

Albemarle-Pamlico National Estuary Program Demonstration Project

**Living Shoreline to Improve Habitat & Water Quality and Reduce Stormwater
Runoff into Bogue Sound
Contract No. 3782**

**Final Report
April 11, 2011 –July 29, 2011**



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Project Background and Benefits

North Carolina State University's Center for Marine Science & Technology (CMAST) is located on the Carteret Community College (CCC) campus in Carteret County, NC in the White Oak River Basin. The CCC campus directly borders the shellfish (SA conditionally approved open) waters of Bogue Sound.

Stormwater runoff is the number one source of impairment of shellfishing waters in North Carolina, with approximately 64,000 acres classified as "prohibited" or permanently closed to harvest. As the preeminent coastal environmental non-profit organization in the state, the North Carolina Coastal Federation (NCCF) is extremely concerned about the impacts of stormwater runoff to shellfish waters. Like NCCF, the facilities on the CCC campus are keenly interested in pursuing practices that will reduce the overall impacts of the campus on the marine and estuarine resources of North Carolina, particularly in Bogue Sound.

In the interest of environmental improvement and providing demonstration project availability, CCC, CMAST and NCCF previously partnered on a shoreline restoration project along the Bogue Sound shoreline of the CCC campus. This previous project consisted of various shoreline stabilization techniques and plantings, oyster reef development and the installation of best management practices. Agencies such as the N.C. Clean Water Management Trust Fund, Restore America's Estuaries, the National Oceanic and Atmospheric Administration and the National Fish and Wildlife Foundation also provided funding for this large restoration project.

To supplement this previous restoration effort and provide additional filtration of stormwater runoff into Bogue Sound from the CCC campus' parking lots and other impervious surfaces, and provide valuable habitat to a variety of commercially and recreationally important fish and invertebrates, over 6,000 marsh plants were planted through this APNEP Demonstration Project. The marsh plants will also help to reduce erosion and improve water quality by reducing the amount of sediments, nutrients and toxins entering the Bogue Sound waters.

Objectives/Progress: April 11, 2011 – July 29, 2011

The "Living Shoreline to Improve Habitat & Water Quality and Reduce Stormwater Runoff into Bogue Sound" project goals were to:

- Educate local Carteret County middle school students and CCC students on the importance of native wetland plants and controlling stormwater runoff with hands-on lessons in a 'living classroom.'
- Plant the shoreline area in front of CCC/CMAST with *Spartina patens* (saltmeadow hay) and *Spartina alterniflora* (smooth cordgrass) with at least 40 students and community volunteers.
- Document the success of the project through monitoring.
- Educate visitors to CCC/CMAST (fishermen, general public, developers) on the effectiveness of these practices in controlling runoff, creating habitat, building resiliency into the landscape in the face of climate change and demonstrating their ease of application in both residential and commercial settings.

The following project goals and benchmarks have been met for this grant:

- On April 29, 2011, NCCF staff met with CCC staff to generate a planting plan at the site.
- A press release highlighting the May 3, 2011 spring planting event was submitted on April 25, 2011 (see below).
- The Jacksonville Daily News ran the planting event article in the May 2, 2011 issue (attached).
- Photos of the site were taken on May 3, 2011 prior to the planting.
- On May 3 and 16, 2011, a total of 6,400 *Spartina alterniflora* (smooth cordgrass) and 2,000 *Spartina patens* (saltmeadow hay) plugs were planted along the previously restored Bogue Sound shoreline of the CCC campus. The extra 2,400 plants were obtained through funding from the National Oceanic and Atmospheric Administration and Restore America's Estuaries and donated by Garner's Landscaping & Plant Stand.

The plants were planted by NCCF and APNEP staff, community volunteers, middle school students from Gramercy Christian School and high school students from Croatan High School (Figure 1). The students and volunteers used dibblers to create 6" V-shaped holes in the sediment. Individual plugs of marsh plants were then inserted into each hole and covered with sediment. Marsh plants were planted randomly 6 in. to 1 ft. apart within the planting area.

These plants will help to capture and absorb stormwater runoff that flows from the parking lots and other impervious surfaces during heavy rain events from the CCC campus into Bogue Sound, thereby reducing the amount of polluted stormwater runoff entering into the sound. The plants will also help to prevent erosion of the shoreline and create habitat for a variety of estuarine organisms.

- The planting was featured in the Carteret News-Times on Sunday May 8, 2011 (attached).
- NCCF's summer interns from Duke University learned about the project during a tour of living shorelines in central coastal North Carolina on May 31, 2011 (Figure 2). NCCF will continue to give tours at this highly visible shoreline restoration demonstration site.
- NCCF staff visited the site again on July 18, 2011 and took project photos.
- CCC students conducted post-project monitoring on July 27, 2011.



Figure 1. Students and community volunteers learned about stormwater runoff, estuarine water quality and habitat and coastal restoration while they planted the Bogue Sound shoreline. APNEP staff also assisted with the planting (bottom left), May 2011.



