

Little Critters, Big Impacts

It came to America on cargo ships, in ballast tanks below. Made its way through the Great Lakes in bait buckets and the bilge water of boats. It is being carried in fishermen's gear from ports along Lake Ontario and the Finger Lakes.

While not all exotics are successful in their introduction to a new environment, the nearly microscopic fishhook water flea (pictured above) has successfully colonized Lakes Ontario, Erie and Michigan, as well as the Finger Lakes.

Before SUNY Brockport **Joe Makarewicz's** late '90s study of this native of the Caspian and Aral Seas, little was known about *Cercopagis* – what it eats, how it behaves,

how it reproduces and its impacts on Lake Ontario's food web. "This research provides the first available basic information on the biology and ecology of *Cercopagis* in North America," says Makarewicz.

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COASTLINES
 Vol. 33, No. 1, Spring 2004

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Coastlines is a product of NYSG's project C/PC-7 funded under award NA16RG1645 granted to SUNY's Research Fdn. on behalf of NYSG from the National Sea Grant College Program of the US Dept. of Commerce's NOAA. NYSG is a joint program of SUNY and Cornell. Sea Grant is a national network of 30 university-based programs working with coastal communities. Its research and outreach programs promote better understanding, conservation and use of America's coastal resources. Copyright © 2004 NYSG. Text and images in this publication and its electronic form may be used, reproduced or transmitted for educational purposes, giving credit to NYSG. Contact NYSG's Communications (631.632.9124, nyseagrant@stonybrook.edu) for a free subscription or to obtain permission from the originators of all photos and artwork prior to use in any other publication or Web site. This newsletter is also available at: www.nyseagrant.org.

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The "big oaks from little acorns grow" analogy in the title of the cover article could be the theme of this entire *Coastlines* issue. QPX, *Listeria*, *Cercopagis*, and even movements of sand grains all make major changes in their environments whether they are clam beds, smoked fish plants, Lake Ontario or homes along shorelines. I'm reminded of some of my own work on small organisms with big impacts – zebra mussels, the Asian clam, Legionnaire's Disease bacteria – and expect that this issue of *Coastlines* will raise memories for more than just me.

Another parallel title to this issue could be "How small contributions can add up to big effects." I'd like to call attention to several awards to NYSG. The first was by the Northeast Sea Grant Region to our extension and communications team that worked with Connecticut Sea Grant to support and extend information for the Long Island Sound Lobster Research Initiative. The second was by the NYS Environmental Protection Fund to our Hudson River extension specialist to help boaters on the Hudson River appreciate and protect their resource. Finally, the US Department of

Agriculture funded our seafood safety specialist and his collaborators to further their work to help smoked seafood producers fight *Listeria* invasions of their plants.

As a *Coastlines* reader, you, too, can make an individual comment that will add up to a big effect. Note the short survey opposite on page 3. It will take a short time to answer the questions, but your response can make a big difference to us at NYSG. It is extremely important to us to stay in touch with you and focus on issues that are important to you. We think that we do a good job, but only you can be the judge of that. We need you to tell us whether we are dealing with YOUR primary coastal resource issues and if there are issues that are important to you that we are not including in our strategic plan. Such advice is the "Recipe for Success" of NYSG.

Please help us by responding.



On the cover:

Under the microscope, eyespots of about 400 fishhook water fleas are in view under 8x magnification. The critter's s-shaped hook is seen in the insert image, under 40x mag.
 Courtesy of Kim Schulz



You're never too "little" to start learning about our beach environment. Some very engaged youngsters get a lesson from Suffolk County Historical Society's outreach educator Susan Sanfilippo at the exhibit *Shifting Sands: Long Island's Ocean Beaches*. Story on page 8.
 Photo by Paul Focazio

The New York Sea Grant Program Serving New Yorkers Since 1971

Recipe for Success

Ingredients

- ▶ 1 Empire State with its thousands of miles of ocean, lake, and river coastlines along with its millions of residents who are the stewards of its coastal resources
- ▶ 1 List of challenges that face the future of those coastal resources
- ▶ 1 Coastal organization whose dedicated research, outreach and management staff's mission is to provide science-based information essential for informed coastal decision making
- ▶ 1 Primary source of funding from the federal government with other sources coming from state, regional, agency, private and industry partners

Method

Mix in all the ingredients thoughtfully and thoroughly. Blend well.

Optional: Include new ingredients that may bubble up from grass roots or trickle down from national trends.

Preparation time: Variable

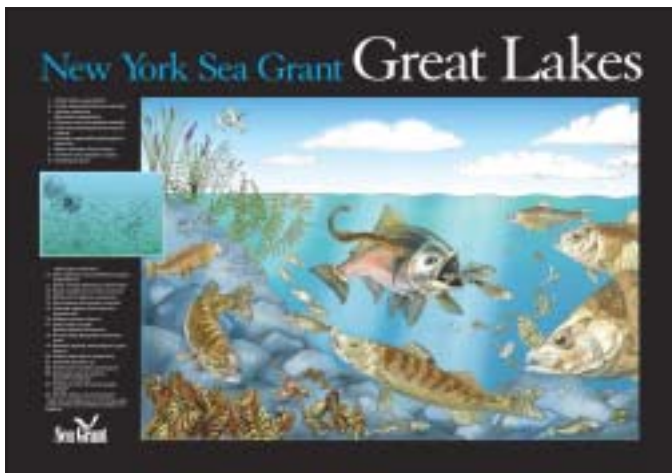
Yield: An informed citizenry that is empowered to make wise choices about New York's coastal resources.

