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Why is a sand bar forming in Packery Channel?

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The mouth of Packery Channel often has breaking waves in the entrance near the seaward end of the jetties. A recent article in the Island Moon newspaper stated that Diedre Williams of the Conrad Blucher Institute for Surveying and Science at TAMUCC described the bar formation as “unusual.” She postulated that the rapid bar formation at the present time and in 2011 may be due to heavy influxes of Sargassum weed in those years and sand blowing into the channel from the beach. This is nonsense. We will see that current flowing into the pass greatly exceeds outflow. The primary source of sand to the entrance is the longshore sediment transport along the bars in the surf just as it is along all other sandy shorelines. Packery channel was built with Jetties that are too short.

Sand movement along the sand bars

There has been a breaking bar in the entrance of Packery Channel when waves are high most of the time since it was built. This can be easily confirmed by the aerial photos and surface photos shown at the following web page.

<http://texascoastgeology.com/passes/packery..html>

The following photograph under heavy surf conditions clearly shows that the third (outer) sand bar curves out past the end of the jetties and can flow sand directly into the mouth of the channel. Think of these sand bars as conveyor belts of sand. The total sand movement in the surf along this part of the coast can be as high as 700,000 cubic yards per year or about 115,000 dump trucks full. Photo taken October 7, 2011.



The underwater bars are clearly shown on the photo taken under very calm conditions on

September 18, 2012. As the beach built out, the bars moved outward as well and sand is carried along the bar into the entrance by waves generated by SE winds. The distance inward from the ends of the jetties to the beach is about 1100 ft.. The sand bars are in the 600 ft nearest the jetties and far from a source of wind blown sand coming into the channel from the beach.

