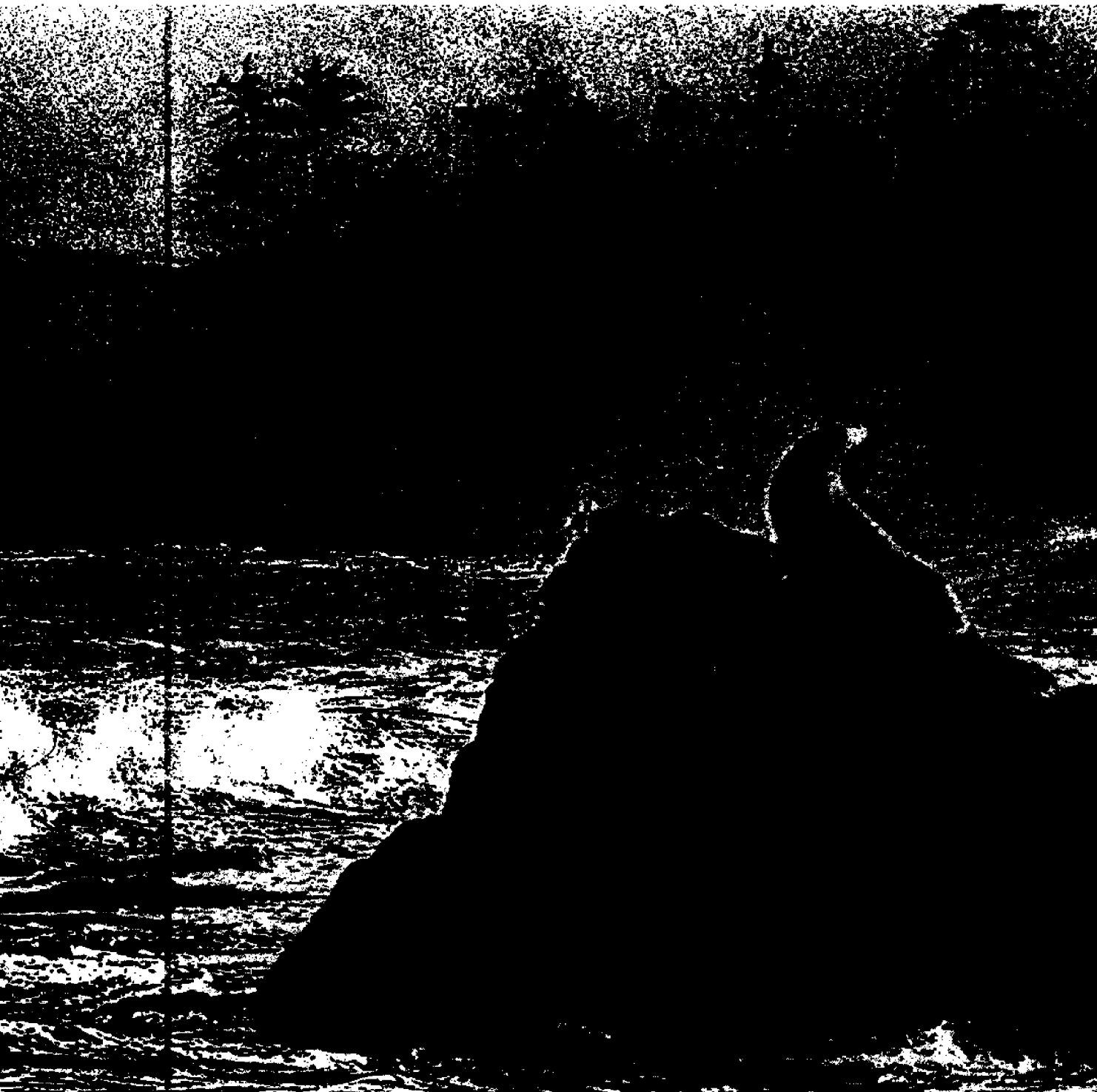


Sea Grant's Marine Advisory Service

Looking to the Future

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**"For all at last return to the sea. . .
like the ever-flowing stream of time, it
is the beginning and the end."**

*-- Rachel Carson, *The Sea Around Us**

Why not do for the culture of the oceans what rose men did for the bell? substitution of the 19th century? Why not have sea-ward colleges?

