

QUARTERLY NEWSLETTER OF THE JACQUES COUSTEAU NATIONAL ESTUARINE RESEARCH RESERVE

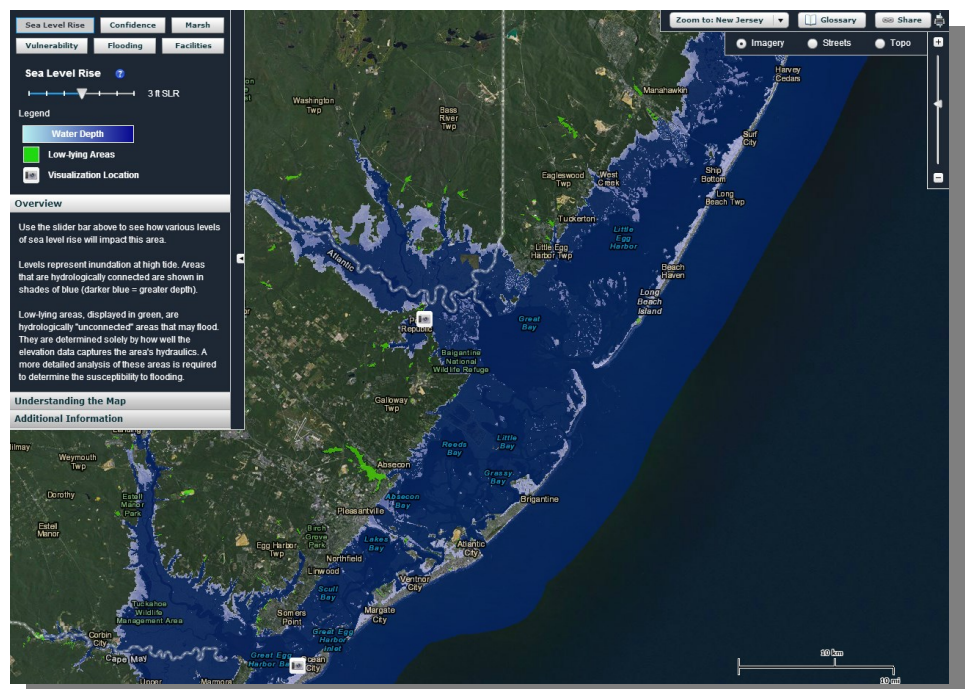
LIFE ON THE *edge*

LAUNCH OF THE NEW JERSEY FLOOD MAPPER

Jacques Cousteau National Estuarine Research Reserve and the Barnegat Bay Partnership announce the launch of a new website created to prepare communities for a changing future.

Due to a changing climate, higher tides and flooding events are occurring more frequently and intensely. JC NERR staff and scientists from Rutgers University have developed several web-based planning tools designed to help communities prepare for these changing environmental conditions as a part of a program to enhance resilience to sea level rise and flood events. "Getting to Resilience" is an online self-assessment tool to enhance community resilience by incorporating mitigation, and adaptation strategies in traditional planning processes. The interactive tool helps community leaders qualify for benefits or "points" via voluntary programs such as the FEMA Community Rating System and Sustainable Jersey. The assessment process also helps communities identify their future vulnerabilities associated with climate change and sea level rise and to address these through hazard mitigation planning.

The Getting to Resilience tool features a questionnaire to be completed by a group of community individuals in a collective process. Key participants include Land Use Planners, Hazard Mitigation Planners, Floodplain Managers, Emergency Managers, Stormwater Managers, Natural Resource Planners, Municipal Engineers, Municipal Leaders, Zoning and Permitting Officials, and Public Works Officials. The Getting to Resilience tool was designed to be used in conjunction with the New Jersey Flood Mapper tool (NJFloodMapper.org). Together, these websites will help communities visualize their future risk and plan for that risk using their existing municipal planning tools. **Above: NJ Flood Mapper– 3ft Sea Level Rise in Tuckerton, NJ.**



