National Park Service
U.S. Department of the Interior

Jamaica Bay Institute
Gateway National Recreational Area

Jamaica Bay: Plight and Promise

A Sharing of Research Perspectives

October 29, 2006
Woody Tanger Auditorium
Brooklyn College

Jamaica Bay: Plight and Promise

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Superintendent's Message

Welcome to the National Park Service's focus on research and monitoring efforts in and around Jamaica Bay. The title of our program, "Jamaica Bay: Plight and Promise" speaks volumes about the bay, its current status and the hopes for the future. Estuaries serve as the nurseries of our oceans and in the case of Jamaica Bay, a resting and feeding stop so important to the survival of migrating birds along the Atlantic Flyway. Many of today's presentations will help illuminate that promise, one that we must rededicate ourselves to in order to preserve one of the most significant estuaries in the world.

I would like to acknowledge the partnership among the Gateway National Recreation Area's Jamaica Bay Institute, the National Parks of New York Harbour Education Center and the City University of New York - Brooklyn college in their collaborative efforts to present this conference. Working together, they help bridge the world of scientific research with our nation's citizens, educators and students.

Enjoy the conference.

Barry Sullivan

General Superintendent,
Gateway National Recreation Area

Jamaica Bay: Plight and Promise

October 29, 2006 - Agenda

10:00 Welcome

10:10 *Herpetofaunal Community Restoration at Gateway National Recreation Area*. Robert P. Cook

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10:40 *Mosquitoes, Birds, and Transmission Patterns of West Nile Virus.* Howard S. Ginsberg

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5 minute Q&A

11:15 *Atlantic Silversides as a New Model Organism for Assessment of Environmental Endocrine Disruption*. Tara A. Duffy

11:30 *Jamaica Bay Marsh Islands Ecosystem Restoration Monitoring Program*. Patricia S. Rafferty

11:45 *Invertebrate Communities in Jamaica Bay*. David R. Franz

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10 minute Q&A

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3:00 *Parkwide Vegetation Inventory and Mapping of Threatened Plant Species.* Richard Stalter

3:15 *An Examination of Predatory Pressures on Piping Plovers (Charadrius melodus) Nesting at Breezy Point, New York.* Brooke Lauro

3:30 *Horseshoe Crab Spawning Activity Survey*. Matt Sclafani

3:45 *Monitoring and Restoration of Estuarine Systems in Jamaica Bay.* Martin P. Schreibman

4:00 *Application of Citizen Science and GIS Technologies to the Field of Invasion Biology*. David G. Delaney

10 minute Q&A

Closing comments

The Jamaica Bay Estuary

In the midst of New York City, lies Jamaica Bay. Broad estuarine waters, expanses of tidal wetlands, and a myriad of birds, fish and other wildlife are all featured in this natural haven. Jamaica Bay's tidal wetland habitat and remarkably resilient fauna and flora exist despite intense urban development. The Belt Parkway, Beach Channel Drive, one of the busiest airports in the world, five landfills (now all closed), and several sewage treatment plants have transformed the shores of New York that were once fringed by salt marshes. Shipping channels carved deep into the bottom of bay have changed the sediment flow and the tidal action that flushes materials in and out of the bay. These urban features are as much a part of Jamaica Bay as are the natural forces.

Despite its altered landscape, Jamaica Bay is the largest and most productive coastal ecosystem in the northeastern United States. Its diverse natural habitats include: estuarine waters, marshes, meadowlands, beaches, dunes and forests. Wetland fringes provide homes for a variety of 80 fish species, while various other habitats provide resting and breeding grounds in what is known as one of the best bird-watching locations in the western hemisphere. Even endangered species like the peregrine falcon, piping over, and Atlantic Ridley sea turtle call this area home. This rich diversity plays a part in maintaining the health and stability of the local environment and contributes to biodiversity on a global scale.