Land Grant universities have existed since 1862. But it wasn't until 1966 that the same concept of university-based research and advisory service was applied to our water resources.

In its 25-year history, Sea Grant has made the study of the oceans and Great Lakes a national priority. Sea Grant's goal is to preserve and enhance our nation's ocean, coastal, and Great Lakes resources. Like Land Grant, Sea Grant addresses these needs through research, education, and technology transfer by scientists and advisory service staff.

The Marine Advisory Service (MAS) provides outreach and technology transfer for Sea Grant. In short, MAS staff take complex information and teach people how to use it to solve problems. MAS agents, specialists, and communicators work at colleges and universities in every coastal and Great Lake state, plus Puerto Rico.

● Within hours of the Exxon oil spill into Prince William Sound, an Alaska Sea Grant MAS agent helped mobilize fishermen and equipment to protect some of the world's most productive salmon hatcheries.

● When record high water levels hit the Great Lakes in the mid-1980s, Sea Grant MAS helped communities and property owners prevent massive damage. Agents also explained to an exasperated public why short-term control of the lakes was impossible.

● When huge amounts of plastic garbage started killing birds and sea mammals, Sea Grant MAS worked with ports, commercial fishermen, recreational boaters, plastic producers, and Congress to reduce large-scale dumping of plastics at sea.

These stories show how Sea Grant MAS helps solve major environmental problems. Every day, we are faced with more complex choices in how we manage our natural resources.

The public demands cleaner water, better fishing, safer seafood, and a view of the beach instead of the condo next door. Our ability to deal with these issues depends on how we study and solve the growing problems of pollution, global warming, overfishing, and inappropriate development of wetlands and beaches.

Can we finally improve—instead of degrade—our oceans and Great Lakes, and all the life that depends on them? By using Sea Grant to its full potential, the answer is yes. For Sea Grant is uniquely designed to take on this task. Its researchers are some of the country's best at identifying and studying natural resource problems. Sea Grant's MAS staff show us how to use this research to solve the many problems facing our environment.





Salmon netting in Alaska



Above: A view of the beach loses its appeal when hotels and condos are built too close to the water.

Below: America's wetlands are vanishing as new development takes over coastal areas.

Today, these problems are increasing at an alarming rate. For example:

- More Americans are moving to the coast each year, creating demand for new homes and development that cause erosion, reduce water quality, and destroy wetlands.
- Pollution of our oceans and Great Lakes harms fisheries and human health. People don't know which fish are safe to eat or whether they should swim at their favorite beach.
- The United States' influence is declining as a producer of manufactured goods. Yet there is a huge—and unmet—foreign demand for our knowledge, especially in fast growing water-related industries. These include aquaculture, marine biotechnology, and pollution control.

- Demand for fresh seafood and fish is skyrocketing, yet we have a limited supply. Disputes between sport and commercial fishermen and environmentalists increase as fisheries are stressed as never before.

Solving these problems requires both research to develop solutions and an informed public to support and pay for it. Sea Grant works with any group in need of information, from large industries to small communities. In New York, Sea Grant worked with Kodak and other major corporations to improve water quality in Lake Ontario. On the east and west coasts, Sea Grant helps small coastal communities evaluate their potential for waterfront development. In the state of Washington, Sea Grant educates port managers on how to stay competitive in international markets.

Sea Grant MAS works to:

- assist industries that depend on the oceans and Great Lakes, and
- promote the wise use and conservation of these resources.

Sea Grant programs deal with regional problems and issues, drawing from a national pool of experts with diverse skills. This makes Sea Grant MAS effective at solving local, regional, and national problems. Plus, Sea Grant provides needed leadership to deal with new problems as they arise.

PLASTIC DEBRIS

Plastic in the oceans is a worldwide problem. Discarded fishing nets drown mammals, fish, and birds. Long after they are lost or discarded, crab pots and gillnets continue to kill fish. Oregon Sea Grant MAS reduced plastics in the ocean by urging commercial fishermen to return plastic garbage to port instead of dumping it at sea. Their success led the National Marine Fisheries Service to fund Sea Grant's garbage disposal project at the Port of Newport. It was so successful, it is being promoted at other Pacific coast ports.

