

Creating New Ways to Teach Biodiversity in NYS High Schools

In 2007, New York Sea Grant and the Yale Peabody Museum of Natural History collaborated to create a new and exciting resource to improve the capabilities of grade 5-9 science teachers to teach biodiversity and global climate change in the classroom. Long Island Sound (LIS) lobster mortality research was used to create a curriculum to meet New York State Learning Standards. The classroom activities use inquiry-based approaches to improve critical scientific reasoning. Incorporating the lobster mortality research into activities conveys important concepts and illustrates key environmental phenomena.

Fifty-four science teachers and outdoor educators from New York and Connecticut participated in a two-day workshop series to evaluate the new curriculum. The educators learned how stressful conditions in LIS and the shell disease that is occurring throughout New England affect American lobsters' health.

As part of the workshop, the educators visited a salt marsh in Sunken Meadow State Park, where they cast seines and observed marine life. These true-life examples will empower science teachers to engage their students in life and earth sciences, and assist students to connect with the marine environment.



Michelle Wise (far left) of the BOCES Outdoor Learning Center shares her knowledge about marine and shore life ecology with teachers. Photo: Antoinette Clemetson, NYSG



High school science teachers learn about marine biodiversity at a salt marsh in Sunken Meadow State Park. Photo: Antoinette Clemetson, NYSG

As a result of this outreach project:

- a new science curriculum is available to better prepare students to prepare for NYS Regents Exams,
- two *BioAction Kit Backpacks* containing resources to conduct classroom activities were created to support a new revolving loan program for Long Island science teachers,
- approximately 100 high school science teachers participated in a special session at the Smithtown Central Public School District's (HS West Campus) science teachers' professional development day, and
- Smithtown Central Public School District (HS West Campus) is working with the coordinators to construct their own *BioAction Kit Backpack* to benefit 1,700 students.

Educating the Next Generation of Citizen Stakeholders

New York Sea Grant (NYSG) is dedicated to ensuring a scientifically and environmentally informed citizenry for the future by making science/environmental education a priority issue. NYSG utilizes teacher training, curriculum enhancement and education programs to involve classroom teachers and non-formal educators and their students in meaningful learning experiences.

Utilizing innovative approaches and second-year funding for the Centers for Ocean Sciences Education Excellence (COSEE) Great Lakes, more than 4,000 students and teachers took part in NYSG education programming in the Great Lakes region in 2007.

The mission of COSEE Great Lakes is to foster lasting relationships through networks that link Great Lakes educators with ongoing science research in the region and with connections of that science to marine equivalents. COSEE GL is co-funded by the National Science Foundation, the National Oceanic and Atmospheric Administration, and the National Sea Grant College Program.

900 Attend Science Exploration Day

Working with the WNY Science Supervisors, NYSG helped coordinate Science Exploration Day, which brought 900 high school students and their teachers to the University at Buffalo to learn from scientists on topics from invasive species to environmental engineering.

Distance Learning Teaches 1,400

A NYSG distance learning program introduced 1,400 students and their teachers to the impacts of invasive species in conjunction



Teachers use NYSG-developed materials to learn about invasive plants and animals aboard a canalboat as part of the Educators, Exotic Species and the Erie Canal workshop. Photo: Helen Domske, NYSG

with the Buffalo Museum of Science and their Authentic Learning program. Senior Extension Specialist Helen Domske serves as the “resident scientist” who provides an interactive lesson on aquatic invasive species and answers questions from students.

Teacher Workshops Create Catalysts

More than 125 teachers took part in five COSEE GL sponsored teachers’ workshops on the Great Lakes, climate change and invasive species during 2007. These teachers received curriculum materials and information to share with their students. An additional 12 teachers took part in a week-long field course on tropical marine ecology in Curacao, that taught them about marine ecosystems as part of the COSEE GL Marine Immersion project. The teachers return to their classrooms to share their knowledge of and enthusiasm for marine environments and education with their students and colleagues.

New York Sea Grant is a cooperative program of the State University of New York and Cornell University. Sea Grant Extension administration is located at 112 Rice Hall, Cornell University, Ithaca, NY 14853.

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NYSG Training Helps Ensure Seafood Safety for Industry, Consumers

The seafood industry contributes more than \$7.9 billion to the state's economy and employs 96,000 New Yorkers (*NY Sea Grant-funded survey, 1999*). To compete and prosper, those in the seafood industry must have science-based systems in place to maximize the safety and quality of the products they produce, process or deliver to consumers.