The National Park Service has jurisdiction and property ownership over the majority of the bay and its surrounding shoreline areas and takes a leading role in its management and protection. Today, Jamaica Bay is a major focus of scientific research, environmental management, habitat restoration and environmental education. To inform all of these ambitious efforts, the National Park Service continues to encourage dialogue between park staff, academia, regulatory agencies, the educational community, and citizen groups, so a more unified vision of the future of Jamaica Bay can be shared.

Managing Jamaica Bay's natural resources is a complex responsibility that requires the participation and cooperation of many partners, including the general public's interest, involvement, and active stewardship. There are great opportunities for our work in Jamaica Bay to be a model for other parks and urban ecosystems.

Keynote Speaker

Mark Bain
Director of the Center for the Environment
Columbia University

Mark Bain is a quantitative aquatic biologist and ecosystem scientist who conducts both basic research and studies driven by current management issues. His taxonomic specializations are fish and benthic invertebrates with major system expertise concentrated on lakes, streams and estuaries. Statistics, modeling, and biological assessment are heavily used in most research and teaching. Environmental policy experience includes endangered species protection, energy-environment conflicts, watershed management, and international conservation.

His current research examines structure and development of bay and lagoon ecosystems around Lake Ontario, behavior and ecology of sturgeon, watershed scale environmental planning, methods for assessing biotic status of aquatic and wetland habitats, and impacts to the Hudson River caused by the World Trade Center destruction.

Herpetofaunal Community Restoration at Gateway National Recreation Area

Robert P. Cook

Gateway National Recreation Area consists of 10,522 hectare managed by the National Park Service in the New York Metropolitan Area. Park habitats include bay, salt marsh, dunes, grasslands, Phragmites, shrub thickets, and woodlands. Although much of its upland habitat was created in the early 20th century from dredge spoil, this dramatically altered landscape still plays a significant role in supporting local native biodiversity. Well known for its significance to birds, dispersal barriers inhibited colonization by amphibians and reptiles. To address this faunal impoverishment, I began a program in 1980 to restore/recreate, to the extent possible, the herpetofaunal community historically native to the area.

I conducted initial inventory, habitat improvements, and translocation of selected species. The species translocated were historically native to the park and immediate area. From 1980 to 1995, I translocated individuals of 20 species to one or more sites. I began with lower trophic level species and depending on species, translocated different life stages. Monitoring results through 1999 indicated survival to at least the following year in 39 of 40 translocations, and evidence of successful reproduction in 33 of 40. More recent data, collected in 2002 and 2003, found evidence of continued persistence for 29 of 40 translocations and evidence of recent reproduction in 26 of 40. Based on from 7 to 22 years of monitoring, 19 translocations appear successful, 7 probably are, 4 are uncertain, and 10 appear failed. As a result of this program, the park now supports a greater proportion of the area's original native herpetofauna. However, most of the success has been with generalist species that remain fairly common outside of large urban areas and errors of judgment lead to failed translocations. These results illustrate both the potential and limitations of translocation as a management tool in urban areas.

U.S. National Park Service, Cape Cod National Seashore, Wellfleet, MA

Since the 1980s, forty reptile and amphibian species have been re-introduced to the Gateway National Recreational Area. Although not all the translocations were successful, the park now supports a greater proportion of the area's native herpetofauna.

Black-Crowned Night-Heron Population Ecology in Gateway National Recreational Area

Andrew J. Bernick[1], **Scott Newman**[2,3], **Veronica Padula** [2,4]

Over 1,700 pairs of colonial wading birds (e.g. herons, egrets, and ibis) breed and forage in the industrialized ecosystem of metropolitan New York City. The Black-crowned Night-Heron (BCNH), a mainly nocturnal forager, is the numerically dominant breeding wader in these colonies.

