

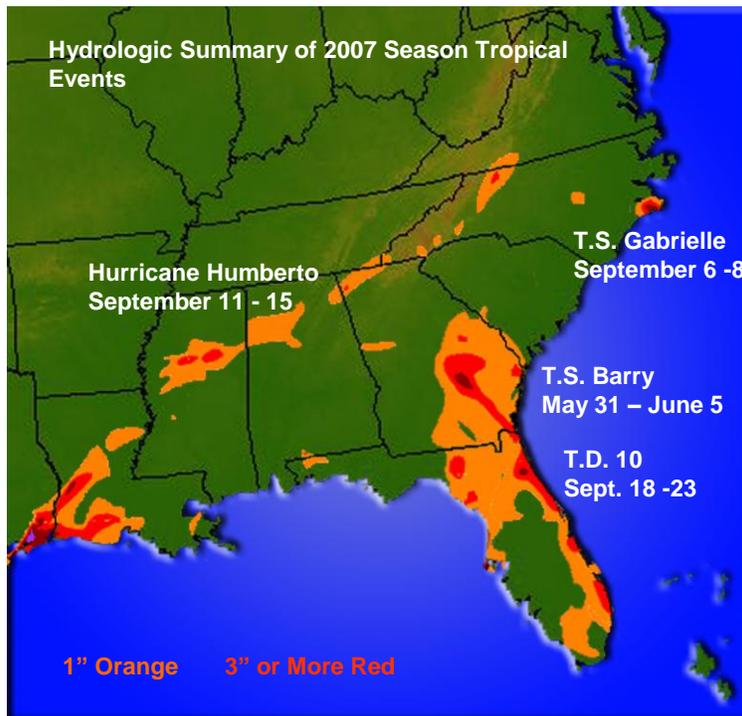


**Critical Issue: Tropical Season Review  
Impact on Southeast U.S. Water Resources**

Issued: December 12, 2007

**Key Conclusions:**

1. There were a well-below-normal number of inland-moving tropical systems.
2. Tropical Season 2007 did not bring notable improvement to water resources over most of the Southeast U.S.
3. Inflow of tropical moisture plumes played as much or greater role than did established tropical storms or hurricanes.
4. Most inland-moving tropical systems only impacted limited portions or far lower reaches of key river basins.



There are several distinct times of the year across the Southeast U.S. when “typical” rainfall patterns provide an opportunity for the recharge of key water resources.

The primary climatologically-based recharge period (with the exception of the Florida Peninsula) is the winter and early spring months. Secondary periods include the tropical season and a small “secondary severe weather” window in fall. This discussion will review the 2007 tropical season.

Tropical season, from June 1<sup>st</sup> through November 30<sup>th</sup>, is a potential time for soil and reservoir recharge. Tropical systems such as tropical storms or hurricanes arrive during an overall dry and inactive season, late summer and early fall.

Recharge from tropical systems can be “hit or miss.” While some area may receive welcome rainfall, other nearby area can remain completely dry. Rainfall will also vary season to season with some seasons extremely wet (several years ago) while other seasons find little if any tropical activity moving across the Southeast U.S.

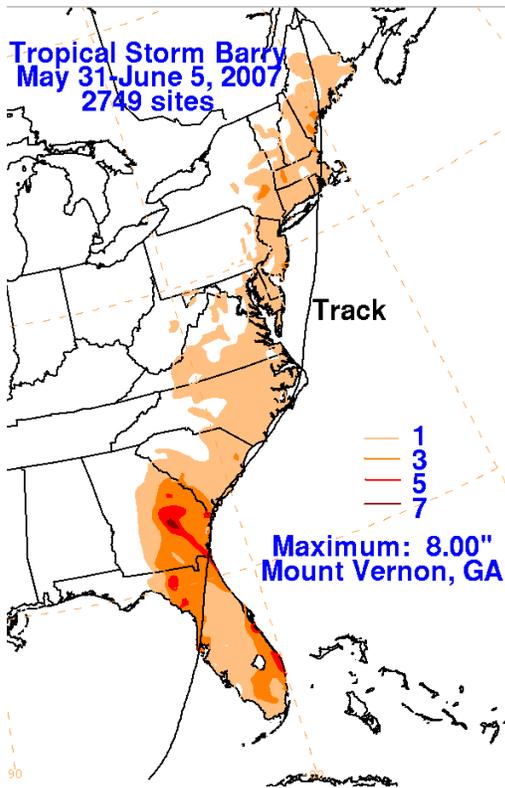
It is also important to note that “tropical-like” systems can play just as important role as strong hurricanes. Plumes of tropical moisture, often times not even associated with a formally-established tropical system, can produce as much or more rain than a strong hurricane.

