

The Tidal Exchange



Newsletter of the New York ~ New Jersey Harbor Estuary Program

Spring 2011, Issue No. 26

The Tidal Exchange is Going Green(er)

(See Page 16)

THIS ISSUE

HARBOR ESTUARY NEWS

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Jump Right Into Estuary Education!

Nordica Holochuck, Terry Ippolito and Peter Schmidt

Introduction

This special issue of *The Tidal Exchange* is devoted entirely to estuary education and provides an exciting opportunity to find out about a few of the many ongoing environmental education programs focusing on the NY-NJ Harbor Estuary in our unique coastal region. Helping people learn about the NY-NJ Harbor Estuary is a vital first step to encourage environmental stewardship, one of the core goals of the New York-New Jersey Harbor Estuary Program (HEP). Much of what impacts the estuary is a result of day to day behaviors of residents who live in the areas surrounding it. For many, exploring the estuary's living and non-living components is a journey that is filled with hands-on experience

as well as new critical thinking skill development. As educational programs move citizens, young and mature, in the field or in the classroom, from awareness to knowledge to understanding and then to action, they see themselves as part of this special ecosystem. And the next step, accepting the tasks involved in being its caretakers, its stewards, follows.

Estuary Education in Our Schools

If you are a teacher who takes your students outdoors it's probably hard for you to understand why everyone doesn't. You see how effectively outdoor education can cover the required curriculum, you appreciate how the field trip, with all its crazy planning, isn't

(continued on page 2)



Fifth grade students from PS205Q in Bayside Queens, conducting a pond invertebrate survey at the Windmill Pond in Alley Pond Park, as part of a GLOBE research project. Photo by Fran Bosi.



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The Tidal Exchange – Spring 2011

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The Tidal Exchange is a publication of the New York – New Jersey Harbor Estuary Program (HEP), a partnership of federal, state and local governments, scientists and citizens working together to protect and restore the natural resources of the estuary. The purpose of the newsletter is to promote an informative dialog on issues related to the Harbor Estuary Program.

The HEP is sponsored by the States of New York and New Jersey and the US Environmental Protection Agency. The HEP Management Committee consists of representatives from the US EPA, NJ DEP, NYS DEC, NY and NJ local governments, US ACE, US DOI, NOAA, Port Authority of NY & NJ, Interstate Environmental Commission, NJ Harbor Dischargers Group, NYS DOS, Science & Technical Advisory Committee and Citizens Advisory Committee.

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Jump Right Into Estuary Education! (from page 1)

just another thing to fit in, but a valuable learning adventure that pays back your efforts in many ways, including how watching the excitement of your students reminds you why you are a teacher. If you work for one of the organizations or centers that distributes the curriculum materials or leads trips you are gratified by how busy you are in the spring and fall, revel in the positive feedback from teachers and students, and know from your friends and colleagues that we have never been busier. It is easy to believe that we have made our point and people understand how important and unique our shoreline and estuaries are.

The reality is that the majority of classes in schools, even within walking distance of the shoreline, don't get out of the classroom to visit and explore, or even use any of the incredibly effective materials distributed by the local network of estuary and environmental education organizations. Teachers and administrators who aren't going out may

have to be convinced that field trips and classroom materials about our coasts are tied directly to the standards (often; science, social studies and literacy), and that time spent outdoors is not wasted time. With that in mind, please share this newsletter and the HEP website with your colleagues and try to let them know how good getting a little muddy can be.

Estuary Education Resources

In 2009, in partnership with New York Sea Grant, HEP updated its guide to estuary education, *Exploring the Estuary*, available free online at <http://www.harborestuary.org/teachers.htm>. Check it out! The guide includes sample lesson plans, estuary fact sheets and several agency-based estuarine science and education related websites. It also profiles more than 50 coastal and estuarine education organizations throughout the New York-New Jersey Harbor Estuary. The updated *Exploring the Estuary* features organization web sites and links reflecting the growing importance of the internet as a tool for

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Map of the New York-New Jersey Harbor Estuary



Exploring the Estuary!

A Teacher's Guide to the
New York New Jersey Harbor Estuary Region



teaching and learning about our coastal environments. For example, the guide includes a sample lesson from the Hudson River lesson plans developed by NY State Department of Environmental Conservation (NYSDEC)'s Hudson River Estuary Program. It also includes a link to about two dozen Hudson Estuary lessons available for download free of charge on NYSDEC's website <http://www.dec.ny.gov/education/25386.html>. They use place based information from the Hudson and New York Harbor as context in exercises that build understandings and skills required by state standards and tests. There are so many worthy education projects throughout the estuary and new ones developing. The teachers guide can serve as a great starting point to begin to get to know the universe of what is available and begin to work more closely with fellow educators.

While visiting the HEP website you can also learn more about the program's additional educational materials, including the estuary posters, "Scenes of Transition" & "Wildlife" posters/brochures. And take a moment to familiarize

yourself with some of the education projects that this program has funded over the years through grants at <http://www.harborestuary.org/grants.htm>.

Another useful resource for estuary education is the Discover the Hudson River activity booklet, produced by Project WET in partnership with the Hudson River Estuary Program, HEP, and many other organizations. Copies can be requested at <http://www.harborestuary.org/teachers.htm>.

The following articles present just a few of the many great and diverse educational programs and initiatives ongoing in the Harbor-Estuary region (for other educational

programs previously featured in *The Tidal Exchange*, please browse our past issues at <http://www.harborestuary.org/newsletters.htm>). Merryl Kafka describes the New York State Marine Educators Association (NYSMEA), and the upcoming June 2011 NYSMEA Conference planned for Brooklyn. Jeanne Dupont writes about a successful youth stewardship program in Rockaway. You'll read Emlyn Koster's story about the Liberty Science Center's new

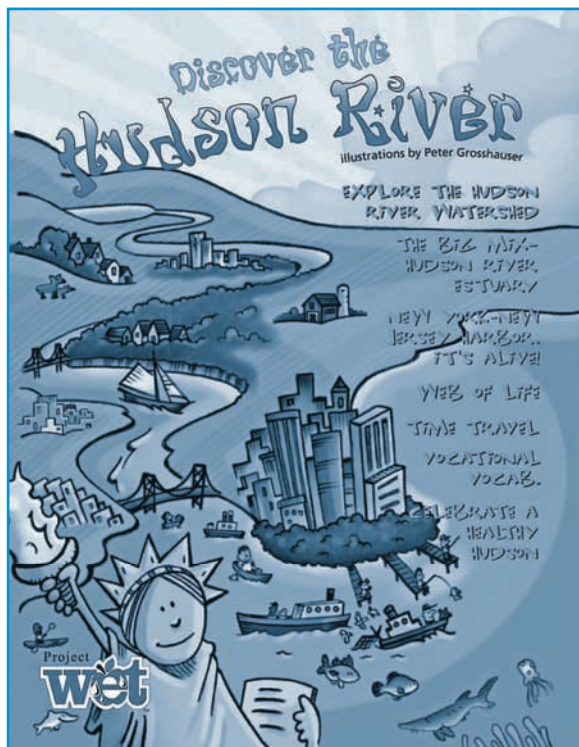
Hudson River exhibit, and "visit" the Harbor School with Cate Hagarty and Sofie Malinowski. Learn about the great programs at the Meadowlands Environment Center reading Angela Cristini's article, and "set sail" with Wetlands Institute's Phil Broder's story about the SEAS program.

