June 2015 Volume 3, Issue 2

Sentinel Site Quarterly

North Carolina
Sentinel Site Cooperative

Summer Field Season

North Carolina Sentinel Site Cooperative partners are hard at work this summer. Check out the Quarterly Newsletter to learn about research and education events, upcoming meetings, and partner activities.

For more information about the NCSSC or to submit ideas for inclusion in the Quarterly, contact Jennifer Dorton.

Previous Quarterly Newsletters can be found on the NCDENR Coastal Training Program website.

In This Issue

Living Shorelines - A Valuable Resource

Living shorelines are formed through strategic placement of natural materials, like vegetation and oysters. Not only do living shorelines reduce erosion by buffering wave energy and trapping sediments, they also provide nursery and foraging habitat for marine organisms and shorebirds. Because of these benefits, the North Carolina Coastal Reserve & National Estuarine Research Reserve (NCNERR) collaborated with UNC-Chapel Hill Institute of Marine Sciences (IMS) in 2012 to create a living shoreline at the Rachel Carson Reserve. Researchers at IMS installed oyster reefs parallel to the shoreline, and volunteers planted *Spartina alterniflora*, or saltmarsh cordgrass,

landward of the oyster reef. Since that time, the loose shell has transformed into a live oyster reef, but the marsh has struggled to thrive, which is why a group of determined volunteers, armed with 3,000 Spartina plants, made a trip back to the site last month to replant the marsh.

The workday began by transporting the Spartina seedlings to the project site with the help of boat transportation courtesy of Duke University Marine Lab (DUML). Once at the site, Dr. Carolyn Currin with the NOAA Center for Coastal Fisheries and Habitat Research (CCFHR) placed markers along the shoreline to direct volunteers where to begin planting. After a quick orientation to the tools used to plant marsh grass, including a specialized shovel called a "dibbler," volunteers formed small teams and diligently took turns digging holes, spreading fertilizer, and placing the Spartina seedlings at proper depths.

Spartina alterniflora seedlings are being planted for a shoreline stabilization project.

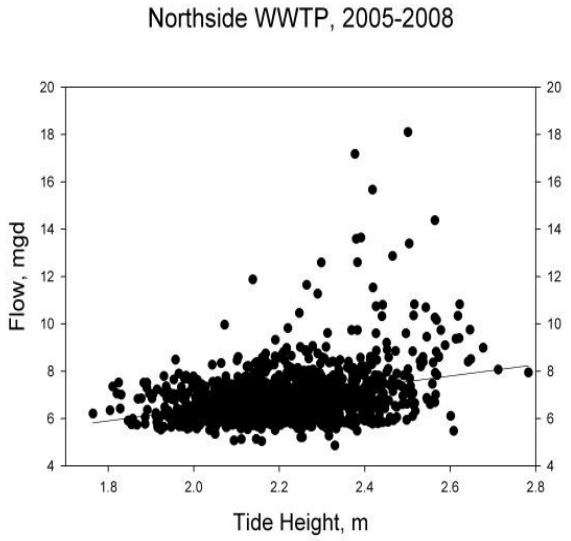
After six hours, the planting was complete thanks to the hardworking volunteers with the N.C. Coastal Federation, DUML, CCFHR, and NCNERR. Even though the work was tiring and the sun was hot, it was well worth the effort to help stabilize the eroding shoreline and bolster the natural environment at the Reserve site. The collaborative project demonstrates a sustainable alternative to traditional bulkhead stabilization, and will continue to generate data and research products focusing on the effectiveness of living shoreline stabilization in estuarine environments.

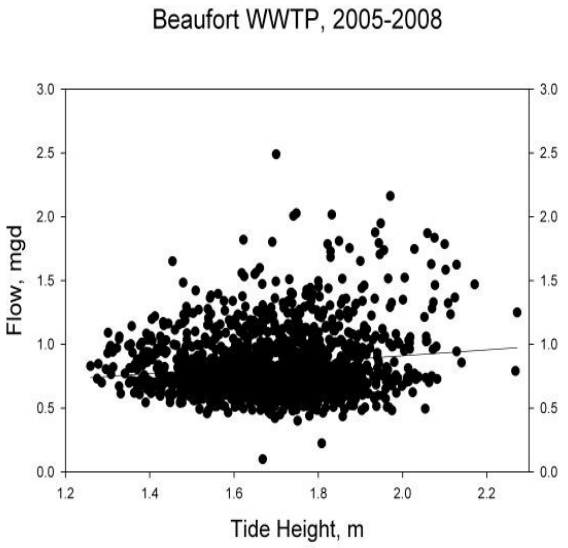
Risks to Coastal Wastewater Collection Systems from Sea Level Rise and Climate Change

