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# FLORIDA'S
# Coral Reefs Are Imperiled

By FRED WARD
BLACK STAR

Photographs by
JERRY GREENBERG and FRED WARD

WHEN FLORIDA established John Pennekamp Coral Reef State Park off Key Largo in 1960, there was general rejoicing that this great American treasure would be preserved for future generations to enjoy. Less than a generation later many of the state's reefs are dying, not just in the park but throughout the keys. Some experts say the causes are part of a natural cycle, and widespread death is inevitable. Others say the causes are unknown, but the result is still inevitable. And others warn that we are actually killing our reefs.

I first dived the Florida Keys while I was a University of Florida student in the 1950s. Through 35 subsequent years of regular scuba trips and documentation (along with the amazing photographic coverage of the reefs by my lifelong diving buddy Jerry Greenberg), I have watched their steady deterioration. Corals are living organisms that have created the very structure of the reefs over thousands of years. Seeing them suffer is like living with a terminally ill family member whose doctors argue over symptoms while the patient silently slips away.

BOTH BY JERRY GREENBERG

*In a troubled underwater world off Key Largo, a school of diving students swarms around the "Christ of the Deep" statue. Fouled waters and thoughtless visitors are destroying growths of coral (above), some of which took centuries to form. Designed to protect an extensive reef system, John Pennekamp Coral Reef State Park and the adjacent Key Largo National Marine Sanctuary are being ruined by too much pollution and too many people.*

There is magic in coral. In secret watery gardens, nature plays out her diverse drama for the snorkeling alien to behold: birth and death, beauty and beast, competition and cooperation. What appears to be a large boulder that resembles a human brain is actually a colony of millions of creatures. Each tiny, seemingly independent polyp, taking in water and nutrients and exuding calcium carbonate (limestone), participates in forming a design specific to each species of coral.

Pennekamp is part of a reef ribbon, made possible by the warm flow of the passing Gulf Stream, that reaches from southwest of Key West almost to Miami.

Although most refer to the area along Key Largo as "Pennekamp," little-noted jurisdictional changes in 1974-75 dramatically altered the reefs' future. At that time the federal government took control of all U. S. underwater areas beyond three miles to a depth of 300 feet. These actions diminished Pennekamp Park (administered by the Florida Department of Natural Resources) to the three



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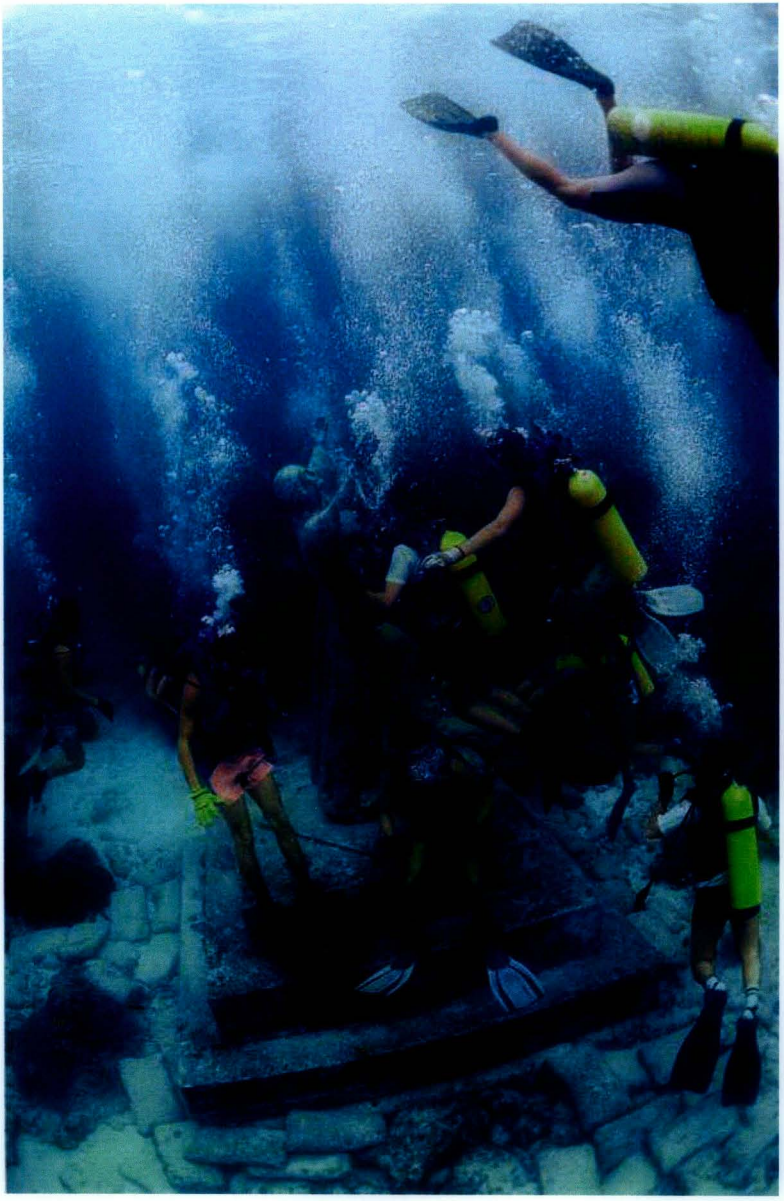