Sea Grant Facilitates Seafood Safety

New York Sea Grant's outreach activities include on-site and distance education training programs, workshops, newsletters, and direct technical assistance. These programs involve collaboration with industry, businesses, federal and state regulatory agencies, the national Sea Grant network, and university resources.

Training Industry Nationwide

New York Sea Grant (NYSG) developed and manages two Internet training programs on federal food safety regulations that apply to the seafood industry. Approximately 2,500 individuals from seafood firms in NY and across the U.S. have registered for the Seafood HACCP Internet training course that will enable them to meet the training requirement of the FDA's seafood HACCP (Hazard Analysis Critical Control Point) regulation.

In 2007, NYSG conducted four workshops attended by 100 individuals from seafood firms in New York and 14 other states. A second Internet training program on current Good Manufacturing Practices (GMP) that covers basic food safety practices for food processors, wholesalers and warehouses was completed in 2007.



Back to Basics: Seafood businesses across New York are utilizing a new web-based, on-demand, low-cost NY Sea Grant training program to train employees in the application of basic food safety concepts and practices (above: foam cleaning of processing equipment).

Training Inspectors

Approximately 500 food safety inspectors from federal and state regulatory agencies have completed the NYSG-managed seafood HACCP Internet course. In 2007, NYSG conducted a series of six training sessions on Seafood HACCP requirements for more than 150 inspectors from the New York State Department of Agriculture & Markets at their annual update conferences at Cornell University.

Training Healthcare Providers Re: Seafood Risks and Benefits

NYSG is part of a national project team led by Oregon State University that received approximately \$600,000 in funding for a National Food Safety Initiative. The team will develop and conduct outreach programs for healthcare providers and practitioners to help them understand and effectively communicate science-based information on the risks and benefits of seafood to patients.

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Assisting Great Lakes Coastal Communities with Sound Land Use Management

One of the major assets of Great Lakes communities in combating the economic doldrums affecting them is local environmental quality. The environment affects not only the tourism industry but many quality of life factors important in attracting and retaining individuals and businesses in the area. Fundamental to local environmental quality is sound land use management, which in New York State is largely the responsibility of local governments. Most local officials have no formal training in land use issues, and public representative turnover is often high, particularly for volunteer positions such as planning boards and zoning boards of appeals. There is thus a serious need for readily available training in a range of issues for local officials.

New York Sea Grant Responds

Coordinating with existing programs, New York Sea Grant is updating and expanding the LEAPE - Locally-led Education and Action for Protecting the Environment - Program. Components include basic training in understanding types of non-point source pollution (sources, impacts, and controls) as well as associated issues such as roles and responsibilities of officials, and available management tools. Specific topics addressed include public management of private septic systems, management of roads (salt, drainage ditches, etc) and grantsmanship.

Formal and informal surveys of local officials and key informants have provided additional specificity regarding information needs. For example, one survey found all communities



“Local government actions in the arena of land use management have both economic and environmental effects.” Photo: J. Herring, NYSG

responding expressed a need for assistance in identifying funding opportunities and applying for grants.

Resources Available

In 2007-2008, NYSG staff have reviewed existing LEAPE materials and are updating the resources. Trainings regarding the management of onsite wastewater systems are being developed which will serve in conjunction with New York State’s Onsite Training Network, filling a gap identified in State assessments for a decade. This training, as well as the training in road ditch and road salt management, are also designed to serve under the NEMO (Nonpoint Management for Municipal Officials) program.

To learn more about how NYSG resources available to municipal leaders can help your Great Lakes/St. Lawrence River community, contact New York Sea Grant at 716-645-3610.

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New York Sea Grant Teaches Bird's Eye View of Hudson River Estuary Watershed

Teaching teachers how to promote watershed stewardship of the Hudson River Estuary Watershed has taken on a new perspective - you might call it a bird's eye view.

In 2007, a team of educators from New York Sea Grant (NYSG) and the Cornell University Institute for Resource Information Systems (CUIRIS) presented aerial photo interpretation and geographic information systems (GIS) data workshops at the "Teaching the Hudson Valley" Summer Institute held at the Henry A. Wallace Education Center at the FDR Historic Site in Hyde Park, NY. The images and data pertained to the lower 150-plus miles of the Hudson River tidal estuary that flows into New York Harbor.

