

Guana Dam Water Quality Monitoring

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Introduction

In August of 2009 Guana Tolomato Matanzas National Estuarine Research Reserve began Water Quality Monitoring at two new locations within the Reserve. The monitoring instruments (datasonde) are designed to collect high temporal resolution data. This data captures short term variations and long term trends within the estuary. The datasonde collect readings every 15 minutes on the physical parameters of the water including Temperature, Salinity, Depth, Turbidity, pH, Specific Conductivity, and Dissolved Oxygen. The data is stored within the device and later downloaded and analyzed. The two new locations are located approximately 2.2 miles north of Guana Dam (ND)(30.053160, -81.338750) and 1.5 miles south of Guana Dam (SD) (30.00099, -81.32684). Guana Dam was originally constructed in 1957 and is located adjacent to the Environmental Education Center. The impoundment formed by Guana Dam is referred to as Guana Lake and encompasses 2400 acres of wetlands. These two new sites are referred to as ND and SD for their respective locations. The sites were chosen to provide a comparative study between Guana River and Guana Lake.

Method

To ensure the validity of the data collected, the same stringent calibration protocol and similar deployment methodologies were applied as required by the National Estuarine Research Reserve System-Wide Monitoring Program.(SWMP) However, in order to overcome the challenges of deploying instruments in such shallow water conditions, it was decided to deploy the instruments horizontally. Consequently, a new deployment apparatus was designed to house the fragile and expensive instruments. The Benthic Aquatic Datasonde Deployment System (BADDs), comprised entirely of PVC and stainless steel, ensures the safety of the YSI 6600 EDS datasonde in order to minimize spatial variation. Consistent placement is accomplished with the use of an imbedded PVC anchoring system and a submerged concrete anchor. Instrument exchanges are timed between data collections to ensure that readings are accurate. All instruments are pre and post calibrated using standardized methods with specific time constraints. Quality Assurance and Quality Control procedures were also adopted from the NERR's SWMP protocol. The goal is to have this data reviewed by the Centralized Data Management Office for Tertiary QAQC.