Through funding from North Carolina Sea Grant, Dr. Larry Cahoon, UNCW Biology and Marine Biology, analyzed wastewater treatment plan infrastructure in the coastal zone. Analysis of the response of flow into wastewater treatment plants (WWTPs) to variation in tide height (daily mean high high water) showed that tide height had statistically significant effects on flow in our study of 4 coastal WWTPs (Flood and Cahoon, 2011). Plots of two

of those relationships are shown here, one for the relatively small WWTP in Beaufort, NC and one for the large Wilmington Northside WWTP (located ~ 25 miles from the ocean near the head of the now strongly tidal Cape Fear River Estuary). Prior analysis of flow into these WWTPs had shown that they experienced statistically significant effects from "inflow and "infiltration" (I&I), indicating they had significant leakage of groundwater into their collection systems. We interpret these results to indicate that leaky collection systems expose coastal WWTPs to effects of changes in sea level that drive changes in groundwater levels. Sea levels change constantly, of course, with semi-diurnal high-low, biweekly spring-neap, and event-scale wind effect variations the most noticeable short-term variations.

Analysis of I&I effects on WWTPs in North Carolina's coastal counties demonstrated that there were statistically significant I&I for 92% of the WWTPS, and that 50% of the WWTPs experienced average I&I values exceeding 10% of base flow. These results indicate that leaky collection systems are common in coastal North Carolina, and suggest similarly widespread vulnerability to elevated sea level effects as well. Analyses of sea level effects for the 86 WWTPs identified as having significant I&I is now underway.





Higher tides drive higher influent flows in the wastewater collection systems serving areas with extensive tidal shorelines. Effects (derived from single factor linear regression) show that Beaufort treats up to 230,000 gallons per day (m-1) and Northside up to 1.097 million gallons per day (m-1) due to additional tidal height. Not only is this inefficient for WWTPs but it also increases treatment costs.

Flood, J., and L.B. Cahoon. 2011. Risks to coastal wastewater collection systems from sea level rise and climate change. J. Coastal Research 27(4): 652-660. Published online, Feb. 23, 2011 doi: 10.2112/JCOASTRES-D-10-00129.1

Webinar: Overview of the new Coastal Flood Exposure Mapper

Monday, July 13, 2015 from 11:00 - 12:00 p.m.

Lauren Long, of NOAA's Office of Coastal Management will give an overview of the Coastal Flood Exposure Mapper that was just recently released for the Southeast region. The Flood Exposure Mapper is a high level planning tool that uses national data sets to generate maps that support community conversations about coastal hazards by showing people, places, and natural resources that are exposed to coastal flooding.

Please RSVP to Bill O'Beirne (bill.obeirne@noaa.gov) or Lauren Long (lauren.long@noaa.gov). Once you have RSVP'd you will receive additional information on how to access the webinar.

You can learn more about the mapper at:
http://coast.noaa.gov/digitalcoast/tools/flood-exposure

2015 Ecological Effects of Sea Level Rise Funding Announcement

The 2015 NOAA Ecological Effects of Sea Level Rise (EESLR) awards have been announced. We are pleased to announce that the following two proposals were selected from the NC Sentinel Site Cooperative region.

- Peter Ruggiero, Oregon State University, is the lead PI for *Developing and Evaluating the Coastal Recovery from Storms Tool (CReST): A model designed to assess resilience and reduce storm and sea level rise impacts on natural and engineered beaches and dunes*.
- Christine Voss, UNC Institute for Marine Science, is the lead PI for *Understanding and predicting changes in coastal marsh ecosystem services: realizing the combined effects of sea-level rise, tides, and storm surge on marshes and their capacity to protect shorelines*.

Funding Opportunities

Below are funding opportunities which may be of interest to NCSSC partners.

- NOAA Fisheries is administering up to $4 million for the Coastal Ecosystem Resiliency Grants Program, which will focus on the development of healthy and sustainable coastal ecosystems through on-the-ground habitat restoration. Proposals are due by July 2, 2015. More information, including a link to the application and FAQs is available at: www.habitat.noaa.gov/funding/coastalresiliency.html
- NOAA's National Ocean Service is supporting the effort with $5 million in competitive grant awards through the Regional Coastal Resilience Grant Program. This program will help coastal communities and economic sectors prepare for and recover from adverse events and adapt to changing environmental, economic, and social conditions. Proposals are due by July 24, 2015. Additional information is available at: http://www.coast.noaa.gov/resilience-grant/

The NOAA Sentinel Site Program leverages existing research and monitoring resources to ensure resilient coastal communities and ecosystems in the face of changing conditions. The program's place-based approach focuses on issues of local, regional, and national significance that impact habitats and species managed by NOAA as well as surrounding coastal communities.