

QUARTERLY NEWSLETTER OF THE JACQUES COUSTEAU NATIONAL ESTUARINE RESEARCH

LIFE ON THE *edge*

CLIMATE TRAINING THROUGH THE JACQUES COUSTEAU RESERVE

Recognizing the Shore's vulnerability to climate change, the Jacques Cousteau National Estuarine Research Reserve has been undertaking research, assessment, planning, and outreach activities to address local impacts of climate change.

It is widely recognized that a changing climate will have consequences at a broad range of scales including locally for coastal communities. Rates of sea level rise along the New Jersey coast are about 3-4 mm/year, with projected future rates expected to increase to about 6 mm/year. The highly developed nature of coastal and barrier island communities in New Jersey make them particularly vulnerable to flooding and inundation. Rising concern among state, county and local government officials has spurred dialogue on strategies to enhance preparedness and accommodate a rising sea level. In April 2010, the Reserve co-hosted a conference on "Preparing Your Community in the Face of a Changing Climate". This meeting provided a framework for other climate-related activities at the Reserve.

One action item that stemmed from the conference was for Reserve staff to assist the Edwin B. Forsythe Refuge with a living shoreline stabilization project. Under the guidance of Dr. Dave Bushek and Dr Norb Psuty, a pilot project was designed and planned. The Refuge is awaiting final permit review and plans to install the living shoreline (coconut fiber logs that serve as natural habitat for organisms and reduce erosion) in spring 2011. As an offshoot of this project, the Reserve hosted the Land Use Regulation staff of the N.J. DEP for a day-long retreat that included stops at the Refuge to view the proposed project, stops at successful living shoreline project in south Jersey, and a final stop at an eroding site located at the Rutgers aquaculture facility in Cape May. The retreat provided the regulatory staff with science-based information on living shoreline projects, and helped them to visualize the benefits of these projects. Other climate activities being undertaken by the Cousteau Reserve include a partnership with the Barnegat Bay Partnership to engage the public in "climate listening sessions." These sessions are expected to guide future climate education in the Barnegat Bay Watershed. The Reserve also co-hosted a Coastal Inundation Mapping Course with the Office of Coastal Management at the NJ DEP. The two-day course allowed 27 coastal management professionals to receive training on the use of ArcGIS software to synthesize information from NOAA, the US Geological Survey (USGS), the Federal Emergency Management Agency and



More accolades for Cousteau Reserve scientist Mike Kennish

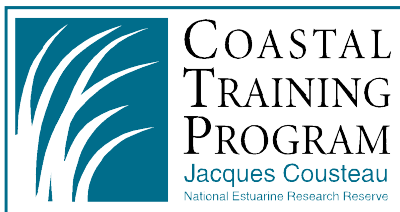
Dr. Michael J. Kennish received the Sierra Club of New Jersey 2010 Outstanding Achievement Award and the American Littoral Society's Graham Macmillan Award for his outstanding contributions to marine science. Speaking of Mike's contributions American Littoral Society Executive Director, Tim Gillingham stated "Mike's contribution, reaches beyond the realm of pure research. He has shown outstanding leadership, courage and unparalleled passion in bringing the threats and challenges facing the coast to the attention of decision makers and the public. His work has provided vital scientific understanding of these issues and given voice to our shared desire to see these ecosystems remain healthy and vibrant."

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Climate training

(continued from page 1) others into a map to identify areas susceptible to flooding. In addition,, the Reserve is working with the Center for Remote Sensing and Spatial Analysis at Rutgers to develop an interactive website that will help users view sea level rise and storm surge over predicted changes in sea level rise. The project aims to make vulnerability mapping accessible to decision makers so they can start incorporating sea level rise planning into community planning. Reserve staff has been assessing the needs of coastal managers so that the website can be designed in response to user needs and preferences.

Cousteau Reserve Coastal Training programs provide proactive initiatives to adapt to rising sea-level. Living shorelines, interactive web tools, and public education programs are feature programs at the Center.



Cousteau Reserve initiates living shoreline program with the Edwin B. Forsythe Refuge.

Rutgers faculty members Dr David Bushek and Dr Norb Psuty assist the Forsythe Refuge with developing plans to stabilize shorelines using coconut fiber logs. The Cousteau Reserve provided an opportunity for NJDEP Land Use regulators and Forsythe Refuge staff to visit successful shoreline stabilization projects along the banks of the Maurice River.



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Managers message



Public Outreach "in the field."

