



1000 Islands International Tourism Council

Sackett's Harbor on Lake Ontario

Great Lakes Small Harbors Initiative

The economic impact of recreational boating in New York is sizable. In 2003, a NYSG-funded study found that NYS-registered boaters spent an estimated \$2.4 billion in the state on gas, food, lodging, launching fees and other boating-related expenses. "The survey gave the boating community an initial understanding of just how large their clout is on New York State's economy," said NYSG Recreation and Tourism Specialist **Dave White**.

Data from a January 2009 Great Lakes Recreational Boating Economic Benefit Study published by the U.S. Army Corps of Engineers expanded on this concept, showing recreational boaters in the Great Lakes states – New York, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Michigan and Minnesota – produce \$22 billion in economic value annually. The region has 4.2 million of the 8.4 million boaters nationally.

"The study estimated that boaters in the Great Lakes states spend \$529 million on vessel-related expenditures and another \$665 million on trip-related expenditures," said Great Lakes Commission Special Projects Manager **David L. Knight**. "That makes the cost-benefit ratio of a funding request to maintain a new Great Lakes Small Harbors Coalition initiative pretty attractive."

In Fall 2009, **Chuck May**, Chair of the Great Lakes Small Harbors Coalition (GLSHC), worked with NYSG on a grassroots effort to secure federal funding for federally-authorized shallow depth harbors in New York's Great Lakes region. There are 20 such harbors in the area: three ports along the St. Lawrence River, 10 along Lake Ontario, three along the Niagara River and four along Lake Erie.

"The regional coalition will help New York's recreational and commercial small harbors address management, dredging and funding needs by recognizing the eight Great Lakes states and hundreds of shoreline communities as all part of the greater Great Lakes system," said White.

White has reviewed 10 years' worth of research funded by NYSG and others that shows the NYS-level value of marinas, sportfishing, charter services, and scuba diving. "This research identifies user groups whose interests connect with those of the GLSHC," White said.

In October 2009, NYSG co-sponsored meetings in Oswego and Albion (near Brockport) to further connect with users. During the meetings, May spoke with nearly 50 representatives of New York's waterfront interests – harbor masters, elected officials, and representatives of marinas and marine

trade associations, yacht clubs, port authorities and government, environmental, and tourism agencies.

As a direct result of these meetings, at least nine new resolutions have passed with others now pending to become members of the GLSHC. These include ones in Niagara, Orleans, and Oswego counties, the Towns of Wilson, Carleton and Sandy Creek, and the City of Rochester. In addition, Congresswoman **Louise Slaughter** submitted a request with Reps. **Dan Maffei** and **Bill Owens** late last year to the U.S. House of Representatives Subcommittee on Water Resources and Environment's Transportation and Infrastructure Committee to establish a dedicated fund to dredge federally-authorized harbors on Lake Ontario and the Niagara River. Between their three offices, Slaughter, Maffei and Owens represent all of the Federal harbors on Lake Ontario.

"It's critical that we maintain adequate funding to protect and leverage New York's north coast harbors to help create jobs and spur economic development," said Rep. Slaughter. "Lake Ontario is our region's largest and most important natural resource. Over the past five years I have been proud to have secured over \$3 million to complete dredging and pier repair work in Rochester Harbor, Oak Orchard Harbor, Olcott Harbor, and Wilson Harbor."

—Paul C. Focazio and Kara Dunn

Does winter productivity bring summer hypoxia?

When you think about summertime fisheries on Lake Erie, an image of frigid weather and ice does not come immediately to mind. Yet it's wintertime microbial activity under the ice that influences the development of the summertime hypoxia which has an important impact on the lake's fisheries. Preliminary field studies in 2007 and 2008 documented presence of diatoms and estimated their biomass and production. The importance of this phenomenon relates to the expected degradation of this biomass during the summer months contributing to the low-oxygen condition known as hypoxia.

With NYSG funding for a two-year project, **Dr. Michael R. Twiss** of Clarkson University and **Dr. Steven Wilhelm** of the University of Tennessee-Knoxville set about to further assess winter microbial biomass and



Photo credit (r and l): Michael Twiss

Environment Canada technicians recovering sediment traps through ice on Lake Erie in winter.

metabolism and to test the importance of winter productivity to summer hypoxia in Lake Erie.

