Flooding simulation at the Fraunces Tavern ® by Anita Kusick; photo by Peter Reitzfeld


# Closing the Doors on Storm Surges

The storm warnings are up. Torrential rains, flooding, strong winds and high seas are expected to hit the area as the powerful storm reaches the metropolitan area early this evening. The storm gathers strength as it moves north. The forecasters are calling this a 100-year storm. The NY metro area braces for impact.

In the middle of rush hour, the giant storm slams ashore with 110 mph winds and a storm surge 12 feet above mean high tide. Large scale flooding occurs as low-lying neighborhoods are inundated. Massive flooding along the FDR Drive stalls vehicles. Stranded motorists are trapped by rising water and buffeted by high winds and driving rain. Sea water floods the Brooklyn-Battery Tunnel.

Continued on page 6



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New York

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# *From the Director*

The huge loss of life, land and infrastructure resulting from the December earthquake and tsunami in the Indian Ocean has highlighted aspects of the NYSG portfolio of research and outreach that are not often in the news. One current research project, led by Steve Goodbred at Stony Brook University, has uncovered indications that the structure of today's South Shore estuary may have been influenced by a two-millennia old tsunami. However, work on erosional aspects of storm surges and climate change are more the common fare for NYSG attention. Storms in both New York's marine waters and at Lake Bluff on Lake Ontario, perhaps exacerbated by sea level or lake level rise, have the highest potential for modifying coastlines. This is one of the points made in an *Opinion* article in March 27's *Newsday* (page A37) that was co-authored by Jay Tanski, NYSG's coastal processes specialist.

Two articles in this *Coastlines* issue deal with prevention of storm damage or erosion. The cover story outlines results of a high-tech modeling study that shows that storm surge barriers have potential for protecting New York City from violent weather events. Of course, there are other considerations in deciding whether to build and implement them. However, recent subway delays resulting from water damage indicate the potential for city shut-downs if storm surge flooding should occur. [As an aside, the lack of an early warning system in the Indian Ocean contributed to the scope of the December disaster. One of the values of establishing an Integrated Ocean Observation System is early warning. NYSG is represented on planning for such systems in the Great Lakes and the Atlantic coasts.]

The second erosion article (page 12) is close to the other extreme – a compilation of low tech contributions to control shoreline erosion on Lake Ontario. Molly Thompson, NYSG's dune and habitat educator, is distributing a *Stewardship Guide* that discusses using buffer zones to reduce erosion. The guide includes a packet of wildflower seeds, suggesting the use of native plants to counter the ravages of water.

The rest of the issue includes the usual diversity of coastal issues that NYSG is involved with: PCB toxicity mitigation, stimulation of coastal businesses such as diving and tourism, providing ocean sciences support to legislative and executive offices in Washington via the Knauss Fellowships, seafood safety, non-indigenous species (mitten crab) invasion, causes of the 1999 lobster die-off as identified by a five-year research and monitoring initiative, recent publications and, of course, our seafood recipe.

Enjoy!


**Mt. Sinai High School won the 4th Annual Bay Scallop Bowl hosted by NYSG and the Marine Sciences Research Center (MSRC) at Stony Brook University. Left to right are: David O. Conover, MSRC Dean and Director, students Zachary Kurtz, Sara DiNapoli, Christopher Ryczek, Robert Spataro, Mt. Sinai coach (and former Sea Grant Scholar) Andy Matthews, and Bill Wise, MSRC Associate Director and event coordinator. It was Mt. Sinai's third win in four years.**
**Photo by Joe Dlhopolsky**

# *The ABCs of PCBs*

Polychlorinated biphenyls, or PCBs, are a group of oily liquid and solid compounds that do not burn easily and thus make good insulators. Since the 1930s, PCBs were widely used in the manufacture of electrical transformers, household appliances, TVs, and fluorescent lamps. In the early days of such industries when manufacturing plants were located on rivers, runoff from these industrial sites often contained PCBs. The compounds have no odor or taste and are often colorless—but they are toxic. In humans, PCBs act as carcinogens and cause skin irritation, liver and kidney damage as well as thyroid gland injuries.

Although the manufacture and importation of PCBs were banned in the United States in the late 1970s, large quantities of PCBs are still in storage or in use. During the many years that PCBs were used unchecked, the compounds accumulated in the sediments of New York's lakes and rivers. These compounds do not readily break down and become persistent environmental toxins that bioaccumulate in organisms. By way of example, concentrations in top-of-the-food-chain fish can reach levels hundreds of thousands of times higher than in the water in which the fish live. Human consumption of PCB contaminated food is considered the major source of PCB accumulation in humans. PCBs also get into the air and eventually return to the land and water via snow, rain or in runoff.

Removing PCBs from soil, water, or underwater sediments is a daunting challenge. Activities in busy waterways often disturb the sediment and dredging is a necessary action taken to keep shipping lanes, ports, or docks open for commerce. But what happens to the PCBs that are pulled up with dredged sediments?

Continued on page 4

**Birds on the winter ice in Oswego Harbor in Lake Ontario, the site of NYSG-funded PCB research.**
**Photo by Barbara A. Branca**

*continued from page 3*

# *PCBs in the Air*

One line of research has been to better understand how PCBs degrade under sunlight in the environment. It is known that semiconductors, such as titanium, zinc or iron oxide when suspended in water can effectively degrade PCBs when irradiated with ultraviolet or solar radiation. A team of SUNY Oswego researchers funded by NYSG investigated this method of chemical decomposition of PCBs by way of sunlight radiation, or photolysis. The team, led by **Dr. Ronald Scrudato**, used natural particulates in sediments to assess the rate and extent to which PCBs would be degraded by sunlight.

In a series of experiments run by **Dr. Gideon Oenga** (then a Sea Grant Scholar), sediment containing the contaminant was dredged from Oswego Harbor. After three weeks of irradiating the sediment, the team found no change in the concentration or distribution of PCBs. These results suggested to the investigators that photolysis does little to destroy or alter PCBs in aqueous environments during short time periods.

