

A Look Back...



...A Look Ahead

It was the sixties. Our nation was in the throes of social upheaval paired with unprecedented technological advances. Rachel Carson's book, *Silent Spring*, had begun to raise our awareness about the environment. Many proclaimed Lake Erie to be dead. Yet our nation's technological machinery was moving at a breakneck pace ever since John Kennedy challenged America to put a man on the moon by decade's end. But compared to exploring space, exploring the ocean was back at the starting gate.

Things were about to change. At the 1963 meeting of the American Fisheries Society, keynote speaker **Althehan Spilhaus**, a University of Minnesota professor, first mentioned the concept of "Sea Grant colleges" along the same lines as Land Grant colleges that he considered "one of the best investments this nation ever made." "The same kind of imagination and foresight should be applied to the exploration of the sea," said Spilhaus in a 1964 issue of *Science*.

Then in 1966, the National Sea Grant College Program was born by act of Congress, led by Rhode Island Senator **Clayborne Pell** and Florida Congressman **Paul Rogers**. Its goal was to initiate and support education, research and outreach programs with the object of imparting useful information to people interested in working with marine resources, the scientific community, and the general public.

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COASTS STILL LIVE

Director
Jack Mattice
Associate Director
Dale Baker
Assistant Director
Cornelia Schlenk
COASTLINES
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Editor/Writer
Barbara A. Branca
bbranca@notes.cc.sunysb.edu

Contributing Writer
Paul C. Focazio
pfocazio@notes.cc.sunysb.edu

Design
L.C. Graphics
Layout
Sharon O'Donovan
Production Assistants
Sharon O'Donovan
Susan Hamill

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New York Sea Grant Institute
121 Discovery Hall, SUNY at Stony Brook
Stony Brook, NY 11794-5001
(631) 632-6905

New York Sea Grant Extension Offices:
10 Westbrook Lane
Kingston, NY 12401-3824
(845) 340-3983

Cornell University Research & Extension Center
3059 Sound Avenue
Riverhead, NY 11901-1098
(631) 727-3910

146 Suffolk Hall, SUNY at Stony Brook
Stony Brook, NY 11794-5002
(631) 632-8730

Morgan II, SUNY College at Brockport
Brockport, NY 14420-2928
(716) 395-2638

204 Jarvis Hall, SUNY at Buffalo
Buffalo, NY 14260-4400
(716) 645-3610

340 Roberts Hall, Cornell University
Ithaca, NY 14853-4203
(607) 255-2832

62B Mackin Hall,
SUNY College at Oswego
Oswego, NY 13126-3599
(315) 341-3042

101 Broad Street
Plattsburgh State University
Plattsburgh, NY 12901-2681
(518) 564-3038

New York/New Jersey Harbor Estuary
Program Office
290 Broadway, 24th Floor
New York, NY 10007-1866
(212) 637-3816

From the Director

As you have seen from the cover article, this issue of *Coastlines* initiates the 30th anniversary of New York Sea Grant. Much of the content of this issue takes advantage of the materials that we prepared for the (successful) review of NYSG by the National Sea Grant Office that took place over a week in September 2000. You've read my earlier discussions on the values of integrating the research, outreach and education components of the NYSG program. Six Coordinated Issue Areas highlighted the integration. This *Coastlines* issue includes two of these areas, Aquatic Nuisance Species (ANS) and Seafood Safety, as well as short articles on a few other topics that emphasize other aspects of integration that are important for the success of NYSG.

NYSG has played a national, even international, leadership role in the ANS arena. The program's focus has expanded from zebra mussels to include not only fresh water, but also marine, invasive species – check out the list of 30 New York State invaders on page 5. The ANS articles starting on pages 4 and 6 highlight the importance of interaction of outreach, research and education components for the issue, but also call attention to the fact that the designation of issues is cross-cutting. In this case, zebra mussels influence water quality, a critical influence to be considered for lake-wide management

Photo by Ernie Bruno



New York Sea Grant professionals gather at the annual staff meeting in the Catskills, November 2000.

plans. Perhaps we could say that integration, or communication, among issues can also be important.

The seafood safety issue, including the importance of extension, education and research efforts and their integration, has been highlighted in previous *Coastlines*. The articles starting on pages 8 and 10 call attention to the breadth of research, outreach and education that is necessary to deal effectively with the issue. Research includes traditional surveys of specialized customer populations (socioeconomic) to determine needs, as well as application of some of the latest methods (biotechnology) to analyze for pathogens. Conversion of traditional training to web-based courses also shows the way NYSG takes advantage of the computer age. The website award (page 12) also shows this.

The articles on the Great Lakes Student Summit and on the Quogue native plant garden (page 13) show the way that NYSG integrates efforts with regional and local stakeholders, in these cases, to foster youth education.

So you can see that the integration theme infuses this whole issue. I suppose it would be a little too much to claim that the Annual Report (page 14) and the recipe on the last page do the same, even though the recipe does include varied shell and fin fish. But I think you get the point that the success of NYSG does have a lot to do with the pains all of the program staff pay to integration within the program and with the stakeholders interested in resource decision making.

Enjoy!



A Look Back...

...A Look Ahead

(Continued from cover)

Throughout the late sixties, a number of states became eligible for funding under the National Sea Grant College Act, states with coasts along not only the Atlantic and the Pacific, but the Great Lakes, our continent's inland seas. New York, with its unique location, borders the Atlantic Ocean and two of the Great Lakes – Erie and Ontario. On Monday, November 1, 1971, the New York Times ran this headline: New York Sea Grant Program Receives Initial Funding. "New York State has received its first \$600,000 grant under the new National Sea Grant Program. Funding for the New York Sea Grant Program will be used to explore development of the state's 2,400 miles of coastline along the Atlantic Ocean, Lakes Erie and Ontario. Dr. D.F. Squires at the State University at Stony Brook will head the program, for which initial projects planned are scheduled to be made public soon."

The New York program evolved as a cooperative program of the State University of New York and Cornell University, the state's federally designated Land Grant College. Today, 30 years later, its funding is nearly ten times what it was in 1971. Those initial projects blossomed into a suite of research projects that touch on many important issues facing coastal



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Funding for the New York Sea Grant Program will be used to explore development of the state's 2,400 miles of coastline along the Atlantic Ocean, Lakes Erie and Ontario.”

**New York Times
November 1, 1971**

New York that were then disseminated by seasoned outreach professionals. In this first of three 30th anniversary issues of *Coastlines*, we take a look at two such issue areas: the threat of invasive species in New York waters and seafood technology and safety.

We've gone to the experts.