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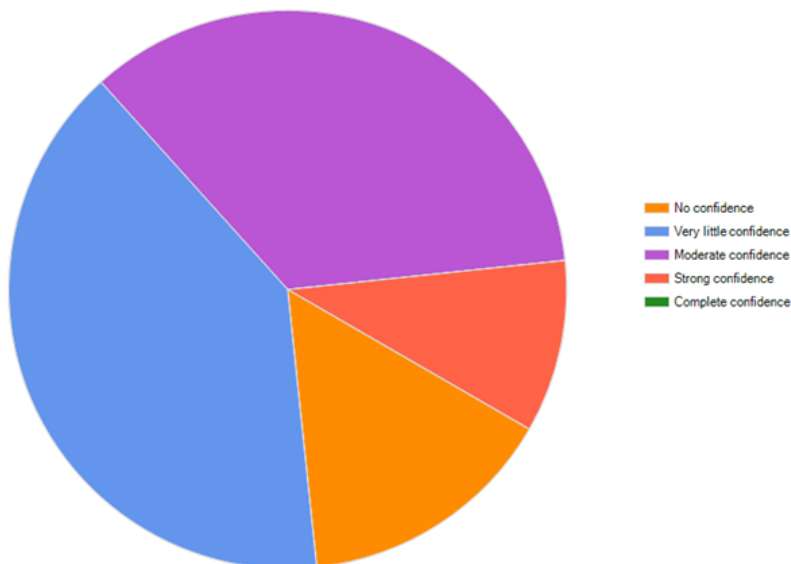
The website was made possible through a partnership between the Jacques Cousteau National Estuarine Research Reserve and the Barnegat Bay Partnership. The online version of Getting to Resilience was produced in response to interest generated by the Coastal Management Office at the NJ Department of Environmental Protection. Additional funds were provided by Sustainable Jersey and the Climate Ready Estuary Program of the Environmental Protection Agency. For additional information contact Lisa Auermuller (auemull@marine.rutgers.edu, 609-812-0649x204) or Martha Maxwell-Doyle (mmdoyle@ocean.edu, 732-914-8108).

Jacques Cousteau NERR and STEM Education

By Melanie Reding, Education Coordinator

Will graduates of New Jersey schools possess the interest and critical thinking and problem solving skills needed to meet the complex scientific and environmental challenges facing New Jersey, the nation and the world?

How much confidence do you have in your current ability to teach marine geosciences to your students?



Pre workshop survey results

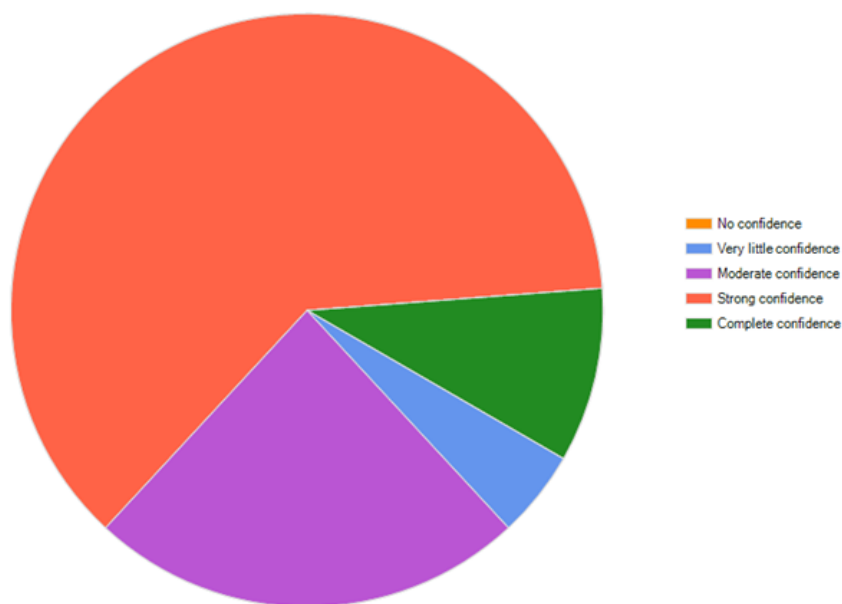
project entitled "A Research and Education Model for Middle School Geosciences Education."

In June 2011, 24 teachers stood along the beach and tossed oranges out into the ocean to look at offshore currents; this is one way we teach basic principles of marine science. The next day the same teachers found themselves using PVC pipe and computer fans to build their own working remotely operated vehicle before seeing REMUS (an autonomous underwater vehicle) in action; another way we enrich science education through hands-on field programs. The teachers were from Red Bank Middle School and spent a week studying estuaries, near shore communities and the coastal morphology of New Jersey. This was part of a National Science Foundation (NSF) pilot project

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How much confidence do you have in your current ability to teach marine geosciences to your students?



