At dawn a lone clammer gets an early start on Great South Bay, Long Island. This relatively shallow body of water, ringed by wetlands, is the site of ongoing efforts to restore the once bountiful hard clam industry.

Photo by Joe Dlhopolsky

Sea Grant New York

Coastlines

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WETLANDS—LOOKING BACK TO THE FUTURE

Clammers use their rakes to harvest tasty shellfish on Long Island's Great South Bay. An international flight lands on a runway built adjacent to JoCo Marsh in Jamaica Bay. Weekend kayakers paddle silently along the Carmans River. Each of these wetlands is a unique coastal ecosystem, playing an important part in the environment and the economy of Long Island.

Concern for the health of Long Island wetlands has grown recently with documented losses of marshes. Factors such as exotic invasive species, dredging, and growing coastal urbanization currently impact wetland health. Future threats may include increased rates of sea-level rise.

How can planners and managers develop effective management programs for marine wetlands? A major step would be to have a greater understanding of marsh-system controls and behavior under different physical conditions. This knowledge would provide the means for municipalities to deal with future changes of valuable coastal wetlands and help develop successful strategies for wetland protection.

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Sea Grant New York

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COASTLINES
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FROM THE ACTING DIRECTOR

Having been a member of New York Sea Grant's management team for two decades, I can attest to our ever-evolving nature. We tap into emerging issues and opportunities while looking even further out to what else is on the horizon. Yet, we do not completely jump to and focus on only whatever is the latest hot topic. Many existing marine and Great Lakes problems still need and deserve attention. NYSG has them in its sights, as well, aiming for progress with innovative approaches and solutions.

NYSG's flexibility is key to our success in covering so many bases, using our three pillars of research, extension/outreach, and education. And, being part of a network of 30 Sea Grant programs across the nation further expands our capacity. It's exciting to be part of an organization that exists to train, inform, and serve as an engine for new science. We are here to serve you and others who live near, work with, play in, or just plain appreciate New York's incredible coastal areas and resources, as we balance economic and environmental concerns.

OK, so you can probably tell I'm energized about New York Sea Grant. Great things are happening, only a few of which are highlighted in this newsletter. For example, we are in the middle of selecting our core research portfolio for 2009-2010 and there are a tremendous number of exceptional ideas targeting topics of importance to this state, region, and beyond – more than we have the funds to support right now. So, we will choose those with the strongest science and the most potential for significant impact. Many of the others may be fine-tuned for future opportunities. All of this will provide material for our extension and outreach activities, getting the results to you.

I am serving in the Director's position only briefly, until a new permanent leader for NYSG can be brought onboard. NYSG had a decade of excellence under Dr. Jack Mattice, who is now very deservedly enjoying retirement. Time will tell what important avenues we will explore and develop for your benefit in the coming years. We look forward to our continuing evolution.

— Cornelia Schlenk

Working with binational stakeholders at a "Future Search" conference in Grand Island, NY, are (from left to right): Dale Baker (NYSG Associate Director, conference co-ordinator), Bruce Lauber (Cornell's Human Dimensions Research Unit and meeting format developer), Tim Johnson (Ontario Ministry of Natural Resources, planning committee), Tom Brown (Cornell HDRU), Dr. Gary Sprules (University of Toronto, planning committee), and Dave MacNeill (conference co-coordinator, NYSG fisheries specialist). Not pictured: Dr. Jack Mattice (former NYSG Director who spearheaded the conference prior to his retirement) and Dr. Jim Johnson (USGS Fisheries Lab, planning committee). **Story on page 4.**

Photo by Barbara A. Branca

GREAT LAKES TALE: THE ALEWIFE AND THE OPOSSUM SHRIMP

Cornell graduate student and NYSG scholar Brent Boscarino (foreground) and Gideon Gal count alewife caught in a gillnet suspended mid-water column in Lake Ontario. The research team compared alewife vertical distribution and gut contents on both new moon (dark) and full moon nights on Lake Ontario. Results show that alewife have higher feeding rates on mysids because of increased light penetration. Photo courtesy of Brent Boscarino

Sea Grant Researchers Examine an Important Predator-Prey Relationship

In recent decades, Lake Ontario has become increasingly clear. The grazing of invasive zebra mussels and the reduction of inputs of compounds such as phosphorus have combined to improve its water clarity. Does an increase in light penetration affect how predators in lake food chains find their prey? Yes, says **Dr. Lars Rudstam**, Associate Professor in the Department of Natural Resources at Cornell University. Increased predation is one consequence of the "illumination of the food web" associated with the increasing water clarity in the Great Lakes.

