Update on the Status of the Old Inlet Breach

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Over the past few months, there have been substantial changes in the breach as evidenced in the series of aerial photos on the project's webpage (http://po.msrc.sunysb.edu/GSB/). As discussed below, in comparing photo mosaics of the breach from January through May, 2017, we see changes that might indicate the breach is closing. However, there is no evidence at present that the flow through the breach has lessened; the water might simply be following other pathways through, over and around the flood delta. In the long run the breach will close on its own, but it does not appear that closure is imminent.

Since the fall of 2015 when a storm cleared out the sand spit between the western shore and Pelican Island, the main channel has passed closely along the western shore and then to the east, south of Pelican Island. In the late fall of 2016 and through this spring, the eastern shore has pushed westward along with a considerable deposition of sand in the breach. By March of this year, it appeared that the connection of the channel along the western shore with the old main channel to the east was being progressively blocked by a shoal in the middle of the breach. The photo mosaic and oblique photo below, Figures 1 and 2a, from May 10, 2017 show the growth of the eastern shore and the large shoal that almost completely fills the breach. At that point, the hannel along the western shore appears to head directly into shallows of the backbay flood delta.

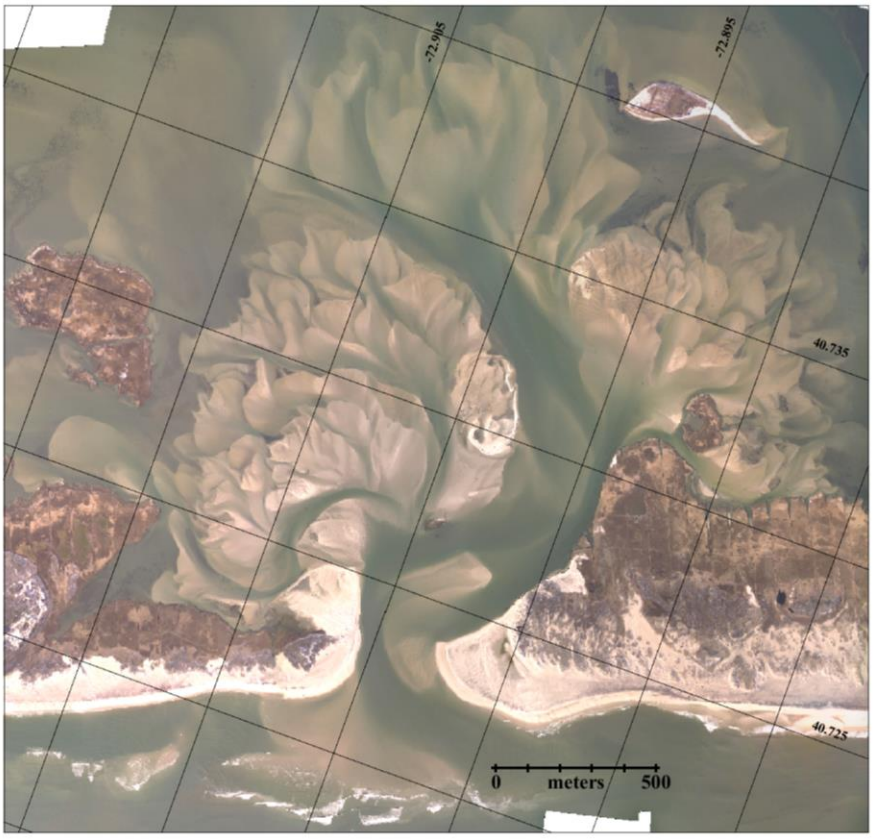

