Recent Changes in the Breach

Charles Flagg, Claudia Hinrichs, Roger Flood and Robert Wilson
School of Marine and Atmospheric Sciences, Stony Brook University

This has been an interesting summer for the evolution of the breach at Old Inlet, which has been characterized by a growing accumulation and movement of sand. Late in 2016 and early this year, the eastern shore began to intrude into the breach for the first time since early in the breach's development. This intrusion reached a maximum in March but the eastern shoreline was gradually eroded back to its more usual location by the end of June. However, the sand that had built up along the shore moved farther into the breach rather than being washed out of the area. At about the same time, a prominent shoal was formed in the middle of the breach as typified by conditions in September, Figure 1a. When the sand moved into the breach, it cut off the main channel that had been there for several months south of the remains of Pelican Island and forced the flow to pass north of the island. This general configuration lasted through the summer.

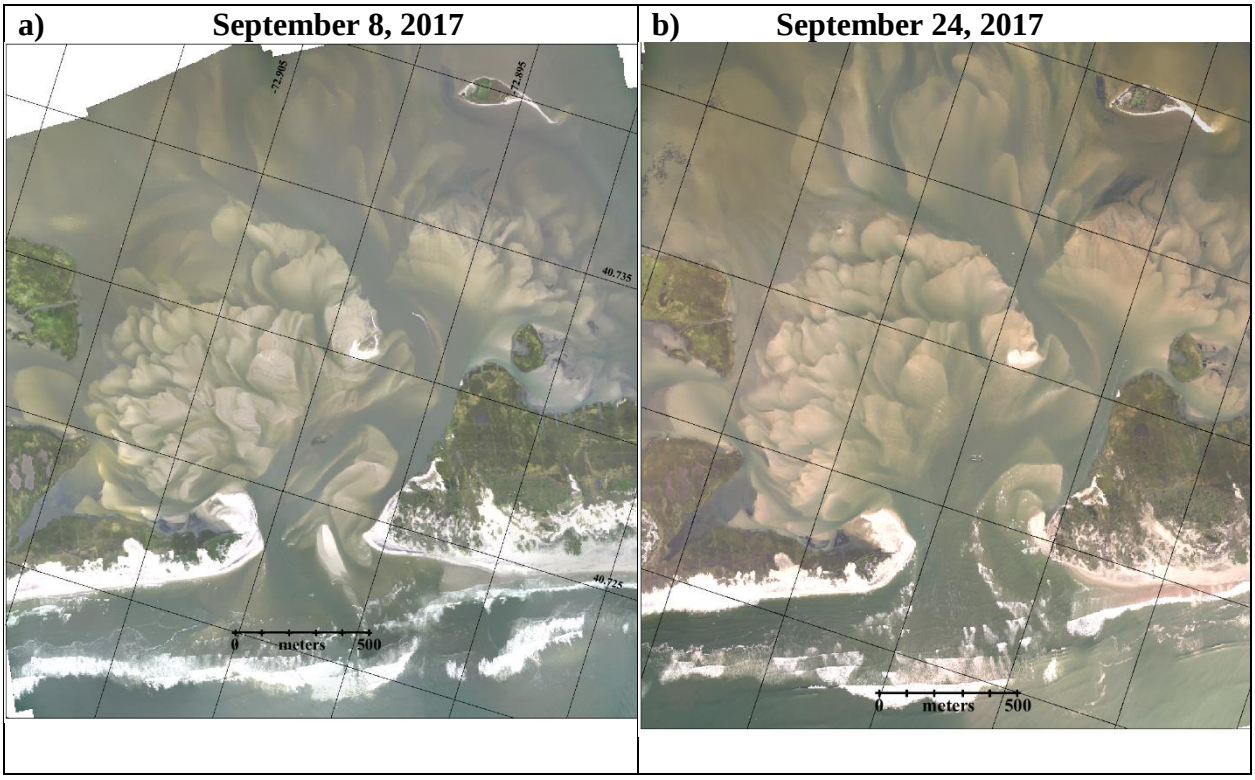

Figure 1, Photo mosaics of the breach area for periods before and after the arrival of the remnants of hurricane Jose.