In several New York Sea Grant funded projects, Rudstam, along with his colleagues and students at Cornell, the USGS Great Lakes Science Center, and the Canadian Centre for Inland Waters, has been examining the interaction of forage fish and invertebrates in Lake Ontario and predicting trends in their populations.

The main forage fish of economically-important sportfish species such as Chinook salmon and other salmonids in Lake Ontario is the alewife. The relatively high abundance of alewife is the reason for the faster growth of Lake Ontario salmon compared to those in other Great Lakes. Alewife may be switching from a diet consisting primarily of zooplankton to one that also includes the opossum shrimp, *Mysis relicta*, a small shrimp that feeds on zooplankton. The alewife benefits from this addition to its diet; the opossum shrimp's high content of unsaturated fatty acids is beneficial for the alewife's successful overwinter survival.

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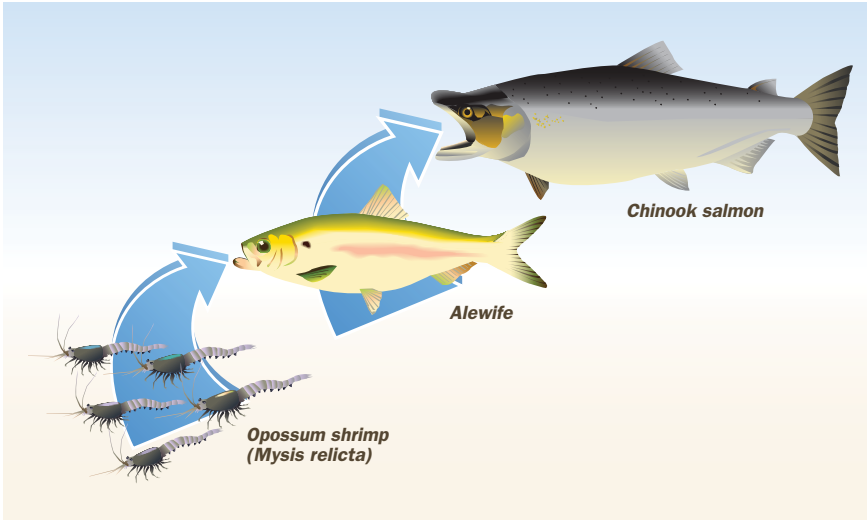
... for more on Dr. Rudstam and his research



Food chain artwork by Loriann Cody

At night, mysids migrate from the bottom of the lake towards the surface to feed, making them vulnerable to alewife predation. Says Dr. Rudstam, "We have shown that light levels associated with the top of the mysid layer are usually too low for alewife to use vision to feed on mysids. We therefore hypothesize that much of the predation we see in the field is occurring at the upper edge of the mysid distribution, where it is still light enough for alewife to utilize vision to feed."

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"Mysis in Crisis" crew on a sampling trip on Lake Ontario led by Lars Rudstam (top row second from left.) Also in crew was Robert O'Gorman (middle row, second from right) who recently retired from USGS, Biological Resources Division, Oswego, NY after many years of service.
Photo courtesy of Brent Boscarino

By comparing alewife vertical distribution and gut contents on both new moon and full moon nights, Rudstam's team has also shown that alewife can feed on mysids in darkness, although capture success declines in such conditions.

In addition to potential increases in alewife feeding, increased water clarity may also limit mysids' access to their own food. Mysids feed on the zooplankton in the warmer, upper layer of water where they are at greater risk of predation. Mysids may therefore grow more slowly, decreasing reproductive rates. The combination of decreased reproductive rates and increased mortality rates should lead to declines in the mysid population. Early indications show this may be occurring. In 2006, the population had decreased to half of the density in 2005. Future work will determine if this is a continuing trend. If so, the future will be hard to predict because the complex alewife-mysis-zooplankton food web interactions are not known.

— Barbara A. Branca

VISIONING LAKE ONTARIO'S FUTURE

How do the people who work, live and play along Lake Ontario see the future of this great resource? Can American and Canadian anglers, government agencies, charterboat captains, planners, aquaculturists, environmental groups and researchers come together to discuss how they'd like to see the future of Lake Ontario?