Figure 1. Photo mosaic of the Old Inlet breach from January 15, 2017

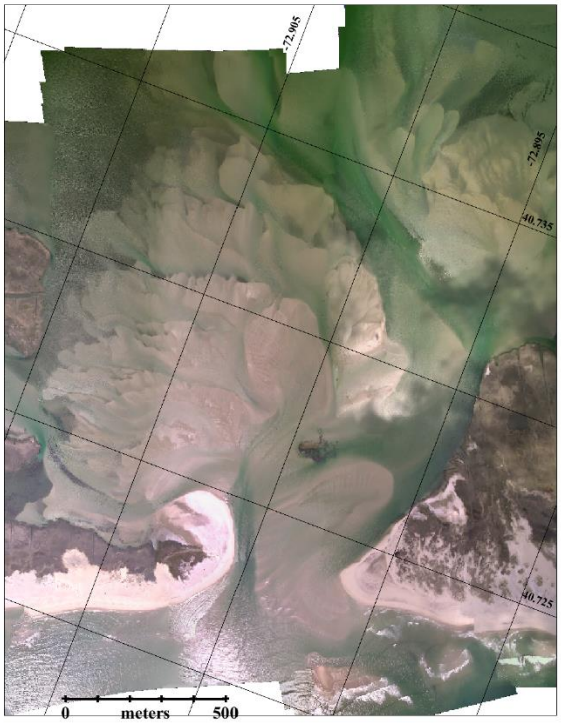

Figure 2a, Photo mosaic of the Old Inlet breach from May 10, 2017.

Figure 2b, Oblique aerial photo of the Old Inlet breach from May 10, 2017.

Another thing of note in comparing the January and May photo mosaics is the changes that took place in the offshore side of the breach. Since about March 2016 the exit channel through the breach turned east, but since April 2017 the channel has gradually shifted more southerly. And now that eastward channel is blocked by a shoal that extends above water during low tide in the ocean, Figure 2b.

The previous discussion might suggest that the breach is in the process of closing. In the long run, that is inevitable. However, the latest photos from June 11, 2017, Figure 3, indicates that the old channel that flows along north of the eastern shore is pushing farther and farther into the breach and may re-establish itself as the primary exit. That is a sizeable channel, has in the past exhibited the strongest currents and is well connected to the main channel through the flood delta. If that happens, it should shift the sand and allow the breach to continue for some time. The thing that is preventing this to occur now is the shoal that has built up offshore which lies almost directly in the path of the old channel, Figure 4. That offshore shoal has shown up in various positions as the ebb delta has responded to storms and wave action. A year ago it was on the western side of the exit channel. So the permanence if that offshore shoal is highly questionable.