More than 20 teachers representing several Hudson Valley School districts were introduced to the diverse uses of maps and



Nordica Holochuck explains an estuary map to New York City teachers at the American Museum of Natural History. Photo: S. Hoskins

aerial photos in classroom lesson plans, and how to promote watershed stewardship through the use of these materials.

The success of the Mid-Hudson workshops inspired continuation of the bird's eye view theme. In November, NYSG and CUIRIS, in partnership with the EPA NY-NJ Harbor Estuary Program, presented the mapping resources at the American Museum of Natural History (AMNH) in New York City (NYC). More than 400 NYC teachers attended the Educators Evening for the newly installed "Water Equals Life" exhibit.

Additional teacher training workshops were held in early 2008 in partnership with the Museum.



Teachers in Hyde Park study air photos as part of a training exercise. The aerial photo above shows New York City's Central Park and the Hudson River. Photo above: USDA; right: N. Holochuck, NYSG



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Promoting Cost-Effective Municipal Stormwater Management

Polluted stormwater is a primary cause of impairments to the Long Island Sound, the Peconic Estuary, and the South Shore Estuary Reserve. Collectively, such contaminants as bacteria, sediment, debris, nutrients, and toxic substances pose serious economic as well as human health concerns.

Municipalities play a central role in addressing these issues. As operators of storm sewer systems, municipalities are responsible for implementing stormwater management programs as required by the Clean Water Act's Phase II regulations. Complex and far-ranging, Phase II presents financial and technical challenges that affect most aspects of local government.

The New York Sea Grant Nonpoint Education for Municipal Officials Program (NYSG NEMO) has helped meet these challenges on Long Island by promoting cost-effective intermunicipal Phase II efforts that advance watershed-based resource protection priorities. Such multi-jurisdictional stormwater programs ensure consistencies of policy as well as efficiencies of scale in revising procedures, conducting operations, utilizing equipment, and providing training.

In 2007, NYSG NEMO launched an email communications program known as the Phase II-L.I. listserve. Now at more than 100 members, Phase II-L.I. expedites dialogue among the municipal Phase II community and provides a forum through which stormwater



Reducing the impacts of polluted stormwater poses many challenges to Long Island local governments. Photo: Eileen Keenan, NYSG NEMO

managers initiate working relationships and exchange information, expertise, and experience. As a result, successful approaches and projects are replicated while funds and staff time are conserved.

Further, the listserve has helped NYSG NEMO to improve its timely response to requests for support and to disseminate important guidance materials, funding announcements, and stormwater management updates from the National NEMO Network.

NYSG NEMO's role as an inter-municipal liaison is a vital component of the support it provides to Long Island municipalities. With growing financial and technical capacity, municipal leaders will continue making strides in protecting the Island's beautiful coast and estuarine resources.

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Called to Action: Students Meet Need for Environmental Restoration

Natural habitats are disappearing quickly in New York's marine district's coastal zone as natural areas are developed for other uses. Many agencies and programs are working together to preserve existing natural areas, while at the same time restoring suitable altered ecosystems. Citizen involvement in habitat restoration is critical, even at the home landscape level. Encouraging people to leave some of their home landscapes natural and to install native plants in their landscapes promotes biodiversity and helps preserve and create important habitats.

In 2007, New York Sea Grant (NYSG) recruited 60 students at Westhampton Beach Middle School to become involved in a small scale habitat restoration project, and used funds from the Allan Overton Endowment to NYSG to purchase the plants and horticultural materials needed for the project.

Working closely with landscape artist Bill Meyer, and school representatives, the students learned about native plants and created a mini-native plant landscape at Art Sites art gallery in Riverhead. Some of the species used in the garden are beach grass, Eastern red cedar, inkberry, little blue stem grass, mountain laurel, winterberry, bearberry, and prickly pear cactus. The effort was part of a larger show at the gallery by landscape artists involved in habitat restoration.



*New York Sea Grant specialist Robert Kent (left) and landscape artist Bill Meyer admire a native "plantscape" created by students at the Art Sites Gallery in Riverhead, NY.
Photo: Margery Daughtrey, Cornell University.*

The students also toured the native plant nursery at Peconic Herb Farm in Calverton, NY, and were given native plants to use in their home landscapes. One student described the project experience this way:

"Learning about the native plants really helped me to create my own gardens with my family at my own house."

