67.7	66.7	3	3
1976-2	69.4	71.1	68.2	69.6	4	
1996	68.5	67.6	70.1	68.7	6	6
2001	66.7	71.0	71.5	69.7	5	5
Ave	67.0	70.6	69.0	68.9		
Norm	66.2	70.6	68.5	68.4		
Summer						
1891						
1907	1.41	2.60	1.62	5.63	1	
1911-2	3.76	0.89	3.03	7.68	2	
1918-2	0.76	2.54	1.55	4.85	3	
1925	1.34	1.34	2.96	5.64	4	
1939-2	4.00	0.53	1.87	6.40	5	
1944	3.03	0.83	2.76	6.62	6	
1951	3.78	2.17	2.62	8.57	7	
1957-2	4.39	7.92	1.19	13.50	1	
1963	1.79	1.38	3.12	6.29	8	
1968	5.40	2.73	5.35	13.48	2	
1972-2	3.10	3.86	4.57	11.53	3	3
1976-2	4.11	1.98	0.81	6.90	9	
1996	3.91	1.94	0.68	6.53	10	
2001	3.32	1.61	1.54	6.47	11	11
Ave	3.15	2.29	2.41	7.84		
Norm	3.07	3.17	3.43	9.67		

Color Legend:	Temps	Degrees
	Below	1.0>
	Normal	0.0-1.0
	Above	1.0>

	Rain	Inches
	Below	1.00>
	Normal	0.00-1.00
	Above	1.00>

SAGINAW	JUN	JUL	AUG	SUM AVE		SUMMER
Summer						
1891						
1907	66.2	71.2	68.1	68.5	1	
1911-2	69.9	73.9	69.7	71.2	1	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
1925	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
1939-2	67.2	70.6	69.0	68.9	4	
1944	68.0	70.7	71.4	70.0	2	
1951	64.8	69.1	66.0	66.6	1	
1957-2	66.6	71.0	67.4	68.3	5	
1963	68.3	71.2	65.9	68.5	6	
1968	66.7	69.6	70.4	68.9	7	7
1972-2	63.7	71.3	66.6	67.2	2	2
1976-2	70.5	71.7	68.5	70.2	3	
1996	70.5	71.7	68.5	70.2	4	
2001	67.8	70.8	71.7	70.1	5	5
Ave	67.5	70.8	69.0	69.0		
Norm	66.8	71.2	68.7	68.9		
Summer						
1891						
1907	1.66	1.39	0.50	3.55	1	
1911-2	2.70	1.21	2.36	6.27	2	
1918-2	1.38	1.22	1.85	4.45	3	
1925	1.23	2.92	4.89	9.04	1	
1939-2	4.22	0.44	2.24	6.90	4	
1944	2.10	1.29	4.26	7.65	5	
1951	3.98	2.11	3.73	9.82	2	
1957-2	3.01	4.83	0.68	8.52	3	
1963	1.75	2.86	2.69	7.30	6	
1968	2.92	0.65	3.32	6.89	7	
1972-2	2.91	2.26	5.18	10.35	1	
1976-2	4.71	2.11	1.80	8.62	4	4
1996	6.92	5.09	1.29	13.30	2	2
2001	2.18	1.92	2.39	6.49	8	8
Ave	2.98	2.16	2.82	7.96		
Norm	3.06	2.50	3.38	8.94		

Color Legend:	Temps	Degrees
	Below	1.0>
	Normal	0.0-1.0
	Above	1.0>

	Rain	Inches
	Below	1.00>
	Normal	0.00-1.00
	Above	1.00>

Note: years where the <u>la Nina to neutral pattern</u> occurred for the second time in two year or so are denoted with a "2" following the year.

<u>Trends Seen</u>

The Neutral analogue summers are really quite mixed on the temperature front this time. Even though Detroit's summer data favors normal to below normal temperatures (like last year), one must closely compare this to Flint and Saginaw. The reason being, the normals at Detroit were increased in the 1971-2000 set (mainly an effect of the local heat island) whereas Flint and Saginaw saw little change in their normals. Therefore, this would logically skew Detroit's <u>temperature departure data down a bit</u>. Just looking at the color code tells one that Flint and Saginaw's summers were mixed.

Looking at the trends seen this spring suggest the summer temperatures will be mixed with the dominant trend difficult to peg. That being said, there are still a few trends to watch for; one being the warmest weather (relative to normal) will come mid to late summer (July and/or August). The stubbornness of the trough in Canada along with some of the cold June's found gives a little more credence to the warmer temperatures mid-late season. Also, our recent guidance is hinting at a warm-up toward the middle of June and thus, it looks as though the middle of June hopefully should begin our summer-like weather. This not only was that seen in some of our recent analogue Junes but it also showed up on the composite trend for June, where temperatures actually averaged above normal.