With the help of collaborators from Environment Canada and Bowling Green State University, the research team sampled the frigid February waters of Lake Erie in both 2009 and again in 2010. Sampling, experiments and analysis are underway to measure concentrations of plankton, photosynthetic efficiency, rate of photosynthesis, plus bacterial production, growth, grazing, and the balance of production versus consumption of organic carbon during the period of ice cover in Lake Erie to provide much greater detail of microbial activity in the lake in winter. Early findings so far indicate an actively growing cold-loving phytoplankton community is present in the lake in the winter.

—Lane Smith and Barbara A. Branca

New Web Site Helps Managers Deal with Nor'easters

Hurricanes may get more press and attention, but winter storms known as nor'easters (or nor'easters) have a greater impact on New York's coast. They are more frequent, last longer and are usually much larger in size than hurricanes. To help coastal communities better deal with these storms, **Jay Tanski**, New York Sea Grant Coastal Processes specialist has been working with **Dr. Arthur DeGaetano**, Director of the National Oceanic and Atmospheric Administration's Northeast Regional Climate Center (NRCC) and professor at Cornell University, to develop the East Coast Winter Storm Climatological and Forecasting Data Web site <http://nywinterstorm.org>. Funded by NOAA's Climate Program, the site was designed in consultation with local coastal managers and emergency personnel to provide them with the real time and his-

torical data on nor'easters along with tools to help them better use this data.

The site provides seasonal forecasts of storm activity, historical climatological data and a "one stop" compilation of sites providing real time weather and oceanographic data in the region. The 2009-2010 seasonal forecast by the NRCC indicated that storm activity this winter will be higher than normal in both number and strength of storms.

One of the features local managers are finding most useful on the site is the Analogue Storm Track tool. When an East Coast Winter Storm is forecast by the NOAA Global Forecast System (GFS) model, the Web site compares the forecasted storm to a historical data base of over 700 storms from 1950 to 2007 and automatically selects the five most

similar storms (analogue storms) based on forecasted positions and pressures. In addition to displaying the tracks and associated pressures for both the analogue and forecast storm, the site allows the user to view actual measurements of storm surge levels associated with the analogue storms at different tide gauge locations as the storm moves up the coast.

"We were surprised at how well the site worked during the past nor'easters. It is being put to good use," said **John Baroni**, emergency manager from the Village of East Rockaway on Long Island's south shore referring to the early 2010 storms that brought record snows to the northeast. Baroni was involved in the development of the web site and is showing others how to use it to better assess the possible impacts of approaching storms.

—Jay Tanski

Ordering Publications

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Journal Reprints

Amoundry, L.O., and P.L.-F. Liu. 2009. Two-dimensional, two-phase granular sediment transport model with applications to scouring downstream of an apron. *Coastal Engineering* 56(7): 693-702. Pub ID# 3250.

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Fact Sheets

Fish Habitat 2009 Fact Sheet Series

A series of seven fact sheets produced by NYSG and SUNY College of Environmental Science and Forestry focuses on the preferred habitats, risks to and tips for improving habitats for three species of fish: Northern pike, muskellunge and walleye. Written by NYSG Fisheries Specialist David B. MacNeill and funded by U.S. Fish and Wildlife Service: Fish Enhancement, Mitigation and Research Fund. Other project partners include NYSDEC, NOAA, USGS, USDA, Natural Resources Conservation Service, Save the River and Thousand Islands Land Trust. Available online at <http://www.seagrant.sunysb.edu/glsportfish/article.asp?ArticleID=377> or contact David MacNeill (315) 312.3042 or dbm4@cornell.edu

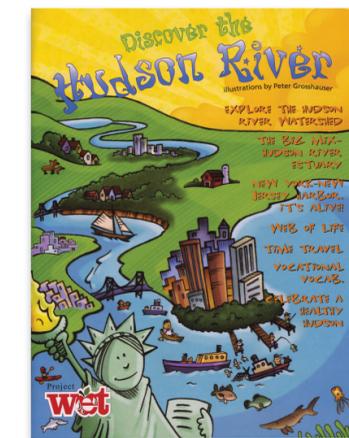
Hudson River Resource for Teachers and Students

Project WET's *Discover the Hudson River*, a 16-page color booklet designed for teachers and students in the upper elementary grades (5-6 grades), uses lively text, games, maps and activities to provide information about the Hudson watershed, its variety of wildlife and the many ways people influence and are influenced by the Hudson River.