JCNERR co-sponsor with the Barnegat Bay Partnership and the Lakewood BlueClaws "Nine Innings for Nature". An open house at the Rutgers Marine Field Station drew a record breaking 826 visitors who ventured through the field station to learn more about ongoing research and coastal issues.

A Message from JCNERR Manager

November 2010

Many of the programs highlighted in this edition of the newsletter feature local and regional work underway at the JCNERR

related to climate change and coastal hazards. At the national level, the reserve system is making a strong, focused commitment to invest expertise and resources to help coastal communities adapt to the human and environmental stressors associated with climate change. These include changes in storm patterns and frequency, freshwater discharge, storm surge, range shifts in biota and a changing sea level. The national framework has four key elements:

- 1) understand vulnerability and the impacts of climate change on reserve estuaries and watersheds,
- 2) foster adaptation planning in coastal communities,
- 3) take steps to ensure long-term resilience and function of estuarine systems, and

4) achieve carbon neutrality with reserve facilities, lands, and programs.

These elements will inform the research, education and stewardship programs at the JCNERR for the next several years. Given our changing climate, the JCNERR and its sister sites throughout the U.S. might be considered as "sentinels" of change to coastal and estuarine ecosystems. Our challenge

will be to observe and understand changes as they occur, and work with our coastal partners to develop adaptation strategies at the ecological and community levels. I encourage you to participate in the broad range of programs emerging on climate change and coastal hazards, and learn what you can do to make a difference.

Mike De Luca



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Implementation of real-world science and technology into formal and informal instruction in urban school systems

A partnership of research scientists, science educators and supporters of science-based conservation are developing mechanisms to engage middle school students and educators from a major urban region in geosciences research with advanced sampling and sensing platforms. The collective science and education strengths of the Jacques Cousteau NERR, Rutgers University, the N.J. Marine Sciences Consortium/N.J. Sea Grant College Program, Brookdale Community College, and the Sandy Hook Foundation--a nongovernmental organization, constitute the backbone of a partnership that is incorporating real-world geoscience programs into formal and informal science curricula and activities at the Red Bank Middle School. The school is revamping its science curricula to align it with the new state science standards which were just revised to include the earth sciences. The partnership is developing educational strategies to incorporate real-world science and technology into the new curricula with an emphasis on inquiry-based learning, integrated science topics, and the inclusion of technology. The project has been funded by the National Science Foundation.

Reserve educator efforts this quarter also focused on developing curriculum activities focusing on climate change, biodiversity, and eels.

Education Programs and Series

Lunch and Learn Series

Navigation Through the Ages- October 13, 2010

Shark Attacks of 1916- November 10, 2010

Protecting Barnegat Bay- December 8, 2010

Tuckerton Railroad- January 12, 2010

Clamming in the Bay with the Parsons- February 8, 2010

Barnegat Bay Sneakbox- March 9, 2010

Impacts of a Changing New Jersey Landscape- April 13, 2010

The Art of Scrimshaw- May 11, 2010

Ecological Evenings

Water in the Pinelands- October 5, 2010

Journey to Africa- November 9, 2010

Terrapins on Great Bay- January 19, 2011

Fisheries Around the World- February 10, 2011

Fish Tracking by Underwater Robot- March 16, 2011

Professional Development for Educators

Learning Ocean Science through Ocean Exploration Curriculum for Science Teachers Grades 6-12 to the Reserve on February 26, 2011

Shore Bowl

Shore Bowl, a regional competition of the National Ocean Science Bowl (NOSB) on February 5, 2011



Glass eels begin their life in the Sargasso Sea.

Eye on Research: American Eels

American eels (*Anguilla rostrata*) are critical components of local estuarine ecosystems as well as an important source of bait for recreational fisherman. In the last two decades eel abundance has declined considerably. Adult eels spawn in the Sargasso Sea. Following an oceanic larval phase the transformed young "glass eels" enter estuarine environments. Little is known about long-term trends in glass eel abundance or the environmental factors moderating ingress. Rutgers researchers seek to better understand patterns and processes relating to glass eel ingress via (1) Quantifying variability of glass eels entering the Mullica River-Great Bay estuary using a long-term ichthyoplankton data set and expanded local sampling; (2) Evaluating the relative degree of glass eel synchrony exhibited between the Mullica River-Great Bay and Great Egg Harbor estuaries using arrays of novel glass eel collectors over multiple spatial/temporal scales; and (3) conducting analyses into the environmental cues moderating variability in glass eel supply. Given the paucity of available early life history data for American eels, this information is highly relevant to the biology and management of local eel fisheries along the entire U.S. east coast.

