

## Prolonged and Significant Coastal Flooding October 2015

Our area experienced an incredible stretch of abnormally high tides for almost 2 weeks in late September into early October.

These unusually high tides were first caused by an increased gravitational pull from the year's closest approach of the moon and a full moon in late September, resulting in what are called the Proxigean Spring Tides. Combine that with several days of persistent onshore winds and large seas due to areas of low pressure in the Atlantic, plus a slower than normal Gulf Stream, that caused even more water to pull up against the coast, and the situation becomes even further aggravated.

We can compare the Gulf Stream to the Amazon River, which is the world's largest river in terms of water discharge. But the Gulf Stream has about 600 times the flow of the South American river. So when you back up that much water it doesn't have much room to go anywhere except toward the coast with the persistent onshore winds.

Finally, with such high tides that are further exacerbated by the freshwater flooding from the historic rainfall led to significant flooding of properties and roads, especially in downtown Charleston. Also, the main access road from Tybee Island to Wilmington Island in Georgia was cut off due to the flooding.

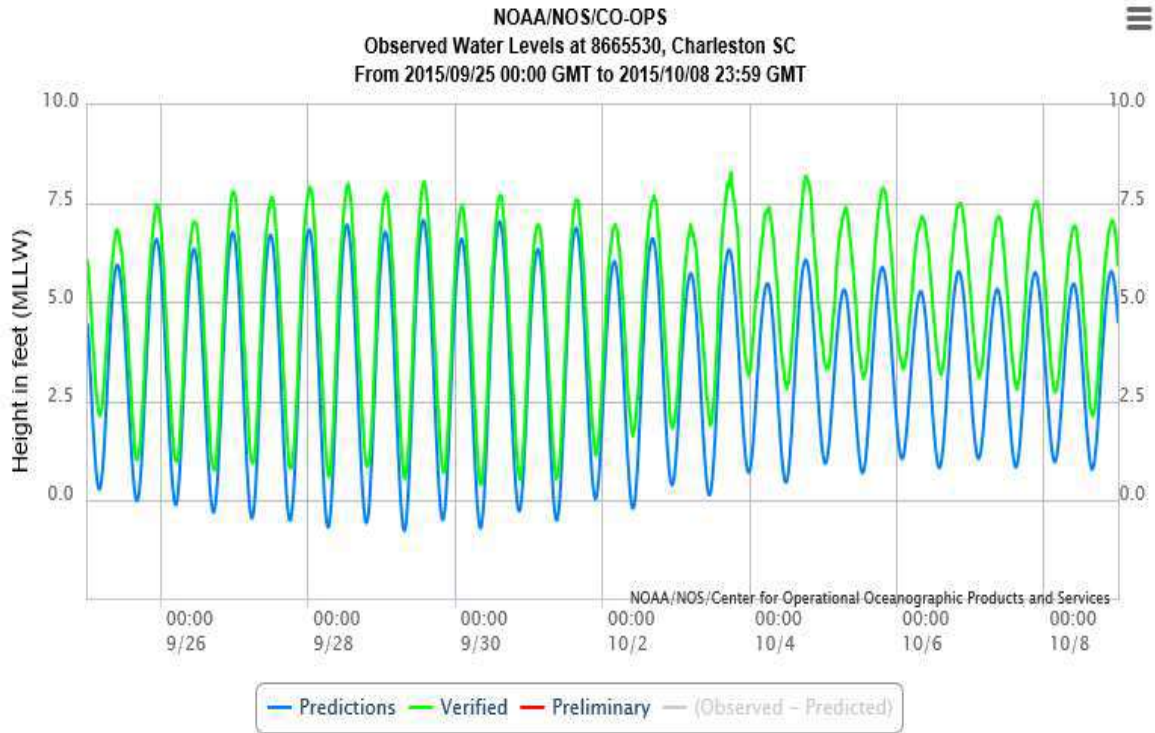
There were 13 straight days (September 25 through October 7) of tides reaching at least 7.0 ft Mean Lower Low Water (MLLW) in Charleston Harbor, or the level at which at least shallow coastal flooding begins. It also resulted in tides reaching at least 7.0 ft MLLW in Charleston for 10 straight tide cycles from September 25-30 and another 9 straight high tides reaching at least 7.0 ft MLLW from October 3-7.