However, during experiments on the exposed sediment as it was drying, **Dr. Gail Arnold**, then an undergraduate fellow, discovered that PCBs are far more volatile than previously recognized. Significant amounts of PCBs were rapidly lost to the air during the drying of contaminated sediments. This finding has direct implications for ports or marinas undergoing dredge operations. In the process of dredging and taking away dredge materials, many operations set up "dewatering sites" where the material is left to dry before being taken away. With this finding, now precautions are being taken at such sites to prevent the PCBs from contaminating the air.

**The lower Hudson River. Dredging to remove PCBs in sediments in the upper Hudson will soon begin. A new guide for Hudson marina owners describes dredged sediment contaminants. See page 15 to learn more or to order PCB research articles.**
**Photo courtesy of Nordica Holochuck**

Says investigator Scrudato, "There is also the possibility of using the volatilization of PCBs as a remedial process. Once the dredged PCB-contaminated sediments are removed from the impacted waterway, by continuing to wet the dredged material to stimulate volatilization, it may be possible to capture the volatized compounds and use either trapping systems such as granulated active carbon or even destroying the compounds with ultraviolet or photocatalytic processes."

The discovery of the volatilization of PCBs also led to further studies of PCBs in the soil and sediment downwind of Lake Ontario as well as the PCBs in the air near the lake and over the water.

The volatile losses of PCBs may pose a more significant source of PCB exposure and have more serious health implications than previously thought. After the completion of Scrudato's project in the late 1990s, another team member, **Dr. Jeffrey Chiarenzelli**, reports that the data sets were used for an unexpected purpose. **Drs. Glenn Johnson** (University of Utah) and **Anthony DeCaprio** (University at Albany) have compared PCB blood data to Chiarenzelli's air data. Comparisons show that some Mohawks who live on the Akwesasne Reserve have blood serum PCB patterns similar to the volatile fraction of PCBs at a nearby Superfund site along the St. Lawrence River in Massena, NY—the site of an old aluminum plant. This implies that in contrast to conventional wisdom, ingestion of PCBs may not be the only significant route of human exposure for all individuals.

The study above is an example of an environmental forensics investigation, which involves taking multiple lines of scientific evidence into account in order to piece together a story of contaminant sources, fate, transport and exposure. It involves analysis of large volumes of chemical data from a site, and comparison of that data to industrial production histories, known and suspected source patterns, as well as environmental weathering patterns. Johnson and his associates have taken an environmental forensics approach in their research and also

in assigning responsibility for contamination in several lawsuits. His group is currently working on a chapter in an environmental forensics textbook which summarizes (among other things) the discoveries at Akwesasne as related to volatilization of PCBs and human exposure.

## *PCBs Resuspended in the Water Column*

Most busy industrial ports have another added factor when considering remediation of contaminated sediments that contain PCBs. The turbulence caused by storms, currents and ship traffic churns up the sediment and clouds the water column with resuspended contaminants. PCBs show a great affinity for staying attached to particles of sediments—the finer the particle, the greater the attachment. Thus resuspension poses a serious risk to water quality in many areas, particularly around the ports in Lake Erie, Lake Ontario and the Hudson River. Scientists use various models to calculate how long it takes for these contaminanted particles to settle back into the sediment—sometimes on the order of weeks to months. In another NYSG-funded project, the research team of **Joe Atkinson** and **Joe DePinto** from SUNY Buffalo studied the interaction between turbulence and sediment particle size and aggregation that led them to develop a model used to simulate how and when the contaminanted particles would drop back down into the sediment.

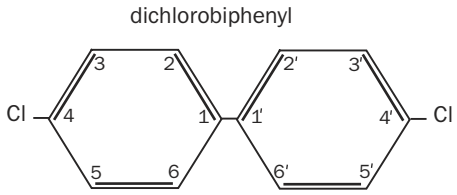
To simulate what happens in ports, the researchers created their own unique reactor made entirely from fused glass to minimize chemical reactions with the sides of the reactor. Within the reactor they could control the amount of mixing from slight to turbulent and measure effects on particle concentration and size distributions.

The Buffalo team's observations were aided by cameras and strobe lights that provided high resolution images of the particles. In general, their model predicts a quicker removal of contaminants because the resuspended particles settle back to the bottom before they reach an equilibrium state with the water concentration. These results provide a tool that can be used to assess the general health of a particular waterway by giving a means of estimating transport of a contaminant out of the system (as during a storm event) or by materials disturbed during dredging. This information can also aid the development of predictive chemical transport models and allow regulators to better manage contaminants that remain in place.

Through the cooperative efforts of state and federal regulators as well as industry, dredging operations will soon begin to remove PCBs from the sediment in the upper Hudson River. At some sites, environmental engineering techniques such as hydraulic dredges will likely be used to suction up the contaminated sediments. A surrounding "silt curtain" may be used in some sites to prevent contaminant resuspension, leakage or disturbance of the surrounding river water. Coverings at the dredge sites will trap volatile PCBs. As PCB remediation proceeds, **Larry Gumaer** of the NYS DEC will lead the damage assessment on the Hudson River resources. Characteristics of PCBs such as the rates of volatilization and resuspension characteristic of PCBs will have to be factored for the safe operation of each dredge site. The foundation of knowledge gained about PCBs from these two NYSG-funded projects will continue to have impacts as future PCB remediation is planned.

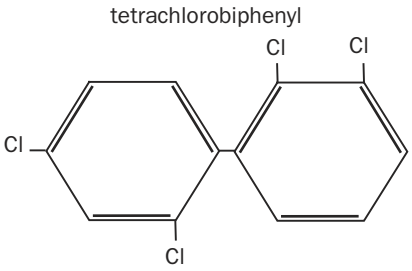
**— Patrick Dooley and Barbara A. Branca**

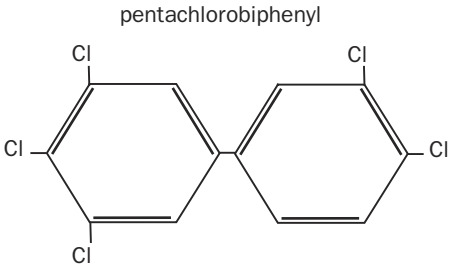
### PCB Basics




Polychlorinated biphenyls are made of biphenyl molecules (two carbon-hydrogen rings bonded together) with additional chlorine molecules attached at specific positions on each ring.