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Biofouling Battle on the Research Trail

Biofouling by organisms such as alga, barnacles, mussels, and amphipods (among others) is a persistent phenomenon that reduces the accuracy and usability of data collected via the long-term deployment of unattended monitoring equipment. The JCNERR has developed some novel anti-fouling techniques that are currently in use at our SWMP Water-monitoring stations. One such method is the fabrication of a vented copper section at the ends of the PVC pipes that house our deployed Y.S.I. datasondes in the field. A recent inspection of the pipe ends and a preliminary review of this year's data compared to those of years' past suggest a significant depression (and at some stations a near-complete prevention) of the fouling communities that typically encrust the below-water portions of the pipes and impede water-exchange across the sensors, creating a false microcosm not representative of the ambient environment. The ultimate goal of such efforts is to eliminate such false-signal effects of biofouling, and this development appears to nicely compliment the manufacturer-recommended use of copper alloy sonde parts and/or treatment of probes with an adhesive copper tape. This technology will be presented at the NERRS Technician Training Workshop in February 2011 to be considered for reserve-wide implementation.



Modified datasonde case reduces fouling and keeps water quality data "clean".

The JC NERR currently has five permanent System Wide Monitoring Program (SWMP) monitoring sites. They include four water-quality monitoring stations (Channel Markers 126 and 139 in Great Bay, Chestnut Neck Marina near the Garden State Parkway overpass, and Lower Bank Bridge) and one weather-monitoring station at Nacote Creek/Stockton College Marine Field Station. Additionally, nutrient-samples are collected and analyzed monthly at the aforementioned, and other, water-quality locations in the Great Bay-Little Egg Harbor Estuary.



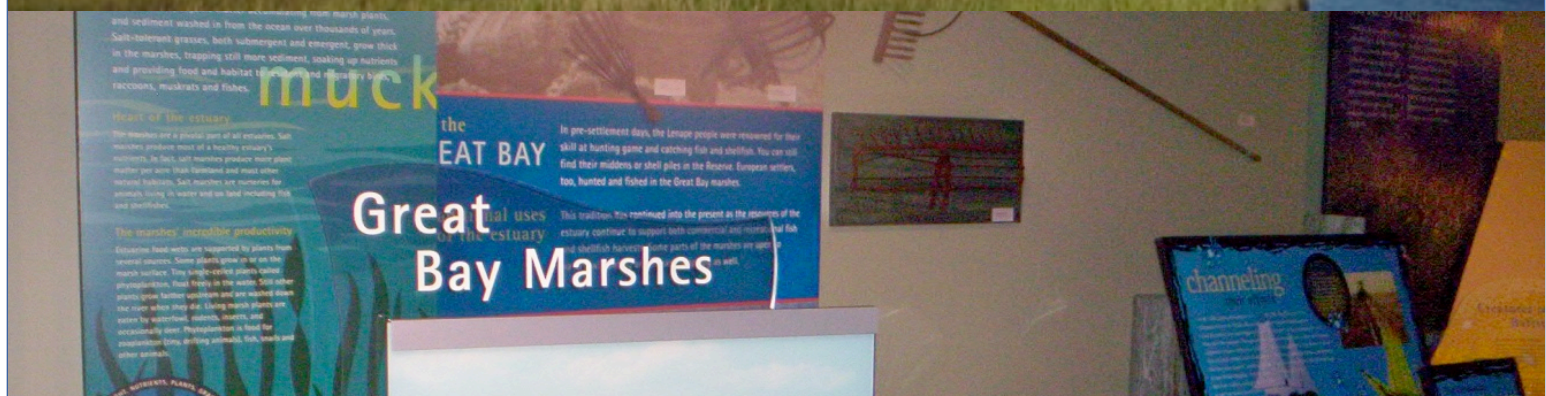
The New Jersey Ambassadors Program is a community-oriented AmeriCorps environmental program coordinated by the New Jersey

Department of Environmental Protection. The program's purpose is to raise awareness about watersheds in New Jersey. AmeriCorps members are placed in watershed management areas across the state to serve the educational water-related interests of their local communities.