Through foraging surveys on Staten Island, NY (2002-2005) and health assessments of nestlings reared at two colonies (Hoffman and North Brother islands, 2004-2005), we determined that: (1) BCNHs use a wide range of marine, freshwater, and terrestrial habitats in this urban system; (2) BCNHs use different foraging techniques in different habitats, capturing more, smaller prey in coastal habitats and fewer, larger prey items in fresh water; and (3) nestlings from Hoffman Island in 2004, likely provisioned by adults foraging near Staten Island, showed significantly different concentrations of enzymes, proteins, and electrolytes than chicks reared on North Brother Island or Goose Island, or from chicks reared on Hoffman Island in 2005. This suggests that in 2004, prey resources contributed to a significantly different physiological health for chicks from Hoffman Island.

As local foraging resource quality influences both the health of adults and nestling BCNHs and the persistence of breeding colonies, understanding the link between adult resource use and nestling health is critical to the protection and conservation of urban wading bird species.

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[2]Wildlife Trust, New York, NY
[3]Wildlife Conservation Society, Rome, Italy
[4]Columbia University, New York, NY

The quality of local foraging resources influences the health of both adult and young black crowned night herons. Understanding this link is essential to the conservation of urban wading birds.

Mosquitoes, Birds, and Transmission Patterns of West Nile Virus

Howard S. Ginsberg[1] **& Roger A. LeBrun**[2]

Mosquitoes at Gateway National Recreation Area were surveyed in 2001 using CDC miniature light traps baited with dry ice, and gravid traps baited with hay infusion and oak leaf infusion. *Aedes vexans* was the most common species in light trap samples, with *Culex salinarius* and *Ae. sollicitans* also common. All of these species are competent bridge vectors of West Nile Virus (WNV). *Culex pipiens* and *Cx. restuans*, both competent enzootic vectors, were common in gravid trap samples. Therefore, WNV transmission is possible at Gateway, and surveillance is appropriate. A study of WNV transmission dynamics between birds and mosquitoes is currently underway. The goal of this study is to develop effective surveillance tools that can predict epizootic activity of this virus, and provide information for efficient management.

[1] USGS Patuxent Wildlife Research Center Coastal Field Station, Woodward Hall-PLS, University of Rhode Island; Kingston, RI
[2] Department of Plant Sciences, University of Rhode Island; Kingston, RI

Mosquitoes found at Jamaica Bay can transmit the West Nile Virus between birds and from birds to humans. This study develops tools to predict and manage the spread of the virus within the bird population.

Bird Banding Mapping Station at Fort Tilden, Gateway National Recreational Area

Richard Veit[1] **& Robert Brown**[2]

Monitoring Avian Productivity and Survivorship is a cooperative effort to study annual indices of productivity and estimates of adult survival rates from data collected throughout North America. Data is gathered through constant-effort mist netting, wherein birds are captured, banded, and released unharmed. Mist-netting of birds allows the investigator to gather important demographic parameters of local bird populations, such as breeding status, age-class, reproductive success, and survivorship from time of first capture.

We have established four MAPS stations in the New York City area, three on Staten Island, and one at Fort Tilden, Queens County. The MAPS station at Fort Tilden is part of the National Park Service's Gateway National Recreational Area, and was established in 1997. We estimated yearly productivity and survivorship of the Gray Catbird (Dumatella carolinesis), one of the most common breeding birds of north-eastern, North America. Productivity indices are based on ratios of juvenile to adult captures during the breeding season. Average productivity of Gray Catbirds from 1997-2004 at Fort Tilden was 0.58 ± 0.27, with a high of 1.12 in 1997, and a low of 0.09 in 2003.

We used the Cormack Jolly Seber model (program MARK), to estimate survivorship of Catbirds at two stations that had sufficient recapture data, Fort Tilden and Willowbrook park (Staten Island). Using AIC, the models that kept survivorship constant over time (time independent), but had time dependent recaptures (chance of recapturing individuals over time), were the best models for determining adult survivorship at both Fort Tilden (0.39 ± 0.06) and Willowbrook (0.47 ± 0.11). Survivorship at these sites is lower than the 0.55 estimated by Desante et al. (2001) for Gray Catbirds, but we present data representative at a local and not regional scale.

