COASTLINES

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INSIDE THIS ISSUE . . .

Nor'easter Blasts the Atlantic Coast

A powerful storm packing near-hurricane-force winds struck along the Atlantic coast, causing tens of millions of dollars worth of flood damage to homes and property and subjecting a variety of beaches from North Carolina to Maine to severe erosion the day before Halloween.

Fragile dunes and beaches were gouged away by 25-foot waves and winds approaching 74 mph, in areas of the Outer Banks of North Carolina, New Jersey and Cape Cod, as reported in *The New York Times*. The Outer Banks, like New York's Fire Island, are barrier islands — essentially, strips of sand rising out from the ocean. They were easy targets for this fierce, slow-moving coastal storm. However, across the south shore of Long Island the most severe erosion damage on Fire Island appeared to be relatively localized in a number of "hot spots." Reported wave heights were on the order of 12 feet on the ocean and 5 to 6 feet on Long Island Sound. Tides ran 5 feet above normal in some places. According to preliminary estimates made by State officials, the storm caused $35 million in damages in New York. Early surveys indicate that a good deal of the damage was from flooding of residential and commercial areas on the mainland and the bay side of the barrier beaches, rather than from oceanfront erosion, according to New York Sea Grant Extension's erosion specialist, Jay Tanski. Continued on Page 2

Nor'easter Blasts Coast

Continued from Page 1

"Most of the structural damage caused by erosion occurred in areas that were already vulnerable for a variety of reasons before the storm hit," says Tanski. In Westhampton, the hardest-hit area on Long Island, some two dozen houses were lost. The high losses there were due largely to the poor condition of the pre-storm beach to the west of an unfinished groin field (stone jetty) project. Started in the 1960s but never completed, the groins were never filled with sand as specified in the original plans. As a result, they trapped and held sand that normally would have nourished beaches to the west. The properties immediately behind the groin field were well protected by the wide beach and dunes resulting from this accumulation of sand, and suffered little damage.

Five other houses were reported lost along the rest of Long Island's 125-mile south shore. At least three of these were older structures that were already standing seaward of the dune line before the storm struck, according to Tanski.

In addition to structural damage, there was beach damage. Some beaches appear to have lost considerable amounts of sand. "We've had reports of 100-foot bluffs receding 7 to 10 feet along the north shore, and dunes that lost 10 to 20 feet on the south shore," says Tanski.

"Despite the intensity of the storm, many coastal areas fared pretty well in terms of erosion," Tanski observes. Three days after the storm, some of the beaches were showing signs of recovery in the form of sand bars migrating onshore. Beaches widened as part of a renourishment (sand-addition) project at Gilgo Beach on the south shore weathered the storm well, providing protection for the dunes and Ocean Parkway, the road running parallel to the beach. Nevertheless, beaches immediately to the west that didn't receive direct nourishment experienced severe erosion that cut into the dunes and threatened the roadway.

In the wake of the storm, the controversy over the cost of beach restoration has once again been rekindled. "Clearly, the cost of beach restoration must be weighed against the value of the beach," states Tanski. According to official estimates the recreational value of downstate beaches to New York's regional economy is more than a billion dollars annually. Unfortunately, because there is no systematic coastal erosion monitoring program in place it is impossible to assess exactly how much sand was lost, how fast and how much will come back, or how much it would cost to restore the beaches.

To help answer these types of questions, Sea Grant, together with a researcher from SUNY at Stony Brook's Marine Sciences Research Center, has been working with the Long Island Regional Planning Board and the State Coastal Management Program to help develop a monitoring program for Long Island's south shore from Montauk Point to Coney Island in Brooklyn. Such a program would provide managers and planners with the timely technical information they need to properly evaluate proposed erosion management strategies and projects. A meeting to discuss this program with State and local officials is

Continued on Page 8

Protecting Our Sand Dunes

Everyone loves a day near the water. Whether it's the Atlantic Ocean or Long Island Sound, or Lake Erie or Ontario, we love the water, especially if there's a beach of fine sand. Here in New York State we're fortunate to have sand along both the ocean and eastern Lake Ontario. But sand beaches and dunes are fragile ecosystems needing special care and protection.

What is a sand dune system?

The eastern Lake Ontario dunes were formed over thousands of years by waves, currents and winds. This wind action usually formed two or more ridges. The first (primary dune) is relatively small with marginal, sparse plants. It protects the secondary, and larger, dune. This secondary dune in turn provides protection for the plant, animal and human life in the back dunes and marsh beyond.