Chuck O'Neill, NYSG's specialist in aquatic nuisance species, and **Ken Gall**, NYSG's seafood specialist, give us a brief history of these important issues. We've paired each of their articles with one by research project assistant **Lane Smith**, who has taken a single representative research project from each area and shown us the impact it has made. Look for future *Coastlines* covering New York Sea Grant's efforts in maintaining fisheries, fostering coastal businesses, restoring water quality and habitat, as well as responding to current trends with new initiatives.

– **Barbara A. Branca**

Coordinated Issue Area

Aquatic Nuisance, Non-Indigenous, and Invasive Species

NYSG coastal resources specialist Chuck O'Neill and fisheries specialist Dave MacNeill offer their insights on the introduction, persistence, and effects that aquatic exotics have on New York's waterways. New York Sea Grant has responded to this issue through integrated research and educational efforts.

Teach the Teachers

Coastal education specialist **Helen Domske** has brought the message about aquatic invaders to educators by helping to orchestrate the Great Lakes Sea Grant Network's Exotic Species Day Camp. The project was successful in providing educational information for teachers around the Great Lakes and introducing them to outstanding multimedia educational kits and curricula. Hi-tech materials for this "teach the teachers" approach— which was bestowed the award of "Outstanding Educational Program" by the American Distance Education Consortium— included CD-ROMs and web sites. See related story on page 13.

Article and p.4 sidebar by
Paul C. Focazio

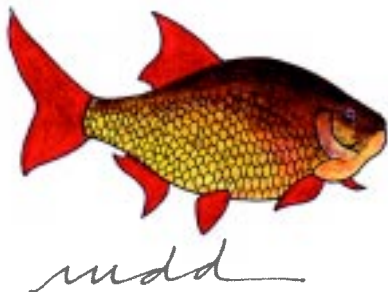
List of 30 Invaders by
Diane Oleson

Illustrations by **Maxie Buchanan**

Having clogged public drinking water intakes in Canada and electric generation facilities in the U.S., the zebra mussel's introduction and spread in the Great Lakes have underscored the aquatic nuisance and invasive species problems in North America. Estimated to have over a \$2.5 billion impact on the Great Lakes fishery by the end of the 20th Century, these aquatic invaders remain a strong concern among local, state, and federal government agencies and officials. But, how does all this affect you?

"Zebra mussels are the most serious exotic intruders in North America for a reason," says NYSG's fisheries extension specialist **Dave Mac Neill**. "Simply put, they affect the entire nation's ecology and economy." Causing billions of dollars in damage to America's aquatic and terrestrial ecosystems and thus its agricultural and fisheries resources, zebra mussels and other exotic plants and animals are clearly invaders worth dealing with.

"Maybe you don't think this matter concerns you because you don't own a boat," says NYSG's coastal resources specialist **Chuck O' Neill** of the critters, which attach to virtually anything in the aquatic environment via adhesive features called byssal threads. "Well, do you go to the beach? Zebra mussels attach to anything, remember. They attach to the beach's cobble. Cover those stones with a solid layer of little half-inch brittle mussels and start walking on them, having them cut your feet. Now, all of a sudden, your day at the beach doesn't seem quite as much fun as you'd planned."



Having begun its U.S. invasion in the Great Lakes (which holds 20 percent of the world's freshwater supply), the zebra mussel has been recorded as far south as New Orleans and the Mississippi Delta in Louisiana, as far west as Tulsa, Oklahoma and as far east as Quebec, Canada. These sightings are listed in the January 2001 issue of *Dreissena!*, the bimonthly publication of Sea Grant's National Aquatic Nuisance Species Clearinghouse (NANSC), for which O'Neill is the project director. In New York, where the zebra mussel and its related species, the quagga mussel, have been sighted in both Lakes Ontario and Erie, Sea Grant's NANSC continues to grapple with the issue.

Operated by NYSG, the NANSC was established in 1990 as a unique information source for researchers, government officials, aquatic resource managers, private industry, and the media interested in the spread, impact and control of a wide-range of invasive species. Based at the State University of New



York at Brockport, the Clearinghouse is the home of North America's most extensive library of publications related to zebra mussels and Asian clams, which foul electric power, industrial, and public drinking water intakes. To date, more than 565,000 publications have been distributed by the Clearinghouse throughout the U.S., Canada, Mexico, Europe, Asia, South America, and Australia.

In addition to providing zebra mussel and Asian clam information on its web site (www.cce.cornell.edu/aquaticinvaders), NANSC features other species that impact North America's freshwater and marine resources: the Eurasian ruffe, round and tube-nosed gobies, the spiny water flea and the blueback herring (see sidebar, page 5).

30 Invaders in New York Waters

Molluscs

- **Asian clam** (*Corbicula fluminea*)
- **Blue mussel** (*Mytilus edulis*)
- **Dark false mussel** (*Mytilopsis leucophaeata*)
- **Zebra and Quagga mussels** (*Dreissena polymorpha*, *D. bugensis*)
- **Shipworms** (*Teredo navalis*)
- **Banded mystery snail** (*Viviparus georgianus*)
- **Mud bithynia** (*Bithynia tentaculata*)
- **New Zealand mud snail** (*Potamopyrgus antipodarum*)

Crustaceans

- **Green crab** (*Carcinus maenas*)
- **Pacific shore crab** (*Hemigrapsus sanguineus*)
- **Fishhook waterflea** (*Cercopagis pengoi*)
- **Spiny waterflea** (*Bythotrephes cederstroemi*)
- **Gribbles** (*Limnoria* spp.)

Jellyfish

- **Freshwater Jellyfish** (*Craspedacusta sowerbyi*)

Tunicates

- **Asian tunicate** (*Styela clava*)

Fish

- **Alewife** (*Alosa pseudoharengus*)
- **Blueback herring** (*Alosa aestivalis*)
- **Common carp** (*Cyprinus carpio*)
- **Grass carp** (*Ctenopharyngodon idella*)
- **Round goby** (*Neogobius melanostomus*)
- **Rudd** (*Scardinius erythrophthalmus*)

Reptiles

- **Red-eared slider** (*Trachemys scripta elegans*)

Algae

- **Dead man's fingers** (*Codium fragile tomentosoides*)
- **Green alga** (*Enteromorpha intestinalis*)
- **Stonewort** (*Nitellopsis obtusa*)

Plants

- **Eurasian water milfoil** (*Myriophyllum spicatum*)
- **European frog-bit** (*Hydrocharis morsus-ranae*)
- **Purple loosestrife** (*Lythrum salicaria*)
- **Common reed** (*Phragmites australis**)
- **Water Chestnut** (*Trapa natans*)

* Although native, *Phragmites* is expanding its range and displacing other native species.

