NOAA, NATIONAL WEATHER SERVICE, WEATHER FORECAST OFFICE

Miami, Florida 33165

2009 South Florida Weather Year in Review

...Warmer than Normal...

Warmer than normal temperatures were observed across south Florida in 2009. After a cool January and February, monthly average temperatures stayed at or above normal values through the remainder of the year.

Here are 2009 temperature averages (F) for selected sites through December 29 (December 30 for Miami Beach and Moore Haven):

Site	2009 Avg Temp	Departure from Normal	Rank
Miami International	77.89	+ 1.2	3rd warmest
*Ft Lauderdale Int'l	77.49	+ 1.6	3rd warmest
Palm Beach International	75.89	+ 0.6	16th warmest
Naples Regional	75.38	+ 1.3	11th warmest
Miami Beach	76.36	+ 0.5	12th warmest
Moore Haven	73.97	+ 0.9	12th warmest

* (The official Fort Lauderdale climate site was moved in 2002 from the Dixie Water Plant to the Fort Lauderdale/Hollywood International Airport. The new site has shown to be much warmer than the old site. This is probably because the airport is closer to the Atlantic Ocean and the fact that there is more concrete and asphalt at the airport site compared to the Dixie Water Plant site).

A notable aspect regarding the warm temperatures in 2009 was the high number of 90-plus degree days. Miami International Airport registered a total of 121 days of temperatures reaching the 90-degree mark, the most recorded at that site since records began in 1937. At other southeast Florida sites, the number of 90-plus degree days ranged from 83 at Fort Lauderdale International to 91 at Palm Beach International to as high as 137 days well inland at West Kendall Tamiami Airport. On the other hand, coastal locations such as Miami Beach only recorded 19 days of 90-plus degree

temperatures, no doubt influenced by the slightly cooler summer sea breezes. A similar effect occurred on the southwest Gulf coast, where Naples Regional Airport closer to the coast registered 108 days of 90-plus degree temperatures compared to 164 days at the Naples cooperative site in Golden Gate about 6 miles inland. Over inland locations and in the Lake Okeechobee area, the number of 90-plus degree days included 127 days in Moore Haven (5th highest on record), 133 days in LaBelle, 138 days in Immokalee and 169 days in Devils Garden in central Hendry County.

Precipitation amounts varied widely across the region, with most of the metro areas along the southeast and lower southwest Florida coasts registering below normal rainfall and most interior locations recording above normal rainfall (Figure 1). A very dry winter and spring led to a very wet early summer, and then followed by near normal to below normal rainfall right up to the last half of December when very heavy rainfall affected much of the area (see below for further details).

Here are 2009 rainfall totals from around the area (in inches) through 7 AM December 30:

Site	**2009 Precip**	**Departure from Normal**	**Rank**
Miami International	52.09	- 6.32	38th driest
Palm Beach International	59.06	- 2.13	52nd driest
Fort Lauderdale Int'l	45.80 *	- 18.23	
Naples Regional	33.91 *	- 17.89	3rd driest
Hollywood Water Plant	68.71	+ 7.26	
Miami Beach	62.12	+15.52	9th wettest
The Redland (S. Dade)	61.37	- 0.19	
Moore Haven	50.53	+ 4.09	34th wettest
NWS Miami	57.56		
Clewiston	56.12	+10.72	
Homestead	53.93	- 4.90	
Marco Island	51.84		
Ortona	51.02		
Brighton Reservation	50.01		

* (Naples cooperative site at Golden Gate Aquatic Complex measured 56.78 inches and Fort Lauderdale cooperative site at Dixie Water Plant measured 64.16 inches)

Perhaps most noteworthy in 2009 is what didn't happen weather-wise. No tropical cyclones affected south Florida in 2009, mirroring the trend of below normal activity in the tropical Atlantic.

Nevertheless, there were a number of significant weather events in south Florida during 2009 which are included in the seasonal breakdown below.

January – April

The driest winter on record (December-February) was set at Miami and Fort Lauderdale, where rainfall amounts during the three-month period were 0.74 and 0.39 inches, respectively. West Palm Beach, Naples and Miami Beach recorded their second driest winter on record. West Palm Beach set individual monthly driest records in January and February when a combined total of only .25 inches fell.

March and April continued the very dry trend, however no records were set as the area received slightly higher rainfall amounts compared to the bone-dry winter months. The six-month period from November 2008 through April 2009 ranked as the second driest period on record over most of south Florida. As a result, severe to extreme drought conditions prevailed over south Florida from late February through April. The very dry ground contributed to a number of wildfires across the area, most notably a very large wildfire in the Big Cypress National Preserve in Collier County which burned over 30,000 acres from late April through early May.