Photo by Barbara A. Branca

To open up such a discussion, the binational Lake Ontario team of the Great Lakes Regional Research Information Network (GLRRIN), led by NYSG's **Dale Baker** and **Dave MacNeill**, held two separate conferences at opposite ends of Lake Ontario. Facilitated by **Dr. Bruce Lauber** of Cornell University's Human Dimensions Research Unit, these two Lake Ontario "Search Conferences" were held this spring in Grand Island, NY and Gananoque, Ontario.

After an overview of Lake Ontario presented by NYSG fisheries specialist and conference co-coordinator MacNeill, facilitator Lauber led each group of approximately 40 participants into a "shared history" discussion of Lake Ontario. Participants wrote on a wall-sized timeline to show decade by decade the natural and socioeconomic history of Lake Ontario. They were aided by conference planning team members **Tim Johnson**, **Gary Sprules, Tom Brown** and **Jim Johnson**.

By alternating small and large work groups, each consisting of a balance of stakeholders, participants listed a shared vision of the "ideal future" and then the "likely future" of Lake Ontario (see photo left). They had an opportunity to identify information needs that would be of practical value to Lake Ontario stakeholders. Each group reported its findings and all participants had an opportunity to indicate which information needs had priority for planning future research, extension and outreach projects.

Lists of prioritized needs as well as pre- and post-workshop evaluations will be synthesized into a report by the team in the coming weeks which will be made available on the GLRRIN web site.

— Barbara A. Branca

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... for more on the Lake Ontario Future Search conferences, including photos and insights by some of the participants

RESEARCHERS SCRUTINIZE BROWN TIDE GENES

Is it something in the genetic makeup of the tiny brown alga, *Aureococcus anophagefferens*, that triggers the brown tide blooms that sporadically darken the waters of some of bays, causing declines in bay scallop and other shellfish populations as well as the decrease of eelgrass beds that serve as shellfish nurseries? Researchers of the self-assembled *Aureococcus* Genome Consortium (AGC) believe that the organism's genetic makeup or genome holds the key.

In the summer of 2007, the Office of Science within the US Department of Energy's Joint Genome Institute (JGI) announced that the *Aureococcus* genome sequencing was complete, and that 11,500 predicted genes exist within its 56 "megabase" genome. After the release of this information, members of the AGC sought to examine gene sequences and pathways, looking for genetic causes of brown tide formation. According to **Dr. Christopher Gobler** of Stony Brook University's School of Marine and Atmospheric Sciences and investigator on numerous NYSG brown tide research projects, "The AGC used an approach of comparative genomics whereby the genome of *Aureococcus* is being directly compared to other phytoplankton species which it may compete with to form blooms."

By October 2007, AGC members came together to share the preliminary results of their comparative analyses in a two-day New York Sea Grant-sponsored *Aureococcus anophagefferens* Genome Jamboree held in Southampton, NY.

The Jamboree kicked off with an overview of the history and ecology of *Aureococcus anophagefferens* by Dr. Gobler. He presented the foundation for the comparative genomics approach, explaining how the *Aureococcus* clone in this current sequencing project was isolated from the Great South Bay of LI, which is also home to the diatom *Thalassiosira* and the green alga *Ostreococcus,* making them excellent comparative choices. Dr. Gobler showed a comparison of the ecology of these species, highlighting their differential bloom dynamics, and usage of nutrients and light as the framework for identifying critical genes which may or may not be present and absent in each species.

Left to right: Dianna Berry, Christopher Gobler, Theresa Hattenrath, Adam Kustka, Jackie Collier, Steven Wilhelm, Kathryn Coyne, Sonya Dyhrman, Astrid Terry, Louie Wurch, Erin Bertrand and Peter Countway. Photo courtesy of Chris Gobler

Dr. Astrid Terry, a genome analyst from the Joint Genome Institute in Walnut Creek, CA, described how the *Aureococcus* genome with its 11,500 genes has a gene count larger than all eukaryotic algae sequenced to date and the nuclear genome of *Aureococcus* is surprisingly most similar to that of another phytoplankton, *Ostreococcus*. *Aureococcus* has a large proportion of genes related to amino acid metabolism and synthesis and has many unique classes of genes not found in similar organisms. Dr. Terry also provided advanced training related to the *Aureococcus* genome for members of the Consortium.