American beach grass.

Along Lake Ontario, American beach grass traps the sand blown from the beach. This grass continues to grow upward as it is buried, thus helping to stabilize the dunes. However, beach grass is very brittle. If stepped on or run over by a vehicle, it does not bend easily and may break. Beach grass is especially vulnerable to foot and vehicular traffic. When beach grasses and other dune vegetation are destroyed, wind erosion can deter establishment of new vegetation and enlarge the damaged area. This process is called *destabilization*.

In addition to beach grass, other forms of vegetation are crucial. Sand dune willow, artemisia and eastern cottonwood are tolerant of the harsh conditions found along the beach. These trees and shrubs also play an important role in protecting the shoreline.

Dune systems provide shelter to coastal bays, ponds and marshes that in turn pro-

Continued on Page 4

Dr. Anne E. McElroy Appointed Director of New York Sea Grant Institute by Board of Governors

Dr. Anne E. McElroy

Dr. Anne E. McElroy has been appointed director of the New York Sea Grant Institute by its Board of Governors at their recent annual meeting held in Syracuse, New York. Dr. McElroy, formerly an associate professor of environmental science at the University of Massachusetts, Boston, began as director of the Institute on September 11, 1991. The Institute's main administrative offices are located on the campus of the State University of New York (SUNY) at Stony Brook, Long Island.

New York Sea Grant Institute, which this year celebrates its 20th anniversary, is a cooperative research and education program conducted jointly by the State University of New York and Cornell University.

During the past ten years McElroy has been actively involved in marine environmental research, specifically dealing with the fate and effects of organic contaminants in near coastal environments and organisms.

McElroy received her Ph.D. in oceanography in 1985 from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Oceanography. She received her undergraduate degree in aquatic biology in 1976 from Brown University.

According to Dr. Lucinda Noble, chairperson of New York Sea Grant Institute's Board of Governors and director of Cornell Cooperative Extension, "Anne McElroy is an excellent scholar with broad interests in areas important to New York and relevant to Sea Grant. She has all the qualities needed to be an outstanding Sea Grant director."

Reflecting on her selection, McElroy said: "I am delighted with this appointment and look forward to the opportunity of helping to continue the fine work of our researchers, extension specialists, and communications staff in 'bringing science to the shore' throughout the state. People who live and work along New York's shoreline, who eat the seafood or use the products from New York's waters, and who use the Great Lakes, Long Island Sound, and Atlantic coast for business and recreation can all benefit from the cooperative effort of research and education that Sea Grant conducts."

New York Marine Education and Information Directory Available

Whether you are looking to save a bay, educate a kid, join an environmental group, get marine-related information, or just find something recreational to do, *The Long Island Directory of Marine Education and Information,* produced by New York Sea Grant Extension from a grant by the New York Power Authority, may be just what you're after.

This 93-page directory contains an alphabetical listing of diverse marine-related groups, programs, organizations and governmental entities that are of interest to educators, anglers, people in the commercial fishing industry, environmentalists, businesses, government agencies and the interested public.

The directory contains the name, address and phone number of the listed organization, its business hours, its mission, the services it provides, the age group(s) it targets its services to and any fees it may charge, as well as any newsletters it may publish.

To obtain a free copy of the directory write to New York Sea Grant, 39 Sound Avenue, Riverhead, NY 11901–1098, or call (516) 727–3910.

Environmental Stewards Wanted

Protecting the environment is everyone's responsibility. In many cases, individuals, civic groups and service groups, as well as businesses, want to get involved with important local and regional environmental issues but don't really know how to get started.

In an effort to help promote citizen involvement in marine stewardship projects on Long Island, and to build partnerships between organizations, New York Sea Grant sponsored its first Marine Environmental Stewardship Expo the evening of December 5th, 1991, at SUNY College at Farmingdale.

At the expo, individuals and organizations got an overview of local marine environmental issues, learned about marine environmental projects on Long Island and found out about how to play a role in establishing sound environmental policies. Those who attended the expo also had an opportunity to view displays and speak with staff members from a variety of organizations involved in marine environmental projects.

For more information please contact: New York Sea Grant, 125 Nassau Hall, SUNY at Stony Brook, Stony Brook, NY 11794–5002. Phone (516) 632–8730.