With all the extra sand in the breach, it was reasonable to wonder whether we were entering a closing phase. If the breach was indeed shrinking, we might assume that one impact would be a reduced exchange between the ocean and the bay, resulting in a freshening of the bay at least at Bellport. If such a freshening occurred, it does not appear obvious in the salinity data from the Bellport marina sensor, Figure 2. The data show the usual seasonal freshening in the spring, but there does not appear to be an additional freshening; and if anything, it looks like the salinities

are a little higher during the summer than in some of the previous years. A similar examination of the tidal range at Bellport does not show any noticeable differences from earlier times; that is

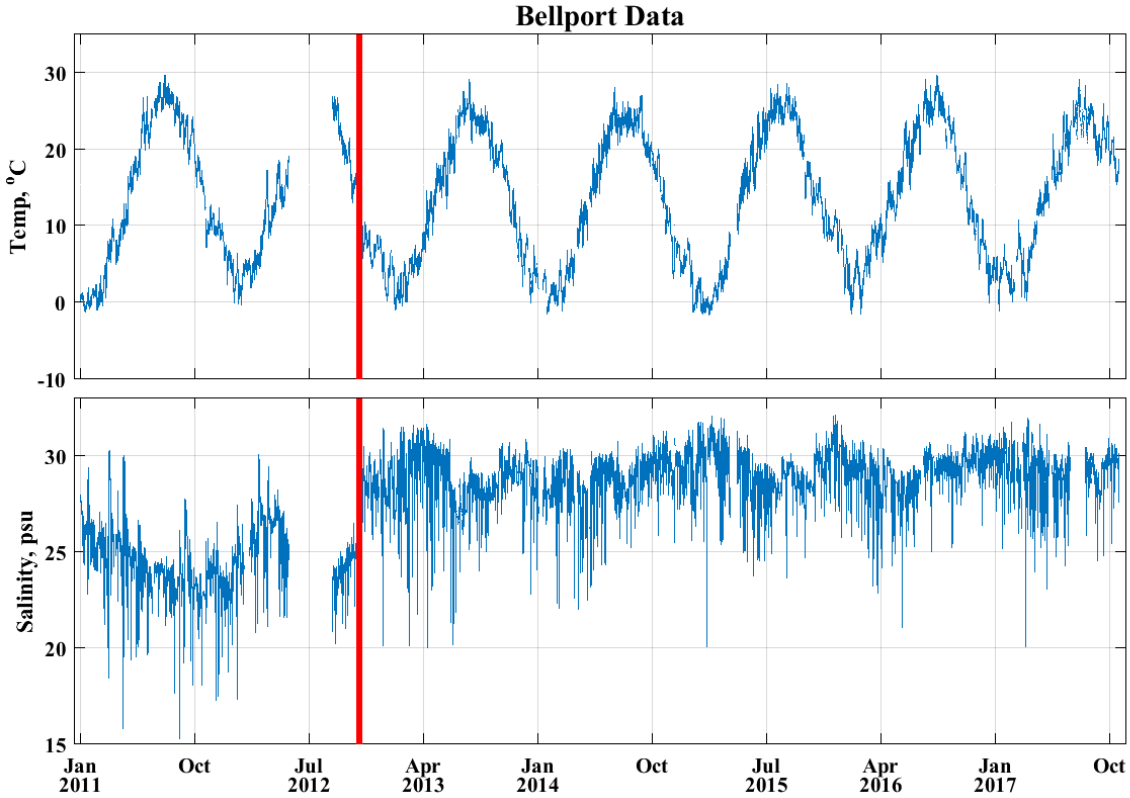

Figure 2. Long-term time series of temperature and salinity from the SeaCat at the Bellport marina.

not a surprise as the tides throughout the bay are mostly a result of processes that occur in the Fire Island Inlet.

At the end of the summer, there came the remnants of Hurricane Jose. We did not get a direct hit from the hurricane, but it parked offshore for several days and generated significant wave heights out of the ESE at the NDBO buoy 44025 of about 4 meters for 24 hours and more than 2 meters for about 48 hours, Figure 3. Significant wave heights are the average of the 1/3rd highest waves, peak to trough, so that means there were larger waves in the mix. The erosion in the breach from these sustained large waves was substantial, Figure 1b, removing the sand island in the middle of the breach and eroding the shoals inside the breach to the north of Pelican Island. The ebb shoal along the offshore portion of the breach showed little alteration in terms of itslocation, although we do not know if the depths over the ebb shoal changed.

We expected that erosion of the shoals within the breach would increase the ocean-bay exchange, and this seems to have happened to some degree. Salinities in Bellport Bay increased briefly to nearly 31 psu at the end of September. While that is not unusual as Figure 3 shows, the high September Bellport salinities were accompanied by higher than normal salinities at the GSB1 buoy south of West Sayville. There, the salinities increased to nearly 30 psu from a more typical value of 28 psu to 29 psu since the breach opened. Again, there has been no noticeable

change in the tidal ranges. In mid to late October, the salinities at Bellport have varied between 28 and nearly 30 psu, which is somewhat more normal and lower than the peak value.