[1] CUNY College of Staten Island
[2]Chief Science Technician, Biology Dept/Adjunct Professor of Biology The College of Staten Island

Using mist-netting and bird banding techniques, it's possible to estimate the productivity and survivorship of grey catbirds at two sites in Staten Island and Fort Tilden.

Atlantic Silversides as a New Model Organism for Assessment of Environmental Endocrine Disruption

Tara A Duffy, David O Conover, Anne E McElroy

The impact of wastewater effluent on marine organisms is a major concern for ecosystem health. Personal care products, detergents and other chemicals that are not removed through standard water treatment have been shown to disrupt normal endocrine function in fish, altering reproduction. Prior research in our lab has illustrated that winter flounder in Jamaica Bay are feminized, and that exposure to sediments from Grassy Bay causes both feminization and developmental abnormalities in young fish.

To assess the wider impact of exposure to estrogenic chemicals in the waters around Long Island, we chose the Atlantic silverside, *Menidia menidia* as a model organism. This fish is widely distributed, ubiquitous in estuarine environments and displays a unique form of sex determination, dependent upon the temperature of the environment. Because the sex of *M. menidia* is labile, we hypothesize that exposure to estrogenic compounds will be a potent modulator of sex ratio of the silverside.

Fish were collected from bays and estuaries around Long Island and examined to determine sex ratios. Temperature recorders moored at the sites of fish collection provided a record of temperature throughout development to rule out site differences due to the natural environment. Results indicate a highly female biased sex ratio at sites closest to New York City, supporting our hypothesis. The Atlantic silverside may provide a sensitive indicator of exposure to endocrine disrupting chemicals in the environment.

State University of New York, Stonybrook, NY

There is evidence that exposure to estrogenic chemicals, commonly found in personal care products, alters the endocrine function of Atlantic silversides. Results show that there is a greater proportion of females at sites closest to New York City.

Jamaica Bay Marsh Islands Ecosystem Restoration Monitoring Program

Patricia S. Rafferty[1], George W. Frame[2], M. Kathryn Mellander[2], and Douglas A. Adamo[2,] Alexander S. Kolker[3], Donald R. Cahoon[4], Charles T. Roman[5], Mary K. Foley[6]

Jamaica Bay, New York, a unit of Gateway National Recreation Area, is a complex of marsh islands and shallow brackish water located within the highly modified New York City landscape. Jamaica Bay is experiencing a significant loss of *Spartina alterniflora* marsh. The National Park Service (NPS) has partnered with the New York District Army Corps of Engineers, Port Authority of New York and New Jersey, New York City Department of Environmental Protection and New York State Department of Environmental Conservation to restore approximately 70 acres of wetland in Jamaica Bay.

In conjunction with this project, an interagency team has developed a Monitoring and Adaptive Management Plan to ensure the systematic collection of data to evaluate the restoration project. The goal of the monitoring program is to identify factors contributing to the success or failure of the restoration project, to quickly identify any problems requiring remedial action, and to implement identified remedial actions in a timely manner. In addition, the monitoring program will aid in identifying factors that are contributing to marsh loss throughout Jamaica Bay. The Monitoring and Adaptive Management Plan provides for monitoring vegetation, nekton, birds, benthos, insects, biogeochemistry, sediment elevation, habitat and landscape at the restored marshes (Elders Point East and Elders Point West) as well as one reference (JoCo) marsh. NPS initiated the monitoring program in 2005, prior to restoration, to establish the existing baseline condition. Construction of the restoration project began during the spring of 2006. Monitoring will continue for five years after restoration to track the response of the treatment marshes to restoration and to assess progress towards the reference condition. An overview of the monitoring program and pre-construction monitoring data will be presented.

[1]National Park Service, Northeast Region, Patchogue, NY
[2]National Park Service, Gateway National Recreation Area, Division of Natural Resources, Staten Island, NY
[3]Marine Sciences Research Center, Stony Brook University, Stony Brook, NY
[4]US Geological Survey, Patuxent Wildlife Research Center, Beltsville, MD
[5]National Park Service, Northeast Region, University of Rhode Island Bay Campus, Narragansett, RI
[6]National Park Service, Northeast Region, Boston, MA

A Monitoring and Adaptive Management Plan has beem developed to evaluate marsh restoration and identify problems requiring remedial action, as well as to identify factors that contribute to marsh loss in Jamaica Bay.

