

COASTLINES

New York Sea Grant Institute

Volume 20 Number 1

Spring/Summer 1990

INSIDE THIS ISSUE . . .

THE ZEBRA MUSSEL REPORT:

- INFO. CLEARINGHOUSE 1
- LEGISLATIVE RESPONSE 3
- HAND-TO-HAND COMBAT 4
- RESEARCH GRANTS 4

"PISCES" HUNTS FOR PCBs 5

1991 KNAUSS FELLOWSHIPS 5

STUDENTS BRING SCIENCE TO THE SOUND 6

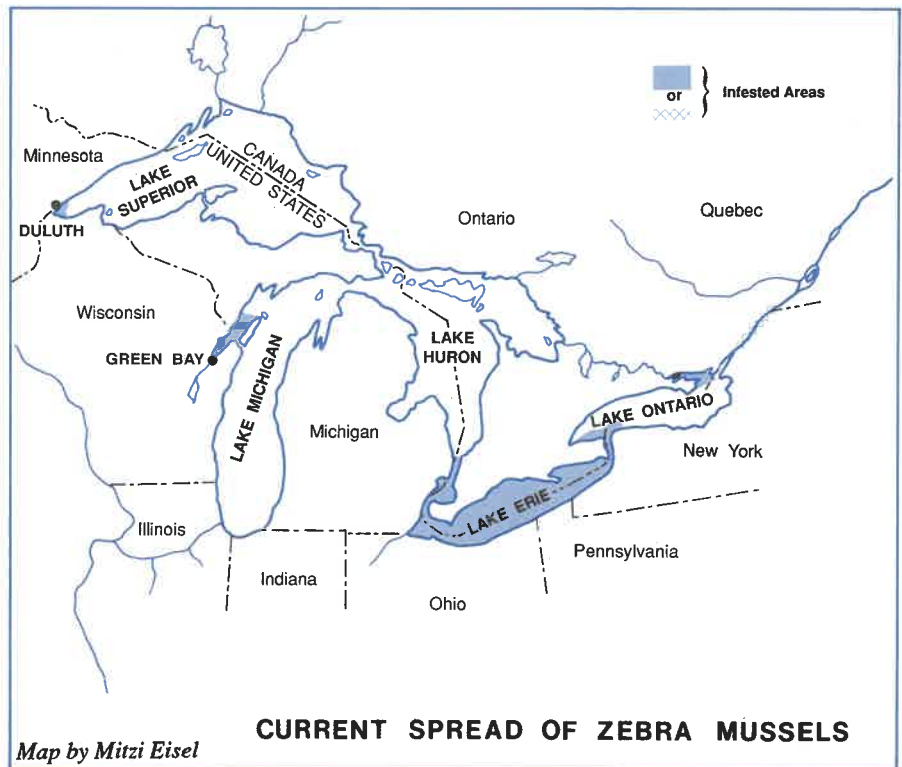
TEACHING SCIENCE TO YOUR KIDS 6

SAREP: HANDS-ON LEARNING 7

GET YOUR SEA GRANT / WCBS RADIO EARTH GUIDE WHILE SUPPLIES LAST! 8

ZEBRA MUSSELS: The Invasion Spreads

**\$1/2 Billion Damage to the Environment Projected:
NY Sea Grant Receives \$100K to Create Information Clearinghouse**



Zebra mussels can now be found in all of Lake St. Clair and Lake Erie; the Niagara River; the southwest corner of Lake Ontario; the St. Lawrence River from slightly downstream of Lake Ontario to the New York State/Province of Ontario border; the far northeast corner of Lake Ontario; Green Bay on western Lake Michigan and Duluth Harbor at the far west end of Lake Superior.

Sea Grant Receives \$100K for Z-Mussel Clearinghouse

NEW YORK SEA GRANT RECEIVES NEARLY \$100K GRANT FROM THE STATE ENERGY CONSORTIUM TO CREATE AN INFORMATION CLEARINGHOUSE ON ZEBRA MUSSELS; EXTENSION SPECIALISTS AND SCIENTISTS GEARING UP TO BATTLE THE HARMFUL PEST; ALMOST \$1/2 BILLION ENVIRONMENTAL DAMAGE EXPECTED ANNUALLY.