Post workshop survey results

This NSF project united research scientists, science educators and supporters of science-based conservation in a unique partnership to revitalize science, technology, engineering and mathematics (STEM) learning practices in an urban middle school environment. After the week long summer training, teachers developed lesson plans focused on geosciences to use in their classes which ultimately became part of the Red Bank curriculum. Evaluations of the training revealed a strong increase in the confidence educators gained to provide geoscience content and training to their students.

Expanding on the success of this pilot, a new and expanding collaboration between the Jacques Cousteau NERR, Rutgers University, Stockton College, NJ SEA Grant Consortium and American Friends of Engineering aims to ensure that the need for future ocean engineers and marine scientists will be met by incorporating real-world research programs, field-based opportunities and advanced technologies such as Remotely and Autonomously Operated Vehicles (ROVs and AUVs) to enrich on STEM education.

On August 6-9th, 2012 the Jacques Cousteau Reserve hosted a four-day professional development workshop to incorporate advanced technologies in STEM programs. The program, "*Underwater Robots, Exploration and STEM at the Shore*," included field and classroom activities, and presentations by researchers along with plenty of resources and lessons to enrich K-12 science education. Teachers from around the state explored and discovered how to develop integrated learning opportunities for students from kindergarten through 12th grade to promote skill development in mathematics, science, technology and engineering, and to help prepare students to meet future workforce needs in science and technology.

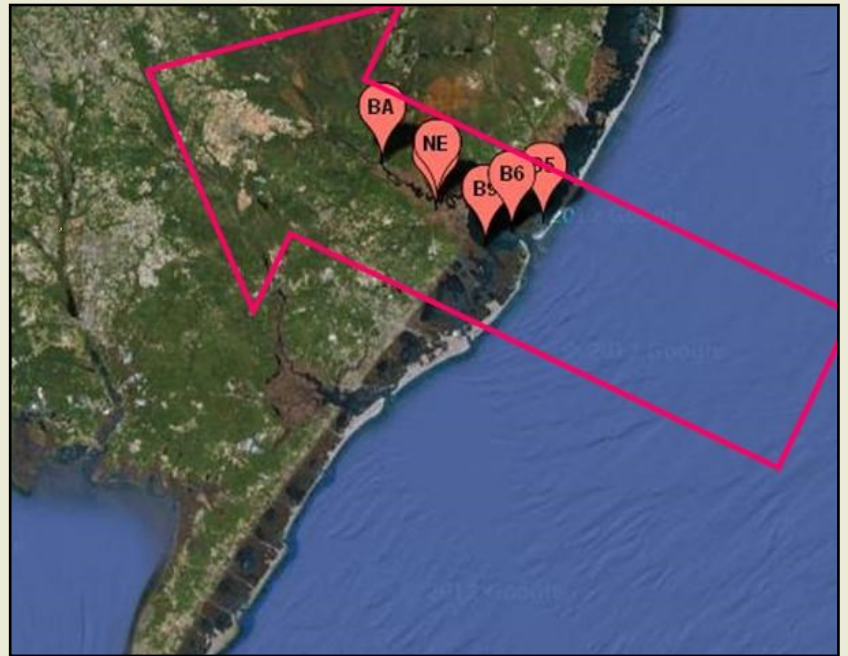
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WHAT HAPPENED AT JC NERR DURING SUPERSTORM SANDY?

Superstorm Sandy as Seen Through the Eyes of the JC NERR System-Wide Monitoring Program (SWMP)

While the JC NERR and the Rutgers University Marine Field Station (RUMFS) sustained damages and breaks in operation due to Superstorm Sandy, great efforts were made to get up and running and continue sampling and monitoring, both to satisfy commitments to our respective programs and funding agencies, but also with the knowledge that data collected during and after the event would prove critical in understanding the immediate and lingering effects of the storm. The SWMP (System-Wide Monitoring Program) water, weather, and nutrient datasets collected prior, during, and after the storm is one such example.