Another student wrote:

"It was very interesting to learn about plants native to Long Island and how they help repair some of the damage done by development."

The show at Art Sites received wide attention, including an article in *The New York Times*.

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NYSG Prey Fish Program Assessment Results in Surveying Improvements

Since 1978, the United State Geological Survey (USGS) and New York State Department of Environmental Conservation (NYSDEC) have conducted prey fish population surveys in Lake Ontario. This survey program tracks changes in prey fish abundance and age class structure, and is used to predict future population trends. Prey fish population trends are the basis for setting stocking rates of trout and salmon to balance predator and prey abundance – an essential ingredient of healthy and sustainable recreational fisheries. The recreational fisheries of Lake Ontario provide an estimated economic benefit to NYS exceeding \$400 million annually (NYSG, 1996).

In 2003, New York Sea Grant (NYSG) organized an independent, technical review of the Lake Ontario prey fish assessment program to evaluate prey fish sampling design, data analysis, and the validity of prey fish abundance indices. Three prominent marine fisheries assessment scientists: Stephen Smith, Fisheries Oceans Canada; Dr. Steven Murowski, NOAA National Marine Fisheries Service; and Dr. Gerald Ault, Rosensteil Institute of Marine Science - participated in the review. Since the 2003 review, a number of improvements have been made to the prey fish survey program.

During 2006 and 2007, in response to the NYSG-brokered independent peer review of the USGS-NYSDEC prey fish assessment program for Lake Ontario, the two agencies:

- began using a revised acoustic sampling program to compare fish abundance over trawling areas with non-trawled areas to



The RV Kaho is a research vessel operated by the U.S. Geological Survey, which in conjunction with the RV Seth Green operated by the New York State Department of Conservation conducts fisheries assessment in Lake Ontario. Photo: U.S.G.S., Oswego

better understand whole lake prey fish distribution

- reanalyzed the 28-year alewife catch data, verifying the data's accuracy; and applied new statistical procedures to re-evaluate the need for correction factors to account for changes in vessels and assessment gear, and
- modified the alewife sampling strategy by extending sampling to greater depths and adopting a more efficient sampling effort that has increased the survey's precision and decreased the number of bottom trawl tows needed to assess the alewife population.

The collaborative NYSG-led project with USGS, NYSDEC, and marine scientists has resulted in a more accurate and efficient prey fish assessment program in Lake Ontario, providing fisheries managers with enhanced ability to manage New York's world-class recreational fisheries.

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Addressing VHS Impacts on Great Lakes Fisheries

VHS - viral hemorrhagic septicemia - is a serious viral disease of freshwater, marine, and aquacultured fish. A new strain of VHS in the Great Lakes causes mortalities of ecologically and economically important species including muskellunge, walleye, and smallmouth bass. The unfamiliarity of Great Lakes fish propagation staff, managers, and businesses with VHS containment, prompted APHIS (the U.S. Department of Agriculture's Animal and Plant Health Inspection Service) to impose stringent regulations restricting live fish transport. These regulations created unintentional economic hardships for fisheries-dependent businesses.

Early in 2007, New York Sea Grant (NYSG) organized a meeting with regulatory agencies, fish disease experts, and legislators, including U.S. Senator Hillary Clinton, to strategize VHS-related fisheries protection with minimizing economic impact on small businesses.

Other meetings were held with individual State Assembly members and New York State (NYS) Governor Elliot Spitzer's office to provide representatives with VHS information and potential implications for NYS fisheries.

NYSG collected VHS research information from worldwide sources and disseminated CDs of 285 articles to the New York State Department of Environmental Conservation and the Great Lakes Fisheries Commission.

NYSG is currently collaborating with Cornell University researchers to develop extension outreach of new fish diagnostic tools and a statewide economic survey of the bait industry.



Juvenile Pacific herring with VHS. Photo: Paul Hershberger, Western Fisheries Research Center, Nordland, Washington

The NYSG-led meetings helped expedite development of:

- regulations addressing how to cope with VHS through legislators and APHIS
- an effective live fish euthanization procedure for live fish processors, and
- identified sources of low interest loans for a business worth \$170,000 to the upstate economy.

All of these actions resulted in significant reduction of economic losses to small businesses.