Benthic Aquatic Datasonde Deployment System



ND Instrument Exchange

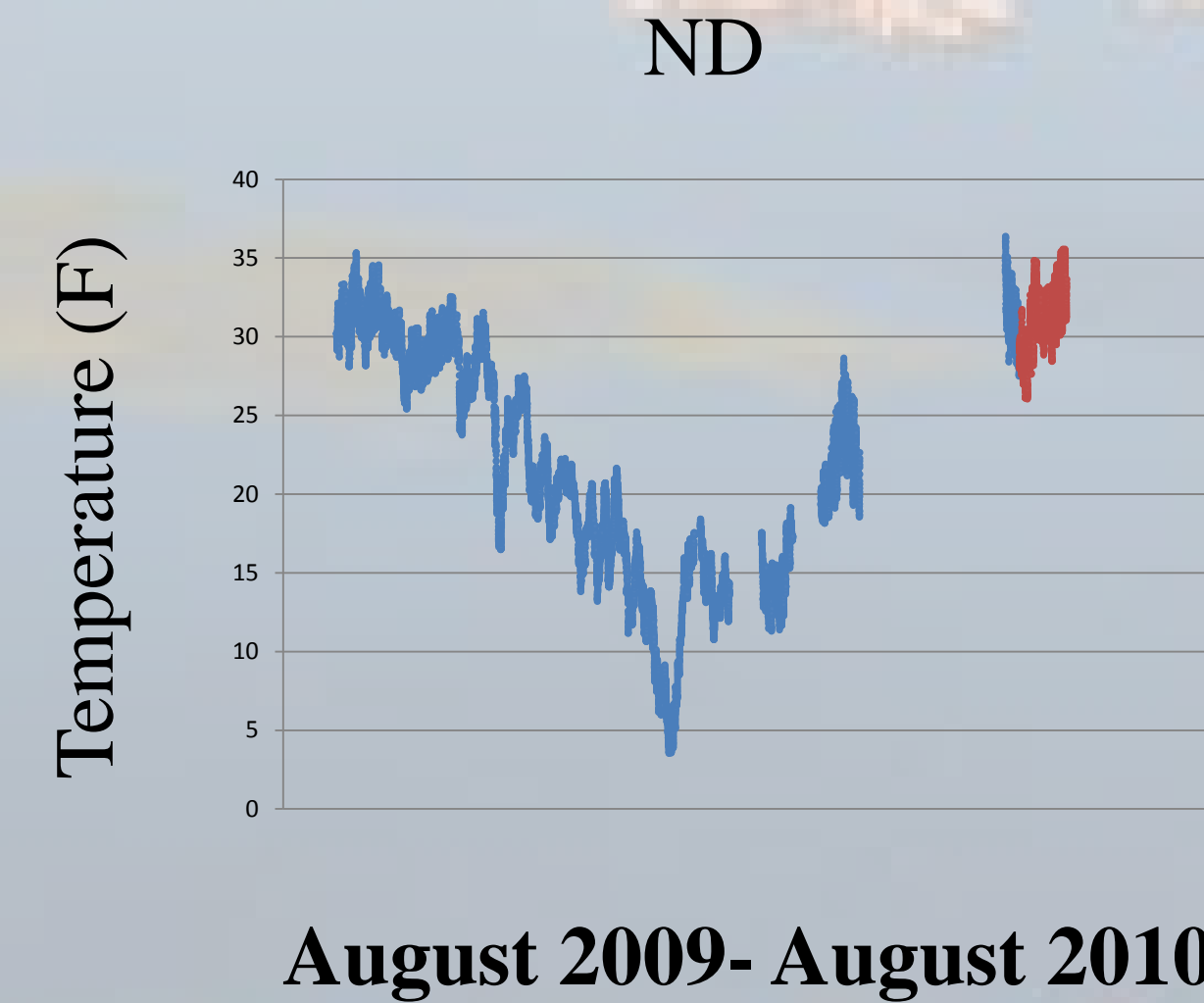
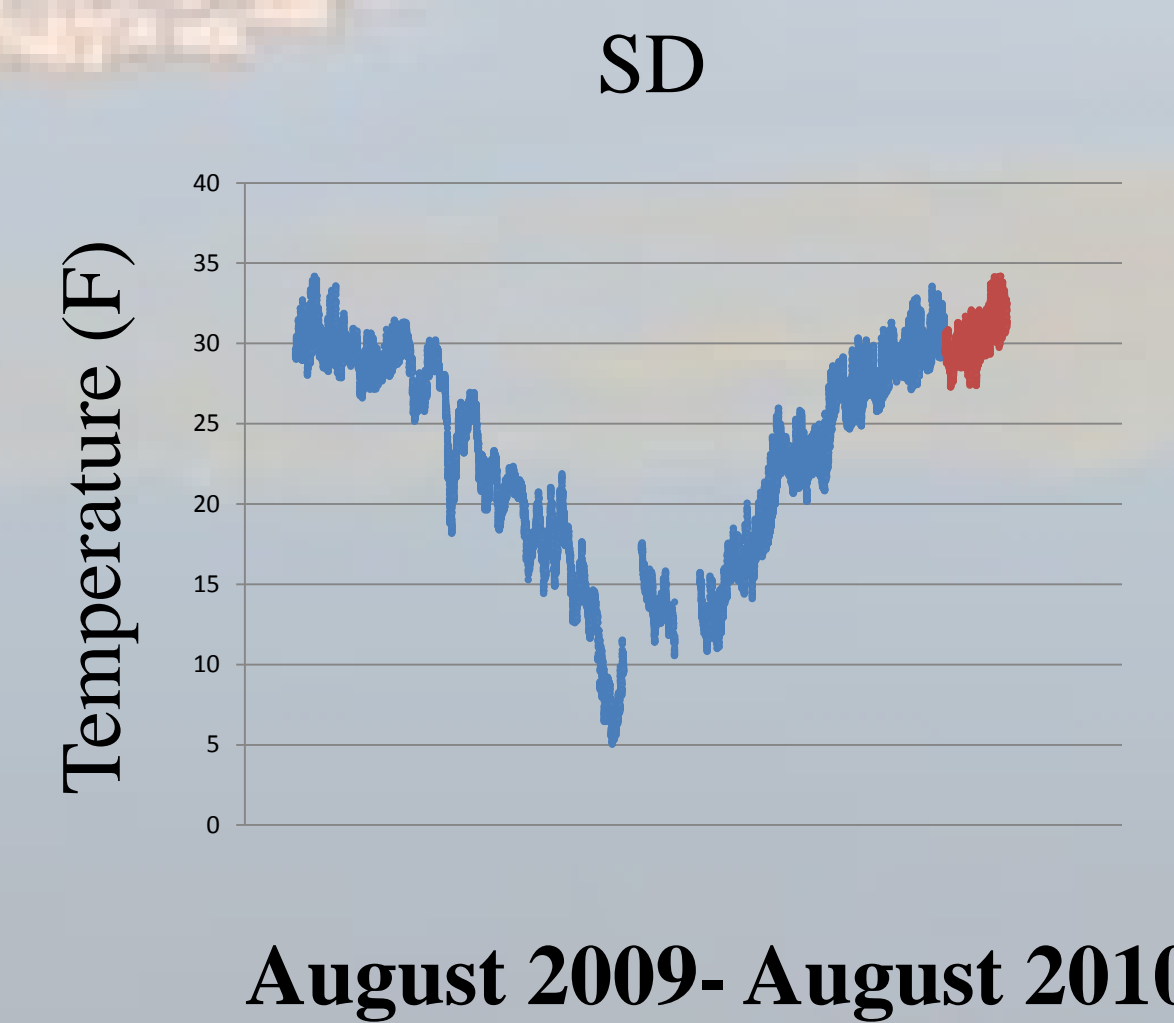
