

United States
Environmental Protection
Agency

Office of
Public Awareness (A-107)
Washington D C 20460

Volume 6
Number 5
May 1980



EPA JOURNAL



**YEAR
OF
THE
COAST**

The Coastal Dilemma

"Yet each man kills the thing he loves. . . ."—Oscar Wilde

In our eagerness to enjoy the sea wind's whistle, the surf's endless rhythm and the serenity of land's end, we have so crowded onto some of the loveliest coastal strips, particularly the barrier islands, that we may be destroying them.

The rapture of the lonely shore is increasingly difficult to find in summer as swarms of urban residents battle each other in long weekend skeins of traffic to reach the fresh breezes of the coast.

In this issue, EPA Journal examines some of the problems of this increasingly threatened vulnerable part of our environment.

An excerpt from a fine book, *The Thin Edge*, by Anne Simon helps put the coastal dilemma in perspective.

Administrator Douglas M. Costle describes some government actions to protect and restore wetlands and shorelines. Deputy Administrator Barbara Blum outlines the World Conservation Strategy.

Two Congressmen, Senator Ernest Hollings and U.S. Rep. Gerry Studds, discuss legislative solutions for coastal ills. Bill Painter, Director of the Coast Alliance, explains plans to celebrate the Year of the Coast which his organization is sponsoring.

Truman Temple, EPA Journal Associate Editor, describes EPA research activities designed to help preserve Chesapeake Bay. A photo essay shows what a magnet the shore has become to builders.

The National Oceanic and Atmospheric Administration and



the California Coastal Commission provide reports on actions to encourage shoreline protection.

Madonna F. McGrath, Director of EPA's Great Lakes National

Program Office, reviews some of the problems and prospects of The Fourth Coast—the Great Lakes.

A United Nations official re-

ports on progress being made to curb pollution in the Mediterranean Sea. A report from the Department of the Interior confirms that the barrier islands are a special and delicate ecosystem.

EPA JOURNAL

Douglas M. Costle, Administrator
Joan Martin Nicholson, Director, Office of Public Awareness
Charles D. Pierce, Editor
Truman Temple, Associate Editor
John Heritage, Chris Perham, Assistant Editors

Articles

EPA is charged by Congress to protect the Nation's land, air and water systems. Under a mandate of national environmental laws focused on air and water quality, solid waste management and the control of toxic substances, pesticides, noise and radiation, the Agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

Caring for the Shore 2

Administrator Costle describes some government steps to protect and restore wetlands and shorelines.

The Thin Edge 4

This excerpt from the book of the same name, by Anne Simon, is becoming a new classic for people who love the sea.

Protecting the Global Commons 8

Deputy Administrator Blum outlines the World Conservation Strategy for preventing further damage to the ocean.

Reordering Coastal Priorities 10

Senator Ernest Hollings reviews the legislative history of coastal zone management and issues that need further attention.

Choosing a Course 10

Congressman Gerry Studds looks at several major concerns relating to our Nation's shoreline and opportunities for the future.

Alliance for the Coast 12

Coast Alliance Director Bill Painter outlines some of the many activities planned to celebrate the Year of the Coast.

Managing the Shore 14

The Federal effort to encourage shoreline protection is described in this piece by Michael Glazer, NOAA Assistant Administrator for Coastal Zone Management.

A Gull's View 16

A pictorial sampler of human impact at land's end.

The Chesapeake: Beautiful and Vulnerable 18

Truman Temple describes EPA research activities in the Tidewater region.

The Fourth Coast 22

The Director of EPA's Great Lakes National Program reviews some plans for improving the future of America's inland seas.

California Coastal Management 25

California has one of the Nation's most comprehensive programs for shoreline protection, as seen in this round-up of actions by the State Coastal Commission.

Fact Sheet 27

A listing of details about the coastline.

Rocking the Cradle of Civilization 28

A look at the impressive progress made by UNEP in uniting countries to protect the environment of the Mediterranean Sea.

A Fragile Balance 36

A study by the Department of the Interior confirms that the barrier islands hugging our eastern and southern shores are a special and delicate ecosystem.

Departments

Nation 30
News Briefs 33

Update 34
People 36

Almanac 40

Cover: These bathers, jammed together on Jones Beach, an ocean shore on Long Island near New York City, illustrate the intensive use which is damaging many coastal areas. (See article on P. 4)

Opposite: Wildflowers flourish on the cliffs along California's Big Sur Coast. (See article on P. 25)

Photo Credits: Bert Miller/Black Star, Ed Cooper, Steven Foss, U.S. Coast Guard, Dick Rowan*, Georgia Dept. of Industry and Trade (Tourist Div.), Pat Weill/Coast Alliance, NOAA/Ted Butts, Md. Fisheries Extension Service, Chesapeake Bay

* Documerica

The EPA Journal is published monthly, with combined issues July-August and November-December, by the U.S. Environmental Protection Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget.

Bridge Tunnel, Md. Dept of Economic and Community Development/Office of Tourist Dvlpt., Donald Emmerich*, Robert Perron, Dick Rowan*, Gene Daniels*, PUBLIFOT/WHO, The Washington Post, The Santa Barbara News Press, John Vachon*, U.S. Geological Survey, Dennis Hart

Design Credits: Robert Flanagan, Donna Kazaniwsky and Ron Farrah.

Views expressed by authors do not necessarily reflect EPA policy. Contributions and inquiries should be addressed to the Editor (A-107), Waterside Mall, 401 M St., S.W., Washington, D.C. 20460. No permission necessary to reproduce contents except copyrighted photos and other material. Subscriptions: \$12.00 a year, \$1.20 for single.

copy domestic: \$12.00 if mailed to a foreign address. No charge to employees. Send check or money order to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20540.

Not printed on recycled paper.



CARING FOR THE SHORE

By Douglas M. Costle
EPA Administrator

The Year of the Coast, which we are now celebrating, has been a-borning for a long time. As in so many other aspects of the environmental movement, we owe a debt to Rachel Carson for raising public awareness of our coastal treasures. In 1951 her literate and scientific tour of the mariner's realm was published as *The Sea Around Us*. She followed it with *Under The Sea Wind* and *The Edge of the Sea*, capturing the interest of millions of Americans, and by her perceptive insights pointing out the problems.

One major aspect of our coast are the wetlands, and we have made substantial progress in legislation at both the State and national levels to prevent the unchecked despoliation of these areas by dredging, bulldozing, and pollution.

Today almost all coastal States have tight restrictions on the use of wetlands. At the Federal level, we are beginning to implement some realistic solutions to the problem of vanishing wetlands, after a long struggle with the Corps of Engineers to define objectives and purposes. In the course of passing the Federal Water Pollution Control Act of 1972 and the Clean Water Act Amendments of 1977, we found that there were reasonable processes for protecting these coastal assets.

State and Federal controls on coastal areas have come none too soon. Nearly half of the original wetlands in the United States are estimated to have been lost through human activities. Our voracious appetite for land has filled the swamps with bulldozers and dotted the marshes with high rises so one family could have a beautiful view of another family's balcony. We devoured wetlands as we ate potato chips—never stopping at one.

Yet our coastline is limited. Its very scarcity and esthetic appeal of waterfront locations for a variety of purposes

has intensified developmental pressure. Up until a few years ago, all this seemingly ignored the value—both biologic and economic—of our coasts.

What is the biological merit of this long, green coastal fringe, this mixture of marsh, tideland, swamp, salt meadows, and estuary? Why would anyone want to save it? When one looks back in history, it seems as if the world's marshlands generally have always gotten a bad press. The general reaction has been to eliminate them wherever they were. The Russians in the 19th century dug some 3,000 miles of canals trying to drain the Pripet Marshes. In Italy, it was one of Mussolini's proudest boasts that he drained the Pontine marshes south of Rome. And the process was repeated elsewhere. As Dr. Kai Curry-Lindahl, a noted conservationist, has put it, Western countries have suffered from an "obsession with drainage" of their wetlands.

But these curiously fragile lowlands contribute in immense and subtle ways to our environment. More than half of us live within an hour's drive from a major coastline of the United States. In addition to the millions of people who live in coastal counties bordering the oceans, Great Lakes, and Gulf of Mexico, millions more vacation there. Thus the fate of the coastal environment directly affects the majority of U.S. citizens. Indirectly it affects all of us. One third of the air we breathe is recycled for us by phytoplankton, creatures that perform in the ocean the same photosynthetic function that green plants do on land. The world fish catch supplies at least 10 percent of mankind's animal protein. And the 10 percent of the ocean's area near the shore is critical to maintaining that protein supply. Most commercial fish depend on coastal waters for life support at some stage of their lives—for food, for spawning grounds, or for nurseries for their young. By contrast, the open ocean far from land is a biological desert.

To anyone but a biologist or bird-watcher, a salt marsh at low tide—with its mud, mosquitoes, coarse grass, and smells of decomposing plants—might seem an environment we could cheerfully dispense with. Yet such places are the

center of a great web of marine life. Scientists have found they are among our most precious natural resources. Wetlands, especially the salt marshes and mangrove swamps and sheltered estuaries, are twice as productive biologically as fertile farmland. Professor Eugene Odum of the University of Georgia, (*EPA Journal*, April 1980) has calculated that they produce 20 times as much plant material as the open sea, 2½ times as much as temperate forest, and fully as much as a tropical jungle. Indeed, a tidal marsh is one of the most productive sources of organic food on Earth. Its grasses average 10 tons of animal food per acre, compared with a world average for wheat of 2½ tons per acre.

But their value does not stop there. Coastal marshes are the foundation of the food chain on which most commercially important coastal fish and shellfish depend. Without them, our fishing industry would be drastically shrunken. In addition, coastal wetlands soften the battering of waves and serve as a kind of giant sponge to absorb Nature's incessant storms. Their long grasses also stabilize the shoreline, and act as filters to trap sediments carried in farmland runoff, thereby clarifying waters.

A few years ago Professor Odum and others made some interesting calculations about the value of coastal wetlands as fish nurseries, suppliers of food, waste-treatment plants, and other contributions to marine ecology. On this basis, they estimated that the average marshlands along the South Atlantic and Gulf coasts were worth \$50,000 an acre, and that the best were worth \$82,000 an acre. So in hard economic terms, there is little reason to dispute that marshlands need to be protected as life-support systems.

I have mentioned that numerous States have passed legislation to preserve coastal wetlands. Already one can see the impact of these new laws. Before the Maryland Wetlands Act of 1970, for example, the Chesapeake Bay had been losing 1,000 acres of wetlands a year to development.

Continued to inside back cover

Globs of oil from the well blow out in Campeche Bay in the Gulf of Mexico stained beaches on South Padre Island last summer. The well has since been capped and EPA and other government agencies are working together to minimize the environmental effects of the oil.

THE THIN EDGE

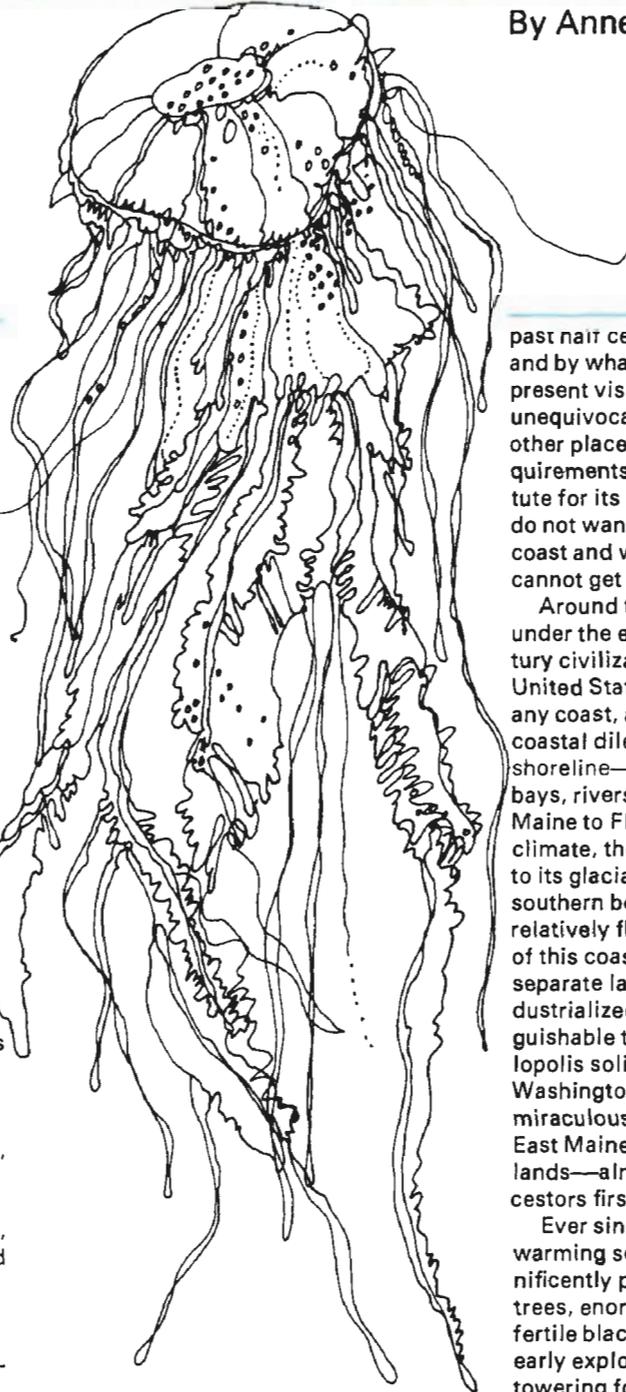
By Anne Simon

The coast, that bright thin edge of the continent where you can sit with your back to the crowds and gaze into seemingly infinite space, is now a theatre of discovery. On the seashore where terrestrial life began, we have to use all the wits man has developed to figure out how life can continue, how to design our complex, fast-moving, energy-consuming existence without destroying nature's system of life support in the process. It is a compelling adventure. Wherever it leads, neither man nor coast will be the same again.

Survival on land and in the sea depends on a functioning coast. The coast keeps us from drowning, maintaining the present global balance of one-third land, two-thirds water. It nurtures fish and shellfish, birds and plant life, as it nurtures the ocean, the essential source of a third of the world's oxygen, the largest source of its protein. Its multiple processes are arranged in dozens of natural systems with myriad parts, each neatly slotted into an operation as sophisticated as the latest computer, as intricate as a vast jigsaw puzzle. Its abilities are exquisite in their detail, awesome in their grand accomplishments.

Universally we yearn for the coast with an inexplicable need for its serene horizons, for the endless, timeless rhythm of waves on rough rocks or smooth beaches, for the amplitude—plenty of sand, water, seagulls, seaweed, a harvest of sea-worn pebbles and minute sea animals in every wave. Here where the sea is shallowest, land is lowest, rivers slowest, there is dynamic interchange between water and earth, a phenomenon often believed to make passions run higher, emotions keener, the sense of well-being quickened. We come closer to our primitive selves on the thin edge, at once nurtured and excited by it.

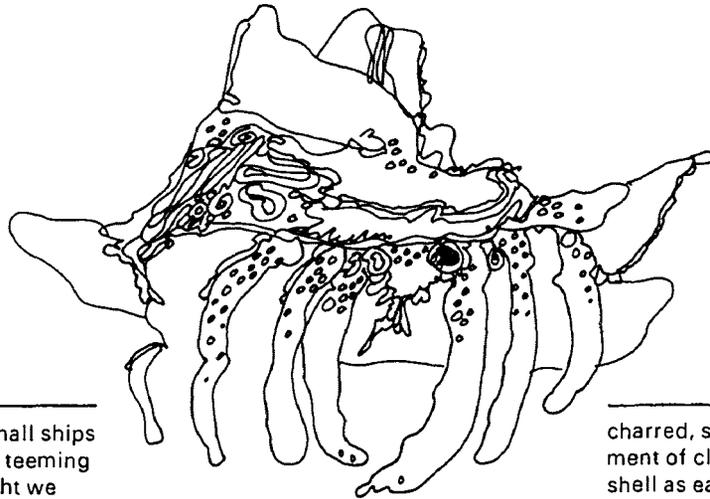
Ever-obliging, its generous compliance has provided poetry, joy, convenience and profit. But now we glimpse its deeper nature, stern, inflexible, firm in principle and in its limits. Innocent use has been cut short in the 1970's by what has been discovered about the coast, most of it in the



past half century, much in the last decade, and by what is tantalizingly beyond our present vision. The existing information is unequivocal; the coast is different from any other place on Earth and has different requirements. There is no man-made substitute for its manifold natural functions. We do not want to get along without a working coast and we now realize that we literally cannot get along without it.

Around the globe, coast functions falter under the encrustations of twentieth-century civilization. The east coast of the United States is vividly representative of any coast, anywhere, magnifying every coastal dilemma in its 28,000 miles of shoreline—coast, offshore islands, sounds, bays, rivers and creeks—stretching from Maine to Florida, from rigorous to tropical climate, the rocky northern shore testifying to its glacial past, the long stretches of wide southern beach, having escaped the glacier, relatively flat. Thirteen States have a slice of this coast under their domain and separate laws. It is heavily developed, industrialized, crowded, with hardly distinguishable towns wedged into the megalopolis solidifying between Boston and Washington, although there are, almost miraculously, still a few places—Down East Maine, some of Georgia's barrier islands—almost as they were when our ancestors first set eyes on their virgin marvels.

Ever since the last Ice Age gave way to a warming sea, the coast had been a magnificently productive system. Enormous trees, enormous quantities of fish and fertile black soil on the Maine coast amazed early explorers. The few remnants of the towering forests are remarkable today where they have survived, mementoes of a time when they covered the shore: "... goodly tall Firre, Spruce, Birch, Beech, Oke very great and good," says James Rosier, clerk on Sir George Waymouth's *Archangel*, sailing on a fair June day in 1605 past Monhegan Island, "a meane high land," to George's River "as it runneth up the maine very nigh forty miles toward the great mountains." Upon the hills, Rosier says, "notable high timber trees, masts for ships of 400 tons."



The adventurous men in their small ships were no less amazed by the waters teeming with huge fish of all varieties, a sight we can only imagine. "While we were at shore," Rosier relates, "our men aboard with a few hooks got about thirty great Cods and Haddocks, which gave us a taste of the great plenty of fish which we found afterward wheresoever we went upon the coast." The *Archangel* found "Whales, Scales, Cod very great, Haddocke great, Plaise, Thornbacke, Rockefish, Lobster great, Crabs, Muscles great with pearls in them, Tortoises, Oisters"—the list is long. Haddock and lobsters were so thick in the waters that some fishermen scooped them out with a bucket, salting them down in the hold for the long voyage home.

Even the much-traveled Captain John Smith was impressed. "Besides the greatness of the timber . . . the greatness of the fish and the moderate temper of the air," he writes, "who can but approve this a most excellent place for health and fertility?"

We can still see something of this excellent Maine coast. So too on a few remaining wilderness islands to the south, lush and semitropical, there are still wide sand beaches which sweep into a protecting line of dunes, while, behind them, gargantuan live oaks, pines, and palms combine in a primeval forest, an enchanting world apart. When Giovanni da Verrazzano, still searching for the way to Cathay, explored this coast in 1524, wilderness was everywhere.

He saw the beaches, dunes, and estuaries that we struggle to keep fragments of. "The shoare," he says, "all covered with small sand, and so ascendath up for the space of 15 foote, rising in form of little hills . . . small rivers and armes of the sea washing the shoare on both sides as the coast lyeth."