Each PCB is named according to the bonding position.




For example, the molecule with five chlorines is named 3, 3', 4, 4', 5-pentachlorobiphenyl.

In general, the more chlorinated molecules are less soluble in water and thus accumulate in sediments. These same PCBs can be released into the air when dredged sediment is drying.

*continued from page 1*

# Closing the Doors on Storm Surges

### Storm Surge

**According to the Federal Emergency Management Administration (FEMA), storm surge is simply water that is pushed toward the shore by the force of winds that are part of a storm. This advancing surge combines with the normal tides to create a storm tide which can increase the mean water level 15 feet or more in some areas. This rise in water level can cause severe flooding in coastal areas, particularly when the surge coincides with the normal high tides.**

Subway lines in lower Manhattan, Brooklyn and Queens are flooded by sea water, stopping service and trapping passengers. Shorts and electrical fires halt the entire subway system. Basements of buildings are flooded and electrical systems shorted out. Downed utility lines leave 250,000 customers without power, and repair crews are hampered by flooded streets. As the storm lashes the area, a year's worth of coastal erosion occurs in one day.

When it's all over, a shaken and battered New York and northern New Jersey assess the damages. Thousands are left homeless, recovery will take months and the damages are expected to be in the billions.

This scenario may seem like frightening fiction out of Hollywood. However, according to scientists, the scenario of a massive storm hitting the New York metro area is very possible. It is not a question of if, but a question of when. Led by **Dr. Malcolm Bowman**, New York Sea Grant researchers at Stony Brook University's Marine Sciences Research Center have studied the possibility of protecting the metropolitan New York City area from powerful storms through the use of storm surge barriers. Such barriers erected at three "choke points" would effectively seal off the area from incoming storm surge (see map page 7). The question Bowman and his Stony Brook Storm Surge Research group addressed was this: Would such barriers work and protect the area from devastating surges of powerful storms?

Our region is always at risk for large, damaging storms such as hurricanes and nor'easters that can produce unusually large storm surges resulting in severe flooding. Add to that the impact of global warming and sea level rise which would increase the frequency and severity of damaging storms. Says Bowman, "The damage done by a 100 year storm now will equal the damage done by a 25 or 50 year storm later in the century if sea level rise accelerates."

In the wake of the devastation caused by the December 2004 Indian Ocean tsunami, many started to wonder if New York is vulnerable to such destructive waves. Though chances are small that an earthquake-generated tsunami like the one in the Indian Ocean would strike New York, storm surge is an ever-present threat. The question remains: Is there anything that can be done to protect the New York metropolitan area from a major storm surge? Fortunately the answer is yes. First of all, accurate weather forecasting provides early warning that allows time for evacuating vulnerable areas and saving lives. However, the region's population density would make evacuation slow and difficult, limiting its usefulness. Also, valuable infrastructure would still be vulnerable and costly to repair or replace. According to NYSG research, the building of storm surge barriers could protect valuable real estate and infrastructure and reduce the need for a costly and dangerous evacuation.

To determine the potential effectiveness of hypothetical barriers built at The Narrows, the upper East River (near the Whitestone Bridge), and at the mouth of the Arthur Kill (Perth Amboy, NJ), the research team developed a modeling system that adapted and combined two well-established numerical models that are used to help predict regional weather and coastal ocean currents. The system, called the Stony Brook Storm Surge system (SBSS) integrates the Advanced Circulation Model for Coastal Ocean Hydrodynamics (ADCIRC) and the MM5, a regional weather forecasting model.

**Co-investigators Roger Flood (l.) and Robert Wilson (r.) view the three Tainter gates at the Fox Point Hurricane Barrier in Providence, RI. Others working with the research group are Douglas Hill, Brian Colle, Frank Buonaiuto and several students. Photo by Douglas Hill**

**This retractable storm surge barrier spans 3,000 meters across the Eastern Scheldt in the Netherlands.**
**ANP–Foto**

**Cover photo: The Fraunces Tavern ® was built in 1719 on marshy ground in lower Manhattan and was frequented by George Washington. At only a few feet above sea level, the area near the Battery is at risk for flooding should a huge storm surge accompany a 100-year storm.**

***Fraunces Tavern ® is a registered trademark of Sons of the Revolution in the State of New York Inc.***

The SBSS uses calculations from both models to simulate the impacts of surges from major storms. It can also show how effectively barriers would protect the metropolitan area from storm surge flooding. This system provides the research team with a valuable tool that can be updated as new data become available and then used for future modeling.

The research group validated the model by running it using conditions from previous real storms to simulate water levels and then compared their results with actual observations of the storms. The results showed the model to be accurate. The simulations (called hindcasts) of the September 1999 Hurricane Floyd (downgraded to a tropical storm by the time it reached NY) and the Christmas 2002 nor'easter showed that model predictions were almost identical to observed values.

With the model validated, the researchers next used the model system to predict what effect the closed storm surge barriers would have during a storm. They created a scenario in which a storm generated wind speeds almost double that of Tropical Storm Floyd. They dubbed this synthetic storm "Super Floyd." Such a storm would lead to a peak water level of four feet above mean high tide at the Battery in lower Manhattan, somewhat higher than the three feet peak caused by Floyd.