Superstorm Sandy made landfall on the JC NERR, and steamrolled her way inland over the SWMP stations. While the telemetry station at Chestnut Neck was damaged and vulnerable underwater equipment was lost or compromised during Sandy, event data were recovered from the four water-monitoring stations and the weather station, yielding rich datasets that documented what happened during the storm and how the system responded after the floodwaters receded and the figurative dust settled. Coincidentally, a winter storm (dubbed Athena by the National Weather Service) arrived a week after Sandy, which provided an interesting comparison between the “superstorm” and a more typical (but still strong) Nor’easter event.



The storm surge recorded at the Buoy 126 and Buoy 139 stations in the “bay” portion of the reserve showed a storm surge of approximately 1.5 meters (just shy of 5 feet) over a typical high tide at these stations. This agrees with the damages sustained at RUMFS; while the structure itself survived, floodwaters and wave action decimated the docks in the boat basin, flooded the generator room, tore out the electric and plumbing under the building, and knocked boards out from the deck and causeway. The Chestnut Neck station on the Mullica River experienced a storm surge on par with the bay stations. Interestingly, the up-river station at Lower Bank Bridge recorded a storm surge in excess of 2 meters (over 6.6 feet), suggesting that as the storm surge traveled up the narrowing river, it was constrained by the steep banks on both sides, amplifying the vertical reach of the surge. This was evident by the flood damage experienced by many homes on relative high ground at this location. The level of flooding generated by Athena, a powerful storm in her own right, was only approximately half that of Sandy.

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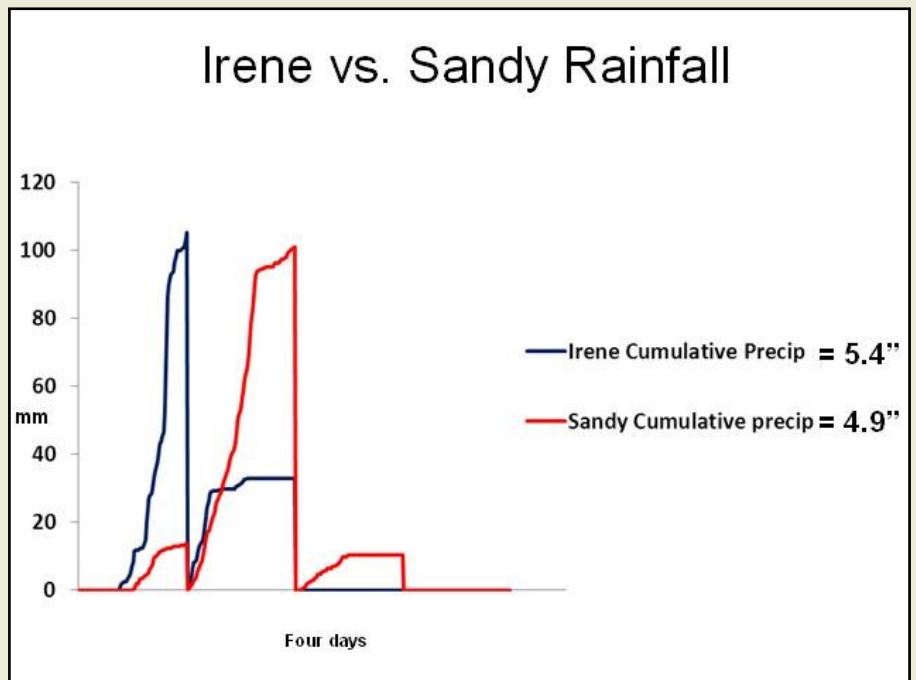
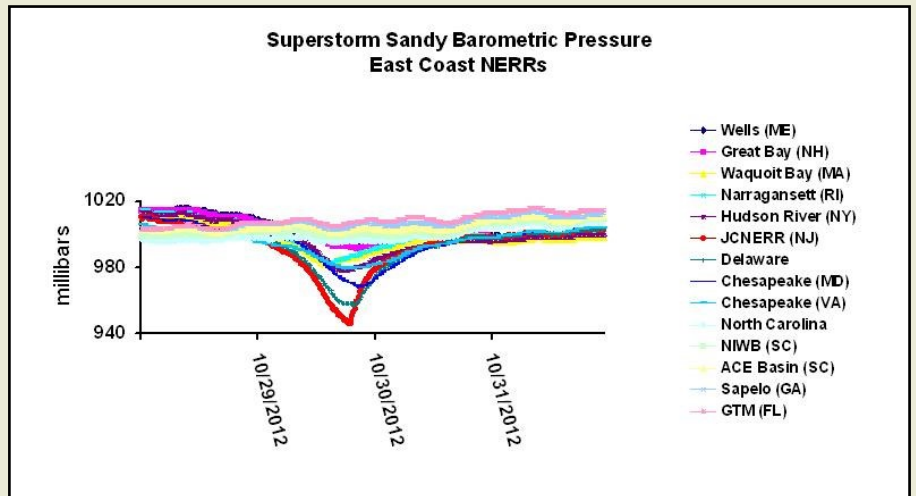
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Not to be outdone by its underwater brethren, the JC NERR meteorological station at the Stockton Marine Field Station in Port Republic generated interesting data as well, most notably a barometric pressure of 946 millimeters of mercury, just a few millimeters shy of the 940 recorded by buoys offshore before the storm made landfall and the lowest among all the National Estuarine Research Reserves along the eastern seaboard.