Raising concern, also, is the introduction of the predatory "fishhook" waterflea, *Cercopagis pengoi*, into Lake Ontario, which Brockport-based NYSG-funded researcher **Joseph Makarewicz** is addressing along with **Edward Mills** and **Lars Rudstam** (both Cornell University affiliates). Says Makarewicz, "Being that this species has the potential to impact the food web and foul fishing gear, our initial research to gather baseline information about *Cercopagis* in the lake has led to further funding to learn more about its biology and ecology." With a focus on the fishhook waterflea's population dynamics, genetic identity, environmental tolerances, life history, and impacts on the Lake Ontario food web, the project's second phase may bear results with implications on fish stocking policy.

In a separate study, Mills investigated the offsetting responses of fish populations, such as the yellow perch in Oneida Lake, to the invasion of the zebra mussel. The study found that some benthic invertebrate groups and macrophyte beds increased after the introduction of zebra mussels. Amphipods, which are a preferred food for yellow perch, increased in abundance in the presence of zebra mussels.

Researcher **Donald Stewart** of SUNY College of Environmental Science and Forestry undertook his own NYSG-funded project to model the post-invasion impact of zebra mussels on lower trophic level lake dynamics in Oneida Lake. According to his findings, although water clarity increased and algal biomass declined following introduction of the invaders, primary productivity did not decline significantly.

Sandra Nierzwicki-Bauer, Director of Rennselaer Polytechnic Institute's Darrin Fresh Water Institute on Lake George, is developing a genetic probe method whereby water samples can be quickly and simply screened

for zebra mussel young without going to the laboratory for identification. Industrial collaboration is allowing field testing of a portable product for use in the field. "This is one of the most exciting advances in monitoring and detection technology since the mussel's introduction into North American waters 11 years ago," says O'Neill. "Nierzwicki-Bauer's project has the potential for use in many water treatment settings and could result in substantial economic savings over traditional plankton net or pumped sampling techniques."

New York Sea Grant researcher **Daniel Molloy** is currently investigating the use of bacteria to control zebra mussels. Says Molloy, "This project takes an extremely exciting biotech approach to zebra mussel control by field testing a strain of bacteria-dead cells that kill zebra mussels but apparently not non-target species." If successful, this research could provide what is possibly the only type of zebra mussel control alternative to be utilized outside of infrastructure settings in natural surface waters.

By some estimates, about one out of every ten established exotics has had serious impacts on Great Lakes ecosystems. And while more than 145 established exotics have successfully invaded the Great Lakes so far, including 15 fish

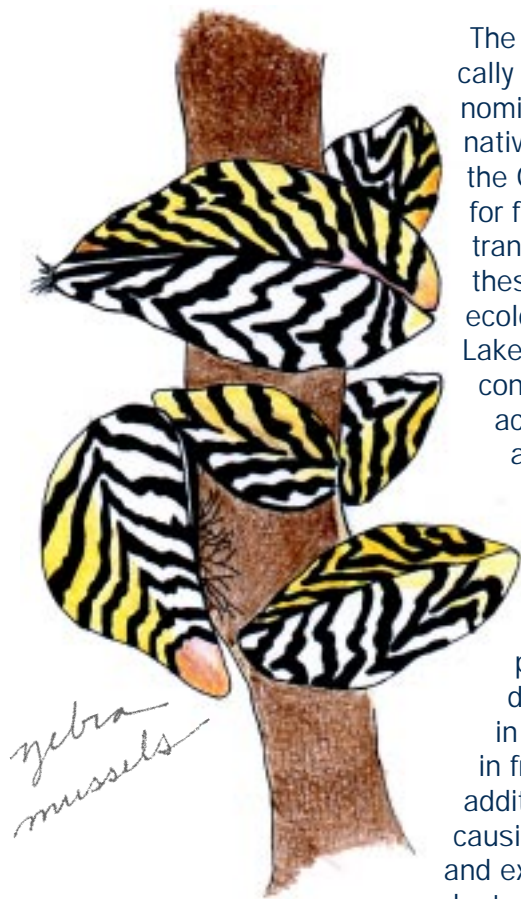
species in Lake Ontario, it is the zebra mussel that raises the most red flags among researchers and educators.

Says MacNeill. "It is crucial to continue tracking where the zebra mussel is going." While O'Neill adds that NYSG-funded efforts have surfaced "no silver bullets" in the fight against the aquatic invaders, he says, "there are lots of arrows in the quiver."



Purple loosestrife

The Shell Game: *Where's the Phosphorus?*



The Great Lakes basin is historically a hub of international economic activity. Ever since the first native peoples settled the region, the Great Lakes have been used for fishing, recreation, trade, and transportation. In modern times, these activities have created ecological problems for the Great Lakes, often threatening the continuation of those very activities. Two major problems are water pollution and the invasion of exotic species.

An important water pollutant for several decades has been phosphorus, once used in detergents but now common in fertilizer. Phosphorus is limited in freshwater lakes and its addition acts like fertilizer, causing unsightly algae blooms and explosive plant growth.

When the algae and plants die, their decomposition can consume the lake's dissolved oxygen and result in fish kills. The expanded plant beds can choke formerly open water, interfering with swimming and boating. Officials and managers have sought to reduce phosphorus in surface waters in order to maintain water quality suitable for both wildlife and humans.

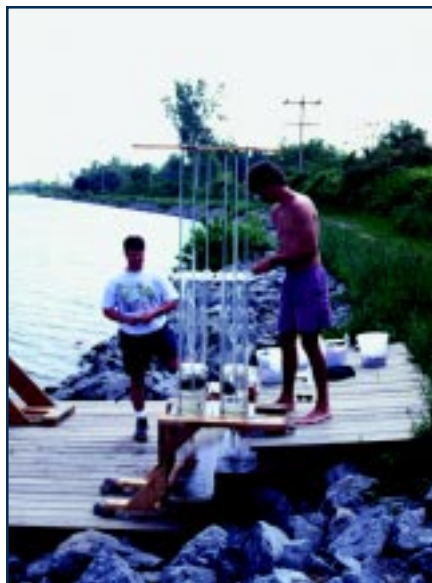
The invasion of exotic species has been another major ecological problem for the Great Lakes. Non-native species, often introduced by commercial shipping, may push out native species through competition and/or predation. They can also alter the functioning of the ecosystem through their presence, as does the zebra mussel (*Dreissena polymorpha*). Zebra mussels have much higher filter feeding capacity than native mussels do.

Combined with the high population densities that they can achieve, these molluscs have a big impact on the water column. The filtering activities of zebra mussels impact phosphorus cycling, making the jobs of water quality officials and managers even more complicated than they already are. The question is, do zebra mussels and zooplankton secrete the phosphorus contained in phytoplankton back into the water column or do zebra mussels sequester the phosphorus into their body tissues and shells? The answer to that question may impact management plans designed to reduce phosphorus pollution. Enter New York Sea Grant research.