Get Into The Mix

Please take a moment to complete these three questions to our survey, either as a written note or an email. From what you know about New York Sea Grant's program:

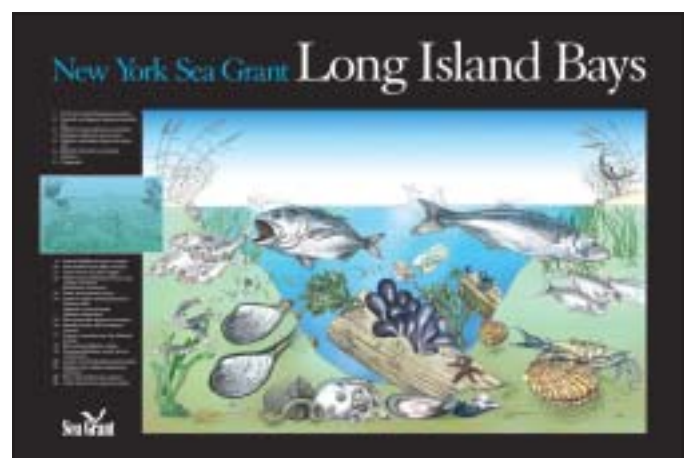
1. Please list the "top 3 or more" things you think NYSG *does particularly well*.
Providing details would be helpful.
2. Please list the "top 3 or more" things you think NYSG is *not doing particularly well*.
Tell us how we might improve those aspects of our program.
3. Are we hitting those coastal issues that are a high priority for you? If not, what topics would you suggest that we address?

E-mail replies to nyseagrant@stonybrook.edu or mail or fax hard copy replies to our Stony Brook office (see opposite page). Please note that later this year there will be a separate survey just about *Coastlines*.



We Listen

It's because of your response to our food web illustrations from our Summer '03 *Coastlines* that we now have posters of our Great Lakes and marine bay artwork. See Page 15 for details.



Little Critters,



Alewives are the catch of the day for Sea Grant scholar Betsy Damaske and Corey Laxson. Diets of alewife and rainbow smelt were examined before and after *Cercopagis* was discovered in Lake Ontario. The invader was absent in both fish stomachs and zooplankton samples in 1997, but by August 1998 its distribution was lake-wide and spines of the Eurasian water flea were present in stomachs of both fish species.

All photos courtesy of Joe Makarewicz

Makarewicz and his research team used genetic analysis techniques to track the invasion route of *Cercopagis*. "Identifying the travel course and entrance location of *Cercopagis* will help to prevent new introductions and perhaps provide some understanding on how to reduce the spread of established populations," says Makarewicz.

In other studies, differences were identified between the invader's populations in Lake Ontario and the Caspian, Baltic and Black Seas. *Cercopagis* in the Caspian

Sea are genetically distinct from all other populations, deeming the basin an unlikely source of either Baltic Sea or Great Lakes populations. While populations are genetically related, *Cercopagis* from the Baltic Sea may have originated from the Black Sea. And, finally, fishhook water fleas found in Lake Ontario are genetically identical to those in the Baltic Sea, thus making it the likely source of the North American invasion.

While the team's findings confirmed that only a single species of the Eurasian water flea (*Cercopagis pengoi*) exists, sampling has shown

a second form exists. Named *Cercopagis* (*Apagis*) *ossiani*, this form is found only during the early spring and most likely represents hatchlings of *C. pengoi*'s resting egg generation. These eggs, which can withstand extreme environmental conditions, are how the species has been able to successfully spread itself in the Great Lakes and other regions. "Our results will lead to changes in how *Cercopagis* is classified in a taxonomical sense," says Makarewicz.

"Based on our work, we also now know that we're dealing with an epilimnetic species, meaning that it does not migrate out of the lake's upper layer. What's more, we've collected a baseline of information on *Cercopagis*' productivity, birth rates, and seasonal abundance and biomass relative to the other zooplankton species."

Since its invasion nearly seven years ago, *Cercopagis* has become a primary contributor to declines in the abundance of several dominant zooplankton in Lake Ontario's offshore waters – *Daphnia retrocurva*, *Bosmina longirostris* – and *Diacyclops thomasi*. This makes it a viable competitor with fish relying on these species as a food source, such as alewife and rainbow smelt. "If *Cercopagis* adds an extra step in the lake's food web, energy loss through a longer food chain could be substantial," says Makarewicz. "This could result in a significant bottleneck to productivity of the fish community

How to get unhooked

While it may be too late to prevent the spread of *Cercopagis* in the Great Lakes, NYSG's fisheries specialist **Dave Mac Neill** recommends certain procedures to help reduce its reach. "It is important for anglers and boaters to realize there are a number of measures they can take to reduce the risk of transporting *Cercopagis* from one water body to the next."



The most environmental friendly control measures are air drying the boat and equipment for at least 24 hours (but up to 5 days for other species such as zebra and quagga mussels). Rinsing with boiling water or steam cleaning is also suggested.

Other effective but more environmentally damaging treatments, such as boat cleanser, vinegar and salt water can be used in combination, but away from the water.

Despite it being highly effective in destroying *Cercopagis* resting eggs, chlorine beach

Big Impacts

and, ultimately lead to a reduction in stocking.”

So far, the high abundance of *Cercopagis* and lower numbers of other zooplankton have not done much to drive down populations of alewife, rainbow smelt, and other planktivorous (plankton-eating) fish. Makarewicz has several non-exclusive explanations as to how *Cercopagis* has been able to maintain high densities despite predation pressure.

First, the establishment of *Cercopagis* in 1998 coincided with the lowest overall abundance of planktivorous alewife in Lake Ontario in 20 years. Makarewicz adds, “The high productivity rates of *Cercopagis* may allow its population growth to outpace consumption by predatory fish.” Also, with studies showing the invader to be most abundant in the late summer, it may not be around in full force earlier in the season when alewife and smelt are in peak predation mode. The flea’s characteristic s-shaped hook, which can be as large as five times its approximately 2 mm body length, make it low on the menu preference for alewife, smelt, and other prey species. “Our studies show that while both alewife and smelt are known to prey on the invader, *Cercopagis* consumption by young-of-year and adult alewife is rather low,” says Makarewicz.

