# TIDAL VARIATIONS, LOWER FLORIDA KEYS

I first fished the flats of the lower Florida Keys back in 1957. By 1962, I was fishing those waters frequently. During the 70's, I acquired property on Big Pine Key on the open water of the Bogie Channel, approximately mid way between two major bodies of water; the Straits of Florida (Atlantic Ocean) and the Gulf of Mexico.

While the tidal norms of both the Atlantic and the Gulf generally followed the U.S. Government tidal chart predictions, I found gross inconsistencies when trying to apply them to the waters on the flats and in the channels between these two seas.

Over the next many years, I studied these tides as I ran my skiff back and forth between waters of the Atlantic and the Gulf. I acquired data in the following ways:

1. The Government tidal markers placed at key positions, some of which had been placed as far back as the 1940's, and apparently abandoned.

2. PVC stakes which I placed to mark shallow channels between the flats that gained watermarks and marine growths marking high and low average water depths.

3. Tidal current directions easily seen as water moving against the innumerable crawfish and crab trap buoys along my routes.

4. Notations on weather parameters including changes in barometric pressures, wind direction, wind direction, and atmospheric temperature.

5. Observations on the timing of true TIDAL STAND as opposed to those of TIDAL SLACK at areas where I was anchored or "staked out" while fishing. *

6. Comparison of the actual timing of high and low water stand with those in Government tidal publications.

7. Noting the weather data and its apparent effect on the differences for 5. And 6.

This was repeated on a frequent … sometimes-daily basis in later years following my retirement from surgical practice when I moved permanently to my present home on Big Pine Key.

Here is what I learned:

# There can be as much as 2 hrs. or more difference between high water stand and high water slack. The same is true of low water stand and slack.

This resulted in a tidal current "coming in" for a long time after the tide had reached its greatest height as well as a tidal current "going out" long after the tidal water level had reached its lowest point.

During some tidal extremes, I even noted a tide level with a maximum high on the tidal marker followed by that water level actually starting to drop ***despite the fact that the tide was in an incoming tidal current direction.*** The same thing was sometimes noted with respect to minimum tidal level at "low tide".

We had been calling this a, "paradoxical tide".

# As I ran my skiff between the Atlantic and the Gulf repeatedly and observed the current direction indicated by the water flow over the trap markers, I found that on any given tide there was a point where the current would be dead still…. Then start flowing in the opposite direction as I ran my skiff at a high rate of speed in the same direction, toward the opposite body of water.

# That "point" would change depending upon the tidal flow. On some days, there was a narrow range from the average "center point" while on others the range was much greater.

# I noted an average difference of 2 ½ to 4 hrs. between the tidal stands of the Atlantic and the Gulf. This would change depending upon the total tidal range.

# I found (not unexpectedly) that, in general, the tide would rise and fall with respect to the Gulf on one side of the area, and with respect to the Atlantic on the other side.

# On any given tide, there was a nodal point representing the approximate center of this range.

# With careful study, I noted that this "center" was a moving target …. A range of nodal points, which varied with time and the tidal range.

At any given point, the predicted height of the tide as well as the times for tidal stand and tidal slack would vary according to changes in the weather, as follows:

1. If the weather was calm, with no temperature or barometric extremes, at either side of the range the tides would follow the Government predictions fairly well.

2. Strong wind in the direction opposite the tidal flow would dramatically diminish the final tidal height and make it later in time. The opposite was also true.

3. The wind effect was a bit less on high temperature days, and greater on low temperature days.

4. Extreme winds sometimes kept the water off the flats for many hours or even days.

5. On high barometric pressure days, the actual high and low tide stand levels were always lower than predicted.

6. On low barometric pressure days, the actual high and low tide stand levels were always higher than predicted.

7. The above remained true despite the well known predicted tidal variants due to the proximity of two primary bodies of water yielding a semi-diurnal variation resulting in a "high-high" and a "low high" along with a "high low" and a "low-low" during each 24 hr. period. **

8. We, also, noted that the tidal flow had a minor reverse effect on the wind as these winds abated to a degree briefly during tidal slack periods.

9. I noted that the times of tidal stand and tidal slack would vary as much as 30 minutes to 45 minutes on either side of a shallow flat which was not more than 200meters in width!

Then I came to some conclusions as to why there were so many variables not the least of which was the apparent paradox in the dramatic differences between tidal stand (highest and lowest points of depth) and tidal slack (time of tidal flow cessation).

It all became clear when I considered that the tidal current would continue long after the height of the tide had ceased to change or had even reversed BECAUSE OF THE VAST EXPANCES OF SHALLW WATER FLATS WHICH TOOK A GREAT DEAL OF TIME TO FILL AND EMPTY due to the geologic impediment to the tidal current motion as these flats were encountered. Simply put, shallow waters take longer to fill and empty. ***

The obvious reason that the Government tidal charts were accurate on some days but not others was that in making them there was no way of including the important variables of wind, temperature, and barometric pressure.

- ***CHAPMAN PILOTING, SEAMANSHIP & BOAT HANDLING,*** 63rd Edition, 1999, pp. 341-349.

** ***2011 Tide Tables, high and low water predictions, EAST COAST OF NORTH AND SOUTH AMERICA including GREENLAND, Lighthouse Press, Information***

***produced by and obtained from the 'department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service.***

*** ***BEYOND THE MOON, A Conversational, Common Sense Guide to Understanding the Tides,*** **by James Greig McCully, 2006, pp. 113-144.**

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