In 2007, VHS information provided by NYSG was used to:

- investigate possible control strategies from Europe to adapt to NYS hatcheries
- continue discussions in the NYS Assembly for developing more restrictive ballast water legislation, with VHS as a focal point
- focus increased attention on fish pathogens at a NYS Assembly public hearing at which NYSG testified, and
- stimulated discussions by Governor Spitzer's office for proposed expansion of fish diagnostic capabilities in NYS.

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I FISH NY: Sharing the Facts & Fun of Fishing in NYC and on Long Island

Though New York City (NYC) and its surrounding metropolitan areas make up 57 percent of New York's population, only a fraction of natural resource allocations go to this region. To address this problem, New York Sea Grant (NYSG) and the New York State Department of Environmental Conservation (NYS DEC) partnered to create I FISH NY, an urban recreational fishing program that encourages NYC and Long Island (LI) residents to conserve aquatic resources by learning about and going fishing.

Since 2005 NYSG has employed two full-time Recreational Fisheries Specialists in NYC and on LI to implement and augment the groundwork established by NYS DEC staff. Using these pilot programs as a guide, the NYS DEC was able to hire four new Promotional Biologists in 2007 to extend the program throughout New York State. Independently, each specialist addresses the unique challenges of his or her region.

I FISH NY — New York City

I FISH NY-NYC maintained its presence in city schools, taking more than 1400 students fishing. For the first time, NYSG created and administered program evaluations to in-school participants. This information has helped the NYSG specialists modify content and will serve as the baseline for how the program is meeting its goals.

I FISH NY — Long Island

Through partnerships, I FISH NY-LI has taken close to 9,000 people fishing. In-class programs and out-of-classroom events (clinics



A child learns to identify fish, an important skill for anglers, at an I FISH NY clinic.

Photo: NYS Department of Environmental Conservation

and festivals) have been successful venues for introducing beginners to their aquatic surroundings.

In 2007, I FISH NY-LI continued its collaboration with local Board of Cooperative Educational Services (BOCES) to offer in-class programs that supplement existing party boat fishing trips. To increase the value of current programming, lesson plans not only follow New York State Learning Standards, but now also contain worksheets that pull concepts directly from New York State mandated tests.

The I FISH NY specialists have standardized the look and content of programs. As I FISH NY evolves and expands, letterheads, lesson plan formats, and press kits can be used with minimal modification for any I FISH NY office.

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“Westward Ho the Mussels” -- The Day the Dreissenids Crossed the Great Divide

Zebra and quagga mussels (*Dreissena spp.*) will celebrate the 20th anniversary of their North American invasion in 2008. During those 20 years, the mussels have disrupted ecosystems, and caused billions of dollars of industrial, electric generation and water treatment impacts. Even though the mussels spread throughout lakes and rivers in 23 states and two provinces in just 19 years (not bad for critters without legs, wings or fins!), they remained “Easterners,” never venturing west of the Rockies. This ended in January 2007 when the National Park Service confirmed the first homesteading quaggas in Lake Mead National Recreation Area (NRA) on the Colorado River. In short order, the mussels were found downstream in Lakes Mohave & Havasu, putting the critters in Arizona, California and Nevada.

Lakes Mead and Mohave combined can host more than 7,000 boats on a peak summer weekend, raising the specter of mussels hitchhiking on trailered boats to other western waterbodies. As Yogi Berra might have said, it was “deja vu all over again.”

A Lake Mead Interagency Team was formed to develop a quagga response plan. New York Sea Grant (NYSG), with its extensive zebra mussel experience, was part of the Lake Mead Science



Las Vegas Boat Harbor, site of quagga mussel discovery in Lake Mead on the Colorado River. Photo: Chuck O'Neill, NYSG

Team that met on the shore of Lake Mead to provide science-based management recommendations. The teams developed a pragmatic approach to minimize the mussels' impacts on lake resources and on stakeholders. The plan was proved doubly useful when the mussels were discovered upstream in Lake Powell NRA in July. NYSG continues to provide support to the Interagency Team.

On a parallel track, California formed an “incident response team” to address the invasion of Lake Havasu - the gateway to that state's massive interconnected water distribution system. A Science Advisory Panel met at the San Francisco Estuary Institute to provide science-based input on a California quagga mussel eradication/containment plan and to set research priorities. Once again, NYSG was at the table.

NYSG's recognized expertise with the mussels provided a linkage to 19 years of eastern experience, science and outreach and helped states west of the 100th Meridian to minimize the potential spread and related ecologic and economic impacts of the mussels in the West.