“The extent to which alewife and rainbow smelt prey on *Cercopagis* has important ecological implications for Lake Ontario and, as our



NYSG-funded researcher Joe Makarewicz (pictured here with Sea Grant Scholar Betsy Damaske) says his team’s results are a benchmark in studies on the invader *Cercopagis*. “Basically, we now have a better understanding of the impact, though potentially minimal, and role of this exotic in Lake Ontario and other water bodies.”

studies have shown, may vary between age, size classes and species,” says Makarewicz. Because of its consistent presence and, at times, high abundance, *Cercopagis* may decrease food available for the plankton-eating fish. This shift is possible if the invader’s consumption of zooplankton substantially lowers the density of this food source for the fish and if it does not serve as a suitable alternate prey.

“We know that in the Baltic Sea, the entire planktivore food web was impacted by the invasion of *Cercopagis*,” says Makarewicz. “But, aside from the potential for this organism to spread quickly and far, much less is still known about the invader’s impact on Lake Ontario or other invaded ecosystems.”

— Paul C. Focazio

should not be used for disinfection near any lake either. It has toxic effects on aquatic life and can also damage boat equipment and gear.

Bait and bait water should be dumped on dry land (not back into the water) before transporting a boat and gear to another aquatic location.

Examine the boat, anchor lines, fishing lines, trailer, and gear. Remove all mud and plant fragments from the boat and equipment.

Drain and clean the boat motor. Disinfect bilge, transom and live wells, bait buckets and fishing apparatus and gear.



“*Cercopagis* is one in a number of ballast water-borne species that have invaded the Great Lakes in the past century,” says Hugh MacIsaac, a co-principal investigator on a NYSG-funded study headed by SUNY Brockport’s Joe Makarewicz. “Its introduction into Lake Ontario is attributed to the release of water taken on by ships in foreign waters for stability.”

Two If By Sea Grant



Retired Navy Vice Adm. Conrad C. Lautenbacher, Ph.D., Undersecretary of Commerce for Oceans and Atmosphere and NOAA administrator (l.) congratulates NYSG's new Knauss Fellows Brian Weitz (c.) and Mike Snyder (r.).
Photography Services: Office of the US Sec'y of Commerce

New York Sea Grant has not one, but two fellows selected for the Dean John A. Knauss Marine Policy Fellowship Class of 2004.

Mike Snyder is a dual-degree student who has received a Masters of Public Administration degree (MPA) from the Maxwell School of Syracuse University and expects to complete the requirements for a MS in Ecology at the SUNY College of Environmental Science and Forestry in the spring of 2004. Mike has been placed in the Senate Committee on Commerce, Science & Transportation, on the Subcommittee on Oceans, Fisheries and Coast Guard. He is a former NYSG Scholar who worked on NYSG's applied research project to develop a *Cercopagis* interdiction and prevention protocol with NYSG fisheries specialist **Dave MacNeill** and researchers **Kim Schulz** of SUNY ESF and **Joe Makarewicz** at SUNY Brockport. This team is creating a brochure based on NYSG-funded research to better inform Lake Ontario boaters and fishers of aquatic invader *Cercopagis*. Because resting eggs of the fishhook water flea can be transported from lake to lake even on dried out boat lines, "We're looking at a variety of ways to track *Cercopagis* and reduce their further spread," says MacNeill.

Before his Congressional appointment starts, Mike is working in Washington, DC at the headquarters of the National Oceanic and Atmospheric Administration (NOAA, the parent organization of Sea Grant in the federal government) as part of the Research Participation Program administered by the Oak Ridge Institute for Science and Education. Through his current appointment at NOAA's

Office of Education and Sustainable Development, he is helping to establish an agency-wide education program that will promote environmental literacy of ocean and coastal sciences.

Says Mike, "I'm both extremely excited about my placement and grateful to NYSG for their continued support. Sea Grant has earned the respect and admiration of people who are involved in coastal research and stewardship efforts throughout the country. It's an honor to be part of its rich tradition. The Knauss fellowship is recognized by those who work on ocean policy as an outstanding opportunity, and I can't wait to begin."

Brian Weitz received a BA in environmental biology from Columbia University, and then an MPA in environmental policy from Columbia University's School of International and Public Affairs. For his MPA, Brian worked as a consultant to the Ocean Conservancy, helping to develop their position on potential changes to the Magnuson-Stevens Act. Brian also did research on the Salmon Planning Act which has yet to pass in Congress, but calls for the removal of four dams on the Salmon River to help restore salmon in the Pacific northwest.

Says Brian, "Given the recent release of the Pew Commissions report on the oceans and the expected release of the US Oceans Commission report, I cannot think of a better time to begin this fellowship. Hopefully this next year will see marine issues pushed to the front of public awareness, and there will be a tremendous amount of momentum and enthusiasm in Congress to accomplish what needs to be done."

Like Mike, Brian is assigned to the same Senate subcommittee. Each will be working for a different political party, so they should have a very interesting, and hopefully productive year. Both Fellows are eager to get their feet wet in the program that began February 1.

The Knauss Fellowship, established in 1979, provides a unique educational experience to students who have an interest in ocean, coastal and Great Lakes resources and in the national policy decisions affecting those resources. The program matches qualified graduate students with hosts in the legislative and executive branches located in the Washington, D.C. area, for a one year paid fellowship. The program is named in honor of one of Sea Grant's founders, former NOAA Administrator, **John A. Knauss**.

— **Barbara A. Branca**

Unknown Parasite Is Hard on Clams

The clam industry has suffered the ill-effects of brown tide, a phenomenon attributable to a large population of a tiny phytoplankton. However, a new disease that is caused by an unidentified single-celled microscopic parasite has been threatening the fishery. This disease, **Quahog Parasite Unknown** or "QPX disease," is caused by a parasite that infests northern hard clams (*Mercenaria mercenaria*) only.

The disease does not pose any risk to human health but it is causing serious harm to the clam industry. The first reports of a QPX-like organism were in dead and dying clams in New Brunswick, Canada in 1959 but it wasn't until the 1990s that QPX disease began to be associated with clam die-offs in the Northeast and Mid-Atlantic. Gross signs of the disease vary in the areas investigated to date but clams typically have an intense inflammatory response to the parasite.