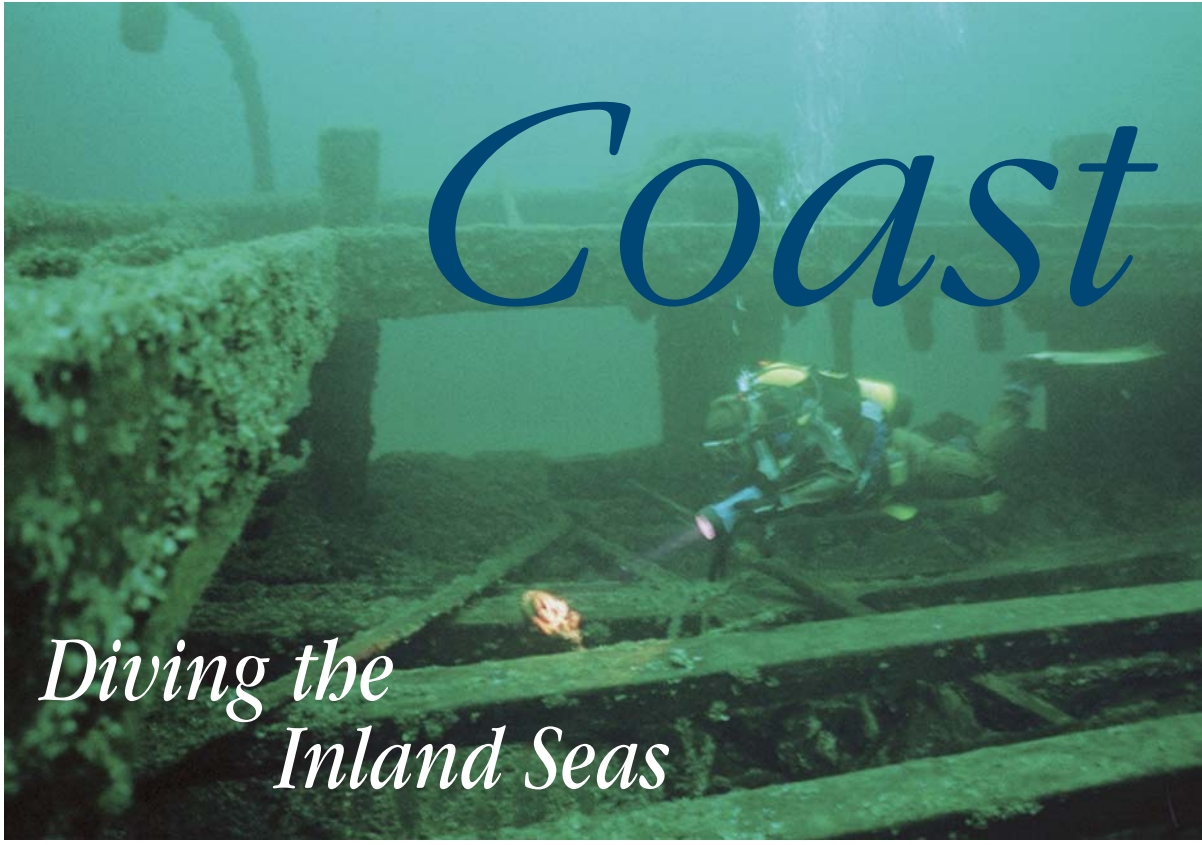
With such anticipated high water levels, how well would the barriers work? If they had been closed at low tide before the approaching storm, the model predicted that the barriers would have been very effective at the three planned locations. With the barriers closed, water levels on the inside remained at normal levels during the period of the storm.

The results of this project show that storm surge barriers would be effective in protecting some low lying parts of the NY metro area from storm surge flooding. According to researcher Robert Wilson, "Analysis of results continues, including the possible amplification of storm surges outside (seaward) of the barriers."

Of course, actually building such barriers would need to take into consideration a host of other factors including cost and environmental issues. Such barriers have been built in New England, Holland and England and have been effective in providing protection against storm surge flooding. In these cases they were built following flooding disasters with loss of life. With careful planning and foresight, such a disaster could be avoided in New York. This project provides the first step.

**— Lane Smith**


**This metropolitan area map indicates in white the hypothetical locations of storm surge barriers used for modeling.**
**Base map courtesy of Laura Bartovics**



The *City of Sheboygan*, as its name implies, was built in Sheboygan, Wisconsin in 1871. In 1915 the 135-ft schooner, loaded with feldspar, was caught in a storm and sank in Lake Ontario off Kingston, Ontario, Canada. Photo courtesy of Phil Church

# Coast

# *Diving the Inland Seas*

Brisk and bright, with snow piled high along the shore of Lake Ontario, it was a fitting March day for the Great Lakes diving community to hear shipwreck explorers share their tales of underwater adventure. Dive enthusiasts from clubs and shops from Rochester, Syracuse, Rome, Watertown, Ontario and along the St. Lawrence River crowded the SUNY Oswego lecture hall to attend Great Lakes Underwater 2005. "The best one ever," was echoed in the halls outside this annual shipwreck and diving symposium, hosted by the Oswego Maritime Foundation and New York Sea Grant. The nearly 150 attendees, many of whom dive in pretty cold water, came to hear about the next "hot" spot or wreck to explore come summer. Even if they make a foray to the Caribbean during the winter, these divers still consider the "Inland Seas" their emerging dive mecca, according to NYSG's **Dave White**. "At Great Lakes Underwater, people can learn more about great dive sites and how to access them from the experts!" says White.

A diver in the St. Lawrence River explores the *Keystorm*, a 245-ft long coal freighter that sank one foggy morning in 1912 en route to Montreal. The crew of 20 was rescued. Photo courtesy of Phil Church

The morning's presentations kicked off with the first of several Sea Grant speakers from around the Great Lakes. **John Karl** of Wisconsin Sea Grant treated the audience to some great underwater shots of shipwrecks in the two most western lakes, Lake Superior and Lake Michigan. Partnering with Shipwreck Preserves, Wisconsin Sea Grant helped design and maintain a web site **www.wisconsinshipwrecks.org** where non-divers can take a virtual tour of these historic wrecks. Photos and maps of shipwrecks in Lake Erie were shown by **Dave Kelch** of Ohio Sea Grant. In the afternoon session, **Anne Danielski** of Pennsylvania Sea Grant gave an update on the STEAR project—Shipwreck Training, Education, Archaeology and Research–in which hosts of school children can get their feet wet about underwater archeology while learning history and aquatic ecology.