Invertebrate Communities In Jamaica Bay

David R. Franz

Benthic (bottom-living) invertebrates, which include animals such as polychaete worms, amphipod crustaceans, bivalve and gastropod mollusks etc., play a critical role in the ecological function of the estuarine ecosystem. As the major consumers of planktonic algae and detritus, the invertebrates are able to convert the enormous primary production of the system into a form which can be consumed by higher trophic levels such as fish and shorebirds. Invertebrates have the additional benefit of being easily sampled, are always available, and are important indicators of the overall health of the Bay ecosystem. For Jamaica Bay, little information on the structure and species composition of benthic and intertidal communities exist prior to the establishment of Gateway NRA. Currently, subtidal benthic habitats are dominated by sand sediments (ranging from very fine through medium) except in certain channels, where harder bottoms with coarse sand and/or gravel bottoms prevail. Sea grass beds are absent. Intertidal sediments are predominantly medium-sand. Intertidal salt marshes, although threatened, are important habitats in Jamaica Bay and support extensive beds of ribbed mussels (*Geukensia demissa*) .

Bay-wide surveys of benthos and intertidal invertebrates by Brooklyn College scientists, supported by the NPS, began in the mid 1980s and continued through 2002. More recent detailed studies have focused on specific areas or features (e.g. borrow pits), hard clam mortality, oyster restoration etc. The Jamaica Bay estuary is severely disturbed and greatly modified by human activities. Nitrogen loading from sewage treatment plants and from other sources have caused severe eutrophication, as reflected in seasonal macroalgal blooms (*Ulva lactuca*), some bottom hypoxia, reductions in species diversity, and possibly a decline of larger, longer-lived invertebrates. Even so, our data indicate that both overall species richness and local species diversity remain relatively high in many sites, and that benthic production continues to support higher trophic levels such as fish and shorebirds. Exceptions include borrow pits and a number of sites affected by landfill leachates, sewage outlets and by runoff from Kennedy Airport. All functional groups of invertebrates are represented in the Bay, and there is high potential for recovery of benthic communities even in highly disturbed sites. It is important that the NPS continue to monitor invertebrate community structure in order to identify changes which could indicate further degradation or positive changes in the Jamaica bay ecosystem.

Brooklyn College, Brooklyn, NY

Although the Jamaica Bay estuary has been greatly modified by human activities, the benthic invertebrate community remains healthy and continues to support fish and shorebirds. However, landfill leachates, airport runoff, and sewage outlets have reduced species richness and diversity at some sites, indicating degraded ecosystems.

Assessment of the Use of Stable Nitrogen Isotope Ratios in Monitoring Anthropogenic Nutrient Inputs to Estuarine Systems

Rebecca O. Bannon & Charles T. Roman

Many estuaries are increasingly subject to high inputs of nitrogen from septic systems and wastewater treatment facilities. The use of stable nitrogen isotope ratios is one method that has been proposed to indicate anthropogenic nutrient enrichment. This study sampled several common marsh species in order to determine which organisms are the most sensitive indicators of changes in anthropogenic nitrogen loading. Samples were collected from six salt marshes in Cape Cod, Massachusetts, Great South Bay, New York, and Jamaica Bay, New York. These marshes represent a range of anthropogenic impact, with Hatches Harbor, MA representing a relatively pristine system and Jamaica Bay representing a highly impacted system.

Power analysis was used to examine sample sizes necessary to detect change in nutrient source using the species sampled. $\delta 15N$ values of all species increased along gradients of increasing human population and residential development from Hatches Harbor to Jamaica Bay. Consumer species demonstrated lower within-site variability than producer species and would therefore require smaller sample sizes in order to detect changes in nitrogen source. The isotope data collected in this study provide baseline data for potential use in long-term monitoring of the study marshes.