MARINE HABITAT

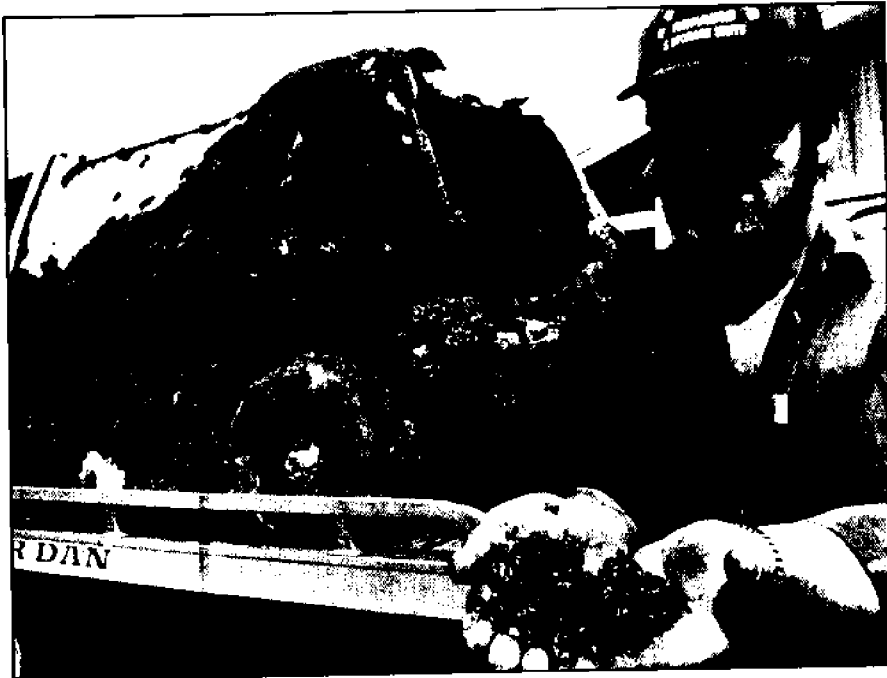
Wetlands are disappearing at an alarming rate, causing a loss of habitat for waterfowl and fish. Texas Sea Grant MAS and the U.S. Soil Conservation Service organized grass plantings along the Texas shore to replace valuable wetland habitat and slow erosion. Sea Grant also helped create a park out of marsh that was damaged by chemical companies. The companies and the Texas Parks and Wildlife Department funded development of the 31-acre park.

GLOBAL CLIMATE CHANGE

Global climate change can be slowed by changing consumer behavior. Yet the public gets conflicting messages as scientists debate whether the Earth is warming and how fast it is happening. Young people, especially, need information to help them change habits that contribute to climate change. Sea MAS programs, led by Hawaii and Washington Sea Grant, are beginning a national education campaign to tell young people and the public how they can reduce damage to the environment.

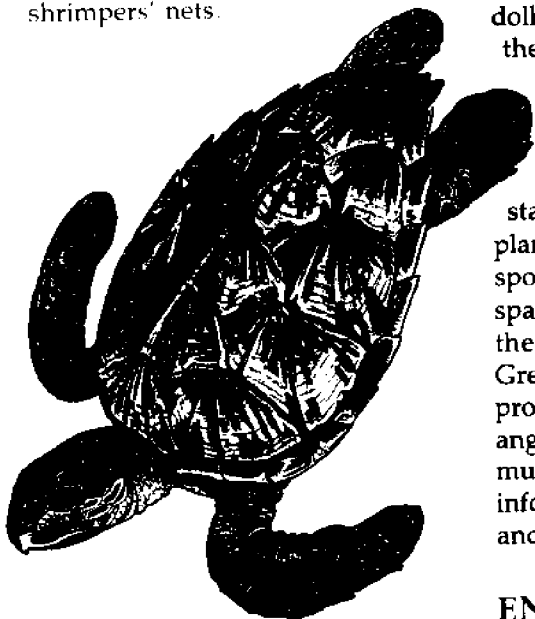


Seals and birds are common victims of plastic garbage floating in the oceans.



Above: Zebra mussels find a new home in Lake Ontario.

Below: Sea turtles often drown in shrimpers' nets.