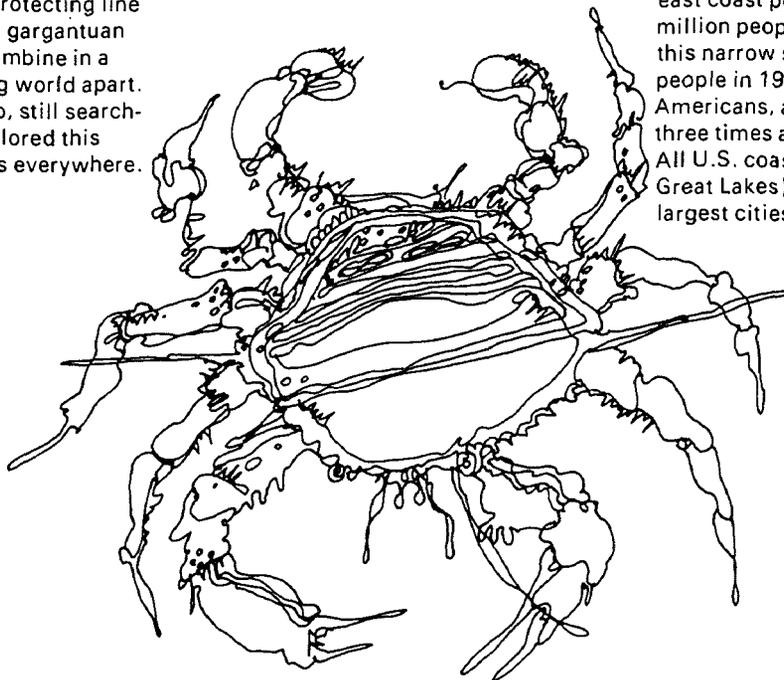
It was a land "as pleasant and delectable as is possible to imagine." And on it, Verrazzano reported to his French sponsors, a delectable population, "people of color russet [who] go altogether naked except that they cover their privie parts with certain skins of beastes . . . which they fasten onto a narrow girdle made of grasse very artificially wrought, hanged about with tayls of divers other beastes."

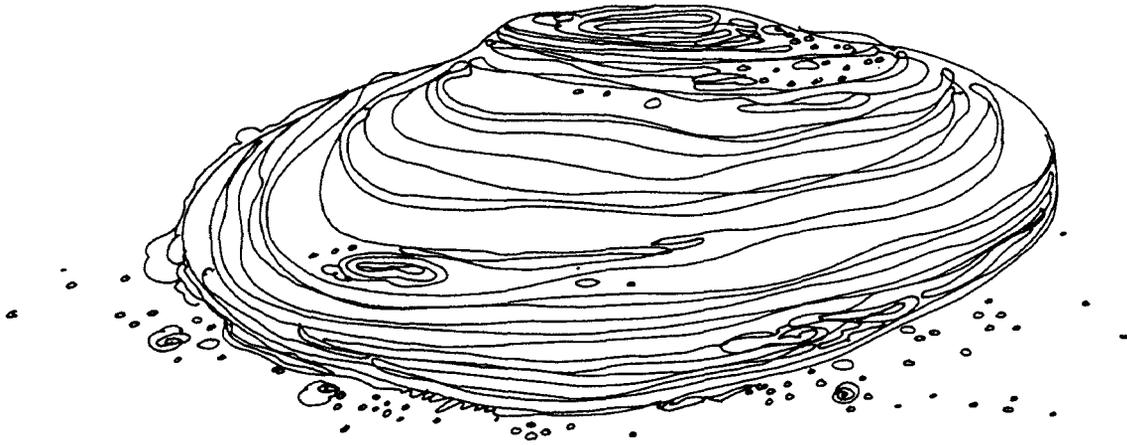
In the millennia that man has inhabited the ancient edge of this continent, he has taken the short-term view of gratifying his desire for pleasure and security, shooting a few birds in the marsh for dinner, trapping furred animals, going fishing. Great piles of shells unearthed by archeologists, some

charred, some halved, testify to the enjoyment of clambakes and clams on the half shell as early as 4000 B.C. Along with the shells in the middens, there are bones of otters, seals, whales, all sorts of fish, suggesting that their fur, fat and meat were used and valued. Coast dwellers took what they found when they wanted to, there being no apparent reason not to.

The coast's abundance welcomed colonists with the necessities—the fertile soil, wild game and fish, great timbers—that made settlement of the new world possible. The number of settlers was small, their requirements modest; the shore provided food and shelter and the water their only means of transportation. It was not until 1722 that for the first time a team of horses was driven from Connecticut to Rhode Island on a dirt path, winding through dense woods from one coastal clearing to the next. The coast, apparently constant and indestructible, continued to perform its functions.

It continued, in fact, through centuries of settlement and development, continued valiantly through industrialization. It continued, if somewhat less efficiently, as the east coast population zoomed from 29.8 million people living within fifty miles of this narrow strip in 1940, to 48 million people in 1970, almost a quarter of all Americans, and the proportion increases three times as fast as the national average. All U.S. coasts together (including the Great Lakes) contain the Nation's seven largest cities, account for 53 percent of its





population and 90 percent of its population growth, and it is anticipated that, by the year 2000, two hundred millions will squeeze themselves into smaller and smaller segments of the thin edge.

Unprecedented numbers of people swarming onto the coast make unprecedented use of it in this technological age. The ravenous growth society devours many parts of the continent for its expansion requirements, but the thin edge, with its special attributes, is most delectable of all. It is a magnet for growth.

It is a magnet for people. On every coast the people business burgeons, lining the shore with stacked condominiums interspersed with mobile-home parks, marinas, dense second-home developments. A roaring tourist industry ricochets off coastal highways with its accompanying eateries, motels, neon-lighted putting greens. Coast recreation—surfing, swimming, snorkeling, sport fishing—escalating to an average ten days per year per American, is a profitable business.

The great bays of the east coast—Chesapeake, Delaware—and other estuaries are a magnet for heavy industry, refineries, power plants using water for cooling processes. Forty percent of the Nation's industrial complexes edge its estuaries, 50 percent of its manufacturing facilities, and the east coast has more than its share. On the Delaware River, for example, utility companies plan 42 new power plants by 1986; one of these alone will evaporate 54 cubic feet of water per second, a loss equal to that of a small city. These activities of all these people and industries bring waste in unprecedented quantity to the shore, dumping it into the water.

Offshore waters are a magnet for the oil business. The colonists' lifeline becomes the tankers' trek as they ply and break up alongshore. Superships, with moorings approved for the Gulf coast in 1977, will soon rock in east coast offshore swells, and

tracts of its Outer Continental Shelf have been leased to oil companies, now preparing to start full-scale oil fields in the Baltimore Canyon depths and in Georges Bank off Massachusetts, relatively shallow water warmed by the Gulf Stream and long a fabled fishing ground.

In the last ten years the coast's magnetic pull has become stronger than ever—more industry, more oil, more people, hotels, motels, boatels, more sewage, more waste . . . and more pressing evidence that the coast has limits, an idea hardly known and little considered until now. Sometimes quietly, sometimes violently, the coast is informing us that there is a saturation point beyond which its natural functions no longer flourish, often diminish, or simply cease.

The fastest-growing area in the United States is said to be the Florida Keys, a sixty-mile strip of islands and reefs some ten miles wide. At the present rate, the two millions who now crowd this reef will increase to ten millions before the century ends. Under the jammed Keys, reef-building corals, the only such colony in U.S. continental waters, are dead, their massive branches skeletons, covered with white spots where the organisms once grew. If you go snorkeling there, gliding past the dead coral mass, any fish you see, a dwindling population, are likely to be diseased and deformed. Biologists say coral requires warm, well-oxygenated water, that too much sewage and too much silt from dredging and filling for new buildings have suffocated the coral that built the Keys that are attracting humans faster than any other place in the country.

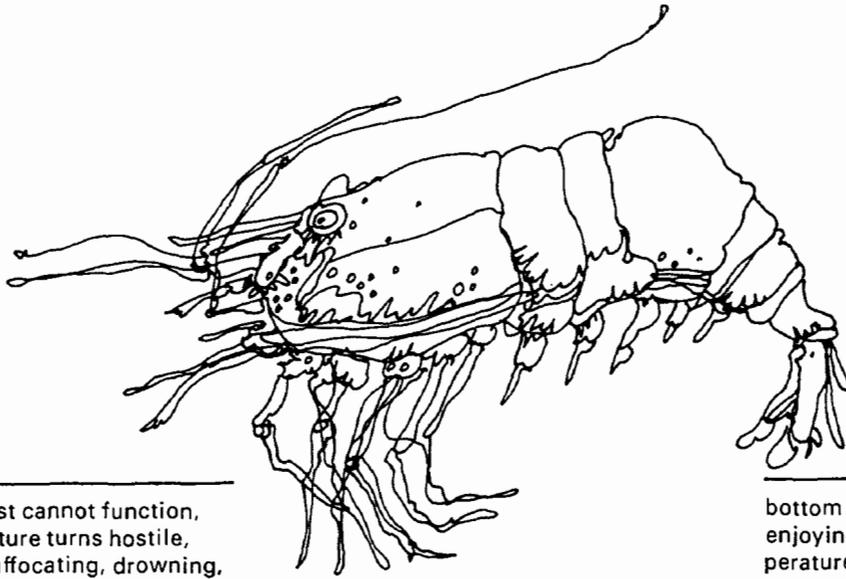
A coral reef, suffocated by the human life it supports, is a signal, quiet enough to go unremarked in the rush to cover the remaining inches of the Keys with concrete. Although such action can't further harm the coral, already smothered, it has other effects, noticeable wherever man transforms the soft sand shore into an inflexible wall.

The coast protects higher land by using wave and wind energy and gravity to build

sand barriers that resist storms and pounding surf, as in the surprisingly sturdy barrier beaches that guard much of the east coast. In this era when the sea level is rising throughout the world, water encroaches on the shore and the coastline retreats. These barrier beaches reveal the remarkable ability to move inland along with the shore, rolling over on themselves to migrate with their entire ecosystem—beach, dune, marsh—intact. A North Carolina island has just performed such a giant somersault in less than a century. Pace is the key: the shore must move at its own speed, when and where it will. Interfere with its pace and it will neither guard nor turn somersaults. Before this life-saving information was discovered, much of the shore had been covered with mammoth concrete development, preventing free movement of sand and water, a matter of considerable concern. It will be of more concern if the hurricane cycle, which has been in an unusual and seductive lull during the 1970's, years of the most concentrated seaside building, returns as expected, roaring along the concretized and thus dangerously vulnerable Atlantic coast. "The cost in dollars and lives of the next Camille-size hurricane will be staggering," a scientist predicts.

Behind the barriers where rivers empty into protected bays, the coast manufactures food for marine life by a mix of fresh and salt water, wetland grasses, sun and tide, delivers it to coastal species, for many of which these sheltered spaces are a necessary habitat during part or all of their lives. It has recently been found that, acre for acre, wetlands are the most productive land on Earth. Without protective barriers they will drown. Already, thousands of such acres along the eastern seaboard have been irretrievably lost; they were filled in, converted to high land, dredged or otherwise stressed, before their value became known, and even after.

The man-coast love-hate relation changes with each discovery of a new facet of coastal character. We begin to see limits



beyond which the coast cannot function, where its nurturing nature turns hostile, antagonistic to life, suffocating, drowning, poisoning. The signals are ever stronger, ever deadlier.

The Glorious Fourth weekend of the Nation's Bicentennial, when New York was momentarily a festival city, applauding the muster of the tall ships in its rivers and harbors, the skipper of the *Faye Joan*, trawling for whiting off New Jersey, winched in his net, spilled a thousand pounds of fish on the deck. "The contents stank," David Bulloch, an observer, says.

"The fish were dead, a few dying, most decaying. The crew worked, barely breathing, to shovel the fish over the side. The urge to vomit was overpowering." Diving to investigate, Bulloch and others found unusual dark brown water and below it, on the cold bottom, piles of dead fish, crabs, lobsters, mussels, "a foot-thick black mass of decay swaying with the surge of the sea." By August the killing sea extended for three thousand square miles. "Everything was dead," a microbiologist on the scene reports. "Nobody can remember anything like this." The level of dissolved oxygen in the water, required to sustain marine life, fell to zero, overpowered by the torrents from the celebrating city's sewers.

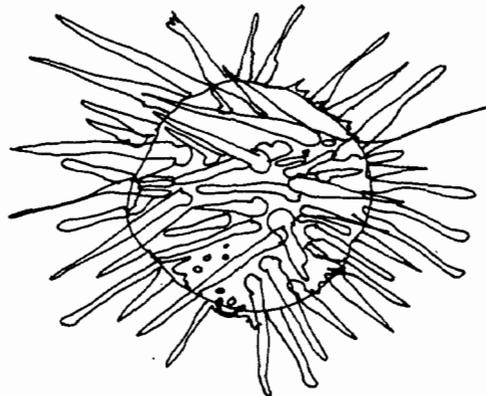
A different coast from the natural shore explorers found, different from the settled coast of the start of this century, different, even, from what it was just a decade or two ago when we apparently passed many of its limits without even knowing it! Each day we venture further into the unknown character of a world without a working coast, to date the only generation to experience such terror. But each day we are better equipped to stake out the limits for man on the coast. We begin to decode the signals that issue from the thin edge.

Each change of one part of the coast system affects other parts. Some connections have been discovered, such as the linkage of barriers and wetlands; some are still unknown. It may be that the shore is so complex that we will never completely

quantify the results of a change, that we must always play Russian roulette with our coastal intrusions. Consider the mid-seventies decision to explore for oil in Georges Bank. The results circle out like the ripples from a pebble thrown into a quiet pond, with no end in sight. One such ripple catches up coastal flora and fauna in an interconnection never imagined.

Marine biologists, of late particularly interested in the common seaweed kelp because it can be cleanly, cheaply converted to fuel, are surprised to find bald areas in underwater kelp forests off the northeast coast. More than eight times the expected number of sea urchins in great herds are grazing the kelp down to bed rock, John Culliney says in *The Forests of the Sea*. Some suspected increased sewage in the waters, enjoyed by the prickly half-sphere animals, might be responsible; others believed that over-harvesting of lobsters, the urchins' most avid predators, could account for the multiplying urchin armies and the vanishing kelp.

There are fewer lobsters to eat urchins and to be eaten by man for a reason that these strange succulent creatures have long kept hidden. Only in 1970 was it discovered that some lobsters, primitive, awkward and slow-moving as they may seem, have each fall for thousands of years walked 150 to 200 miles across the rock and sand



bottom of the offshore sea to Georges Bank, enjoying the winter in the nonfreezing temperatures there, walked back again in spring to coastal waters to copulate under sheltering rocks where, in a miracle of precise timing, the females shed their hard shells to make it possible for the waiting males to enter their bodies and deposit sperm.

Something new has happened in the underwater world of Georges Bank, a change so fascinating to lobsters that they hang around like hooked junkies, Culliney says, the vernal journey back to shore and its primal purpose forgotten. There is oil in these waters now, oil from exploratory digs, oil from tanker spills, more oil than ever before, and the lobsters, it has just been found out, are mightily attracted to it, will attack and eat kerosene-soaked paper in laboratory tanks, seek it out in their wintering grounds. If Georges Bank oil wells start in earnest, propagation in the wild of the migratory branch of *Homarus americanus* may be over forever.

As a single change of balance it could be inconsequential; sea urchins are unlikely to take over the world, lobsters can, perhaps, be successfully cultivated. But as representative of countless changes, revealed or still unknown, the kelp-urchin-oil-lobster cycle is grave and deeply troubling.

The change is an archetype coast module, the module that appears in hundreds of fragments and forms, in unexpected places with sometimes inconvenient, sometimes punishing, sometimes murderous effect. The more such a module is pieced together, the clearer it becomes, suggesting as it does that the essential coast character is its intricate, indisputable interconnection. Discovery of the coast's amazing systems advances our knowledge of this interlocking nature of the thin edge where we stand, precariously, listening to its silent scream. □

Copyright © 1978 by Anne W. Simon
Taken from the book *The Thin Edge*,
Reprinted by permission of Harper & Row,
Publishers, Inc.
The Thin Edge is also available in paperback from Avon Books.

Protecting the Global Commons

By Barbara Blum
EPA Deputy Administrator

The World Conservation Strategy, which I recently helped announce in Washington, is a courageous and thoughtful initiative to help all nations become conserving societies.

This strategy, prepared by the International Union for Conservation of Nature and Natural Resources, provides both an intellectual framework and practical guidance for conservation.

The aim of the strategy is to achieve three main objectives:

1. To maintain essential ecological processes and life-support systems such as soil regeneration and protection, the recycling of nutrients, and the cleansing of waters.
2. To preserve diversity in the range of genetic material found in the world's organisms.



3. To ensure the sustaining utilization of species and ecosystems—oceans, forests, grazing lands, and wildlife that support millions of rural communities as well as major industries.

These goals are urgent. Our planet's capacity to support life is being irreversibly reduced by enormous losses of soil, which is washed away annually as a result of deforestation and poor land management practices. The runoff from eroding lands results in floods that destroy homes and crops. Silt fills in water supply reservoirs and limits the capacity of hydroelectric generators. Vast quantities of prime farm land also are lost each year through road-building and industrial and housing development.

Deforestation is a pressing problem. In tropical areas forests are shrinking so rapidly that unlogged productive forests may be reduced by half by the end of the century. Wood for cooking and heating is scarce in many developing countries. Thus animal wastes and crop residues that otherwise could be used to regenerate poor soils and improve crop yields instead must be burned to warm and feed families.

The coastal support systems that form the resource base of many fisheries are being destroyed or polluted. Some estimate that in this country alone, the losses to this industry may total \$86 million each year.

The Environmental Protection Agency's major laws, which address air and water quality, solid waste management, the control of toxic substances, pesticides, radiation and ocean dumping, recognize that land, air, and water provide the fundamental support for all life and must be preserved and protected.

EPA was created in recognition that environmental problems could not be confined by local and State boundaries. Much the same can be said of national environmental dilemmas. They also extend beyond borders into the global commons, those parts of the Earth's surface and atmosphere that we all share, including the open ocean and the resources found there. While we at EPA work to protect all of the environment, the current celebration of the Year of the Coast presents a special opportunity to consider what effects a World Conservation Strategy could have on the oceans.

At the present time, most of the open ocean remains a frontier, vulnerable to the exploitation of living resources. While it is not as biologically rich as the continental shelf areas, the open ocean does possess unique ecosystems. There is, however, no protection of the habitats of open ocean species. The advent of deep sea mining and an increase in the general use of

ocean space now makes such action necessary if we are to conserve this natural resource.

Ocean disposal of wastes is regulated by the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, and also by regional agreements. Those countries that are not party to the convention are urged to do so under the World Conservation Strategy.

It also is important to control the effects of deep sea mining, including oil exploration. Before this can be achieved we must learn what is required to protect the ocean from irreversible damage. Accordingly, the Strategy calls on all nations pursuing activities with unpredictable effects on ocean ecosystems to:

- Commission in advance a comprehensive ecological survey to determine their impact.
- Designate areas of the deep sea to be kept free of mining or other significant disturbances, assuring that the size and shape of each area is adequate to maintain stability.
- Establish guidelines for scientific research to assure minimum disruption of the natural state of these areas and to provide for full exchange of information on the results of research.

International seas are another area that the World Conservation Strategy addresses. Most large maritime nations and several smaller ones have declared exclusive economic zones for 200 nautical miles from their shores. Others are likely to do so.

The establishment of the zones gives coastal states more incentive to protect the habitats critical for fish, since they now control the fisheries—at least of the non-migratory species that the habitats support. By protecting them and making sure the fisheries are exploited only on a sustainable basis, coastal states subscribing to the strategy may assure a regular supply of high quality protein and often a substantial source of income.

Many marine species, however, move between zones and out into the ocean beyond national jurisdiction. In addition, as oil spills regularly demonstrate, currents carry pollutants from one zone to another. The World Conservation Strategy therefore, calls for new or improved bilateral and multilateral agreements to control marine pollution and maintain the reasonable harvest of marine resources.

More specifically the strategy supports regional plans assuring proper use of fisheries and other living resources; the protection and maintenance of the support systems of critical habitats and of genetically rich areas such as coral reefs. It also encourages measures to control pollution, and the prevention of oil spills as well as provision for a rapid and effective response to such accidents.