Also providing training was **Dr. Dianna Berry** of Stony Brook University, who acquainted attendees with internet-based tools that allow members to make protein and nucleic acid sequence comparisons, search JGI genome databases for sequences of interest, and to search databases for similar genes by protein domain structure.

During a work session, Consortium members were able to present their gene models to Drs. Berry and Terry for assistance. Members also presented gene models which showed discrepancies between computer models and known gene models in other species.

During the second day, **Dr. Steven Wilhelm** of the University of Tennessee, working with **Dr. George Bullerjhan** of Bowling Green State University, presented his analysis of the chloroplast genome. In this organellar genome, he found the *Aureococcus* chloroplast genome was smaller than most other chloroplasts which have been sequenced to date and is most similar to several diatoms and the coccolithophore, *Emiliania huxleyi*.

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Coast

WETLANDS – LOOKING BACK TO THE FUTURE

A National Park Service (NPS) biologist works on Big Egg Marsh on Jamaica Bay where goldenrod blooms and the Manhattan skyline looms to the west. This marsh was restored by the NPS in 2003 through application of a thin layer of sand with a high pressure jet spray.

Photo inset courtesy of National Park Service, Gateway National Recreation Area. Photo above by Barbara A. Branca

A core from one of the experimental sites, Hubbard County Park located on the western part of Peconic Bay on Long Island's east end. Color differences indicate chemical activity of the sediment. For example, brownish-red layers suggest oxidized sediments whereas grey to black layers suggest that reduction was taking place.

Photo by Alex Kolker

To provide a deeper understanding of Long Island's marshes, a research team at Stony Brook University led by **Dr. Steven Goodbred** (now at Vanderbilt University) took a novel approach. By looking at the history of Long Island wetlands recorded in peat cores, the research team was able to reconstruct how wetlands responded to environmental change over time. The layers within each long, cylindrical core can be read like chapters of a marsh's past—the chemistry of its sediments, the remains of the marine life, the effects of currents and waves, long term weather patterns.

Long Island's great expanse of shoreline is made of a broad range of physical coastal environments that exhibit large differences in tidal range, upland urbanization, wave energy, and sediment supply. Goodbred's team chose five sites in physically distinct settings and investigated the physical marsh structure, sedimentation rates, and paleo-environmental indicators of each in order to understand the major controls and response patterns of these different marshes.

The results of this NYSG-funded project show that Long Island marshes are very different in terms of the stresses being placed on them and in how they respond to these stresses. In general, the researchers found that marshes in areas with high tidal ranges such as Jamaica Bay on the south shore and the Nissequogue River on the north shore that empties into Long Island Sound were controlled mainly by oceanographic processes such as the North Atlantic Oscillation.

In contrast, marshes with lower tidal ranges (and thus considered lower-energy marshes) such as in Great South Bay and western Peconic Bay were more strongly influenced by climatically-driven events such as storms and weather fronts.

One important conclusion that can be drawn from this research is that management and preservation strategies for the various marshes of Long Island must consider their unique settings and their different tolerances and reactions to the natural and anthropogenic changes that are ongoing and

Watch

The Carmans River, another experimental site in Goodbred's NYSG-funded project, is considered a "low-energy" marsh. Visitors can fly fish for trout in the upper part of the river or kayak near the mouth where the river empties lazily into Great South Bay.

Photo by Susan Hamill

expected in the coming decades. Thus a one-size fits all management approach will not be appropriate.

Using lead isotope analysis as well as field cores, the team also found that accretion rates of the Long Island marshes they examined have kept pace with sea-level rise over the past century. Although marsh health has declined, these findings imply that recent losses in Jamaica Bay and other areas may not be primarily caused by sea level rise and may be related to more local factors, such as land use, urbanization, or dredging activities rather than decreases in the rates of the natural buildup of sediment.

Work by Sea Grant Scholar **Alexander Kolker** suggests that toxic effects of hydrogen sulfide could be a factor contributing to marsh loss in Jamaica Bay. He observed that nitrogen inputs into the Bay result in low oxygen conditions. These conditions produce toxic hydrogen sulfide in sediments which kills the marsh grasses that hold the sediments together. The weakened marsh structure is then more susceptible to erosion. Thus Kolker's observation suggests that reducing nitrogen inputs could be helpful to the health of Jamaica Bay.