EXOTIC SPECIES

Zebra mussels are considered one of the most destructive exotic species to ever take hold in this country. The mussels are rapidly infesting the Great Lakes and are expected to cause billions of dollars in damages. Introduced in the ballast water of ocean-going ships, the mussels reproduce very quickly, clogging intake pipes serving industries, cities, power generating stations, and water treatment plants. They may also ruin sportfish habitat by colonizing spawning reefs and reducing the fish's food supply. Great Lakes Sea Grant MAS programs work with boaters and anglers to slow the spread of the mussels. They also provide information on the latest research and control options.

ENDANGERED SPECIES

Five species of endangered sea turtles live along the east and Atlantic coasts. The fact that

many sea turtles drown in shrimpers' nets has created hostility between shrimpers and activists who want to protect the turtles.

The Turtle Excluder Device (TED) allows turtles to escape by diverting them to a trap door or hole in a shrimp trawl. Georgia Sea Grant and other MAS programs in the region provided technical advice to the National Marine Fisheries Service, which developed TEDs. Sea Grant then taught shrimpers how to use TEDs to release turtles, while keeping most of their catch.

SOLID WASTE

Fish waste from commercial and sportfishing adds up quickly to create tons of smelly garbage. Like all garbage these days, it is expensive and difficult to dispose of properly. Sea Grant MAS programs across the country have shown managers of marinas, resorts, and fishing docks how to compost fish waste with peat, wood chips, and other materials. The resulting compost is high quality, and will dramatically reduce waste disposal costs.

Some fish waste is so valuable, it has launched new industries. Chitin is a substance found in the shells of shrimp, crabs, and lobsters. For years, it was thrown away in billions of tons of seafood waste. But in 1969, a Washington Sea Grant MAS specialist put a seafood processing company in touch with researchers. After years of Sea Grant research at seven universities, an incredible range of uses have been found for chitin, including: boosting the nutritional value of animal feed, bandaging wounds, filtering sewage from water, and increasing wheat production.



A volunteer jumps in frigid Lake Superior in a Sea Grant study on how long people can survive in icy water.

SAVING LIVES

"We had five minutes from the time we knew we had a fire, until the wheelhouse was engulfed in flames and we made it to the life raft."

Kris Boehmer, captain of a 73-foot fishing boat, got his crew off the boat in time because he knew what to do. He was trained through a Rhode Island Sea Grant workshop on fishing safety. Boehmer's experience shows how dangerous it is to work on the oceans and Great Lakes. In fact, commercial fishing has the highest job-related death rate of any U.S. industry.

Providing safety training and education to fishermen is difficult since they often live and work in remote locations. An Alaska Sea Grant agent found a solution; he trained local residents in these remote areas to teach safety to fishermen in their communities. Their training has been so successful, the program is being used as a model for safety education throughout the U.S.

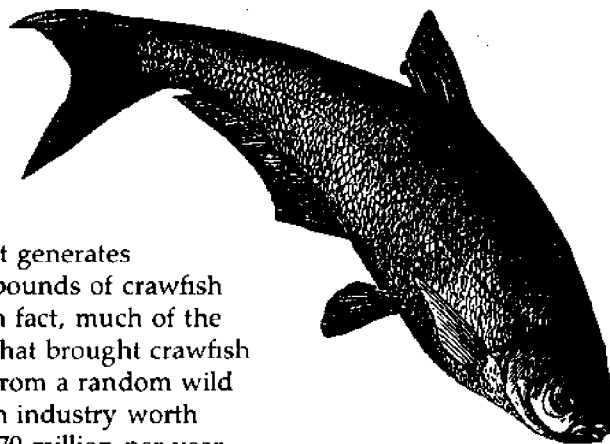
Hypothermia kills many fishermen and oil rig workers as well as people who sail, boat, and fish for recreation. Michigan Sea Grant helped save at least 2,500 lives by discovering that many people who drown in cold water can survive. They found that victims submerged in cold water for up to one hour can be revived if they are properly resuscitated.

AQUACULTURE

Aquaculture—or fish farming—is the fastest growing sector in U.S. agriculture. Sea Grant was an early leader in this field and its work is showing dramatic results. Researchers and MAS staff have developed new techniques to produce fish and crustaceans and solved production problems to make the industry more competitive.

Louisiana Sea Grant solved a major production problem to

create an industry that generates 100 million pounds of crawfish each year. In fact, much of the technology that brought crawfish production from a random wild harvest to an industry worth more than \$70 million per year grew from Sea Grant research and MAS projects.