National Park Service, Northeast Region, University of Rhode Island Bay Campus, Narragansett, RI

Nitrogen isotope ratios are used to indicate anthropogenic nitrogen loading, for instance from wastewater treatment facilities. Consumer species were found to be the most sensitive indicators for nitrogen source.

Diamondback Terrapins in Jamaica Bay: Combining Scientific Research, Conservation and Environmental Education.

Russell L. Burke, Ph.D.

Research on diamondback terrapins since 1998 has focused on three goals: pure science, conservation, and promoting environmental education through volunteer involvement. These goals overlap extensively. The pure science research component has been focused on investigations of temperature sex determination (TSD). Analysis of the largest and most complete TSD study is currently underway, with good prospects for future studies. The results of this work are bringing Jamaica Bay and its terrapins to the attention of new scientists around the world. The conservation component has been focused on identifying the main factors affecting population size. Raccoons and native plants are major sources of nest predation and probably affect recruitment into the population. The effects of marsh loss and other ecosystem-level changes on the terrapin population are unknown.

Terrapin research projects provide environmental education in two ways: involvement in research and unplanned interactions with visitors. Research at Jamaica Bay provides a rare and valuable opportunity for people from urban habitats to easily get involved in scientific field research. Clearly many urban residents want to directly experience field research, particularly with wildlife, and specifically with turtles. Numerous volunteers, mostly from NYC, have provided essential assistance with these projects by doing field surveys and helping collect data. At least 30 high school students have carried out either individual or group research science and conservation projects. Many hours of interactions between park visitors, volunteers, students, and research scientists have resulted in valuable information exchanges in all directions, and have left everyone involved with a better understanding of environmental issues.

Department of Biology, Hofstra University, Hempstead, NY

Research and conservation of diamondback terrapins is bringing Jamaica Bay to the attention of scientists around the world and giving the public an opportunity to get involved with turtle-related field work.

Parkwide Vegetation Inventory and Mapping of Threatened Plant Species

Richard Stalter, Eric Lamont, Michael Byer, Deanna Barranco, Grace D'Oria, Shahryar Eshaghian, Lauren Fisher, Olga Galeano, Robert Gorgoglione, Kristy Haley, Steve Kollar, Manika Malik, Candice Milton, Affaf Munir, Nelson Tang

Jamaica Bay Wildlife Refuge (JBWR) is situated within Jamaica Bay, an inlet of the Atlantic Ocean at the west end of Long Island, New York (40°35'N Latitude, 72°52'W Longitude). This floristic study is based upon more than 15 years of observations and collections. The vascular flora of Jamaica Bay Wildlife Refuge consists of 456 species within 270 genera and 90 families. Two hundred and thirty-four species, or 51% of the flora, are native to the refuge. The largest families in the flora are the Asteraceae (77 species) and Poaceae (57 species). Other large families are the Rosaceae (26 species), Fabaceae (24 species), Cyperaceae (21 species) and Brassicaceae (19 species). The largest genus is *Polygonum* (ten species), followed by *Cyperus* (nine species), *Aster*, *Panicum*, *Trifolium* (each with seven species).

Twelve species reported from JBWR are listed as rare in New York by New York Natural Heritage Program. Nine rare plant species observed by us have been documented by either voucher specimens or photographs: *Aster subulatus*, *A. tenuifolius*, *Cuscuta pentagona*, *Cyperus retrorsus*, *C. schweinitzii*, *Elecocharis halophila*, *Eupatorium hyssopifolium var. laciniatum*, *Solidago sempervirens var. mexicana* and *Tradescantia ohiensis*. Fifteen plant species occurring at JBWR are listed as "protected native plants" by New York State Department of Environmental Conservation. Most of the endangered species grow in successional fields and marshes.

The present vegetation of JBWR can be categorized into seven different plant communities: 1) salt marsh community, 2) maritime beach and poorly developed dune community, 3) successional shrubland community and thickets, 4) early successional woodland community, 5) successional fields, 6) freshwater wetlands and 7) ruderal sites (including roadsides, lawns, gardens, paths and disturbed sites around buildings).