"Kolker's research provides greater insight into the conditions contributing to marsh loss in Jamaica Bay," says **Stephen Zahn**, Natural Resources Supervisor of NYS DEC in the region. "Understanding the causative factors is critical to the development of a sustainable recovery plan."

Kolker was invited to be on an expert panel of the U.S. Climate Change Science Program looking at wetland response to potential changes in sea level rise that was assembled by the USGS. After completing his PhD, Kolker is now a postdoctoral scholar at Tulane University in New Orleans where he is working on challenges that face marshes along the Gulf coast.

The results of this research were useful to the National Park Service at Jamaica Bay National Recreation Area and the Jamaica Bay Task Force in their work to help prevent marsh loss and promote marsh restoration initiatives. The results from Goodbred's project have also been useful to the New York City Department of Environmental Protection in the development of its Jamaica Bay Watershed Protection Plan. Municipalities along Long Island have found the results of this project useful for wetland and marsh management and planning.

— Lane Smith and Barbara A. Branca

Black Bank Marsh in Jamaica Bay is an example of a deteriorating marsh that shows erosion down to the underlying mineral sediment (gray area) and marsh peat (foreground). Photo courtesy of Don Cahoon, USGS

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... for more on Jamaica Bay marshes and the North Atlantic Oscillation

Record Crowd Attends Great Lakes Underwater

A record crowd of 180, including 25 teachers from Wayne County, NY, attended the March 2008 Great Lakes Underwater conference in Oswego, NY. A surprise guest joined keynote speaker Dennis Hale, the sole survivor of a steamship that sank on the Great Lakes in 1966. Norman Lagowski was among the US Coast Guard seaborne rescuers searching for Hale who was rescued by helicopter after 38 hours in a life raft. The conference was the first ever meeting of the two.

Conference presenters also included noted underwater explorers **Jim Kennard** and **Dan Scoville** talking about using the high tech sonar they built to find a 19th century Canadian shipwreck. Eastern Ontario Artificial Reef Association members spoke on the planned sinking in the Canadian waters of the 1000 Islands of HMCS (*Her Majesty's Canadian Ship*) *Terra Nova*. New York State Divers Association members shared Two Tank Tips two wrecks-for-one dive sites in Lake Ontario, Lake Erie, the St. Lawrence River, and several other NY waters. **Doug Pippin** of SUNY Oswego spoke on archaeology. New York Sea Grant's

After 42 years keynote speaker Dennis Hale (l.) met for the first time Norman Lagoswki, a Coast Guardsman who had been looking for him. After nearly two days in a life raft, Hale was rescued by helicopter. Photo by Dave White

Dave White gave an update on the *Dive the Seaway Trail* project, a series of freshwater dive sites that are marked, buoyed and maintained by community-based stewards. Interim Director **David Decker** reported on the New York State Blueway Trail, an effort to connect and promote dive sites and diving trails statewide.

— Kara Dunn

Long Island's Dynamic South Shore

NYSG's Coastal Processes specialist, **Jay Tanski**, has authored an illustrated, 28-page booklet entitled *Long Island's Dynamic South Shore: A Primer on the Forces and Trends Shaping Our Coast*.

From the booklet's introduction we learn that LI's south shore is home to a wide variety of habitats which support a vast array of plants and animals, some threatened or endangered. It is also the place where millions of people live, work, and play. The 120-mile coast stretching between Coney Island and Montauk is remarkably diverse in terms of its physical characteristics, use, and development. This shore contains everything from heavily developed urbanized barrier islands to New York State's only federally-designated wilderness area. Area beaches are a prime recreational resource, attracting millions of visitors every year and serving as the foundation of a multibillion-dollar regional tourism industry.

Long Island's coast is also extremely dynamic, constantly changing in response to natural processes associated with wind, waves, and tides as well as human activities. The dynamic nature of the shoreline coupled with people's desire to use and enjoy the shoreline presents unique challenges in managing this resource. Making decisions that balance conservation of the natural environment with significant demand for use of the shore requires a sound understanding of the processes shaping and impacting the coast.

This booklet provides a brief overview of what we know about coastal processes and erosion on Long Island's south shore, based on the best available scientific information. While by no means an extensive treatment of the subject, the information presented is intended to familiarize the reader with the major shoreline trends and technical issues associated with erosion and erosion management on the south shore.

