Cool and Warm and Dry and Wet
Summer of 2007 Review

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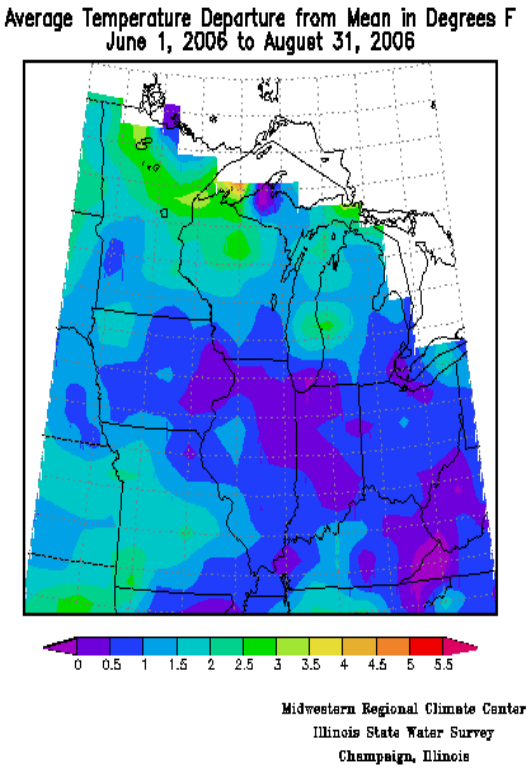
The Summer of 2007 had many contrasting patterns which was mainly due to a rather amplified and at times, changeable upper wind pattern. It was when the upper winds (or jet stream) locked into place for a awhile that the most notable patterns would evolve. Interestingly, it would be two opposite upper wind patterns, a ridge and a trough over the Great Lakes early to mid summer that spelled the same thing in the long run DRY. The pronounced ridge diverted meaningful fronts and resultant rains west of us into the Upper Mississippi Valley early summer. Then, troughing over the Great Lakes and New England mid summer bought cool but primarily dry air from central Canada. In response to the ridge, temperatures averaged above normal for June and under the prevailing trough, below normal in July. A stormy pattern erupted during August in response to several troughs digging into the Midwest and Great Lakes region. Most areas received more rain in August than in June and July combined. Below is the table (1) of the monthly/summer temperatures, rainfalls and departures statistics.

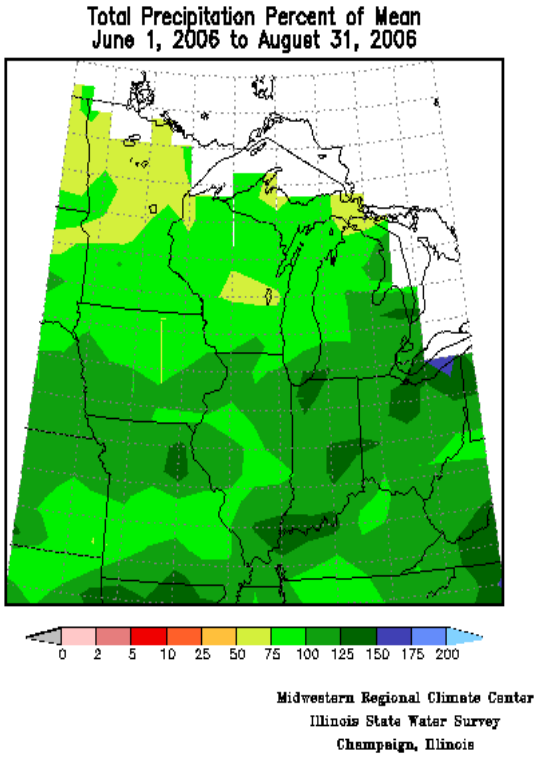
Table-1

2007 SUMMER STATISTICS - SOUTHEAST LOWER MICHIGAN				WARM	&	WET!
TEMPS	JUN	JUL	AUG	SUMMER AVERAGE	SUMMER NORM	DEPART
	14th w		18th w			
DETROIT	71.3	72.0	73.8	72.4	71.4	+1.0
DEPART	+2.3	-1.5	+2.0			
	14th w	20th c	12th w	16th w		
FLINT	68.8	69.7	71.0	69.8	68.4	+1.4
DEPART	+2.6	-0.9	+2.5			
	13th w					
SAGINAW	69.9	69.6	69.7	69.7	68.9	+0.8
DEPART	+3.1	-1.6	+1.0			
RAIN	JUN	JUL	AUG	TOTAL	NORM	DEPART
			7th w			
DETROIT	3.10	2.10	6.61	11.81	9.81	+2.00
DEPART	-0.45	-1.06	+3.51			
		17th d	9th w			
FLINT	3.48	1.83	5.09	10.40	9.67	+0.77
DEPART	+0.41	-1.34	+1.66			
			4th w	13th w		
SAGINAW	2.06	2.90	6.73	11.69	8.94	+2.75
DEPART	-1.0	+0.40	+3.35			