Even this small sampler of programs really highlights the diversity and variety of education programs out there, formal and informal programs for all ages and in all sorts of settings. Perhaps this makes even more relevant author Betsy Ukeritis' article about the exciting new initiative to develop Harbor Literacy Points, an estuary-wide effort to develop some common understanding about what we all should learn and value about our wonderful, local natural resource. So, jump right in. We'll see you in the estuary! ♦

Nordica Holochuck is the Hudson Estuary Specialist with New York Sea Grant, Cornell Cooperative Extension. Her office is located upriver in Kingston, New York. Nordica's favorite HEP sponsored project was the "Birds Eye View" workshops she conducted 2008-2010. Workshop content included teaching geospatial skills using maps and photos of HEP restoration sites. Learn more in the HEP teachers guide online, or at www.nyseagrant.org.

Terry Ippolito is the Environmental Education Coordinator for the U.S. EPA Region 2, which includes New York and New Jersey. Her responsibilities include managing EPA's environmental education (EE) grants program in the region, serving on the agency workgroup that maintains its educational websites, and supporting educators (both formal and non-formal) through electronic networking, workshops and school visits. Her work at EPA follows sixteen years as a science teacher. Educators can find EE resources at <http://www.epa.gov/teachers>.

Peter Schmidt is currently Associate Director of the Queens College/ConEd GLOBE NY Metro Program, training teachers to use the resources of the GLOBE Program to engage their students in authentic environmental research. He has enjoyed thirty years of working at nature centers, encouraging teachers and students to get into the woods, streams, and coastal waters in the metropolitan area and get a little dirty, because then, the learning comes naturally.



Harbor Education: It takes more than a City

Betsy Ukeritis

How many square miles is the New York-New Jersey Harbor watershed?

What exactly are a watershed and an estuary?

How many miles of waterfront are there in the New York-New Jersey Harbor?

These seem like easy questions—until they are put to students and adults and it becomes painfully obvious that no one actually knows the answers. While it may not be surprising that specific details like the area of the watershed are not widely known, it alarms me that residents don't grasp the basic understandings of the NY-NJ Harbor: it is influenced by ocean tides, the shape of the harbor was instrumental in military strategy, and especially that the harbor plays a key role as one of the busiest ports in the nation supplying everyday needs and driving the region's economy.

The Harbor Education Task Force (Task Force), with leading educators from organizations in both New York and New Jersey, is acutely aware how poorly residents in the NY-NJ Harbor area understand the waters that

surround them and provide them with economic, recreational, public health, and educational benefits. It's one of the reasons Task Force members make time in their busy schedules to jointly strategize ways to change this alarming fact. Convened by the Metropolitan Waterfront Alliance (MWA), the Task Force is one of six that was created in 2007 to set a forward-thinking policy agenda for the NY-NJ waterfront.

Oh wait, you want the answers? There are about 16,300 square miles in the harbor watershed (for reference, the Chesapeake Bay watershed, one of the largest on the East Coast, is over 64,000 miles). A *watershed* is the area that drains to a common waterway, such as a stream, lake, estuary, wetland, aquifer, or even the ocean. An *estuary* is a place where a river meets the sea. And there are about 770 miles of waterfront in the harbor.

In 2007-08, the Task Force formulated education policy ideas that MWA used to develop the Harbor Education White Paper and the Waterfront Action Agenda. As an outcome of the Task Force meetings, a subcommittee

was formed to put together the Harbor Literacy Points, or concepts about the harbor that all students and adults should know. The Harbor Literacy Points will be used to help evaluate and create a framework for educational opportunities around the Harbor. The Task Force was looking to create a document similar to the Climate Project's Climate Literacy Framework or Ocean Literacy Network's Ocean Literacy Framework.

At the 2010 Waterfront Conference on 30 November 2010, as a member of the subcommittee, I shared the first draft of the Harbor Literacy Points. In its current draft, the Harbor Literacy Points are set up as five main topics – Watershed & Human Connections; the Living Estuary; the Physical Estuary; Water Quality; and History of the Harbor. These five main topics were distilled from the eight subcommittee members' thoughts about the most important facts and concepts students and adults should know about the Harbor. Six members then took one topic each and wrote up vocabulary words, five to six sentences on the main topic, and two "take home" or "connections back to the harbor" points that tie the topic back to a person's everyday life. (If you'd like to see a copy of the current draft of the Harbor Literacy Points, please email me at baukerit@gw.dec.state.ny.us.)

I know what you are thinking! If you're an educator, it's *oh, great, another document to try and fit into an already impossibly tight curriculum*. If you're a parent, it's *oh, wonderful, more knowledge I don't know about to encourage my kids to think is important*. If you're an organization's development officer or grant writer, it's *fantastic! How can I fit these into my grant proposal to bring students out on the water and how does it fit into proving on-water recreation is important for students?* To educators, my answer is simple: the next draft of these literacy points will contain correlations to both New York and New Jersey learning standards in science, math, social studies, and language arts. To parents, my answer is also simple: turn it into a learning experience for **both** of you. By that I mean take your kid out onto the water at an event sponsored by one of many local organizations, such as those in MWA's guide to waterfront education, SPLASH! or during an on-water field trip or explore the

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Being outdoors and engaging in a meaningful activity are important in instilling a sense of responsibility as stewards of the Harbor. Children learn the connection between their lives and the Harbor. Photo by NYC Soil & Water Conservation District.

New York-New Jersey Harbor Estuary Program's Teacher's Guide to the Harbor. To organizations, mention them in the grant proposals and be sure to highlight the fact that the Harbor Literacy Points is a document created and supported by a consortium of environmental education organizations in the Harbor. It can only help your proposal when it is tied to sound learning approaches and place-based learning opportunities!

