

NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE GRANT
Semi-Annual Progress Report

Period: January 1, 2016 – June 30, 2016

Grant Number and Title: F14AC1068 “Optimization of Marsh Restoration for Storm Surge Abatement and Sea Level Rise”

Organization: University of South Carolina

Project Leader: James Morris, Professor

Abstract: The objective of this study is to parameterize the coupled marsh and hydrodynamic models MEM and ADCIRC for estuaries in New England affected by Hurricane Sandy. The coupled model will forecast the abatement of storm surge afforded by coastal wetlands with and without acceleration in rising sea level, and with and without wetland restoration. The model will be applied to Plum Island Sound, MA; Chaffee National Wildlife Refuge, RI; Forsythe National Wildlife Refuge, NJ; and the area from the mouth of the Chesapeake Bay in VA to Ocean City, MD.

Were planned goals/objectives achieved last quarter? Yes

Progress Achieved:

- LiDAR and bathymetric data covering the Plum Island Sound landscape has been obtained and processed and a seamless digital elevation model (DEM) has been created.
- A DEM is near completion (95%) for the Virginia/Maryland study location (inlet of Chesapeake Bay to Ocean City, MD). The DEM is a compilation of:
 - 1 m lidar-derived DEM for Accomack, VA, Worcester County
 - 1 m lidar-derived NOAA post-Sandy DEM
 - 1/3 arc-second (10 m) FEMA Region III DEM
 - 1/3 arc-second (10 m) Ocean City, VA/MD/DE and Virginia Beach NOAA NGDC DEM
- An unstructured mesh of Plum Island estuary, tributaries, and intertidal marsh has been developed to simulate astronomic tides using the ADCIRC two-dimensional shallow-water equations code.
- Simulated water surface elevations from the developed Plum Island Estuary ADCIRC model have been compared and validated to observed time-series water levels at all available tide gages in the region (Figures 2 and 3).
- The Hydro-MEM model has been setup for the Plum Island estuary and preliminary simulations have been performed for present day and various SLR scenarios.
- An unstructured mesh for the Virginia/Maryland study area is currently under development and 75% complete.
- A DEM for the Chaffee and Forsythe study sites currently in development and are 25% complete.

- RTK data have been obtained for the Chaffee site and the Assateague portion of the MD/VA site to ground truth the LiDAR data
- Presentations of the project were made at meetings at FWS Northeast Regional Office in December 2015 and Parker River NWR in April 2016 as well as at the AGU 2015 Fall Meeting.
- Conducted site visit to Chaffee NWR in April 2016 to see current and planned TLD and restoration projects

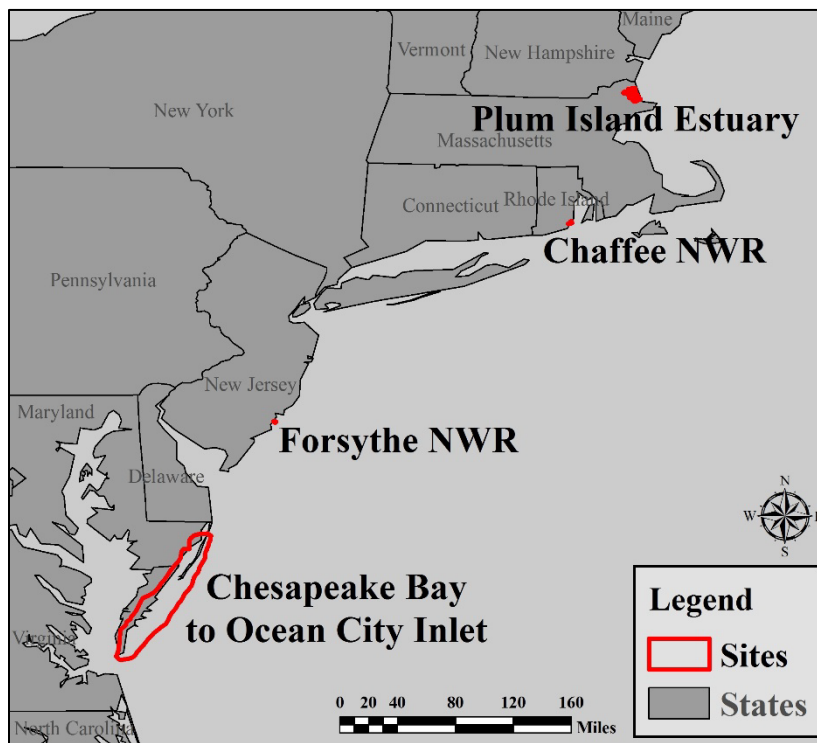


Figure 1. Location map of the study sites.

