SCIENCE

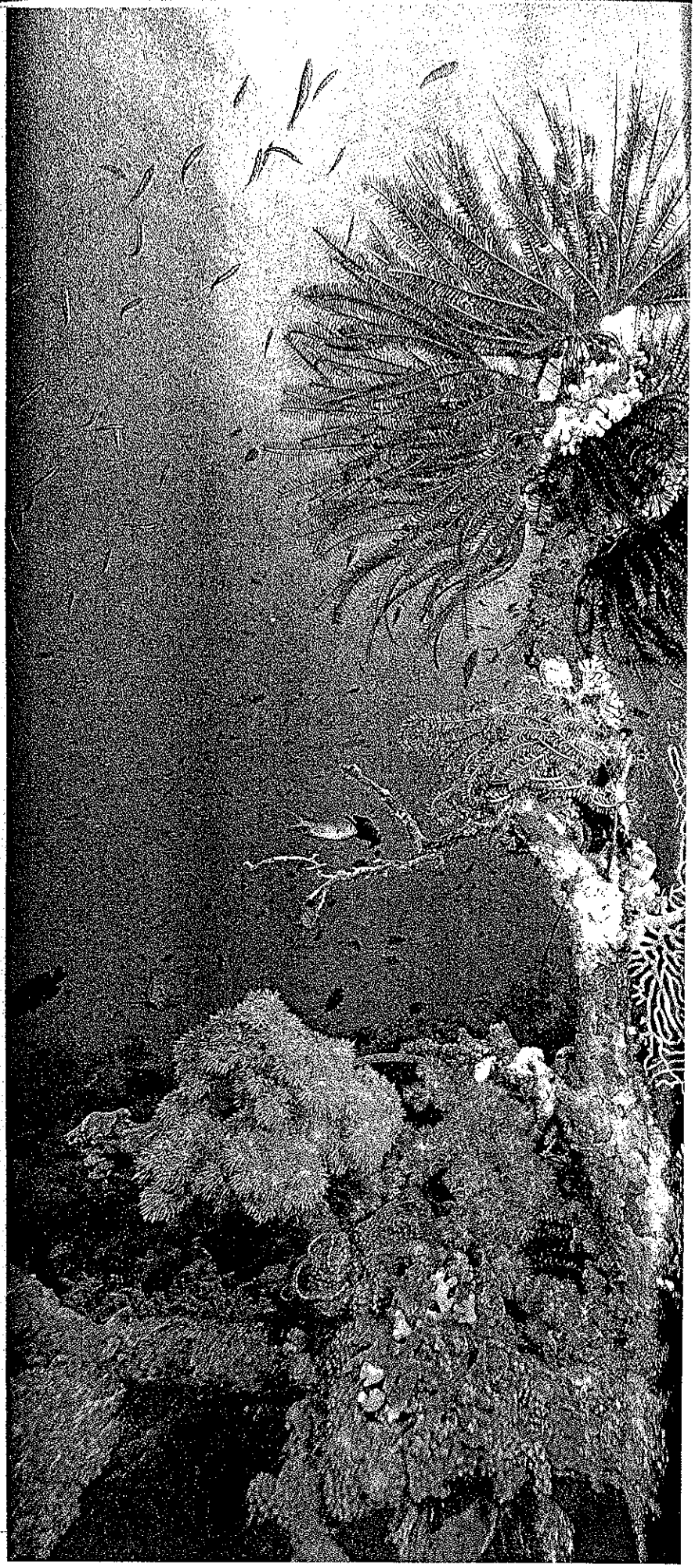
Coral Under Siege

Pollution, overfishing and global warming have gravely endangered reefs. Help is finally on the way, and this time the U.S. is taking the lead