"We're offering teachers an add-on to their science curriculum that's educational but not too cumbersome for kids," says NYSG Hudson Estuary Specialist **Nordica Holochuck**, of the visually-driven *Discover*. "The puzzles and games included in the booklet are interesting and fun. It represents another approach to engage young people in environmental education."

For more information, go to www.nyseagrant.org/hriver and click on "Publications." Teachers can request a free copy of *Discover the Hudson River from Holochuck* for a limited time via E-mail, nch8@cornell.edu or phone, (845) 340.3983.

Produced in 2009 to commemorate the 400th anniversary of Henry Hudson's first exploration, the booklet is a joint venture of Project WET (Water Education for Teachers), the New York State Department of Environmental Conservation, New York Sea Grant, the New York-New Jersey Harbor Estuary Program, the National Oceanic and Atmospheric Administration and Central Hudson Gas and Electric Corporation.



...CoastWatch

Continued from page 1

divided surge events into minor and moderate storm surges. A 2 to 3-foot storm surge is considered a minor surge and for a surge of that size, the NWS issues a coastal flood advisory if it occurs during a high tide. A moderate storm surge exceeds 3 feet and for this the NWS issues a coastal flood warning if this threshold is met during a high tide.

Colle's team found that in the 50-year period there were 244 minor and 46 moderate surges. Combined with the observed tide, this yielded 174 minor and 16 moderate flooding events. The number of minor and moderate surge events varied dramatically each year as a result of large variations in storm activity and tracks near the coast.

The researchers tracked all the cyclones (low pressure systems) associated with the minor and moderate surge events for NYC. They found that minor surges are associated with a wide variety of storm tracks. But moderate surges are usually associated with nor'easters, damaging winter storms that track northward along the east coast. East coast winter storms can cause millions of dollars in damage over a large area from coastal flooding (see page 4).

Colle's team found only one moderate surge during the 2000 to 2007 period suggesting that nor'easters may be tracking differently as compared to the relatively active period of the 1990s for NYC storm surges. "These are interesting results in light of the fact that other studies examining possible effects of climate change suggest that our area may see fewer nor'easters due to changes in storm tracks," says **Jay Tanski**, NYSG coastal processes specialist. "Given the uncertainty about how climate change may influence these storms, studies like Colle's are important in that they can help give us an idea how things may be changing."

The last decade studied, 1997 to 2007, was a relatively "quiet" period in which the number of minor surges decreased. However, the number of minor flooding events increased slightly. This is attributable to the gradual rise in sea level. The research team noted that small annual sea level rise at the Battery has resulted in a water level 10 to 15 centimeters (4 to 6 inches) higher in the 2000s than in the early 1960s.

The Intergovernmental Panel on Climate Change (IPCC 2007) has estimated that sea level will increase between 18 and 59 centimeters during the next century. Says researcher Colle, "If sea level rises 12 to 50 centimeters during the next century, the number of moderate flood events is likely to increase rapidly." By adding 12.5, 25 and 50 centimeters of sea level rise to observed water levels from the 1997 to 2007 period, Colle noted that the number of moderate flooding events increased to 4, 16, and 136 respectively. The highest number of events equates to having a coastal flood warning issued for NYC nearly twice a week. This illustrates that NYC will become much more vulnerable to storm surge as sea level continues to rise.

The data over the 50-year period showed some other interesting results including a qualitative relationship between the number of minor surges at the Battery and El Niño-South Oscillations events. The researchers found that three of the top four minor surge years at the Battery were associated with years of strong El Niño events. These years coincide with years of a greater number of east coast winter storms that track in a favorable orientation along the east coast.