The Summer of 2007 will be remembered mostly for its notable dry spell early-mid summer and ironically, very wet and stormy ending in August. The main period of dry weather hit at one the worst times for agriculture and garden interests, coming in mid June to mid-late July. August brought a complete change from the relatively cool and dry July to warm and muggy conditions with several rounds of severe thunderstorms and very heavy rains. Note the average temperature departure maps and total rainfall relative to the mean for the Midwest and Great Lakes for the summer (Fig-1).

Fig-1





How Dry We Were

Checking the mid summer rainfall departure map below (Fig-2), generally shows a one to four inch rain deficit over Southeast Lower Michigan. This lack of rain placed the region into an abnormally dry to moderate drought criteria during this time frame (Fig-3).

Fig-2

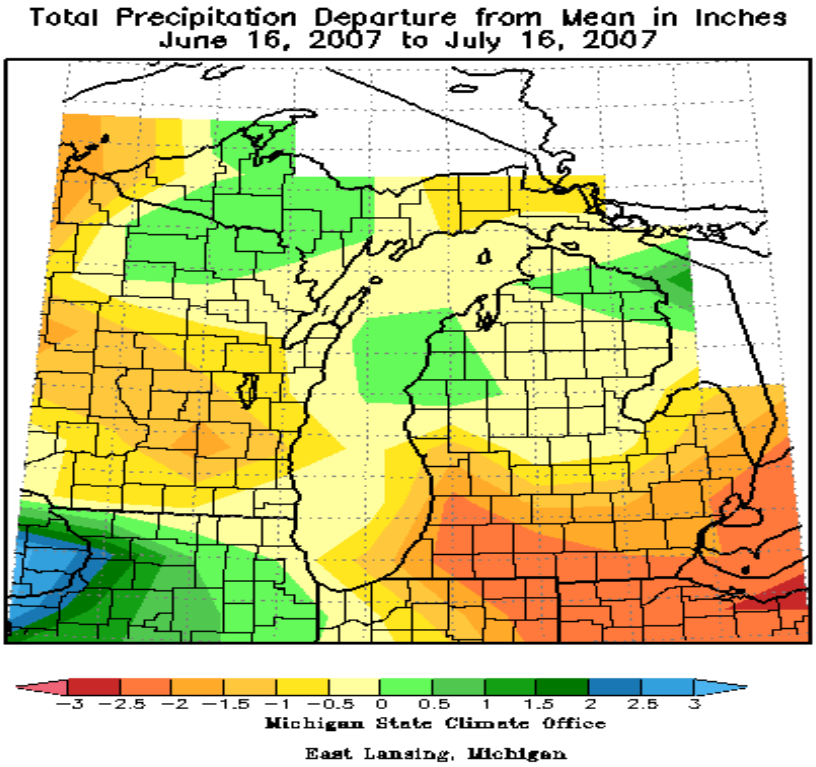
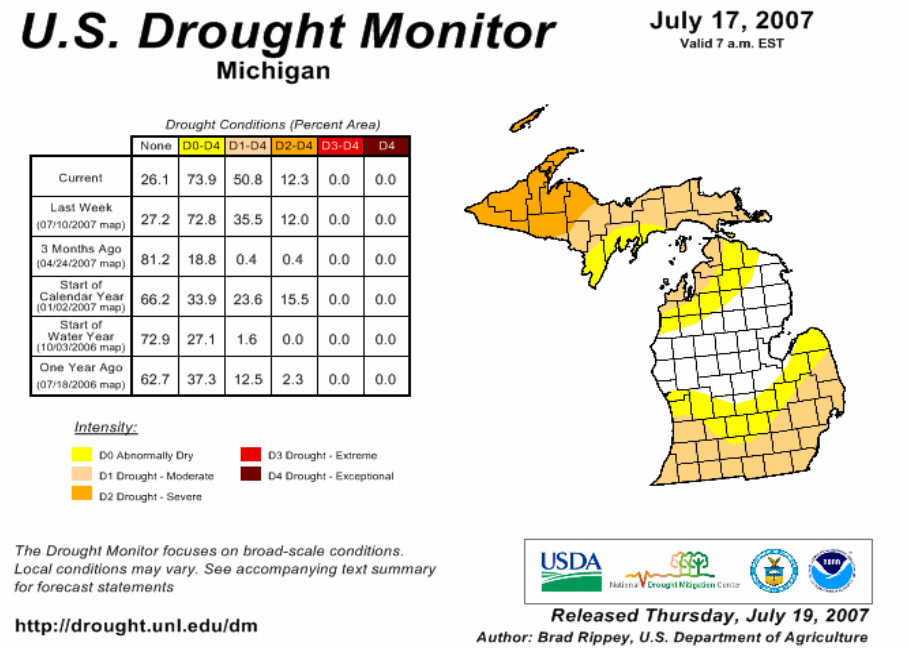