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ALL BY JERRY GREENBERG

has been roundly criticized for continuing to hand-feed barracuda and moray eels even after a number of people have been bitten while imitating him. Slate has recently come down on the side of a fishing prohibition, saying, "Let's protect everything, lobsters and all. I want my guests to experience a living, beautiful reef."

But divers and fishermen alone do not threaten the reefs' survival. After 1960 Florida Keys development even outdistanced neighboring mainland counties, which themselves had some of the highest growth rates in the country. Key Largo, the nearest island to the reefs, once a rustic collection of trailer parks and weekend fishing shacks, has burgeoned into a development of homes, condos, and shopping centers straddling U. S. 1 and crowding the land between ocean and bay.

Carl Nielsen says, "Onshore development is a continuing problem. Monroe County has no storm-water treatment facilities and no tertiary (or fully processed) sewage plants, which means that street runoff washes right into the water and unprocessed sewage is dumped into the ground. Key West has the only city sewage-treatment plant in all the keys, and it opened just last year."

The rest of the keys use septic tanks, injection, and small, local sewage plants operated by schools, apartment buildings, and shopping centers. The underlying limestone is as porous as a sieve. Anything dumped on the ground soon filters into the water table.

"A coral reef is only as healthy as the water around it," explains Florida regional biologist Renate Skinner, who keeps some of the scarce hard data on Pennekamp's water quality. A tiny woman who works in a cramped trailer, she appears even smaller among her crush of books and papers.

Poring over her computer



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and the economy probably could not survive a substantial loss of fishing revenues. Yet in the absence of constraints, there may be no game fish in the future.

Hook-and-line saltwater fishing is still allowed in the 120 square miles of Pennekamp Park and the national marine sanctuary. The fish that are taken are often the scarcest, the biggest, and the best.

I asked Mike White, manager of the Key Largo National Marine Sanctuary, how the sanctuary and park justify letting people catch the very fish that two million visitors hope to see. He answered, "Our program is responsible for resource protection while encouraging multiple compatible uses. These requirements often conflict. I have another year to make a report on water use and to advise whether all the keys should become part of the federal sanctuary system." Mike believes Florida would condone such an act but has watched the protest movement grow as treasure salvors, commercial lobstermen and fishermen, and tropical fish collectors organize to defeat any further attempt to federalize the reef tract.

Events, however, have overtaken Mike's study. After three freighters ran aground within 17 days last fall, Congressman Dante Fascell introduced legislation to designate all the reefs from Biscayne National Park to Dry Tortugas as the Florida Keys National Marine Sanctuary. "It doesn't take a congressman to see that the reefs are dying," Fascell told me. Florida's Senator Bob Graham has also introduced legislation.