Clamming is almost second nature to native Long Islanders and this unique fishery is monitored closely to safeguard public health. Commercial clambers need a license to fish in NY waters, and areas that fall below a certain water quality standard are off-limits to everyone. One of the largest programs being administered by NYS Department of Environmental Conservation is the *Raritan Bay Shellfish Transplant Program*, which works together with certified clambers to harvest shellfish from the polluted waters in Raritan Bay. Clams are transported to designated areas in Peconic Bay and held for three weeks to



Photo courtesy of
Antoinette Clemetson

purge themselves of pollutants and toxicants before they are sold on the market to the general public.

It isn't known with certainty whether or not New York's hard clams were infected with QPX prior to 2002. Large numbers of dead and dying clams were reported in Raritan Bay off the coast of Staten Island in 2002, resulting in a loss of between \$4-\$5 million in the dockside value of the clam resource. QPX organism was subsequently identified in these clams and this diagnosis resulted in the suspension of the Raritan Bay Shellfish Transplant Program for 2003. An unacceptable high level of QPX was found and the disease is most prevalent in the center of the most productive part of the fishing ground.

Research into QPX is continuing and Drs. Bassem Allam and Alistair Dove, Stony Brook University Marine Disease Pathology & Research Consortium Laboratory hope to research the organism's genetic make up and determine if clams from different populations have higher disease tolerance to the QPX organism. This research will help to develop new tools to monitor QPX in New York and prevent the spread of the disease.

Photo (left) courtesy of
New York State Department of
Environmental Conservation

For additional information contact 631.727.3910 to request the brochure *QPX Disease in Hard Clams – Quahog Parasite Unknown*.

— Antoinette Clemetson
Fisheries Specialist



Shana Miller, NYSG Technical Outreach specialist for the Peconic Estuary Program, visits the *Shifting Sands* exhibit on view at the Suffolk County Historical Society until October 2004. Photo by Paul C. Focazio



The Suffolk County Historical Society, 300 West Main Street, Riverhead, NY (631.727.2881), is a private, not-for-profit organization and an authorized agency of the county that receives partial funding from Suffolk County. The Shifting Sands Exhibit was made possible with funding from the NY State Council on the Arts.

Jeannette Ott of Flanders, her son Collin and friend Marissa Russo watch a video of the 1993 breach in the Westhampton barrier island that created Little Pike's Inlet that was subsequently closed. New inlets formed during storms are a major concern because they may cause changes in the bay and mainland areas, as well as along the ocean shore. Photo by Paul C. Focazio

A snowy afternoon in February isn't your usual day to pack up the kids and head to the beach. But that's exactly what some families did when they came to the Suffolk County Historical Society and visited the exhibit *Shifting Sands: Long Island's Ocean Beaches*. This exhibit culminates three years of work on the part of the Historical Society's staff with the help of NY State Council on the Arts planning and installation grants.

Shifting Sands combines the societal with the scientific. Through historical photos and artifacts, video and sound bytes, the exhibit brings to life the natural forces that shape and diminish Long Island's barrier beaches and the cultural, economic and historical trends that have molded human interactions with them.

Working with the exhibit curator **Marsha Hamilton**, NYSG coastal processes specialist **Jay Tanski** helped to develop the *Shifting Sands* exhibit by blending more objective, science-based information with the historical perspective. Says Mr. Tanski, "Long Island's coast is a dynamic environment, constantly changing in response to natural processes and human activities. Proper manage-

ment of this important resource requires a good understanding of the factors controlling erosion and the impacts they can have on different coastal areas."

The exhibit also provides the casual viewer with snapshots of how people have long interacted with Long Island's beaches and been affected by its patterns of erosion. Historical photos show us what it was like to be a clammer or a beachgoer a hundred years ago. An old clam rake and the woolen bathing "costumes" worn by women and men make that era come alive. More recent photos show us property damage caused by winter storm erosion. A video



Watch

animation (made available by Fred Mushacke of the NYSDEC) speeds up the process of a storm breaking through a barrier island and forming Little Pike's Inlet. Audio recordings (provided by George Maul of The Werkshop) let us hear both sides of the beach nourishment issue – whether or not to add sand to beaches that have been eroded by storms.



Erosion control structures and beach nourishment have helped slow down erosion and preserve the beach in front of the heavily-developed Coney Island shoreline.
Photo courtesy of Jay Tanski

Said **Wallace Broege**, Director of the Suffolk County Historical Society, "*Shifting Sands* is an exhibit that tells the story of our changing view of the natural world and the complex interaction between people and the environment, over time. Our actions have an effect on the natural world, just as the natural world affects us. Many of the issues and problems we face today, along our south shore, are not new and are a direct result of our actions or inaction."

Tanski informs us that like all coasts, Long Island's beaches depend on four major factors: the supply of sand available for beach building; the energy of waves and currents that impinge on the coast – especially during storms; short

and long-term changes in sea level; and finally, those human activities in the coastal zone that alter or disrupt natural processes or sand transport.

It's those human activities, such as building houses, protective seawalls and groins along the beach that have escalated in recent years and are the subject of some controversy. This exhibit gives visitors some sound scientific facts as Long Islanders seek to balance the environmental, social and economic costs of conserving the barrier islands, protecting private property, and ensuring public access to

beaches. The scientific and social factors interact in complex ways and are different along each particular stretch of coast.