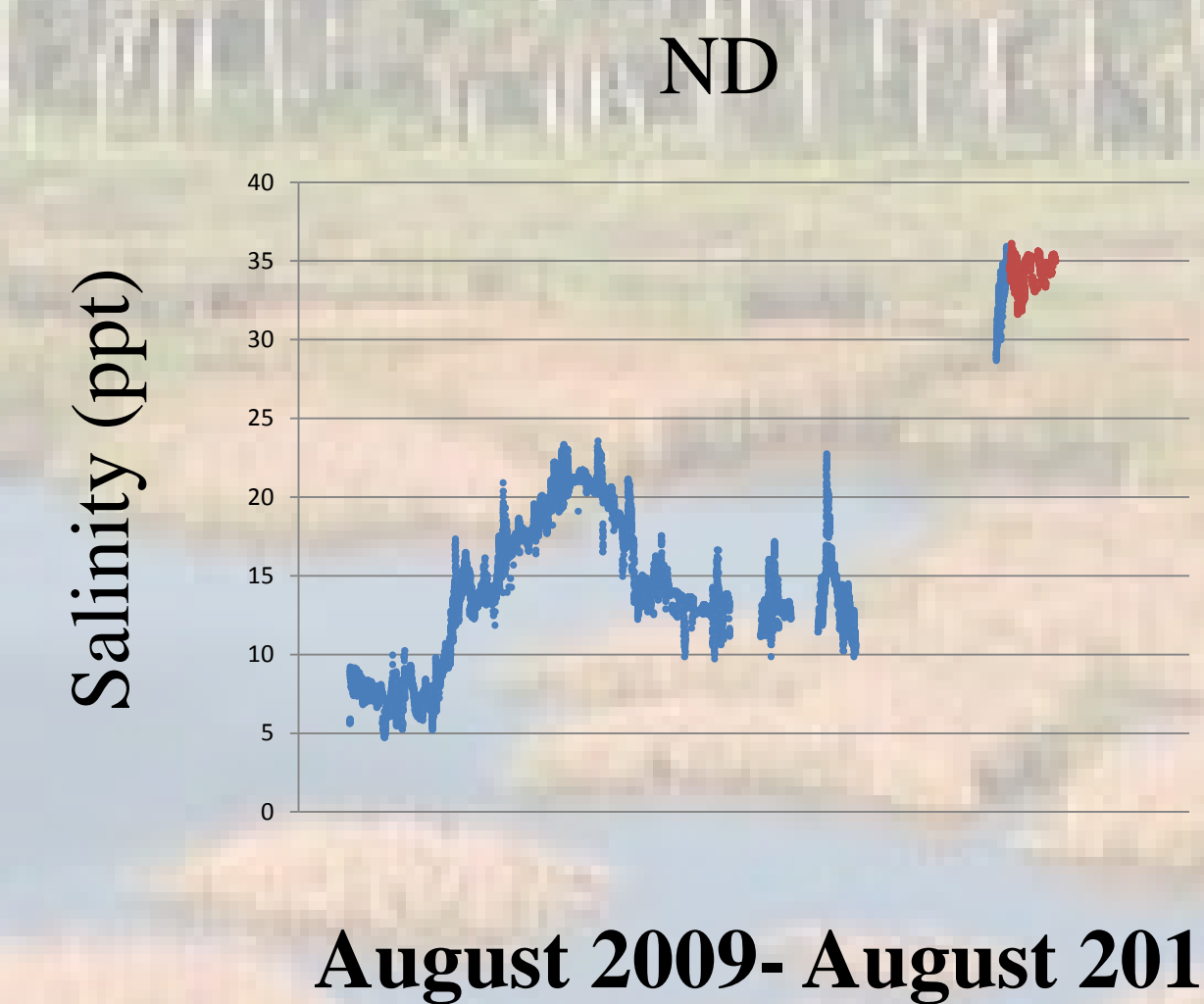
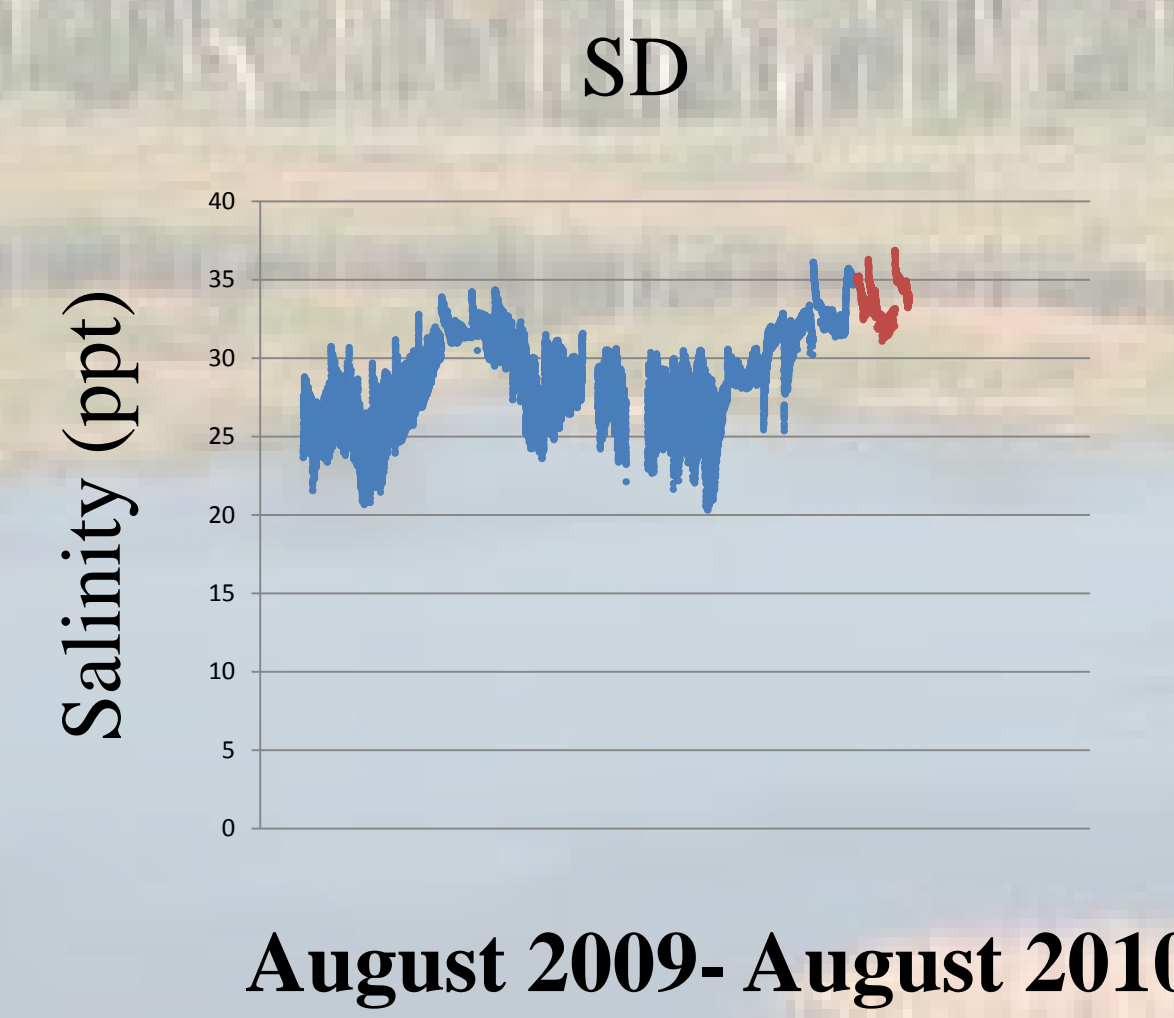