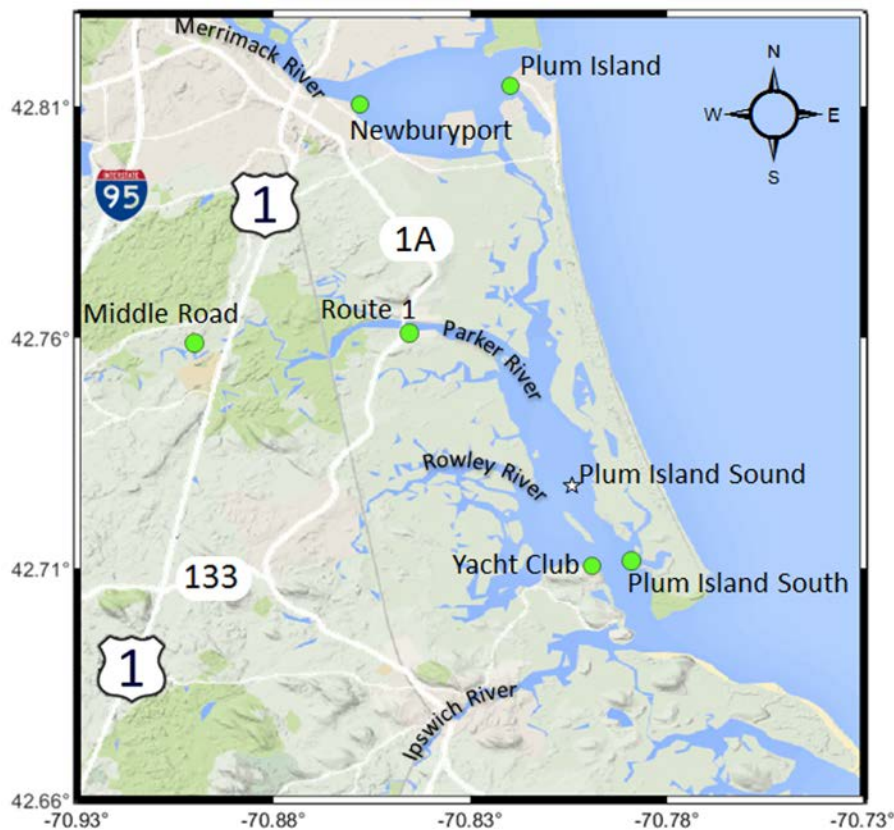


Figure 2. Map of the Plum Island Estuary study region. Tide gauges and water level loggers are indicated by the labeled green circles.

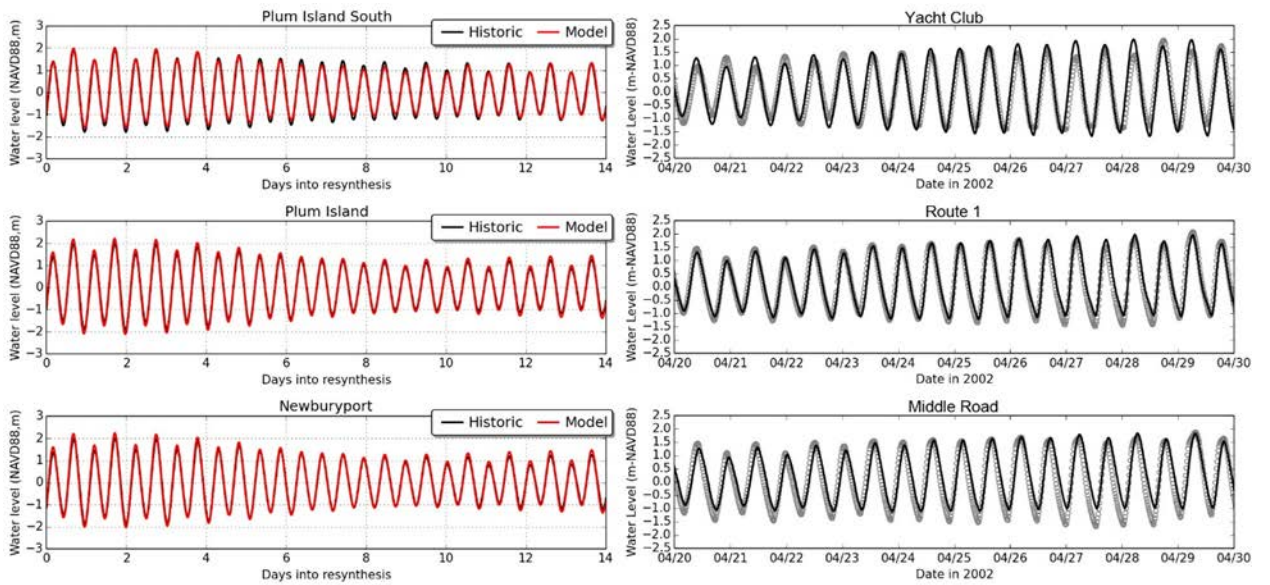


Figure 3. Hydrograph of historic and modeled tidal re-synthesis water levels at the three NOAA tide gauges (left). Hydrograph of historic (gray circles) and modeled (black line) water levels during April 2002 (right). See Figure 2 for gauge locations.

Difficulties Encountered: None.

Activities Anticipated Next Six Months:

- Close data gaps where existent – A field trip is planned for August 2016 to collect field data at Forsythe and in the MD/VA section.
- Compare RTK data to lidar-derived DEMs to correct for errors associated with vegetation cover.
- Finalize the Hydro-MEM model for the Plum Island estuary.
- Finalize the DEM for the VA/MD study site.
- Finalize the ADCIRC model for the VA/MD study site.
- Conduct preliminary Hydro-MEM simulations for the VA/MD study site and continue to refine Hydro-MEM for VA/MD.
- Continue to obtain topographic elevation data and continue DEM development for the Forsythe and Chaffee study areas.
- Continue development of the ADCIRC model for the Forsythe and Chaffee study areas.

Expected End Date: Original end date is October 31, 2016. Request for extension to October 31, 2017 has been submitted.

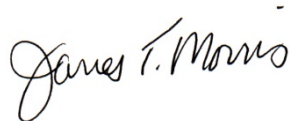
Total expenses the quarter: \$__70,396.45_____

Total life to date expenses (incl this quarter): \$__123,247.39_____

Total Approved Budget: \$__230,000.00_____

Are you within the approved budget plan and categories: Yes

Signature:



Date: July 25, 2016