Total Precipitation Departure from Mean in Inches
June 16, 2007 to July 16, 2007
−3 −2.5 −2 −1.5 −1 −0.5 0 0.5 1 1.5 2 2.5 3
Michigan State Climate Office
East Lansing, Michigan

Fig-3


U.S. Drought Monitor
Michigan
July 17, 2007
Valid 7 a.m. EST
Drought Conditions (Percent Area)
None D0-D4 D1-D4 D2-D4 D3-D4 D4
Current 26.1 73.9 50.8 12.3 0.0 0.0
Last Week (07/10/2007 map) 27.2 72.8 35.5 12.0 0.0 0.0
3 Months Ago (04/24/2007 map) 81.2 18.8 0.4 0.4 0.0 0.0
Start of Calendar Year (01/02/2007 map) 66.2 33.9 23.6 15.5 0.0 0.0
Start of Water Year (10/03/2006 map) 72.9 27.1 1.6 0.0 0.0 0.0
One Year Ago (07/18/2006 map) 62.7 37.3 12.5 2.3 0.0 0.0
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://drought.unl.edu/dm
USDA
Released Thursday, July 19, 2007
Author: Brad Rippey, U.S. Department of Agriculture

By mid summer, a Category 0 (abnormally dry) and Category 1 (moderate drought) was posted for much of Southeast Lower Michigan in the Drought Monitor Map (Fig-3). For more information (and latest National overview) click on:
http://www.drought.unl.edu/dm/monitor.html and
http://www.drought.unl.edu/dm/12_week.gif\

The dryness peaked in intensity and extent by late July. Below, the precipitation table represents rainfall from mid June to mid–late July at our main climate locations across Southeast Lower Michigan. Along with these climate stations, rainfall amounts during this time across Southeast Lower Michigan show the wide variance of amounts. Many areas reveal a "dry-core" mid June to mid July, while still other locations were hard pressed for rain as long as six to eight weeks (table-2).

Table-2

EARLY - MID SUMMER RAINFALL

	4WEEK TOT/DEP	6WEEK TOT/DEP	Jun-Jul total
LOCATION	6/16 - 7/16	6/16 - 7/31	
DETROIT /DTW/	3.41 / -1.86	5.20 / -1.29	
FLINT /FNT/	4.48 /-0.17	5.26/-1.14	
SAGINAW /MBS/	4.23 /-0.13	4.96/-0.10	
NWS-WHITE LK/DTX/	2.48 /-2.53	4.03/-3.05	
Capac Yale			1.54 1.77
Port Huron	0.79	2.84	
Manchester (Was)	0.64	1.62	
Millington (Tus)	0.80	1.43	
Dearborn /UM/ (Way)	0.91	2.44	
Milford GM Prov (Liv)	1.01	1.57	
Berkley (Oak)	1.06	1.90	
Wyandotte (Way)	1.16	3.19	
New Baltimore (Mac)	1.21	2.35	
Hudson (Len)	1.22	3.31	
Saline (Was)	1.32	4.26	
Newport (Mon)	1.39	3.09	
Sandusky (San)	1.39	1.93	
Bad Axe (Hur)	1.50	1.65	
Grosse Pte (Way)	1.70	2.73	
Ruby (St. C)	1.72	2.81	
Howell (Liv)	1.91	3.11	
Adrian (Len)	2.05	5.24	
Harbor Beach (Hur)	2.11	2.12	
Linden (Shi)	2.16	2.78	
Auburn (Bay)	2.22	2.38	