In addition, because the Arctic environment takes so long to recover from damage, the World Conservation Strategy recommends that the Arctic be considered a priority sea. It encourages nations to systematically map critical land and sea ecological areas within their Arctic territories, to draw up guidelines for their long-term management, and to establish a network of protected areas to safeguard these ecosystems.

Antarctica and the Southern Ocean are defined as all land and sea south of the Antarctic Convergence, where the cold surface waters of the Southern Ocean sink beneath the warmer waters of the Atlantic, Indian, and Pacific Oceans. Currently the potential of krill, a tiny shrimp-like creature found in huge quantities in the Southern Ocean, is attracting a great deal of interest. It is said that the catch should rise from about 50,000 tons in 1977-78 to 60,000,000 tons, thereby doubling the world's annual fish catch. However, krill are the major food of five species of great whales, including the endangered blue whale and humpback whale, and are also important for three species of seals, many seabird species, and some fish. Unless krill harvesting is very carefully regulated, the effects on other Southern Ocean species could be devastating.

The World Conservation Strategy supports a convention to regulate the harvest of living resources. This convention is being negotiated and is expected to be followed by plans for mining and oil exploitation. The Antarctic treaty powers and nations fishing in the Southern Ocean are encouraged to restrain catch levels until understanding of this uniquely productive ecosystem improves.

A decade ago, the idea that a group of nations—with clear differences of interest and ideology—could unite to protect the environment would have seemed doubtful at best. Indeed, many would have said it was impossible.

Today as we reflect upon the existence of the United Nations Environment Program and the new environmental consciousness demonstrated by other international organizations, we at EPA know that agencies such as ours must develop plans and programs that link with international environmental initiatives such as the World Conservation Strategy and support them.

As Deputy Administrator of EPA, I know all too well how, as a Nation, we have been consuming our natural endowment. I also recognize the international implications of such consumption.

EPA is working in several international forums to support global environment goals. The World Conservation Strategy can serve as a unifying framework for those initiatives. □

By Senator Ernest F. Hollings
(D., S.C.)

Reordering Coastal Priorities



Choosing a Course

By Representative Gerry E. Studds (D., Mass.)

This is an appropriate year to reflect on progress made in managing our coastal lands and waters. The late 1960's, as you will recall, was a time of reflection on matters of national interest in environmental resource management. This virtual "wave" of concern gave rise to a number of Federal programs designed to address the newly articulated environmental policies.

Although the majority of the new Federal programs concentrated on issues such as air and water pollution, one focus emerged in a geographic-specific fashion—coastal zone management. Congress and others concerned with resource management saw the need for comprehensive, multi-level, long-range planning to avoid improper allocation of what was judged to be a resource of unique and infinite value.

Two major studies were completed in 1969-70, which were catalysts in the development of Congressional thinking, and

hence, the development of the coastal zone management legislation. The Stratton Commission Report concluded: "The coast of the United States is, in many respects, the Nation's most valuable geographic feature. It is at the juncture of the land and sea that the greater part of this Nation's trade and industry takes place. The waters off our shore are among the most biologically productive regions of the Nation." The finding was also made that "effective management to date has been thwarted by a variety of governmental jurisdictions involved." The second report, The National Estuary Study, focused on one of the key natural resources of coastal areas and concluded, "Estuaries are in jeopardy. They are being damaged, destroyed, and reduced in size at an accelerating rate by physical alteration and by pollution."

From these reports and other trends and evidence that were presented, the Congress determined that without a comprehensive management program, the consequence would be further depletion of irreparable natural resources and missed opportunities for encouraging environmentally sound, coastal-dependent economic growth.

The total weight of economic activity closely related to coastal resources and shoreline locations is most impressive.

or destroyed over 40 percent of our wetlands, and continue to do so at a rate of 300,000 acres per year.

We are only now beginning to recognize the consequences of our actions, and what we are learning is not pleasant. It has only been in the last ten years, for example, that we have come to understand the extraordinary importance of wetlands in the chain of life. We now know, for instance, that most of the top value fish in the Atlantic and Gulf waters are directly dependent in some stage of their lives upon these areas. It is particularly sobering to recognize that people are part of that same chain.

I do not mean to suggest that we have lost forever the battle to develop the coastal regions of our country in a careful and deliberate manner. I am suggesting, however, that we are well on the way toward such a defeat. It is imperative that we begin today to carefully evaluate our actions over the past few decades and to decide the wisest course for the future.

This year will present us with a unique opportunity to begin this effort. 1980 has been proclaimed "The Year of the Coast" by a number of major environmental groups and by the President of the United States. This designation will be the theme for a great many activities—both in Washington and around the country—designed to increase public awareness of the value of our

The population growth in the coastal regions of this country over the past few decades has been staggering. As we enter the 1980's, nearly four out of every five Americans live within 100 miles of the oceans or the Great Lakes. By the end of this decade, nearly 75 percent of the American people will reside within 50 miles of the sea.

Residents of Southeastern Massachusetts—one of the fastest growing areas on the East Coast—do not need to be told of the great pressures this unprecedented growth has placed on our coastal environment. The tremendous economic incentive to develop our region and similar regions of the country has in many instances led us to build unwisely in areas far too fragile to accept such construction; to virtually eliminate public access to thousands of beautiful beaches; and to randomly construct massive energy facilities in the coastal zone. In our haste, we as a Nation have damaged

Commercial fisheries, in addition to supplying food for our country and the world, represent a \$7 billion industry with nearly 500,000 man-years of employment. The maintenance of a healthy, productive estuarine environment is essential for maintaining a commercially harvestable stock of important marine species. Recreation and tourism in coastal areas stimulates \$12 billion in economic activity and is the dominant industry in several coastal areas, including parts of my own State of South Carolina. Manufacturing that requires access to water transportation and port facilities and a reliable source of water is drawn to coastal locations. Nearly 50 percent of our manufacturing facilities are located in coastal areas. Such industries are vital to the Nation's economic security as well as providing employment in coastal States. One of the more water-dependent industries, of course, includes segments of our energy industry which are important not only to the coastal States in which they occur, but to the entire Nation as well.

And then we have people. Of the eleven counties with the highest growth rate during the 1960's, nine were coastal. The Nation's eight largest cities are on the coast and nearly 70 percent of our population lives in the coastal counties and in the metropolitan areas. These kinds of pres-

ures, placed on a limited resource, provided the stimulus for creation of the coastal zone management legislation.

The kinds of concerns which these reports identified remain with us today, and have been intensified. But we have made progress on a number of points. Programs administered by many different agencies, including the Environmental Protection Agency, have made improvements in slowing the rate of wetlands destruction, in improving the quality of our coastal waters, in protecting fisheries habitat, and finally, through coastal zone management, in coordinating the efforts of all levels of government.

Nineteen State programs have been approved by the Federal Office of Coastal Zone Management, and several more are currently pending. Considering only those States which have approved programs, roughly 70 percent of the Nation's coastline is directly dealt with by Coastal Zone Management. Government, citizens, and the private sector are beginning to work together as these programs move into the implementation phase.

The fact that 1980 has been declared by a variety of groups as "Year of the Coast" and that at least ten States have officially designated it as such speaks of the level of awareness and concern that exists today on

coastal issues. My own State of South Carolina was among the first, through an executive order, which recognized and endorsed the significance of this action. A citizen's committee has been appointed consisting of all levels and interests which have a stake in the future of our coast.

This is an important year for coastal zone management. Authorization for implementation funding expires this year and the Congress must consider extension of the program, as well as Administration-proposed amendments. It is a year when the objectives of the Year of the Coast movement can impact positively on our deliberations.

I believe that without a mechanism that brings together all the varied interests in the coast to work toward a commonly understood set of objectives, we would have only a series of single-purpose, often conflicting programs to rely on which "manage" by incremental losses and gains. This approach has too often thwarted efforts both to protect the coastal environment and to provide opportunities for economic use of coastal resources. This is one of the major reasons why coastal zone management was passed by the Congress, and I continue to believe that the program

Continued to page 32

coastal resources and the great threat they face today.

As chairman of the Subcommittee on Oceanography, I intend to be in the very forefront of this effort. Legislatively, we will focus on four primary areas: The Coastal Zone Management program; the protection of undeveloped barrier islands; the development of ocean thermal energy; and the protection of fisheries habitats.

Coastal Zone Management

Any comprehensive review of the state of our coastlines must begin with a careful review of the Coastal Zone Management Act, which still stands today—eight years after its enactment—as the only comprehensive tool which the Federal Government has to manage our coastal resources.

In passing the Coastal Zone Management Act in 1972, the Congress recognized that it was in the national interest to protect and preserve our coasts. It recognized as well that individual States had neither the funding nor the expertise to develop and implement wise management policies for these areas. Consequently, it approved a program which offered both. It was thought at the time—an era when conservation issues were preeminent—that States would recognize it was in their own best interest to participate. As a result, participation was made strictly voluntary, and it was decided that individual States—with their unique

coastal resources—should not be forced to comply with specific Federal guidelines on development.

Eight years later it is clear that the program is not fully working the way the Congress intended. Regional hearings we have held recently in Washington and in Detroit, Seattle, San Francisco, and New Orleans have shown us that the results achieved and the protections provided have varied greatly from State to State. In general, however, these protections have not relieved the tremendous pressures which unchecked development and growth have placed upon our coastal areas.

In this Year of the Coast, we will have a special chance to broaden and strengthen this act so that it does provide more uniform protections for our shorelines. We must guarantee through the Coastal Zone Management program that no matter where they are located, our wetlands, beaches, dunes, and barrier islands will not be destroyed or irreparably harmed. We need to restore some measure of predictability and direction to the program so that those involved in planning coastal development will restrict development in our most fragile areas and permit it only in those areas where it is appropriate and where it poses the least threat to our environment. Later this year we expect to introduce legislation revamping the Coastal Zone Management

program. To a large extent we will use the information we have gathered in our national hearings as the basis for these changes.

This legislation will be crucial to the success or failure of the Year of the Coast because the Coastal Zone Management program encompasses so many different types of safeguards for our coasts, including flood protection in hazardous areas, the Coastal Energy Impact Program, and protections from perhaps the most controversial of all coastal issues—offshore oil drilling.

The Act, for example, gives the Governor of a State the responsibility to review an oil company's drilling plans prior to any offshore drilling operations. If a Governor determines that these plans are not consistent with the policies of his State's program, then he has the authority to prevent any drilling activities whatsoever. Provisions of the Coastal Zone Management Act like this are crucial to the survival of our coasts. We must make sure that the Act is working—and working well—if we are to have any chance of managing our coastal resources in an effective manner.

Barrier Islands

We are only now beginning to understand the importance to our environment of bar-

Continued to page 32



Alliance for the Coast

By Bill Painter

On New Year's Day, 1980, when most Americans were soundly sleeping off the effects of the night before, thousands of citizens were walking on the shores of the country's coast. At more than 35 locations on the Atlantic, Gulf, Pacific, and Great Lakes coasts, people concerned about the Nation's most precious resource symbolically launched the "Year of the Coast." In Massachusetts, beachwalkers "toasted the coast" and took a boat trip to Plum Island near Boston. Near San Pedro in southern California, hearty coastwatchers started off their year with a polar bear swim

*Learning about
sea creatures is part
of a youngster's visit to
Hopkins Marine Institute
in California.*

—braving the Pacific on a fine winter's day. Events such as these will be occurring around the country—including many on a much larger scale, like Boston's Operation Sail '80 on Memorial Day—to heighten public awareness and educate the Nation about the threats to and the invaluable nature of our country's coast.

America's coastline represents a priceless resource of great diversity, which is threatened by the competing, conflicting demands our society places upon it. Overall, coastal resources continue to deteriorate. A new coalition of environmentalists, sportsmen, urban groups, and other interests—the Coast Alliance—has recently been formed to focus national attention on the value of the coast and the need for wiser use of this fragile resource.

The coast, like our farmlands and forests, is a natural resource of immense esthetic and economic importance. Millions of people visit the coast for recreation and sport, and its rich and varied scenery continues to refresh and inspire the human spirit.

Boating, fishing, hunting, swimming, bird watching, sun bathing, and other activities contribute to a multi-billion dollar coastal tourism industry.

by 10 fold. This level of production is a natural process, continuing without use of fertilizers or pesticides or artificial improvement of genetic stocks.

People are only now coming to understand the unique character of the coast. Within the coastal zone, the ecological systems that have evolved are among the most intricate on the planet. Terrestrial and marine life processes overlap constantly in fascinating displays of mutual interdependence and fecundity.

However, human abuses of both land and water merge and become magnified in the thin coastal edge. At an alarming rate, coastal biological systems are being repeatedly disrupted by development in the coastal area. It is common along our coast to see oil-stained tidal pools, lowered shore-bird populations, shellfish beds in quarantine, closed beaches, and urban waterfronts in decay. Despite their high ecological and economic value, wetlands are still being lost at a rate of 300,000 acres per year nationwide.

The Coast Alliance was formed early in 1979 by a group of concerned individuals who feel that a major national initiative is needed to halt the deterioration of our vital coastal resources. With the support of virtually every national environmental organization, the Alliance is working toward a number of goals that include increasing public awareness of the

immense value of the coast and the threats thereto; encouraging groups and individuals across the country to work for the protection of coastal resources and to promote beneficial uses of the coast; discouraging private development and public investment in coastal flood and erosion risk areas; and improving public access to coastal areas.

The Alliance has created a four-part program to be implemented during 1979-1980: (1) a massive education/mobilization campaign, "Year of the Coast: 1980"; (2) a review of the administration of Federal coast-related programs; (3) selected litigation; and (4) comprehensive proposals for national coast protection legislation.

A number of national organizations are working in conjunction with the Alliance on projects for the Year of the Coast that include a series of regional conferences, a

"Coast Crisis Center"—a clearinghouse for coastal information; and a campaign aimed at substantially increasing the amount of coastal area under long-term private or public protection. Ideas for activities range from workshops, tours of coastal areas, rallies, petition drives, and legislative initiatives to sail-ins, waterfront festivals, TV specials, poster contests, and beach walks.

Dozens of activities are already being planned by local, State, and regional groups. A group dealing with the Lake Michigan region is planning a series of workshops and information activities. Exhibits, slide shows, and other special activities are being planned for the Brooklyn, N.Y., Public Library System.

An Oregon wilderness group plans to develop and promote a State legislative package focusing on the natural, historical, and educational aspects of seashores. A museum curator in Daytona Beach, Fla. is developing exhibits, to be supplemented with a lecture series on coastal processes and problems. Interest in participation in Year of the Coast is even being expressed in other countries!

On another front, the Alliance, along with a number of associated organizations, is seeking an overall policy review of the administration of programs such as the Coastal Zone Management Act, Outer Continental Shelf Oil Leasing, and National Flood Insurance Program, with a goal of coordinating these programs more effectively to provide greater protection and wiser management of coastal resources.

A major victory in this campaign was won last August, when President Carter, in his second environmental message to Congress, called for a review of all Federal programs affecting the coast, to determine if they are consistent with stated Federal policies for wise use of coastal resources.

The Alliance and associated groups is sponsoring a legislative package covering a variety of techniques for protecting, enhancing, and wisely utilizing the coast; new approaches to protection of coastal areas; assistance to waterfront revitalization; measures to cut Federal subsidization of unwise coastal development, and other proposals.

Realizing that it has set out a large agenda, the Coast Alliance is asking those who would like to organize Year of the Coast activities in their communities or be involved in the administrative review or legislative campaign to write to COAST, Box 2708, Washington, D.C. 20013. □

Bill Painter is the Executive Director of the Coast Alliance.



(Expenditures by salt water fishermen alone equaled \$3.4 billion in 1975.)

Two-thirds of the commercial fish caught by Atlantic and Gulf Coast fishermen are dependent on coastal waters for some part of their life cycle, according to *Our Nation's Wetland's*, a report issued by the President's Council on Environmental Quality. The Nation's fishery supports 260,000 commercial fishermen who caught 6 billion pounds of fish in 1978.

Coastal waters are among the most productive ecosystems on Earth, with some like the salt marshes of our southeast coast surpassing the productivity of a wheat field



Managing the Shore

By Michael Glazer

The decade of the 1970's saw a dramatic change in public attitude about the environment in general and the Nation's coasts in particular. In addition to legislation aimed at improving the quality of the air we breathe and the water we drink, the Congress in 1972 passed the Coastal Zone Management Act.

The philosophical impetus for the law was straightforward and direct: the coastal areas of the United States simply would not take care of themselves. Although such a notion had in fact been widely held throughout the 1950's and '60's, it became increasingly clear in the 1970's that the country's coastal areas held valuable but finite resources. And these resources were coming up against increasing and frequently contradictory pressures—growing recreational, residential, and commercial uses were confronting pressures to preserve our rapidly diminishing wilderness areas and our valuable fish and wildlife habitats.

Adding to the problem was the almost exponential rise in the coastal population,

with fully half of the country's citizens living within 50 miles of the coast and nine of our ten largest cities located on the Atlantic, Pacific, Gulf, or Great Lakes coasts.

The Coastal Zone Management Act, administered by the National Oceanic and Atmospheric Administration's Office of Coastal Zone Management, began making grants to the States in 1974. Those Federal dollars were available to States initially to prepare plans to resolve conflicts over coastal land uses. The program is voluntary and is flexible enough to allow each State's program to reflect its own needs and issues. Each State that chooses to take part must define its coastal boundaries, determine what land and water uses it will permit, and set priorities for those uses. And of course each State must create a management structure to carry out and enforce its program.

To the surprise of even those who were sanguine about the program in its early days, all 35 eligible States and territories have received planning grants from the Federal coastal management office. In addi-



Bulldozers are used to maintain the beach in Ocean City, Md.

tion, by the end of the first quarter of this year, 19 coastal States and territories, representing more than two-thirds of the Nation's coastline, were operating under some form of Federally-approved coastal management program. In human terms that means that some 45 million coastal residents, fully half the population that lives in coastal counties, are assured that such diverse elements as energy, recreation, port development, and residential housing are being approached rationally and intelligently.

What have the States accomplished? Although some States are still in the planning stage of their coastal programs and only two of the 19 States with approved programs have been operating for more than two years, results are already apparent, especially in the area of protecting natural resources.

A number of States have used their Federal dollars to establish brand new programs to protect wetlands, barrier islands,

fish and wildlife habitats, and beaches and sand dunes. Others have used their coastal programs to do a better job of enforcing existing programs dealing with these resources.

- Since entering the Federal program, South Carolina, Louisiana, the Virgin Islands, and Texas all have enacted for the first time laws to regulate wetland development.

- Seven States are providing new protection for animal habitats.

- Four States have mandated setback lines for construction near beaches and sand dunes to protect these resources from new development.

In addition to protecting coastal resources themselves, a rewardingly large number of States are coming to grips with the problem of protecting citizens from natural coastal hazards. The coasts have always been prone to such dangers as hurricanes, floods, erosion, and land subsidence. Careless development in threatened areas can result in needless and extensive loss of lives and property.

Among the States that are trying to prevent thoughtless development in hazardous areas are:

- North Carolina, whose 300 miles of shoreline, much of it barrier islands, is among the most strictly controlled in the country.

- Rhode Island, whose coastal management program prohibits development on any of the State's 18 undeveloped barrier islands.

- Texas, which has set up a hurricane awareness program to educate its citizens about the dangers of building in hurricane-prone areas and about the safest actions to take in the event of a tropical storm.

Other States are trying to find out what kind of development they should allow on the coast and where that development should take place. For example, Maryland has come up with a program for power plant siting that we think is exemplary. And in California, the State's coastal commission has identified locations that it considers inappropriate for power plants as well as sites that are appropriate for liquefied natural gas facilities.

In addition to State coastal programs, which form the core of the Federal program's business, the Office of Coastal Zone Management has established two related coastal programs that could have far-reaching consequences for the protection of our valuable coastal resources: the marine sanctuary program and the estuarine sanctuary program.

Both these programs were established after the 1972 passage of the Coastal Zone Management Act and both are aimed at providing environmental protection that the individual States could not, by themselves, carry out.