NPS zebra mussel monitoring program volunteer Wen Baldwin searches for quagga mussels on dock floats in the Las Vegas Boat Harbor. Photo: Chuck O'Neill, NYSG

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New Partner Joins Eastern Lake Ontario Habitat Restoration Efforts

During summer 2007 the New York Sea Grant (NYSG) Steward Coordinator assisted Oswego County Soil & Water Conservation District (OCSWCD) in bringing a new partner to the Eastern Lake Ontario Dunes and Wetlands Area. The collaboration secured funds for a habitat restoration project and development of an interpretive brochure.

NYSG provided the proposal development and project oversight that brought Entergy Nuclear Corp. support to the Eastern Lake Ontario Dunes and Wetlands Area for the first time. A \$10,000 grant from Entergy made possible a habitat restoration day at Deer Creek Marsh Wildlife Management Area (WMA).

In August 2007, volunteers from Entergy, Eastern Lake Ontario Dune and Salmon River Stewards, and various personnel from NYSG, OCSWCD, and the New York State Department of Environmental Conservation installed protective fencing and signage, and planted beachgrass to protect the fragile dunes area and heighten public awareness of the unique ecosystem at Deer Creek Marsh WMA.

In 2008, the NYSG Steward Coordinator will oversee the development of an interpretive brochure that will promote environmentally



Dune and river stewards helped install snowfencing during habitat restoration day. The stewards worked alongside Entergy volunteers to make the day at Deer Creek Marsh WMA a success.

Photo: Mary Penney, NYSG

sound use of Deer Creek Marsh WMA. Dune Steward Tyler Kukko, who will help develop the brochure, says, "This new brochure will showcase the unique resources here. I feel people will be more environmentally-friendly at Deer Creek if they know how fragile and important the dunes are."

Steward Program supporters appreciate what the new partnership with Entergy is making possible. Oswego County Legislator Margaret Kastler, says, "The program is working wonderfully well in educating the public on respecting and saving these fragile dunes. The continuation of the Steward Program is vital in the protection of Lake Ontario's dunes, one of the attractions that brings people to these areas to bird watch, walk our beaches and enjoy our gorgeous sunsets."

Entergy volunteers with Dune & River Stewards at the habitat restoration day, made possible by Entergy Nuclear Corp. funds, installed approximately 500 feet of protective snowfencing. Photo: Mary Penney, NYSG



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New Resource Assists Coastal Stakeholders with Shoreline Management Decisions

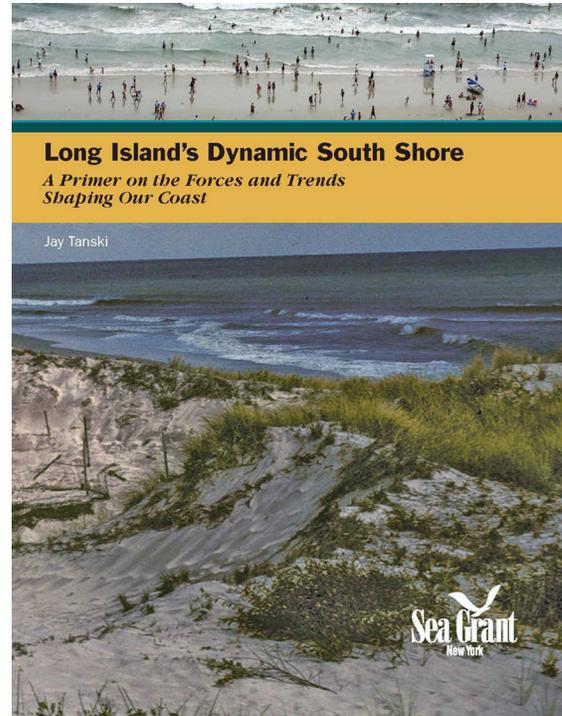
The dynamic nature of New York's Atlantic coast coupled with high population density presents many management challenges. Presently, a number of efforts are being undertaken by federal, state, and local interests to develop erosion management and storm damage reduction plans for the south shore of Long Island. Decision makers, coastal stakeholders, and the public are being asked to review and approve these measures which can cost tens of millions of dollars and are often controversial. These audiences require science-based information about the processes and forces shaping the shoreline and the effect of these changes on both the natural and built environment in a form understandable to the layperson.