The battle against zebra mussels took an important step forward in mid-May with the designation of the New York Sea Grant Extension Program regional office at the State University College at Brockport as the New York Zebra Mussel Clearinghouse for collection and dissemination of information on this harmful new invader of North American waters in the Great Lakes region.

The Clearinghouse, which received a major funding grant of \$99,400 from the Empire State Electric Energy Research Corporation (ESEERCO), a consortium of utilities (Central Hudson Gas & Electric Corporation, Consolidated Edison Co. of N.Y., Inc., New York Power Authority, New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation, Orange and Rockland Utilities, Inc., and Rochester Gas and Electric Corporation), will become a depository and information/education source for all data that is currently available on the mussel. An additional \$2,000 for clearinghouse educational programs was received from the Monroe County (Rochester) Water Authority. The zebra mussel threatens to cause severe ecological and economic damage throughout the Great Lakes basin and North American inland waters.

The U.S. Fish and Wildlife Service has projected that the cost impact of the zebra mussels on utility and industrial facilities, public water supplies, sportfishing, tourism, commercial navigation, boating and recreation throughout the Great Lakes ba-

sin will amount to over \$480 million annually. These increased costs of doing business in the Great Lakes will be passed on to consumers in the form of higher prices or direct expenses affecting boat owners, anglers and other water users.

According to Chuck O'Neill and Dave MacNeill, the New York Sea Grant extension specialists that have been tracking the spread of the zebra mussels for almost two



Inset: Sea Grant Extension Specialist Dave MacNeill has been following mussels for two years. *Photo courtesy Scott Weston*
PHOTO: A technician going down to inspect the pumping wells at the Dunkirk Power Plant for z-mussels. Dutch researchers (left) Dr. Abraham bij De Vaate and (right) Dr. Henk Jenner, along with Sea Grant Extension Specialist Chuck O'Neill (center), look on with concern. *Photo courtesy Chuck O'Neill.*

years, there is an urgent need for the type of information collection and dissemination that the Clearinghouse will provide.

"We need to collect every piece of information that is available on these critters and get it out to the people who need it in our effort to control the spread," explained O'Neill. "The Clearinghouse will also help to determine what scientific research has already been done on the organism, so we don't waste time and money by duplicating existing research. It will also benefit a wide range of New York water users, from the electric generating facilities to anglers to beachgoers." The Clearinghouse will be closely linked to other zebra mussel infor-

mation programs in other states throughout the Great Lakes basin.

New York Sea Grant is currently pushing through emergency funding for zebra mussel research and monitoring as part of the state's scientific counteroffensive against the potentially harmful mollusk. Zebra mussels are small freshwater bivalve mollusks not more than three inches long. Their elongated shells are marked by alternating light and dark bands much like the stripes of a zebra.

Native to the region of the Black and Caspian Seas, the mussels are believed to have been transported to North America as hitchhikers in the ballast water tanks of ships from European freshwater ports. When the ballast water was discharged into the Great Lakes so too were the mussels. Once they're in the water, it doesn't take long for zebra mussel larvae to disperse and quickly grow, attaching themselves to nearly any hard surface using dense elastic-like threads called byssal fibers.

Zebra mussels were first discovered in Lake St. Clair in June 1988. The first sighting in Lake Erie was in July 1988. By April 1990 the mussels had spread throughout Lake Erie and had been found in southwest and northeast Lake Ontario and the St. Lawrence River.

"Within a very short time we have seen colonies of zebra mussels reach densities of more than 100,000 per square meter," said MacNeill. "The mussels harm the environment by filtering out large numbers of microscopic plants from the water when they eat. In this way, the mussels deprive other aquatic organisms of food, forcing them to find other feeding grounds or starve — in a sense knocking the bottom out of the food chain and possibly reducing sport or commercial fishing stocks."