While most years were drier than normal, when it was wet, it <u>was wet</u>! When looking at just the statistics (of which I'm really not a fan of since they generally don't tell the whole story), the odds this summer's rainfall will come in an inch or more <u>below normal</u> are about 70%. In the past, when chances were that high in the analogue years, it was usually the way to go. What is troubling this time is when the rainfall came in above normal, it was well above normal! This says to me there is a decent potential of some extended battling of air masses and thus, some stalling of fronts (not to mention a higher risk of a forecast bust). The upper air pattern seen late spring could easily evolve into one of these patterns as the summer heats up and the trough in Canada holds somewhat

tough, somewhere a confluent zone will likely set up. At the same time, a dry or drier spell this summer looks just as likely and there-in-lies the problem. Therefore, and going with the trend seen, rainfall looks to be heaviest early to mid summer with drier weather later.

A few notes on the following composites:

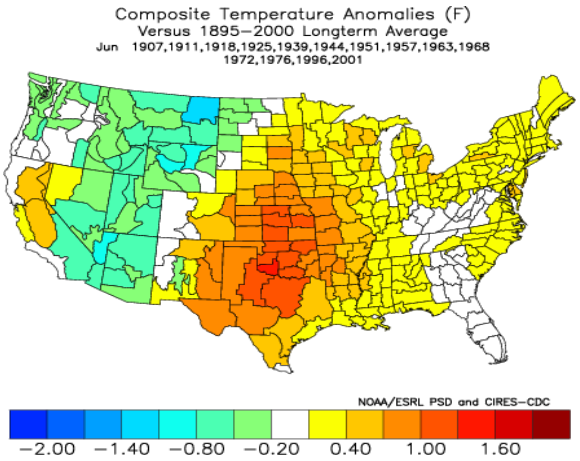
1) It's best to look at the trend of the temperatures or precipitation for an entire season when looking at the monthly projections. In other words, warm or cool periods don't always come neatly wrapped up in one month. Many times a trend is seen overlapping from one month into another. As an example, one month's data may be above normal, while the next is above to below and the third below. The whole season may indeed start out above normal but toward the middle or end, temperature departures average below.

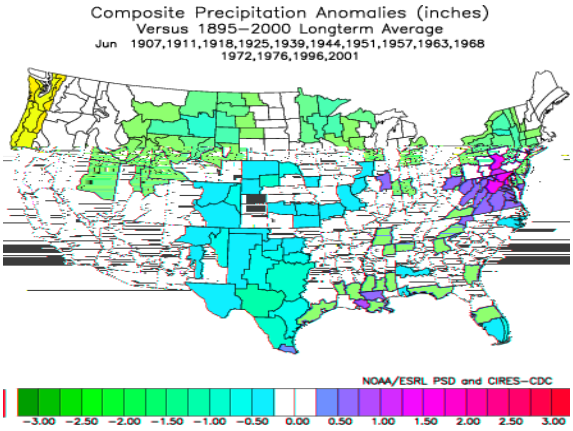
2) The numerical departure value above or below for analogue month or season projections is not as important as the sign(+/-) ahead of it.

COMPOSITE SUMMERS MONTHS 2009
(based on the 1895-2000 average)