These placed-based learning opportunities are important. After all, the point of having the harbor-literate citizens is not simply to have facts and figures rattling around their brains. It's about having them appreciate the beauty and value of the rich natural resources of the harbor. It's about having people become stewards of the harbor, willing to do their part to protect water quality, cultural resources, and improve wildlife habitat. It's about having people feel comfortable exploring the harbor in waders or in a kayak or with a fishing rod in hand!

In dealing with the creation of the Harbor Literacy Points, and at various Task Force meetings, there was always a discussion of barriers—barriers to getting kids outside, to getting kids on (even *near*) the water, and getting teachers to adopt the points in their curriculum. While barriers are different across the boroughs of New York City and New Jersey municipalities, the main ones include lack of transportation (whether it's money to pay for busses or even time to get somewhere near the water); lack of administrative support from principals or school districts; and lack of understanding about liability



Training and empowering teachers is one of the most important steps in ensuring that our children have a meaningful experience in the Harbor. A sail on the Seaport Museum's Pioneer shows teachers how the harbor fits into many disciplines they need to teach, not just science or social studies. Photo by NYC Soil & Water Conservation District.

issues during field trips (by both teachers and administration). While the Harbor Literacy Points will not alleviate any of these barriers, it should help to support educational field trips and demonstrate sound reasoning for getting students out on the water to learn about their surroundings.

Going forward with the development of the Harbor Literacy Points involves several steps. Correlating the document to New York and New Jersey Learning Standards is the most immediate. It must be adopted by the full Harbor Education Task Force and then by MWA members and other organizations. Hopefully, the document can be included

in both New York's and New Jersey's State Environmental Literacy Plans. Ultimately, our expectation is that students and their guardians will not only understand the connections between their everyday activities and these waters but also choose the right actions—and behaviors—that are beneficial to the NY-NJ Harbor.

Because I cannot resist; another couple quick questions about the harbor everyone should know!

Is the harbor affected by ocean tides?

Is the New York-New Jersey Harbor cleaner now than 20 years ago?

The answer to both: *an unequivocal YES! ❖*

Resources/Sources:

SPLASH! (MWA's Waterfront Education Resource Guide):

<http://www.waterfrontalliance.org/projects/waterfronteducationguide>

Chesapeake Bay Program: <http://www.chesapeakebay.net>

US EPA – Watersheds: <http://water.epa.gov/type/watersheds/index.cfm>

US EPA – National Estuary Program: <http://water.epa.gov/type/oceb/nep/index.cfm>

New York-New Jersey Harbor Estuary Program: <http://www.harborestuary.org>

NY-NJ HEP's Teacher's Guide to the Harbor: <http://www.harborestuary.org/teachers.htm>

Hudson River Estuary Program Education Resources: <http://www.dec.ny.gov/lands/5102.html>

Metropolitan Waterfront Alliance: <http://www.waterfrontalliance.org>

MWA's Harbor Education Task Force's 2007-08 White Paper on Harbor Education:

http://www.waterfrontalliance.org/sites/default/files/legacy/MWA_Harbor_Education.pdf

Ocean Literacy Network: <http://oceanliteracy.wp.coexploration.org>

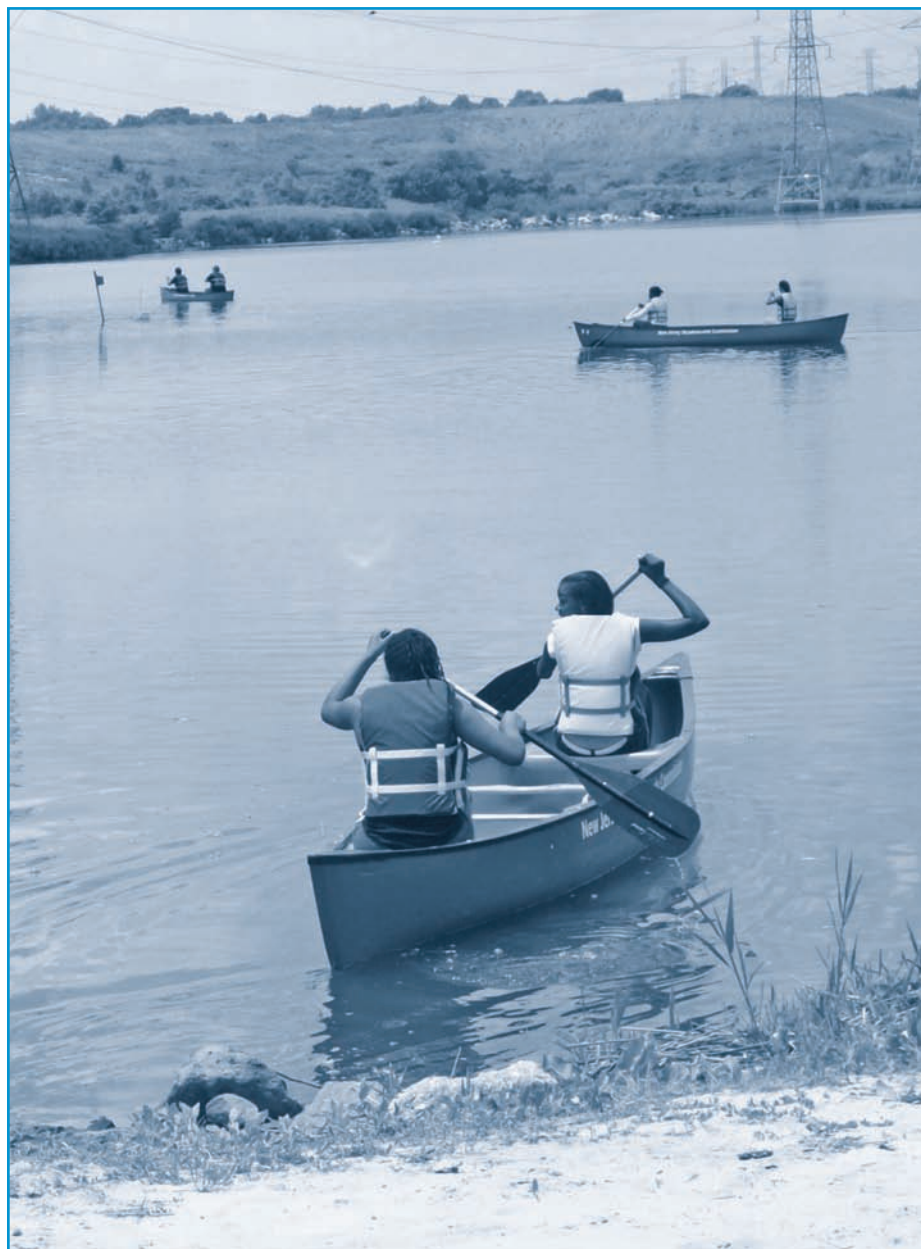
Climate Literacy Network: <http://www.climate-literacy.net>

Betsy Ukeritis is the New York City Regional Environmental Educator for the New York State Department of Environmental Conservation. She has been working in NYC for over eight years, showing educators how to incorporate the natural world into their classroom and administers a hands-on environmental education program at 20 after-school sites around NYC.