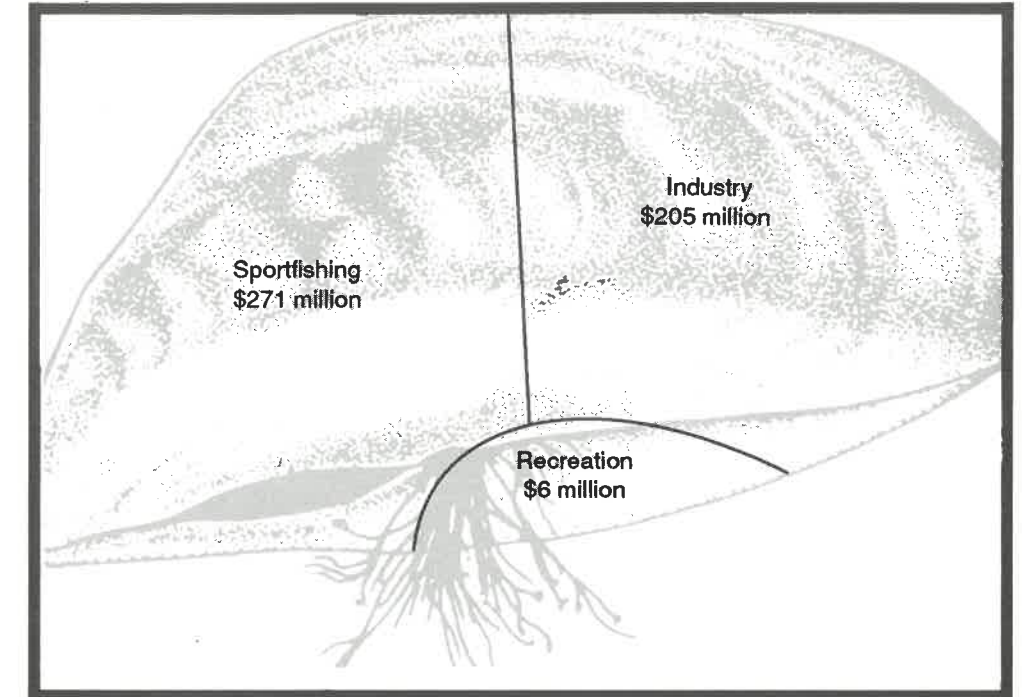
O'Neill noted that "while the mussels are content to live almost anywhere, they are particularly fond of areas of flowing

Continued on Page 3

Clearinghouse

Continued from Page 2

water, such as the intake pipes of electrical and industrial facilities, and water treatment plants, where clogged pipes are already causing significant problems and damage." The mussels are expected to cause considerable damage to docks, piers, buoys, boat hulls and engines. In addition, they are likely to foul water quality and litter beaches with sharp shells. "Now that the mussels are established in the Great Lakes, it is only a matter of time until they spread into the Erie Canal, the Finger Lakes, the Mohawk and upper Hudson rivers and other surface waters in New York and the Northeast, 'hitchhiking' in water in recreational boat live wells, engine cooling systems and angler's bait buckets," said O'Neill. "The zebra mussel appears to be here to stay."



Projected annual cleanup and control costs of zebra mussel infestation.

THE LEGISLATIVE RESPONSE AGAINST Z-MUSSELS

The United States Congress and state legislatures from around the Great Lakes are joining the combat against zebra mussels. Some of the current legislative efforts include:

Legislation introduced in the end of May by Sen. Daniel Patrick Moynihan of New York calls for \$5 million a year for five years along with state and local matching funds to control zebra mussel impacts on public infrastructure. These funds would go into cleanup efforts to be undertaken by the Army Corps of Engineers.

The Nonindigenous Aquatic Nuisance Act of 1990, introduced by Sen. John Glenn of Ohio and Rep. Henry Nowak of New York, calls for the spending of \$4 million a year for five years on prevention programs and the same amount on eradication, research, control and public education. Sea Grant research and Marine Advisory Services activities are slated for funding under this bill.

Rep. Dennis Hertel of Michigan has included \$4.5 million in the Ocean and Coastal Programs Authorization Act of 1990, a major appropriations package that specifically earmarks these funds for research, control and eradication of harmful exotic species in the Great Lakes, including the zebra mussel, river ruffe, Asiatic crab, rusty crawfish, alewife and spiny water flea. Three-fourths of the funding would go to Sea Grant programs, with the balance going to the Great Lakes Environmental Research Laboratory in Michigan.

A New York State Senate Majority Task Force on the Zebra Mussel, formed by Senate Majority Leader Ralph Marino, will seek legislation that would establish a five-year state research program under the auspices of the New York Sea Grant Program. Assemblyman Francis Pordum has authored and introduced companion legislation in the State Assembly.

How to do . . .