Another useful dataset came from the meteorological station: that concerning cumulative rainfall of Superstorm Sandy vs. that of Tropical Storm Irene a year prior. While Sandy was dismissed as a non-rain event (focusing instead on her storm surge) by the media, the precipitation data collected at the weather station suggests that, at least in southern New Jersey (which was south of the path taken by the eye of the storm, where rainfall was most concentrated), total rainfall was not far behind that of Irene.

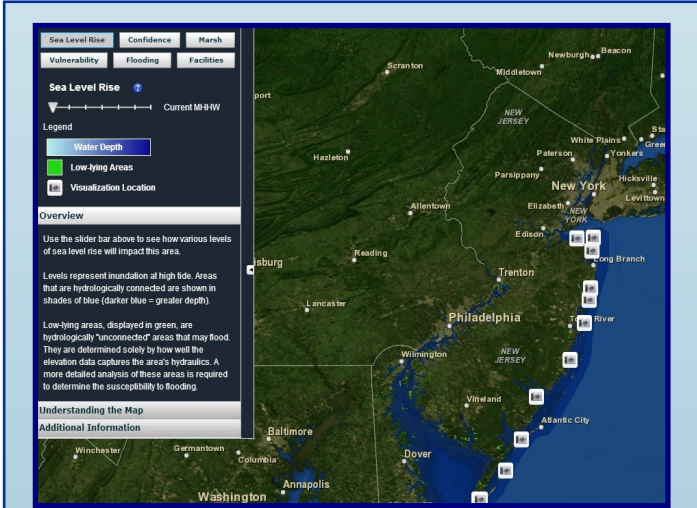
While the results of our SWMP nutrient sampling (we were able to physically collect the water samples, but with no electricity to make pure water and run safety equipment on-site, we overnighted our raw samples to the Great Bay NERR in New Hampshire, who graciously offered to help us during the ordeal) are still to be received from the analytical laboratory, it will be interesting to see how nutrients associated with runoff compare pre- and post-Sandy.

-Gregg Sakowicz, JC NERR SWMP Technician



While Sandy knocked us down, she did not knock us out, and the lessons learned from this storm will help us to prepare better and be more resilient for the next storm. Learn more about our SWMP data, and those data from other NERRs, at www.nerrsdata.org

LIFE ON THE *edge* MANAGERS MESSAGE



NJ Flood Mapper Interface.

Many activities continue at the JC NERR to assist the ongoing recovery effort following Superstorm Sandy. Staff have been actively engaged in assessing damage to natural resources, and have scaled up delivery of coastal training programs designed to assist communities with resiliency efforts. These efforts included the launch of two web-based tools, the New Jersey FloodMapper and Getting to Resiliency. These tools will help communities reduce their vulnerability to sea level rise and flood events, and help to identify open space areas to preserve as a buffer from damaging storm waters. Details on these new tools are presented in the newsletter.



Congressman LoBiondo testing out the NJ Flood Mapper.