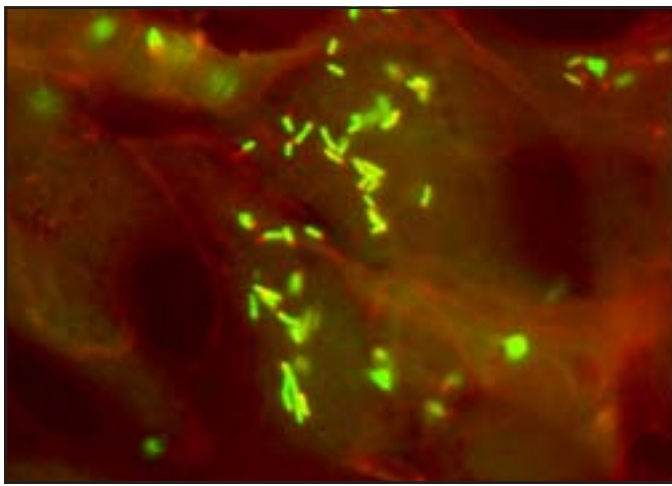
Tanski tells us that the diverse nature of development along New York's ocean shoreline requires a variety of approaches to erosion management. Structures, such as the breakwater and groins at Coney Island (pictured), along with beach nourishment have helped slow erosion and preserve the beach since the 1920's in this heavily developed area. If such structures are used improperly, however, they can disrupt the natural flow of sand and cause erosion problems on adjacent shorelines, usually to the west on Long Island's south shore.

Says Broege, "Understanding the history of the contemporary problems of beach erosion and its possible solutions will help to equip Long Islanders to make informed decisions for the present and the future."

— **Barbara A. Branca**



In the fall, Jay Tanski (right) was honored with a Special Distinctions Award in Natural Resources Programming, one of just two people so honored in 2003 from the Association of Natural Resources Extension Professionals (ANREP), New York Chapter. At left, Robert Kent, NYSG Marine District Extension Coordinator, congratulates him. Tanski was recognized for work on storm surge awareness.
Photo by Barbara A. Branca



Listeria (in green) is one tough little critter. Here shown in a photomicrograph of an animal cell, Listeria is a harmful pathogen occasionally found in ready-to-eat foods such as soft cheeses and smoked fish. Photo courtesy of Martin Wiedmann, Cornell University.

On the Forefront of *Listeria* Control

What do savory smoked salmon in New York, spicy Cajun popcorn in New Orleans or

succulent Dungeness crab cocktail in Seattle have in common? All may be purchased as ready-to-eat seafood delicacies that are prepared in seafood processing plants under strict regulation. The quality of ready-to-eat (RTE) food – food that won't be cooked before it is consumed – is safeguarded by the U.S. government's current regulatory policy of not allowing any *Listeria monocytogenes* in such food. *Listeria monocytogenes* is a bacterial pathogen that is widespread in the environment; it can cause severe illness and death in high-risk consumers. Processing plants that produce RTE foods face significant challenges in preventing product contamination because bacteria is constantly being brought into the plant environment and can be difficult to eliminate. Smoked seafood and other ready-to-eat processors have experienced numerous and costly product recalls when contamination is found.

Ken Gall, New York Sea Grant's seafood specialist, and **Martin Wiedmann**, food science professor from Cornell University, served as co-investigators for a three-year integrated research and outreach project designed to help processors of RTE seafood products control *Listeria*. The project team included seafood specialists from several Sea Grant programs, students and faculty at Cornell University, the National Fisheries Institute (NFI), the National Food Processors Association (NFPA) and from ten seafood processing plants from around the country.

Delivering Results of Two Concurrent Projects

This coordinated research and outreach effort involved several parts. One research project involved using molecular DNA fingerprinting procedures available at Cornell to characterize specific *Listeria* contamination profiles for each of the ten participating processing plants. These research results were then used to help each plant develop, implement, and evaluate specific control strategies to reduce the potential for *Listeria* contamination of finished ready-to-eat products.

A concurrent effort undertaken by some of the project collaborators was the development of a 60-page handbook, ***Listeria monocytogenes Control Manual for Smoked Seafood Processors***. The book describes in detail the elements and procedures needed to minimize the potential for finished product contamination. In 2003, this manual was adopted as a reference for the *Model Code for Cured, Salted and Smoked Fish Good Manufacturing Practices* produced by the National Association of Food and Drug Officials. This model code is designed to provide guidance to state regulatory agencies to help them develop appropriate regulations for the production of smoked and cured seafood products.

In 2003, the results and experiences learned from these two concurrent projects were delivered to processors of RTE seafood products in the U.S. in a series of five workshops held in Louisiana, Virginia, New York City, Seattle and Chicago. Of the 175 individuals who attended these workshops, almost

Smoked salmon on the assembly line. Photos courtesy of Ken Gall





Salmon coming out of the smoking room (left) and getting sliced by hand (below) at a smoked fish processing plant. Photo courtesy of Barbara Branca

60% were from seafood businesses, one third were from regulatory or other agencies, and 7% were from trade associations or academia. All of the firms who had implemented some *Listeria* controls in their plants reported that they were planning to modify or enhance these controls after attending the workshop. Of those who had not implemented any *Listeria* controls, 18 of 20 indicated that they were planning to start implementing some or all of the controls presented in the workshops.

And just how much impact have the workshops had in getting controls implemented? The results from the industry show unequivocally the importance of the workshops. In a follow-up evaluation sent to workshop participants who mainly process smoked fish, crab, crawfish and shrimp, 80% reported that they had implemented new *Listeria* controls or enhanced their existing controls. Employee training is considered an essential part of a complete *Listeria* control program, and the follow-up evaluation revealed that a total of 33 in-plant employee training programs were conducted by plant management since the *Listeria* workshops and half of these programs used the training materials developed for the Cornell/USDA project. Over 80% of the firms reported that they had changed or implemented new sanitation procedures critical to *Listeria* control, and half of the firms had modified their process, upgraded equipment or processing areas, and initiated a new *Listeria* testing program or modified their existing testing program.

Investing in Control Prevents Costly Recalls

Eleven firms provided information on the amount of time and money devoted to *Listeria* controls since attending the workshops. The average expenditure on *Listeria* controls was almost \$20,000 with reported expenditures ranging from \$1,200 to \$75,000. Follow-up evaluation respondents also reported that their estimated monthly cost for *Listeria* controls was

approximately \$2,100 per month or almost \$25,000 per year with a range from \$6,000 to \$84,000 per year depending on the size of the plant and the volume of products produced. But with better controls in place, such RTE seafood processing businesses are better ensured against the sting of costly recalls.