St. John's University, Jamaica, New York, NY

The vascular flora of the Jamaica Bay Wildlife Refuge consists of 465 species, half of which are native to the area. These include several state-listed endangered species, most of which grow in successional fields and marshes.

An Examination of Predatory Pressures on Piping Plovers (*Charadrius melodus*) Nesting at Breezy Point, New York.

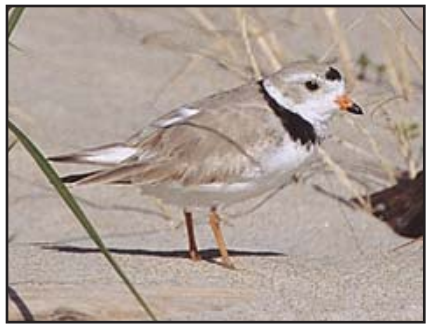
Brook Lauro

Piping Plovers are shorebirds that nest locally on Long Island beaches and are protected under the Endangered Species Act. Plovers face a number of unnatural threats to their reproductive success that include: habitat loss, human disturbance and increased pressure from predators like gulls, crows and raccoons that eat human garbage. The focus of this study is to examine predatory threats to Piping Plovers *(Charadrius melodus*) nesting at Breezy Point, New York, a part of Gateway National Recreation Area.

This is accomplished by conducting an artificial nest study. Nests containing quail eggs were placed throughout Breezy Point on a monthly basis (April-July). Egg removal for all months combined was 84%. The two main predators based on visible footprints in sand were avian: gull and crow. Results found that crows took significantly more eggs (35 %) than gulls (19%) at artificial nests although on average the number of crows observed was 13 (SE=2.8) while the average number of gulls observed was 672 (SE=137.0) for the 14 days of testing.

Results suggest that mammalian predation at this study site was less important. Therefore, based upon results it is suggested that a crow management program, including nest removal, is implemented to support the gull and mammal management programs already in place.

Department of Computer Science, Mathematics and Science, St. John's University, Jamaica, New York.



Piping Plover (*Charadrius Meloddius*)

An artificial nest study found that crows are the most significant predators of piping plover eggs. A crow management plan would benefit the plovers, which are listed under the Endangered Species Act.

Horseshoe Crab Spawning Activity Survey

Matthew Sclafani

Horseshoe crabs support important coastal fisheries for bait and biomedical use, and their eggs provide essential food for other animals including migrating shorebirds. In recent years, declines in horseshoe crab and shorebird abundances have triggered concerns about the status of horseshoe crab populations. In response the Atlantic States Marine Fisheries Commission (ASMFC) developed a horseshoe crab Fishery Management Plan (FMP) to control the exploitation through reduced harvest. The FMP also concluded that current scientific information on population condition was insufficient to conduct a quantitative stock assessment and to determine trends.

The New York State Department of Environmental Conservation with assistance from Cornell Cooperative Extension of Suffolk County, initiated experimental survey work in 2005 to monitor the relative abundance of spawning horseshoe crabs on Long Island beaches. Volunteers assisted with the survey to count spawning horseshoe crabs along a 100 m transect and measure their size and weight during the new and full moon events from May-July. We observed that peak spawning typically occurred in late May/early June, and there was approximately a 2 week delay (or 1 lunar cycle) in spawning activity between the north and south shore beaches. The southshore beaches; including Plum Beach (Jamaica Bay), had the greatest spawning activity relative to the northshore and Peconic Bay.

Observed differences in spawning behaviors between the monitoring sites indicate that different sampling methods (e.g. egg counts, SCUBA survey, etc.) will be needed to accurately sample horseshoe crabs at each location. Additional plans for future monitoring include conventional and telemetry tagging methods which will also be discussed.