Lobsters, tender to eat and difficult to protect, raise tensions to the breaking point. It is almost impossible to find a mature lobster at Pennekamp only a couple of weeks after the season opens. I was on the reefs daily for six weeks and saw no more than half a dozen lobsters.

"Any person with a license can take 6 lobsters a day or 24 per boat during the August 6 through March 31 season," says Mike White. "So one man with a boat can take 24 lobsters a day. And that's not the worst of it. Commercial lobster licenses are cheap in Florida, and there's no limit on the number of traps or lobsters taken."

During the summer two-day non-commercial "mini-season," locals say so many amateur lobstermen show up you can walk from boat to boat six miles out to the reefs without getting your feet wet.

***Divers' rest stop that appears to be bare rock (below) is actually an overturned stand of coral. Boaters who ran aground (left) were fined according to a formula that considers coral density, damage, recovery potential, and degree of negligence. Ignoring rules against touching the coral, divers paw through a dying stand of elkhorn in search of lobsters. In 1989 three persons caught with 399 lobsters were fined more than $4,000 apiece for violating size and bag limits.***

A few days after the mini-season, Jerry Greenberg returned to finish photographing a particularly attractive stand of coral at Carysfort, near the sanctuary's northern border. Only a pile of paint-scarred coral fragments remained, silent testimony to careless boating.

THE REEFS' chief defenders are an unusual coalition of environmentalists and a few of the businessmen whose lives depend on having something alive on the reefs for people to see. One such is Captain Spencer Slate, gregarious owner of Atlantis Dive Center, who



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article in NATIONAL GEOGRAPHIC magazine in 1962, prompted an almost instantaneous influx of boats and divers, putting new pressures on the underwater environment. A few divers might have caused little noticeable disruption, but safer, less expensive equipment and more leisure time helped popularize scuba diving.

Pennekamp, beautiful, accessible, and irresistible, became one of the most frequented diving destinations in the world, with nearly two million visitors a year (half of whom actually make it onto or into the water). The five most crowded reefs attract 3,000 people on an average day and double that on warm weekends.

Their boats pollute the water and everything in it with petroleum products and sewage. Incompetent operators crash into the reefs. They litter the sea with plastic foam cups, aluminum cans, glass, plastic bags, bottles, and miles of tangled fishing line. This debris does not go away—it is, for all practical purposes, indestructible.

Thousands of swimmers routinely bump, scrape, and step on coral. To a tired swimmer, standing on coral may seem as harmless as resting on a rock. But the slightest contact by a foot, boat shoe, dive tank, or swim fin can weaken a section of living reef. Algae then overcome damaged polyps. If only one person in a hundred scars or breaks off a piece of coral that took a century to grow, the cumulative devastation is enormous. Although spearing and specimen collecting are prohibited in the park, they continue illegally to this day.

***Death can be shockingly swift in a coral reef that took some 6,000 years to grow. Thirty feet down in Molasses Reef, boulder coral (top, at left) and branches of elkhorn, at right, were suffering in 1983, but much of the area remained alive. Just six years later the boulder coral was seriously eroded, and the elkhorn had nearly succumbed.***

PEOPLE PRESSURE makes money for Randy Pegram, operator of the private park concession responsible for getting half of all the area's visitors onto the water. In his tiny dockside office he still worries about their impact. "The place is literally exploding," he says. "Over half the growth in the last 25 years has occurred in the past six. We're 'maxed out' every other weekend. Pennekamp has to close the gates because there's no more room for cars."

Parking-lot size seems a strange way to determine how many people get in. Carl Nielsen, then Pennekamp's energetic park manager (he has since changed jobs), agreed: "I'm not sure we want to bring in more visitors. We keep an annual list of 'destruction to natural features,' which includes boat groundings, mangrove damage, coral breakage, and boat-prop dredging. There was an increase of nearly 300 percent of such incidents between 1984 and 1989. We may soon be forced to close off parts of the reefs on a regular basis, to give them some breathing room to recover."