On April 17th, the JC NERR commemorated the acquisition of the Grassle Marsh with funding from NOAA and the Ocean County Natural Lands Trust. This 15 acre parcel which sits adjacent to the reserve headquarters in Tuckerton, will support research, education and training programs at the JC NERR. Plans are to "wire" the marsh with remote sensing instruments and use it as a "living classroom" for educators and coastal decision-makers. The marsh was named in honor of two internationally-renowned scientists, educators and coastal stewards, Fred and Judy Grassle.

Mike De Luca



Grassle Marsh Dedication.



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Searching for Ghost Pots in New Jersey Estuaries

Estuaries are one of the most productive places on Earth. With their mixtures of fresh and salt water, partially protected from the open ocean, they provide food, shelter and nursery grounds for a myriad of organisms. These productive systems are relied upon for enjoyment, recreation and for many individuals, making a living. Commercial and recreational crabbing is a common practice in both the Mullica River-Great Bay estuary as well as Barnegat Bay. Both commercial and recreational crabbers lose crab pots due to boat traffic, storms, currents and even vandalism.



Above: Ghost pots collected during the project.

When crab pots are lost they become derelict and are commonly referred to as “ghost pots” because they can continue to fish, trapping blue crabs and other species in the pots. “Ghost pots” can also become navigational hazards in the shallower waters of our bays.

Starting in August, 2012, Melanie Reding (Education Coordinator) partnered with Mark Sullivan, Steve Evert and Peter Straub of the Richard Stockton College of New Jersey on a two year NOAA Restoration grant titled “*Derelict crab trap removal I the Mullica River-Great Bay Estuary: a sustainable community-based effort engaging commercial crabbers, undergraduate/graduate marine science students,*

and NOAA national estuarine research reserve volunteers.” This work was a pilot effort based on similar projects in larger estuarine systems such as the Chesapeake Bay.

The goals of the project were to 1) identify and map derelict crab traps via side-scan sonar surveys at the mouth of the Mullica River and heavily fished portions of Great Bay, 2) remove and dispose of derelict gear retrieved by collaborating crabbers, and 3) improve gear retention among commercial/recreational fishers, boaters and other bay users.



Above: Map of Great Bay, NJ showing ghost pots (white dots). Commercial crabbers received funding, equipment and training to collect pots during the off-season using survey maps produced from side-scan sonar imagery.

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In April, JC NERR volunteers helped to evaluate, dismantle and recycle 491 derelict pots recovered by the crabbers during year one of the project. In addition to removal of existing “ghost pots,” the project team recognized that an outreach effort was necessary to help reduce future loss of crab pots by

raising awareness among the many users of our bays including boaters, crabbers and shore visitors. To date, education and outreach activities have focused on creation of a website (WeCrabNJ.org) and development of brochures that identify ways to reduce loss of ghost pots. Community presentations were also delivered as part of the outreach and awareness effort. A video will be produced during the second year of the project to transfer lessons learned and best practices broadly to other organizations for application in their local waterways.

In addition to the NOAA funding, a grant was received from the Barnegat Bay Partnership to survey specific areas of Barnegat Bay and produce density maps for future pot removal efforts as additional funding becomes available. If you are on the water, you have an important role in helping to reduce the occurrence of ghost pots. To learn more about the project, or what you can do, visit www.WeCrabNJ.org or contact Melanie at reding@mairne.rutgers.edu or 609-812-0649 ext. 206.

Winter 2013 Community Benefits by the Numbers:

- >1500** Number of probable derelict pots imaged with Stockton College’s Klein 3900 side-scan sonar system in the Mullica River-Great Bay Estuary (MRGB).
- 13 km²** Total combined area of estuarine habitats surveyed.
- 491** Number of ghost pots retrieved by four participating crabbers during shortened retrieval season (early February – mid-March 2013).
- 50** Number of Jacques Cousteau National Estuarine Research Reserve community volunteer hours logged on April 6th crab pot processing day (491 pots evaluated).
- 125** Number of recovered pots deemed intact and fishable that were returned to the commercial crabbing community (estimated value: \$40 /pot = \$5,000).
- \$6,000** Estimated total value of recovered pots - including \$700 for various re-usable parts (re-bar, escape panels) and \$300 for unfishable pots recycled as scrap.
- 345** Number of middle and high school students reached at World Water Monitoring Day
- 15** Number of formal and informal teachers that learned about the project during a professional development workshop in July
- 3** Number of professional presentations given
- 1** website created www.WeCrabNJ.org

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THE NEW LIFE ON THE EDGE EXHIBIT

This past year the Jacques Cousteau Reserve has been busy with the renovation of the Life on the Edge Exhibit located upstairs in the Yacht Club building at the Tuckerton Seaport Museum.