But for those who long to be underwater, two underwater videos by **Dan Scoville** of Stealth-Dive in Rochester and dive buddy **Jim Kennard** really got everyone excited. This pair recently discovered two shipwrecks in Lake Ontario–the tall ship *Etta Belle* and a US Coast Guard vessel. Scoville's video brought you right down into the 93-foot oak-hulled schooner as she lay fairly well preserved in about 200 feet of water. Canadian built in 1852 and originally named *Champion*,

# Watch


**A Wynne-Win situation**

the *Etta Belle* was en route to Toronto, Canada from Little Sodus Bay with a load full of coal when she foundered suddenly during calm weather in September 1873. Kennard and Scoville also showed footage of a 56-foot Coast Guard cable vessel that was en route to Niagara from Oswego in 1977 when it was overcome by high waves and wind. Although not as historic or romantic a vessel, it was still an interesting discovery, especially since the Coast Guard's records show that the vessel had been salvaged.

And, lest we leave out the sometimes forgotten lake, Lake Huron, Canadian underwater photographer **Tom Wilson's** slide show gave the audience a "clear" picture of his newly found dive sites. Lake Huron has not had the invasion of zebra mussels as have all the other lakes. Thus you can still see the wooden structure in many of the wrecks—a detail often obscured by an encrustation of zebra mussels.

The program ended with talks by NYSG's Dave White on Diving the Seaway Trail and by Oswego Maritime Foundation's **Phil Church** on the Lake Ontario Dive Site Steward Project. The pair spoke of the increasing interest in the rich underwater cultural heritage that exists in the region and the need for proactive monitoring and preservation of these sites. White and Church, partnering on this their 9th annual event, initiated the concept of underwater dive preserves in the region and were the catalysts for the first ever Lake Ontario dive site.

**— Barbara A. Branca**


**Couchman wins kayak**

**Presenters Anne Danielski of PASG, Dave Kelch of Ohio Sea Grant, Dave White of NYSG, and John Karl of Wisconsin Sea Grant treated divers to some interesting presentations at Great Lakes Underwater.**

**All photos this page by Barbara A. Branca**

## Diving Makes a Splash on the Economy

**What draws divers to the Great Lakes, giving a boost to the local economy? Some divers, like Ryan Tuke of Rochester, may head for the tropics for winter dives, but stay close to home in the summer. And it doesn't hurt that zebra mussels have increased visibility in Lake Ontario, says Moe Hunt of Hunt's Dive Ship in Watertown. Business is up in area dive shops. A 1999 NYSG study found that diving has millions of dollars in impact on the Great Lakes economy. The numbers must be increasing, matching the lively turnout at each successive Great Lakes Underwater. Says Tom Rutledge, manager at Northern Tech Diver in Kingston, Ontario, the number of dive enthusiasts keeps increasing.**

**The diving trend is matched by greater accessibility. Says NYSG's Dave White, "Many Great Lake states have implemented shipwreck identification and buoying programs to further enable access by divers and historians to these historic and cultural resources."**

**According to Wynne Shaul, the region's only female dive instructor, there are more women and families getting into the sport, too. But diving is not cheap and many enthusiasts buy raffle tickets in hopes of winning big prizes. Shaul, representing Delta Dive of Rome, NY, presented winner Richard Drake of Alexandria Bay with a dive regulator donated by Delta. Grand prize winner Kyle Couchman of Ithaca (also web master and trustee of NYS Divers Association) showed off the kayak donated by National Aquatic Service of Syracuse. Aquatic World of North Syracuse was also an event sponsor.**

# Knauss Fellows Go to Washington

**Gabrielle Dorr, pictured on Heron Island in the southern part of Australia's Great Barrier Reef, is currently in Washington assessing how NOAA manages deep sea coral reef habitats. The former Stony Brook University graduate student is one of three Sea Grant Knauss Fellows from New York this year.**
**Photo courtesy of Gabrielle Dorr**

Early last month, New York Sea Grant sent three fellows to Washington to join a class of 40 from across the county to work in the federal government. **Katherine McFadden, Lelia Hatch,** and **Gabrielle Dorr** were each awarded one-year, $40,000 Dean John A. Knauss Marine Policy Fellowships. The fellowships were given based on each of their interests in ocean, coastal and Great Lakes resources and in the national policy decisions affecting those resources.

McFadden, a Columbia University doctoral graduate in Ecology and Evolutionary Biology, was placed in NOAA Research's Office of Scientific Support. "My first month on the job has been a real eye-opener," she says. "Every day I learn something new about NOAA, its organization and incredible breadth of research." McFadden's role is to integrate new ways of ecosystem management in NOAA's future research plans.

> *"I'm gaining experience in how natural resource decisions are made in the face of competing constituent interests."*
>
> ***— Katherine McFadden, Knauss Fellow***

With a recent doctorate in Ecology and Evolutionary Biology from Cornell University, Hatch is working for the House Committee on Resources' Subcommittee on Fisheries Conservation, Wildlife and Oceans. She drafts questions, memos and legislation for the subcommittee's minority (Democratic) members and participates in briefings, hearings and meetings for issues put forth by both her sub and full committee as well the Senate and executive branch. "My involvement in these activities is giving me a better understanding of how legislation on marine resources is crafted by our 109th Congress," she says.

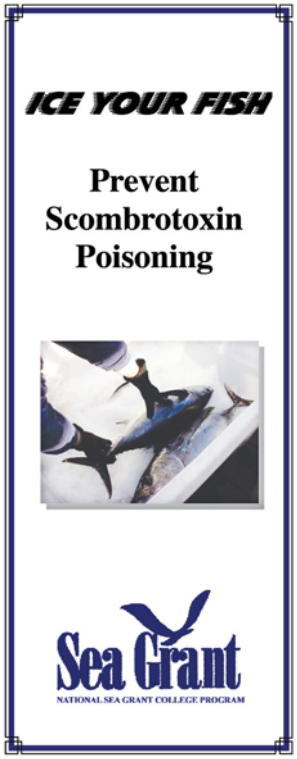
Dorr, who holds a Masters of Science in Marine Environmental Science from Stony Brook University, works at NOAA Fisheries' Office of Habitat Conservation, where she assesses how NOAA manages deep sea coral reef habitats. These habitats, which provide shelter for marine animals, are being destroyed by fishing techniques such as bottom trawling. "I am particularly interested in helping devise management strategies to protect and conserve these highly diverse habitats," she says. As for her future, Dorr adds, "I'd like to pursue a career in coral reef conservation, either in the government sector or with a non-profit organization. An outreach position would be ideal because I feel that education is an important key to successful conservation."