SNAGGING OF SALMON TO BE HALTED

A state Supreme Court judge this fall has ruled that the New York State Department of Environmental Conservation (DEC) has the legal right to outlaw snagging of Pacific salmon in Lake Ontario and its tributaries. Snaggers use bare weighted hooks to impale a fish anywhere on its body in order to catch it.

A study by New York Sea Grant Extension revealed that anglers spend about $10 million in the upstate community of Pulaski during the peak salmon-fishing months of September and October. The ban on snagging could cost the regional economy as much as $2.5 million if snaggers are turned away, according to State officials and a study by researchers at Cornell University. That is slightly more than 25 percent of the seasonal total.

A group of Oswego County businessmen who had brought the lawsuit to prevent the snagging ban said that if the ruling stands it could economically devastate the Pulaski area. They claim that without snagging large numbers of fish will just die and decay in the Salmon River. State officials argue, however, that snagging is contrary to traditional sportfishing ethics of using baited hooks, flys, or lures to entice fish.

Although the law has allowed anglers to snag chinook and coho salmon on some sections of Lake Ontario tributaries since the early 1970s, the DEC has said that they plan to end the practice in New York waters by autumn 1994.

Kudos for SG Researcher David Conover

A paper by New York Sea Grant researcher David O. Conover of SUNY at Stony Brook's Marine Sciences Research Center has been chosen as the most significant paper published in the *Transactions of the American Fisheries Society* during 1990. The paper, entitled *The relation between capacity for growth and length of the growing season: evidence and implications of countergradient variation* was awarded top recognition out of the over 120 that were published in the journal last year. Conover received the award during the Society's annual meeting in San Antonio, Texas this fall.

Sand Dunes

Continued from Page 2

vide breeding areas for wildlife and fish. The common tern, black tern, and piping plover are just a few of the species that depend on sand dune protection. The common tern and piping plover are both included on the threatened species list in New York State.

Why are the dunes eroding?

People visiting beaches, climbing the dunes and crushing the vegetation can cause the dunes to erode. Even more damaging than pedestrian traffic is the use of all-terrain vehicles (ATVs) on the dunes. ATVs injure plants in the dunes far more rapidly than foot traffic. Without vegetation to hold the dune together, there is nothing to prevent wind and water from eroding the dune. In addition to being susceptible to people and vehicular traffic, sand dunes are affected by wave action and weather conditions of wind and rain. If the dune becomes destabilized, the entire ecological system can break down. As plants are destroyed and the dunes erode, wildlife species lose their homes and breeding grounds.

Why conserve?

The sand dune system along Lake Ontario's eastern shore is the only freshwater dune system in New York State. This dune network stretches from the mouth of the Salmon River north to the outlet of Black Pond, about 17 miles. It protects coastal residents from erosion and property damage. The dune system is also a source of scenic beauty. And, as mentioned above, many species of wildlife are dependent on this protection as it provides breeding grounds and habitat.

The wooden dune walkover is designed to protect the sand dune from heavy foot traffic.

Southwick Beach State Park/Lakeview Wildlife Management Area along eastern Lake Ontario provides a good example of dune conservation. There's a scenic interpretive trail that begins in an upland wooded area, travels near freshwater marshes and ends at the sand dune and barrier beach. At the end of the trail there's a dune walkover. This wooden bridge over the sand was built to allow people access to the dunes without disturbing the vegetation. The walkover helps the dunes continue to function as a natural barrier.

What can you do to help?

To conserve Lake Ontario's dune areas:

- avoid walking on the dune unless you are on a marked trail or dune walkover
- do not trample vegetation
- keep all vehicles out of the dune area (this includes bicycles as well as ATVs)
- respect areas that have been closed or posted.

Sand dunes are a valuable natural habitat because they protect both wildlife and commercial and residential property. To learn more about this unique and irreplaceable resource contact:

New York Sea Grant
Swetman Hall
SUNY College at Oswego
Oswego NY 13126–3599

Three NY Students Win National Sea Grant Award

Three graduate students representing the New York Sea Grant program, two of whom were NY Sea Grant Scholars, were winners of Sea Grant Association Student Abstract Awards for meritorious Great Lakes and marine-related research. The awards were presented to the students during the National Sea Grant Week conference this summer.