The marine sanctuaries program allows areas anywhere within the country's coastal waters out to 200 miles to be set aside for protection and study. The aim of designating such areas is to achieve compatibility between society's needs for food, energy, navigation, and the continued survival of our rich marine resources.

To date only two marine sanctuaries have been designated: the Monitor Marine Sanctuary, which protects the wreck of the famous Civil War ironclad off Cape Hatteras, N.C., and the Key Largo Marine Sanctuary, which protects some 100 square miles of fragile coral reef off Florida's southeast coast. We anticipate that others will soon be designated, including areas off the coasts of California, Louisiana, Texas, and Hawaii.

Unlike marine sanctuaries, which are "owned" by the Federal Government, although they may be managed jointly with the adjacent State, estuarine sanctuaries are owned and managed by the individual States. The program was established to help States buy and permanently protect estuarine land, through 50/50 matching grants from the Office of Coastal Zone Management, that can be set aside as a living laboratory, allowing scientists the rare opportunity to study natural and human processes within areas that are among the most productive in the coastal zone.

There are now seven individual sanctuaries in Oregon, Georgia, Hawaii, Ohio, California, and Florida. The estuaries are to be kept as undisturbed as possible so that scientists can study the naturally functioning system and can use the areas as controls against which to measure ecological changes in other unprotected estuaries.

In addition, the sanctuaries provide students and the general public with a place where they can learn about the ecology and the environment in a natural setting. And they afford protection for vital habitats of estuarine-dependent animals and plants, including endangered species.

Ironically, one aspect of coastal zone management—a critically important one—won't show up in any review of the program or in any statistical table on the number of States participating. That is the creation of a coastal awareness at the grass roots level, a kind of a coastal ethic, if you will. The fact that 1980 has been designated the Year of the Coast heightens the hope that such an ethic will become ingrained into our government, our business, and our private lives. □

Michael Glazer is Assistant Administrator for Coastal Zone Management in the National Oceanic and Atmospheric Administration.

A Gull's View

These are examples of the impact of civilization on some of the fragile beach areas on our coasts. Two of these photos show development on the barrier island at Ocean City, Md. Secretary of the Interior Cecil D. Andrus has said that "strong environmental safeguards, based on an understanding recognition of the natural forces of the sea, must be foremost in any program for protecting barrier islands from unwise development and use." All beach areas are also increasingly threatened by oil spills and intensive construction.

Photo A—High-rise condominiums tower above the surf at Ocean City, Md., in the foreground while in the background are the vacation homes which have been built on reclaimed marshland. All are located on what the Geological Survey describes as an "eroding barrier island which is retreating landward."

Photo B—A private home has been built across the beach and close enough to be splashed by the ocean at Ocean City, Md.

Photo C—Visitors arrive in beach buggies at a resort area near San Juan, Puerto Rico.

Photo D—Crab smeared by oil spill on the coast of Santa Barbara, Calif.





C



D



THE CHESAPEAKE

Beautiful and Vulnerable

By Truman Temple

It may come as a surprise to some residents of the tidewater region to learn that anything so large as the Chesapeake, with all its majesty and splendor, can also be vulnerable. After all, this is the bay that Baltimore's H. L. Mencken once called "a great big outdoor protein factory." The size and fertility of its waters, the strength of its cleansing tides, and the sweep of its broad mouth into the open Atlantic all seem reassuring proof that nothing can harm this mighty estuary.

To many, in fact, "bigness" confers upon the Bay a kind of immunity to the impacts of industrialized society. Yet area citizens and managers are coming to realize that while we are putting heavy demands on the Chesapeake's ecosystem, we have only a limited understanding of its capacity to assimilate the waste materials of millions of people. And it is the balance between this assimilative capacity and the Bay's bountiful gifts—its superb fishing and sailing, its usefulness as a transportation corridor and an environmental sink for waste materials—that they want to protect.

The Chesapeake Bay Program

At the urging of Maryland's Senator Charles McC. Mathias, Jr., Congress in 1975 directed that the U.S. Environmental Protection Agency begin an in-depth study of the Bay. The purpose was to sort out the problems and possible solutions to correct a problem highlighted by him later at the Bi-State Conference on the Chesapeake Bay in April, 1977, when he declared:

"It is obvious to me that the single great flaw in our array of programs, laws, research projects, citizens' lobbies, and even Space Age technology such as Landsat that come to bear on the Bay is that Federal, State, local and private agencies still have no workable way to coordinate their stewardships of the Bay."

For this reason, the Chesapeake Bay Program is intended to sort out the arrays of laws, research projects, policies, and citizens' efforts to get a comprehensive picture. It is assessing the principal factors that have an adverse impact on the Bay.

It will coordinate and help to evaluate work that is going on and fill in gaps in current information. In short, it is trying to pull together a great deal of disparate information so that Federal, State and local governments can use it more efficiently to protect the estuary.

How Big and How Productive?

The Bay and its tributaries form one of the largest and most complex of the 850 estuaries located around the coastline of the United States. The mainstem of the Bay is about 195 miles long, and including the numerous tributaries, such as the James, Potomac, York, Rappahannock, Patuxent, Chester and Choptank, to name a few of the longest, the Bay system has a shoreline of about 8,000 miles. Its drainage basin is approximately 65,000 square miles, encompassing parts of six States.

The Chesapeake is considered the most productive estuary in North America. It is big enough to support a recreation industry valued at \$200 million a year. These rich waters produce a seafood harvest worth about \$175 million during a good year. There are approximately 80,000 licensed hunters and fishermen in the Bay area and upwards of 200,000 registered pleasure boats.

The Bay provides America's dinner tables with more blue crabs in a year than all other areas combined. Likewise for the soft-shelled clam; the estuary accounts for more than half the annual catch in America of these clams.

The Bay also is a major stop on the Atlantic Flyway for migratory birds and waterfowl, providing food in its waters and submerged aquatic vegetation and shelter in its marshes, coves, and fields. More than 500,000 Canadian geese and 40,000 whistling swans winter there. It is a nesting area for the endangered bald eagle and the threatened osprey. In fact, the Bay area contains the largest osprey population in the U.S.

Most of the environmental stresses on the Bay are common—that is, they generally are not unique to the Chesapeake. We know, based on National Pollutant Discharge Elimination System permits, field

assessments, and a general knowledge of land-use activities, that the Bay receives many industrial and agricultural chemicals. The toxic chemicals are a major concern, especially those that may accumulate in the food chain. Treated municipal sewage enters the Bay and its tributaries at an estimated rate of 400 million gallons per day, or put another way, treated sewage constitutes an estimated 2.7 percent of the total freshwater flow to the Bay. The corresponding percentage in the Potomac, which has well known problems resulting from over-enrichment, is estimated at 4.8 percent. Environmental pressures from shipping and various land-use activities are suspected to contribute to the present stress on the Bay. And the list undoubtedly could be broadened.

With the population expected to double by the year 2020, these pressures on the Bay will increase.

Changes In Abundance of Living Resources

There are numerous statistics that reflect the downward trend in the recent harvest of blue crabs, oysters, striped bass, and shad. It is difficult to pinpoint the causes since the critical studies have not until now been performed. In some cases, the seafood in question does not lend itself readily to experiments. For example, some species are difficult to raise in a laboratory. Also, there has been a marked decline in the submerged aquatic vegetation, which plays a vital role in the food chain and as a critical habitat for numerous Bay organisms.

The coincidence that several marine species are showing a decrease of abundance in the Bay has deeply concerned area citizens. It also is not fully understood why several other species, such as the osprey, croaker, and sea trout, have shown an *increase* in recent years. These opposing trends show how difficult it is to separate natural fluctuations from those caused by human activities on and around the Bay.



More Traffic Ahead

Both commercial shipping and recreational activities on the Bay are expected to increase significantly in the future. It's estimated that the volume of cargo handled in Baltimore Harbor and Hampton Roads, for example, will double in the next 40 years. Recreational boating demand will rise from 11 million "activity days" in 1980 (one person's activity for one day on the water equals one activity day) to more than 36 million four decades from now. Rising fuel prices, of course, could cut the growth rate sharply.

Nearly every form of human activity has an impact on the Bay's water quality. Water pollution comes from the discharge of industries' waste, heated water from power plants, municipal sewage discharges, oil spills, farm runoff, shoreline erosion and sedimentation, and shoreline development which increases the sedimentation and runoff from paved surfaces. Other water quality problems are created by dredging and disposal of silt, by modification of

tributaries which impedes the cleansing tides, and by pleasure boating, which also erodes shorelines and stirs up sediments.

Until now the resiliency and productivity of the Bay have helped prevent serious environmental damage. But with the increased shipping, recreation, and anticipated land use activities in the uplands forecast for the next few decades, the ability of the Chesapeake to absorb future environmental punishment remains a question mark.

Current Research Areas

The Chesapeake Bay Program, a joint effort between EPA Region 3 and the Office of Research and Development, operates with about a dozen full-time scientists on its own staff located in Annapolis, Md. and relies on some 40 grants and contracts with more than 30 scientific and educational institutions to carry out much of the investigation. They range from the Hampton Institute to the U.S. Naval Academy, from Johns Hopkins University to the Environmental Law Institute. Dr. Tudor Davies, Director of EPA's Environmental Research Laboratory in Narragansett, R.I., also serves as Director of the Chesapeake Bay Program.

A number of EPA's laboratories also are supporting the Program. These include the Industrial Environmental Research and the Health Effects Research Laboratories at Research Triangle Park, N.C.; the Environmental Research Laboratories at Athens, Ga. and Gulf Breeze, Fla.; the Environmental Monitoring and Support Laboratory at Las Vegas, Nev., and the Annapolis Field Office of Region 3.

In the fall of 1977, the Program staff, representatives of the States of Maryland and Virginia, and the citizens in a workshop identified ten major problem areas to be addressed by the Program. These were:

- Decline of submerged aquatic vegetation
- Eutrophication (nutrient enrichment)
- Toxic substances
- Dredging and dredged material disposal
- Fisheries modification (biological resources)
- Shellfish bed closures
- Hydrologic modification
- Wetlands alteration
- Shoreline erosion
- Water quality effects of boating and shipping

Since a comprehensive evaluation of all ten areas was likely to be beyond the resources of the Program, and in order to make maximum use of available funds, three critical areas have received intensive, high-priority research attention: the decline of submerged aquatic vegetation, eutrophication (nutrient enrichment), and toxic substances.

In each of these areas, a uniform research approach is being pursued. Sources of causes of these problems are being investigated to see how pollutants interact with the Bay's ecosystem. Systems are being set up for collecting, measuring, and managing various types of environmental and other related data. Finally, control methods and alternatives for correcting the problems are being investigated.

Providing the framework for the optimum use of research results is the Environmental Quality Management Study. For each of the three technical problem areas, it is describing the management network currently in place on the Bay. That is, the roles and responsibilities of government agencies in the management of submerged aquatic vegetation, nutrients, and toxics are being defined. Later the Bay management agencies will be reviewed and catalogued, and the effectiveness of existing Bay management mechanisms will be analyzed. The



The great blue heron is one of many wild creatures who find refuge in the marshes of the Chesapeake Bay.

effort is to assure that all the related components of the Bay Program work together smoothly and efficiently to achieve the objective of a better Bay. The management program includes tasks to support and refine the existing management strategies and to analyze alternative scenarios for Bay management.

Another aspect deals with public participation. The Program has several organizations under contract to raise the level of public awareness about the Bay, to increase public understanding, and to involve the public in the Program.

The EPA has awarded grants to Maryland, Virginia, and Pennsylvania for program coordination and management. The States participate in the Program's decision-making and provide staff support on working groups that develop technical work plans.

Vanishing Underwater Plants

The decline of submerged aquatic vegetation is a principal area of concern because so many species depend on these plants for food and shelter. Not only do young striped

bass and shad make use of the vegetation for their habitat, but also the famed blue crab needs the shelter when it is molting and vulnerable to predators. Beds of submerged grasses are a significant source of food for waterfowl, shrimp, and fish, and also play an important role in reducing wave action and the speed of currents, allowing sediments to settle out of the water.

The Chesapeake Bay Program has a number of institutions under contract to look at different aspects of the aquatic plant problem. The Virginia Institute of Marine Science and the American University, for example, are gathering information for an inventory of the vegetation throughout the Bay.

Johns Hopkins University is charting the life cycles of vegetation over the past few centuries, using core samples from the Bay bottom. The purpose is to find any changes in the cycles that may be linked to human activities.

The Virginia Institute of Marine Science is also under contract to look at the role of eelgrass, an important factor in the ecology of bluefish, sea trout, weakfish, and the species they prey upon. In another project, it is examining some aspects that deal with the planting of new eelgrass beds.

Are toxic herbicides contributing to the problem of disappearing underwater aquatic vegetation? The Center for Environmental and Estuarine Studies of the University of Maryland is trying to find the answer under another EPA contract. Part of the study is to learn about the pathways and mechanisms by which herbicides and sediments travel through the Bay. Finally, the Migratory Bird and Habitat Research Laboratory of the U.S. Fish and Wildlife Service has the task of pulling together the data from these and other studies to find the relationship of the underwater plants to migratory water fowl, and to present a broad picture of the vegetation, trends in its distribution, and causes for its decline.

Excessive Nutrient Enrichment

The process of nutrient enrichment, frequently called eutrophication, is a natural process by which nutrients are supplied to bodies of water. However, excessive quantities of plant-nutrient minerals, especially phosphorus and nitrogen, have been entering the Bay from a variety of sources. Enriched by these minerals, algae thrive in a number of areas, but when they die, they rob the water of dissolved oxygen necessary for the survival of other marine life. Green scum floating on the surface of the water is one symptom, and massive fish kills can also result. Low levels of dissolved oxygen have been observed in certain parts of the Bay and its tributaries, notably the Potomac River.

Scientists are now studying historical

data to identify trends in the Bay's water quality and how the problem relates to an estuarine system. They also are gathering data to provide a clear picture of current eutrophic conditions there. From this body of information and from projections of population growth and urban, rural, and industrial development, researchers expect to correlate nutrient loads with water quality conditions. If so many acres of land are to be developed in a given area, for example, what changes can be expected? What will this do to the Chesapeake?

The answers will be the tools that the public and government officials will need to make informed decisions affecting the future of the Bay—not only in its water quality but in the economic and social future of the region. Among those institutions under contract to examine the eutrophication problem are the Chesapeake Research Consortium, looking into historical data and defining needs for future research on the Bay; the Maryland Department of Natural Resources, evaluating available tools for predicting eutrophication and comparing costs and accuracy of various models; the Virginia State Water Control Board, engaged in similar work in its area; and the Hampton Institute, evaluating water quality by means of a helicopter-borne sampling system and correlating measurements with observations made by Landsat satellite.

Toxic Chemicals

Some substances such as trace metals occur normally in nature, but the vast majority of toxic substances are by-products of industrialized society. Many pesticides, herbicides, chemicals in industrial waste streams, organic chemicals, and petroleum-based products are all potentially toxic.

These toxic chemicals enter the Bay the same way nutrients do, from either point sources such as industrial discharges, spills from vessels and shoreline storage facilities, or from non-point sources such as farmland and paved area runoff or atmospheric fallout.

Research is focused on obtaining information about the sources, pathways, and final destination of toxic substances in the estuary. From such studies, strategies can be designed to reduce the environmental hazards and protect the health of the Bay.

Among the approaches to the problem, scientists will use an inventory of industrial sources of toxicants to identify compounds and test their potential for being absorbed by Bay organisms. The Virginia Institute of Marine Science under one contract will identify toxics in sediments and oysters at various sites. (Where oysters aren't found, they'll substitute the brackish water clam.)

Other researchers will be studying the pathways of toxic chemicals entering the water, the movements of sediments associated with toxics and their occurrence in bottom mud.

The Johns Hopkins University's Chesapeake Bay Institute, for example, is looking into the role of suspended sediment as an agent for transporting toxic substances in the water. The Maryland Geological Survey is investigating the chemistry of "interstitial water", which is a layer of water from the Bay's bottom to about one yard below the sediment surface. Since this water and sediment form a thick soup acting as a mixing zone where pollutants move between the sediment and the water, researchers are seeking to understand more about the chemical reactions going on in this zone. The University of Maryland under another contract is doing a geochemical survey of bottom sediments to determine the types and amounts of trace metals there, to permit estimates of the rates that metals are settling into the sediments.

Eventually scientists expect to have a much clearer picture of the movements of toxic substances in the Bay, their chemical transformation, sometimes into even more toxic compounds, their effects on sediments and marine life, and the implications of their accumulation in the food chain. The ultimate goal is to gain enough knowledge to predict and prevent problems associated with these substances.

Products of the Program

There will be numerous scientific papers that are important in their own right. There also will be for the first time a large data base on factors relevant to water quality that will be coordinated and comprehensive. This will permit all the pieces of information to fit together into an organized pattern to help in future management decisions about the Bay.

EPA's Office of Research and Development, headed by Stephen J. Gage, summarized the studies of the Chesapeake in its Research Highlights 1979 publication this way:

"The program's goal is to provide the people with straightforward facts, alternatives, and realistic costs, in order that well-informed decisions about the Bay area's environmental future can be made. If people in the area, for example, opt for maintaining the status quo, the results of the study will tell them *this* is what maintaining the status quo means environmentally and *these* will be the costs sustained. If, on the other hand, the choice is to improve environmental quality, then *this* is what it will cost and *these* are the benefits that can be expected." □

Truman Temple is Associate Editor of EPA Journal.

Annapolis Facility Expands

EPA's Central Regional Laboratory in Annapolis is moving into brand new quarters that will not only provide nearly five times as much working space but will include highly sophisticated equipment for measuring pollutants.

The new facility, located only about a mile from the rented, cramped quarters where its scientists have worked for many years, is a 34,294-square-foot brick and glass building designed for 45 staff members including chemists, engineers, biologists, technicians and other support personnel. The laboratory, which serves EPA Region 3, is large enough to permit expansion in its staff in future years.

Orterio Villa, director since 1973, said one major new area of testing and research by the Laboratory will be in controlling hazardous wastes, since the Agency has placed this high on its priority list. The EPA Fiscal 1981 budget, reflecting mounting concern over the problem, has proposed substantial increases in the hazardous waste program.

The laboratory also will maintain its fleet of three power boats for sampling waters, sludge, fish, and shellfish of the Chesapeake Bay and tributaries.

During the summer sampling season the staff devotes a considerable part of its time to work on Region 3 rivers, such as the Potomac and Delaware, as well as its continuing workload including hazardous waste sites, municipal and industrial plant investigations, and public water supplies. In other seasons ambient monitoring plays a minor role while Enforcement and Resource Conservation and Recovery Act programs are emphasized.

"Crisis management," the term for handling sudden, unexpected incidents of hazardous pollution, takes up a large portion of the Laboratory's

time, according to Villa. The facility serves a five-State region comprising Pennsylvania, Maryland, Virginia, West Virginia, Delaware, and the District of Columbia.

"Dump sites are currently our biggest problem," Villa explains. "Region 3 has more than 600 of them and we do a lot of screening to determine which are the potentially hazardous sites. We're developing protocols for site examination—we're primarily concerned with what's leaching into underground aquifers and nearby streams, what's getting off the site and posing a health hazard to the public."

One of the most sophisticated pieces of equipment being added to the Laboratory is called an Inductively Coupled Argon Plasma spectrometer. The device is able to analyze 16 different metals in a sample at one time, where earlier equipment was able to analyze only one at a time. Heavy metals are a major concern for environmental scientists because they can pose health hazards if they find their way into the food chain.

The laboratory also is able to detect organic compounds in soil and water using a high performance liquid chromatograph and an automated gas chromatograph.

"We will be looking for compounds that can't be detected now with present equipment," says Villa. "For the last three years we've been investing to upgrade our analytical equipment. We're not quite there but we're getting close now."