This booklet was made possible with funding from the National Park Service. For ordering information, refer to page 11. This publication is also available online.

— Jay Tanski

Larissa Graham Is New LI Sound Outreach Coordinator for NYSG

Larissa Graham has joined New York Sea Grant as the new Long Island Sound (LIS) Public Outreach Coordinator. Graham recently completed her MS degree at Virginia Polytechnic Institute where she conducted research on horseshoe crabs. While new to New York, she is no stranger to Long Island Sound. As a Connecticut native, she learned to fish on her family's boat docked in the Connecticut River on the mouth of the Sound.

After receiving her BS degree in environmental science at the University of Connecticut, Graham worked two years for the CT DEP with its lobster project and LIS Trawl Survey. Graham replaces **Kimberly Graff** who was outreach coordinator for 15 years.

"I'm delighted to have Larissa Graham on our Sea Grant staff," says **Robert Kent**, NYSG's Marine District Program Coordinator. "She brings to us a strong background in marine science and work experience related to LIS issues. She is passionate about the Sound and is dedicated to working with the Long Island Sound Study to bring the best available science to stakeholders and concerned citizens. A goal of her program is to get people actively involved in protecting and restoring the economy and environment of Long Island Sound."

Larissa Graham holds a lobster that was caught off Long Island's south shore during the Horseshoe Crab Research Center's trawl survey.
Photo by David Hata

— Barbara A. Branca and Robert Burg

Ken Gall Wins Seafood Science Award

At the November 2007 meeting of the Atlantic Fisheries Technology Conference (AFTC) in Portland, Maine, NYSG seafood specialist **Ken Gall** became the 2007 recipient of the prestigious McFee Award in recognition of his expertise in delivering vital scientific information to the seafood industry and helping to ensure the safety of seafood products.

The award is named for Earl P. McFee, Research Quality Control Director of Gorton Corporation in the 1950s who is credited with standardization of the frozen fish block and creation of the McDonald's Corporation breaded fish portions.

"Several decades later, Ken Gall has also had a great impact in the seafood technology field," says **Robert Kent**, NYSG's Marine District Program Coordinator. Gall, an AFTC member, is internationally known for his extensive training of members of the seafood industry on Hazard Analysis Critical Control Point (HACCP), a scientific approach to keep seafood safe from catch to consumer. "Gall has supported and nurtured the New York Seafood Council and developed a HACCP distance learning program used not only from coast to coast, but internationally," continues Kent.

More recently, Gall helped launch a new Internet-based training course on the *Food and Drug Administration's* (FDA) Good Manufacturing Practices (GMP) regulation for the processing, packing or holding of human food. Sea Grant did not develop or enforce the regulations, but is there to help businesses be able to comply with them. "The course is designed for supervisors, middle level managers, quality control staff and anyone else responsible for ensuring that a food processing, wholesale or warehouse operation meets current GMP requirements," says Gall.

— Barbara A. Branca

Comments

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... for more on the Internet course on the FDA's Good Manufacturing Practices

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WHAT IS A JAMBOREE?

According to the US Department of Energy's Office of Science Joint Genome Institute (JGI),"A jamboree is a scientific meeting at which members of a scientific community gather to discuss the genome of an organism of common interest. Participants have the opportunity to annotate the genome in advance of the meeting. The focus can be a single organism or a family of organisms. Similar creatures are also typically studied in order to draw comparisons and contrasts. Attendance is by invitation."

Dr. Jackie Collier of Stony Brook University examines a DNA sequence. Dr. Collier found that *Aureococcus* has approximately double the number of light harvesting genes of other organisms which may convey to brown tide a competitive advantage during periods of low light found during blooms.

Photo by Barbara A. Branca

Dr. Jackie Collier (Stony Brook University) presented her findings of Light Harvesting Complex (LHC) genes in the *Aureococcus* nuclear genome which assist in the proper aligning and functioning of chlorophyll. In contrast to the small chloroplast genome, Dr. Collier found 62 light harvesting genes in *Aureococcus* which is, on average, double the number found in other organisms. Moreover, there are 25 LHC genes which are unique to *Aureococcus*. These genes may convey a competitive advantage to *Aureococcus* during periods of low and/or variable light levels found during blooms.