The New York students won in three of five research categories:

- Peter S. Rand of SUNY College of Environmental Science and Forestry at Syracuse won in the area of environmental studies for his abstract the *Effect of Salmon Migrations on Phosphorus Dynamics and Primary Productivity in Lake Ontario Tributaries.*
- Christine M. Velicer of Cornell University won in the area of human dimensions for her abstract *The Lake Ontario Sportfishery: A Risk Communication Challenge.*
- Pradeep S. Hirethota of SUNY College of Environmental Science and Forestry at Syracuse won in the area of fisheries and aquaculture for his abstract *Responses to Aquatic Contamination: Analysis of Long-term Contaminant Related Stress in Fish Populations.* Hirethota's work was also highlighted at a poster session at the Marine Technology Society meeting this fall in New Orleans.

The Student Abstract Award winners received a certificate and a $125 check as well as a trip to Denver to attend the awards luncheon.

Peter S. Rand

Christine M. Velicer

Pradeep S. Hirethota

Zebra Mussels Spreading Rapidly Throughout the Great Lakes into the Mississippi River and Beyond

According to Sea Grant's Zebra Mussel Information Clearinghouse, zebra mussels have now been found and verified in two locations in the Mississippi River, one just south of La Crosse, Wisconsin and the other some 500 miles further downriver in an area north of St. Louis, Missouri. The mussels have also been found in the Lake Kentucky portion of the Tennessee River near the Kentucky border.

In New York State the zebra mussel's extraordinarily rapid spread has reached as far south as Newburgh in the Hudson River; Cayuga and Seneca lakes, the two largest of the Finger Lakes; and the Susquehanna River near Binghamton along the Pennsylvania border. With the mussel's relentless advance into the lower part of the state, experts are becoming increasingly concerned about its impact on the reservoir system that supplies fresh drinking water to millions of New York City and metropolitan area residents.

While many of the sightings are of just small numbers of mussels, experts say that large colonies may develop in those areas over the next 18 months. If that happens, utilities, water treatment plants, docks, boat bottoms, rivers and lakefront areas may become clogged with zebra mussels, a rapidly reproducing bivalve mollusk with alternating light and dark bands that give it a zebra-like shell pattern. The current estimate for controlling this pest in just the Great Lakes region alone is $5 billion over the next decade.

Unfortunately, the mussel's rapid spread makes it difficult for researchers to investigate how the mussel adapts to its new environment. "We are just learning how the mussel reacts within the Great Lakes and how it affects that ecosystem," explains Charles O'Neill, project director of Sea Grant's Zebra Mussel Information Clearinghouse. "Now with the mussel's move south we are dealing with many different environmental conditions and concerns. For example, how the mussels interact with their environment in the Great Lakes may be quite different from the way they react in the Finger Lakes or the Mississippi River."

In order to establish colonies, some as dense as 700,000 mussels per square meter, the mussels need a hard or rocky surface on which to attach their highly adhesive byssal threads. Bodies of water with a sand or silt bottom may not be suitable locations for the mussels. And zebra mussel experts think that the mussels may be able to survive and colonize brackish (part saltwater/part freshwater) locations to some extent.

Even such fundamental questions as the number of offspring that female zebra mussels produce are now being reexamined. "We have believed that the female was capable of producing 40,000 to 50,000 eggs per year," says Dave MacNeill, a New York Sea Grant extension specialist. "Now we are reading from European researchers that this may be a gross underestimation, with the real number of zebra mussel eggs per female closer to 1 million per year."

While many questions remain unresolved, some of the most current research was presented at the Second International Zebra Mussel Research Conference November 19 to 22 in Rochester, New York. The conference was sponsored by the Great Lakes Sea Grant Network, and Environment Canada/Fisheries and Oceans.

Hospitality Training: Turning Good Manners into Money

You have just arrived in town on your family vacation, and notice that the local department store is running a one-day sale on fishing rods. So after unpacking you drive to the store to see whether now might be the time to buy some new gear for your family fishing trip. When you get there you encounter a salesclerk who is in an animated telephone conversation with his girlfriend. You stand by the counter and wait for a while. You start to drum your fingers on the counter. More time passes. You clear your throat — several times. And still no salesclerk.

Eventually, the clerk hangs up. Looking right past you as if you're invisible, he starts to scurry off for parts unknown. "Eh, excuse me," you begin, trying to hide your impatience and growing anger. "Can you tell me where the fishing rods that are on sale are located?"