Temperatures were cooler than normal during January and February, bouncing back to near normal in March and above normal in April. Two significant freezes affected south Florida: one on January 21st and 22nd and the other on February 5th. The coldest temperatures in 6 years were experienced in many areas of south Florida from both cold outbreaks. Freezing temperatures occurred as far south as the agricultural areas of southeast Florida on January 22nd and all the way into metro areas of Palm Beach and Broward counties as well as coastal sections of Collier County on February 5th. Lowest temperatures recorded during both events were 22 degrees in Palmdale (Glades County), with readings in the mid and upper 20s over large portions of the interior southern Florida peninsula. Heavy frost on January 22nd led to severe crop damage in southwest Florida and around Lake Okeechobee (Figure 2). Damage estimates to crops was in the $60 million range. The coldest temperatures of the year for the primary weather stations are:

Naples: 33 (Jan 22)
West Palm Beach: 33 (Feb 5)
Fort Lauderdale: 37 (Feb 5)
Miami: 38 (Feb 5)

May-September

The spring's severe to extreme drought conditions persisted into the first half of May. Fortunately, the rainy season began early, on May 11, and was noted for very wet conditions over all but the western sections of Collier County. These conditions lasted through the end of May and most of June. The very wet start to the rainy season put an end to the drought by the last week of May. This reversal from very dry to very wet conditions over the course of a couple of weeks is best illustrated by West Palm Beach

going from their second driest “dry” season on record to their second wettest May on record. In fact, West Palm Beach’s entire May rainfall of 15.69 inches fell between May 18th and May 31st! Other locations received rainfall amounts of 8 to 12 inches in May, except Naples which remained below normal at 3.92 inches. The primary cause for the reversal from dry to wet was a persistent mid to upper level low pressure trough which set up over the Gulf of Mexico and provided moisture and atmospheric instability to the region.

This mostly wet pattern prevailed through June and into much of July. As a result, above normal rainfall continued through the first half of the rainy season, primarily over interior and eastern sections of south Florida. On the afternoon of June 5th, a supercell thunderstorm remained nearly stationary over downtown Miami and Miami Beach. The storm dropped a total of 9.3 inches of rain in Miami Beach in less than 3 hours along with golf ball sized hail. The result was severe flooding in portions of Miami Beach (Figure 3). Areas along the immediate Gulf coast, particularly the city of Naples, were the exception to the rule as they remained drier than normal due to westerly winds keeping most of the thunderstorms inland.

During August and September, the pattern shifted to high pressure over the western Atlantic and the southeast United States which brought mostly easterly winds to south Florida. The shift in wind direction steered most of the daily showers and thunderstorms towards the west, resulting in much needed above normal rainfall values for western sections of mainland south Florida.

Temperatures were above normal through the May- September period. A historic heat wave occurred on June 21st and 22nd. Temperatures soared into the upper 90s to 100 degrees over interior and eastern sections of south Florida. An all-time recorded high of 100 degrees was tied at Fort Lauderdale on June 22nd. Miami tied their monthly record with a high of 98 degrees on the same day. The very hot temperatures of June 22 were followed by severe thunderstorms which pounded south Florida during much of the day on June 23rd. The thunderstorms of June 23rd resulted in 4 injuries and thousands of dollars in damage from lightning and strong winds.

The hottest temperatures of the year for the primary weather stations are:

Fort Lauderdale: 100 (June 22)
Miami: 98 (June 22)
West Palm Beach: 96 (June 21 and June 22)
Naples: 95 (July 11 and August 17)

October-December

Strong high pressure over central Florida caused unseasonably hot and dry weather over all of south Florida during most of October. Miami established its hottest October on

record with an average monthly temperature of 82.4 degrees. The temperature in Miami reached or exceeded 90 degrees on 13 consecutive days from October 5 to October 17, setting a record for most number of consecutive 90-plus degree days in October. LaBelle and Moore Haven tied their record of consecutive 90-plus degree days with 15 and 12 days, respectively. The heat reached its peak on October 6 and 7 when temperatures soared into the mid to upper 90s. Clewiston and Ochopee hit 98 degrees, which for Clewiston is a record for the month of October. An unseasonably strong cold front swept through south Florida on October 17th, putting an abrupt but temporary end to the heat. Lows dropped into the 40s and 50s; and highs on October 18th were as much as 20 degrees lower than the previous day's highs. Record low temperature readings were set at all four primary south Florida sites.

This front also brought an end to the south Florida rainy season. Fort Lauderdale set a record for their driest October on record with a total of only 0.73 inches of rain. Overall, the 2009 rainy season was near to above normal, with the exception of portions of the southwest Gulf coast and southeast metro areas which were relatively dry.