The Knauss Fellowship Program, established in 1979 in honor of one of Sea Grant's founders, former NOAA Administrator, **John A. Knauss**, provides a unique educational experience to qualified graduate students. The program matches students with ocean, coastal and Great Lakes resource and policy hosts in the legislative and executive branches or appropriate associations or institutions in the Washington, D.C. area, for a one year paid fellowship.

**— Paul C. Focazio**

# *Sea Grant Initiative Helps Ensure Safety of Fishermen's Catch*

Tuna, bluefish, mahi-mahi, mackerel, amberjack, marlin and wahoo are frequently found on restaurant menus or in retail stores all along the eastern seaboard. But these popular fish have something else in common. If not kept at the proper temperature from the time the fish are caught until they are consumed, compounds like histamine can begin to form in the fish tissue. When consumers eat fish that have high levels of these compounds an illness known as scombroid fish poisoning which has symptoms similar to an allergic-type reaction can occur.




Fish from commercial sources as well as those recreationally caught have been associated with scombrotoxin poisoning, currently the most frequent type of illness associated with the consumption of finfish in the U.S. For commercial seafood products, current Food and Drug Administration Hazard Analysis and Critical Control Point (HACCP) regulations require seafood processors and handlers to have effective time/temperature controls in place to prevent histamine formation in susceptible fish species. Processors who receive these fish from fishermen are encouraged to obtain records and conduct monitoring procedures that demonstrate that the fish were handled properly on board the vessel or test for histamine before they accept their catch.

A nationally-funded Sea Grant team developed outreach training materials that educators can use with commercial and recreational fishermen to make them aware of this potential food safety problem and help them to identify and implement effective strategies to prevent it. Training materials include fact sheets that describe control measures and FDA requirements, model control plans for various commercial fisheries, a PowerPoint presentation to reach targeted audiences, and an educational display for conferences and meetings. These resources and an extensive reference list are available at **www.iceyourfish.seagrant.org** hosted by the Maryland Sea Grant program.

This project is expected to have a significant impact in helping commercial fishermen improve their ability to implement effective on-board handling systems for fish species most "at risk" for developing scombrotoxin. As a result, commercial fishermen can improve their ability to comply with current FDA guidance for appropriate HACCP controls for this food safety hazard. Outreach efforts to recreational fishermen and charter and party boat operators should enhance both the safety and quality of the recreational catch. It is hoped that the ultimate indicator of the project's success will be a decrease in the number of food borne illness incidents caused by temperature abused fish that have developed scombrotoxin (histamine).

**— Ken Gall and Barbara Branca**

## NYSG: Part of a National Initiative

**In 2002, funded by the National Sea Grant College Program's competitive Fisheries Extension Enhancement Initiative, a project was selected to develop educational materials and training strategies to help commercial and recreational fishermen understand this food safety hazard and implement effective controls to prevent it. Coordinated by Tom Rippen of MDSG, the national project team members included: Ken Gall and Dale Baker (NYSG), Dan Jacobs (MDSG), Lori Pivarnik (RISG), Doris Hicks (DESG), George Flick and Mike Jahncke (VASG), Dave Green and Barry Nash (NCSG), Keith Gates (GASG), Steve Otwell (FLSG), Jon Bell (LASG), and Mike Morrissey (ORSG). Experts from the FDA Office of Seafood and industry members also worked closely with the Sea Grant team throughout the project.**

# Seeding Lake Ontario's Shoreline Stewardship


New York Sea Grant's new resource guide is helping shoreline landowners to co-exist with the more than 3,500 native plants and animals and 90 fish species that frequent southern Lake Ontario's 712 mile-long shoreline. This free guide includes environmentally-friendly tips to improve the properties of cottage and home owners, which occupy 42 percent of the area's shoreline. A packet of wildflower seeds accompanies the Lake Ontario Stewardship Guide CD, available through **www.nysgdunes.org**.

Guide author and project coordinator **Molly Thompson**, NYSG's dune and habitat educator, says "The goal of the targeted Stewardship Guide is to provide tips and resources specific to Lake Ontario to encourage property owners to use native plants, create shoreline buffers, and to help control non-point source pollution of the water by not over-fertilizing lawns and by properly disposing of pet wastes and other pollutants."

Made possible by an EPA grant through Chicago's Great Lakes National Program Office, the Stewardship Guide is packed with region-specific information in a clean, bright format with vibrant photographs.

Sections include: tips for creating a wildlife friendly shoreline, important regulations and recommended plants. The guide offers information on yard care, landscaping with native plants, attracting birds with species-specific nest boxes and feeders, enhancing shoreline buffer areas and protecting shoreline habitat for fish. A regulations section outlines state agency restrictions that apply to shoreline property and offers resources for more information.

**Sally Sessler**, a Cottage Owners Association President in Syracuse, says anyone who owns shoreline property should find this CD of interest. "My family has had Lake Ontario shoreline property since 1947. Many landowners now seem to want a manicured lawn like in the suburbs. I think it's important to leave some of the shoreline property natural." Sessler already has a natural buffer along her shoreline area bordering Lake Ontario and South Pond and is letting a large section of her North Rainbow Shores Tract property grow naturally.

**— Kara Lynn Dunn**

# *A Stay for Mitten Crab in NY's Waterways?*

**Mitten crab photo courtesy of Paul Heinowitz, Oregon Sea Grant**

Following last fall's discovery of a single invasive Chinese mitten crab in the St. Lawrence River near Quebec City, New York Sea Grant scientists are enlisting the support of river area residents to watch for the crab's advancement in New York waters.