New York Sea Grant (NYSG) obtained a \$19,000 grant from the National Park Service to produce *Long Island's Dynamic South Shore: A Primer on the Forces and Trends Shaping our Coast*. This 27-page, illustrated booklet uses objective, science-based information and provides a layman's overview of the natural and anthropogenic processes that control shoreline erosion and how they impact our coast.

The publication was designed to educate coastal audiences so they are better equipped to evaluate and choose among the many management alternatives being considered.

This new booklet is being used by a wide range of audiences:

- Fire Island National Seashore is distributing it to park visitors and using it to develop a long-term General Management Plan



New York Sea Grant provides objective, science-based information on complex topics in a form that the layman can understand and use to make decisions.

- the New York State Department of Environmental Conservation is incorporating the booklet in training programs for Coastal Erosion Hazard Area program staff, and
- the U.S. Fish and Wildlife Service has used and cited the publication in developing its official biological opinion on a proposed multimillion dollar federal shore protection project.

Through efforts like these, NYSG provides the foundation of factual information needed to help coastal stakeholders select the best strategies for managing this precious resource based on the best available science.

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Diving the Seaway Trail: An Economic Development Partnership

Scuba divers represent an economic impact of more than \$108 million to New York's Great Lakes region (*New York Sea Grant survey, 1999*). The fresh waters of the St. Lawrence River, Lake Ontario, Niagara River and Lake Erie are filled with fascinating shipwrecks, aquatic life, and geologic formations. In 2007, "Dive the Seaway Trail," a project of New York Sea Grant and Seaway Trail, Inc., showcased this largely undiscovered underwater destination for attention by diving enthusiasts and history buffs.

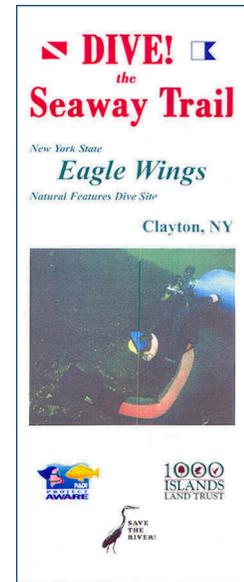
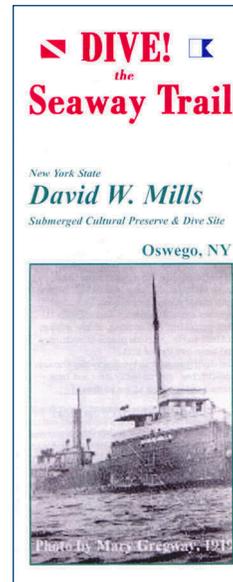
The "Dive the Seaway Trail" project includes development of a series of dive sites marked, buoyed and maintained by community-based stewards along the 518-mile freshwater shoreline in New York and Pennsylvania.

"We are pleased to be bringing New York's freshwater resources to the attention of divers looking for exciting new experiences," says Seaway Trail, Inc. President and CEO Teresa Mitchell. "In return, the divers are positively impacting the region's economy."

A 1999 New York Sea Grant survey showed divers living within the Great Lakes region spent \$61 million a year on boat and auto fuel, lodging and food, etc. and \$47 million on diving-related expenditures.

The "pilot" destinations being profiled on the Dive the Seaway Trail website are:

- the *David W. Mills*, Lake Ontario's first New York State Submerged Cultural Preserve, Oswego, NY;
- Eagle Wings natural features dive site, Clayton, NY;



These brochures were developed to help divers and shipwrecks enthusiasts learn about New York's Great Lakes' underwater resources.

- the *St. Peter*, an advanced-level, deep historic dive site, Pultneyville, NY; and
- the *Islander*, a shore-access dive site, Alexandria Bay, NY.

The Oswego Maritime Foundation's management of the *David W. Mills* and Save the River's stewardship of the Eagle Wing have set the project's site stewardship model. New York Sea Grant and Seaway Trail, Inc. are assisting stewards by providing funding for the development of promotional and interpretive materials for the sites.

Learn more about the "Dive the Seaway Trail" project on this America's Byway and National Recreation Trail at www.nysgunderwater.org.

New York Sea Grant is a cooperative program of the State University of New York and Cornell University. Sea Grant Extension administration is located at 112 Rice Hall, Cornell University, Ithaca, NY 14853.

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