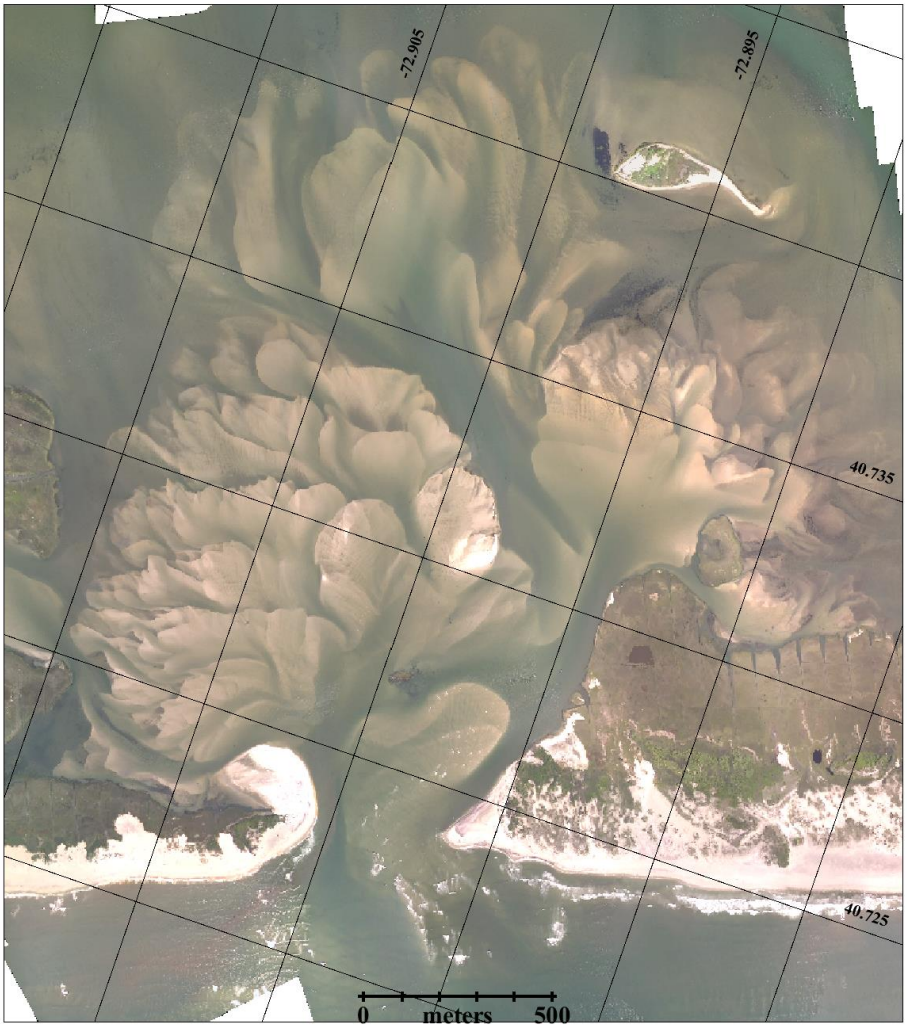

Figure 3. Photo mosaic of the Old Inlet breach from June 11, 2017.

Figure 4. Oblique photo of the breach from June 22, 2017 near low tide in the ocean.

Another way to assess the condition of the breach is to see if there have been any changes inside the Great South Bay. The most immediate impact of the breach was the increased exchange between the ocean and the eastern portion of the Bay, which increased the salinity substantially from 24 to 25 psu (practical salinity units) prior to the breach to 28 to 30 psu afterwards. In the middle of the Bay at the GSB1 buoy south of West Sayville, the salinity there gradually increased as well by roughly 1 psu as a result of a change in the average current pattern that carried Bellport Bay water westward into Patchogue Bay. So if there were to be a significant change in the ocean-bay exchange through the breach, one would expect to see some sort of change in the salinity. Figure 5 shows the temperature, salinity and fluorescence records from Bellport and the GSB1 buoy for the past 2.5 years. Regarding temperature, one expects that as a result of the ocean-Bellport Bay exchange that the temperatures would be cooler in Bellport Bay relative to the central Bay during the summer, and warmer in the winter. And that is the case in past years and is still the case into July of this year and shown in Figure 5 where the orange trace from GSB1 tends to be slightly higher than Bellport's blue line.

Salinity is much more variable, especially at the Bellport marina because of the proximity of the shore, Beaver Dam Creek and Carmans River which are all sources of fresh water during and after rainfall events, Figure 5. There are clearly other longer term variations in the salinity including a seasonal fluctuation whereby salinity is higher in the winter months and lower in the spring and summer. The seasonal salinity changes make it a little difficult to discern a clear trend that might signal an altered breach. While the Bellport record is about normal for this time of the year, the record at the GSB1 buoy underwent a surprisingly steady decline in salinity from mid to late June. If that continued or the salinity remained low it would suggest a decrease in the supply of salt from Bellport Bay. But over the past couple of weeks after a period of southeast winds, the GSB1 salinity record has recovered to near normal salinities for post breach conditions. It is somewhat early days so we need to keep an eye on that record.