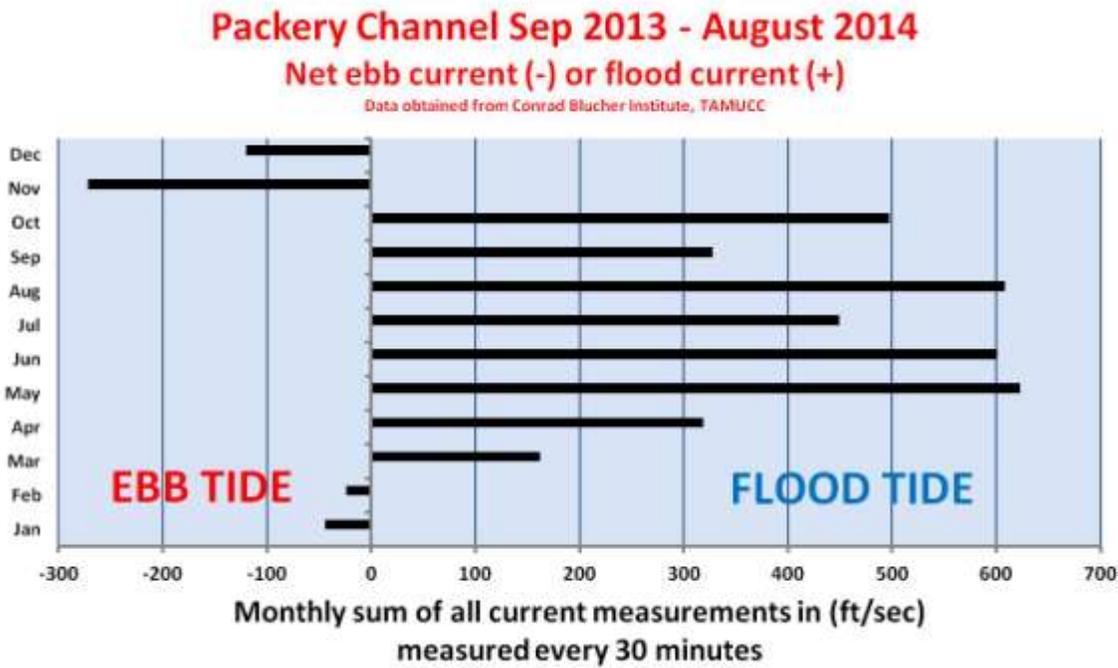


Tidal Currents in Packery Channel

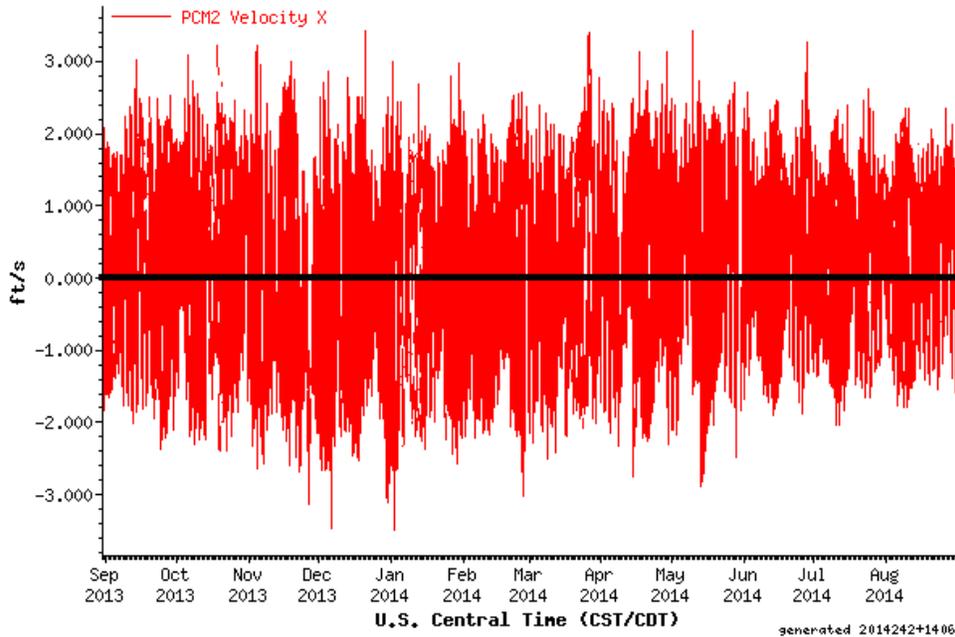
Ms. Williams mistakenly postulated the sand bar in the channel will be washed out by the ebb tides during northers in the winter. While that may seem to be a logical conclusion, even a cursory examination of the tidal current data for Packery Channel shows that to be very unlikely. While it may remove some sand, we will see that the inlet is **HIGHLY** flood dominated through most of the year. This means more water flows into Packery from the Gulf than flows out. This is primarily because of the way that wind affects water levels in Corpus Christi Bay. During the onshore SE winds most of the year, the wind blows water from the south end of Corpus Christi Bay to the north side. During northers the tilt of the water in the bay is the opposite. This causes Packery channel to be flood dominated during the SE winds and ebb dominated during northers. Let's look at the current data for Packery Channel measured by the Conrad Blucher Institute where Ms. Williams is employed. We shall see, the duration of flood domination greatly exceeds that of ebb domination. This causes sand to flow into Packery from the bars most of the time. The volume of incoming sand is increased during brisk SE winds, when the waves are high because wave action suspends sand allowing it to be easily carried into the pass on the flood

current. During northers there is little wave action to help suspend sand for it to be carried out into the Gulf.

Data from the Conrad Blucher Institute, which should have been examined by Ms. Williams plainly shows the flood tide domination of Packery Channel. Measurements were taken every 30 minutes, so this graph represents over 17,000 measurements. Current measurements with a negative (-) number indicate currents flowing out toward the Gulf (ebb tide). Positive measurements show current flowing from the Gulf through Packery into the bay (flood tide). The channel is highly flood dominated. It is only ebb dominated during November, December, January, and February, the months with the most northers, and two of those months, January and February are barely ebb dominated. It is unlikely that northers will clear the channel of sand.



The following graph is all of the current data for the same year showing measured velocity and direction. Note that even during the norther months, nearly as much current flow into the channel as outward and remember that when that is happening waves can suspend sand to help it flow into the channel.



How do we keep the channel from shoaling?

Since the source of most of the sand coming into the channel is surely from the longshore bars dumping sand right into the entrance, the only effective solution is to make the jetties longer, much longer, as I recommended before Packery was built. Sand blowing into the channel is surely minor by comparison and since the pass is highly flood dominated, that sand will move inward and not out to form a bar at the mouth. Remember that sand is blowing into the channel on the SE winds when the pass is very flood dominated. Proper design of jetties means that they must be long enough to reach water sufficiently deep that waves do not break in that depth except during major storms such as tropical storms and hurricanes. When one of the shore parallel sand bars reaches beyond the entrance jetties, this unequivocally proves that the jetties are not nearly long enough. In the first photograph above, you can clearly see waves breaking far beyond the entrance to the jetties. Those waves are suspending a lot of sand which is being swept into the entrance on the flood tide.

I warned about this problem before the pass was built and that maintenance would cost far more than was estimated. This has all come to be true. If you look back through the history of the pass in the aerial photos that I have provided, you can see that this has been explained and demonstrated with photos many times.

<http://texascoastgeology.com/passes/packery.html>

The only solution to have a safe for navigation pass is to extend the jetties 500 to 1000 ft. farther into the Gulf and/or dredge very frequently. The last time the pass was dredged, I believe that part of the bar at the mouth was left in place, yet that was the most important part to be dredged.