Top: Greg Crego (left) and Greg Lampman (right), set the experimental chambers containing rocks covered with zebra mussels.

Bottom: Lampman checks the experimental chambers in the Erie Canal that allow him to measure filtering rates of the isolated mussels.

Photos courtesy of Joseph Makarewicz, SUNY College at Brockport



Top: Crego samples for veliger larvae of zebra mussels in the Erie Canal.

Bottom: Lampman checks zebra mussel cages where the molluscs are acclimated before use in an experiment.



New York Sea Grant researcher **Joseph Makarewicz** of the State University of New York College at Brockport and his team of graduate students conducted a project

from 1992 to 1995 to examine the dynamics between zebra mussels and phosphorus. The research measured the inputs and outputs of phosphorus in a zebra mussel population in the Erie Canal. The team also conducted laboratory experiments that compared the rates at which populations of zebra mussels and zooplankton (such as *Daphnia*) graze on phytoplankton and secrete phosphorus back into the water column. The major finding of the project was that zebra mussels divert phosphorus out of the water column and sequester it in their body tissue and shells.

This research was valuable in expanding knowledge about zebra mussel impacts, since at the time there was little known about the interaction between zebra mussels and phosphorus cycling. With research results showing that live zebra mussels take phosphorus out of the water column, management agencies trying to mitigate nutrient enrichment of their local surface waters can develop more effective abatement plans. Examples of local agencies that have benefited from this and related research by Makarewicz include the Livingston County Planning Department, the Monroe County Planning Department, and the Wayne County Soil and Water Conservation District. Each of these agencies is working on management plans to improve their local water quality that include components for phosphorus abatement. New York Sea Grant research such as this provides the knowledge to better inform local agencies so they can develop more effective management plans.

- Lane Smith

Emerging Scientists

This project also helped launch the science careers of four graduate students at SUNY Brockport who were part of the Makarewicz research team. **Eileen Desormeaux** received her MS degree and is currently a high school biology teacher in Chili, New York. **Greg Crego** earned his MS degree and is currently in the Ph.D. program at Mississippi State University fisheries department. **Phil Tangorra** received his MS degree and is now working for an environmental consulting firm in Utica, New York. **Greg Lampman** received his MS degree and worked as a research assistant at the Institute of Ecosystem Studies in Millbrook, New York. He currently works for the New York State Energy Research and Development Authority.

Photo by Diane Kuehn



Results of Sea Grant research are being used in the phosphorus abatement program for Sodus Bay in Wayne County.



Coast

¿Que Clase de Pescado Prefieres?

What Fish Do You Prefer?

The New York metropolitan area is an ethnically and culturally diverse region. For New York's seafood industry, the challenge is to effectively market seafood to customers that may have a diversity of

attitudes and perceptions about the quality, safety and healthfulness of New York seafood. It would be ideal to have information about those perceptions and how they may vary. If there were any differences,

based on ethnicity, culture, economics or any other measure, seafood marketing could improve to appeal to a wider number of customers. Unfortunately, such information is rare. However, one New York Sea Grant researcher who has taken an interest in the Hispanic community did research that helps fill one of the gaps.

New York Sea Grant researcher **Carole A. Bisogni** and Sea Grant scholar **Stephanie Weinstein** at Cornell University conducted a mail survey of Hispanic households in Manhattan and Queens in New York City in the spring of 1994. The bilingual survey measured beliefs related to seafood and the sociodemographic characteristics of respondents. Historically, the Hispanic population has been one of the fastest growing ethnic groups in metropolitan New York. This group represents a potentially large and growing market for the seafood industry in New York State and the rest of the United States.

This study provides some of the first information about seafood preferences and eating practices of Hispanics in metropolitan New York. The researchers learned that the Hispanic population consumes a variety of seafood and most respondents to the survey had positive beliefs about the healthfulness of seafood. Also, the type of seafood consumed was influenced by country of origin, household size, and past seafood consumption. The federal Expanded Food and Nutrition Education



Grocer Raina Galarza explains that she stocks plenty of canned Pacific shellfish that Ecuadorans prefer to use in their traditional ceviche, a cold seafood dish made with lime juice.

Photos by Susan Hamill

Watch



At a supermarket seafood counter, Ki Ro helps Mrs. Penida choose croaker and mullet, fish similar to the kind she prepared in her native El Salvador.



Signs in Spanish help the Penida family choose fish for tonight's fish fry. Photos by Barbara Branca

Program (EFNEP) used results from this study to aid its food and nutrition education and counseling work with New York City Hispanic residents.

The study also found that shoppers were generally satisfied with the availability and quality of seafood products. However, marketing changes that would be positively received include providing recipes, samples, in-store demonstrations and species names

in Spanish. This is useful information for metropolitan New York City seafood businesses. Beyond New York City, researchers from Puerto Rico, New Jersey and Minnesota expressed interest in using the survey methods of this study to learn about their Hispanic communities. Research like this could also be used to learn about other ethnic groups. This provides information for the New York seafood industry to reach out to all people who come to New York and enjoy seafood as part of their diet.

As a result of this research project, **Stephanie Weinstein** received her Master of Science degree at Cornell. She went on to complete her doctorate with the Division of Nutritional Sciences at Cornell and recently joined the staff of the Center for Nutrition Policy and Promotion at the United States Department of Agriculture. The mission of that group is to improve the health of Americans by developing and promoting dietary guidance that links scientific research to the nutrition needs of consumers.

- Lane Smith



Seafood manager Jaime Turnil has a wide array of fresh seafood to serve a predominantly Hispanic population in a Long Island community. Fresh shrimp is his biggest seller.

The research also resulted in the following journal articles:

Weinstein, S.J., and C.A. Bisogni. 1995. Hispanics in Metropolitan New York: perceptions and practices related to the quality, safety and healthfulness of fish and seafood. Report to the New York Sea Grant Institute, Stony Brook, NY: 185 pp.

Weinstein, S.J., C.A. Bisogni, E.A. Frongillo, Jr., and B.A. Knuth. 1999. Factors explaining seafood consumption among Hispanics living in New York City. *Journal of Nutrition Education* 31(4): 212-223.

Weinstein, S.J., C.A. Bisogni, M.E. Villalobos, and D. Sanjur. 1999. Bilingual mail survey approach to examine seafood consumption practices among Hispanics living in metropolitan New York. *Journal of Nutrition Education* 31(4): 201-211.

Coordinated Issue Area

Seafood Safety

Whether you prefer clams, lobster, fresh tuna or flounder, smoked salmon, gefilte fish, pickled herring, or high quality sushi you can always find your favorite type of seafood in New York. Just how much money New Yorkers spend on seafood and how important the seafood industry is to the state's economy is the subject of a Sea Grant report that will be out later this spring.