This research and outreach effort to help processors of RTE seafood and other food products implement effective *Listeria* controls will continue. Dr. Wiedmann, Ken Gall, and collaborators from Cornell, Penn State University and the University of Vermont received a second \$500K grant from the USDA in 2003 to develop a mathematical model to help firms interpret plant environmental testing results for *Listeria* and take appropriate actions to prevent finished product contamination. This effort will include smoked seafood processors as well as processors of RTE meat and dairy products. Thus techniques of control developed for the RTE smoked seafood industry will be spread to other segments of the multibillion dollar RTE industries, providing an ever-widening circle of protection against *Listeria* contamination and diminishing the potential for expensive recalls.

— **Barbara A. Branca and Ken Gall**



Spreading the Word About *Listeria* Control

Results of these far-reaching projects are being shared through numerous publications including peer-reviewed scientific journals. Four research papers (2 published, 1 in press, and 1 submitted) are or will be published in the *Journal of Food Protection*. Four additional papers summarizing the elements of the *Listeria Control Manual for Smoked Seafood Processors* are in preparation for submission to the other journal of the International Association for Food Protection, *Food Protection Trends*. The first paper in this series entitled "Implementing Targeted Good Manufacturing Practices (GMPs) and Sanitation Procedures to Minimize *Listeria* Contamination of Smoked Seafood Products," written by NYSG's Ken Gall in collaboration with Dr. Martin Wiedmann, Jenny Scott from the National Food Processors Association, Bob Collette from the National Fisheries Institute, Doris Hicks from Delaware Sea Grant and Mike Jahncke of Virginia Tech, has been accepted for publication and will appear in the May 2004 issue of *Food Protection Trends*.

—Ken Gall, NYSG Seafood Specialist



Nordica Holochuck and the Hudson.
Photo courtesy of Nordica Holochuck

NYSG Receives Hudson Estuary Program Grant

Estuary Interpretive Signs for Marinas” project will produce a series of interpretive signs to be posted at Hudson River marinas and yacht clubs that highlight the ecological, biological, physical and cultural aspects of the estuary.

New York Sea Grant will receive funds of nearly \$13,000 to place new signs at marinas to increase boater awareness, understanding, and stewardship of the Hudson River Estuary. The grant, one of 36 such awards for projects that protect and enhance the natural, cultural and historical resources of the river, is from NY’s Hudson River Estuary Grants Program funded under the State’s Environmental Protection Fund and is part of Governor George E. Pataki’s million-dollar plan.

“While excellent interpretive centers and signage either exists or is planned for many of the valley waterfront locations, there are no permanent interpretive signs located at the most common points of access for thousands of Hudson anglers and recreational boaters – the region’s marinas and yacht and boat clubs,” says **Nordica Holochuck**, NYSG’s Hudson Estuary Specialist. Holochuck will work with partners and marina personnel to select sign content and materials early in 2004.

In partnership with the Hudson Valley Marine Trades Association and Hudson River recreational boating associations, NYSG’s “Hudson

— **Barbara A. Branca**

Great Lakes Anglers Meet

New York Sea Grant’s fall 2003 Great Lakes Fisheries Leadership Institute workshops helped anglers learn the latest science on the fisheries of Lakes Erie and Ontario. NYSG’s coastal education specialist **Helen Domske** and fisheries specialist **Dave MacNeill** organized programs covering fisheries management, fish ecology, the Great Lakes food webs, and invasive species.

species.” Dave MacNeill’s presentation on the history of what the fishery once was and what it has become helps groups think about how and where they fish. “MacNeill’s words may also lead such groups to think why a conservative approach to stocking is more timely now than in the past when the forage base was stronger and the bottom of the food web was different,” added Sander, a NOAA 2002 Environmental Hero of the Year.

A participant in the Lake Erie workshop, Tom Marks of the Southtowns Walleye Association, has been using what he learned to make presentations on exotic species to angling and community groups throughout Western New York.

— **Kara Dunn**

After attending the Lake Ontario workshop, **Ed Sander**, a Monroe County Fisheries Advisory Board member and Great Lakes Fisheries Commission advisor, commented, “In addition to the habitat and ecology information, I will emphasize (to fisheries groups, sportfishing clubs and charter boat associations) the uncertainty of the fisheries and the role of invasive



artwork by Jan Porinchak

GLU 2004 "Covers the Lakes"

On Saturday, March 6, shipwreck explorers, scientists and educators shared a stage at SUNY Oswego for Great Lakes Underwater. Hosted by Oswego Maritime Foundation (OMF) and NYSG, this eighth annual event included adventurous underwater tales and discussions on existing diving preserves and sites in Lakes Ontario, Erie, Champlain, George and the St. Lawrence River. After almost a decade, interest in the event continues to build. "We have a built-in appeal to divers and non-divers alike," says **Philip Church**, director of OMF's submerged cultural resources program. "Whether you're a history buff or just someone who enjoys true stories of adventure and exploration, we offer a wide range of professional presentations, exhibits, and displays to take pleasure in."

NYSG's Great Lakes Program Coordinator **Dave White** discussed "Diving the Seaway Trail." The 504-mile Seaway Trail is part of the federally-designated "America's Byway" noted for great American road trips.

Joe Zarzynski, pictured along Lake Ontario at an earlier Great Lakes Underwater, returned to discuss underwater preserves and diving sites in Lake George. Photo by Barbara Branca

New York's portion of the trail parallels 454 miles of the St. Lawrence River, Lake Ontario, Niagara River and Lake Erie shorelines and connects with 50 miles of byway along Pennsylvania's Lake Erie coast.

Ed Scollon, a NYS trooper and member of their scuba team and the Lake Champlain Boat Patrol, outlined Lake Champlain's Valcour



Bay Research Project (VBRP). Since 1999, when a Revolutionary War cannon was discovered in the bay, VBRP has evolved into a full-scale archeological investigation of this submerged battle site.