Fitting together the pieces of storm surge, sea level rise and flooding events together to predict New York City's climatology may be of great interest to emergency planners. The data analysis suggests that sea level rise over the last few decades may already be enhancing the number of nuisance flooding events—those for which a coastal flood advisory is issued. Says Colle, "New York City will be increasingly more vulnerable to storm surge as sea level continues to rise, thus suggesting the need to take more immediate action to protect the city from more frequent larger flooding events."

—Barbara A. Branca



On Facebook & Twitter

...for an update on the March 2010 storm surge that occurred at press time and other stories. You can find us on YouTube, Facebook and Twitter.

Coastlines

NEW YORK



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From the Director...

Welcome to New York Sea Grant's (NYSG's) first *New York Coastlines* issue of 2010, the first of our new shorter, but more frequent and timely issues! While the search for a new Associate Director for Extension continues, **Chuck O'Neill** (pictured at right) recently replaced **Bob Kent** as our Interim Associate Director. Chuck has been with NYSG since 1981 and is best known for his leadership on invasive species issues in the Great Lakes and elsewhere. I want to thank Bob Kent for his efforts on behalf of NYSG during the past year, and wish him well as he returns to his regular extension duties on a half-time basis. Bob has also been leading the planning for the upcoming meeting of northeast Sea Grant programs in the scenic Hudson Valley in May, hosted by NYSG.

We are currently reviewing research pre-proposals from our latest call for proposals. This call for proposals is focused on two areas of research from our new Strategic Plan that are currently receiving only limited research support: sustainable coastal development and coastal hazard resilience. We hope that this call for proposals will help broaden both our research portfolio

and the community of researchers supported by NYSG.

This issue of *New York Coastlines* focuses on harbors, from New York Harbor in New York City to small harbors upstate. New York Harbor and other exposed coastal areas such as Long Island's south shore are threatened by the storm surge from nor'easters and other storms. The lead article features some of our research and extension efforts to predict storm surges as well as to disseminate timely information in a form useable by emergency managers. A shorter article covers the Great Lakes Small Harbors Initiative to secure Federal support for these important upstate economic engines. Articles on Lake Erie research and a new Hudson River publication round out the issue.



Interim Associate Director
Chuck O'Neill



CoastWatch...

The Quiet Before the Storm?

New York, New York, a wonderful town. The Bronx is up, but the Battery's down.
—“On the Town”

Whether “up” in the Bronx, the most northeasterly borough of New York City on the mainland or “down” on the Battery, at the southern tip of Manhattan Island, much of NYC and adjacent coastal Long Island to the east lies less than 15 feet above mean sea level.

Over a quarter of a million people work within walking distance of historic Battery Park, the largest open space in downtown Manhattan. Over four million workers, residents and tourists visit the park annually where the only thing between the park and the breathtaking expanse of New York Harbor is a seawall several feet high.

When water levels at the Battery peaked at 8 feet during the December 1992 nor'easter, water overtopped the seawall and caused major flooding to many of New York City's subways and commuter trains. For nearly two decades there has been no major flooding event in NYC. Is this the quiet before the storm? What gives in Gotham?

With New York Sea Grant funding, a group of researchers—**Dr. Brian A. Colle** of Stony Brook University's School of Marine and Atmospheric Sciences (with help from undergraduate **Katherine Rojowsky**, now a graduate student at North Carolina State

University) and **Dr. Frank Buonaiuto** of the Department of Geography at City University's Hunter College—have been looking at storm surges and the climatology of the region. In an article in the January 2010 issue of the *Journal of Applied Meteorology and Climatology*, they zeroed in on NYC, because of its “large population and billions of dollars of infrastructure at risk.” In their published work, the researchers sought to give forecasters and emergency managers a refined conceptual model of what local and regional atmospheric conditions are likely to cause flooding in the New York City area.

To come up with a complete climatological picture, the team described storm surges and actual flooding events at New York Harbor in the 50-year period from 1957 to 2007. By storm surge the team meant the difference between the observed water level during a storm and what would be expected under normal conditions. For flooding events, the team used the thresholds defined by the National Weather Service (NWS): a minor and moderate actual flooding event around New York Harbor was defined as a total water level (storm surge plus the tide) exceeding 6 and 8 feet above the daily average low tide, respectively. They also

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