Coming Soon to Computer Screens Near You

NYSG's Ken Gall is heading up a national project to convert the three-day Seafood HACCP Alliance training courses into a Web-based distance learning format for the seafood industry and food inspection agencies who, under a December 1997 U.S. Food and Drug Administration regulation, have had to develop and implement a HACCP system to control all significant food safety hazards associated with their products and operations.

In 1994, the National Seafood HACCP Alliance developed a training curriculum for these groups that was recognized by the FDA as the standardized curriculum to meet the training requirement in the agency's seafood HACCP regulation. Almost 12,000 individuals had completed this training program in the U.S. and other countries by October

(continued on page 11)

According to **Ken Gall**, NYSG's seafood specialist, New York has a diverse seafood industry. The largest industry sectors are involved in the wholesaling or distribution of seafood products, whether they are available from Long Island, Louisiana, Chile or China, to the retail and restaurant operations that serve the state's large and diverse population.

Because seafood is such a unique and diverse food, there are a wide variety of issues that can have an impact on many different New Yorkers including seafood businesses, consumers, and even anglers who catch fish or shellfish for recreation and their own personal consumption. These impacts, coupled with new advances in seafood production and technology over the last two decades, have been the focus of New York Sea Grant's seafood safety and technology program. This focus has created a true synergy between NYSG's research and outreach components.

Since the inception of Sea Grant in the 1970s and especially in the 1980s, seafood consumption rose sharply in the U.S., as new information about seafood's nutritional benefits became available. In the late 1980s and periodically since that time, public attention has been focused on a variety of food safety issues associated with seafood products that has created the impression to some that seafood products are not adequately inspected and may be unsafe. Sea Grant has played a leadership role in helping both the seafood industry and consumers understand food safety issues related to seafood and develop strategies to effectively manage potential risks.

To help improve industry performance and educate the public with science-based information, Sea Grant's Ken Gall actively works with a variety of groups including the seafood industry, regulatory agencies, researchers, consumer educators, and public programs. In the early 1990s he played a key role in helping the state's seafood

industry organize itself to form the New York Seafood Council, which provided a voice for the industry to help it address the crisis in public confidence in seafood safety that was prevalent at that time. Throughout the 1990s this and other industry organizations have been active collaborators with Sea Grant to develop and implement new initiatives to enhance seafood safety. In 1995, the U.S. Food

and Drug Administration (the federal agency charged with regulating seafood safety) published a new regulation to

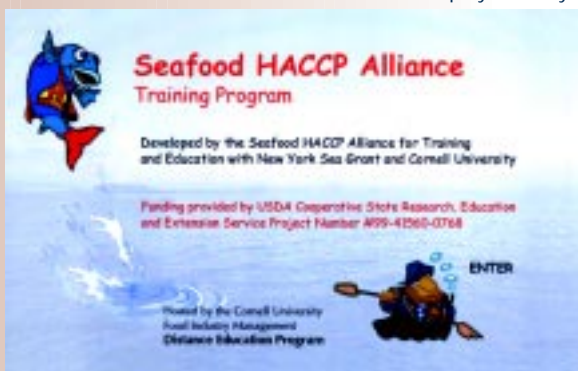


enhance seafood safety that requires seafood firms to utilize a HACCP (Hazard Analysis Critical Control Point) based system to prevent, eliminate or reduce food safety hazards to an acceptable level in products produced or imported into the U.S.," says Gall. Once a final Seafood HACCP regulation was published, seafood processors, wholesalers, docks and others in the distribution chain had two years to develop and implement a HACCP plan for their operation. Since then, NYSG has provided HACCP training in collaboration with local and regional FDA officials, NYS agencies such as the Department of Agriculture and Markets and the Department of Environmental Conservation and the New York Seafood Council to over 800 people in New York from the seafood industry and regulatory agencies **(See sidebar)**.

In a 2000 national survey of seafood businesses conducted by Gall and the National Seafood HACCP Alliance, 77 percent of the 750 respondents said that they could not have been able to get a HACCP plan in place without the help of HACCP training. A report issued earlier this year by FDA in response to the General Accounting Office's (GAO) evaluation of FDA's seafood HACCP program cited the survey. "Two surveys of the seafood industry, one by the New York Sea Grant Extension Program and one by the Seafood HACCP Alliance, report that, as a result of FDA's HACCP program, the seafood industry is acquiring a better understanding of food safety hazards and how to control them."

The application of this new science-based system in the seafood industry has also pointed to a need for new research. According to Gall, "During the process of applying the HACCP concept to seafood products, it became clear that our current understanding of some hazards associated with seafood and how to effectively monitor and control them was inadequate. Additional scientific research was needed to develop or improve existing controls for some biological and chemical hazards."

One such hazard is *Listeria monocytogenes*, one of the most difficult microbial pathogens to control in foods that are not cooked before consumption. Currently there is a regulatory policy of zero tolerance for *Listeria monocytogenes* in ready-to-eat foods including seafood



products such as smoked fish. Thus, the smoked fish processing industry is subject to increased scrutiny by federal and state regulatory authorities. Since 1998, NYSG has funded research by **Martin Wiedmann** and **Kathryn Boor**, and graduate students **Dawn Norton** and **Adam Hoffman** of the Food Safety Laboratory at Cornell University. They have applied new DNA fingerprinting methods to study this pathogen, its ecology, and the effectiveness of measures to control it in seafood processing plants. Working cooperatively with NYSG's and managers of three smoked fish plants in NY, the Cornell team has taken hundreds of samples from each plant. "Results from this project provide additional strong evidence that different *L. monocytogenes* subtypes differ in their ability to cause human disease," says Weidmann. "The improved *Listeria* control strategies which have and will be implemented in smoked fish plants as a result of this project will decrease the likelihood of finished product contamination."



The results of this research have been communicated to the regulatory agencies and the seafood industry. "We conclude that application of molecular approaches can provide critical information on the ecology of different *L. monocytogenes* strains in food processing environments. This information can be used to develop practical recommendations for improved control of this important food-borne pathogen in the food industry," reported the research team in the January 2001 issue of the scientific journal, *Applied and Environmental Microbiology*. (See page 15 for journal citation.) The results of this research have also been extended to a national audience via the National Fisheries Institutes' Smoked Fish Committee.

NYSG is currently funding a second research project to examine in-plant control strategies for *Listeria*. In 2000, Wiedmann and Gall also received over \$500,000 in additional funding support from USDA's Food Safety Initiative program to expand this work to other ready-to-eat seafood products in addition to smoked fish. This 3-year project involves collaboration with a team of research and extension specialists from Virginia Tech, the Universities of Maryland and Delaware, Louisiana State University, the National Fisheries Institute, the National Food Processors Association and 10 seafood processing plants in the Northeast, Mid-Atlantic, Gulf Coast and Pacific Northwest regions of the U.S.