Fishing and diving, two main water sports in the keys, have conflicting goals: One enthusiast wants to catch what the other wants to see swim free. Killing major game animals is not allowed in other state or national parks, but the argument for prohibition falls on deaf ears when the issue is fishing; nearly every resident has a boat and rod. Anything that affects recreational or commercial fishing polarizes the keys,



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1960

1989



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*A wondrous realm unfolds in a panorama taken by Jerry Greenberg at Carysfort Reef in 1960 (top). Golden branches of elkhorn coral stand beside brain coral, at lower right. In the same region 29 years later, coral was reduced to a mass of stumps. To compare such areas, author Fred Ward (above) uses laminated old photographs.*

*Earth's largest formations made by living organisms, coral reefs are the handiwork of small marine animals called polyps, which reproduce asexually. After a polyp dies, it leaves behind deposits of calcium carbonate upon which live polyps build. When nutrient levels soar from such sources as human sewage and fertilizers washed from farmland, algae can overwhelm and smother the polyps.*



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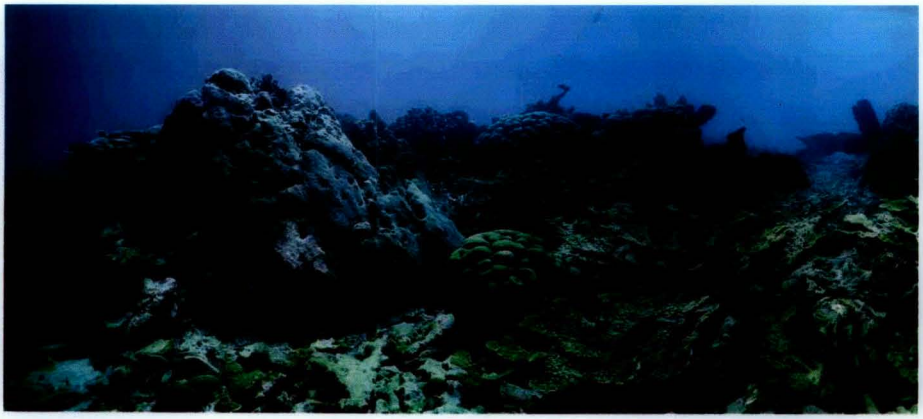

1983

1989



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*(Continued from page 116)*

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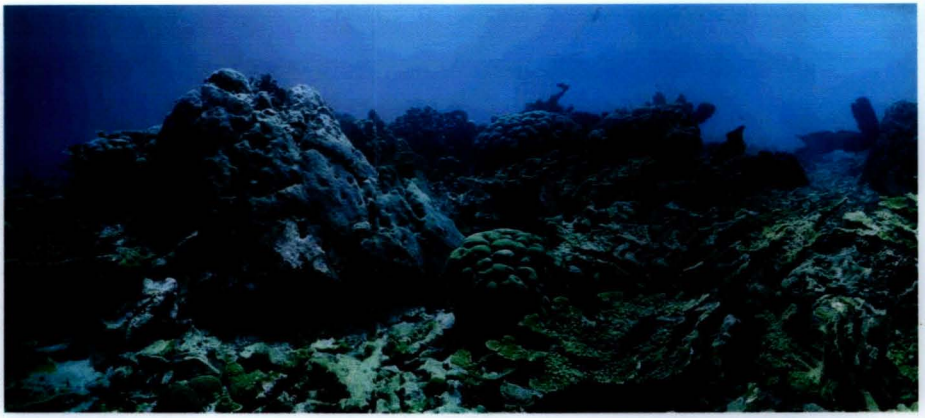

1983

1989



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***Small but feisty, a damselfish guards its turf (below). By picking at polyps, the fish kill patches to create algal lawns (left). In defense, a "chimney" of new growth appears (above). If habitat is destroyed, the fish swarm to nearby reefs, where coral destruction is intensified.***

FRED WARD (BELOW); JERRY GREENBERG

says, "Cleaning up Key Largo and the other Florida Keys and putting them all onto sewage systems would be a major step in the right direction." Agricultural, boating, and industrial pollutants should be kept away from the reefs. Finally, fishing and lobstering should be banned in Pennekamp Park and the sanctuary.