Cornell Cooperative Extension, Centerport, NY

Volunteers helped survey horseshoe crab spawning on Long Island beaches in order to estimate their abundance. Due to differences in spawning behaviors at different sites, a variety of monitoring techniques are necessary to accurately assess horseshoe crab spawning.

Monitoring and Restoration of Estuarine Systems in Jamaica Bay

Martin P. Schreibman[1], Chester B. Zarnoch[1], John T. Tanacredi[2]

For almost 25 years the Aquatic Research and Environmental Assessment Center (AREAC) at Brooklyn College has utilized the resources at Gateway National Recreation Area (GNRA) to conduct research in a wide range of topics. They include fisheries biology, winter flounder distribution and reproductive physiology, captive breeding of local aquatic species, origins and effects of endocrine disrupting pollutant chemicals, study and restoration of wet land loss, assessment studies for the restoration of Jamaica Bay (JABERRT), bivalve (clams and oysters) research and horseshoe crab distribution, captive breeding and biology. In more recent years we have utilized GNRA as a classroom to teach urban marine ecology and environmental science to hundreds of students from all levels of the NYC educational system, as well as to their teachers.

Our presentation will briefly review these areas of research and education and will also discuss new approaches to maximize the synergy between the park and the university regarding vital urban environmental issues.

[1]Aquatic Research and Environmental Assessment Center (AREAC), Brooklyn College, City University of New York, Brooklyn, NY
[2]Dowling College, Oakdale, NY

GNRA is an environmental science classroom for elementary school children and university students alike.

Gateway National Recreational Area has been used as a classroom to teach urban marine ecology and environmental science to students and teachers from all levels of the NYC educational system.

Application of Citizen Science and GIS Technologies to the Field of Invasion Biology

David G. Delaney[1], Corinne D. Sperling[1], Christiaan Adams[2], and Brian Leung[1]

Invasive species are being transported to different habitats at an alarming and increasing rate, spurring unwanted global change. Scientists who are dealing with this environmental problem are not provided with adequate resources to effectively monitor and manage invasive species. To address this issue, scientists have turned to creative management options. Volunteer-based monitoring has been highlighted as a potential solution to ever-decreasing funding availabilities, since it maximizes the reach of vital monitoring capacities. Concurrently, this approach grants opportunities for outreach, in which amateurs and novices alike are provided with first hand learning experiences.

We will give a brief background on the issue of invasive species, as well as an overview of a volunteer monitoring network: 'Citizen Science Initiative: Marine Invasive Species Monitoring Organization' (CSI: MISMO). This volunteer citizen science monitoring network has undergone a validation study, and the data it has gathered will help to fill in gaps in monitoring done by scientific communities. Geographic Information System (GIS) technologies will also be used to examine large-scale distribution patterns of the invasive Asian shore crab (*Hemigrapsus sanguineus*) and European green crab (*Carcinus maenas*).

[1] Department of Biology & School of Environment, McGill University, Montreal
[2] Massachusetts Institute of Technology, MIT Sea Grant College Program, Cambridge, MA

Volunteers can help fill the gaps in monitoring when the scientific community lacks the resources to effectively manage invasive species. GIS is used to examine large-scale distribution patterns of invasive crabs.

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Mission Statements

Gateway National Recreation Area

The Secretary shall administor and protect the islands and waters within the Jamaica Bay Unit with the primary aim of conserving the natural resources, fish, and wildlife located therein and shall permit no development or use of this area which is incompatible with this purpose.

Jamaic Bay Institute

To promote and improve the ecological health and social relevance of Jamaica Bay though research, education and informed decision making.

National Parks of New York Harbor Education Center & Brooklyn College

The mission of the National Park Service and City University of New York partnership is to collaboratively develop innovative and enriching programs and new alliances to enhance the quality of public education for all students and further excellence in teaching, research and scholarship. To provide opportunities for involvement in public service that develops personal and social responsibility and fosters stewardship of the land and its natural and historic resources. To ensure that these resources remain relevant all people and inspire lifelong learning.

National Park Service
U.S. Department of the Interior

Jamaica Bay Institute
Gateway National Recreational Area