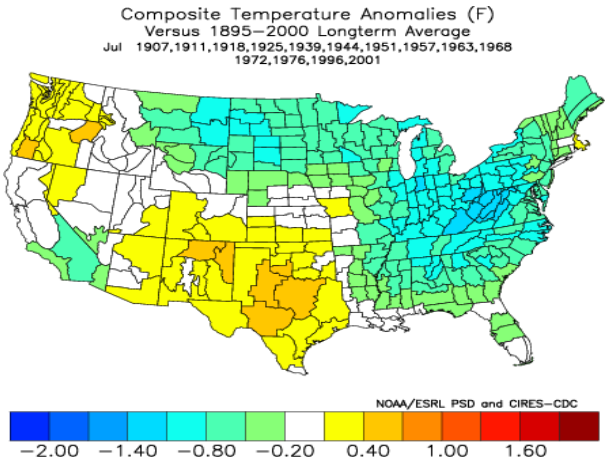
Temperature ***Precipitation***

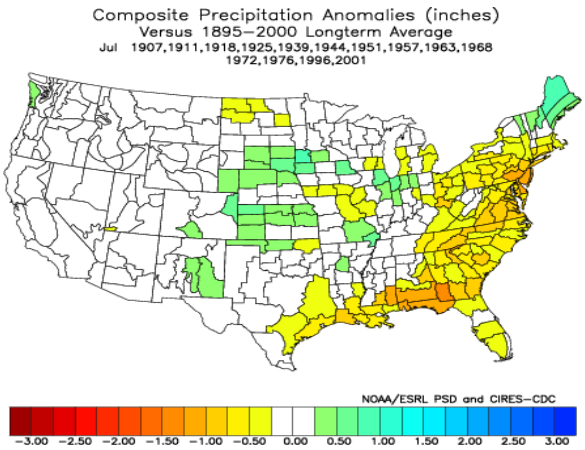
June



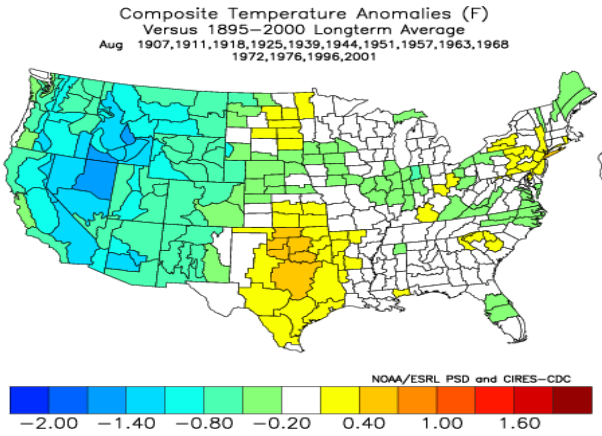


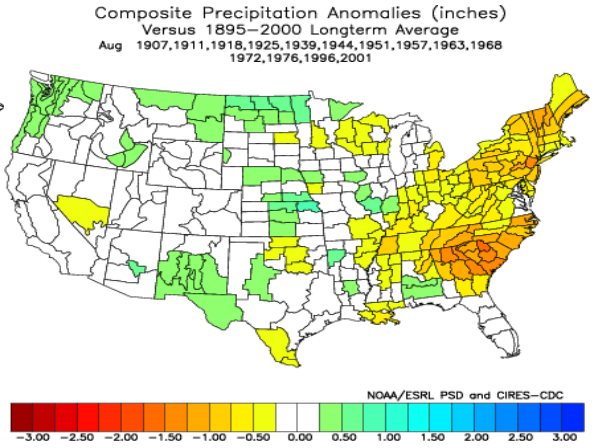
July



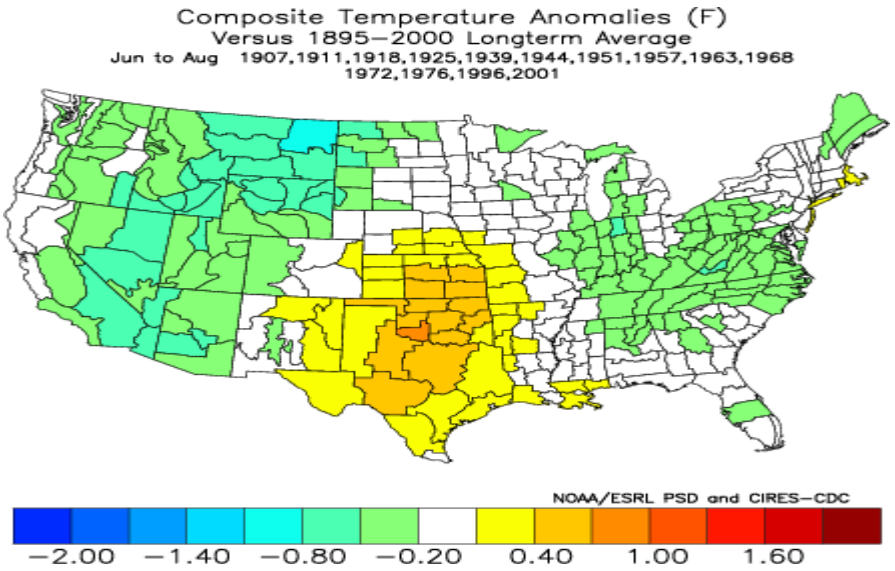


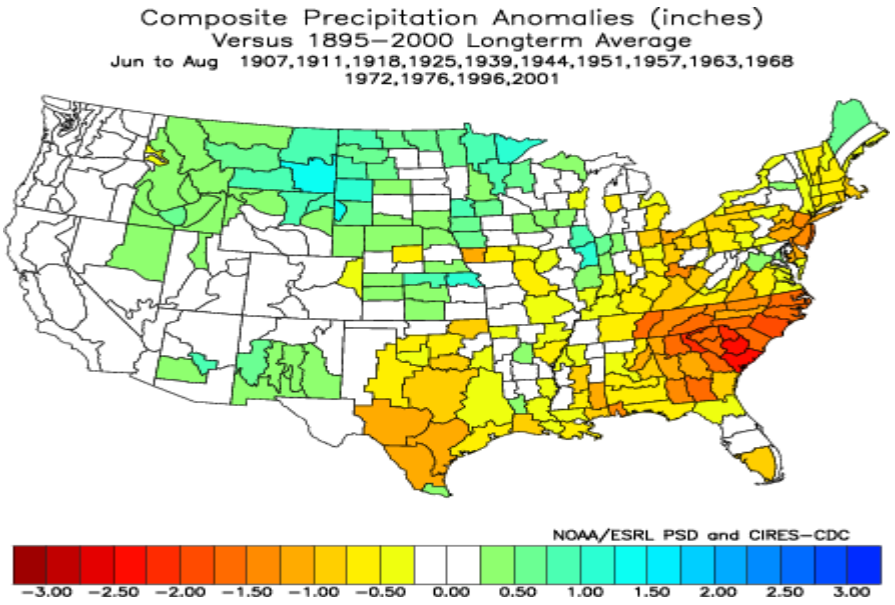
Aug



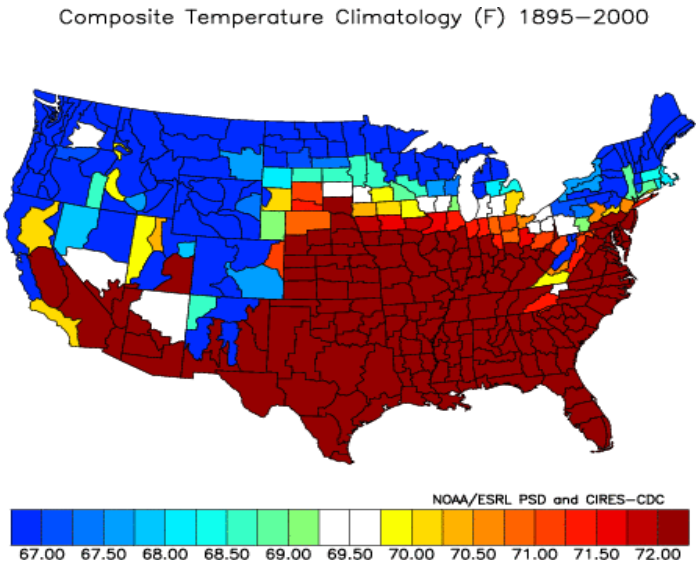


COMPOSITE SUMMERS 2009
(based on the 1895-2000 average)





Since this average temperature departure is derived from the 1895-2000 average temperature (as opposed to the 30 year norm), it would be nice to know what the summer averages are in Southeast Lower Michigan for that century plus period.