Welcome 2010 Watershed Ambassador

Nina Sassano has been appointed as the 2010/2011 Mullica River Watershed Ambassador. Nina graduated in May of 2010 from The Richard Stockton College of NJ with a Bachelor of Science in marine biology. Nina is working towards her ultimate goal of becoming a marine biology professor. In discussing her new position, Nina says "As a watershed Ambassador my duties entail public education with people of all ages as well as field work collecting data to supplement the DEP's water quality assessment programs. I also host training opportunities so the public can have the opportunity to get a hands on experience building their environmental stewardship. I am a free resource for schools, adult communities and public events and am more than happy to organize anything to help promote a clean and healthy future for everyone." Nina can be contacted at the email address: watershed@marine.rutgers.edu.

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Funding in Place to Revamp Life on the Edge Exhibit

In 2002, the JC NERR opened the “Life on the Edge” exhibit at the Tuckerton Seaport. The Life on the Edge exhibit is the gateway to the Reserve by introducing how its habitats are connected by one water system: the Mullica River/Great Bay. As well as being the prime opportunity for the JC NERR to reach the public, the Life on the Edge Exhibit is the introductory directive into the Tuckerton Seaport, a 40 acre maritime museum on the Tuckerton Creek. Visitors experience the seamless connection between the coastal community’s nature and cultural history through the interpretation of both the Reserve’s and Seaport’s exhibit. Due to wear and tear of hands-on equipment, areas of the space have to be closed. There is also a need for up-dated changes to the messaging, in order to address issues of our changing estuary such as affects of pollution, habitat loss, and climate change. NOAA has provided funds that will allow the JCNERR to renew and revision our exhibit to be the “north star” of JCNERR mission: To improve management of NJ coastal environments through science,

education and stewardship. The Life on the Edge exhibit tells a story that couldn’t easily be told at the Cousteau Coastal Center, allowing our staff to do other things. One disadvantage of being off-site is; it is harder to brand the Exhibit as part of the JC NERR. Careful planning for the Exhibit renewal will help our target audience attain an enhanced perception of the Reserve as a special place of immense value and beauty.

To get started, JCNERR exhibit redesign staff is meeting with a team from the Franklin Institute in order to tap into its expertise in audience research and complex science interpretation. Through the process of joint meetings, exhibit evaluation, and defining the project’s interpretation goals and desired outcomes, the Franklin Institute team will produce a document that will allow a design studio understand the scope of the changes that are achievable within the available grant funds.

The first meeting took place on Nov. 12th and after a walk thru and an initial review of the exhibit; we learned that there is way too much text. There is an “exploded book on the wall” effect due to all of various fonts and confusing colors that do not provide connection and

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continuity between the different sections of the exhibit. No wonder a common reaction from visitors is “This is really a beautiful exhibit and there is a lot to see. I’ll come back when I have more time” We had a discussion about creating visitor experiences to get the visitor to both to understand information [cognitive] and to feel something about the information [affective] Our goal now create an exhibit so compelling that visitors will want to immerse themselves and engage with it immediately; no more vague promises to return at the later date to read the all the text boards. Our meeting ended with a brainstorming activity of word crafting an overall mission of the renewed exhibit. There is a genuine excitement about going forward with the project. Look for an update in the next newsletter.

From the Interpreter

Visit our interpreter, Ida Louise Scott at the Life on the Edge exhibit.

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JCNERR Volunteer Base Grows Providing Critical Support for Reserve Activities

The summer and fall of 2010 has been filled with festivals, public programs, and workshops all accomplished successfully with the help of our Reserve's fantastic volunteer members. Our volunteer base grew quite a bit over the past few months with the sign up of 28 new members; this brings our total number to 140 volunteers! Over 1,180 hours have already been contributed since the summer began and we can't thank our volunteers enough for their dedication and service to the Jacques Cousteau Reserve!

Some of the highlights this summer and fall season have varied from festivals to field work. These events included the Barnegat Bay Festival, Cattus Island Festival, Cohansey Riverfest, Harborfest, and Coast Day. In addition, volunteers assisted the Rutgers Marine Field Station with its Long Term Otter Trawls in the field and also helped host the marine field station's Open House – where a record breaking 826 visitors ventured through the field station to learn more about the research conducted there. Our volunteers were vital to the success of that day and many of the other events we host here at the Reserve including our free summer public programs for kids such as "Creature Features" and several of our adult programs like our "Lunch n' Learn" and "Ecological Evenings" series, as well as our Professional Development workshops.