Hand-To-Hand Combat Against Zebra Mussels

In an effort to help people deal with these midge monster mussels, NY Sea Grant Extension Specialists Chuck O'Neill and Dave MacNeill make the following suggestions:

- Scraping is the currently recommended method of removal if you have zebra mussels on docks or piers. Be advised that live mussels may be able to reattach to hard surfaces, so the scraped mussels should be caught in a bag or a bucket. This is also important if the mussels are dead, because they foul the water and create an obnoxious odor as they decay.

Depending on the degree of infestation, scraping once or twice a month should keep colonies under control. A large buildup should be avoided because the mussels' waste excretions speed up corrosion of docks and piers.

- Drain all bilge water, live wells, and bait buckets before leaving infested areas. Leftover bait should not be transported from infested waterways to uninfested waters.
- Thoroughly inspect your boat's hull, outdrive, trim plates, trolling plates, prop guards, transducers and trailer. "Hitch-hiking" mussels should be scraped off.
- Thoroughly flush hulls, outdrive units, live wells (and pumping systems), bilge, trailer frames, anchors and anchor ropes, bait buckets, raw water engine cooling systems and other boat parts and accessories that typically get wet using *hot* (140° F or hotter) water. Using a pressurized steam cleaner would also be effective, would require less time and would be environmentally compatible.

Or, use a 10 percent solution of household chlorine bleach and water or a hot saltwater solution (1/2 cup salt per 1 gallon water), followed by a clean water flush to remove chlorine/salt residues. Do not use these solutions where they will run off

into surface water, however. Also, check with engine manufacturers before using such solutions in cooling systems.

- Boats and trailers should be allowed to dry thoroughly in the sun before being transported to uninfested waterways.
- On boats that remain in the water, mussels can attach to outdrives, covering or entering water intakes and resulting in clogging, engine overheating and damage to cooling system parts. Mussels on and around props and shafts can increase drivetrain wear. If possible, avoid leaving outdrives in the down position. Hulls and drive units should be inspected and scraped free of mussels.
- Antifouling paints may be effective in preventing attachment of zebra mussels on boat hulls, outdrive units, propellers and other underwater boat components and accessories. Consult with your local marine dealer or manufacturer for applicability and local use or environmental restrictions. Hull waxes do not appear to be effective.
- When going to the beach, make sure that you take sandals or some other kind of footwear. Broken zebra mussel shells are very sharp. Before you settle in, inspect the beach site and clear it of as many shells as possible.
- Town and county governments working with citizen volunteer monitors can form beach patrols to aid in removing mussel shells and other debris.

The use of chemicals such as chlorine, ozone and molluscicides by the public could result in severe ecological harm, leading to even greater cleanup costs; these should be avoided.

Z-Mussel Grants

A New York Sea Grant research grant has been awarded to Dr. Howard P. Riessen, department of biology, SUNY at Buffalo, to monitor some ecological impacts of zebra mussels in the eastern basin of Lake Erie. New York Sea Grant has also awarded research funds to Dr. Joseph C. Makarewicz, department of biological sciences, SUC at Brockport, to assess the role zebra mussels play in increasing water clarity.

In meetings with other Sea Grant programs throughout the Great Lakes, the U.S. Fish and Wildlife Service, and other

research organizations within the region, scientific needs have now been identified — ensuring that little time will be lost in getting new investigative work started once additional funding becomes available.

NY Sea Grant Extension has provided a grant of \$5,000 to Mr. Ken Balling, program leader for Cornell Cooperative Extension's 4-H program in Chautauqua County. The monies will provide hands-on zebra mussel research opportunities to 24 seventh- to eleventh-graders.

The work will be carried out in

cooperation with Fredonia State University College researchers Dr. Tom Storch and Dr. Jim Winter, who will supply the scientific support and equipment for the youngsters.

The students will be researching modes of transportation, new infestation, population dynamics and local consequences of the zebra mussels. "Who knows," said Balling with a smile, "One of these students may be the one who eventually solves the problems of zebra mussels."

The Hunt for PCBs: PISCES Sampler on the Trail

There were PCBs flowing in the Black River, which runs through Jefferson and Lewis counties, south and east of Watertown, New York. The question was: Where did this known cancer-causing agent come from?