As I photographed one morning from the top of a park concession snorkel boat, its young captain, Kevin Puch, glanced below at nearly a hundred snorkelers leaping onto one small patch of reef. We exchanged concerned looks.

"I make my living driving this boat, and I love it," said Kevin. "But the only way this place will recover, if it even can, is to treat it like a real park . . . restrict activity in the fragile areas, and let it try to heal."

Kevin is probably right that some parts should be closed. But cleaning up the water is the first priority. We will kill the coral reefs if we're not careful, by ignoring their silent plight and loving them to death. □



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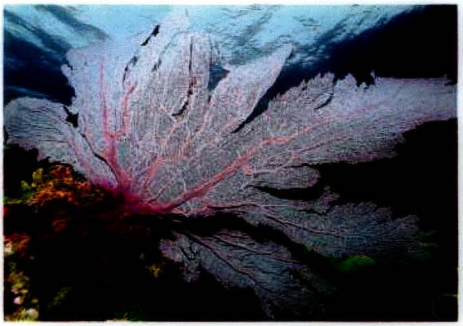

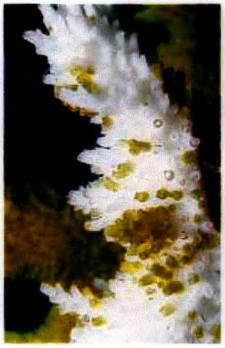

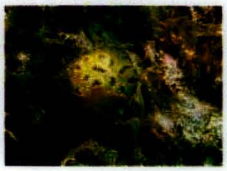

*The ruddy glow of its branches reflects the health of a sea fan (right), which grows best in warm, clean water with a low nutrient level. A dying coral of the same species haunts the deep like a specter (facing page), perhaps the victim of parasites or polluted water.*

*Lifeless white limestone discolors a branch of elkhorn coral after the spread of white band disease (bottom left), whose cause remains a mystery. Produced by bacteria, black band disease, here infecting a star coral (center right), can kill a 200-year-old formation in two months. Experiments to stop the disease and treat infected coral so far have failed.*

*Known as golf ball coral, Favia fragum (bottom right) is smothered by algae, which then use the remains as a base for further growth.*

*Life on a reef is typically balanced, with a variety of corals coexisting with coral-eating parrotfish, algae, sea urchins, and damselfish. Normally corals have the ability to cleanse and heal themselves of disease and impact wounds. At Pennekamp the reefs may no longer be able to withstand the stresses of their environment.*

"There are almost no butterflies left where the county sprays. The number of birds has declined because their food is killed in the process of killing mosquitoes."

Carl Nielsen notes the county is supposed to cut off the spray as planes fly over the park or over water, but, he says, "We pick up those pesticides in our water samples. Anything that lands on Key Largo ends up in the park."

Once water quality deteriorates, corals may not have the strength to recover from the stresses of people, boats, storms, silt, chemicals. Anything can push them over the edge.

That fatal "anything" can come from almost anywhere. Richard Curry, resource management coordinator for Biscayne National Park, reports, "We pick up paper plants' residues from the Midwest brought down by the country's sewer, the Mississippi River, mixed in the Gulf of Mexico, and carried here by the Gulf Stream. Every product that people make is found around our reefs—including far too many nutrients."

Agricultural runoff, garbage, sewage, and thousands of products that humans discard have seriously raised the level of nutrients in the water around the keys.

"Nutrient loading could make the Florida Keys reef tract the first in the world to be killed by humans," says Brian Lapointe, water-quality expert with the Florida Keys Land & Sea Trust. Calling the keys an "ecosystem dysfunction," he notes, "Coral reefs thrive only in a low-nutrient environment. Pollution is pushing Florida's



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