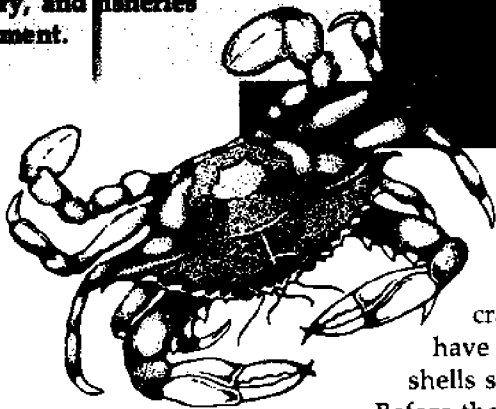
MINORITY EDUCATION

As the nation's population becomes more ethnically diverse, demand increases to educate new citizens. They need help learning business practices and American customs. Sea Grant fills this need through MAS programs and college scholarships.

Most Vietnamese fishermen tend to be isolated from their peers in the industry as well as from American culture. They rarely ask for information or assistance so they know little about customs and laws of our society, or about fishing safety.

Sea Grant MAS in Mississippi and California developed Vietnamese language programs to reach these fishermen. Agents successfully integrated the Vietnamese into the fishing industry, reduced conflict with American fishermen, and saved lives by teaching safe fishing techniques.

American Indians in Minnesota manage large portions of the state's natural resources on their reservations. Sea Grant's AIMS program (American Indians in Marine Science) trains Indians to manage their wildlife, fisheries, and aquaculture facilities. The first program of its kind, AIMS has trained 17 students who have gone on to careers as varied as medicine, chemistry, and fisheries management.



Soft-shell or "peeler" crabs are blue crabs that have shed their hard shells so they can grow. Before the new shell hardens, most of the soft-shell crab is edible. Until recently, producing "peeler" crabs was possible only

in a small area in Virginia. Through Sea Grant's improvements in production, the industry has expanded to the entire east and gulf coasts. Now Sea Grant MAS is exporting "peeler" technology to Japan, Turkey, and Europe. It expects to do the same with soft-shell crawfish.



Demand for crayfish and other crustaceans is expanding worldwide.

INTERNATIONAL TRADE

The United States imports over half of the fish we eat, which contributes to an annual \$7 billion trade deficit in fish products. Aquaculture is becoming more important to international trade, thanks in large part to Sea Grant.

Until recently, the Japanese bought little U.S. tuna because the meat was so poor it was unacceptable for their raw fish market. East coast Sea Grant MAS programs taught fishermen different techniques to keep their tuna fresh. As a result, thousands of tuna fishermen do a better job of handling their catch and U.S. exports of fresh tuna have increased from \$300,000 to over \$2 million in the past five years.

ECONOMIC DEVELOPMENT

Fish are more than a product to buy and sell. Today, selling the services and attractions to catch

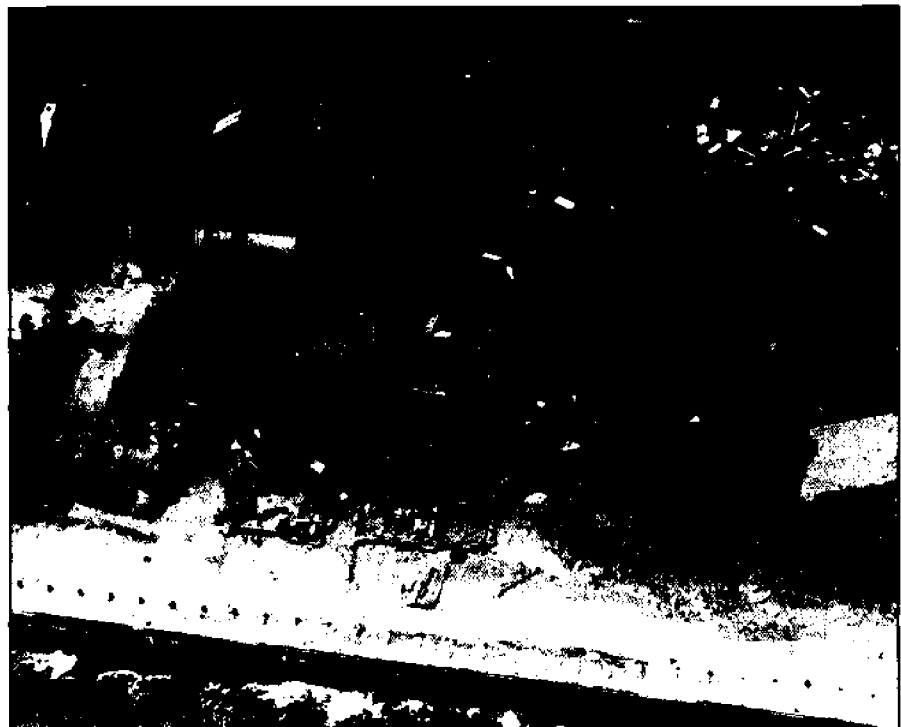
fish is equally important to our economy. Sea Grant is a leader in helping communities promote fishing for economic development. Sea Grant MAS helped the Great Lakes charter fishing industry grow from a tiny