Simon Litten, a research scientist from the State's Department of Environmental Conservation Division of Water, wanted to find out. He used a sampling device developed through NY Sea Grant research in his attempt to unravel this environmental mystery.

PISCES (short for Passive In-Site, Concentration-Extraction Sampler) is a sampling device developed by Dr. John Hassett, a Sea Grant researcher and Associate Professor of Chemistry at the SUNY College of Environmental Science and Forestry. To track the PCBs, Litten set up pairs of this sampling device at selected points along the river.

Because PISCES is small, inexpensive, has no moving parts and is easy to deploy, it has proved to be ideal for field use. The device consists of a container filled with a solvent and covered with a polymer membrane that can be penetrated by PCBs and other pollutants.

After several weeks the devices were fished out of the water and examined. According to Litten, the sampler was remarkably sensitive, detecting even extremely small concentrations of PCBs in the water.

Extensive investigation eventually pinpointed the source of the PCB contamination: an old paper plant. According to Litten, the investigators might not have been able to find it without the environmental forensics provided by PISCES.

The U.S. Fish and Wildlife Service has



ESF graduate student Ken Karwowski holding "PISCES" PCB sampler during field testing. The device has proved to be effective in tracking down cancer-causing substances. Photo courtesy John Hassett

also been running similar tests of the PISCES device in the Niagara and St. Lawrence rivers. Dr. John Hickey, who is with the Fish and Wildlife Service's environmental contaminants program at Cortland, NY, says PISCES shows great promise in detecting nonpoint source pollution — that is, pollution that results from overflowing storm drains and groundwater that contains harmful substances. These contaminants eventually find their way into rivers and streams.

While the PISCES system will not replace contaminant monitoring in fish, it will be an important complement to it.

Applications for 1991 Knauss Fellowships Now Available

All students in New York State who are currently in a master's, doctoral or professional program of a marine- or Great Lakes-related field are eligible to apply for the 1991 Dean John A. Knauss Marine Policy Fellowship.

The program selects highly qualified applicants and matches them with "hosts" in Congress, the Executive branch, or appropriate associations or institutions located in the Washington, DC area for a one-year fellowship. The experience will enable the successful applicant to participate in the decision-making process as it relates to the development of marine policy at the Federal level. The Knauss Fellow will receive a stipend of \$24,000 along with reasonable transportation and moving expenses. Applications must be received at the Institute's office no later than September 7, 1990. For further information please contact Ms. Ruth Tompkins at (516) 632-6905.

COASTLINES Vol. 20 No. 1

Coastlines is published quarterly by the New York Sea Grant Institute, a cooperative program of the State University of New York and Cornell University. Address all comments to:

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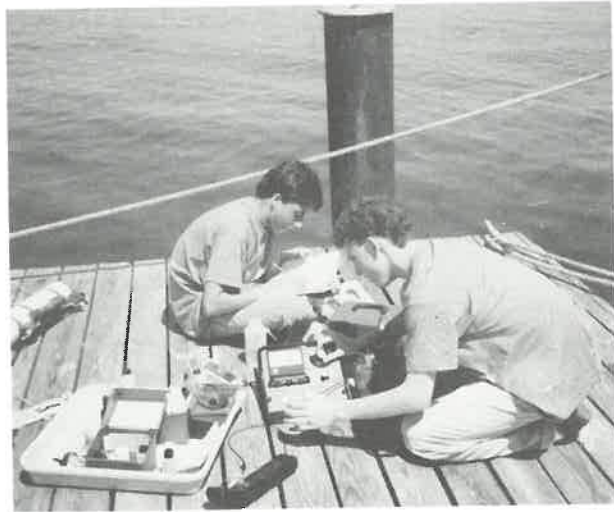
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STUDENTS BRINGING SCIENCE TO THE SOUND



Students preparing to take water samples of Long Island Sound. Photo courtesy Jim Cunningham

The SEA members meet after school and are monitoring water quality at two sites they surveyed and selected in Oyster Bay.

Working with Jim Cunningham from Cornell Cooperative Extension of Nassau County, Melissa Beristain of the Sea Grant Extension Program, and Chock, SEA participants are learning about the ecology of the Long Island Sound estuarine environment and the importance of monitoring specific indicators of environmental health to learn about ecosystem reactions to human activities.