The clerk abruptly screeches to a stop. Glaring at you with contempt in his eyes, he says, "Whatever is left is over there," points off in some direction or another, and hustles away from you, down an aisle and out of sight. Thoroughly frustrated, you make a hasty retreat out of the store, swearing never to return there again.

Seem familiar? Have you been there before? While the particulars of such a scenario may differ for each of us, the basics are the same: a frustrated customer and a blown sale for the business. And according to Diane Kuehn, a New York Sea Grant extension specialist, many customers are lost by stores, hotels, motels, restaurants, and other tourism-related businesses through a simple lack of courtesy.

"Many people don't realize that tourism is the second largest industry in New York State, and it is growing. Before too long it will probably be number one," explains Kuehn. "And in spite of the economic downturn, people keep on traveling, although much closer to home. Weekend trips are increasing."

In an effort to help tourist-related businesses attract customers, Kuehn provides them with a variety of useful solutions. "Whenever I hold a workshop one of the first things I try to do is to get each person to assess his or her own potential for courtesy. If they are business owners and they have a hard time being courteous, I often suggest that it would be in their interest to hire someone who is better able to deal with customers."

By using examples such as the case of the surly salesclerk, Kuehn tries to show people some of the best approaches to dealing positively with customers. In that example, for instance, the clerk should not have been on the phone to begin with. But once he realized that a customer was waiting, he should have ended the call and immediately apologized to the customer. When asked where the fishing rods were that were on sale, the salesclerk should have walked the customer to the exact location instead of pointing. Once there, the clerk should have asked the customer if he needed further assistance. If the customer said "no," the clerk should have left the customer alone, letting him know where he'd be should any additional help be needed. Despite the customer's initial frustration, the salesclerk could have turned a negative situation around.

> *". . . hospitality is important because the number one form of advertising is word-of-mouth."*

According to marketing experts, it is extremely difficult for a business to win back customers after they have had a bad experience. Worse yet is that a business not only loses the original customer, but often also the friends, coworkers and relatives of that customer as well. This kind of negative multiplier effect can ruin any thriving establishment.

In another of Kuehn's examples, a family arrives on the doorstep of a bed and breakfast without a reservation. It's late and everyone is tired. But unfortunately, there are no rooms. What does the proprietor do? "Many bed and breakfast establishments are members of a regional bed and breakfast association. Networks are often created through these associations so that owners can call around to other b & b establishments to help find a room for visitors whom they can't put up for the night," she explains. "So even though the b & b might not gain an immediate customer, the good will that is gained can bring in more customers through positive word of mouth as this family relates the tale of their plight to their friends and associates. And you can almost bet that the next time they go back into the area they will seek out that b & b to stay in."

There are many reasons why tourism-related businesses can fail, according to Kuehn. Bad location. Ineffective advertising and marketing. Noncompetitive pricing. And a lack of people skills, which is what hospitality training is all about. "In all my workshops I let people know that hospitality is important because the number one form of advertising is word-of-mouth. Newspapers, radio, and TV may keep your business's name in front of people, but hearing about the quality of your products and services actually gets customers through the door," relates Kuehn. "When people say 'Oh, I went to such and such a place and it was great,' it brings in more people."

But how do businesses know if their people skills are succeeding? Kuehn cites as an example restaurants that use little evaluation cards placed along the counter and at each table, asking people how the service was. This type of self-assessment can also be done by a clerk at a checkout desk in a hotel, store or restaurant who can ask the customer: Was everything satisfactory? Were the accommodations to your liking? Did you find the store friendly? Did you get the help you needed? "Most of the time if someone responds negatively to those questions, just the fact that they were asked about their experience, and that the store or hotel showed that they cared enough to find out about it, will mean they will come back. As long as the businesses are able to find out about any problems and react to them and *change how employees act,* they are likely to bring in even more customers," asserts Kuehn.

To find out more about the value of hospitality training or for information about other tourism issues please contact: New York Sea Grant, Swetman Hall, SUNY College at Oswego, Oswego, New York, 13126–3599, (315) 341–3042.

Sea Grant Pubs

Recent Publications from New York Sea Grant

Please send requests for the following publications (including checks payable to **New York Sea Grant**) to: Communications, New York Sea Grant Institute, Dutchess Hall, SUNY at Stony Brook, Stony Brook NY 11794–5001. Call (516) 632–6905 if you would like further information.