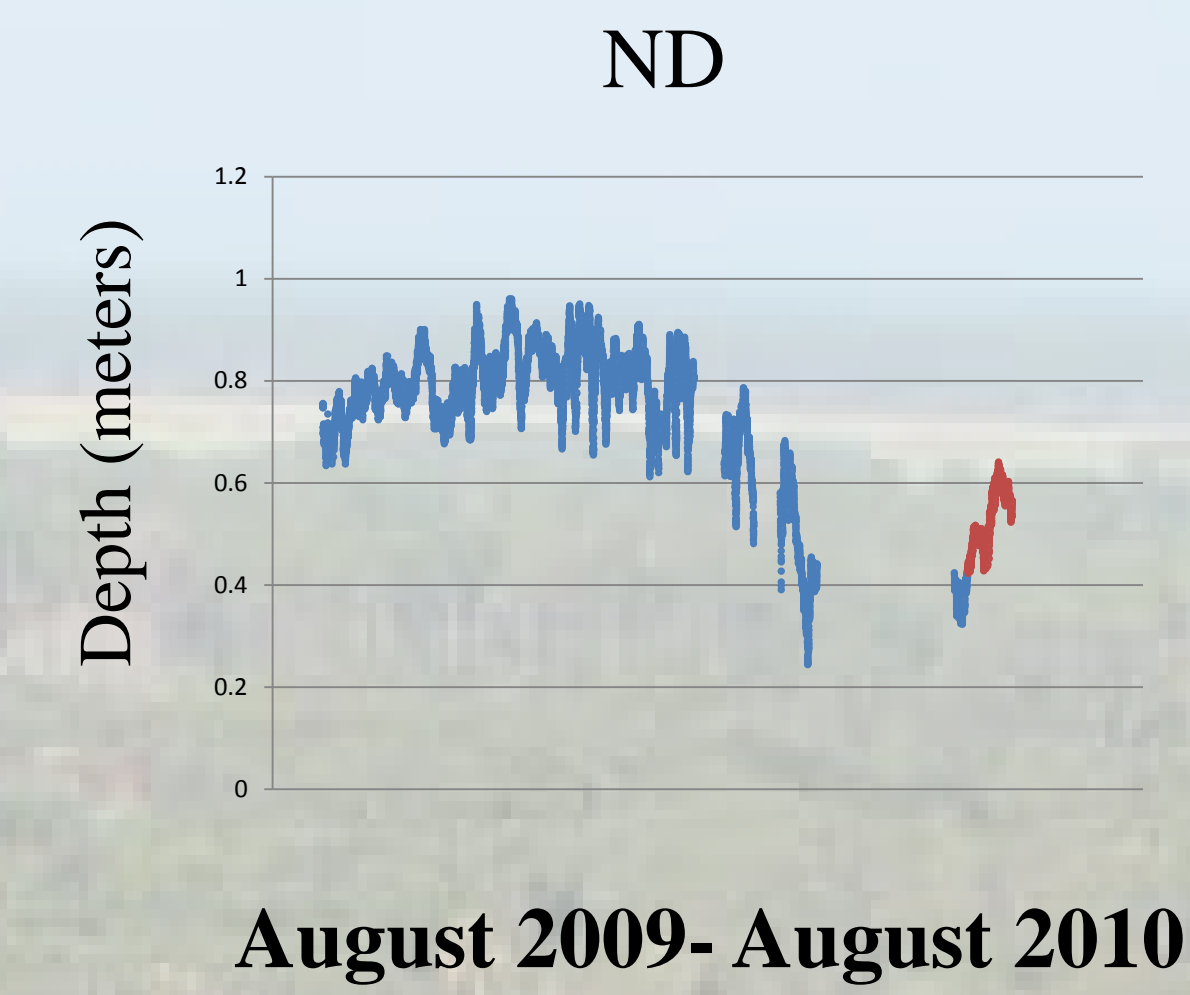