Total cost of the new facility including equipment will be approximately \$3.5 million, according to the director. As an indication of how dangerous some chemicals can be in dumps these days, Villa noted that the Laboratory has ordered special protective clothing resembling space suits for its inspection teams and also is acquiring devices to detect harmful gases on-site, since a number of chemicals finding their way to dumps these days are highly volatile and give off hazardous fumes.



The Fourth Coast

By Madonna F. McGrath,
Director, Great Lakes
National Program Office

Madonna McGrath has been named Director of the Great Lakes National Program Office in EPA's Chicago region. As acting Director during the last five months she has prepared the strategy that realigns the Lakes Program work with the Agency's overall Great Lakes pollution-control efforts. McGrath joined EPA in February, 1978, as Chief of the Environmental Planning Staff at the Great Lakes National Program Office. Before coming to the Agency she was an Environmental Programs Coordinator with the U.S. Army Corps of Engineers. McGrath entered government service in 1971 as Confidential Assistant to the Secretary of the Interior. She was named Region 5 Field Representative for the Department of Interior in 1973. She earned a bachelor's degree from Webster College in St. Louis in 1968 and a master's in public administration from Roosevelt University, Chicago, in 1979.

Jetties trap shifting sand along Chicago's Lakeshore Drive.



The Great Lakes are considered the fourth coast of the United States. Like the country's three marine coasts, the Great Lakes' shores play a variety of roles.

They are recreation areas. Increasing numbers of boat launches, private developments, and parks attest to a growing popularity, and protected areas along the Lakes are being vigorously defended from encroachment.

The Lakes also are used in generating electricity. Sixty-four of the Nation's generating facilities are located in shore counties.

In addition, the Great Lakes shores are historic. Indian mounds and well-traveled routes dating to French explorers remind the visitor that these mighty, interconnected lakes opened up the center of the country. Commercial fishing has a long history on the Lakes. So does shipping, which increasingly moves the area's raw materials, from steel to grain to coal, and its finished goods to the Nation and the world. An estimated one-fourth of U.S. industry is located along these inland shores.

Other aspects of the Great Lakes make restoring and maintaining water quality a matter of extreme importance—and make this an altogether different, even unique coastline. These Lakes are an interconnected system; their very long retention times and slow flushing rates make them literally sinks for pollution. Further, the Great Lakes contain not salt but fresh water—six quadrillion gallons of it, to be precise. That is 20 percent of the world's fresh surface water, and 95 percent of the United States' supply. More than 40 million people—nearly 20 percent of U.S. population and 50 percent of Canada's, live in the Great Lakes Basin, the area that drains into the Lakes.

More than 23.5 million people depend on the Great Lakes for their drinking water. It is this use of these glacial bodies of water, as well as recreation and fishing and commerce, that is of urgent concern to many government entities. Within the U.S., the majority of Great Lakes pollution-control responsibilities fall in the management sphere of EPA's Region 5, which serves six of the eight States that border the Lakes.

Because of the economic, environmental, and social value that the complex Great Lakes ecosystem represents to both the United States and Canada, EPA in late 1977 created the Great Lakes National Program Office, headquartered in Chicago. Originally this office concentrated on coordinating the various Great Lakes-related activities already underway within the Region, in response to the U.S.-Canadian Great Lakes Water Quality Agreement



Gulls and nets vie for fish during the smelt run at Tawas City, Mich

of 1972. Following the 1978 revision of that agreement and an intensive Agency evaluation, the Great Lakes National Office and other EPA Regional programs significantly changed the ways in which they respond to Great Lakes needs.

For the first time, EPA has a definitive strategy for working on Great Lakes pollution problems. More important, the months of discussion and debate have resulted in a strong affirmation of the Agency's commitment to effective Great Lakes program management that is based on the full force of State and Federal authorities and international objectives. No longer are Great Lakes water quality improvement activities isolated from the mainstream of the Agency's environmental programs. Rather, there is a conscious effort by all parties to collectively protect this precious resource.

The Great Lakes National Program Office emerged in a pivotal role to guide this integration process. Its goal, with the strong support of Region 5 Administrator John McGuire (who is the Great Lakes National Program manager), is to help identify and recommend solutions to Lakewide or transboundary pollution problems that cut across traditional lines of authority. Further the Great Lakes National Office is to serve as a U.S. ombudsman for the Lakes.

To accomplish these assignments, the Great Lakes office is concentrating most of its scientific and technical resources on three key areas:

1. The revision and implementation of a Great Lakes monitoring program, with particular emphasis on toxic chemicals and nutrients;
2. Special investigations of serious "hot spot" problem areas, with emphasis on developing control measures for the full range of pollutant sources, i.e., land, water, and air;

3. Increased State involvement in Great Lakes decisionmaking through the State/EPA Agreement process.

To understand why the Great Lakes office is focusing on these areas, one must review the problems that currently plague the Nation's fourth coast.

The most serious threat is the existence of persistent toxic chemicals in Great Lakes water, fish, wildlife, and sediments.

These substances affect all portions of the Great Lakes in varying degrees. Many have the capacity to bioaccumulate; they have been found in the Lakes' fish and wildlife in alarming concentrations. Fish from Lake Ontario are heavily contaminated by Mirex. Lake Michigan fish cannot be sold commercially because of high levels of PCB's. Fish from Lake St. Clair had high levels of mercury that restricted their use for several years.

These substances reach the aquatic environment through direct discharges from industries, in runoff from agricultural and urban activities, and from the atmosphere after evaporation or insufficient incineration. While the effect of toxic substances on aquatic organisms is not well understood, severe adverse health effects on mammals and birds are well documented.

Present remedial programs include a ban on DDT and similar pesticides, a ban on PCB's except by special EPA permit, and individual actions against point sources of other compounds.

An example of one severely toxic-affected area is Waukegan Harbor, just north of Chicago. Studies done in 1975 and 1976 established that the Johnson Motors Division of Outboard Marine Corporation was discharging PCB's and was the source of severe PCB contamination in sediments of the North Ditch and

Waukegan Harbor, both tributaries of Lake Michigan. In February, 1976, EPA issued an administrative order requiring Outboard Marine to cease its discharge of PCB's; the Illinois EPA issued a notice of violation in the matter. The company subsequently took certain steps to reduce its PCB discharge.

In March, 1978, the U.S. Government filed with the Northern District of Illinois against Outboard Marine, asking that it be required to dredge and dispose of sediments from the ditch and harbor in a safe manner.

As part of its lengthy efforts to solve this problem, EPA has conducted investigations of the PCB problem in Waukegan and its potential solution. These investigations are continuing as part of the Agency's preparation for its trial presentation to the Federal Court, which should occur in the near future. Clearly, the road to control of such pollutants is long and steep.

There are other toxic chemical hot spots in the Great Lakes that EPA is checking. One way EPA finds these areas is through an extensive fish tissue analysis program, which concentrates on fish found both in the open waters and in the nearshore tributary streams. Scientists combine findings from these surveys with results of intensive sediment studies to identify toxic chemical hot spots in selected harbors and tributary basins. Regulatory assessments to identify specific sources and remedial measures are under way or planned in the following areas: the Ashtabula River in Ohio, Buffalo River in New York, Raisin River in Michigan, Indiana Harbor Canal, the vicinity of Gary, Ind., and Milwaukee, Wis. We continue to evaluate other areas for future intensive investigation.

While toxic chemical pollution is receiving a great deal of attention, there still remains the problem of accelerated eutrophication, or aging, of the Great Lakes by nutrient enrichment. If not controlled, this enrichment and the resulting loss of oxygen can lead to greatly increased costs for treating drinking water and elimination of high-quality fish species. An aging lake can lose recreational activities through fouling of beaches, elimination of sport fisheries, and increased algal growths on the hulls of boats and ships that sail the Lakes.

All the Great Lakes are affected to varying degrees, but Lake Erie and sheltered areas such as Green Bay and Saginaw Bay are the most severely affected; they have suffered major deterioration in the quality of their fish stocks. Dissolved oxygen depletion in the bottom water of the central basin of Lake Erie has a severe impact on fish reproduction because of fish respiratory problems and changes in chemical quality. The impact on Lakes Superior and Huron has been minor, but Lakes Michigan and Ontario as well as Erie have been significantly affected.

The most prominent example of how nutrients reach the Lakes is the City of Detroit's municipal sewage treatment plant. Detroit has missed a Federal Court-ordered deadline for secondary treatment by more than a year. A total of \$350 million has already been spent during the past 10 years to upgrade the plant, one of the Nation's largest, which processes 700 million gallons of sewage daily from Detroit and more than 75 suburban communities in three counties. EPA and the U.S.-Canadian International Joint Commission have called the plant the worst polluter of Lake Erie. As recently as 1978 this one plant alone discharged 45 percent of the total municipal phosphorus load to the lake. Fortunately, phosphorus treatment at the facility has been improving in recent years.

In March, 1979, a U.S. Federal judge appointed the mayor of Detroit special administrator of the troubled sewage treatment plant. The Court, city, State, and EPA are working vigorously to resolve the plant's problems and meet the 1982 phosphorus-control deadline, to which all parties have agreed.

Milwaukee, like Detroit, is spending a good bit of time in court. The city was sued by and settled with the State of Wisconsin under the Clean Water Act. The State of Illinois sued Milwaukee on the basis of nuisance law and pollution of Lake Michigan and won a judgment that required even stricter cleanup. A study by the State and the Great Lakes Office will further evaluate problems in the Milwaukee Harbor and estuary and recommend specific corrective actions.

But toxic chemical pollution and nutrient enrichment of the Great Lakes may not be completely controlled solely by more stringent requirements on direct discharges to the Lakes. Pollution from rural land runoff, combined sewer overflows, and urban drainage also affects the water quality of the Great Lakes ecosystem. The Great Lakes Office administers a special demonstration grant program that is testing new methods and techniques to control diffuse pollutant sources. Projects developed with State and local governments are underway in Saginaw, Mich.; Cleveland, Ohio; Rochester, N.Y.; and Allen County, Ind. We have encouraged "Best Management Practices" on agricultural lands and combined sewer overflow controls, and there is substantial evidence that water quality has improved in many areas.

The atmospheric deposit of nutrients and toxic substances to the surface waters of the Lakes is yet another major environmental problem. Atmospheric inputs of phosphorus to Lakes Superior and Huron are estimated at 15 and 11 percent, respectively, of the total phosphorus loads to these lakes; inputs of total metals are esti-

mated at 30 to 40 percent of the two lakes' total load. PCB's have been found in isolated lakes of Isle Royale in Lake Superior; the atmosphere is the only conceivable avenue. Studies of Lake Michigan indicate atmospheric inputs of similar magnitude. Scientists estimated that 5 percent of the total nitrogen and phosphorus loads to Lakes Erie and Ontario come from the atmosphere and will represent higher percentages as other sources are controlled.

But what of the future? What are the challenges ahead? While much of the visible pollution of the Great Lakes has abated, it is what we do not see, taste, or smell that may cause more severe problems in the years ahead.

If pollution contaminates more groundwater sources, even more millions of people will look to the Great Lakes as a source of drinking water. The energy situation may require that we use the Great Lakes even more intensively for navigation, power production, and possibly natural gas, for which Canada already drills in the western end of Lake Erie. Recreation close to home will continue; popular resort areas such as Door County, Wis., already face the possibility of overbuilding and the resulting strains on water treatment systems. Other emerging problems, such as increased levels of sodium and chlorides, also may affect the ecological balance within the Lakes and their interconnected systems.

Finding solutions to these problems requires both an interstate and international partnership and heightened public awareness. The States are identifying their priority pollution areas and focusing more attention on the Great Lakes air, water, land interface. We are making resource commitments, and State-EPA Agreements in the 1980's will reflect specific Great Lakes efforts.

Internationally, the U.S.-Canadian Great Lakes Water Quality Board is moving toward a strong ecosystem approach, recognizing that artificial lines on a map can no longer be a barrier to coordinated, joint pollution control.

And the public, which ultimately uses and benefits from the Great Lakes' bounty, must continue to flag issues and prod policymakers if the future of the Lakes is to be as great as their past. □

Correction:

A statement in an article on the Great Lakes in the January issue of EPA Journal, based on information provided by Region 5, that Bay Beach, a park and beach near the mouth of the Fox River and the city of Green Bay, had been reopened was in error. The park is open but the beach is not. A statement in the same article that "most beaches" on Lake Michigan and Lake Erie were closed because of pollution should have read "many beaches."

California Coastal Management



Under the Federal coastal act, California has received about \$12.3 million to develop and implement its coastal program. California is also entitled to grants and loans through the Coastal Energy Impact Program, a part of the Federal Coastal Act. A third inducement for California's participation in the Federal program is the authority it grants to States to review Federal activities and activities that require a Federal permit for consistency with the approved State program.

The Commission has been given a key role in coastal energy and port development decisions through its permits, planning consistency, and grant allocating responsibilities. Most energy projects proposed for the coastal zone need a permit from the Commission. Through its activities the Commission is providing energy companies with clear guidelines on where and how nationally needed energy facilities can be sited on offshore California's coast.

This year, Congress must reauthorize the Federal Coastal Zone Management Act. The Commission has urged that the Act be reauthorized to provide a firm foundation for coastal protection in the 1980's.

One of the Coastal Act's highest priorities is assuring coastal access for the general public. This is a complex and controversial issue, involving strong conflicting public and private interests. Yet, the California Constitution guarantees access to the navigable waters of this State, and this right is the basis for the strong public access policies in the Coastal Act.

Access includes public pathways and trails to and along the beach, recreational and visitor facilities, parks acquisitions,

"visual" access or viewshed protection, coastal housing opportunities for all segments of society, and getting people to the vicinity of the beach through mass transit, bikeways, and parking facilities.

The Coastal Commission has increased public access through various permit conditions needed to bring projects into conformity with Coastal Act requirements. For example:

- The Santa Monica Redevelopment Agency proposed construction of 637 residential units on a 20-acre site along the Santa Monica waterfront. The Commission approved a 397-unit project that included a six-acre park. The approved project, which is under construction, requires 250 units to be constructed or rehabilitated for low and moderate income residents in the Ocean Park neighborhood.

- An 18-story convention hotel was proposed for an oceanfront parcel in downtown Long Beach. Because the adjacent beach area and shoreline would have been reserved for hotel guests and would have provided few public amenities, the Commission required an expanded boardwalk area and public plaza, a bicycle path, and 36-acre public park with fishing area, and a recreational vehicle campground.

- A free public boat launch ramp has been installed near Cannery Row as part of Monterey's harbor facility. The Commission strongly supports and encourages this type of facility, since it provides for public recreation and encourages dry boat storage.

- The City of San Diego Port District cooperated with the Commission when designing Marina Park. The park includes 40 acres along two miles of shoreline with walkways, a bike route, picnic tables, and recreational boating piers.

- In the rural La Selva Beach area of Santa Cruz County, the Commission denied a proposed 260 unit condominium development in 1973. Concerned about lack of public access and impacts of a high density project on agricultural lands, the Commission worked with the developer to find an agreeable plan and approved a permit for 97 condominium units, half available to the public for vacation rental. In addition, a 28-acre park will be dedicated to Manresa State Park along with funds to manage it.

- The Departments of Parks and Recreation and Transportation are constructing a bicycle trail along portions of the Santa Barbara County coast. The South Central Regional Commission has aided their efforts by requiring appropriate easements to ensure completion.

- The Coastal Conservancy funded 13 grants in 1979 consisting of land acquisition and development improvements such

The decade of the 1980's will be crucial for California's coast. As policy makers, resource planners, and the public look ahead, it is important to evaluate the lessons learned in the 1960's and 70's. Most often coastal management has succeeded when certain things don't happen; a wetland isn't filled; public access to a beach is not closed off; and a coastal bluff is not carved up. The continued existence of unobstructed sea-side views, acres of productive coast farmland, and rugged remote oceanside areas are indicators that the coast is being protected.

Effective coastal management in California began in 1965 with legislation creating the San Francisco Bay Conservation and Development Commission. The Bay Commission's success in preventing continued destruction of the bay and in providing bayfront access spurred statewide and national efforts for broader coastal protection.

In 1972 Congress approved the Federal Coastal Zone Management Act and, following two years of extensive citizen and legislative efforts, California voters overwhelmingly approved Proposition 20, the initiative to protect the coast. Federal law provides strong national policy supporting coastal management along with funding to encourage voluntary State participation. Proposition 20 created a State Coastal Commission and six regional commissions to plan and regulate coastal development.

From 1973 to 1975 the newly created Commission prepared the Coastal Plan, a blueprint for permanent coastal protection. Although the legislature did not adopt the plan, it did adopt the Coastal Act of 1976, which embodied key recommendations from the plan. The Act established a permanent Coastal Commission, again with permit and planning authority, and six temporary regional commissions. This time, however, the mandate called for return of regulatory controls to local governments by mid-1981 through Commission-approved local coastal programs, at which time the regional commissions will be phased out.

At the same time it approved the Coastal Act, the Legislature established the State Coastal Conservancy, which may buy and sell coastal property, make grants for coastal resource protection and restoration, and otherwise carry out Coastal Act policies through non-regulatory means.

Together, the Coastal Act, Conservancy Act, McAteer-Petris Act (which established the San Francisco Bay Commission), and a 1976 Park Bond Act comprise California's Coastal Management Program, which was approved in 1977 by the Department of Commerce under Federal Coastal Zone Management Act standards.

as staircases, a ramp for the handicapped, parking spaces, a bike trail, pathways, and toilet facilities.

In several instances, the Commission required the incorporation of public pathways and trails in new development proposals:

- The Hotel del Coronado in San Diego has a public walkway through hotel property and along the beach frontage, as required in a permit condition. The dedicated public easement has been recorded, improved, and is posted with an "Open to the Public" sign. No public access had previously been available there.

- The Marina City Club in Marina del Rey has a marked, open public accessway along the bulkhead, obtained when the Club received its permit for private recreational facilities.

- A homeowner in Bolinas is providing stairs and a 10-foot walkway across a bulkhead after he sought permission to reconstruct a seawall in a way that blocked the shoreline.

- A stairway to a blufftop public park in Santa Barbara was installed. The park would otherwise have been isolated from the public by surrounding development.

These represent only a handful of the total number of offers to dedicate access as required in many permit approvals. However, the Coastal Act provides that dedicated public accessways cannot be opened to public use until a public agency or private association has agreed to accept liability and maintenance responsibilities.

Coastal Act access policies include protecting and, where feasible, providing housing opportunities for low and moderate income persons. Without these provisions, persons of moderate means would be entirely displaced from the coastal zone. Many such projects have been approved under the Act.

Nearshore coastal habitats, especially estuaries and wetlands, encompass some of the world's most productive living systems. Yet, about three quarters of California's coastal wetlands have been destroyed by diking, dredging, and filling, or by the processes of erosion and sedimentation greatly accelerated by watershed development. The Coastal Act prohibits further degradation and loss of these valuable areas. The Commission is cooperating with local government through the local coastal programs to map remaining wetlands, identify their resource values, determine ways to plan for their protection, and where feasible, accomplish restoration. To meet these ends, the commissions have consistently denied permits for developments which would alter or destroy wetlands.

- The Noyo River, Big River, Elk Creek, and Sitka Spruce Grove were designated as Special Treatment Areas for timber harvesting in order to protect estuaries and wetlands.

- The Coastal Conservancy funded a marsh restoration project in Arcata. The ground-breaking began in September, 1979, to re-establish the marsh, create a recreational lake, aquaculture ponds, and picnic, birdwatching, and nature study areas.

- Approximately 60 acres of marsh created in conjunction with a marina in South San Diego Bay have been designated as a wildlife area.

- Based on the Commission's nomination, Elkhorn Slough in Monterey County has become a Federal estuarine sanctuary. Federal and State funds have been appropriated for land purchase to preserve this valuable natural area.

Debate surrounding the Commission's regulatory activities continues, yet the process of resolving conflicts in permits and planning has led to changed attitudes. Property owners, government agencies, and the public are more aware now of the finite and fragile nature of coast resources and have a better understanding of how to preserve them.