Pennsylvania Sea Grant's **Anne Danielski** introduced the audience of nearly 130 to the wrecks being explored under the Lake Erie Underwater Preserve Project. As PASG's Education and Maritime Specialist, Danielski focused on

outreach initiatives such as an interactive CD program on the importance of local maritime history. Other efforts include a scuba diving training workshop held for teachers who expressed interest in creating lesson plans on Lake Erie's underwater cultural resources.

— **Paul C. Focazio**



Nearly 100 high school students from 19 high schools across the region participated in the **Bay Scallop Ocean Sciences Bowl** on Saturday, February 28 at Stony Brook University. The competition featured Q&A "buzzer" rounds and team challenge questions that tested the students' understanding in all the sciences related to the ocean. "Getting young people interested in marine issues is essential to fulfilling the goals that have been identified by the Oceans Commission," said **Jack Mattice**, Director of New York Sea Grant, one of the Bowl's cosponsors. "It is their generation that will decide how to recover, develop, maintain or conserve sustainable ocean resources for the future."

David Conover, Dean and Director of SBU's Marine Sciences Research Center, another cosponsor said "We need to attract the brightest young minds to a career in oceanography to help us find solutions to the decline in health of our marine environment."

This year's bowl proved to be very competitive. Said coach

Andy Matthews whose Mt. Sinai High School team captured the Bay Scallop Bowl title in both 2002 and 2003, "This year's team worked pretty hard, but there were a lot of great teams competing." Mt. Sinai placed third in the competition. High school teacher Matthews, a former NYSG Scholar and MSRC graduate was featured in *Coastlines* in 2003.

Another dedicated coach is **Karl Biedlingmaier** who brought two teams on the seven-hour trip from Churchville-Chili High School in upstate New York to the Bowl for the third year in a row. His A team made a strong showing against most of the suburban LI teams, but facing off against teams from Bronx High School of Science and Saint Ann's School in Brooklyn proved challenging. And a new wild card was added into the mix this year. A team from State College area in Pennsylvania took home the number 2 spot.

So it's the winning team from Bronx High School of Science that will go on to compete against 23 other regional champions from around the country in the 7th Annual National Ocean Sciences Bowl on April 24th in Charleston, SC. Nationally, the NOSB® is sponsored by the Consortium for Oceanographic Research & Education in Washington, D.C.

— **Barbara A. Branca**

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A Winning Team for Lobster Outreach

Directors **Jack Mattice** of NYSG and **Ed Monahan** of CTSG are proud to announce that NYSG's **Antoinette Clemetson**, **Barbara Branca** and **Paul Focazio** along with CTSG's **Nancy Balcom** and **Peg Van Patten**, received the Group Outreach Award at the mid-January Northeast Sea Grant Regional Meeting in Durham, New Hampshire. The award was for their efforts to support the LI Sound Lobster Health Initiative, including arranging and conducting researcher and public meetings, preparing publications including the *Lobster Health News*, and maintaining the Web site www.seagrant.sunysb.edu/LILobsters.

Emory Anderson of the National Sea Grant Office and chair of the LI Sound Lobster Research Initiative Steering Committee, told the winners, "We on the steering committee are extremely grateful for all of your hard work. Without your efforts, all that has been accomplished would have been impossible."

Anthony Calabrese of the National Marine Fisheries Service said, "As former Chair of the Steering Committee it was my privilege to have worked with you. Your hard work and professionalism most certainly made my job as Chair go more smoothly. I thank you for your help over the last few years."

Said **Nick Crismale**, president of the CT-based Long Island Sound Lobstermen's Association, "I speak for all the Sound lobstermen in telling you how appreciative we are for all your efforts in the LIS research initiative. It is because of people like you and your efforts to coordinate research projects that hopefully will produce the knowledge to bring back the healthy lobster resource we once enjoyed."

New York Sea Grant Welcomes Shana Miller

Shana Miller joined the Marine District Extension staff in January 2004 as the Technical Outreach Specialist for the Peconic Estuary Program. The Peconic Estuary, located in eastern Long Island, is part of the National Estuary Program (NEP) whose mission is to identify, restore, and protect the nation's significant estuaries. The program is coordinated by the Environmental Protection Agency. Ms. Miller joins two other NYSG staffers who are also involved in outreach education with the NEP. **Kimberly Zimmer** has long served the Long Island Sound Study and **Laura Bartovics** conducts outreach and education for the New York/New Jersey Harbor Estuary Program.

Ms. Miller received her BA from Cornell in biology and her MS in marine biology from Stanford University. Welcome aboard!

—Robert Kent



Accepting their awards for outstanding outreach related to the Long Island Sound Lobster Health Initiative are (from l. to r.) from CT SG: **Nancy Balcom**, Extension Program Leader and **Peg VanPatten**, Communications Director; from NYSG: **Antoinette Clemetson**, Lobster Outreach Specialist; **Barbara Branca**, Communications Manager and **Paul Focazio**, Web Developer. Photo courtesy of Sea Grant

This multiprogram, integrated extension and communications effort has contributed heavily to the current progress under the LI Sound Lobster Health Initiative and provides an excellent template for scientific, industry and public outreach for a very complex initiative conducted within a cloud of litigation.

Congratulations to the team for its excellent, and now award-winning, outreach program.

— Jack Mattice



New Peconic Estuary technical outreach specialist **Shana Miller (l.)** and NYSG Communications Manager **Barbara A. Branca** at the Shifting Sands exhibit.

Photo by Paul Focazio



Spend some time this spring with us at nyseagrant.org and discover:

- ▶ The status of botulism in Lakes Erie and Ontario - Download the proceedings from last spring's workshop read up on late-March 2004's fourth event in the series
- ▶ What we know and what we'd like to learn about shell disease. The second issue of *Lobster Health News* also includes articles on the effects of pesticides in Long Island Sound as well as an update on monitoring efforts of lobster populations.
- ▶ Details on our newly-funded 2-year \$2.4 million suite of projects. The award funds an additional 11 research investigations and numerous education and communications efforts, as well as an extension program serving the state's coastal communities from NY's two Great Lakes to the Hudson Valley, the greater NY metro area and Long Island.