Figure 2. NCCF summer interns tour the shoreline restoration project, May 2011.

Albemarle-Pamlico Comprehensive Conservation & Management Plan (CCMP) Actions Addressed

- **Vital Habitats Plan** – Conserve and Protect Vital Fish and Wildlife Habitats and Maintain the Natural Heritage of the Albemarle-Pamlico Sounds Region.
 - Objective C: Maintain, restore and enhance vital habitat functions to ensure the survival of wildlife and fisheries
 - The project restored and enhanced salt marsh habitat adjacent to the shellfish (SA conditionally approved – open) waters of Bogue Sound. Additionally, this project met the objectives of the NC Division of Marine Fisheries Coastal Habitat Protection Plan.
- **Water Quality Plan** - Restore, maintain or enhance water quality in the Albemarle-Pamlico region so that it is fit for fish, wildlife and recreation.
 - Objective B: Reduce sediments, nutrients and toxicants from nonpoint sources
 - Re-vegetating and restoring the shoreline provides increased infiltration and reduced volume of polluted stormwater runoff entering Bogue Sound.
- **Stewardship Plan** - Promote Responsible Stewardship of the Natural Resources of the Albemarle-Pamlico Sounds Region
 - Objective B: Increase public understanding of environmental issues and citizen involvement in environmental policy making.
 - This project is located in a high visibility area; members of the community and the general public visit the site on a daily basis, creating an ideal opportunity to learn about stormwater pollution and best management practices. The site's high visibility increases the project's utility as a public demonstration site.
 - Objective C: Ensure that students, particularly in grades 6-8, are exposed to science and environmental education.
 - NCCF will conduct classroom lessons for local students and involve them in the shoreline plantings. This environmental education will teach the importance of protecting and improving water quality for the benefit of fish, fisheries and coastal habitats.



FOR IMMEDIATE RELEASE

April 25, 2011

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New Habitat for Bogue Sound

OCEAN – On Tuesday, May 3rd, over 50 students from Croatan High School and community volunteers will be involved in a unique hands-on coastal restoration opportunity from 10:00 a.m. until 4:00 p.m. The volunteers will plant 15,000 plugs of two species of salt marsh grass at two locations along the Bogue Sound shoreline in Morehead City; behind the NC Division of Marine Fisheries (NC DMF) facility and behind N.C. State University's Center for Marine Science & Technology (CMAST) building located on the Carteret Community College campus.

The marsh plants will provide valuable habitat for fish and crabs, absorb and filter polluted stormwater runoff from the parking lots, sidewalks and other impervious surfaces associated with the facilities, and help to prevent shoreline erosion through their extensive root systems.

The plantings are being paid for through environmental enhancement and demonstration grants from the Albemarle-Pamlico National Estuary Program that were awarded to the North Carolina Coastal Federation and the North Carolina Division of Marine Fisheries to improve water quality and create valuable estuarine habitat in the Albemarle-Pamlico estuarine region.

The shoreline restoration at NC DMF is part of a comprehensive stormwater management site plan that was developed in 2008 to reduce stormwater runoff into Bogue Sound and improve its water quality. The plan was derived through a mini-grant from the N.C. Clean Water Management Trust Fund. A rain garden was previously installed at NC DMF through the recommendations of this master plan to capture and absorb stormwater runoff on site.

The planting at CMAST will enhance fringing salt marsh habitat that was restored through a previous living shoreline project, the goals of which included shoreline stabilization, establishment of coastal marsh and oyster reef habitats, construction of a stormwater treatment wetland and educational opportunities.

Interested volunteers can register for either the 10:00 a.m. - 1:00 p.m. or the 1:00 p.m. - 4:00 p.m. restoration sessions, although they may register for both. Volunteers will be assigned to one of the two nearby planting locations. Water, snacks, sunscreen, bug spray and planting tools will be provided. Volunteers should wear closed-toe shoes and clothing that may get wet and dirty. All ages are invited, though children under the age of 12 will need to be accompanied by an adult. For more information and to register, please contact Lexia Weaver at 252-393-8185 or at lexiaw@nccoast.org.



Volunteers needed for bogue sound plantings

2/11
2005

Daily News staff reports that the Division of Marine Fisheries and Atmospheric Administration is looking for volunteers to help with a project in Bogue Sound. The project is part of the National Estuarine Research Reserve's effort to improve water quality and create valuable habitat in the state's coastal waters.

Community volunteers are invited to join Carteret County students in a project to plant 15,000 plugs of salt marsh grass along the sound's shoreline, behind the N.C. Division of Marine Fisheries headquarters and at the nearby Center for Marine Science & Technology located on the Carteret Community College campus in Morehead City.

More than 50 students from Croatan High School will team up with volunteers Tuesday to plant 15,000 plugs of salt marsh grass along the sound's shoreline, behind the N.C. Division of Marine Fisheries headquarters and at the nearby Center for Marine Science & Technology located on the Carteret Community College campus in Morehead City.