The renovated exhibit focuses on the importance of estuaries to plants, animals and all of us. Estuaries are habitats where rivers meet

the sea - where fresh and salt water mix to create a unique and very productive ecosystem vital to life both on land and in the sea. These remarkable and productive places provide many environmental and economic benefits including a nursery ground for young fish and shellfish, a

buffer against storm damage and flooding, a filter for runoff from human activities, and a shelter, refuge and source of food for many birds, fish, plants and wildlife. Through hands-on activities and multimedia components, visitors are able to explore the roles estuaries play in our daily life, a variety of aquatic life that call these places home, and what individuals can do to become stewards of this unique and important ecosystem. New exhibits fea-

"The kind of world our children inherit tomorrow depends on how well we care for it today" reads the wall as you climb the stairs and enter the Jacques Cousteau National Estuarine Research Reserve's newly renovated Life on the Edge Exhibit.

ture a photo booth pledge station, a theater and multipurpose room, a giant view master and a chance to look into the depths of a water droplet, something for everyone and all ages. According to Mike De Luca, Senior Associate Director of the Institute of Marine and Coastal Sciences at Rutgers University and Manager of the JC NERR "the new

exhibit highlights ways in which estuaries are special places, constantly changing in response to humans and natural processes. The public shares a role in protecting and preserving these unique coastal systems."

Interpretive stations evoke the daily and seasonal rhythms of

the estuary. Visitors will learn how humans affect the estuary in small and large ways, how they can reduce or manage human impact, and how they can be a catalyst for change and take action to support sustainable practices. With exciting new exhibits such as our photo booth pledge station, a giant view master and a chance to look into the depths of a water droplet, there is something for everyone and all ages!

From the Interpreter

Visit the Life on the Edge Exhibit at the Tuckerton Seaport!

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Education Programs and Series

LUNCH AND LEARN SERIES

The Beach Apparatus Drill

May 14, 2014

On a blustery January night of 1850, an all-volunteer group gathered on the Jersey Shore to save the passengers from the stranded brig Ayrshire. Their effort were a watershed moment in New Jersey maritime history as they marked the first successful implementation of the Beach Apparatus Drill. Join us for a lively discussion and demonstration of the BAD– completed with historic artifacts! Speakers: Paul & Tim Hart

PROFESSIONAL DEVELOPMENT

WOW! Wonder of Wetlands Workshop

May 3, 2014 9:00 AM –3:30 PM

An instructional guide for educators that provides a resourceful and creative collection of wetland activities, information, and ideas. WOW! includes: over 50 hands-on multidisciplinary activities in lesson plan format, extensive background information on wetlands, ideas for student action projects, and a wetlands resource guide.

PROFESSIONAL DEVELOPMENT

Barnegat Bay Ecology

July 30, 2014 - August 1, 2014

The Jacques Cousteau Reserve, in partnership with the Pinelands Preservation Alliance, is offering an exciting 3-day workshop focused on Barnegat Bay using a newly developed high school curriculum. You'll increase your knowledge of Barnegat Bay and the ecological issues facing our estuaries through field studies, classroom activities and science presentations.

Sand, Surge and Sea Level: a Teachers on the Estuary (TOTE) workshop for mid-Atlantic Educators

August 11, 2014 - August 14, 2014

The Jacques Cousteau Reserve in partnership with the Delaware Reserve, is offering an exciting 4-day workshop focused on mid-Atlantic estuaries. You'll increase your knowledge of the issues facing our coasts and how a changing climate will impact the mid-Atlantic region. Field studies, classroom activities and scientific presentations will make this a workshop you won't want to miss!

For the most up-to-date information about the JC NERR :



@JCNERR



Jacques Cousteau NERR &
Jacques Cousteau Reserve— Coastal Training
Program

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JC NERR 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

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The JC NERR 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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