NYSG Acting Great Lakes Program Coordinator **Chuck O'Neill** stresses that the discovery of a single individual Chinese mitten crab does not signal that a successful invasion is underway.

"Other nonindigenous marine species have been found in the river—including a juvenile octopus found in the upper reaches of the river a year ago, along with the occasional flounder in the Great Lakes—without being able to successfully establish self-sustaining populations," says O'Neill, an invasive species specialist. "The discovery does, however, serve as a wake-up call that we all need to be extra vigilant to prevent and detect the introduction of all aquatic invasive species."

O'Neill is the founder of the National Aquatic Nuisance Species Clearinghouse, and a member of national and state invasive species advisory committees and the federal Aquatic Nuisance Species Chinese Mitten Crab Task Force.

The Chinese mitten crabs' life cycle requires time spent in both freshwater and saltwater, O'Neill explains. The lower St. Lawrence River estuary provides an ideal setting for the crab to quickly establish a large population.

The species, which spreads naturally by water and occasionally over land for short distances, can also be transported in ships' ballast water. The crab originated in China and spread to Europe before being reported in San Francisco Bay in the early 1990s. Although the Chinese mitten crab (so named for dense patches of hair on some of its claws) has been found periodically in the Great Lakes since 1965, the species has apparently not taken up residence there.

The crabs, which have a two- to five-year life span, compete with fish and invertebrates for food. They reproduce rapidly and burrow into riverbanks, increasing the potential for erosion problems, and can easily clog fishing gear and water intakes.

NYSG's Fisheries Specialist **David MacNeill** says, "Largely because of their scavenging nature, the crabs may threaten the recreational and commercial fishing industry in estuaries by robbing bait off fish hooks and fish traps, damaging fish nets, and injuring netted fish." The crabs also biaccumulate mercury, lead and other heavy metals that can be passed along to potential predators, causing burdens of these contaminants to increase up the food web, MacNeill says. For additional information on the Chinese mitten crab, see **www.aquaticinvaders.org.**

Anglers and commercial fishermen can help prevent the spread of nuisance species by following the tips suggested in the NYSG's fact sheet on the fishhook waterflea (see "Last Wave," page 15, for ordering details).

**— Kara Lynn Dunn**

# *Results of Long Island Sound Lobster Research are Presented*

Participants gathered at Stony Brook University for the 4th Annual Long Island Sound Lobster Health Symposium in October 2004 to learn about the results of the three-year research program into the causes of the 1999 lobster mass mortality in Long Island Sound. This meeting was attended by just over 200 participants from the lobster industry, resource management agencies, research and environmental communities, and the general public. Speakers presented the results from monitoring programs and 17 research projects that addressed the status of lobster populations, the response to changes in the habitat quality, lobster response to disease, stress, and toxic sources. Participants also heard the results of two independent desk studies to model contaminant flow in Long Island Sound.

**Dr. Anthony Calabrese (center), past Chair of the LIS Committee for Lobster Disease and Research receives original artwork at the 2004 lobster symposium to recognize his leadership. Pictured are Connecticut Sea Grant Director Dr. Edward Monahan (r.) and NYSG's Lobster Outreach Coordinator, Antoinette Clemetson (l.) Photo by Paul C. Focazio**

Research results support the preliminary suspicion that LIS lobsters were subject to substantial stress, and several factors worked together, synergistically, to cause the mass mortalities in the western basin. Researchers described a "snowball" effect arising from environmental, climatic, and oceanographic factors, which caused sufficient stress to lobsters up to a point where their immune systems were overwhelmed by these sustained, rapidly changing, and increasingly lethal conditions.

A 2°C rise in bottom water temperature lies at the core of this phenomenon, and it was a key stress factor that created a hostile environment for lobsters. This anomaly was compounded by other factors, most notably an hypoxia event and a pronounced salinity stratification resulting after the passage of a hurricane and its heavy rains. All of these factors, collectively, are believed to have pushed the lobster population beyond its physiological tolerance limits. These conditions would have caused lobsters to die, even in the absence of pesticide spraying in 1999, although the harmful effects of pesticides were not completely ruled out.

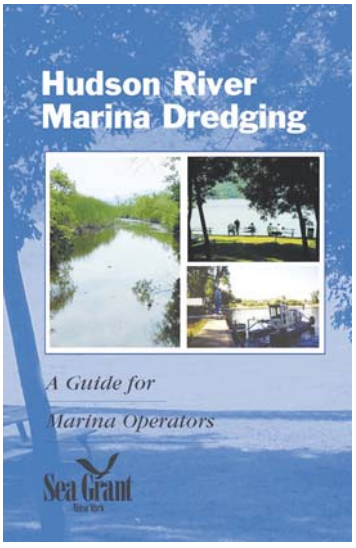
The pesticide, malathion, could not have played a major role in causing lobster mortalities in 1999. However, the model identified areas within LIS (mostly coastal embayments in the western basin), where specific pesticides (e.g., sumithrin) might have built-up to lethal concentrations, and may have weakened lobsters further, and made them more susceptible to disease and the hostile habitat. The combined effect of the pyrethroids resmethrin and sumithrin is not understood and should be studied.

A special issue of the *Journal of Shellfish Research* is being published as a technical report and more information can be obtained by visiting the website **www.seagrant.sunysb.edu/LILobsters**, or contacting Antoinette Clemetson (631.727.3910 Ext 4).

**— Antoinette Clemetson**

## What's new this Spring @ nyseagrant.org

- Get listings for over 70 coastal research and outreach projects we're currently funding.
- Read up on Sea Grant's 5th "Botulism in the Great Lakes" Workshop, held in early April.
- Peconic Estuary Program's support of *Healthy Bodies, Healthy Bays*, a 5K race near Sag Harbor this spring
- Wanted! Eco-students for paid internships on Lake Ontario, Salmon River this summer
- Long Island Sound Study's fellowship applications for interested graduate students are due mid-May.