In these past few months we have also tackled a few new endeavors, including acting as a co-sponsor with the Barnegat Bay Partnership and the Lakewood BlueClaws for their event "Nine Innings for Nature". Volunteers and JCNERR members enjoyed a nice night at the ball



park in addition to promoting our respective missions alongside other environmentally minded organizations. A new monthly Volunteer Newsletter made its debut in June and has received much praise from volunteers as a nice addition to increasing our means of communication. An Orientation was also held this summer to recruit new volunteer educators for the Reserve's "Life on the Edge" exhibit, which showcases the importance of estuaries and is hosted by the Tuckerton Seaport Historic Museum. We now have three new volunteer educators in addition to our two Public Docents, Astrida Sinteff and Joan Kupchynsky. Joan and Astrida are two very dedicated volunteers who received professional training specifically to educate the public in a museum based setting as docents. Many of our volunteers were showcased in newspaper articles highlighting their contributions to research at the Rutgers Marine Field Station, specifically Pat Filardi for his work with

Bridgenetting and Otter Trawl and Tori Musemeci for her research on the American Eel, which she presented to high school and middle school students at World Water Monitoring Day in Batsto Village. Last but not least, one of our volunteers was also recognized as "Volunteer of the Year" by the Monmouth University's Urban Coast Institute. Steve Zeck was awarded "Volunteer of the Year" at the Urban Coast Institute's "Ocean Champion and Leadership Awards" ceremony and we were all incredibly proud of his accomplishment and incredibly grateful for his service over the years here at JCNERR.

To conclude, it was a very productive and fun summer and the momentum built from that has carried over into our fall activities. Thanks to all of our volunteers for their contributions. The Cousteau Reserve would not be such a success without you!

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Publications & Presentations 2010

Books

Kennish, M. J. and H. W. Paerl (eds.). 2010. Coastal Lagoons: Critical Habitats of Environmental Change. Taylor and Francis, CRC Press, Boca Raton, Florida. 558 pp. (Published in June 2010).

Kennish, M. J. and M. Elliott (eds.). In Press. Human-induced Changes in Coastal and Estuarine Regions. Volume 8, Treatise on Coastal and Estuarine Science, Elsevier, Oxford, England.

Invited Editor (M. Kennish): Treatise of Estuaries and Coastal Science, Volume 8: Human-induced Changes in Coastal and Estuarine Regions. (In Press).

Kennish, M. J. and H. W. Paerl. 2010. Chapter 1. Coastal Lagoons: Critical Habitats of Environmental Change. In: Kennish, M. J. and H. Paerl, eds., Coastal Lagoons: Critical Habitats of Environmental Change. Taylor and Francis, CRC Press, Boca Raton, Florida. Pp. 1-16. (Invited Contribution).

Kennish, M. J., M. Haag, and G. P. Sakowicz. 2010. Chapter 8. Seagrass decline in New Jersey coastal lagoons: a response to increasing nutrient loading and eutrophication. In: Kennish, M. J. and H. W. Paerl, eds., Coastal Lagoons: Critical Habitats of Environmental Change. Taylor and Francis, CRC Press, Boca Raton, Florida. Pp. 167-202. (Invited Contribution).

Kennish, M. J. In press. Barnegat Bay-Little Egg Harbor Estuary. In: P. Glibert, C. Madden, W. Boynton, D. Flemer, C. Heil, and J. Sharp (eds.), Estuarine Nutrient Criteria Development: State of the Science. EPA Office of Water, Washington, D.C. (Invited Contribution).

Kennish, M. J. and V. N. de Jonge. 2010. Nutrient and organic carbon enrichment: Causes and consequences of eutrophication. In: Kennish, M. J. and M. Elliott, eds., Human Induced Changes in Coastal and Estuarine Regions. Treatise on Coastal and Estuarine Science, Elsevier, Oxford, England. 133 pp. (Manuscript in Press).

Journal Articles (Refereed)

Kennish, M. J. 2010. Nutrient pollution indicator development for the Barnegat Bay-Little Egg Harbor Estuary, New Jersey, using eelgrass, *Zostera Marina* (L.). Aquatic Botany. (Manuscript submitted, in review).

Abstracts

Kennish, M. J., S. M. Haag, and G. P. Sakowicz. 2010. Effects of nutrient enrichment on seagrass habitat in the Barnegat Bay-Little Egg Harbor Estuary. Annual Meeting Abstracts, National Estuarine Research Reserve System Program, Sheperdstown, West Virginia, October 13, 2010.