Journal Reprints

Angler associations as partners in walleye management. J. K. Buttner, D. B. MacNeill, D. M. Green, and R. T. Colesante. *Fisheries,* 16(4):12–17. NYSGI-R-91-023. Single copies free.

Development and evaluation of a monoclonal-antibody-based enzyme-linked immunosorbent assay for the diagnosis of *Renibacterium salmoninarum* infection. H.-M. Hsu, P. R. Bowser, and J. H. Schachte, Jr. 1991. *Journal of Aquatic Animal Health,* 3:168–175. NYSGI-R-91-022. Single copies free.

The eelgrass canopy: an above-bottom refuge from benthic predators for juvenile bay scallops *Argopecten irradians.* D. G. Pohle, V. M. Bricelj, and Z. Garcia-Esquivel. 1991. *Marine Ecology Progress Series,* 74:47–59. NYSGI-R-91-011. Single copies free.

Electrocardiogram during deep breath-hold dives by elite divers. M. Ferrigno, B. Grassi, G. Ferretti, M. Costa, C. Marconi, P. Cerretelli, and C. Lundgren. 1991. *Undersea Biomedical Research,* 18(2):81–91. NYSGI-R-91-009. Single copies free.

Influence of dinoflagellate cell toxicity on uptake and loss of paralytic shellfish toxins in the northern quahog *Mercenaria mercenaria.* V. M. Bricelj, J. H. Lee, and A. D. Cembella. 1991. *Marine Ecology Progress Series,* 74:33–46. NYSGI-R-91-010. Single copies free.

Influence of nearshore structure on growth and diets of yellow perch (*Perca flavescens*) and white perch (*Morone americana*) in Mexico Bay, Lake Ontario. R. J. Danehy, N. H. Ringler, and J. E. Gannon. 1991. *Journal of Great Lakes Research,* 17(2):183–193. NYSGI-R-91-019. Single copies free.

Lake Ontario's sport fisheries: socioeconomic research progress and needs. T. L. Brown, B. A. Knuth, and F. C. Menz. 1991. *Canadian Journal of Fisheries and Aquatic Sciences,* 48(8):1595–1601. NYSGI-R-91-018. Single copies free.

Offshore distribution, size, age, and lateral plate variation of late larval/early juvenile sticklebacks (*Gasterosteus*) off the Atlantic coast of New Jersey and New York. R. K. Cowen, L. A. Chiarella, C. J. Gomez, and M. A. Bell. 1991. *Canadian Journal of Fisheries and Aquatic Sciences,* 48(9):1679–1684. NYSGI-R-91-021. Single copies free.

O_2 pressures between 0.12 and 2.5 atm abs, circulatory function, and N_2 elimination. D. Anderson, G. Nagasawa, W. Norfleet, A. Olszowka, and C. Lundgren. 1991. *Undersea Biomedical Research,* 18(4):279–292. NYSGI-R-91-020. Single copies free.

Waves trapped along a breakwater. P. L.-F. Liu and C. J. Lozano. 1991. *Wave Motion,* 13:253–260. NYSGI-R-91-007. Single copies free.

Fact Sheets and Directories

The Impact of Septic Systems on the Environment. T. R. Schneider. Long Island Sound Study Fact Sheet #13. September 1991. 2 pp. Free.

The Long Island Directory of Marine Education and Information. R. J. Kent (ed.). 1991. NYSGI-D-91-002. 109 pp. Free.

Sound Gardening: Gardening with an Eye on Water Quality. Cornell Cooperative Extension, University of Connecticut Cooperative Extension, New York Sea Grant Extension, and Connecticut Sea Grant Marine Advisory. April 1991. NYSGI-G-91-004. $2.00 for set of 10 fact sheets.

Water Conservation and Marine Water Quality. T. R. Schneider. Long Island Sound Study Fact Sheet #14. October 1991. 2 pp. Free.

The following fact sheets and directories are available from New York Sea Grant's Oswego office. Please send requests for these publications (including checks **payable to Cornell University**) to: New York Sea Grant Communications, Swetman Hall, SUNY College at Oswego, Oswego NY 13126–3599. Call (315) 341–3042 if you would like further information.

Fillmore Brook/Lake Ontario Dune Trail Interpretive Guide. S. Ravenscroft. 1991. NYSGI-H-91-002. 18 pp. Free.