In fact, a recently-issued study by NASA indicated that smaller tropical storms do more to alleviate droughts than do hurricanes over a season as they result in greater cumulative rainfall.

Let’s take a look at topical season 2007 to see where areas of recharge occurred.

Four primary tropical systems impacted the southeast U.S. in 2007.

<b>Event</b>	<b>Date</b>	<b>Primary Hydrologic Impact</b>	<b>Average Rainfall</b>	<b>Maximum Rainfall</b>
T.S. Barry	May 31-June 5, 2007	NE Florida, SE Georgia	2 – 4 inches	8.00 Mount Vernon, GA
T.S. Gabrielle	Sept. 8 – 10	Far Coastal NC	3 – 5 inches	9.03 Harlowe / Newport N.C.
Hurricane Humberto	Sept. 11 – 15	Scattered Area of Northern AL. and GA.	1 – 3 inches	14.13 Texas
T.D. 10	Sept 18 – 23	Near Jacksonville, FL	3 – 5 inches	7.29 Hastings Ag Center, FL.



**Tropical Storm Barry**

T.S. Barry arrived early in the season. Prior to its arrival, southeast Georgia and northern Florida were experiencing extensive severe wildfires. These fires had resulted in widespread evacuations and even closed down Interstate 10 for a time.

Rainfall from Barry fell almost directly over the fire area and provided welcome relief. Barry produced a fairly widespread 3 to 5 inches of rain north of a line from Tampa to Jacksonville, and extended northwards towards the Savannah River. This includes much of the Okefenokee Swamp, which had seen extensive fire action.

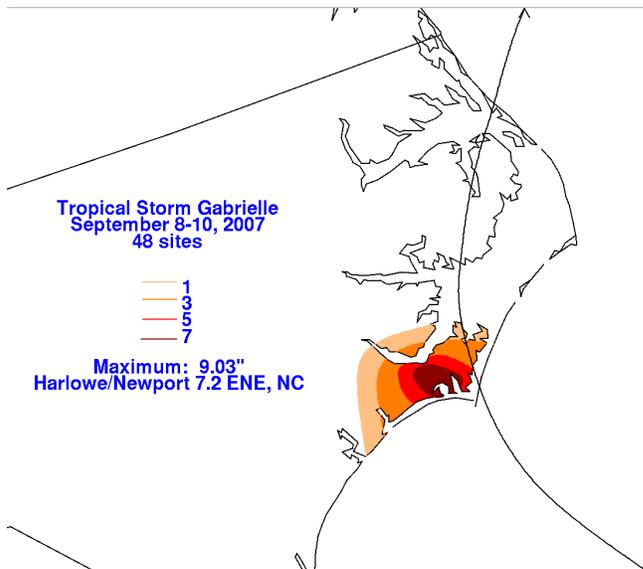
While Barry did not completely extinguish the wildfires, it did go a long way in bringing them under control.

This rain did provide some recharge to the Suwannee and lower Altamaha River basins.

However, the rains did not extend far enough north to provide significant reservoir recharge to key Savannah River Reservoirs

**T.S. Barry Hydrologic Impacts:**

- Significant upper soil recharge along lower Altamaha and Suwannee Basins
- Minimal Savannah River Reservoir recharge