Merrill (Sag)	2.48	4.03	
Filion (Hur)	2.80	3.61	
Cass City (Tus)	3.31	3.47	
Frankenmuth (Sag)	3.43	4.13	
Corunna (Shi)	4.20	4.28	

Feast and Famine

A good term to use for the Summer of '07 is Feast and Famine (or in better sequence, Famine and Feast). After the long duration of dry weather, as mentioned above, August broke loose with several bouts of heavy rain and severe weather. Just as the table-2 above relays our dry times, table-3 below, relays our wet! Some stations in the Saginaw Valley and Thumb areas had lesser rains (near normal) and weren't used. Much of the rain fell the third week between the 17th and 24th.

Table-3

LOCATION	August Total	Dundee (Mon)	9.02
DETROIT /DTW/	6.61	Milan (Mon)	6.32
FLINT /FNT/	5.09	Monroe (Mon)	9.03
SAGINAW /MBS/	6.73	Lapeer (Lap)	8.66
NWS-WHITE LK/DTX/	5.45		
Ann Arbor (Was)	5.40		
Chelsea (Was)	6.56		
Howell (Liv)	6.02		
Dearbom (Way)	7.31		
Milford GM Prov (Liv)	6.19		
Berkley (Oak)	5.97		
Canton Twp (Way)	5.98		
West Bloomfield(Oak)	6.14		
Mt Clemens (Mac)	6.39		
Farmington (Oak)	6.11		
N Livonia (Way)	6.25		
Tecumseh (Len)	9.11		
Saline (Was)	7.06		
Hudson (Len)	11.83		
Manchester (Was)	7.99		
Pontiac (Oak)	5.93		
Yale (StC)	6.46		
Richmond (Mac)	8.09		
Corunna (Shi)	6.91		
Tipton (Len)	9.26		
Morenci (Len)	9.99		
Auburn (Bay)	6.56		
Algonac (St C)	6.54		

Summer Outlook Performance

Past versus Present:

How did our analogue summers perform in projecting this summer's weather and trend? After researching the preferred analogue summers, the following was issued for the summer forecast

"Overall, look for temperatures to range from near normal to above /0.0 to +2.0 degrees/ in the final analysis."

Temperature departures fell comfortably within the projected range from +0.8 at Saginaw, to +1.0 degree at Detroit and +1.4 at Flint.

It was further stated:

"Local data reveals that our analogue summers generally "warmed up" as the summer evolved. More specifically, out of the three months, June had the best chance to see below normal temperatures, while July and/or August had the best chance of above normal temperatures."

Ironically, this trend did evolve but the timing was slower. The warmest part of summer did come late in the summer /August/ but the cool period that happened mainly early summer /June/ in the analogue years did show up, albeit later in July. Given one is looking back a 100+ years at analogue summer monthly temperatures and timing, the important thing to take from the data is that the analogue years were strongly suggesting the summer would not be straight across the board, warm - like a simple departure number or a flat "above normal" projection for the entire summer would relate. And, by projecting a notable cool period during the first half of the summer, it was helpful (and more accurate to what occurred, than no mention at all) even though the timing was off.

Precipitation (from our summer outlook)

"Rainfall: ***Overall rainfall will average around normal to locally above."***

Precipitation (from our mid summer update)

"When looking at the general August rainfall map from our analogue summers, rainfalls actually averaged normal to above. We can only hope that trend shows up because of the prevailing dry spell in many areas."

In respect to the dry spell early-mid summer, we were blessed with heavier rains in August. As our projected composite rainfall maps from our analogue summers showed, there was a good chance for a dry spell most likely early - mid summer but then, by

late summer /August/, above normal or heavier rains were indicated from past analogue August trends. Note the trajectory of rainfall (denoted by the red arrows) in the analogue Augusts, this showed heavy (or above normal) rains from the upper Mississippi Valley southeast into Michigan and Northern Ohio. Let's compare these past composite August patterns (Fig-4), to August of 2007 (Fig-5/6) over the same region...

