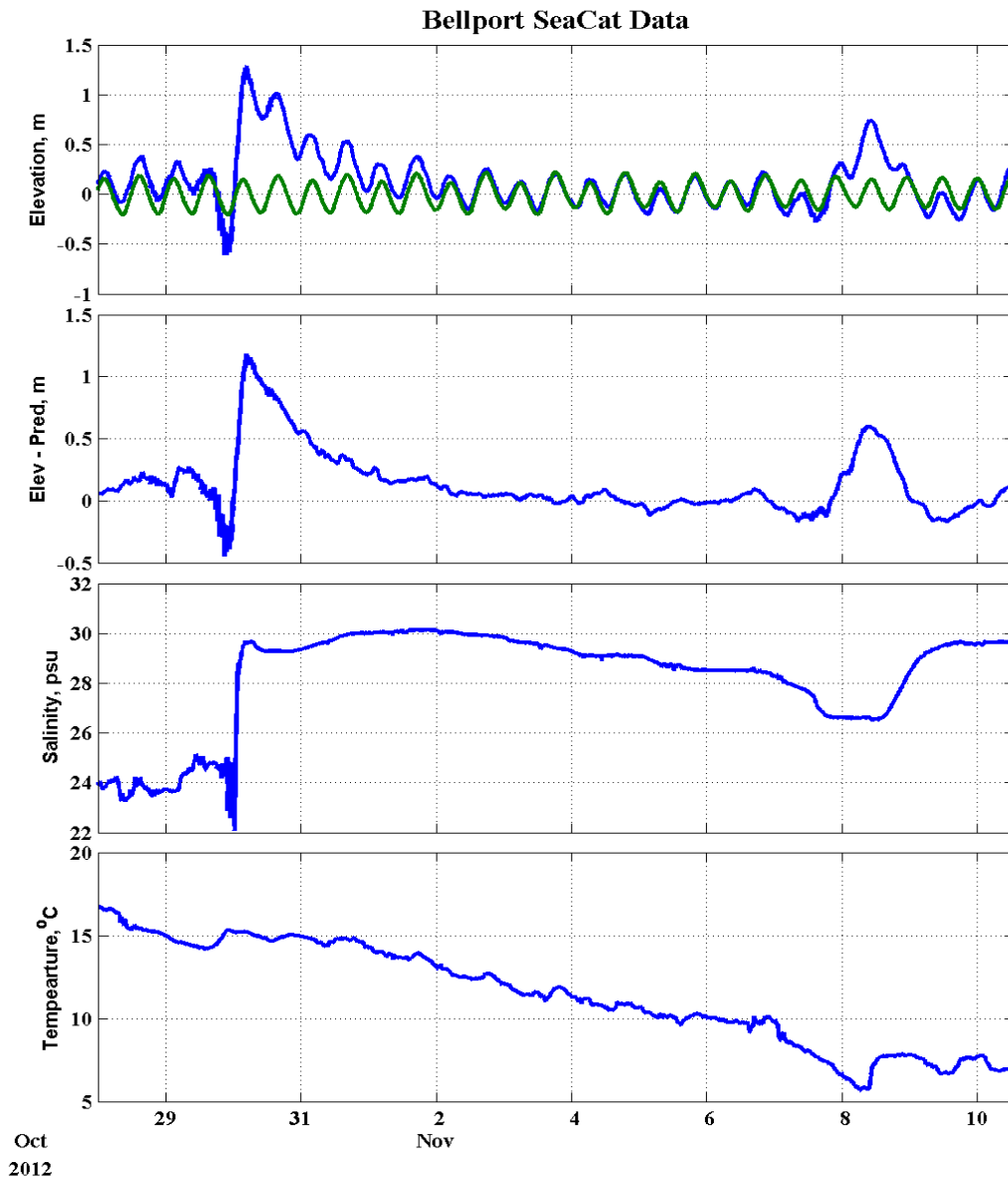


## Bellport SeaCat Results - Charles Flagg

An oceanographic sensor that records water temperature and salinity, called a SeaCat, has been deployed at the Bellport marina since 2004 and since late 2009 the sensor also recorded sea level. Of particular interest now, is that this instrument recorded these parameters during super-storm Sandy (Oct.29-30) and the nor-easter that passed through the area nine days later (Nov.7-8). As a result, we have a remarkable record of the effects that the breaches in Fire Island had on the water properties and circulation in the eastern end of Great South Bay. In the figure below, the top two panels show the surge in sea level as a result of the storms. The green line in the upper panel is the predicted tide based upon the first 65 days of the record prior to the storm. The third panel down shows the changes in salinity while the final panel shows water temperature. Times are in GMT, that is EST + 5hrs.



Super storm Sandy passed over the area on the afternoon of October 29<sup>th</sup> and through much of the 30<sup>th</sup>. The initial response of sea level was the expected drop that usually accompanies a strong east wind. In this case, the sea level dropped about 0.6m below mean water level and 0.4m below the low tide level. Some time around 0000 hrs GMT on October 30 the breach(es) in Fire Island appear to have opened and the sea level at Bellport, augmented by a coincident high tide, quickly rose to 1.3m above the mean water level, and 1.1m above the usual high tide level. About 12 hours later there was a second high as a result of usual high tide. Over the next four days or so, the sea level gradually returned to its normal level as did the tide range and phase. That the tide range and phase returned to their original condition indicates that the new breach is having relatively little effect on the Great South Bay's tidal prism. There is simply too much area within the Bay to be strongly affected by the relatively small amount of water that passes through the breach and so the tides are still governed by what happens at Fire Island Inlet.

The salinity record shows another aspect of the storm and breaching. During the initial phase of the storm and prior to the breaks in Fire Island, salinity fluctuated, decreasing by as much as 2 psu at times. Since there was little rain accompanying the storm, about 0.15" at Bellport, this low salinity is almost certainly due to outflows from Beaver Dam Creek and Carmans River as sealevel was initially depressed. After the breach(es) opened, salinity at the Bellport dock quickly increased by nearly 6psu indicating a major influx of ocean waters through Moriches Bay and the new breach at Old Inlet. The salinity remained high for about 4 days during a period with relatively calm winds. Between the 3<sup>rd</sup> to the 7<sup>th</sup> of November there was a general decrease in salinity by about 1.5 psu which may reflect a recovery of Bay to more normal conditions as waters from the western Bay were blown eastward. The winds during this period were from the west and northwest.

On November 7<sup>th</sup> and 8<sup>th</sup> the area was hit by a nor-easter during which the winds rotated from east to north reaching a maximum late on the 7<sup>th</sup> before decreasing and rotating to the northwest. This caused another but smaller surge in Bellport Bay of about 0.7m above mean water level and 0.6m above the high tide level. During this event the salinity initially decreased by about 2 psu for a day before recovering to its previous high of nearly 30psu.

We were told by National Park Service scientists charged with evaluating the impact of the Old Inlet breach that the nor-easter had caused an alteration of the breach morphology such that the inflowing ocean waters had switched paths from westward just north of Fire Island to eastward toward the old Old Inlet channel. The fluctuations in salinity at Bellport during the nor-easter may be a reflection of this change in flow regime.