In coming years local governments will assume the regulatory responsibilities set out by the Coastal Act. The Commission and staff will refocus their activities from regulation to management and monitoring. Federal rules that allow California to have a say in outer continental shelf oil and gas development will continue to be applied. Through these actions the people of California will continue their efforts to protect the State's coast resources for this and future generations. □

Excerpted from the January/February, 1980 issue of Coastal News, the newsletter of the California Coastal Commission. Copies of this and other issues are available upon request from the State Coastal Commission Office, 631 Howard St., San Francisco, Calif. 94105



FACT SHEET

The United States, bounded by three oceans and the Gulf of Mexico, has a general coastline 12,383 miles long, including 2,069 miles along the Atlantic, 1,631 miles along the Gulf of Mexico, 7,623 miles along the Pacific (5,580 miles in Alaska), and 1,060 miles along the Arctic. The tidal shoreline, measured to include the shorelines of the outer coast, offshore islands, and inlets to the head of tidewater, totals 88,633 miles, and is more than seven times as long as the general outline of the coast. For the Great Lakes, the combined coastlines in the United States have a shoreline of about 3,075 miles.*

The total weight of the Earth's seawater is one billion billion tons.

The maximum depth of the sea is about six miles, in the Kermadec-Tonga Trench in the Pacific Ocean.

The average depth of the sea is 2.38 miles.

The average salinity of the sea is 35 parts per thousand.

Much of the world's ocean activity is concentrated above the continental shelves, shallow parts of the ocean, 1,000 feet deep or less, off most coasts.

The Great Lakes comprise almost 20 percent of the world's surface supply of fresh water.

More than 50 percent of the U.S. population is in coastal counties, nearly half our manufacturing capacity, and more than 60 of our oil refineries. This includes the Great Lakes area.

In 1978, there were 24 major oil tanker spills at sea. The spills totaled 328,260 long tons of oil.** Dramatic recent examples of ocean oil spills include the blow-out in Mexico's Campeche Bay and the Amoco Cadiz and the Argo Merchant wrecks.

Other marine pollutants include organic chemicals, pesticides, and herbicides, as well as toxic metals such as mercury, copper, cadmium, chromium, and tin.

There are about 12,000 known species of marine fish globally.

There are eight species of so-called great whales, 35 feet or longer. The U.S. lists all eight of those species on the endangered species list.

In the U.S. in 1970, marine sport fishing took an estimated 1.5 billion pounds of fish. The number of marine sport anglers in the U.S. increased from 6.3 million in 1960 to 9.5 million by 1970.

Commercial fisheries, in addition to supplying food for our country and the world, represent a \$7 billion industry with nearly 500,000 man-years of employment.

More than two-thirds of the commercial and recreational fish caught and eaten by Americans directly depend for part of their lives on estuaries, the areas where rivers, streams, or other fresh water bodies meet the open seas.

About two-thirds of U.S. operating nuclear and fossil-fueled electric generating plants are in the coastal zone.

At least 50 percent of Connecticut's tidal marshes have been destroyed by development. An estimated 300,000 acres of wetlands in the Nation are being lost each year, including coastal marshes.

As of March, 1977, 7.8 million acres of coastal and offshore area in the Gulf of Mexico were held under active lease for petroleum production.

Two marine sanctuaries have been created in the U.S. The Monitor Marine Sanctuary off Cape Hatteras in North Carolina protects the wreckage of the Civil War iron-clad ship USS Monitor. The Key Largo Coral Reef Marine Sanctuary near Miami protects a 100-square mile coral reef area.

In Fiscal Year 1978, the Federal Government spent \$165 million for ocean pollution research, development, and monitoring. The effort involves nearly 1,000 projects and 11 Federal agencies.

Under a Congressional directive, ocean dumping of harmful sewage sludge is to halt by Dec. 31, 1981.

In 1972 Congress recognized as a pressing problem the increasing demand for the limited supply of coastal lands and shoreline. The Coastal Zone Management Act authorized a national effort to improve the management of U.S. coastal zones.

Nineteen of 35 eligible States have Federally-approved coastal zone management programs. □

*Encyclopedia Americana

**From the Oil Spill Intelligence Report

Reading

The Frail Ocean, by Wesley Marx, 1967, A Sierra Club-Ballantine Book, 220 Bush St., San Francisco, Calif. 94104

The Thin Edge, by Anne Simon, 1978, Harper and Row, New York, N.Y. 10022, also available in paperback from Avon Books.

The Beaches Are Moving, by Wallace Kaufman and Orrin Pilkey, 1979,

Anchor Press/Doubleday, Garden City, New York.

The Sea Around Us, by Rachel Carson, 1951, Oxford University Press, New York, N.Y.

The Edge of the Sea, by Rachel Carson, 1955, Houghton Mifflin Co., Boston, Mass.

Our Nation's Wetlands, 1978, Council on Environmental Quality, Supt. of

Documents, U.S. Govt. Printing Office, Washington, D.C. 20402 (# 041-011-00045-9)

Freshwater Wetlands; A Citizen's Primer, 1979, Catskill Center for Conservation and Development, Inc., Hobart, N.Y. 13788, (\$2).

National Wetlands Newsletter, The Environmental Law Institute, Suite 600, 1346 Connecticut Ave., NW, Washington, D.C. 20036. (6 issues/\$21)

Rocking the Cradle of Civilization

by Paul E. Ress

Let us not dream. There won't be a Mediterranean Community in the near future. But after all, European cooperation began with coal and steel. Why should not Mediterranean cooperation start with the protection of the environment and the rescue of a threatened sea?"

Is there wishful thinking or reasonably-founded optimism in these words of Serge Antoine, director of studies and research in the cabinet of the French Minister of Environment?

If one looks backward to the first meeting in Barcelona in 1975, in which 16 of the 18 Mediterranean governments participated, and if one measures the progress of the past five years, then Serge Antoine's words seem more prophetic than wishful.

On May 17, in Athens, the Mediterranean countries will take a giant step in their joint

effort to save their common sea from further deterioration. Most of them are expected to sign a long-awaited, carefully-prepared treaty controlling pollution from land-based sources: factory waste, municipal sewage, and agricultural run-off from pesticides and fertilizers. Since these account for about 85 percent of all Mediterranean pollution, its signing and ratification by Mediterranean Parliaments in the next year or two are fundamental to any serious effort to diminish and control pollution in the region.

Does this mean that the Mediterranean will be resuscitated, or nursed back to health from the death bed? No, because the Mediterranean was never dead or dying. Its coastal waters are sick. How sick no one really knows, but certainly polluted enough that something drastic has to be done.

"The determination of the

overwhelming majority of the Mediterranean governments and peoples to act together to do something now about their common sea proves that ancient and current political conflicts can be overcome," says Dr. Mostafa K. Tolba, the Egyptian micro-biologist who heads the United Nations Environment Program (UNEP).

Left to themselves, the coastal states of the Mediterranean probably would not have succeeded in working so harmoniously together. Not only are they handicapped by bitter territorial and political disagreements, but they have a keen competition going for tourists. With more than 100 million tourists flocking to the Mediterranean every year, and twice that already staggering number expected in the year 2000, the region is easily one of the world's foremost tourist attractions.

So UNEP stepped in at the invitation of the Mediterranean countries themselves. "The international conference on the environment in Stockholm in 1972 had made marine pollution a priority field, and UNEP felt that if it could succeed in such a politically difficult region as the Mediterranean, it could be effective in any sea," recalls Peter S. Thacher, Deputy Executive Director of UNEP. "Indeed, UNEP has a Regional Seas Program, inspired by the Mediterranean Action Plan and involving 80 countries. The United States participates in the Caribbean one."

The first step was for UNEP to bring together as many of the 18 Mediterranean countries as possible. How many would actually turn up in Barcelona in 1975? No one knew. The 16 that did approved a Mediterranean Action Plan. This plan called for a series of treaties to be drawn up and signed, the creation of a pollution monitoring and research network, and a socio-economic program that would reconcile vital development with a respect for the environment. For it should not be forgotten that all but three or four of the Mediterranean states are developing countries, most of them poor.

"Barcelona I," as that conference is called, was a major accomplishment. A look at the map of the Mediterranean makes this clear. From west to east: Spain, France, Monaco, Italy, Yugoslavia, Albania, Greece, Turkey, Cyprus, Syria, Lebanon, Israel, Egypt, Libya, Tunisia, Malta, Algeria and Morocco. All were present except Albania and Cyprus.

One year later in February, 1976, "Barcelona II" brought together again 16 Mediterranean states, this time to approve three treaties. Normally at such conferences delegates approve but go home to think about signing the treaties in a month, in a year or sometimes never. It was a measure of the seriousness of the Mediterranean governments, and of the concern of their citizens, that plenipoten-



Crowded campsites, like this one in Italy, are now common on the shores of the Mediterranean Sea.

tiaries of most of the countries signed the three international agreements in Barcelona immediately. They entered into force in February, 1978. Today 16 Mediterranean countries (Turkey and Albania are the exceptions) and the European Economic Community have ratified the three treaties.

The principal treaty or framework convention commits the coastal states to "take all appropriate measures . . . to prevent, abate, and combat pollution . . . and to protect and enhance the marine environment." The second treaty or "Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircrafts" prohibits any dumping at all of dangerous substances on a "black list" and requires a special permit for the dumping of less toxic substances on a "gray list." The third agreement or "Protocol on Cooperation in Combating Pollution . . . by Oil and Other Harmful Substances in Cases of Emergency" provides for the exchange of information, coordination of communications, and assistance in emergencies involving massive oil spills.

Admittedly, these three treaties do not get to the heart of the pollution problem, that is, factory waste, municipal sewage and agricultural run-off but, politically and psychologically, they prepared the way for the key Athens treaty this month.

The four years between Barcelona II and Athens have certainly not been wasted in the domain of science. They were used to build a network of 84 marine laboratories in 16 Mediterranean countries and to create seven pilot projects for them. Four of these are basically monitoring activities based on common sampling and analytical procedures, while three deal with research on the behavior and effects of pollutants in the marine environment.

The results of four to five years of monitoring and research will be published in Britain in 1981 in a 600-page book called "The State of Pollution in the Mediterranean Sea."

A special study on land-based sources of pollution turned up massive evidence of

the major role played by large rivers (such as the Rhone, the Po, the Ebro, and the Nile) in carrying factory waste and sewage to the Mediterranean. In many instances pollutants come from several hundred miles upstream. If 85 percent of all Mediterranean pollution comes not from the sea but from the land, about 85 percent of that pollution comes not from coastal areas but from inland industry, agriculture, and cities.

Without such information obviously it would not have been possible to draw up an acceptable treaty on land-based sources of pollution.

Does this all mean that it is not safe to swim in the Mediterranean?

"Do I cross the street?" replies Dr. Stjepan Keckes, the Yugoslav marine scientist in charge of UNEP's Regional Seas Program. "Scientific evidence of infection from swimming in polluted water is scarce but the risk does exist. The accent is on the word 'risk'. Don't forget that in the Mediterranean people swim, snorkel, sit on the rocks, lie in the sand for hours, some of them practically from sunrise to sunset. They

exposure. Don't forget either that in most places the Mediterranean coastal waters are clean. Naturally I go swimming . . . when I can find the time."

It would be inaccurate to pretend that the Mediterranean is less polluted today than it was five years ago at Barcelona I.

"The Mediterranean wasn't polluted in five years and, besides, with urbanization, industrialization, population growth, and the rapid development of tourism, pollution is simply not going to disappear. At best, we can limit and control it. If the Athens treaty on land-based sources of pollution is ratified in about two years and seriously implemented, I think we can reverse the rising tide of pollution by the end of this decade," Dr. Keckes says. "That would be 15 years after the birth of the Mediterranean Action Plan. And that's not really a long time. After all, people began talking about cleaning up the Thames in the 1950's, and how long is it taking to restore the Great Lakes to a decent condition?"

No one really knows how much it will cost to "clean up"

and will. "The money will be spent over a period of 10 to 20 years, and no country will have to pick up any other country's bill. The 17 countries will share the cost. If the Mediterranean countries do not raise the money to deal with their industrial and municipal waste, then they will find themselves losing huge sums on medical treatment of their sick citizens (and of tourists), on an ailing fishing and shellfish industry, and on decreasing numbers of tourists. Holiday-makers may go somewhere else if they risk getting sick in a polluted Mediterranean. In short, the Mediterranean countries really have no choice."

Slowly, imperceptibly, a "Mediterranean mentality" is forming among the thousands of Action Plan participants. In spite of all the things dividing them, these Mediterranean "activists" have clearly found something they all love and wish to save. As a delegate from Greece remarked to a group of Mediterranean neighbors after the third Barcelona conference in February, 1980, "I used to consider myself a Greek and an inhabit-



are under water, they frequently swallow water, so they are exposed to the contact of sea water and beach in a completely different way from those who swim in the colder waters of the Atlantic. We do not know the magnitude of the risk they are taking by doing this, but the risk is definitely proportional to their

the Mediterranean. Estimates vary from five to 15 billion dollars. In a period of economic crisis skeptics are entitled to wonder whether the 17 countries actively cooperating in the Mediterranean Action Plan will be willing and able to raise such an enormous amount of money.

Dr. Tolba, UNEP's Executive Director, is convinced they can

tant of the Balkans. Now, after all these encounters with people from all parts of the Mediterranean, I regard myself as a Greek and a Mediterranean man." □

Paul Ress is the European Regional Information Officer for the UN Environmental Program.

Around the Nation

1

REGION

River Festival

U.S. Senator Paul E. Tsongas, the New England Rivers Center, EPA, and State, local and private river protection organizations will hold a Massachusetts Rivers Celebration May 31 and June 1. The purpose of the celebration is to highlight successful efforts to restore our rivers as a natural resource. Activities will include canoe races, barge rides, fishing derbies, art exhibits and picnics.

Hazardous Waste Conference

EPA Administrator Douglas M. Costle will be the keynote speaker at a hazardous waste management conference sponsored by the Maine Audubon Society, Maine Association of Conservation Commissions, and the Associated Industries of Maine on May 30th in Portland, Me.

2

REGION

Hazard Suit Filed

The Department of Justice, on behalf of EPA, has filed a suit against Nick LiPari, owner of the inactive LiPari Landfill site in Gloucester County, N.J. The suit alleges that pollution coming from the landfill has created an imminent hazard to the health of anyone coming in contact with it.

The Justice Department wants the site to be fenced off.

EPA has already committed \$50,000 to evalu-

ate short-term measures to halt leachate and an additional \$250,000 is expected from the Agency to develop long-term methods for pollution control and treatment.

Toxics Grants Set

EPA Region 2 awarded New Jersey's Department of Environmental Protection (DEP) \$794,053 for research on the origin, transport, and presence of toxic substances in the air, water, and vegetation. The grant also will finance the creation of a Toxic Substances Information Resource Center and an experiment involving a biological analysis technique that could alert scientists to carcinogens that haven't yet been examined in the laboratory. This technique may prove more cost-efficient than chemical measurement. The projects are part of a series of toxic substances strategies agreed to by EPA and DEP.

Puerto Rico received \$258,394 under the same type of cooperative agreement with the Agency.

3

REGION

Fuel Switch Fine

The City of Reading, Pa., recently paid a \$2,000 fine levied by EPA for illegally using leaded gasoline in police cars designed to use unleaded fuel only. The use of leaded gasoline in cars requiring unleaded fuel will eventually destroy the catalytic converter, a major pollution control device.

The violation occurred in July, 1978, when an unleaded gas pump in a Reading municipal garage broke down. A garage supervisor ordered that the smaller unleaded fuel nozzle be switched to a

leaded gasoline pump. Thirteen police cars were subsequently filled with leaded fuel. This was done despite the existence of another municipally-owned unleaded pump nearby, and the availability of credit cards to purchase unleaded gas at retail outlets. The unleaded pump was repaired within two days, and the switching stopped.

An inspection of police cars revealed that no damage had been done to the catalytic converters. Reading officials notified the EPA about the incident in September, 1978, and EPA filed a complaint against the city in May, 1979.

4

REGION

CLEARing the Air

CLEAR, the Coalition to Launch Environmental Awareness and Response, is sponsoring a three-day seminar this month to promote public understanding of Charlotte, N.C.'s air pollution problems and to encourage increased use of the city's rapid transit system.

Because of the Appalachian Mountains to the west, the Atlantic Ocean to the east, and persistent high pressures to the south, air becomes trapped for substantial periods of time in the Charlotte-Mecklenburg County area. Ozone and carbon monoxide are the principal pollutants. Because the area does not meet EPA standards for carbon monoxide the counties will have to install an inspection and maintenance program for automobiles.

To be certain that program participants don't lose sight of the problem, the seminar will be held at the University of North

Carolina at Charlotte. The UNCC campus is located in the northeast section of the city where ozone concentrations are the worst.

The CLEAR coalition is made up of representatives from the Audubon Society, the Junior Women's Club, the League of Women Voters, and the Sierra Club.

5

REGION

\$35 Million Saving

The use of new testing techniques which allow unprecedented efficiency in the selection and development of rural wastewater treatment systems will save an estimated \$35 million in the construction of five rural sewage treatment facilities in Region 5, according to Charles H. Sutfin. Sutfin said these techniques are being used for the first time on EPA construction grant projects by Region 5 and its environmental impact statement consultants, Wapora, Inc., of Chevy Chase, Md. These techniques, he said, if used on even a portion of the hundreds of similar projects for which construction grant applications have already been submitted, could result in the saving of hundreds of millions of dollars in the next ten years alone.

Rural sewage treatment facilities are often exorbitantly costly to build, sometimes as high as \$15,000 in construction costs per dwelling served. Furthermore, because the planning of these projects often does not indicate adequately the resulting impact on existing water quality and upon the environment, the construction of such facilities can harm nearby natural areas such as wetlands.

The estimated total of \$35 million can be saved in construction of the first five of seven planned treatment projects on which Environmental Impact Statements are prepared using the new techniques. These projects, located on lakes in Michigan, Minnesota, Indiana, and Ohio, can now be built at a substantial saving. Reductions in monthly user charges will range from 50 to 90 percent.

The new methods rely on aerial infrared sensing to assist in identification of surface septic system failures and ultraviolet fluorescence sensing to reveal effluent plumes entering streams and lakes from septic tanks. These techniques, coupled with waste flow management, permit the replacement of only the defective septic tanks rather than requiring the expensive installation of new sewer systems to replace all septic tanks. EPA can then avoid unnecessary construction and overbuilding.

6

REGION

Women's Conference

About 300 women attended the first two-day Regional Conference for American Women held in Dallas recently. Five regional conferences are scheduled across the country as part of U.S. participation in the World Conference of the U.N. Decade for Women, 1980, to be held in Copenhagen, Denmark, July 14-30. The Regional conferences will focus on the major issues facing women in the 1980's—health, education and employment.

Barbara Blum, EPA Deputy Administrator, said EPA hosted the

Dallas conference because the agency "owes its existence . . . to countless women in communities across the Nation who continue to support strong environmental programs."

Region 6 Administrator Adlene Harrison said the women's movement is scrutinized constantly by skeptics or adversaries looking for flaws. "We as women have to put our best foot forward. We are constantly in the spotlight, and people watch our actions," she said.