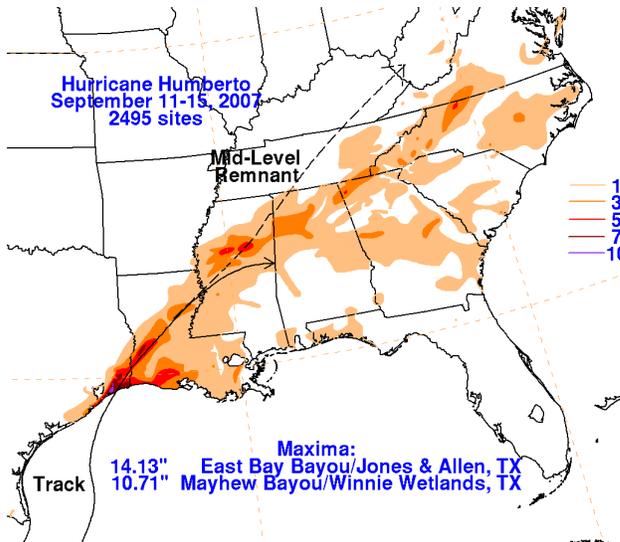
T.S. Gabrielle brushed the North Carolina shore early in September. Rainfall generally remained offshore. Rainfall was confined to far eastern coastal reaches of North Carolina. Newport N.C. received 9.03 inches but rain the heaviest rain was confined to the coast.

Rainfall from Gabrielle did not extend across any significant river basins.

While localized coast and near-coast flooding occurred, there was little or no inland hydrological

recharge.

T.S. Gabrielle Hydrologic Impacts:  
None of significance to inland river basins



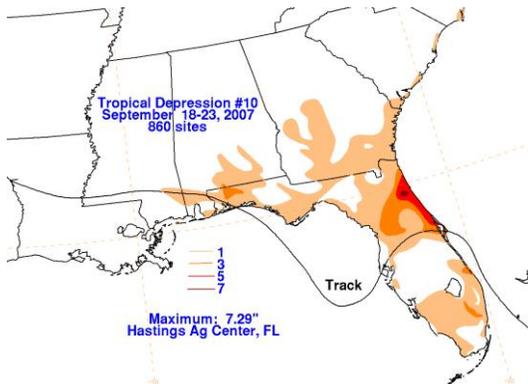
Hurricane Humberto brought heavy rain and flooding to southeast Texas and parts of Louisiana but it quickly tapered off as it moved northeast.

While it did bring about an inch or so rainfall to the parched northern sections of Alabama and Georgia, for the most part the rain was decreasing rapidly as it pushed northeast.

This rainfall, while welcome, did little more than wet upper soils. Little if any runoff resulted.

Hurricane Humberto Hydrologic Impacts:

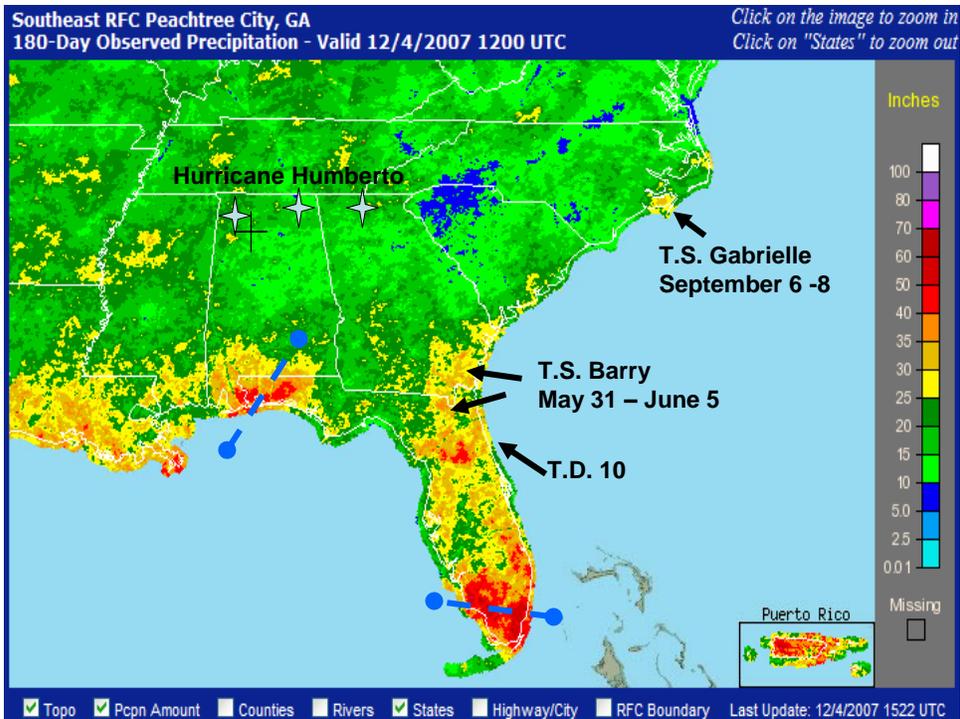
Scattered areas of 1-3 inches of rain covered small northern reaches of the Tombigbee and Alabama River Basins. Limited recharge of upper soils occurred with limited mainstream river runoff. Smaller tributaries experienced brief rises.