At Fort Pulaski there were 9 straight days (September 26 through October 4) of tides reaching at least 9.2 ft MLLW, or the level where typically at least shallow coastal flooding begins. They also had 8 straight high tide cycles reaching at least 9.2 ft MLLW from September 26-30.

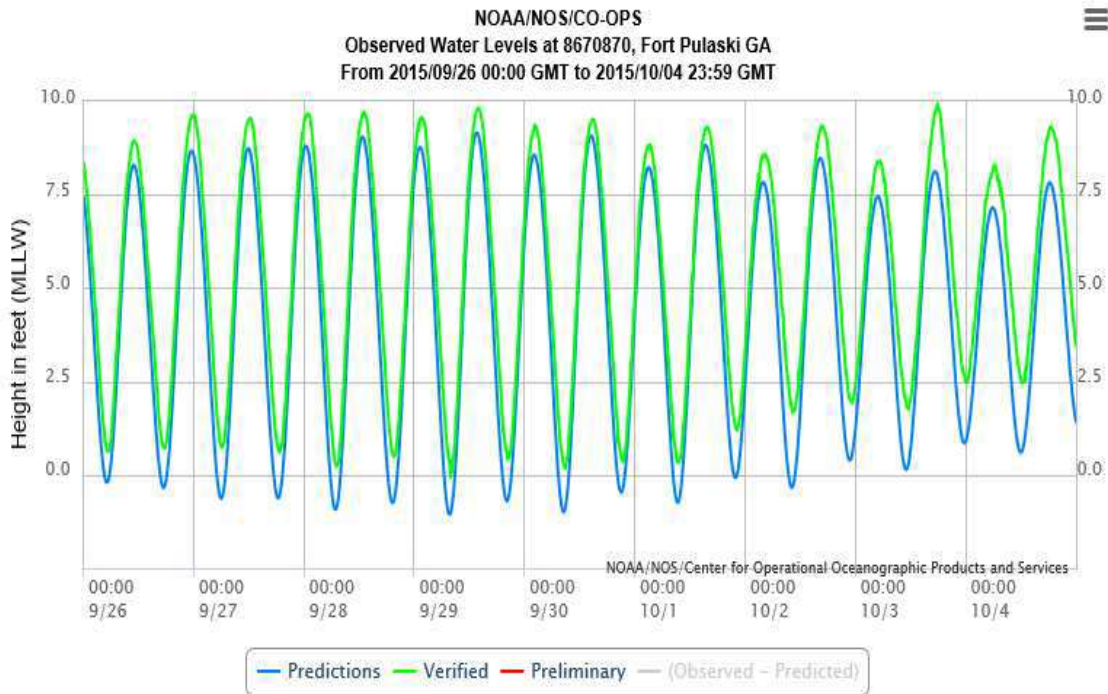
In fact, tide levels during this prolonged stretch peaked at 8.16 ft MLLW in Charleston Harbor on October 4 and at Fort Pulaski, where tides peaked at 9.88 ft MLLW.

As impressive as these levels were, they were actually surpassed by another abnormally high Perigean spring tide later in the month, which combined with a slowing down of the Gulf Stream and persistent onshore winds and elevated surf. Tide levels from October 25-31 produced coastal flooding yet again, as tides peaked on the 27th at 8.65 ft MLLW in Charleston Harbor at 836 am, and at 10.43 ft MLLW at Fort Pulaski at 842 am. For Charleston this is the 4th highest tide level on record, while it is the 3rd highest at Fort Pulaski.

The first chart shows the observed water levels (green) compared to astronomical (or predicted) tide levels (blue) at the Charleston Harbor tide gauge from September 25 through October 8. Note the significant tidal departures through the entire period.



The second chart shows the observed water levels (green) compared to astronomical (or predicted) tide levels (blue) at the Fort Pulaski (Savannah area) tide gauge from September 26 through October 4. Again note the significant tidal departures through the entire period.



For additional information please visit:

<http://water.weather.gov/ahps2/forecasts.php?wfo=chs>

<http://tidesandcurrents.noaa.gov/waterlevels.html?id=8665530&timezone=GMT&units=standard&datum=STND>

<http://tidesandcurrents.noaa.gov/waterlevels.html?id=8670870&timezone=GMT&units=standard&datum=STND>