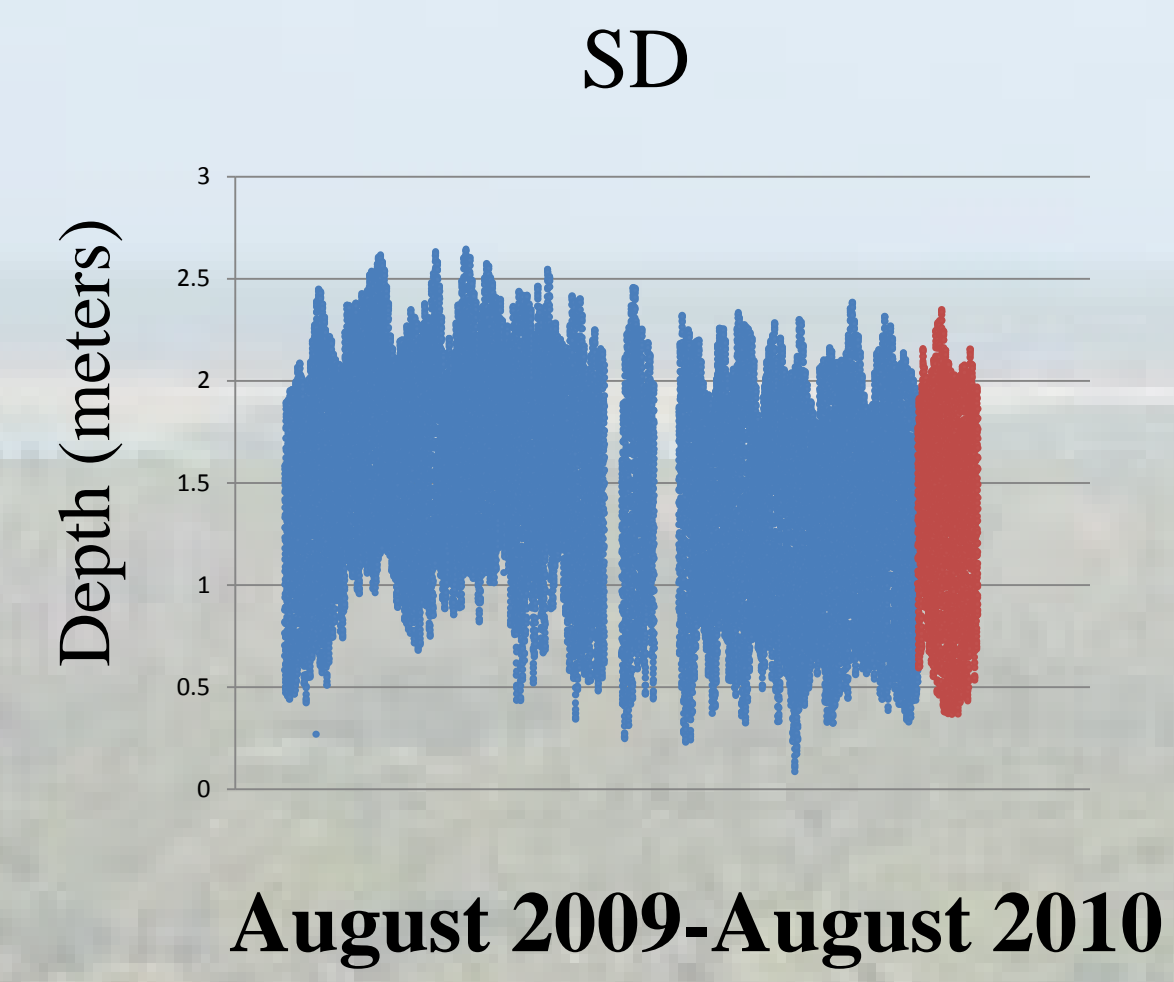
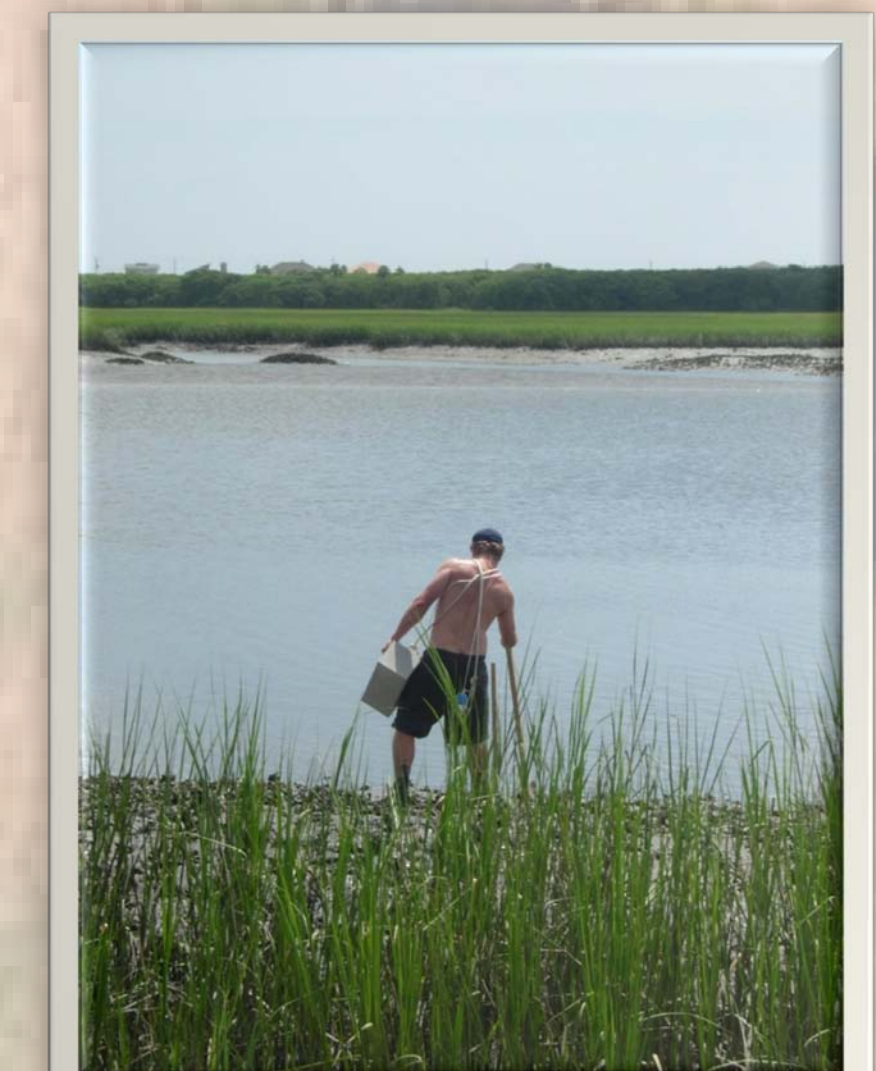