The warm temperatures continued in November and December with few interruptions. Temperatures soared into the upper 80s to near 90 on December 3rd ahead of a cold front and again on December 9th and 10th. West Palm Beach (90 degrees on Dec 9) and Miami (89 degrees on Dec 10) tied their all-time recorded December highs.

Rainfall during the last 2 months of the year was near to below normal across south Florida until mid-December when a series of weak frontal systems brought copious amounts of rain to much of the area. On the night of December 17th and early morning of December 18th, a retreating warm front helped to produce extreme rainfall amounts over parts of Broward and Miami-Dade counties. Rainfall amounts of 10-15 inches were either measured or estimated over southeast Broward and northeast Miami-Dade counties, causing severe flooding to scores of homes and businesses (Figure 4).

2009 Severe Weather Statistics

A total of 8 people died as a result of weather related hazards in mainland south Florida in 2009. Rip currents once again led the list with 5 deaths directly attributed to the "fair weather killer". Lightning strikes claimed 2 lives; and one death was attributed to cold exposure in Pompano Beach on February 5th. A total of 14 weather related injuries were noted: 8 from rip currents, 5 from lightning and one from thunderstorm winds. Only four tornadoes were confirmed over mainland south Florida, the lowest yearly total since 2006. Monetary damage amounts as a result of weather hazards is estimated at $62 million, most of it coming from crop damage during the freezes of January and February.

2010 Outlook

With El Niño expected to remain in place through the spring, the Climate Prediction Center's outlook through April calls for an enhanced likelihood of below normal temperatures as well as above normal precipitation. Near normal temperatures and precipitation is possible during May, followed by the possibility of above normal temperatures and above normal precipitation for parts of the summer and early fall (please note that the outlooks at longer ranges are prone to large errors).

For the latest weather forecasts and alerts, please visit the National Weather Service Miami/South Florida web site at weather.gov/southflorida.

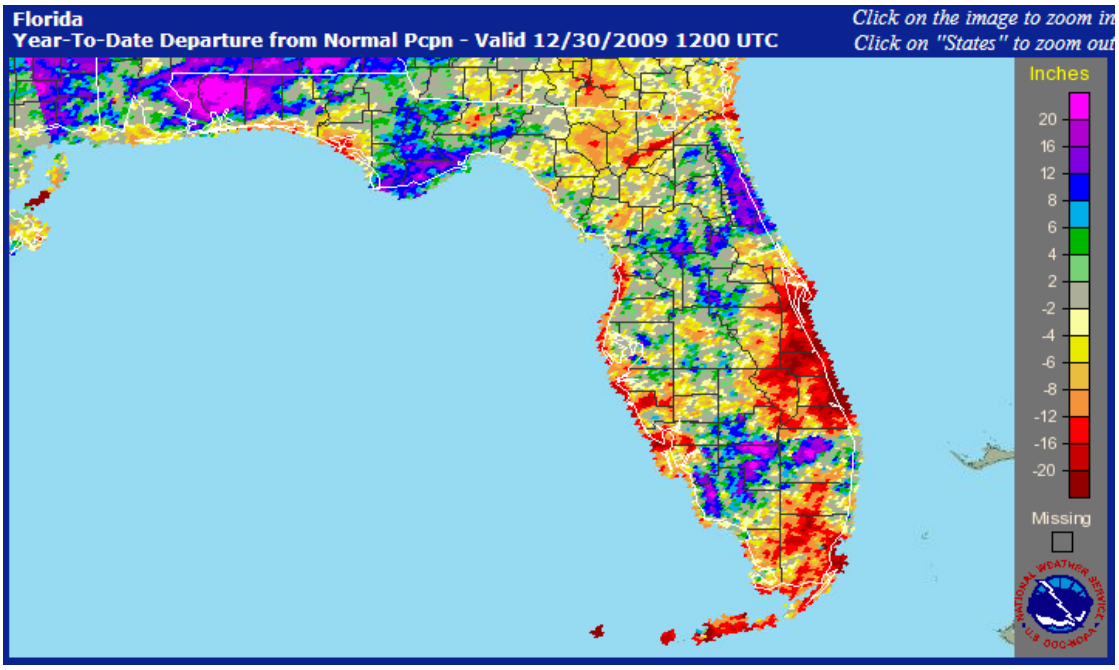

Figure 1: 2009 Departure from normal rainfall in inches as of 7 AM December 30th. Green/blue/purple areas represent above normal rainfall and yellow/orange/red areas represent below normal rainfall

Figure 2: Heavy frost covering ground in southern Glades County on January 22nd (picture by Angie Snow – Glades County Emergency Management)

Figure 3: Severe flooding in Miami Beach on June 5th (picture by Eric Blake)

Figure 4: Severe flooding in Hallandale Beach from torrential rains of December 17/18 (picture by AP/Amy Beth Bennett, courtesy of South Florida Sun-Sentinel)