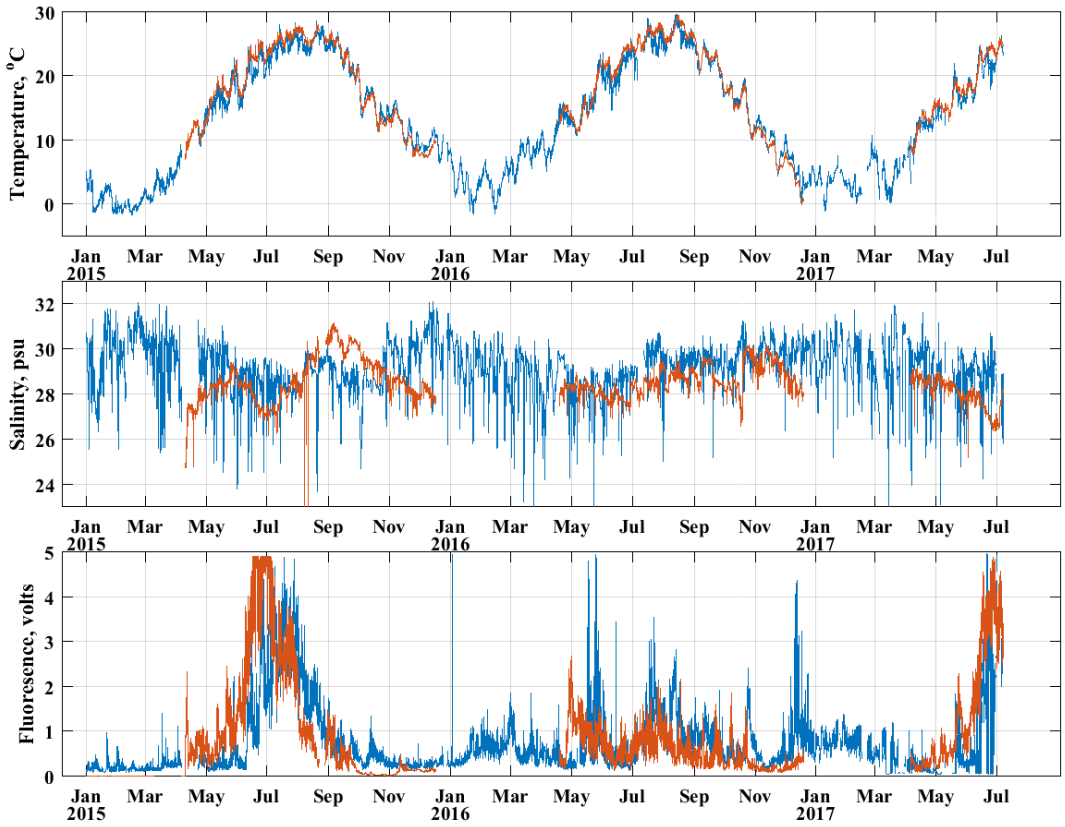

Figure 5. Time series plots of temperature, salinity and fluorescence from Bellport (blue) and the GSB1 buoy south of West Sayville (orange).

The lower panel in Figure 5 shows the fluorescence records from Bellport and the GSB1 buoy. The fluorometers at these locations provide an indication of how much chlorophyll is in the water produced by whatever kind of algae are present. The alga of most concern is of course the Brown Tide, whose concentration can be so great as to prevent light from reaching the sea grass and which has a low nutritive value for shellfish. As the waters warm in the spring under the right nutrient conditions, the Brown Tide bloom starts when waters reach 18 to 20^{o}C and tapers off when temperatures reach 24 to 25^{o}C. The fluorescence record shows the dramatic occurrence of the Brown Tide in 2015 and again this year with lower values in the spring of 2016. In general, the Brown Tide is less severe and usually of shorter duration in Bellport Bay than farther west in the central Bay. One of the benefits of the breach has been the reduction in nutrients in Bellport Bay which has lessened the impact of the Brown Tide but clearly that does not mean its elimination.

So the jury is out at this point regarding whether the breach is in the process of closing or simply shifting the pathways of the ocean-Bay exchange. Tides are about the same as are salinities, at least in Bellport Bay. Overflights and measurements around the Bay will continue but for scheduling and funding reasons we haven't been out to measure the size of the breach or the through-flow, although we hope to get out sometime this summer. At that point we will have a better basis upon which to judge the trends.