Research findings have shown that *Aureococcus* has a series of unique nitrogen metabolism genes which would allow for its usage of alternate forms of nutrients (as shown by experimental data over the years). In lab experiments conducted by Drs. Gobler, Berry and **Kathryn Coyne** (University of Delaware), *Aureococcus* has been shown to be able to utilize chitobiose, an abundant polysaccharide. Genes for the chitobiase enzyme are found in *Aureococcus* but not in other phytoplankton species. The genome also contains genes for metabolizing proteins, amino acids, nitriles, amides, urea, and all the standard nitrogenous nutrients (nitrate, nitrite, ammonium). These findings confirm that *Aureococcus* is suited for dominating under a variety of nutrient conditions.

Dr. Sonya Dhyrman (Woods Hole Oceanographic Institution) related her experiments on phosphorus uptake and metabolism genes in *Aureococcus*. Her work shows that *Aureococcus* has six ortho-phosphate transporters while co-occurring picoplankton have only two. *Aureococcus* also has more than 20 genes which can be used to synthesize enzymes for the degradation of organic phosphorus compounds, demonstrating it can access organic matter as a source of phosphorus.

Graduate student **Louie Wurch** of the MIT/Woods Hole Joint Program has investigated nitrogen transporter genes in *Aureococcus*. Transporter genes are located at the interface of the cell and its geochemical environment. *Aureococcus* has more transporters for urea, ammonium, and amino acids than all competing species. However, it has only a single nitrate transporter, a finding consistent with its inability to dominate when nitrate levels are high.

Another MIT/Woods Hole Joint Program grad student, **Erin Bertrand**, presented that *Aureococcus* is a vitamin B12 auxotroph, meaning it lacks the genes needed to grow without B12. It also is likely a B12 scavenger, meaning it can salvage degraded vitamin B12 molecules to reconstruct the molecule.

Dr. Adam Kustka of Rutgers University focused on iron use and transport in *Aureococcus*, identifying three genes responsible for iron transport. By contrast, one or none were present in other species. However, he did not find any genes for enzymes that could be used to reduce or store iron.

Each successive presentation helped to further connect aspects of brown tide blooms with specific *Aureococcus* genes. While the researchers continue to confirm the presence of similar genes in the comparative organisms as well as manually annotate genes of interest, Consortium members are currently refining the details of a joint manuscript that will be submitted to a peer reviewed journal in the near future.

— Dianna Berry, Chris Gobler and Barbara A. Branca

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... for more brown tide and its causes

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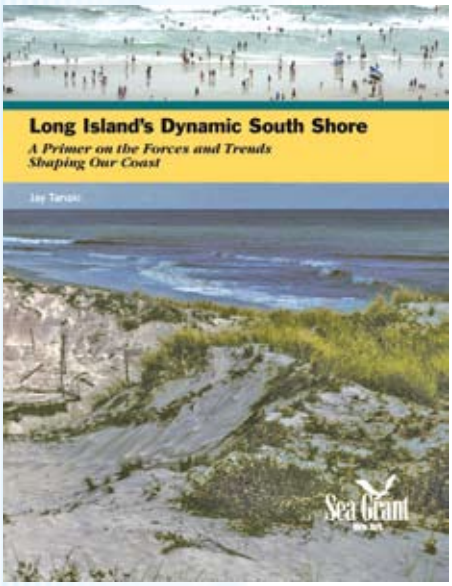
LAST WAVE

... Shipboard and Shoreline Science Workshop. The Center for Ocean Sciences Education Excellence (COSEE) Great Lakes will take 15 educators led by NYSG's Helen Domske on a cruise of Lake Ontario the week of July 13-19 aboard the USEPA's *Peter Wise Lake Guardian*. The workshop is designed to promote Great Lakes and ocean sciences and forge lasting relationships between science researchers and educators. Direct link to the course blog: http://coseegreatlakes.net

Cross-Border Travel Tips for Recreational Boaters, RV Owners & Motorists Traveling the Great Lakes Seaway Trail. NYSG and Seaway Trail. Spring 2008. Direct link: www.nysgextension.org and www.seawaytrail.com

I FISH NY Newsletter. NYSG and NYSDEC. Spring 2008. Direct link: www.ifishnewyork.org



Long Island's Dynamic South Shore: A Primer on the Forces and Trends Shaping our Coast. J. Tanski. 2007. NYSG. 27 pp. Pub ID# 3141. *$2.50* Direct link: www.seagrant.sunysb.edu/CoastalGeo/LIDynamicSouthShore.pdf