Seely, T. and M. Kennish. 2010. Spatial and temporal variation of epiphytic growth on *Zostera marina*. Annual Meeting Abstracts, National Estuarine Research Reserve System Program, Sheperdstown, West Virginia, October 13, 2010.

Kennish, M., S. Haag, R. Connell and R. Schuster. 2010. Benthic community assessment of nearshore ocean waters in New Jersey. 55th Annual New Jersey Academy of Science Meeting Abstracts, Kean University, Union, New Jersey, April 24, 2010.

Presentations (Conferences and Symposia)

Kennish, M. J. 2010. Barnegat Bay-Little Egg Harbor Estuary: eutrophication update. New Jersey Water Quality Council Meeting, New Jersey Department of Environmental Protection, Trenton, New Jersey, September 22, 2010.

Seely, T. and M. J. Kennish. 2010. Spatial and temporal variation of epiphytic growth on *Zostera marina*. RIOS Project Presentations, Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, New Jersey, August 9, 2010.

Kennish, M. J. 2010. Ecosystem condition of the New Jersey coastal bays. Invited Presentation, Virginia Institute of Marine Science, Gloucester Point, Virginia, August 10, 2010.

Kennish, M. J. 2010. Barnegat Bay-Little Egg Harbor Estuary: estuary assessment. Technical Conference on the Barnegat Bay-Little Egg Harbor Estuary, New Jersey Department of Environmental Protection, Trenton, New Jersey, July 14, 2010.

Kennish, M. J. 2010. Barnegat Bay-Little Egg Harbor Estuary: ecosystem assessment. New York Bight Nitrogen Workshop, New York Sea Grant, New York, July 8, 2010.

Kennish, M., S. Haag, R. Connell and R. Schuster. 2010. Benthic community assessment of nearshore ocean waters in New Jersey. 55th Annual New Jersey Academy of Science Meeting Abstracts, Kean University, Union, New Jersey, April 24, 2010.

Kennish, M. J. Climate change in the northeast. Annual Meeting, Northeast Regional Leadership Technology Conference, Soil and Water Conservation Society, USDA, Avalon, New Jersey, April 14, 2010.

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Cousteau Center at Bridgeton Builds Knowledge and Oyster Reefs

Volunteers gathered at the municipal dock in Shellpile to help load 2700 bags containing 16 tons of clam shell on to a barge. The shell bags destined for a tidal flat located in the lower Delaware Bay were created by Bridgeton area school children who participated in the Cousteau Center at Bridgeton's feature K-12 education program Project PORTS: Promoting Oyster Restoration through Schools. The children experienced in-class enrichment activities presented by scientist

educators. The multifaceted lessons provided students an opportunity to learn about an important local resource and help restore oyster habitat in the Delaware Bay.

Once deployed in the bay, the shell bags became home to 7.2 million oyster spat, which attached to the shells encased in the bags. In late summer the shell and attached oyster spat were transplanted to conservation and fishery areas located in the upper Bay. The oyster habitat restoration project was conducted in collaboration with the American Littoral Society and the NJDEP Shellfisheries Bureau.

Also at the Bridgeton Center

- Center co-hosted inaugural Cohansey RiverFest
- Acoustic mapping of Atlantic sturgeon with the autonomous underwater vehicle-REMUS

Project PORTS provided sustained, authentic learning and created a spirit of environmental stewardship among our students. Each of your visits was the source of excitement for hands-on learning led by an actual marine biologist! Gail M. Curcio, Principal, D'Ippolito Elementary School, Vineland, NJ

Student stewards

Students at West Avenue School in Bridgeton construct shell bags. D'Ippolito School, Vineland student prepares to measure oyster shell height as part of a Project PORTS lesson about oysters.



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JCNERR Partners

National Oceanic and Atmospheric Administration, NOAA,
Estuarine Reserve Division • NOAA Coastal Services Center •
Rutgers, The State University of New Jersey, Institute of
Marine and Coastal Sciences • New Jersey Audubon
Society's Nature Center of Cape May • New Jersey
Department of Environmental Protection • New Jersey
Pinelands Commission • Edwin B. Forsythe National

Wildlife • Richard Stockton College of New Jersey •
Tuckerton Seaport • The Cooperative Institute of Coastal
and Estuarine Environmental Technology

*The JCNERR promotes informed use and management of the
Mullica River—Great Bay Estuary through scientific research,
education, and stewardship.*



JACQUES COUSTEAU COASTAL CENTER

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