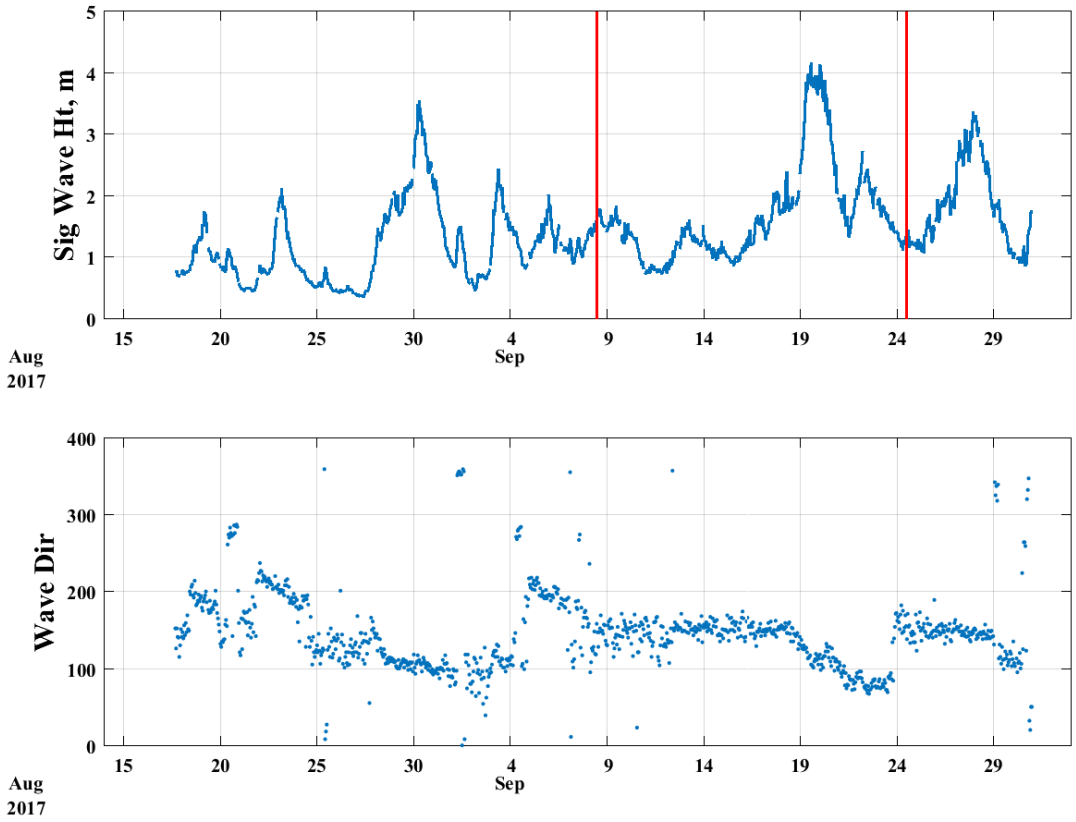

Figure 3. Recent significant wave height and direction data from the NDBO buoy 44025 located some 30 nautical miles south of Long Island. The red lines indicate the times of photo flights over the breach shown in Figures 1b and 4.

This brings us to the latest aerial photos and photo mosaics from the flight on October 20th, Figure 4. Given what was shown in the late September photo, Figure 1b, the changes in the breach were rather surprising. Instead of a wide open breach with shoaling inside, the breach is now dominated by an even larger sand island in the middle with expanded shoaling to the north. There is even a small island along the western shore, something we have not seen since December 2015. The September 24th photo, Figure 1b, shows that the beach along the eastern shore had been eroded all the way to the brush line. That beach has now been rebuilt with an offshore ridge and runnel system, indicating the arrival of even more sand to build up the beach some more. The main channel through the breach remains along the western shore, but it now splits around Pelican Island and then passes over a plume of sand deposited during flood. After that, the main channel turns around what should be called "New Ridge Island" and heads off in a more westerly direction than in the early days of the breach when it was closer to John Boyle Island. New Ridge Island is the sandy shoal that is above normal high tide to the north of Pelican Island. This dry shoal has been in this location since the summer of 2014 and has the same relationship to the breach that Ridge Island has to the Old Inlet, so "New Ridge Island"

seems an appropriate name. The flood-tide delta is developing a more complicated structure and there is not one channel from Great South Bay to the inlet. The sand bars that have developed immediately north of the inlet suggest that the flood-tide has dominated sand transport near the inlet in the recent past.

Figure 4. The most recent photo mosaic of the breach and flood and ebb deltas obtained on October 20, 2017.