Kansas Citizens Cited

Dr. Kathleen Q. Camin, Region 7 Administrator, recently presented Environmental Quality Awards to eight Kansas citizens for their personal contributions toward preserving the quality of the environment. The awards ceremony was held in Topeka, Kan., at Governor John Carlin's offices. The recipients are:

- Ronald G. Bliss, public affairs director for KARD-TV, Wichita, who received an award for producing the television documentary, "Water—A Very Dry Subject." The documentary warns of impending crisis in the underground water supply in Kansas;

- Robert Bolon, president of the The American Walnut Company, Kansas City, Kans., was recognized for aggressive leadership in reducing air pollution. Bolon's company, a manufacturer of gunstocks and lumber, meets air pollution control standards by a comfortable margin, and is nearly energy self-sufficient;

- Joyce P. Fent, Salina, was honored for her outstanding efforts as citizen

activist for the environment. Recently, Mrs. Fent brought public attention to environmental deficiencies of a proposed rural water district;

- Merlin Green, Pratt Wastewater Treatment Plant supervisor, who received an award for dedicated effort in maintenance and supervision of the treatment facility in order to meet clean water standards;

- Dr. E. Raymond Hall, University of Kansas zoology professor, was recognized for a distinguished career as educator and author and for instilling in his students concern for the environment;

- Both Dr. Wesley Jackson and his wife Dana of Salina received an award for direction of The Land Institute, an innovative education and research organization devoted to the study of alternatives in agriculture, waste, shelter and energy; and
- Dr. Ross McKinney, Director of Environmental Engineering and Environmental Health, University of Kansas, received an award for research, teaching, and publishing in the field of environmental engineering. Dr. McKinney has been internationally recognized for his work in wastewater treatment systems.



Indians Protect Air

Two Montana Indian tribes will be building the foundations of their own air pollution control programs this year with the help of grant funds from EPA's Denver Regional Office. The Northern Cheyenne tribe, whose 440,000-acre reservation lies in southeastern Montana, and the Assiniboine-Sioux, from their 1 mil-

lion-acre Ft. Peck reservation in northeastern Montana, will be acquiring technical staff, doing monitoring, and performing research. Both tribes are concerned with air quality and energy development within their reservations and activities near their lands that will affect them. There are extensive coal resources in the vicinity of both reservations.

EPA will provide some \$33,000 of a total \$44,000 grant to the Northern Cheyenne and \$45,000 of a \$79,000 grant to the Assiniboine-Sioux. Remainder of the funds will come from the Department of Interior and the tribal government.

For the past several years both tribes have been active in various aspects of pollution control on their reservations including solid waste control, water quality planning, and air pollution.



Hazardous Waste Aid

The San Francisco Regional Office recently coordinated a Federal and State task force to reduce the release of hazardous chemicals from an abandoned waste site near Riverside, Calif.

Known as the Stringfellow Hazardous Waste Site, the area contains chemical, petroleum, and sulphuric acid wastes. Before being abandoned in 1975, the site was used for 17 years as a chemical waste disposal site with an estimated 32 million gallons of waste liquid deposited there. A series of ponds on the site was within one foot of overflowing due to heavy rainstorms in southern California. Soil in the area was saturated and additional rainfall posed a

threat to downstream waters. Two years ago heavy rain caused the ponds to overflow and waste entered Pyrite Channel flowing through the community of Glen Avon and eventually reached the Santa Ana River.

The State of California Water Resources Control Board has been monitoring the site for several years. Recently the State removed approximately one million gallons of waste material from the site. However, continued rains refilled the ponds and the State requested assistance from EPA.

Section 311 of the Clean Water Act established a revolving pollution fund to handle oil and hazardous substances emergencies. Region 9 used this fund to respond to the State's request for assistance. Over three million gallons of hazardous waste materials were pumped from the ponds and trucked to an alternative disposal site, dams and dikes were repaired, and leachate from the ponds was controlled.



Water Misunderstanding

The Seattle Office of External Affairs has been busy fending off recurring reports that EPA is considering the diversion of water from the Northwest to other areas of the West where water is in short supply. This is simply not true says Regional Administrator Donald P. Dubois. The water diversion rumors originated last January in San Antonio, where someone apparently misunderstood what was said by an EPA contractor during a presentation about his work on the benefit-cost relationships of certain possi-

ble energy developments in the West. A very small part of his study—one or two pages in over 10 volumes—concerned past studies of interbasin transfers of water. As for new studies, the contractor explicitly told his audience in San Antonio that such studies by any Federal agency were forbidden by an act of Congress. EPA couldn't study water diversions even if it wanted to and, declared Dubois, "We definitely don't want to. EPA has its hands full trying to protect water quality. We have no desire, plan, intention, or thought of doing anything else with the water."

States Served by EPA Regions

Region 1 (Boston)
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Boston, Massachusetts
617-227-2211

Region 2 (New York City)
New Jersey, New York, Puerto Rico, Virgin Islands
New York, New York
212-264-2826

Region 3 (Philadelphia)
Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia
Philadelphia, Pennsylvania
215-597-9914

Region 4 (Atlanta)
Alabama, Georgia, Florida, Mississippi, Louisiana, South Carolina, North Carolina
Atlanta, Georgia
404-681-4121

Region 5 (Chicago)
Illinois, Indiana, Michigan, Minnesota, Wisconsin, Missouri
Chicago, Illinois
312-321-2022

Region 6 (Dallas)
Arkansas, Louisiana, Oklahoma, Texas, New Mexico
Dallas, Texas
214-767-2000

Region 7 (Kansas City)
Iowa, Kansas, Missouri, Nebraska
Kansas City, Missouri
816-374-5452

Region 8 (Denver)
Colorado, Utah, Wyoming, Arizona, New Mexico, South Dakota, North Dakota
Denver, Colorado
303-837-3096

Region 9 (San Francisco)
Alaska, California, Nevada, Oregon
San Francisco, California
415-776-7221

Region 10 (Seattle)
Alaska, Idaho, Oregon, Washington
Seattle, Washington
206-462-7000

Reordering Coastal Priorities

Continued from page 11

remains the proper forum for this collective approach.

The Administration is proposing amendments to the Coastal Zone Management Act of 1972, as amended, and the Congress has already begun to consider the future of this program. It is vitally important that in our deliberations, we maintain the spirit of the original Act and continue to recognize the need for strong partnership in developing programs which resolve conflicts. It is a tall order under current circumstances, but it is still the most sensible means we have for responding to all legitimate interests.

Beyond the careful consideration given to the process which the Congress has spawned in this program, critical issues which are being raised by Year of the Coast efforts are being called to our attention.

● *Hazards.*

David and Frederick, the two hurricanes of last fall, reminded us of the risks faced by the millions of people living at the water's edge. Much development occurring along our coasts places people and property at great risk, and often unknowingly. Government programs support this development directly or indirectly. At the

same time, programs like South Carolina's coastal zone activities have direct policies concerning further development on barrier islands and other high risk hazard areas. The Federal Government and its vast array of public facility support programs (such as water and sewer treatment plants, highways, etc.) and others such as the Flood Insurance Program must be equally responsive to the need for greater care in developing coastal areas. One point which has been abundantly brought home by the current state of economic crisis is that the Federal Government will not be able to bear the costs indefinitely of rebuilding in the higher risk areas.

● *Urban waterfronts.*

A subject of increasing concern is the need to revitalize many of our coastal urban waterfronts. These areas have great potential for increasing vital economic activity as well as offering unique potential for increasing public access to the shore. Several major cities such as Charleston, Baltimore, Detroit, and Boston, and countless smaller municipalities have made marked improvements along their waterfronts. These have been the types of improvements which have benefited ports, towns, recreational boating, the quality of life for neighborhood residents, and all citizens and visitors to the community.

● *Energy Facility Siting.*

A need exists to resolve energy facility

siting issues in a more expeditious manner. This is not to say that important environmental considerations should be overlooked. Rather, we must find more systematic means for identifying appropriate sites and for ensuring that environmental disruptions are minimized.

● *Improved Environmental Protection.* Improvements can be made in protecting the significant environmental resources of our coastal lands and waters. Coastal Zone Management has taken an extremely important step in this process by identifying these resources in the basic management plans. CZM is both a facilitator of this objective and a means to coordinate the effects of other agencies in achieving improved protection.

Year of the Coast is more than a theme for assessing where we've been. It should be a catalyst for citizens, all levels of government, the Congress, and the Administration to accelerate momentum built over the last decade. This should be a year of milestones, and it will be a year of tough, practical decisions that will set a new pace for the decade. No one element in this complex partnership can, alone, make the difference. Coastal Zone Management must be carefully reviewed and citizens must use Year of the Coast to press for responsiveness in government, particularly at the State and local levels. □

Choosing a Course

Continued from page 11

rier islands and beaches. These long, finger-like pieces of land protect estuaries and sounds—which are among the richest and most productive ecosystems known to man—from natural disruptions like storms and hurricanes and from man-made disasters like coastal oil spills. They are unique components of the coastal zone and as such merit special attention and protection.

Any permanent development on these islands and beaches is both unwise and hazardous because of the tremendous physical changes they are constantly experiencing.

Land considered safe today for building may well be covered with water within a few years, the result of the great natural forces at work in these areas. They are as well extremely vulnerable to ocean storms, which periodically hasten these natural changes—as was apparent in New England during the blizzard of 1978.

Unfortunately, the dynamic and fragile character of our barrier islands has not yet been sufficiently recognized by the Federal Government, which has instead encouraged and assisted the development of these islands. In fact, a recent study by the Department of the Interior found that "over three fiscal years, the permit granting and licensing agencies committed nearly half a billion dollars to barrier island development projects." The study goes on to conclude that "this action results from a general lack of knowledge and understanding of barrier islands as unique resources warranting special attention and a lack of appreciation of the need for protection."

It is particularly disturbing that the Federal Government has not only encouraged the development of these islands, but has spent millions of valuable taxpayer dollars redeveloping areas clearly not suited for development in the first place. As a result of these policies, barrier islands have become urbanized at a rate twice that of the Nation as a whole. Already, 14 percent of our island space is considered urban as opposed to only three percent of the mainland.

The Year of the Coast offers us an opportunity to change these policies and to alert the public at large to the tremendous importance of these areas. I have recently co-sponsored the Barrier Islands National Parks Bill which would provide funds for the purchase of undeveloped islands for inclusion in a system of National Parks.

Ocean Thermal Energy

One of the most promising new technologies which could help the United States become independent of imported oil during the 1990's is ocean thermal energy conversion, a process which uses the temperature difference between warm, surface waters and cold, deeper waters to generate electricity. While this process would not be practical in the cold waters of New England, large thermal energy conversion platforms could be located near the coasts of Hawaii, Puerto Rico, and other areas with warm water, and the electricity they produce could be delivered to shore by submerged cables.

While the technology involved in producing ocean thermal energy on such a large scale still needs additional engineering and demonstration, it is clear that this

News Briefs

EPA, L.A. Reach Sludge Agreement

EPA Deputy Administrator Barbara Blum announced an agreement with the city of Los Angeles to stop the city's discharge of sewage sludge into the Pacific Ocean by mid-1985. Under the terms of the agreement, the city would incinerate the sludge, the residue left after treatment, rather than continue discharging it by pipeline seven miles out into the ocean. The new process dries the sludge, forms it into pellets and incinerates it, thereby producing more energy than is consumed. The surplus will be converted into electricity that will be more than adequate to meet the needs of the entire sewage plant. The agreement ends over a decade of violation of clean water requirements by the city and resolves a number of lawsuits involving the city, the State of California, EPA and other organizations and private citizens. Los Angeles has been discharging over 100 million pounds of sludge into the ocean each year. The agreement also calls upon the city to set up a \$2,165,000 fund to be used for other environmentally beneficial projects in the Southern California area. EPA and the city will decide the nature of each project. "The citizens of California can now look forward to realizing the benefits of cleaner coastal waters," said Blum. "The new agreement will do much to make sure these waters remain healthy for future generations."

could become one of the major new types of electrical generating plants being built in the 1990's. The construction of these facilities could relieve us of one of the greatest pressures now being placed on our coastal environment: the need for electric utility companies to find sites near water to build their traditional oil, coal, or nuclear power plants. The emergence of thermal energy conversion as a viable alternative energy source would reduce the need to allocate space in already crowded coastal areas for the construction of such plants.

While some local environmental disruption may still be caused by the huge volume of water which must be pumped through an operating thermal energy conversion plant, all indications are that the overall impact upon the environment would be far less severe than the problems caused by the power plants on which we now rely.

Because of the great potential for ocean thermal energy, I have cosponsored legislation to speed up the construction of large scale demonstration plants. I have also written and introduced legislation to remove some of the legal and financial barriers to the prompt commercial construction

of these plants. This legislation has been referred to our Oceanography Subcommittee. I believe our effort to develop renewable energy alternatives from the sea is an important and vital part of what we can accomplish during the Year of the Coast.

Fisheries Habitat Protection

The Fisheries Conservation and Management Act—the act which established the 200 mile fishing limit—has made significant progress in restoring the vitality of our domestic fisheries. Since its inception in 1977, landings by American fishermen have increased significantly, while foreign fishing within our waters has dropped dramatically. Fisheries management plans are now being developed across the country by Regional Councils comprised in part by working fishermen.

Unfortunately, much remains to be done before we can rest assured that the future of the fishing industry will always be as bright as it is today. The law establishing the 200 mile limit was important because it gave us a tool with which to manage the harvest we reap from the sea. Equally important, however, are safeguards that will allow our commercial and recreational

fisheries to continue to regenerate in sufficient number. Wetlands, estuaries, harbors, and bays provide the habitats for most of our fisheries during various stages of their development. The absence of these habitats would lead to a dramatic if not total decline in the fish population. Ironically, there is no requirement that Federal agencies protect these important areas. One of our major efforts during the Year of the Coast will be to guarantee the protection of these fish habitats.

Our subcommittee staff is currently studying various proposals to safeguard these areas, and I am hopeful that we will soon be prepared to introduce legislation that will bring this about. The continued viability of our fishing industry depends upon it.

To a large extent it will be the success we have in increasing public awareness of the issues involved that will ultimately determine the success of the Year of the Coast. This will be our single greatest challenge in the year ahead. □

A review of recent major EPA activities and developments in the pollution control program areas.

ENFORCEMENT

Excess Lead

The EPA has taken enforcement action against a major oil refiner for adding too much lead to its gasoline, thereby violating health-based lead rules.

An administrative civil complaint issued against Americana Petrofina of Texas alleges the refiner exceeded the 0.8 grams per gallon lead standard at its Port Arthur, Tex., refinery during the October-December quarter and proposes a penalty of \$122,074.

Jeffrey Miller, Acting Assistant Administrator for Enforcement, said the penalty was designed to offset any profits the refiner may have received during that quarter by not complying with the Agency regulations.

EPA has given refiners an extra year to produce gasoline at the 0.8 grams per gallon level before the final lead phase-down standard of 0.5 grams per gallon goes into effect in October of this year.

The agency said it discovered the lead violations while reviewing the refiners reports submitted to EPA at the end of the last quarter. The reports are required by the lead phase-down regulations in order to ensure compliance with the standards.

PESTICIDES

Cleanup Suit

The Department of Justice, on behalf of EPA, has filed a suit against Vertac Chemical Corporation, Inc., seeking clean-up of a site in Jacksonville, Ark., containing waste from the production of the herbicides 2,4,5-T and 2,4,D. Much of the waste contains dioxin, one of the most dangerous chemicals known to man, suspected of causing cancer, miscarriages, birth defects, and genetic mutations in humans.

Dioxin has been found in soil on the site, in Rocky Branch Creek which runs along the site, and in soil in residential areas adjacent to the site. Dioxin has also been detected in fish downstream from the site.

Vertac and Hercules, Inc., a previous owner of the site, are being asked in the suit to jointly clean up the site. Specifically, they are being asked to provide secure storage of all barrels on the site, to cease the discharge of hazardous wastes into soil and water, and to submit plans to EPA for clean-up of the site and of Rocky Branch Creek and a bayou into which the creek runs. The more than 3,000 barrels on the site contain chemical waste with dioxin.

The suit also asks that Vertac and Hercules be fined \$10,000 a day for each day of discharge into navigable waters without a permit, under the Clean Water Act.

Meanwhile, EPA has ordered Vertac, Inc. to delay off-site disposal of the barrels until the Agency can advise the firm of a safe disposal method.

Pesticide Protection

An agreement to provide for the development of a pesticide protection program for farm workers has been reached by EPA and the Department of Labor. The objective is to protect farm workers from adverse effects of pesticides.

A principal feature of the agreement is a \$5 million, five-year study of the effects of pesticide exposure, if any, on the health of youth under 16 years old employed in agriculture. The Fair Labor Standards Act allows youth under 16 to work on farms under specified conditions.

Specifically, a study will be undertaken to determine actual pesticide exposure and physical effects of such exposure, absorption rates of pesticides into the body, and acute and chronic health effects in relation to duration and level of exposure.

The agreement also calls for joint efforts in the development and distribution of information on pesticides to farm workers and for cooperative enforcement efforts by the Labor Department and EPA.

Improving Accuracy

The EPA has told the manufacturer of an insecticide, advertised in major newspapers as a "doomsday powder for roaches," to make labeling and advertising for the product more accurate or risk losing EPA's permission to sell it in this country.

In a letter to Copper Brite Incorporated of Los Angeles, EPA said advertisements for the company's "Roach Prufe" insecticide "made claims which are either too promising, are an implied safety claim or have not been accepted for registration." Registration is EPA's permission to market a pesticide in the U.S.

EPA regulates the sale and use of pesticides in this country under the Federal Insecticide, Fungicide and Rodenticide Act. The Agency is not contesting the basic effectiveness of Roach Prufe in controlling cockroaches, ants, and silverfish in houses and certain other buildings, but it does believe that some of Copper Brite's promotional claims for the insecticide are excessive or unsubstantiated.

Roach Prufe is a powder containing 99 percent boric acid, a widely recognized poison for cockroaches and certain other common insect pests.

Herbicide Decision

The EPA says its investigation of the herbicide oryzalin has not disclosed adverse effects associated with its current use. It therefore proposes no regulatory action under the Federal pesticides law against use of the chemical at this time.

However, continuing uncertainty about reported human health effects to children of workers at a GAF Corp. plant in Rensselaer, N.Y., which manufactured the chemical during 1974 to 1976, has caused EPA to require oryzalin's producer, Eli Lilly & Co. of Indianapolis, to conduct additional animal studies to resolve questions about the herbicide's potential for causing harmful health effects.

The Agency's investigation concentrated on potential hazards from oryzalin to users of the herbicide. The Agency also inspected the eight plants besides the GAF facility that produced or are producing the herbicide, reviewing the various production processes used and examining existing information on oryzalin's toxicity.

EPA's plant inspections and a review of its own records indicated no adverse health effects recorded or reported by production workers, or mixers, loaders, and applicators of the herbicide.

The actual circumstances of the Rensselaer situation are being investigated by the Occupational Safety and Health Administration and the National Institute for Occupational and Health.

The GAF plant no longer produces oryzalin.

Limited Use

The EPA says it will allow a rodenticide called Compound 1081 to be used only against rats in sewers. Use will be restricted to certified commercial applicators.

The risk of children, pets, and wildlife accidentally eating the rat killer, the Agency said, is too great to allow its use in locations other than sewers.

EPA opened its investigation of Compound 1081 in 1976 after three children in Durant, Okla., died from eating wafers soaked with the poison. They found the wafers in a pest control operator's unlocked truck. That investigation has now been completed and the manufacturer last November voluntarily revised the label on the product to limit the use specifically to rats in sewers.

ArCHEM Corporation of Portsmouth, Ohio, the sole manufacturer, already has the product available for sale under the new label.

TOXICS

Exposure Facts

The EPA has announced plans to begin gathering basic information on how and to what extent people and the environment are exposed to many of the Nation's largest-volume chemicals starting with some 2,300 substances.

"Although we have learned a great deal about chemical production volumes, there still are many unanswered questions about what they are used for and who is exposed to them," said Steven D. Jellinek, EPA Assistant Administrator for Pesticides and Toxic Substances.

Working from a list of the nearly 47,000 commercial chemicals made or imported into the U.S., the Agency identified the 2,300 compounds primarily on the basis of their relatively high production volumes, as well as information on their toxicity.

EPA is proposing that manufacturers and importers of these chemicals be required to submit general information on what each chemical is being used for and by whom, how each chemical is being handled by workers and others who come into contact with it, and how much of each is released into the environment. The Agency is also asking for updated production volume information for the year 1979.

Toxics Control

EPA has awarded two States and the Commonwealth of Puerto Rico a total of \$1.44 million to develop programs for investigating and controlling human and environmental hazards from toxic chemicals.