Meadowlands Environment Center

The Marsh Beyond the Sports Complex

Dr. Angela Cristini



Campers from Garfield NJ Boys and Girls Club enjoy canoeing through the marsh as part of the Meadowlands Environment Center's summer programs. Photo by MEC.

The Meadowlands Environment Center (MEC) is located in DeKorte Park on the lower Hackensack River in Lyndhurst, NJ, only 5 miles from Giants Stadium, near the intersection of NJ Route 17 and NJ Route 3. The MEC is a New Jersey Meadowlands Commission facility which is operated by Ramapo College of New Jersey.

The MEC was formed by the New Jersey Meadowlands Commission in 1983 in order to increase awareness and

enjoyment of the vital Meadowlands ecosystem. The Ramapo College staff at the MEC designs and presents comprehensive, hands-on environmental education programs for schools and scout groups, and informal educational events for the general public. The MEC also presents summer camps, offers professional development for teachers and conducts programs funded by grants from the National Science Foundation and the New Jersey State Department of Education.

School Programs for Students Grades K-12

From September through June the MEC presents educator-led programs for K-12 school groups. The MEC's most popular programs are based on the surrounding estuary environment. The salt marsh habitat, its inhabitants, the nature of brackish water, and the importance of the estuary in this urban area are common elements of all programs. Educators teach environmental science, introduce scientific tools and lead the students in an investigation of the lower Hackensack River. Hands-on activities are integrated throughout all programs. Students learn how to make observations, analyze the characteristics of the local brackish water, and document their observations with customized journals. Middle school and high school students analyze more complex components of water chemistry—such as turbidity, dissolved oxygen, and pH—in the MEC's state-of-the-art wet labs. Each educator-led group is limited to 15-27 students so that every participant has the opportunity to use the science tools, make and record observations, and share with their peers. Dip netting and nature walks to discover what lives in and around the marsh are enjoyed by all! In the 2009-10 school year more than 13,000 students from more than 70 school districts participated in the MEC's educational programs.

Other school programs at the MEC use the same approach: teaching environmental science and then applying it in terms of the local environment. The age- and grade-appropriate programs cover topics such as plant and animal adaptations, animal migration, food chains, water conservation, recycling and sustainability. In addition, coincident with the 2008 opening of the William D. McDowell Observatory, astronomy programs for all grade levels are now part the standard MEC school offerings.

All school programs are correlated to the NJ Core Curriculum Content Standards.

The MEC's education programs are

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unique in several ways. These include:

- The MEC welcomes students with disabilities. The MEC education building and its programs are accessible. Students with physical or learning disabilities can be accommodated (individuals or self-contained classes). Our MarshAccess program, with support from the National Science Foundation (NSF), has engaged more than 5,000 disabled adults and children in outdoor field-based experiences, fostering their interest in science. The Director of Disability Education contact information is available on the MEC website, www.njmeadowlands.gov/ec. Groups should provide advance notification to plan their experience at the MEC.
- The MEC has established partnerships with school districts. In these partnerships the MEC and school districts work together to ensure that learning experiences during MEC programs are integrated into and enhance school curriculums. As part of the partnership, the MEC provides professional development for teachers, pre- and post trip lessons, and annual reviews.
- The MEC presents two-day convocations for the Hudson County Gifted and Talented Consortium, covering subjects such as *Environment Through the Artist's Eyes*, *Green Buildings*, and *Astrobiology*. The convocation program is so successful that MEC staff is exploring the possibility of sharing it with other school districts.

Community Programs and Events for All Ages

Throughout the year, informal community programs offered at the MEC provide unique learning experiences for individuals and families. Programming includes:

- Weekend events - a variety of science, environment and nature-related programs and workshops as well as musical and theater performances and film screenings for both adults and children.
- A very popular summer senior

series which features 16 events including lectures, concerts and dances for older adults.

- Programs for Boy Scouts, Girl Scouts and 4-H clubs.
- Summer camp experiences for town recreation programs, Y-camps and Boys and Girls Clubs.
- Open viewing of the Meadowlands sky every Monday and Wednesday night at the William D. McDowell Observatory.

In 2010 more than 2,800 people attended MEC public programs.

The Senior Environmental Experiences project (SEE), funded by the NSF, produced a series of interactive science experiences using Internet videoconferencing to connect seniors at community centers, senior centers and extended care facilities with environmental experts at the Meadowlands Environment Center. The educational modules associated with this program cover natural history, ecosystem structure and the future of the Meadowlands.

Eco-Tourism programs that specifically involve going out onto the salt marshes on either the walking trails or in canoes or pontoon boats are offered through the New Jersey Meadowlands Commission. The NJMC's nature programming includes a regular schedule of guided pontoon boat cruises and canoe tours of the Hackensack River,

free twice monthly bird walks within Richard DeKorte Park as well as other nature walks and special events often held in collaboration with the Bergen County Audubon Society.

In addition to all the programs presented at the Meadowlands Environment Center facilities or the surrounding trails and salt marshes, the education staff regularly goes out to community organizations such as schools, senior centers and nursing homes to present programs about the meadowlands ecosystem to individuals unable to travel to the Meadowlands Environment Center.

An updated list of community programs and events is available on the MEC's website: <http://www.njmeadowlands.gov/ec>. In addition, interested individuals may subscribe to a periodic newsletter which describes upcoming community programs and permits registration. Most of the MEC's community programs are free or offered at a minimal cost. Registration to reserve space is strongly suggested because many events "sell out".

Dr. Angela Cristini is a Professor of Biology at Ramapo College of New Jersey and directs educational activities at the Meadowlands Environment Center. She has been the principal investigator on over a dozen research grants (NSF, EPA, NOAA, See Grant, NJDEP). She is a past president of the American Littoral Society. ❖



Older adults at the Hackensack Senior Center learn about the ecology and history of the Meadowlands. Photo by MEC.

Harbor School Students

Dive Head First Into Harbor Restoration:

Could restoration-based education give purpose to public education and save the harbor?

Cate Hagarty and Sofie Malinowski

Harbor School student Alpha Francois leaves his apartment in East Flatbush, Brooklyn, stops at a local bodega for a bacon-egg-and-cheese and walks the concrete streets before descending to the 3 train platform. His commute starts like any other NYC DOE high school student's. However, from the time he exits at Whitehall - South Ferry, his day takes a sharp turn away from the common experience. One block and 3 minutes later, he joins 414 students on the *Coursen*, a small ferry that shuttles students and staff to Governors Island and to a totally unique, hands-on curriculum and course of study geared specifically towards actively restoring the health of the Harbor.