business to one of the most successful, popular tourist activities in the six state area. It now generates \$100 million a year in economic benefits.

Artificial reefs improve sportfishing by providing shelter for fish. Florida Sea Grant MAS supplied much of the expertise for developing artificial reefs. Ohio Sea Grant MAS organized funding and provided advice to build the largest freshwater artificial reef in the world.

REDUCING COASTAL PRESSURE

As sport anglers, tourists, and new residents are drawn to the coast, they create new stresses on communities and the environment. By advising local agencies, governments, and developers on how to protect the coast, Sea Grant MAS reduces environmental damage caused by poor development and overpopulation. For example, Maine and New Hampshire MAS



Most homes were destroyed by Hurricane Hugo because of poor construction and inadequate code enforcement, according to a Sea Grant MAS study.

THE VALUE OF OUTREACH

Until recently, Long Island Sound was full of life. It was a major fish spawning ground; home to lobsters, clams, mussels, blue crabs, and oysters; and a habitat for over 400 species of birds. Today the Sound's coastline is home to over 5 million people, 86 sewage treatment plants, and massive amounts of pollution. Much of the marine life is gone.

The Long Island Sound Study (LISS) was created to improve the Sound's water quality. LISS is a major research and management program funded by the EPA and its National Estuary Program. Sea Grant's regional network, plus its experience in outreach programs, makes it a valuable participant in LISS.

To succeed, LISS needs the support of taxpayers, who will pay for the six-year, \$6 million study. New York and Connecticut Sea Grant's effective outreach programming is making it possible to win public support for the project.



Striped bass, a fish common in Long Island Sound.

taught 75 local and state officials how to manage new development in fragile coastal areas throughout New England.

Hurricane Hugo showed the cost of bad coastal development.

Many homes were destroyed because of poor construction, lax building codes, and inadequate code-enforcement. A South Carolina MAS specialist found that well-built homes could have survived the hurricane. To reduce future destruction, the

MAS specialist developed a computer program on how to construct new buildings to withstand hurricanes.

People have built homes too close to the water for decades. Consequently, property damage from flooding and erosion is an increasingly expensive problem. Advice from North Carolina Sea Grant led to cost-effective changes in the National Flood Insurance Program. It now pays some of the cost of moving a house instead of waiting for it to be extensively damaged.

THE FUTURE

In the next 20 years, more and more Americans will go to the coasts to live and vacation. Year after year, we will put more pressure on our beaches, wetlands, fisheries, lakes, and oceans. Sea Grant's experience and expertise will help us develop and enjoy these resources without ruining them.