The states receiving the funds under cooperative agreements are New Jersey and North Carolina. The grants are the second group to be awarded for State program development under the 1976 Toxic Substances Control Act. The first group of grants went to Maryland, Michigan, New Jersey, New York, and Wisconsin in 1979.

The States have until May 11 to apply for a third round of grant money totalling \$1,250,000.

RADIATION

Three Mile Island

Officials from several Federal agencies and the Commonwealth of Pennsylvania met recently to update the interagency long-term plan for monitoring radioactivity in the environment around the disabled Three Mile Island nuclear power plant. EPA was named the lead Federal agency for releasing information on environmental monitoring levels.

The updated plan also includes additional requirements for off-site monitoring in the event that radioactive Krypton gas is vented from the inoperative nuclear reactor at Three Mile Island.

The meeting, which took place March 11 and 12 in Harrisburg, was attended by officials from EPA; the Department of Health, Education, and Welfare; the Nuclear Regulatory Commission; the Department of Energy, and the State.

New additions to EPA's current monitoring plans will allow the Agency to obtain a comprehensive picture of environmental levels of Krypton-85 venting from Three Mile Island, in the event

that the Nuclear Regulatory Commission decides that this action is necessary. These additions would consist of increasing the monitoring personnel in the area, collecting additional gas samples for Krypton analysis, increasing the frequency of air sample collection, and collecting atmospheric water vapor for radioactive analysis.

The public at large, key State personnel and officials in communities near Three Mile Island are to be kept informed of all monitoring information.

Under the current EPA long-term surveillance plan for Three Mile Island, a network of air sampling and gamma rate background recording stations will continue to operate. Periodic review and revisions of the plan will continue in accordance with planned clean-up operations.

WATER

Training Center

As knowledge of the relationship between water pollution and public health increases, so does the need for trained specialists. To answer this need, the EPA is trying out a new short-course training center approach.

The Agency's first Area Training Center is now being established on a trial basis at the University of Massachusetts in Amherst. Beginning this June, it will offer selected three- to five-day courses to public and private sector employees, primarily from the Northeast, who work in the pollution control and public health fields. The courses will stress the latest techniques and technology in these areas.

The Center's operations will be evaluated over the first year. If the Training Center idea proves its worth during that period, the Agency will consider opening additional centers in other parts of the country.

The Director of the training center is Dr. Francis A. DiGiano, Associate Professor of Civil Engineering and Coordinator of Environmental Engineering Program at the University of Massachusetts. He can be contacted at the University's Department of Civil Engineering, Amherst, Mass. 01003. Phone (413) 545-0685 for more information. □

A FRAGILE BALANCE



Sea oats abound on Jekyll Island, one of Georgia's barrier islands.

In his 1977 Environmental Message, President Jimmy Carter directed the Secretary of the Interior, in consultation with other Federal agencies and State and local officials, to develop an effective plan for protecting barrier islands.

The President ordered an examination of various Federal programs which through subsidies, permits, and management programs contribute either to the protection or development of barrier islands.

The Secretary of the Interior established a work group under the general direction of the Heritage Conservation and Recreation Service for a comprehensive review of these islands in order to prepare options for a plan for protecting them. The review surveyed the nearly 300 barrier islands in 18 East and Gulf States reaching from Maine to Texas and incorporating nearly 1.6 million acres.

The report and draft environmental impact statement said that:

- Barrier islands form the shoreline's first line of defense against storms and hurricanes along the several thousand miles of the East and Gulf Coasts. When an island's dunes are leveled, its first and foremost defense against storms is removed.

- One of every four Americans lives within 100 miles of a barrier island.

- Today, with many more people living on or visiting barrier islands, huge economic investments are involved.

- Nearly one-third of those 295 islands studied are heavily populated and substantially developed. In some cases, major cities are on these islands, including Miami Beach, Atlantic City, and Galveston.

- Of the 1.6 million acres studied, 739,000 acres are undeveloped but are unprotected from future development.

- Estuaries surrounding barrier islands are among the most productive ecosystems anywhere.

- At last count, in 1976, the Gulf States offshore fishing industry accounted for about one-third, by both weight and value, of the total U.S. fisheries. Of the catch, almost 98 percent are estuarine-dependent species.

- Interior's National Park Service manages popular barrier island recreation areas, including Cape Cod, Fire Island, Gateway in New York, Assateague, Cape Hatteras, and Padre Island. In 1978, visitation to seashores managed by the National Park Service totaled about 26.3 million people.

- Thirty-one barrier islands support National Wildlife Refuges managed by the Interior Department's Fish and Wildlife Service.

- About 34 endangered or threatened species of animals depend on barrier islands, including the Loggerhead Sea Turtle, Whooping Crane, Bald Eagle, Eastern

Brown Pelican, Peregrine Falcon, and the American Crocodile.

- Barrier islands abound with cultural and historical treasures. There are 76 National Register properties on 43 island groups, and 73 National Landmark sites on 68 island groups.

- Of the 295 islands studied, 175 provide direct access for vehicles by road, bridge, or causeway; nine have airports; and 24 offer regular ferryboat service.

- Population density in America's coastal counties is more than four times the national average. The density over the entire continental U.S. between 1960 and 1970 was 60 persons per square mile; whereas, in barrier island counties, the density was 278 persons per square mile.

- Population growth in these coastal counties is accelerating at a rate more than double the rate in the continental U.S.

- From coastal erosion alone, property losses on barrier islands are estimated at \$300 million a year.

- Due to a lull in hurricane activity along the Atlantic coast over the past 20 years, approximately 80 percent of the people who live on the coast have no experience in the hazards of hurricanes. And this does not count tourists and island visitors.

- Experts say the Atlantic Coast is long overdue for a hurricane of killer dimensions.

- A sea level rise of even a few feet can flood routes of escape from many of the populated barrier islands.

This seems to set the scenario of potential tragedy.

What happens if those waters rise above an island's bridge of escape? Or if a truck jackknifes on a causeway between the islanders and the mainland? Or if turbulent waters send a barge or ship smashing into a bridge? Or if island inhabitants react too slowly to early warning? Or if the warning is not sounded early enough?

Recently, Hurricane Frederick lashed from the Gulf into areas around Mobile, Ala. Effective warning and evacuation procedures aided by a vivid memory of Hurricane Camille spared lives. But damage to private and public properties was close to \$2 billion.

The winds of Hurricane Frederick had hardly died before questions of Federal assistance were being raised. These questions hinged on a range of Federal "responsibilities"—loans, insurance, rebuilding plans, and other forms of disaster assistance. Federal assistance was expected and has been provided in the past.

This raises a question of whether the Federal Government should subsidize the recurring costs, costs often paid and then paid a second time and even a third for the same property damage.

The Federal Government has subsidized and encouraged development on barrier islands.

When natural disaster does occur, the Federal Disaster Relief Act of the Federal Emergency Management Agency pays for a range of relief efforts—emergency warning, evacuation, shelter, food, and medical care.

Thus, Federal programs provide protection and recreation, but they also encourage and help people and businesses to return and rebuild again.

Citizens and groups, governments at all levels, planners, builders, property owners, investors, and conservation groups are commenting on the draft environmental impact statement which resulted from the barrier islands study.

They are responding to draft environmental impact statement proposals for Federal alternatives and options. Their comments will help the Secretaries of Interior and Commerce make recommendations to the President.

The Barrier Islands draft environmental impact statement gives three options or alternative levels:

1. The "low" level alternative essentially is a description of status quo. No options for change are given.

2. The "moderate" level describes options designed to make authorized programs more effective in protecting barrier islands.

3. The "high" level options are new program thrusts. New legislation will be required as well as strong executive directives.

These preliminary options in the draft impact statement were prepared for consideration, study, and to stimulate comment, but they are not recommendations or the Administration position.

Robert L. Herbst, Assistant Secretary of the Interior Department, sums up the problem as follows:

"Barrier islands are different . . . (They) contain fascinating ecosystems not found anywhere else . . . Because of their inherent beauty, they are places of great attraction, offering not just scenic land and water scapes, but also the mystery and an allure that seacoasts always have had.

"We see today a pervasive disregard of the barrier islands' nature—of what ought to be their proper role. The balances are fragile, but the forces at work are not.

"It is clear that we cannot continue to develop barrier islands as if they were mainland sites. Sooner or later we have to pay for our mistakes." □

Aires; Attorney, Office of the Special Trade Representative; International Economist, Economics Bureau, State Department; Special Assistant to the Legal Advisor and to the Chairman, U.S. Law of the Sea Task Force, State Department, and Political Officer, American Embassy, Caracas. Harris received an A.B. degree from Princeton in 1960 and a law degree from the University of Texas in 1965.

Michael Cook

He has been appointed Associate Deputy Assistant Administrator for Water Program Operations (Environmental Emergency Response and Prevention). Cook had been Director of the Facility Requirements Division in the Water Program since September, 1978. He was chief of the Facility Requirements Branch from 1975 to 1978 and of the Permit and Policy Branch in 1974 and 1975. He joined EPA as a program analyst in 1973. His previous government service was with the Department of State in various positions from 1966 to 1973. Cook received a bachelor's degree from Swarthmore College in 1963, was a Woodrow Wilson School Fellow at Princeton University in 1963, and was a Rhodes Scholar at Oxford University, England from 1964 to 1966. He was awarded the EPA Silver Medal for superior service in 1976, and the EPA Gold Medal in 1978.

Michael Cole

He has been named Deputy Director of External Affairs in Region 7.

He was most recently Legislative Director of Common Cause, a public interest lobby group. In that role he drafted and analyzed legislation, supervised the group's legislative strategy and acted as spokesman for the group to members of Congress and the public.

Cole also served for two years as an attorney with the Department of Housing and Urban Development Office of General Counsel. He received a B.A. in 1965 from Yale University and a J.D. in 1968 from the University of Michigan Law School.



Jeffrey G. Miller

He has been named Acting Assistant Administrator for Enforcement. Miller formerly headed EPA's National Hazardous Waste Enforcement Task Force. He was Deputy Assistant Administrator for Water Enforcement from 1975 to 1979. He joined EPA in 1971 as chief of an enforcement branch in the Agency's Boston Regional Office. Miller later became director of the enforcement division and served in that post for two years. Before coming to EPA in 1971, Miller practiced law. An honor graduate of Princeton University in 1963, and Harvard Law School in 1967, Miller was a Research Fellow at Harvard for a year following graduation.

Joan Kovalic

She has been named Associate Deputy Assistant Administrator for Water Program Operations. Kovalic comes to EPA from the House Committee on Public Works and Transportation, where she was a staff member for water resources from 1973 to 1979 and Assistant Counsel for Water and the Environment since May, 1979. She served as a research analyst with the Department of Labor in 1972 and 1973, and was a program analyst with the Senate Committee on Public Works in 1971. Kovalic earned a bachelor's degree in 1970 and a master's in 1972 from Carnegie-Mellon University in Pittsburgh, Pa., and a law degree from George Washington University in 1979. She is a member of the Bar of the Supreme Court of Pennsylvania. Her appointment is subject to approval by the Office of Personnel Management.

Awards

Richard J. Bull and the team of Robert K. Stevens and Thomas G. Dzabay have won the top prizes of \$5,000 in EPA's Scientific and Technological Achievements awards competition. The awards were set up to recognize exceptional and distinguished achievement in research and development by Agency employees.

Categories include: Health; Monitoring, Measurements and Methods Development; Ecology, Transport and Fate; and Control Systems. The Science Advisory Board evaluated each nominee by reviewing a published paper describing the scientific or technological achievement.

Bull, who is stationed at the Health Effects Research Laboratory in Cincinnati, won in the category of Health. The second place award of \$2,500 in that category went to Philip M. Cook at the Environmental Research Laboratory in Duluth.

Stevens and Dzabay shared a joint reward for their work under the category of Monitoring, Measurements, and Methods Development. Jack Wagman and Ronald Patterson shared the second place award of \$2,500 in this category and James Mulik received \$500 for third place. J. P. F. Lambert and F. W. Wiltshire also shared a \$500 third place award in this category. Recipients of all awards in this category are stationed at Research Triangle Park, N.C. in either the scientific or monitoring laboratory.

Under the third category, Ecology, Transport and Fate, first prizes of \$3,750 each went to Basil Dimitriades of Research Triangle Park and Robert D. Rogers of the Environmental Research Laboratory in Las Vegas. David J. Hansen of the Environmental Research Laboratory at Gulf Breeze received the third place award of \$1,000.

In the Control Systems category, a first place award of \$3,000 went to Richard Field, located at the Municipal Environmental Research Laboratory in Edison, N.J. Alan Stevens

and James Symons of the Municipal Environmental Research Laboratory in Cincinnati shared another first place award of \$3,000 in this category. Gary S. Logsdon and James Symons of EPA's Cincinnati laboratories shared the third place award of \$1,000.

Region 9 Appointees

William H. McNeice, Deanna M. Wieman, Sara J. Segal, and Jo Ann Semones have been appointed to positions in the Region 9 Office of External Relations. McNeice, who will be Director of the Office of External Relations, has been Chief of Public Affairs for the Army Corps of Engineers in San Francisco for the past nine years. He has been an information officer with various Federal agencies in Michigan and Washington, and was a professor of English Literature in Boston. Deanna Wieman, the new Congressional Liaison Officer, has been with EPA since 1971. She was Acting Director of the Office of External Relations in 1979 and had developed and managed the Region's Congressional relations, constituency liaison, and public participation programs. Sara Segal, the new State Liaison Officer, was previously a State Coordinator in EPA's Region 5 office and a section chief in the water division. Her experience includes directing the Land Advocacy Program for the City of Chicago and serving as a conservation consultant to the Michigan School System. Jo Ann Semones, the new Public Information Officer, had been Assistant Regional Director for Public Affairs and Communication for the Small Business Administration. She also served as press secretary to Congressman James Corman of California and was a newspaper reporter/photographer for the San Fernando Valley Sun.

Sea Sentinels



In the often stormy and violent world of many seashores around the world live little blue-black-shelled creatures known as mussels which are beginning to provide us with important information about our environment.

Each of these creatures pumps in several gallons of water a day through its system and filters out tiny food particles before expelling the water. In the process they suck in and retain any pollutants. The result is that mussels serve as a live monitor at the edge of the sea.

While barnacles, limpets, sea urchins, oysters and other shore creatures have also learned to survive the hammering of an ocean surf, none of these can match the mussels as pollution sentinels.

Enormously successful survivors, the mussels succeed in holding strategic positions on the tidal shore by putting out anchor lines to hold their places on the rocks. These shiny silken lines, spun by a gland in this animal's "foot," extend in all directions. If one line is broken, it is replaced by another.

Using several of these mooring lines, the mussel is secure from currents from any direction and in a storm heads its shell into the seas, taking the impact of waves on the "prow" of its narrowest edge.

Another reason why the mussels are useful as monitors is that they are found, often in staggering numbers, in temperate waters around the world. Their flesh serves as a depository where alien materials in the water can be concentrated.

In order to use the remarkable monitoring capability of these creatures, EPA has had a program in operation since 1976 known as Mussel Watch.

The results of Mussel Watch have led to several conclusions, as the 1979 annual report of the Council on Environmental Quality noted: "... available data show that serious contamination of resident shellfish populations is taking place in many parts of the country. Second, as expected, mussels are good samplers and consequently good indicators of environmental quality. Third, the results show that certain toxic pollutants, particularly those that do not break down easily into non-toxic forms, are present in coastal waters and probably will be for many years to come.

"The molluscs have also pointed to problems whose cause is unknown, for example, high—and unexplained—levels of the radioactive element curium at Cape Charles, Va.

"As more data become available, and as other nations start similar programs, a more detailed picture of the environmental quality of the estuarine waters in which mussels dwell will emerge."

The mussel findings could help provide a basis for the management of wastes released from our expanding nuclear fuel and fossil fuel technology.

For example, the increase in coal combustion and tanker movement of oil in the years ahead may result in pollution leakage problems that Mussel Watch could help detect and measure.

A "library" of frozen samples from mussels collected as part of this study has been established and is maintained at EPA's Environmental Research Laboratory at Narragansett, R.I.

While some pollutants such as radioactive nucleides may disappear in time from the frozen flesh, others like heavy metals will continue to be measurable in the future.

The preservation of these samples also will be useful to

permit the measurement of pollutants not currently being analyzed but which may be recognized in the future.

EPA began its surveillance of coastal pollution under the Mussel Watch program at 108 locations. Scientists collected samples which were frozen in dry ice and shipped by air to various laboratories for analysis.

As a result of this initial work zones of high pollutant concentrations were discovered which are referred to as "hot spots." Collection of mussels from these "hot spots" is still continuing.

Another reason for using mussels in this sampling is their potential impact on human health, explained Donald K. Phelps, the EPA scientist who directs the U.S. Mussel Watch program from his office at EPA's Environmental Research Laboratory at Narragansett, R.I. These shellfish are eaten extensively in Europe and the market for them in the United States is growing.

He said that an explanation of how the mussel watch program can be used will be discussed at a meeting of environmental management officials in June in Rhode Island. A report on the U.S. Mussel Watch project will also be presented to the International Council for Exploration of the Seas at a meeting in Copenhagen, Denmark, in October.

The promising operation of Mussel Watch in this country has helped stimulate the formation of similar programs in many of the member countries of the 18-nation International Council for the Exploration of the Seas and in organizations such as the Mediterranean Research and Monitoring Program of the United Nations.

—C.D.P.



Caring for the Shore

Continued from page 3

Now the figure has dropped to around 40. Nearby Virginia showed a 90 percent drop in marsh destruction between 1972 and 1975. New Jersey, which was losing around 1,900 acres of wetlands a year, had cut the figure to less than 15 by 1978.

There also have been some creative solutions to restore lost marshlands. Between 1947 and 1967, California lost two-thirds of its estuarine habitat to dredging and filling for harbors, marinas, airports, industrial sites, and the like. That trend not only has been halted, but turned around in some areas. San Francisco Bay is actually gaining wetlands, through such techniques as planting the dredging spoil from channels with marsh grasses.

At the Federal level, we have proposed revisions to the 1975 guidelines for the Corps of Engineers and States to follow in judging permits under the Federal Water

Pollution Control Act. These revisions provide more specific information on aquatic systems, their value, and how to protect them. We have benchmarks for ascertaining the environmental damage potential of both dredged and fill materials and proposed disposal sites. We are able to determine the value of the ecosystems at the sites. We are able to identify measures for protecting existing values.

We also have a National Contingency Plan, developed in response to the Federal Water Pollution Control Act, to minimize damage from oil spills and hazardous substances. It may seem inconceivable that the authors of the plan visualized a spill of the magnitude of the Ixtoc I oil well blowout last year in Mexico's Campeche Bay. Yet when the oil from this spill threatened the shores of the United States and the plan was put into operation, it was exceptionally effective in coordinating the activities of hundreds of people representing Federal, State and local agencies. While these workers were unable to head off all environmental damage from the blowout, the impact would have been far worse without these

Scientists from EPA's Gulf Breeze Laboratory collect specimens for research purposes from tidewater areas along the Florida coast. (See article on P. 3)

Back: Surf laps the shore of a deserted beach at Ecola State Park in Oregon, one of the coastal areas that has so far escaped development. (See article on P. 14)

coordinated measures.

The point of all these measures is that we have come to realize the value of a resource we once took for granted, or even regarded as a nuisance. Despite the esthetic component of our coastal wetlands, we are not engaged in protecting them out of a fundamental concern for national prettiness. Rather we are involved in a task to preserve the natural systems on which the survival of human beings depends. It is no longer true, as Lord Byron once wrote, "Man marks the earth with ruin—his control stops with the shore." For now that our civilization is leaving its mark on the seas and the shores, we must extend our controls to protect them as well. □

United States
Environmental Protection
Agency
Washington D C 20460

Postage and
Fees Paid
Environmental
Protection
Agency
EPA 335



Official Business
Penalty for Private Use \$300

Third Class
Bulk



Please do not place this postage meter stamp on the back of an envelope or other mail piece.