Guana Dam

YSI 6600 EDS



SD Anchoring System Installation



Results

Preliminary data suggests that this system is more complex than initially anticipated. Short term variability is not always apparent; however, it may play an integral role in the overall health of the estuary and its surrounding ecosystem. After the first year of data collection, certain trends are apparent within the data. The depth data shows the effects of tides change in amplitude and magnitude over time. The salinity profile reveals that the salinity in the lake is greatly reduced by freshwater influx from the north. It also shows that the system is completely dependent on rainfall to mitigate the effects of evapotranspiration. Temperature readings show excellent continuity between the two sites. Trends, such as seasonal variability in temperature and tidal magnitude, can be used to predict future conditions, however, this is just the preliminary stage of monitoring this system. Continued monitoring will need to be conducted for several years before further extrapolation. Long term trends will reveal the true similarities and differences between ND and SD. Removed data sets are due to probe malfunctions, following proper QAQC protocol.

Synthesis

In the near future, this research will be used to further understand the complexities of our natural system as well as our managed area. The comparative nature of this study will form a more complete picture of the interactions between Guana Lake and Guana River. This data will be coupled with data collected from other researchers working within the reserve to show correlations between the flora and fauna found within the reserve and the system's water quality. The data collected within the impoundment could be used to alter management practices to better serve the community and minimize adverse effects of public use. Guana Dam provides a recreational fishing and boating area for local residents. The impoundment formed by the dam creates an enticing habitat for migrating waterfowl. Guana Lake, which is adjacent to the Wildlife Management Area, is currently managed by the Florida Fish and Wildlife Conservation Commission. Future water quality monitoring within the impoundment could also be used to assess sustainability of the fishery.