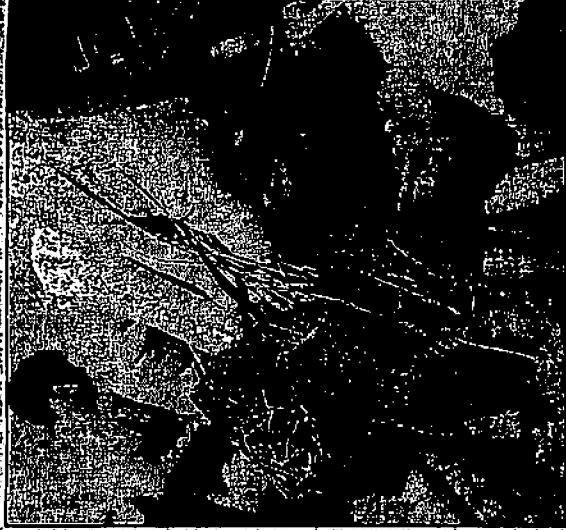
The plantings will start at 10 a.m. and end at 4 p.m. The N.C. Coastal Federation and the Division of Marine Fisheries are heading the effort with grants from the National Oceanic and Atmospheric Administration and the Albemarle-Pamlico National Estuary Program, a joint federal and state effort to improve water quality and create valuable habitat in the state's coastal waters.

The planting, behind N.C. State's CMAST building, will enhance salt marsh habitat that was restored during a previous project. The goal is to control erosion, create coastal marsh, and oyster reefs, build a wetland to treat stormwater, and educate the public.

Anyone interested in volunteering, should contact Lexia Weaver at 252-393-8185 or alexaw@nccoast.org for more information and to register.

The planting, behind N.C. State's CMAST building, will enhance salt marsh habitat that was restored during a previous project. The goal is to control erosion, create coastal marsh, and oyster reefs, build a wetland to treat stormwater, and educate the public.

YCCF-edu
stormwater



Left, Croatan High School students plant marsh grass Tuesday along the shoreline of the N.C. Division of Marine Fisheries in Morehead City as part of a shoreline restoration project sponsored by the N.C. Coastal Federation and other agencies. Above, these plants are ready to go into the ground. (Cheryl Burke photos)

Students, volunteers join in shoreline restoration project

BY CHERYL BURKE
NEWS-TIMES
MOREHEAD CITY — Shovels in hand, more than 50 students from Croatan High School teamed up with adult volunteers Tuesday to plant 15,000 plugs of salt marsh grass. The plugs are along the sound's shoreline behind the N.C. Division of Marine Fisheries and N.C. State University's near-Center for Marine Science & Technology located on the Carteret Community College campus. The marsh plants will provide valuable habitat for fish and crabs, absorb and filter polluted stormwater runoff from the

parking lots, sidewalks and other hard surfaces and help prevent shoreline erosion, according to Sarah Phillips, education coordinator with the N.C. Coastal Federation. Ms. Phillips said the federation has partnered with Croatan High School for several years on planting projects such as the one done Tuesday. "It's a great experience for them, and they have worked so hard," she said. "They got done in two hours what it would have taken us all day to do." Sheila Moore, earth and environmental science teacher at Croatan, said projects such as the one done Tuesday provides

a valuable learning experience for students. "The kids have been studying about terminal groins and methods of stopping erosion," she said. "This is one method of stopping erosion along the waterfront." She added that she values the partnership with the Coastal Federation. "We have an opportunity right here in Carteret County to get out and make a difference, so it's important to get out and do it," she said. Student Andrea Yarbrough said she enjoyed working on the project. "I feel like I'm helping out

our shorelines and making a better environment," she said. Student Mary Leonard agreed. "It feels good. It's fun to be out here helping the environment." Students started out at the Division of Marine Fisheries, where they planted more than 6,000 Spartina marsh grass plants, then moved to the shoreline in front of CMAST, where the balance of plants were placed. The state's fishery division headed the planting effort with grants from the National Oceanic and Atmospheric Administration, Restore

America's Estuaries and the Albemarle-Pamlico National Estuary Program, a joint federal and state effort to improve water quality and create valuable habitat in the state's estuaries. The shoreline restoration at the fisheries complex is part of a comprehensive stormwater management plan that was developed in 2008 to reduce stormwater runoff into Bogue Sound and improve its water quality. A grant from N.C. Clean Water Management Trust Fund paid for the plan. As part of the plan, a rain garden was previously built at the building to capture and absorb stormwater runoff. Patricia Smith, public information officer for the Division of Marine Fisheries, said her agency appreciated the hard work of the students and NCCF volunteers. "This is a lot of help to us," she said. "We have an overall plan for stormwater runoff control and this helps control some of the stormwater runoff that comes from the yard and parking areas." The planning behind N.C. State's building enhances soil marsh habitat that was restored during a previous project. The goals are to control erosion, create a coastal marsh and oyster reef, build a wetland to treat stormwater and educate the public.

NCCF-edu
Stormwater