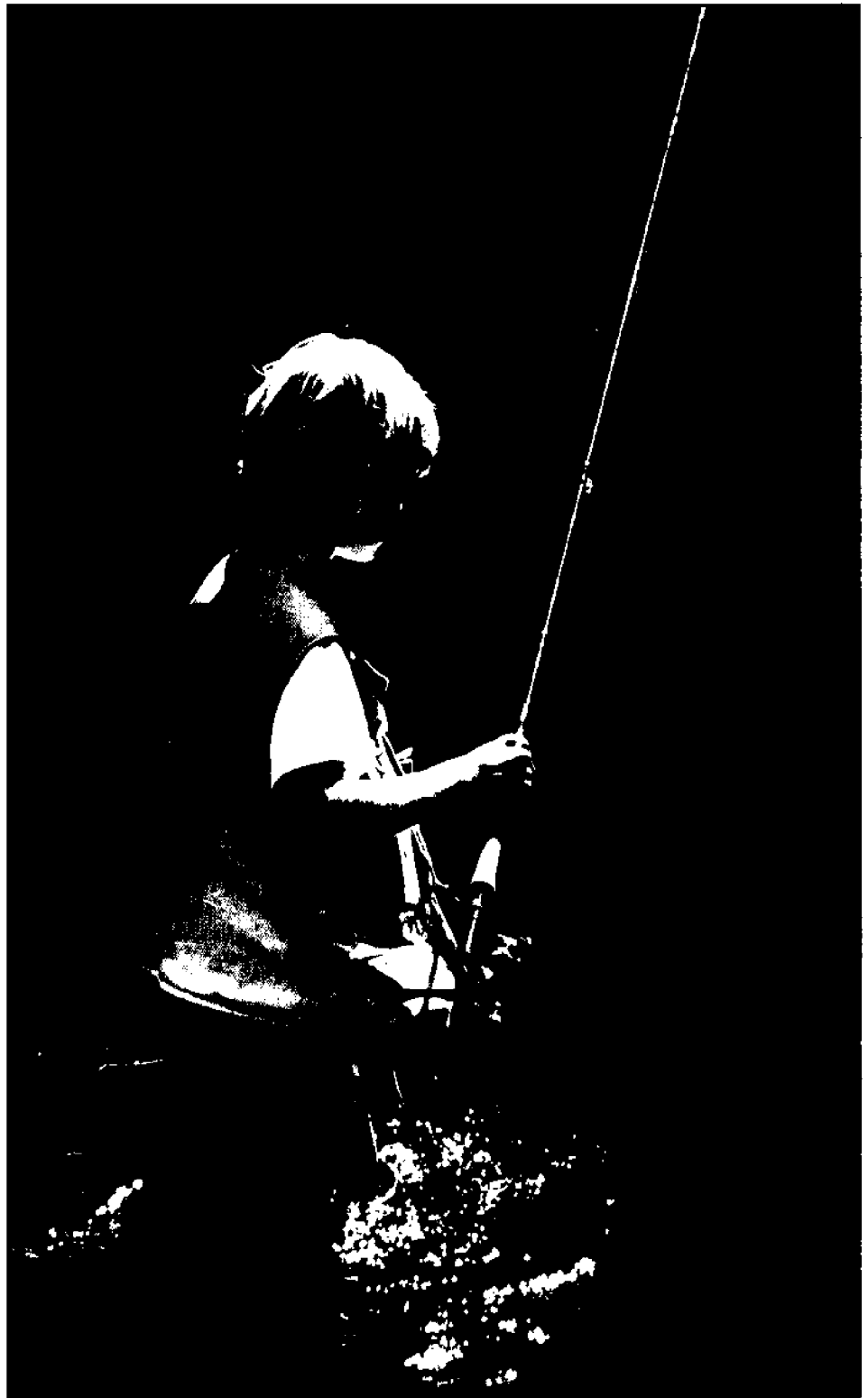
FOR MORE INFORMATION

Sea Grant reaches its audiences through workshops, conferences, brochures, videotapes, films, radio shows, and newsletters. For more information, contact your local Sea Grant program or the National Sea Grant office.

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or

Your local Sea Grant Program



Will our children have clean water and good fishing?

FUNDING

The National Sea Grant College Program is housed in the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Programs receive 58 percent of their support from the federal government. The rest comes from state appropriations, private sources, local governments, industries, and other federal sources.

MAS programs administered by universities' Cooperative Extension Service (CES) receive substantial funds from county and state governments to support agents in those counties.

MISSION

The mission of the National Sea Grant College Program is to increase the understanding, assessment, development, utilization, and conservation of the nation's ocean and coastal resources. Sea Grant provides assistance to promote a strong educational base, responsive research and training activities, and broad and prompt dissemination of knowledge and techniques. Twenty-nine Sea Grant Colleges and institutions serve as the core of the National Sea Grant College Program, which operates through a network of over 300 university and marine research institutions.

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PLEASE RECYCLE



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