The Urban Assembly New York Harbor School uses New York's maritime experience to create a rigorous, college-preparatory curriculum that instills in its students the ethic and skills of stewardship. Founder Murray Fisher's vision of urban youth protecting and restoring the marine environment necessitated a school located on the water. Instead, for seven years the school was placed in landlocked Bushwick and teachers and students had to travel over an hour each way to reach the focal point of the curriculum: the water. In September of 2010, Harbor School landed in the heart of the estuary on Governors Island, the location Fisher had envisioned from the beginning.

Our Talisman: The Amazing Oyster

At Harbor School, students learn about real environmental issues facing New York's Metropolitan community and the importance of teamwork and stewardship, both in the classroom and on the water. The school created a Career and Technical Education (CTE) program to support the vision to build a curriculum that would restore the estuary and train the future stewards and environmentalists of our locale through a college-preparatory curriculum. The Oyster Restoration Research Project (ORRP) (in partnership with several

organizations) is a central element of the CTE program that brings students together around our goal to restore the oyster population in the estuary, which has been destroyed in the last 100 years due to pollution and habitat-degrading dredging. Oysters are a natural fit for the hands-on work of environmental stewardship because they provide many ecosystem services, such as their ability to provide habitat for fish and increase biodiversity. (For more details on oysters and the ORRP, see the Summer 2010 special issue of the Tidal Exchange dedicated to the Eastern Oyster)

Harbor School Gets Everyone on Board

The Oyster Restoration Research Project is an ideal vision for the school as it depends on the collaboration of three different CTE classes:

- In Aquaculture class, led by Instructor and Restoration Coordinator Peter Malinowski, students grow oysters starting with

larvae until they attach to grown oyster shells forming oyster spat, then move them to a FLUPSY (a special system where oysters grow) and lastly, transport them to five artificial oyster reefs that have been created by ORRP.

- The SCUBA divers, led by Dive Masters Liv Dillon and Joe Gessert, physically place the oysters onto the various reefs.
- Throughout this process, the Advanced Vessel Operations class, led by Captain Aaron Singh, uses GPS to locate the reefs while crewing and navigating the *INDY7* (our 40 foot passenger vessel) and other boats around each oyster reef.

Science, SCUBA, Safety, Sustainability

Oyster reefs in Hastings-on-Hudson, Soundview Park, Governors Island, Bay Ridge Flats, and Staten Island will be closely monitored and

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Students work with oysters as a part of the Adeona service day. Students participating in Harbor Corps (a weekend program for students) taught volunteers from Adeona Foundation about the oyster projects that Harbor School students are involved in. On this particular day, students and volunteers were transferring oysters from one net to another. Photo by Sofie Malinowski.

the data collected will be analyzed by students and scientists to ensure the success and growth of this project. Student SCUBA divers, many of whom are working towards scientific diver certifications, have adapted to diving in New York Harbor. They now use full positive-pressure face masks to protect them from the bacteria in the water and have additional safety divers ready for extra support in addition to increasing communication between the divers in the water and the crew aboard the boat.

Planting the Seed... The Journey's Just Begun

Working on this project has given Harbor School students firsthand knowledge of the damaging results of pollution and has provided a way for them to not only understand, but participate actively in a solution. Inculcating an ethic of stewardship, Harbor School students are reaching out to national and global audiences. Aquaculture students were recently selected to present ORRP to EPA Administrator Lisa Jackson.

As a result, the EPA office in Puerto Rico decided to start a restoration project of its own, showing the students the importance of their work, both inside New York City and around the globe. Alpha will take his expertise in Aquaculture and commitment to the environment when he leaves the city to attend Wheaton College on a full Posse Scholarship this fall. In March, students are presenting the Oyster Project at the Island School Leadership in Education Conference, on the island of Eluethera, Bahamas. The project is well underway, but the work has just begun.

Harbor School has finally made it to Governors Island, 'the promised land,' in the words of one student. Surrounded by the Harbor that forms the basis for the curriculum, lessons learned in the classroom are more real than ever: water quality tests reveal that the work of restoring the Harbor to its original state depends on the entire community. Harbor School students, whether cultivating oyster spat in Aquaculture, boat handling in Vessel Operations, or constructing

reefs underwater in SCUBA class, experience the estuary in an exceptional way. Restoration work not only activates young bodies in real work, but engages their brains as well. Commitment to environmental stewardship creates a community built on a common goal and prepares students for success in college and in life. ♦

Cate Hagarty is the school library media specialist at the Harbor School. She runs a vibrant library, works with the compost program, co-teaches biking, and will use any excuse to get on the water.

Sofie Malinowski is the Development and Enrichment Associate for the newly created New York Harbor Foundation, a non-profit implemented to serve the students of the Harbor School by creating, funding, supplementing and running programs that meet the college and maritime career readiness mission. She grew up on the Fishers Island Oyster Farm.



Captain and Waterfront Director Aaron Singh instructs students during the summer on Indy 7. Captain Aaron teaches Advanced Vessel Operations at Harbor School. Indy 7 is an old NAVY launch from the USS Independence and was the first US Coast Guard Certified boat for Harbor School. Photo by Aaron Singh.

Diving In: Introducing the Public and Educators to the Hudson River Estuary

Emlyn H. Koster, PhD



Overlooking the vast river and Liberty State Park, *Our Hudson Home* explores the often complex relationship between nature and humanity in this special and distinct ecosystem. Photo by Liberty Science Center.

Bringing estuary education to large numbers of people can be a challenge. Many people in the greater Hudson River region do not know what an estuary is; that they live, work and play by a vital example; or have an awareness of the many important roles estuaries play in river and marine ecology.

But one key institution is opening the eyes of many hundreds of thousands of people from diverse backgrounds to the fundamental value of the Hudson River Estuary every year – Liberty Science Center (www.lsc.org), located near the west bank of the lower Hudson in Liberty State Park in Jersey City, NJ.

The Science Center's major new *Our Hudson Home* exhibition, part of the 2007 re-opening following a \$109 million expansion and exhibition upgrade project, is devoted to the subject of the Hudson River with a distinct emphasis on the estuary.

To create a robust array of experiences, Liberty Science Center worked with many partners in the creation

of *Our Hudson Home*. These partners include: NASA, New York Shipping Association, the Port Authority of NY and NJ, The Victoria Foundation, The Charles Hayden Foundation, Rutgers Institute for Marine and Coastal Studies, and Global Terminal.