DNA fingerprinting methods have also been applied to another emerging pathogen, the O3:K6 strain of *Vibrio parahaemolyticus*, the organism that caused two different illness outbreaks associated with clams and oysters harvested in Texas and Oyster Bay, New York. Previous collaboration between Cornell's Food Safety Lab and NYSG enabled the Cornell team to quickly develop a project proposal to USDA, and the project was funded in 1999. NYSG's Gall will help regulatory authorities assess applications for this new analytical tool in their monitoring programs.

In a different line of research at the SUNY College of Environmental Science and Forestry in Syracuse, **Gregory Boyer** and his team are working on a toxin analyzer designed for use by the shellfish industry. Paralytic Shellfish Poisoning (PSP) is caused by several species of marine algae. Some species are toxic to fish, while others produce a series of neurotoxins that accumulate in shellfish and may cause numbing or paralysis in humans who consume them. By finding out if shellfish harvest areas have the toxin, regulatory agencies or even fishermen can use this tool to

prevent contaminated shellfish from entering the marketplace. "Our goal is to construct a simple device that can easily be used on a scallop boat to tell immediately if that day's catch is potentially contaminated. Experience gained with installing the research unit in governmental analytical labs has convinced us that our goal is possible. We remain committed to that task," says Boyer.

A series of socioeconomic research projects funded by New York Sea Grant has attempted to characterize risk perceptions and attitudes about environmental chemical contaminants and suggest various risk communication strategies to more effectively reach sport anglers and those who eat their catch. Results from these funded research projects conducted by **Barbara Knuth** of Cornell's Human Dimensions Unit, have been used primarily by public health agencies such as the NYS Department of Health, the U.S. EPA and health authorities in other Great Lakes States and Canada to refine risk communication strategies for those at greatest risk from consuming sport fish with elevated contaminant levels.

—**Barbara A. Branca and Ken Gall**

Photo page 10
Ken Gall demonstrates shrimp deveiner.

Photo page 11
Dr. Martin Wiedman and Dawn Norton collecting samples at a smoked fish plant.

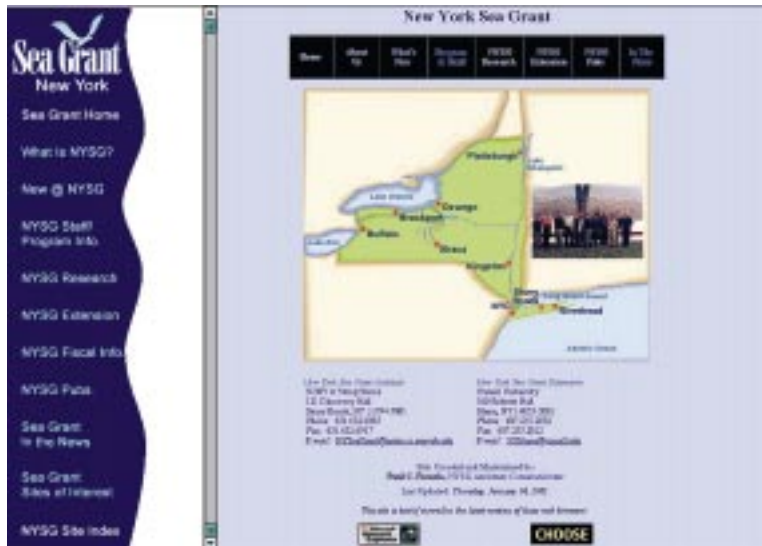
2000. However, the Seafood HACCP Alliance recognized the need to continue offering this course over the long term to smaller audiences on an as needed basis. In response, the Alliance formed an Alternative Training committee in 1998 chaired by NYSG's Gall.

"We determined as a committee," says Gall, "that both trainer and student time and resources could be more effectively managed if students could receive much of the course material in some form of a self-study program delivered via the Internet." In 1999, a project proposal developed by New York Sea Grant in collaboration with Cornell's Food Industry Management Distance Education Program and the Seafood HACCP Alliance Alternative Training committee received over \$50,000 in funding support from the USDA's Cooperative State Research, Education and Extension Service for this project.

The 12 training modules included in the online training course have been completed, and this program is expected to be available to trainers and students in the late spring or early summer of 2001. These modules, as Gall explains, will cover all of the important HACCP concepts including practical examples, interactive worksheets and links to other supporting resources on the Internet. Students will have the option of either viewing each module online or downloading it to their computer. Special features that provide the text in an audio format will also be available. Students who wish to receive a certificate of course completion equivalent to the certificate for the current "live" three-day course can attend a one-day training session and complete a hands-on HACCP plan development exercise.

—Paul C. Focazio

NYSG@30: Coming Ashore Online



near Lakes Ontario, Erie and Champlain, along the Hudson River, on Long Island, and in Manhattan. These offices support more than 60 research and outreach projects annually in such interest areas as fisheries, coastal environmental quality and processes, aquatic nuisance and invasive species, non-point source pollution and seafood safety.

New York's Sea Grant program celebrates three decades of "Bringing Science to the Shore" with a new award-winning online appearance on the World Wide Web. The Great Lakes Information Network (GLIN) named www.seagrant.sunysb.edu its "Website of the Month" for February 2001 and spotlighted the site on the GLIN website, www.great-lakes.net.

"We think NYSG's site is a wonderful resource for information on some important Great Lakes research and education programs," says GLIN Webmaster **Christine Manninen**. Adds NYSG Communicator **Barbara Branca**, "The honor of being named a GLIN site of the month has a lot of merit because GLIN is an important and popular network that receives an average of two million visitor hits per month." GLIN was recognized by the *New York Times* in January as a "provider of an excellent collection of information."

Says NYSG Director **Jack Mattice**, "This recognition affords us the opportunity to highlight our efforts and initiatives in research, extension and education to the larger Great Lakes regional audience."

The site, designed and maintained by NYSG's Assistant Communicator **Paul C. Focazio**, offers information on programming conducted from ten Sea Grant offices located

"My goal in cultivating the Sea Grant website redesign was to integrate fresh concepts and color schemes that would best reflect the program's integration and unification," says Focazio.

The website's e-friendly offerings include an events calendar, the latest "News and Announcements," scholarship and fellowship listings, and a staff directory. The site contains current project fact sheets and information on the \$600,000 Dream Team study of Lake Ontario fisheries, the Lake Champlain Sea Grant project, and research initiatives related to Long Island Sound lobsters, hard clams, and brown tide. Sea Grant's quarterly newsletter, *Coastlines*, is one of several informative downloadable offerings in the "Publications" section.