Actually two temperature averages are displayed for Southeast Lower Michigan. Area-1 paints much of Southeast Lower Michigan (roughly from the Flint and Port Huron areas south to the Ohio border), while Area-2 encompasses the Saginaw Valley and Thumb Region. Note; history tells us that the Saginaw Valley and Thumb Region summers are a few degrees cooler on average than the remainder of Southeast Lower Michigan.

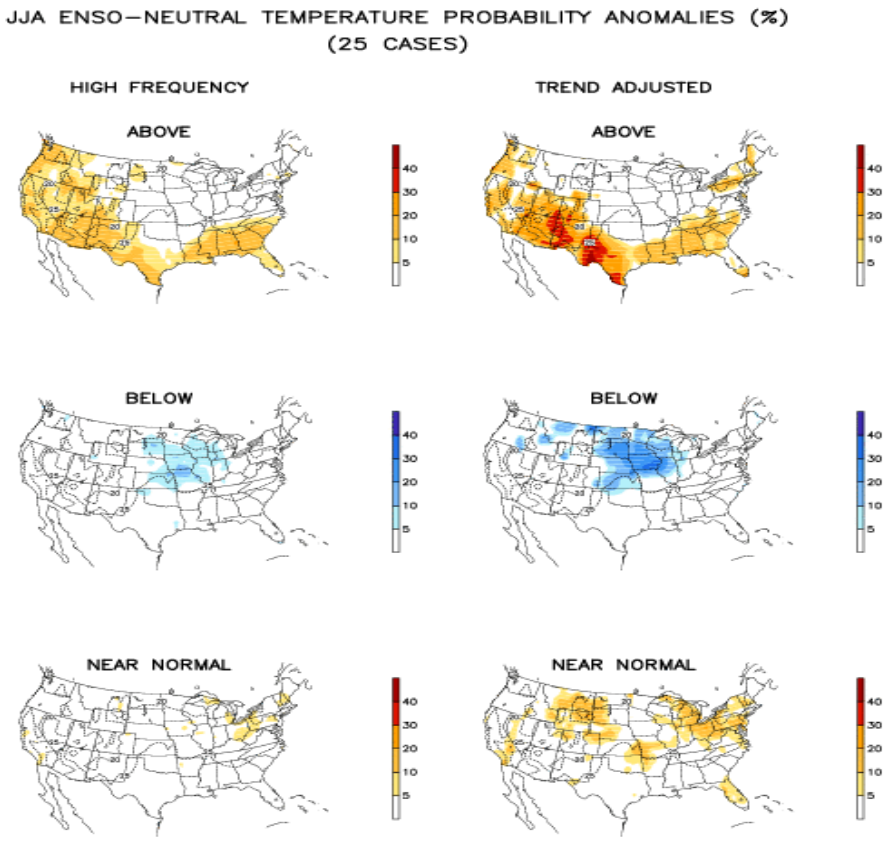
Area-1 displays a summer average of about 70.5
Area-2 displays a summer average of about 68.5