T.D. 10 produced heavy rainfall, but it was confined to the Jacksonville area.

T.D. 10 Hydrologic Impacts:

Urban and flash flooding along smaller tributaries in the metro Jacksonville area.



Above is a graphic showing rainfall for a six month period corresponding (generally) to the tropical season. This is a multi-sensor rainfall estimate using both radar estimates as well as rain gauge data. It is quality-controlled by NWS River Forecast Center hydrometeorologists.

Areas of yellow and red indicate the most rainfall and green and blue areas the least.

The dashed blue lines correspond to plumes of tropical moisture.

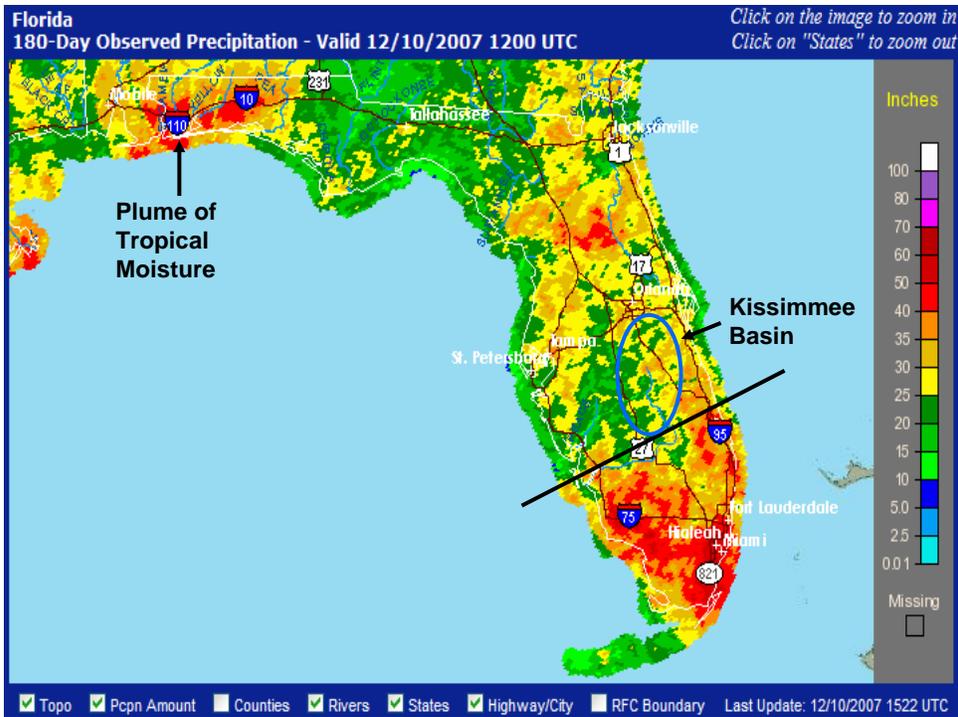
The yellow/red areas correspond well with active tropical systems.

#### Critical role of Tropical Moisture Plumes

It is interesting to note that some of the most significant rainfall over the tropical season was due to sustained inflow-flowing tropical plumes of moisture and not an established tropical system.

There were three main areas of sustained inflow from these tropical moisture plumes.

1. Northwest Florida Panhandle
2. South Florida: The southern 1/3 of Florida experience several inflows of tropical moisture. This did provide needed rainfall for the area. In fact, this is perhaps the only area in the Southeast U.S. that will end up with slightly above normal rainfall for the year.
3. Eastern 1/3 of North and South Carolina



Unfortunately, while rain did fall over Lake Okeechobee the Kissimmee River (which provides inflow into the lake) received much less rainfall. Thus the lake saw minimal overall recharge.