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Journal Reprints

Benthic predators and northern quahog (=hard clam) (*Mercenaria mercenaria* Linnaeus, 1758) populations. O. Polyakov, J.N. Kraeuter, E.E. Hofmann, S.C. Buckner, V.M. Bricelj, E.N. Powell, J.M. Klink. 2007. *Journal of Shellfish Research* 26(4): 995-1010. Pub ID# 3152. *Free*

Consumption of two exotic zooplankton by alewife (*Alosa pseudoharengus*) and rainbow smelt (*Osmerus mordax*) in three Laurentian Great Lakes. A.J. Storch, K.L. Schulz. C.E. Cáceres, P.M. Smyntek, J.M. Dettmers, M.A. Teece. 2007. *Can. J. Fish. Aquat. Sci*. 64: 1314-1328. Pub ID# 3140. *Free*

Economic impacts of zebra mussels on drinking water treatment and electric power generation facilities. N.A. Connelly, C.R. O'Neill, B.A. Knuth, T.L. Brown. 2007. *Environmental Management* 40: 105-112. Pub ID# 3125. *Free*

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The effects of temperature and predator-prey interactions on the migration behavior and vertical distribution of *Mysis relicta*. B.T. Boscarino, L.G. Rudstam, S. Mata, et al. 2008. *American Society of Limnology and Oceanography* 52(4): 1599-1613. Pub ID# 3128. *Free*

Collaborative Publications

Our Eastern Lake Ontario Dunes & Wetlands. Produced by NYSG. 2008. Brochure. *Free.* Call 315.312.3042.

Sand, Wind, & Water. Produced by New York Sea Grant. Revised 2007. Guidebook. *Free.* Call 315.312.3042.

GET THE FACTS ON MONKFISH

According to NOAA's new "Fish Watch" Web site, monkfish population levels are high, no overfishing is occurring, and almost all (97 percent) of monkfish sold in the U.S. are commercially harvested in U.S. waters. Thus this species is one that is sustainable as well as nutritious to eat.

These opportunistic feeders are bottom dwelling and are also known as the "all-mouth" fish. A monkfish is mostly head and that head is mostly mouth!

For more on monkfish and other questions about seafood sustainability and safety go to the National Oceanic and Atmospheric Administration's (NOAA) web site www.fishwatch.noaa.gov, for answers.

When the site launched in late February 2008, NOAA Administrator Conrad Lautenbacher said, "Our hope is that you will go here for 'ground-truth' science."

According to NOAA, with the proliferation of unwarranted seafood health scares and myriad sources dictating what are good fish and bad fish, the new Web site aims to arm the public with an unbiased education and provides a balanced clearinghouse for consumers.

Bringing Science to the Shore

SEAFOOD CORNER

Monkfish Oreganata

Ingredients

2 lbs. monkfish, skinless, boneless fillets

2 tbsp. butter or margarine

2 tbsp. olive oil

several parsley sprigs, fresh

2 cloves garlic, chopped fine

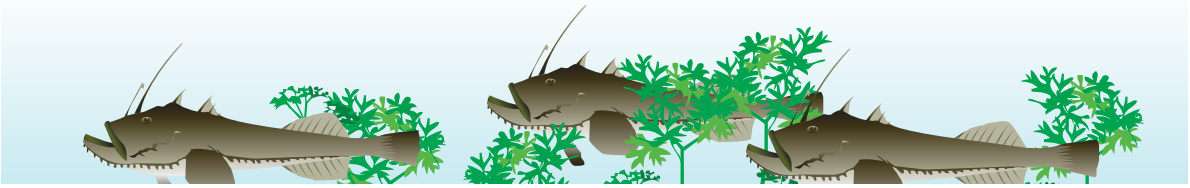
2 cups bread crumbs seasoned

2 tomatoes, medium, slice thin

Method

Preheat oven to 350°. Melt the butter in a medium pan on stovetop. Add olive oil and parsley to the melted butter. Brown garlic in butter mixture. Stir in bread crumbs and set aside. Place monkfish on tomatoes in an ovenproof dish or pan and cover with bread crumb mixture. Bake for 25 minutes. Serves 4.

Source: Provided by Chris McManus, Hewlett Fish Market, Hewlett, NY.



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