Since it is expected that La Nina conditions will fade to Neutral during the summer, it might be worthy to take a look at past effects over the country when Neutral conditions existed. The top maps denote above normal, the

middle below, and the bottom normal. This agrees with our local data of the dominance Note; the Climate Prediction Center /CPC/ explains these two categories (high frequency and trend adjustment) this way:

There have been significant trends in precipitation and surface air temperature at many locations in **recent decades,** so it is worthwhile to examine the **influence of trends on ENSO composites**. For this purpose, two basic types of composites are examined:

- High-frequency (denoted HF) composites
- Trend adjusted (denoted TA) composites
-



After a cold and snowy winter, spring arrived very slowly across Southeast Lower Michigan with the green up taking its time. This was in spite of temperatures averaging above normal both March and April (but this was mainly due to just a handful of large above normal departure days). Heavy snows of the winter along with a fairly saturated soil condition led to a cool ground that was slow to warm through April. Not to mention, a wet April and a slightly cooler May didn't help matters in warming the soil. Aprils's rainfall was well above normal across the entire region and was primarily responsible for the wet spring.

Spring precipitation totals ranged from better than nine inches /9.30"/ at Saginaw to just over a foot /12.09"/ at Detroit (with 12.42" here at the NWS White Lake). Of course, rainfall departures were all above normal, ranging from one to nearly four inches (the highest being around the metro Detroit area). This was in stark contrast to last spring when below normal precipitation (a 2½ - 3.0 inch deficit and coming at the worst time to boot, mainly mid to late spring) affected the region. Another interesting fact, last spring (when just using the three stations), Southeast Lower Michigan averaged 2.45" below normal, whereas this spring we averaged 2.39 above. Yes, Mother Nature does have a way of balancing things out ;-)

SPRING - MONTHLY AVERAGE TEMPERATURES AND RAINFALL

	Detroit	Flint	Saginaw	White Lk
MAR (T)	38.7/+1.8	35.5/+1.8	35.3/+1.8	35.4
(P)	4.17/+0.65	2.71/+0.49	2.20/-0.22	3.61
APR (T)	49.8/+1.7	46.5/+1.1	45.4/-0.1	46.8
(P)	5.03/+1.98	5.42/+2.29	5.61/+2.79	6.38
MAY (T)	59.4/-0.4	56.3/ -0.8	56.2/-1.4	56.9
(P)	2.89/- .16	2.53/ -0.21	1.49/ -1.40	2.43

SPRING -SEASON/AVERAGE TEMPERATURES AND TOTAL RAINFALL

					SE MICH
	Detroit	Flint	Saginaw	White Lk	/DTW-FNT-MBS/
Ave (T)	49.3/+1.0	46.1/+0.7	45.6/+0.1	46.3	47.2 / +0.6
Norm (T)	48.3	45.4	45.5	N/A	46.4
Total (P)	12.09/+3.46	10.66/+2.57	9.30/+1.17	12.42	10.68
Norm P	8.62	8.09	8.13	N/A	8.29 / +2.39
Remarks	10th wettest	10th wettest			

Note: White Lake has no official normals at this time, the - /N/+ just denotes an estimate of above/normal/below (--/++ much below/above).

If conditions warrant, an updated Summer Outlook will be sent.

Have a good summer, enjoy any time off and may good weather be your traveling companion.

SUMMER BEGINS: JUNE 21st at 146 AM EDT