In addition to featuring the latest on a variety of Marine District endeavors, NYSG's website showcases a wealth of information on issues affecting Lakes Ontario and Erie. Program sections detail Sea Grant work focusing on sand dunes and wetlands; marine facility design, operation, and management; coastal youth education, Great Lakes coastal processes and erosion, Native American lands, aquatic nuisances, and coastal tourism planning and development. A Great Lakes fisheries section connects web users to New York's Great Lakes Angler publication.

Teaching Youth. . .

... about the Great Lakes

This May, western New York will once again welcome hundreds of students and their teachers in grades 5-9 from states and provinces around the Great Lakes basin to the fourth biennial **Great Lakes Student Summit** (www.greatlakesed.org/2001summit.htm). **Helen Domske**, NYSG coastal education specialist and associate director of the Great Lakes Program, has been part of the planning teams and has served as a co-host and workshop presenter for each of the Student Summits. Says Domske, "We're looking forward to hosting students from around the Great Lakes, who will be sharing their research projects and environmental concerns. These young people truly are the hope of the new

millennium and the future health of Great Lakes ecosystem will depend on their commitment." Designed to inform, inspire and motivate student interest and involvement on issues affecting the Great Lakes basin ecosystem, this NYSG-supported event will feature field trips to the Niagara Falls region and a boat trip on the Buffalo River and Lake Erie that will involve hands-on water quality testing. In addition, students will showcase their own research projects— on topics such as non-point source pollution effects and watershed restoration— and attend workshops relating to Great Lakes issues. At the conclusion of the Summit, students will summarize what they've learned and vow to protect the Great Lakes into the future by writing "A Promise to Future Generations."

– Paul C. Focazio

... about the value of native plants

A little over a year ago, New York Sea Grant established the **Allan Overton Memorial Coastal Habitat Restoration and Education Endowment** at Cornell University with the goal of involving young people and their teachers in hands-on coastal restoration projects. The first project, completed in October 2000, was the installation of a native plant educational garden at the Village of Quogue's dock on Long Island's South Shore. Around the Island, and across the state and nation, there is a growing interest in using native plants in public and private landscapes. Since native plants are adapted to local environmental conditions, they can be maintained with less irrigation, fertilization, and pest control. Long overlooked by horticulturists because they may be less "showy" than other plants, they are now coming to the forefront of interest. **Ellen Talmage**, a local grower of native plants on Long Island, volunteered many hours meeting

with the Quogue Mayor **Thelma Georgeson** to envision a design for the garden. The Village contributed time and money to prepare the site for planting day and The Long Island Shore and Beach Preservation Association recruited young people from the Westhampton Middle School to help. Some 20 students and their teachers spent two hours planting and installing educational signs about the garden. The mayor hired a professional landscape designer to install native plants around the rest of the newly restored village dock, an area much larger than a youth project could achieve.

Donations of any size can be made to the Allan Overton Endowment by sending a check made payable to Cornell University to Robert Kent, New York Sea Grant, 3059 Sound Avenue, Riverhead, NY 11901.

Village of Quogue Mayor Thelma Georgeson was on hand to help install a native plant garden funded through the Allan Overton Endowment, with additional support from the Village.

Photo and article by Robert Kent



Annual Report

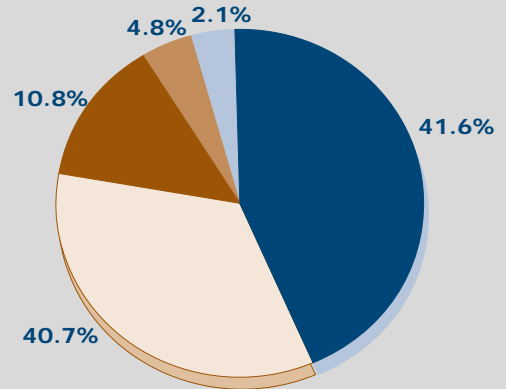
New York Sea Grant Institute Funding 1999

(State, Federal, and Other Funds Allocated in Calendar Year 1999)

Program Administration	\$573,952
Communications	\$255,239
Extension	\$2,212,659
Research and Scholars	
Economic Leadership	\$476,355
Coastal Ecosystem Health and Public Safety	\$364,412
Human Dimensions	\$224,616
Initiatives and National Investments	
NOAA Partnership Investment	\$55,273
Aquatic Nuisance Species/Ballast Water Investment	\$387,317
Marine Biotechnology Investment	\$185,841
Brown Tide Research Initiative (BTRI)	\$466,299
Percent of Above Research Funds Allocated to Scholars	16.2%
Total Research and Scholars	\$2,160,113
Additional Activities	
Fellowships	\$29,700
Conferences/Workshops/Special Projects	\$17,702
Regional Activities	\$17,795
BTRI Administration and Outreach	\$33,701
Hard Clam Research Initiative Administration	\$12,411
Total Additional Activities	\$111,309
Total Funds Allocated	\$5,313,272
Unallocated/Pending Committed Carryover Funds*	\$1,284,230
Additional Non-Federal Cost-Sharing or In-Kind Support (not already included in table above)	\$1,323,266

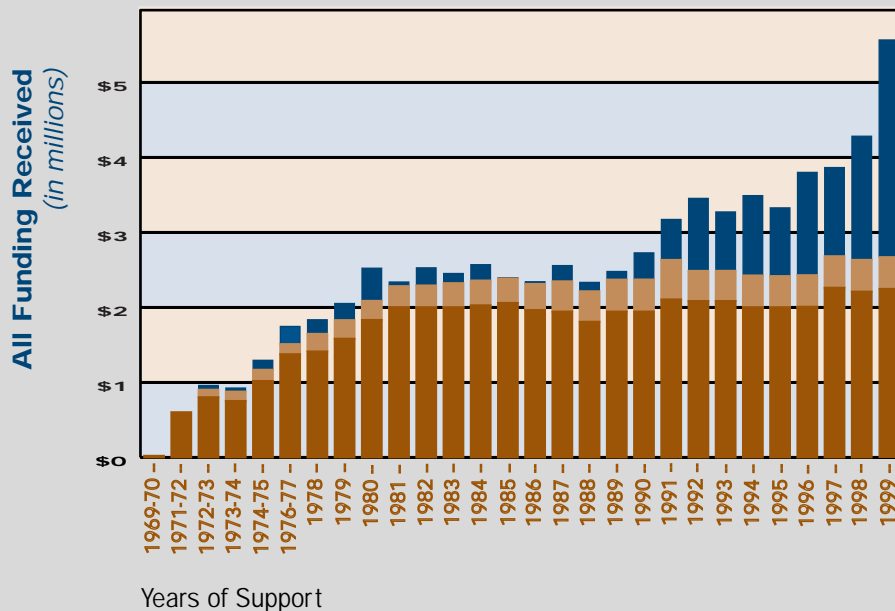
*Includes funds committed to continuation of specific projects/activities, and projects slated to begin in 2000

Distribution of All Funding Among Program Elements



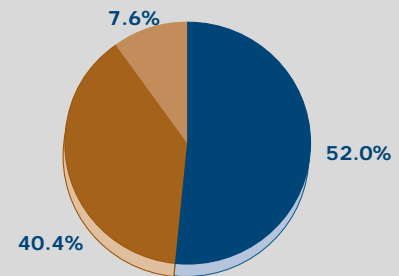
New York Sea Grant Funding

(Since Inception)



Funding Sources

(1999)



Note: "Other" includes additional state, federal, Cornell, SUNY and private funds received by NYSG program.