Our Hudson Home introduces guests, from preschoolers to retirees and from all walks of life, to the concept that the Hudson River Estuary serves vital roles in recreation, commerce, and transportation as well as hosting vital natural ecosystems. The challenge we face is how to balance all of these needs so they work in harmony.

A unique feature of the exhibition is the juxtaposition of live animal displays with interactive exhibits and wide panoramas of the river from windows and a large outdoor deck. As guests enter *Our Hudson Home* they are introduced to the geography of the Hudson River and estuary system. A large high-resolution satellite-image floor map of the river, from the harbor to its headwaters, orients guests to each habitat presented in the exhibition:

the harbor, wetlands and the river corridor.

Graphic murals illustrate the unique features of these habitats and introduce the human activities that play a vital role in the stewardship of this “urban estuary.” Captioned images of “Exhibition Narrators” (actual people with personal connections to the estuary) announce the environmental issues that are explained in detail in the following zones of the exhibition. The use of real-person narrators reinforces the notion that everyone has a personal connection to the estuary.

The Harbor

In a massive aquarium, guests observe live harbor fish representing species that live side-by-side with human activity in the river. Large black sea bass and drums swim alongside crevalle jacks, spiny dogfish, northern puffers and others. An interactive “stream table” models the flow of water and sediment within the watershed and demonstrates erosion and sedimentation processes.

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The Wetlands

In a sloping salt-marsh aquarium, guests investigate the live animals and plants that live in this unique tidal habitat at eye level. Among the marsh vegetation, guests discover an assortment of crabs, snails, schools of juvenile fish and beautiful diamondback terrapins. Illustrated graphic panels describe how climate and tidal cycles affect shallow-water and near-shore environments, and also discuss the threat and management of invasive species such as the wetland reed, *Phragmites*.

The River Corridor

An elongated 6,000 cubic-foot river aquarium showcases the Hudson Estuary with striped bass, shortnose sturgeon, oyster toadfish, flounder and other organisms. Identification panels describe the special features of each species. At an interactive animated timeline guests learn how natural and man-made forces have shaped the geography and ecology. Nearby they can find answers to common questions about the health of the river such as, “Can I swim in the river and eat its fish?”

The Experiment Lab

Like other major exhibitions at Liberty Science Center, *Our Hudson Home* has a lab where guests of all ages can perform ecological experiments. They use actual laboratory tools and techniques to investigate physiological and biological processes that underlie the basic principles of ecological research related to the Hudson Estuary. Guests learn why filter feeders such as mussels are sensitive to polluted waters, and can create an estuarine “salt wedge” to see how tides mix river and ocean waters. In fact, Senator Robert Menendez recently enjoyed trying this lab.

The Observation Deck: Park and Harbor Views

In addition to seeing the Hudson River Estuary and Liberty State Park wetlands through panoramic windows, guests can stroll onto the outside deck to observe their many details.

Teaching Students and Educators

Throughout the exhibition, guests experience how human choices and actions, based on scientific understanding, can bring positive changes to this

ecosystem with its history of misuse and neglect. But Liberty Science Center does even more to raise awareness and educate area residents about the Hudson Estuary.

Ongoing partnerships with the Coast Guard and Rutgers University allow the Center to provide unique and diverse learning experiences for both students and educators. For example, the Center has taken groups of students out onto the water to complete activities such as seeding oysters and launching an underwater data-collecting robot; groups of teachers, meanwhile, increase their teaching skills and knowledge through professional development courses offered by Liberty Science Center. They’ve enjoyed seining expeditions, gathered water samples on the Coast Guard vessel, and learned to better teach students in grades K-12 about the health and care of this delicate and rich ecosystem. Teachers also gain access to specific lessons, hands-on experiments and other curriculum-enhancing tools as part of several programs offered at the Center.

Each teacher we train influences 30 or more students per year, and this number grows exponentially over time.

To keep reaching members of the public, students and teachers about the value and rich complexity of the Hudson Estuary, Liberty Science Center continues to seek out unique and exciting opportunities for direct interaction and positive impacts. We invite your involvement. Together, we can bring even more citizens into a new awareness of the treasure we call the Hudson Estuary. ♦

Dr. Emlyn Koster is president and CEO of Liberty Science Center, the region’s largest and most progressive resource for teaching science, technology, engineering and math. Liberty Science Center is located in Liberty State Park, Jersey City, NJ. Trained as a geologist, Dr. Koster has been at the helm of Liberty Science Center since 1996.



Guests take control of the water and sediment in a 20-foot long model of the Hudson River! Control “rainfall” in the mountains, create dams and levees, and learn more about how sedimentation, erosion and pollution control work. Photo by Liberty Science Center.

Get Marinated with the New York State Marine Education Association

Dr. Merryl Kafka, Ed.D

The New York-New Jersey Harbor Estuary has approximately 770 miles of diversified waterfront, much of which could serve as an exciting outdoor classroom—a unique opportunity to get “marinated” amid one of the most heavily urbanized regions of our country. The New York State Marine Education Association (NYSMEA), a not-for-profit organization, has been working for nearly 40 years to make this a reality for teachers and students, by promoting marine awareness and encouraging the growth and exchange of instructional resources within the scientific, commercial, and educational communities. Although a unique discipline, marine science is a vital one, and also an excellent springboard to teach the STEM classes: science, technology, engineering, and mathematics—with an exciting marine biology foundation that excites students. There are lots of reasons to care about oceans and estuaries and make sure we all learn about them. Oceans and estuaries provide us with many ecological services: they provide most of the atmosphere’s oxygen

(produced by marine plants); nourish us with protein in the form of seafood; are harvested for energy, minerals, and medicines; they control our climate; abate flooding; protect the mainland from winter storms and erosion; and provide essential homes for wildlife.

NYSMEA strives to support our fellow colleagues and educators, from Pre-K to college level, by enriching their learning/teaching experiences. Our members (teachers, students, environmental regulators, curriculum writers, underwater photographers, divers, authors, and researchers, among others) share their knowledge and enthusiasm with fellow educators in formal and informal settings. Many of our field trips are on or near the waterfront, utilizing most of the city’s invaluable educational resources designed for multidisciplinary programming. We visit aquaria, museums, nature and science centers, parks, and zoos, and participate in special tours and programs.

NYSMEA’s mission is fundamental in introducing, reinforcing, and advancing estuary preservation and literacy among

public and private sectors in schools, communities, and professional arenas. One specific project, created by Lou Siegel, NYSMEA co-founder and board member, is the **sSELF** project (South Shore Estuary Learning Facilitator). The **sSELF** project was designed to empower school and/or community groups to be active stewards of their local estuarine environment through education and monitoring. The Long Island South Shore Estuary encompasses 325 square miles of shallow bays and tidal tributaries located along the south shore of Nassau and Suffolk Counties in New York. This project, which has been active for five years, is applicable to NYC waters as well.