Fig-4

Analogue Summers

early - mid - late

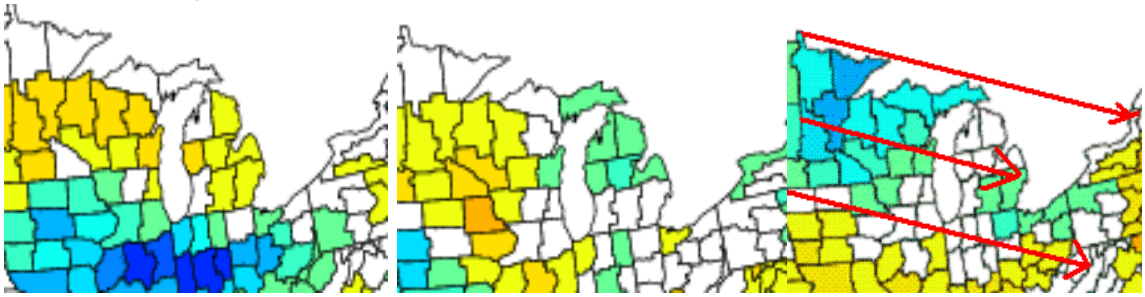


Fig-5

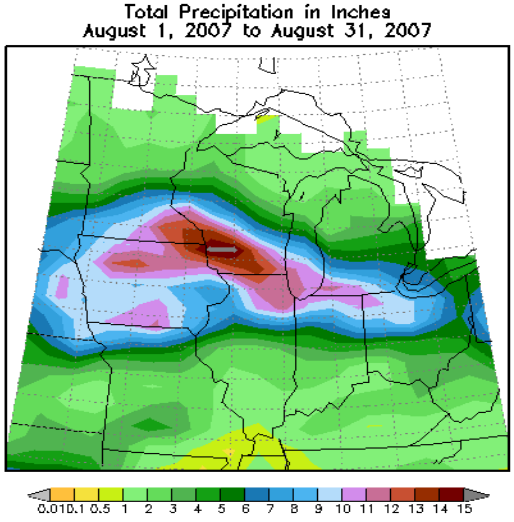
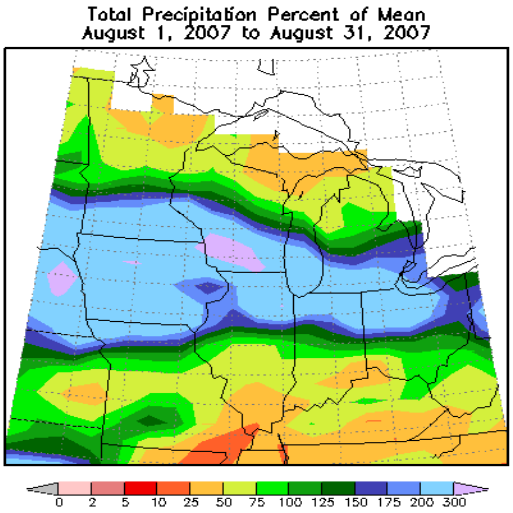
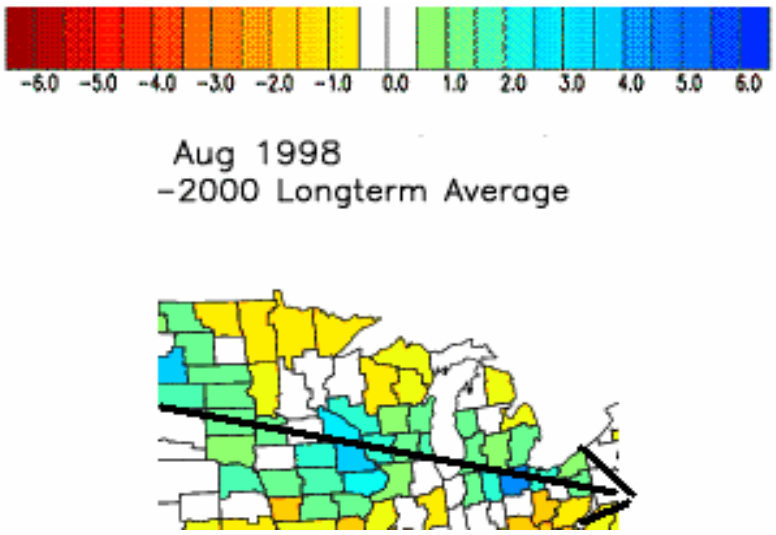


Fig-6



In addition, the most compelling case for a wet August came from Aug 1998 (Fig-7), our last analogue summer. Check out the rainfall pattern and departures above normal during that August compared to this August. Though amounts are not as high as this August, the overall placement and well above normal amounts were also seen in many areas in 1998 with rainfall as much as 6 inches above normal just south of the border.

Fig-7



The Autumn Outlook is out and the Winter Outlook will be released late October to early November. Take Care.