—Stefanie Massucci
Fiscal Officer

LastWave

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New York Sea Grant Publications

NEMO Fact Sheets

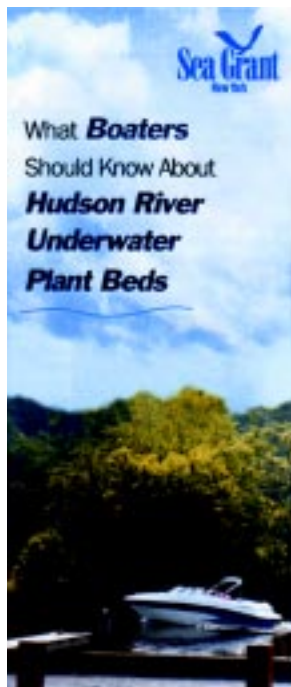
First three FACT SHEETS in a series about nonpoint source pollution by Eileen Keenan, Sea Grant's NEMO Educator.

- **The New York NEMO Program.**
Eileen Keenan. 2001. Free
- **Nonpoint Source Pollution: New York's Primary Water Quality Program.**
Eileen Keenan. 2001. Free
- **Impacts of Development on Waterways: Linking Land Use to Water Quality.**
Eileen Keenan. 2001. Free



Great Lakes Fishes. Great Lakes Network, Wisconsin Sea Grant. 2000. Poster. \$2.00. This heavy-weight 26 1/2" x 38 1/2" color poster features 35 illustrations of fish of the Great Lakes that are anatomically realistic and accurate. Their common and scientific names appear below each illustration.

What Boaters Should Know About Hudson River Underwater Plant Beds. Nordica Holochuck. 2000. Free



Journal Reprints

Molecular studies on the ecology of *Listeria monocytogenes* in the smoked fish processing industry. Dawn M. Norton, Meghan A. McCamey, Kenneth L. Gall, Janet M. Scarlett, Kathryn J. Boor and Martin Weidmann. 2001. *Applied and Environmental Microbiology*. 67(1):198-205. \$1.00

Recruitment dynamics of bluefish (*Pomatomus saltatrix*) from Cape Hatteras to Cape Cod, 1973-1995. Stephen B. Munch and David O. Conover. 2000. *ICES Journal of Marine Science*. 57:393-402. \$1.00

Field testing a metal bioaccumulation model of zebra mussels. Hudson A. Roditi, Nicholas S. Fisher and Sergio A. Sañudo-Wilhelmy. 2000. *Environmental Science & Technology*. 34:2817-2825. \$1.00

Essential fish habitat and marine reserves: An introduction to The Second Mote Symposium in Fisheries Ecology. David O. Conover, Joseph Travis and Felicia C. Coleman. 2000. *Bulletin of Marine Science*. 66(3):517-534. \$1.00

Uptake of dissolved organic carbon and trace elements by zebra mussels. Hudson A. Roditi, Nicholas S. Fisher and Sergio A. Sañudo-Wilhelmy. 2000. *Nature*. 407:78-80. \$1.00

High performance liquid chromatography coupled with post-column electrochemical oxidation for the detection of PSP toxins. Gregory L. Boyer and Gregory D. Goddard. 2000. *Natural Toxins*. 7:353-359. \$1.00

Can stationary bottom split-beam hydroacoustics be used to measure fish swimming speed in situ? Fredrik Arrhenius, Bastoam J.A.M. Benneheij, Lars G. Rudstam, Daniel Boisclair. 2000. *Fisheries Research*. 45:31-41. \$1.00

Billy Captree's Bouillabaisse

Seafood Corner

Seafood Ingredients

- 1 lb. firm, white-fleshed fish
- 20 Long Island mussels
- 12 Long Island little neck clams
- 12 large white shrimp

Other Ingredients

- 3 slices bacon
- 1 medium onion
- 2 tbs. olive oil
- 1/2 cup fennel
- 4 cloves garlic
- 1 cup chicken broth
- 1 cup White Zinfandel (optional)
- 1 cup clam juice
- 2 tbs. Pernod or anisette (optional)
- 1 28 oz. can whole peeled tomatoes
- 1 loaf Italian bread

Method

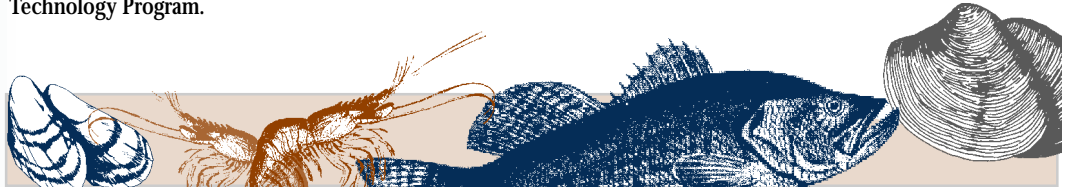
Trim fish, rinse, pat dry and cut into 1-2 inch cubes. Clean and rinse clams and mussels if necessary. Peel and devein shrimp.

Cut bacon into 1 inch pieces. Coarsely chop onion, garlic and fennel. Quarter plum tomatoes.

Add bacon to hot stock pot. Brown, then drain off fat. Add olive oil to hot stock pot. Add onion and fennel, sauté to translucent then add garlic. Cook 1-2 minutes. Add tomatoes, Pernod, Zinfandel, clam juice and chicken broth. Put on medium heat and cover. Let simmer for 10 minutes. Raise heat. Add mussels, clams, fish and shrimp. Cook until mussels and clams open (about 3-5 minutes). Remove from heat. Serve in bowls with Italian bread. *Serves 4 heartily.*

Traditional French Bouillabaisse, which means "boil and settle," takes on a new meaning in this recipe that calls for regional shellfish and firm, white fleshed fish such as monkfish, seabass or striped bass. The addition of fennel and Pernod give this dish a unique signature.

Recipe provided by Bill Zeller, owner of Captree Clam Co., West Babylon, New York. Mr. Zeller is a member of the New York Seafood Council's Board of Directors and is a program advisor to the New York Sea Grant Seafood Technology Program.



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