NYSMEA provides tools and training for educators and helps them infuse marine science into their teaching repertoire. We achieve our goals through annual teacher and student conferences, science-based social events, meetings, lectures, workshops, field trips, fossil hunting expeditions, and boat trips, among other exciting events. We produce

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High School students are introduced to kayaking at one of NYSMEA’s conferences at Dowling College. Photo by L. Siegel.



Lou Siegel, NYSMEA co-founder, preps teachers for a salt marsh exploration at Southampton, LI. Photo by M. Kafka.

a monthly newsletter, “The Strandline”, which alerts members to upcoming activities and available resources. Our website is updated monthly and includes lesson plans, job postings, professional development opportunities, webinars, research opportunities, scholarships and grants, field trip destinations, and marine-related links.

One of NYSMEA’s main events is its annual conference, which will be held this year on Saturday June 4, 2011 along the Brooklyn shoreline at Kingsborough Community College. The theme for this 35th annual conference is “*Our Local Waterways: Resources, Restoration, and Citizen Science Activities*” and will help to introduce teachers to environmental regulators and community activists to transform their lesson plans into site-based action plans for habitat restoration and environmental monitoring. Too often, students lack the necessary field skills needed for career opportunities in the environmental sciences. This conference will present tools to address this gap, while providing a well-rounded, multi-disciplinary education, producing concrete improvements in our estuary environment.

Marine science is so vital to our lives, and yet so underrepresented in our K-12 curriculum, both throughout the

nation and in our city. Let’s embrace the Ocean Literacy campaign for a smarter citizenship, infusing conservation ethics and local exploration, understanding, and appreciation of our wetlands.

In 1524 navigator Giovanni Verrazano explored New York Harbor. Isn’t it about time you did!

Remember, coastlines are our lifelines, so get “marinated” with the New York State Marine Education Association (NYSME). You’ll meet great friends, professional colleagues, and experience environmental adventures with memories to last a lifetime! Join today—a NYSMEA Membership is only \$20 per year! Learn more at www.nysmea.org. ❖

Dr. Merryl Kafka is a Marine Science Educator, recently retiring as Former Curator of Education at the NY Aquarium, and currently serving as an Executive Board Member of NYSMEA. She is also Adjunct Professor at St. John’s University, and Brooklyn College’s Aquatic Research and Environmental Assessment Center (AREAC) founded by Dr. Martin Schreiber. AREAC offers an Urban Marine Ecology summer program for high school students.

Resources for Your Classroom:

- John Waldman. 1999.
Heartbeats in the Muck.
The Lyons Press.
- Mark Kurlansky. 2006.
The Big Oyster.
Ballantine Books.
- Stephen Stanne, R. Panetta,
and B. Forist. 1996.
*The Hudson: An Illustrated Guide
to the Living River.*
Rutgers University Press.

Ocean Literacy information:

- www.coexploration.org/oceanliteracy
- www.education.noaa.gov

“Sharks!” “Snooki!” “Garbage!”

Phil Broder



A Wetlands Institute naturalist shows off a skate that was pulled up in the trawl. Photo by Wetlands Institute.

Ask most kids what they'll find at the Jersey shore, and those are the answers you're likely to get. In our rush to leave no child behind, we've left a sense of place behind. Children may learn about the rainforest, but know nothing about what's in the water right around them.

One boatload at a time, the Wetlands Institute's Science Education At Sea (SEAS) program is changing that. The program began as part of Travis Davis' Aquatic Discoveries business, and went with him when he joined the nonprofit Wetlands Institute in 2006. Originally offered in south Jersey's Cape May area, the Wetlands Institute expanded SEAS to Sandy Hook Bay in 2008 to better serve the NY/NJ metro area.

As they step from the dock in Keyport onto the Captain John, a 65' charter fishing boat, most students are leaving their comfort zone. More than just a dolphin watching adventure, SEAS trips begin with an introduction to the salty environment of New Jersey's bays. Then the kids form into teams, and toss a crab trap overboard; they'll haul it back up at the end of the trip to see which team was most successful. (Naming the team is always the best part, and it's safe to say that more teams have chosen "The Krusty Krabs" than any other name.)

As they head towards Sandy Hook, the students set a trawl net, then team up to pull it in. The net's contents

are divvied up for the final portion of the lesson, as groups of students move around the boat to study fish, invertebrates, and a touch tank. The boat's cabin is even blacked out so everyone can look through microscopes at plankton.

Are there sharks in the bay? Of course, and pulling up smooth dogfish in the net shows everyone that the local sharks aren't exactly man-eaters. In fact, the trawl is full of burst bubbles. The bay isn't dead. There really are fish and crabs and jellyfish and all sorts of life there. The water isn't polluted. It's entirely not what they expected.

Armed with that knowledge, students return to their classrooms with a different perspective, and hopefully an understanding of their role in the health of local waterways. If they pollute or

litter, now they know where it's going. When they see a storm drain that says, "Drains to bay," they've been there. And having gotten their hands wet on a SEAS trip, kids gain confidence in knowing that taking care of nature can be fun.

It's not unusual for the Wetlands Institute to offer something far removed from typical environmental education programming. Formed in 1969 in the salt marshes outside of Stone Harbor, the Institute has always been an innovator in field experiences. Most programs are not just "hands on", they're also "feet wet." A typical visit to the marsh might include pulling seine nets through a creek, taking soil samples, tasting edible plants, collecting mole crabs from the intertidal zone on a beach, or helping census the horseshoe crab population.

Recognizing that not every school can come to the shore, the Institute's educators also bring the shore to the classroom. With Mobile Oceans Outreach programs, live animals (including seastars, urchins, whelks, and horseshoe crabs) go on the road for programs such as "Cool Creatures With Amazing Features" and "Saltwater Gene Pools." In the summer, the same traveling roadshow appears on the Wildwood boardwalk as well as the Cape May – Lewes Ferry to Delaware. Outreach educators routinely travel to schools in north Jersey, Delaware, and eastern Pennsylvania.

The Institute also offers a series of programs for homeschoolers, speaker programs for adults ("Sex In The Sea" is one of the most entertaining), special events like Crabulous Crab Day and the Wings 'n Water wildlife art festival, and popular summer camps.