Peter Martin, winner of Great Lakes and Long Island Bays challenge receives framed artwork by Jan Porinchak. Photo by Barbara Branca

LastWave

Ordering Publications

Please send requests for the following publications along with a self-addressed label and check payable to:

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Journal Reprints

A transient bloom of *ostreococcus* (chlorophyta, prasinophyceae) in West Neck Bay, Long Island. O'Kelly, C.J., M.E. Sieracki, *et al.* 2003. *Journal of Phycology*. 39:850-854. Free

***Cercopagis pengoi* as a new prey item for Alewife (*Alosa pseudoharengus*) and rainbow smelt (*Osmerus mordax*) in Lake Ontario.** Bushnoe, T.M., D.M. Warner, *et al.* 2003. *Journal Great Lakes Research*. 29(2):205-212. Free

Effects of the non-indigenous cladoceran *Cercopagis pengoi* on the lower food web of Lake Ontario. Laxson, C.L., K.N. McPhedran, *et al.* *Freshwater Biology*. 48:2094-2106. Free

Importance of Lake Ontario embayments and nearshore habitats as nurseries for larval fishes with emphasis on alewife (*Alosa pseudoharengus*). Klumb, R.A., L.G. Rudstam, *et al.* 2003. *Journal of Great Lakes Research* 29(1):181-198. Free

Distribution, fecundity and genetics of *Cercopagis pengoi* (*Ostroumov*) (*Crustacea*, *Cladocera*) in Lake Ontario. Makarewicz, J.C., I.G. Grigovich, *et al.* 2001. *Journal of Great Lakes Res.* 27: 19-32. Free

Trend analysis reveals a recent reduction in mirex concentrations in coho (*Oncorhynchus kisutch*) and chinook (*O. tshawytscha*) salmon from Lake Ontario. Makarewicz, J. C., E. Damaske, *et al.* 2003. *Environmental Science and Technology*. 37:1521-1527. Free

Sea Grant Publications

Botulism in Lake Erie Workshop Proceedings. NY, Ohio and Pennsylvania Sea Grants. April 2003. \$2.00. Available upon request: NY Sea Grant, 229 Jarvis Hall, SUNY at Buffalo, Buffalo, NY 14260-4400; ph: (716) 645-3610.

Great Lakes and Long Island Bays food web posters. Two separate 24" X 36" full-color illustrated posters with identification keys (as seen on page 3). Individual poster: \$5; one of each: \$8. Posters shipped in mailing tube. CD with both images (pdf) to print out 11" x 17": \$8. CD and both posters: \$15. Call 631.632.9124 for discounts on multiple posters. Available May 1, 2004.



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Seafood Corner

Mackerel

Did you know that “mackerel sky” describes the silvery clouds that often precede a storm? Fishermen say that mackerel will bite at anything before a storm.

The most common species of mackerel found in fresh seafood markets in NY are the Atlantic or northern, Spanish, and King. The Atlantic mackerel, the most common in NY, is a small, bullet-shaped fish with dark, wavy stripes on its back and a silvery metallic color. Atlantic mackerel are usually available from fall to spring with peak harvests from February through April. Adult Atlantic mackerel run about 1 to 2 pounds and are usually sold whole.

All mackerel are delicate fish that should be handled properly and kept as cold as possible from the time they are caught until they are eaten. The freshest fish have a characteristic bright metallic color and a mild neutral odor reminiscent of an ocean breeze. Fresh mackerel is one of the tastiest, cheapest, most versatile, and most plentiful fish available from fall to spring.

Though mackerel is fatty with more than 10% fat content and over 50% of its calories from fat, it is also a rich source of heart healthy omega-3 fatty acids. Because of its high fat content, mackerel is often grilled or smoked, but it can also be pan-fried, baked or broiled. Mackerel is rich-flavored, moist and often cooked with acidic flavorings such as lemon or tomato. Cooked Atlantic mackerel tends to have a softer texture than Spanish or King mackerel.

—NY Seafood Council

*Bringing
Science to
the Shore*

Mackerel Puttanesca

Ingredients

- 2 large (10 ounce or more) or 4 small (6-8 ounce) mackerel fillets with skin on flour for dusting
- 2 tablespoons olive oil
- 1 teaspoon onion (diced fine)
- 1 teaspoon garlic (chopped)
- 2 teaspoons small capers
- 6 anchovy fillets (diced)
- 4 pepperoncini or Tuscan peppers (diced)
- 8 black nicoise olives (pitted & halved)
- 1 teaspoon chopped fresh basil
- 1 teaspoon chopped fresh oregano
- 2 tablespoons tomato puree (or juice from canned tomatoes)
- 6 plum tomatoes (diced)
- 1 teaspoon chopped fresh parsley
- salt & pepper to taste

*An original recipe by Chef Stanley Kramer
Docks Oyster Bar & Seafood Grill, New York City*



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Method

Season fish with salt and pepper. Dust with flour and shake off excess. Sauté fillets in olive oil, flesh side first for 2-3 minutes. Turn fillets over and cook other side for an additional 2-3 minutes until flesh turns opaque. Remove fillets and keep warm. Save oil.

Saute onion and garlic in the oil that the fillets were cooked in. Cook until soft but not brown (about 5 minutes). Add capers, anchovies, pepperoncini, olives, basil and oregano. Cook for several minutes. Add canned tomato juice or puree. Mix well and add diced plum tomatoes. Simmer approximately 5 more minutes. Salt and pepper to taste. Pour sauce over mackerel fillets. Sprinkle with chopped parsley. Serve with orzo (rice shaped pasta) or rice pilaf.

This dish can also be made with other full flavored fish such as bluefish.

Preparation time: 20 minutes. Serves 2-4

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