A guide for Hudson River marina owners, operators and boat clubs that describes sediment contaminants likely found in lower Hudson River sub-basins, based on marina maintainence dredging projects permitted through NYSDEC. Includes Q & A on the NYSDEC's dredging permit process and river sediment contaminant data from a NYSG-sponsored study by Rensselaer Polytechnic Institute (RPI).

## Ordering Publications

Please send requests for the following publications to:

*New York Sea Grant Communications*
121 Discovery Hall, Stony Brook University,
Stony Brook, NY 11794-5001/631.632.9124

## Journal Reprints

**Changes in fractal dimension during aggregation.** R.K. Chakraborti, K.H. Gardner, J.F. Atkinson and J.E. Van Benschoten. 2003. *Water Research* 37: 873-883. *Free*

**Concentration-dependent effects of toxic and non-toxic isolates of the brown tide alga *Aureococcus anophagefferens* on growth of juvenile bivalves.** V.M. Bricelj, S.P. MacQuarrie and R. Smolowitz. 2004. *Marine Ecology Progress Series* 282: 101-114. *Free*

**Effect of the northern quahog *Mercenaria mercenaria* on the development of blooms of the brown tide alga *Aureococcus anophagefferens*.** R.M. Cerrato, D.A Caron, D.J. Lonsdale, J.M. Rose and R.A. Schaffner. 2004. *Marine Ecology Progress Series* 281: 93-108. *Free*

***Mysis relicta* in Lake Ontario: Population dynamics, trophic linkages and further questions.** O.E. Johannsson, L.G. Rudstam, G. Gal and E.L. Mills. 2003. *Aquatic Ecosystem Health & Management Society* 257-287. *Free*

**Pico- and nanoplankton dynamics during bloom initiation of *Aureococcus* in a Long Island, NY bay.** M.E. Sieracki, C.J. Gobler, T.C. Cucci, E.C. Thier, I.C. Gilg and M.D. Keller. 2004. *Harmful Algae* 3: 459-470. *Free*

**Remediation of PCB-contaminated sediments: Volatility and solubility considerations.** R.J. Scrudato, J.R. Chiarenzelli, J.J. Pagano and M. Wunderlich. 1999. *Remediation* 7-21. *Free*

**Volatile loss of PCB aroclors from subaqueous sand.** J.R. Chiarenzelli, R.J. Scrudato and M. L. Wunderlich. 1997. *Environmental Science & Technology* 31(2): 597-602. *Free*

**Volatilization of polychlorinated biphenyls from sediment during drying at ambient conditions.** J. Chiarenzelli, R. Scrudato, G. Arnold, M. Wunderlich and D. Rafferty. 1996. *Chemosphere* 33(5): 899-911. *Free*

## Sea Grant Publications

**Guidelines for Reducing the Spread of "Fishhook waterfleas" (*Cercopagis pengoi*).** D. MacNeill, M. Snyder, K. Schulz, J. Makarewicz and D.R. Baker. 2004. Fact Sheet. *Free*

**Hudson River Marina Dredging: *A Guide for Marina Operators*.** New York Sea Grant. 2005. Contact Nordica Holochuck, nch8@cornell.edu *Free*

**Ice Your Fish: Prevent Scombrotoxin Poisoning.** Fisheries Extension Enhancement Initiative Program. Available in pdf format **www.iceyourfish.seagrant.org** *Free*

**New York Aquaculture Industry: Status, Constraints and Opportunities.** M. Timmons, G. Rivara, D. Baker, J.M. Regenstein, M.P. Schreibman, P. Warner, D.A. Barnes and K. Rivara. 2004. White Paper. 72 pp. Available in pdf format **www.bee.cornell.edu/extension/aquaculture/PWT_Reference_Material.htm** *Free*

## Mackerel

**The most common species of mackerel found in fresh seafood markets in the Northeast is the Atlantic mackerel. This fish is abundant in ocean waters from Newfoundland to Cape Hatteras. It is a small, bullet-shaped fish with dark, wavy stripes on its back and a silvery metallic color that shades to white on its belly. In New York, peak harvests of Atlantic mackerel generally occur during the late winter and spring.**

**All mackerel are delicate fish that should be handled properly by keeping them well iced and as cold as possible from the time they are caught until they are eaten. (Please read about keeping mackerel fresh in the article on page 11.) The freshest fish will still have its characteristic bright metallic color and a mild neutral odor reminiscent of an ocean breeze.**

**Tasty, inexpensive, versatile, and abundant, fresh mackerel is fatty, rich-flavored and moist. It is one of the best sources of heart healthy omega-3 fatty acids. Because of its high fat content, mackerel can be grilled, but many recipes call for it to be pan-fried, baked or broiled. Mackerel pairs well with acidic flavorings such as the tomato called for in this recipe.**

**— NY Seafood Council**

# Seafood Corner

## *Sautéed Mackerel with Tomatoes and Onions*

### Ingredients

8 mackerel fillets
1/2 cup flour, white
1/2 cup cornmeal
canola oil, for sauté
basil, fresh for garnish

*Tomato Sauce*
1 cup sweet onion, sliced
2 tbsp. garlic chopped
1/2 cup rice vinegar or cider vinegar
8 tomatoes, large, peeled and chopped

### Method

Cook onions in a stainless pan to release juices. Oil is not necessary. Simmer, do not brown. Add garlic and cook for 2 minutes. Add vinegar, turn up heat and reduce to half. Add tomatoes and simmer for 10 minutes. Season to taste. Remove from pan and set aside.
Cut fillets in half to remove the dark line and bones that run from head of the fillet to the tail. Mix flour and cornmeal and dredge mackerel fillets in the mixture. Sauté over high heat in just enough oil to avoid burning the fish. Cook approximately 1 1/2 minutes per side. Remove fish and wipe out pan. Return fish and add sauce. Cook for 2 minutes more. Serve on a warm platter and garnish with fresh basil. Serve with steamed potatoes or pasta.

*Optional:* Add 1 tablespoon lime juice mixed with 1 teaspoon hot pepper paste to sauce.
*Serves 4 - 6.*
*An original recipe by Chef Starr Boggs, Westhampton Beach, NY.*

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