SEAS programs were the

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A student and teacher prepare to let out the plankton net. Photo by Wetlands Institute.

logical step in the Wetlands Institute's mission "...to promote appreciation, understanding, and stewardship of wetlands and coastal ecosystems...." For many children, growing up near the ocean doesn't mean they've actually been there. Often, their only view of the Atlantic will be on TV. Discovery Channel shows like "Blood In The Water" don't exactly provide an accurate depiction of the coastal environment. Many kids are surprised to find out that New Jersey's backbays and estuaries aren't teeming with sharks.

Kids get further connected to science by learning how the Wetlands Institute's research program is linked to what they're seeing. Current research on diamondback terrapins and shorebird migrations is incorporated into the program, providing a real world foundation to what's taught aboard ship. Instead of just seeing that their crab trap has a wire rectangle in the trap's mouth, they'll learn that Institute scientists invented terrapin excluder devices, fought to have their use mandated by law, and that one in every eight crab traps in the state still has a dead turtle inside. It's an eye-opening lesson.

In this era of standardized testing and the race to the top, are three hours on a boat worthwhile? Wetlands Institute programs are correlated to New Jersey's Core Curriculum Standards for Science. But we think that at the very least, it's important for everyone to know where their water comes from, and where it goes after it swirls down the drain. It's also important for kids to recognize that places like Sandy Hook Bay are safe. Ninety percent of inner city kids don't know how to swim, and 34 percent have never been to the beach. That might be because they think that the beach, bay, and ocean aren't safe. Seeing how cool microscopic plankton is, not finding medical waste in the trawl net, or getting to touch a crab without losing a finger helps kids understand that the real world isn't really as frightening as TV makes it out to be.

Although Snooki is still pretty scary...❖

Phil Broder has been an environmental educator for 22 years. As Director of Education, he oversees a team of Touch Tank Lifeguards who teach more than 7,000 students and 20,000 public visitors annually.

Aqua 101 Youth Stewardship Program in Rockaway

Jeanne DuPont

Rockaway Waterfront Alliance (RWA) is a community based organization dedicated to fostering a deeper understanding and respect for the environment. RWA uses the wetlands and dunes of the Rockaway Beach Peninsula to teach schoolchildren and members of the local community to become stewards of their waterfront while supporting local initiatives that advocate for and achieve an ecologically healthy waterfront, inland parks, and better-maintained beaches. The results are improved overall health

Stewardship Program sponsored by the NY-NJ Harbor Estuary Program. Through the program, and with the help of many committed local mentors, 25 middle and high school students from the local Rockaway community took part in large scale marine debris removal and the oyster gardening project along Sommerville Basin, among other activities, in an effort to improve the water quality in Jamaica Bay.

Many of the kids had little to no experience prior to this program but soon became comfortable navigating their

way along the shoreline, both on land and in the water, and learning about the native wildlife on Jamaica Bay. The program brought the students outdoors 3 days a week for a variety of hands-on activities. After being trained in basic operations and safety procedures, students carried out several cleanups. They paddled by kayak out along the shoreline and collected all the debris they found in a designated area for pick up by the Department of Sanitation.

The students also collected data weekly on the water quality and monitored RWA's oyster gardens in Sommerville and Norton Basin. RWA was the first organization on Jamaica Bay to work with local youth on an



Rockaway Waterfront Alliance youth leader Vivian Ogu working with other students to remove a large patch of mugwort and phragmites at Norton Basin. Photo by RWA.

and quality of life for all residents of Rockaway's neighborhoods and other New York City citizens.

RWA is presently the only non profit organization serving youth in the Rockaways with afterschool programming in environmental stewardship.

In 2010 the Rockaway Waterfront Alliance hosted its first full fledged summer program with its Youth

oyster gardening program through NY/ NJ Baykeeper's program. Through the monitoring process oysters grew from 20 to 70 millimeters in less than 7 months and had less than 1% mortality rate. Since the start of this project, the New York City Department of Environmental Protection and the National Park Service have both invested in oyster gardening as a strategy to improve the water quality of Jamaica Bay.

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Would you like to change your address or add someone to our mailing list?

Provide changes or additions below, cut out or copy this section (include mailing label to the right so we can find you in our records) and mail to the Harbor Estuary Program Office, 290 Broadway, 24th Floor, New York, NY, 10007 or email to gabriela@harborestuary.org.



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Aqua 101 Youth Stewardship Program (from page 15)

The children put their hearts and souls into the project as they spent their mornings in the blazing sun cleaning the bay, but had the good fortune of getting to enjoy themselves on the beach in the afternoons while learning about water safety and surfing from some of the most respected experts who hosted workshops with RWA directly on the beach.

The program wouldn't have been possible without the help of Ari Zabloski, owner of Marina 59 who offered RWA a safe space to store their boats and equipment, and lead classes with the youth. Mentors from Sebago Canoe Club, American Littoral Society, US Lifeguard Association, NY Surf School

and countless other local residents also offered to work directly with the students along the waterfront.

As the summer continued, other local students and community members were inspired by our work, and several approached RWA to partner with them on programs. Kulanu Day Camp, a group for developmentally disabled children, participated in the cleanups, chaperoned by more experienced Youth Summer Program students. This proved to be a very enriching process for the whole community, fostering new links and a sense of responsibility and belonging.

By the end of the summer the students had collected some 15,000 lbs of trash and the shoreline was beginning to show signs of renewal where new spartina grasses had started to cover

the shoreline along with the countless horseshoe crabs that were spawning along Dubos Point. It was a significant improvement from past years where glass and trash littered the shore and fishing line strangled numerous crabs along miles of neglected shoreline.

The program has continued to serve many of these same kids afterschool as they

make their way every Tuesday and Wednesday to the Marina at Beach 59th Street; continuing their efforts right into the winter season.

Three of the high school students who participated in the summer program now work with RWA as youth leaders in their afterschool program. The students hope to participate in this summer's New York City Department of Youth and Community Development (NYC DYCD) Summer Youth Employment Program to continue these efforts to be outdoors and teach others to appreciate the environment.

To learn more about the program, go to www.rwalliance.org and check out the rockaway waterfront alliance flickr photos.

Jeanne DuPont is Executive Director of Rockaway Waterfront Alliance

The Tidal Exchange is Going Green(er)

Starting with our next issue, we will begin switching to an email-based newsletter. In addition to reducing our carbon footprint, using an electronic format will allow for more frequent and dynamic updates. To make sure you do not miss our upcoming editions, please send your email and name to gabriela@harborestuary.org. If you do not have email access or prefer to receive hard copies, please let us know by calling 212-637-3793 or mailing a note to: Attn: HEP, 290 Broadway 24th floor, New York, NY 10007.



RWA Board member Don Riepe showing the students a crab as they paddled along Dubos Point. Photo by RWA.