Sea Grant provided funds to purchase LaMotte water quality test kits which the students are using to measure pH, nitrates, phosphates, dissolved oxygen and other factors. These indicate whether pollutants are affecting the marine environment. Water pH (acidity) can be influenced by acid rain and industrial processes, and changes can harm marine life. Nitrate and phosphate levels can reflect the presence of or-

ganic pollutants. Increased levels can lead to an overgrowth of algae and the removal of dissolved oxygen from the water. Low levels of dissolved oxygen stress or kill marine organisms, and have been an ongoing concern in Long Island Sound.

Student enthusiasm for the project has been high, and Chock is hopeful that the SEA program will continue throughout the summer and into the next school year.

Over a period of time, with data collected on these and other environmental indicators, such as fecal coliform (bacterial contamination), the students will be able to identify any changes that occur. Information on these changes would have potential application by health departments, soil and water conservation agencies, and other entities in a position to take action, and would be made available to these organizations. So, in monitoring water quality, students are actually taking a step toward protecting the environment.

There are also plans to have the students learn about mariculture—the cultivation of shellfish (or other marine organisms)—from Suffolk County Marine Extension Agent Chris Smith and the Flowers Oyster Company, which is located in Oyster Bay.

of working with young people, teaching outdoors. You know your kids better than anyone else. Experiment. Here are some things I've done:

Kids love "hands on." Water and youngsters go hand-in-hand. Take them to a nearby stream. Before (and during) the time they are getting completely soaked, encourage them to look at the many critters in the stream. A kitchen strainer or old window screen will help. Talk about the variety of things in the water. A lot of them are little insects that grow up to be big insects that the kids already know (metamorphosis!). They'll learn that different things live in different places (habitat!). These creatures have gills and breathe—but how does the oxygen they breathe get into the

Continued on Page 7

SAREP: Providing Youngsters Hands-On Learning

It had been a long week for volunteer Tom Healy. Working a regular 9-to-5 job brings more than its share of stress. But when you are responsible for repairing high-tech hospital equipment, on call day and night, the pressures can become extreme. That may have been one reason why Healy decided to go back to camp for the weekend. The other was to take part in a new volunteer program to teach youngsters about coastal ecology through recreational activities like fishing.

For the past several years, Healy has been involved with the Master Angler program aimed at teaching youngsters how to fish, helping them to identify different fish, and showing them how to make their own lures and rods. The program was conducted in libraries, 4-H Clubs and youth centers throughout Long Island. And while it is difficult to estimate just how many youngsters Healy has reached over the past three years, a couple of hundred would not seem too farfetched.

"The Sportfishing Aquatic Resources Education Program, or SAREP, is a refinement of the Master Angler program," explained Bob Kent, New York Sea Grant Extension's marine district program coordinator. "What we have tried to do is expand the Master Angler program, not only by having experienced volunteer fishermen like Tom teach the kids to fish, but also by giving them a better understanding of how the aquatic environment works."

Working jointly with the State's Department of Environmental Conservation, which funded a new training manual and workshops that included about 100 volunteers statewide, Kent, along with county 4-H specialists, provided an intensive two-day training course for twenty volunteers in the Long Island, New York region.

The 4-H camp in Riverhead is located in



A youngster digging for seed clams learns about ecosystems from the bottom up. Photo courtesy Robert Kent

a peaceful, semirural section of Long Island's East End. Tom Healy drove east along Sound Avenue, passing the Cornell Cooperative Extension office, which is located at the Long Island Horticultural Research Laboratory, on the right. And just beyond that was the road leading north to the camp. For one fine weekend last fall this beautiful 100-acre site, high on a bluff overlooking Long Island Sound, would be home for Healy and his fellow volunteers.

Men and women, from homemakers to lawyers, were among the participants. These people had seen announcements about the program in regional fishing publications.

"The training was very comprehensive," explained Kent. "All the participants received a teaching manual that they will use to teach sportfishing and a concern for the aquatic environment."

"We ran them through the different lessons that were in the teacher's manual, covering such topics as marine ecology,

freshwater stream ecology, and sampling marine organisms," Kent related. "Then we went through some of the sections on how to teach fishing, with the goal of trying to make this as much a hands-on process as possible."

Each participant was responsible for making his or her own lesson plan, which was presented to the group—while the participants pretended to be a bunch of kids. Clearly a formidable challenge.