New York Sea Grant Great Lakes Directory. New York Sea Grant Extension. 1991. NYSGI-D-91-001. 2 pp. Free.

New York's Great Lakes Marinas: A 1990 Analysis and Profile. D. G. White. November 1991. 12 pp. $1.00.

1990 Motorboat Registrations in New York State. D. Kuehn. August 1991. NYSGI-G-91-008. 6 pp. $0.50.

The Zebra Mussel (*Dreissena polymorpha*): An Unwelcome North American Invader. C. R. O'Neill, Jr. and D. B. MacNeill. November 1991. 12 pp. $1.00. (Revision of *Dreissena polymorpha:* An Unwelcome New Great Lakes Invader, originally printed November 1989.)

Zebra Mussel Research Grants Awarded

New research into the realm of zebra mussels has started for several New York Sea Grant researchers this fall, with funds amounting to almost $353,000 over the next 3 years. The funding was part of a special $1.3 million funding initiative for zebra mussel research by the National Sea Grant College Program.

Zebra mussels are tiny mollusks that, it is estimated, will cause billions of dollars of damage to the economy of the Great Lakes over the next 10 years while also affecting Great Lakes ecology. As mussels spread to most inland freshwater lakes, rivers and streams, their impact is expected to be felt throughout the country.

This latest round of research includes studies by:

- Linda Chalker-Scott, Howard P. Riessen and James D. Scott (SUNY College at Buffalo), on *Effect of Ultraviolet-B Radiation (280–320 nm) on Survivorship of Zebra Mussel* (Dreissena polymorpha)*: A Potential Control Strategy.*
- Joe Regenstein (Cornell University) and Susan Goldhor (Center for Applied Regional Studies), on the *Environmental and Economic Benefits from Zebra Mussel Harvesting Through Contaminant Reduction and Product Development.*
- Robert E. Baier and Anne E. Meyer (SUNY at Buffalo), on the *Nonpolluting Control of Biosurface Fouling.*
- Donald J. Stewart (SUNY College of Environmental Science and Forestry at

Continued on Page 8

Nor'easter Blasts Coast

Continued from Page 2

scheduled for late fall. "Hopefully, the next time something like this happens, New York will have a mechanism in place to quickly get the technical information decisionmakers need," says Tanski.

"We were lucky there were no major breaches or new inlets formed," he adds. Although inlet formation is part of the natural barrier island process, the dramatic changes associated with new inlets are not always compatible with the present use of the bay. Studies have indicated that such changes in the physical and ecological characteristics of the bay environment could impact biological resources, which in turn could adversely affect commercial and recreational fishing activities and increase the threat of mainland flooding.

New York Sea Grant has been distributing erosion information packets that help affected property owners evaluate their particular situation and the options available to them. People interested in receiving materials can contact New York Sea Grant, 125 Nassau Hall, SUNY at Stony Brook, Stony Brook, NY 11794–5002, phone (516) 632–8730.

Zebra Mussel Research

Continued from Page 7

Syracuse and SUNY College at Oswego), Myron J. Mitchell (SUNY College of Environmental Science and Forestry at Syracuse), Edward L. Mills and John L. Forney (Cornell University Biological Field Station), on *The Impact of Zebra Mussels* (Dreissena polymorpha) *on Lower Food Web Dynamics in a Large Freshwater Ecosystem.*

In addition, New York Sea Grant allocated $40,000 of its own initiative funds to Samuel E. Landsberger of Cornell University for researching the *Application of Underwater Robots to Perform Inspection, Cleaning, and Maintenance of Intake Pipes.*

A New National Sea Grant College Program call for zebra mussel research proposals in 1992 will be available shortly, and can be obtained by writing to New York Sea Grant, Dutchess Hall, SUNY at Stony Brook, Stony Brook, NY 11794–5001, or by calling (516) 632–6905.

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Communicator
New York Sea Grant Institute
Dutchess Hall
SUNY at Stony Brook
Stony Brook NY 11794–5001

Managing Editor: Avery Klauber
Editor: Diana Puglisi
Staff Writer: Pat Peterson
Computer Layout: Pat Peterson
Production Assistants: Sharon O'Donovan
Susan Hamill

New York Sea Grant Institute

Dutchess Hall
SUNY at Stony Brook
Stony Brook, New York 11794–5001

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