BY BRYAN WALSH

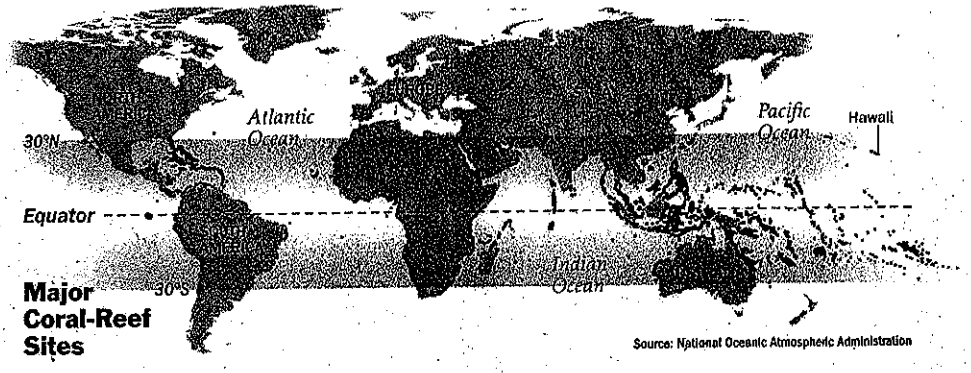
CORAL REEFS ARE THE RAIN FORESTS of the sea: they're beautiful, they're host to a wealth of biodiversity—and they're dying. A comprehensive assessment by the National Oceanic and Atmospheric Administration, released July 7, found that half the coral reefs in U.S. territory are in fair or poor condition, a significant drop since the last survey, in 2005. Another study, published recently in *Science*, found that almost one-third of coral species—the tiny polyps that build the underwater reefs—are threatened with extinction, up from less than 2% a decade ago. That's bad news for the vast variety of sea life that depends on reefs for a home. "Coral reefs hold more than 25% of the world's marine species," says Kent Carpenter, head of the Global Marine Species Assessment, which carried out the *Science*

Dead white *Rising ocean temperatures leave coral bleached, which can lead to mass die-offs*



FROM LEFT: PETER ESSICK—AURORA; CHRIS NEWBERT—MINDEN PICTURES/NATIONAL GEOGRAPHIC

Reefs on the Rocks. Corals are found close to land, within reach of human damage



Source: National Oceanic Atmospheric Administration

study. "The potential loss of biodiversity is permanent."

But help for the corals has come from an unlikely source: the White House. In June 2006, President George W. Bush created the Papahanaumokuakea Marine National Monument, a 140,000-sq.-mi. (360,000 sq km) national park off the northwest coast of Hawaii. Bigger than all other U.S. national parks combined, the reserve protects 10% of the shallow reef habitats in the country. Corals inside the monument are safe from human interference, and the vast protected area could provide a model for future coral-conservation efforts. "The corals here are out of harm's way," says Brian Huse, executive director of the Coral Reef Alliance.

That harm comes in a lot of forms but from just one source: us. As humans expand their presence in the warm coastal waters where reefs thrive—through fishing, tourism, even snorkeling—the corals suffer. Commercial-fishing boats sailing over corals can damage or destroy reefs that have taken centuries to build, while overfishing disrupts the delicate ecological balance that allows corals to thrive. Even smaller recreational boats can obliterate reefs in shallow seas, especially if the ships run aground—as happens at least 600 times a year in Miami's Biscayne National Park. Worse may be the practice of hunting for tropical fish that are sold to hobbyists back home. The fish may look healthy in the pet store, but many of them have had to survive deliberate poisoning first, as they are dosed with cyanide to stun them and make them easy to catch. Long after the fish have been netted, the corals are left to deal with the poison. Set-asides like the one off Hawaii are the only sure way to protect corals from these threats. "We need to scale up regional protected areas," says Roger McManus, vice president for Conservation International's marine programs.

But preserves alone aren't the answer. Human activity far from the oceans can damage corals too. Fertilizer runoff—like the mighty stream of nitrates and phosphates flowing into the Gulf of Mexico—can create vast algae blooms that suck all the oxygen out of surrounding waters. Fast-moving fish can escape the dead zones, but corals can't, and they effectively choke to death. Other toxins ride the runoff and poison corals that are far from the coast; a recent study in Australia found that heavy rains can transport pollutants as far as 80 miles (130 km) away from the shoreline.

The greatest threat to the coral, however, is one that's just as threatening to human beings: climate change. Healthy corals have a symbiotic relationship with algae, which live inside them and provide energy through photosynthesis—not to mention the brilliant colors that are the hallmark of reefs. But warmer ocean temperatures due to man-made climate change can stress the corals, causing them to eject their algae tenants. It's not clear why this happens—though scientists theorize that one cause may be infectious bacteria that thrive in warmer waters—but the result is sickly looking white, or "bleached," corals that are vulnerable to disease and mass die-offs like the one that occurred in 1998, one of the hottest years on record. Increased concentrations of carbon dioxide in the atmosphere don't help either; they lead to more acidic seas, which impair the ability of corals to spin their skeletal reefs. "The corals will be the canary in the coal mine in terms of the effect climate change will have on our ocean," says Carpenter.

All the more reason to establish reserves like Papahanaumokuakea at least to give the corals a fighting chance while we fight climate change. If we don't win that battle, our planet could end up like a bleached coral: a pale and dying imitation of its former vibrant self. —WITH REPORTING BY DAVID BJERKLIE ■