Once the training was completed, the participants became certified as SAREP instructors with the initial goal of starting fishing clubs within their own communities by working with the 4-H agent within each county. "They can also work with their town recreation departments, through libraries, through fishing clubs, and within the schools," Kent related. "Then, during the course of the year, the goal is to run the kids through the curriculum by taking them on fishing trips. During these trips the instructor will teach them about freshwater and marine ecology and about fisheries management issues, while at the same time teaching them good sportsmanship and ethics," he said.

"There are a lot of things that can be done by the water other than just teaching the kids how to fish," Tom Healy said. "Like helping them to understand aquatic entomology [the study of insects], and identifying shore birds that they may not normally see. We can also stress more of the environmental impact of their activities to the kids, even on a basic level, such as: If you don't throw your cups and cans in the water and don't pollute, there will be more fish."

"Let's face it," concluded Kent, "With the limited resources that are currently available, we can reach out to so many more kids through this type of program."

boiling it down, you can show children how syrup and candy are made and how much water is in the sap.

I've always been fascinated by the stars.

Continued on Page 8

TEACHING SCIENCE TO YOUR KIDS



By Dave Greene, Sea Grant Extension Specialist

As part of the do-it-yourself activity we call parenting I've always tried to share my love for the outdoors with my kids. I'm not sure why—probably because the wonders of nature excite me and I want to share this excitement with them.

I've got two kids, now aged seven and ten. Ever since my son (he's the older one) was born, I've pointed out such things as bird songs or clouds: the kinds of things you might see while wrestling in the backyard. I've continued to do this with my little girl as we do things together. Teachers, and in this case, outdoor educators, like

to call this the teachable moment. I'm not really sure whether any of it has sunk in but it does seem to me (fatherly pride?) that the unending stream of questions that the young ones ask has started to make sense.

Maybe the *why* of nature is what I enjoy, but it's not only fun to get children to think about things. I think that learning about nature also gives the kids a positive attitude. I hope that they will grow up to be better stewards of the earth than we adults have been. I'm always amazed at how resilient nature really is. Look at Lake Erie. A few years ago, it was written off as dead! Now, with better management practices, it is one of our greatest resources.

What kinds of nature activities can you do with your kids? I can tell you what I have done with mine, and the kids that I've come in contact with during twenty years

TEACHING SCIENCE

Continued from Page 7

In the winter the sky is often clear and stars are available to see before a little one's bedtime. There are always the Big Dipper, the Little Dipper and the North Star. Orion, the mighty hunter with a distinctive "belt" of three stars, can be seen. Often a planet will present itself for study. With a pair of binoculars you can sometimes see Jupiter's moons and can see that moons and planets are round and don't "twinkle" like stars. Just recently my kids and I received an added bonus from this shared activity. While I was explaining where Taurus was, suddenly the sky was lit up by the most fantastic meteor I've ever seen. The next morning on the national news we learned the meteor was seen by people all over the

East Coast. This kind of experience is something that may last your kids a lifetime!

Much of the exploring that I have suggested can be done in your own back yard or near your home, but don't neglect the many wonderful sights that can be found all over New York. Take a trip to Niagara Falls, the Thousand Islands, Jones Beach or Montauk. Go for a walk in one of our terrific county parks. Answer your child's questions as best you can, but don't be afraid to say that you don't know an answer. You can make an activity of going to the library and looking it up together.

We're still growing and as I talk to my kids today I see that some of what we've discussed has sunk in. Of course, some hasn't — but by encouraging their natural curiosity and by helping them to find answers for themselves through libraries, I am giving my children a foundation that will help them in school — and, I hope, in life.

SEA GRANT/WCBS RADIO'S EARTH GUIDE OFFERED

While the 20th anniversary of Earth Day has come and gone, the Sea Grant/WCBS Radio *Earth Guide: 88 Action Tips for Cleaner Water* is here to stay (while supplies last).

The 24-page booklet, written by Melissa Beristain, New York Sea Grant regional extension specialist, contains useful information describing how every individual can take responsible action in the battle against water pollution.

The guidebook, which is completely user-friendly, was a cooperative effort of WCBS News 88 and the Sea Grant Programs of New York, New Jersey and Connecticut, and is available from New York Sea Grant's Communications office at (516) 632-6905. Single copies are free.



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