

## HURRICANE ANDREW

# Research Destruction and Opportunity in Storm's Wake

When Hurricane Andrew cut a swathe of destruction across southern Florida last week, leaving in its wake smashed property and human lives, it also left its brutal mark on a variety of scientific projects. Research efforts in botany, marine science, and animal husbandry, some of it painstakingly built up over several decades, was all but wiped out in a few hours of devastation. While disaster relief officials dealt with the immediate problems facing hundreds of thousands of people left homeless by the storm, researchers were trying to make their way back to wrecked facilities and start the long rebuilding process. For some of them, however, the storm could be a golden opportunity: Environmental researchers in particular are chafing to get back into the field to get a close look at what a killer storm can do to an ecosystem. They are hoping it will help them build a better understanding of the relative impacts of human and natural influences on south Florida's ecology.

One researcher who has firsthand experience of the destruction and research opportunities of the storm is invertebrate physiologist James Porter of the University of Georgia. For the past 7 years Porter has been mak-

ing a longitudinal study of the declining health of reefs including Biscayne National Park, just south of Miami. Porter, who is part of a project trying to determine the relative impact of natural events and human activities on coral death, was at one of the Biscayne sites to document the annual spasms of coral spawning when the storm chased him and his team away. Getting back to the site won't be easy: The research building on Elliot Key and the boats Porter relied on for his work have been destroyed. "It's as if there had been some sort of homing beacon on our two studies in Biscayne," said Porter. "The storm hit them head on."

Andrew provided an acute test for a newly installed system of automated monitors, designed to give meteorological and oceanographic conditions along the 220-mile-long line of reefs. The hurricane blew out the northernmost monitor at Fowey Rocks, just south of Porter's Biscayne sites. Its last gasp transmission recorded winds of up to 167 miles per hour.

When Porter and his team resume their work they expect, based on past studies of hurricane damage to reefs, to find soft corals

like sea fans and branching corals like staghorn to be gone. Many hard coral heads will likely be toppled. He is particularly eager to determine if the larval coral animals from the recent spawning have survived to settle into the calcium carbonate substrates newly exposed by overturned coral colonies. If so, that would confirm earlier observations that coral reefs are able to begin recovering from strong storms relatively rapidly. As exciting as this research opportunity is, however, Porter is worried about the possible impact on public attitudes: "I'm afraid the hurricane will divert attention to degradation of the system by natural causes we can't control, as opposed to continued interest in human caused destruction we can control," he says.

While marine scientists found research opportunities in Andrew's wake, plant and medical science found only nightmares. Take the case of primates being bred for medical research at two facilities—one at the University of Miami south campus in Perrine and the other at the Mannheimer Research Institute near Homestead. When Andrew smashed through the area, more than 2000 of these animals escaped. Rumors began circulating that the animals were infected with the AIDS virus, and already frightened residents shot many of them in the first couple of days. Joseph Wagner, head of the division of veterinary resources at the University of Miami, blamed erroneous newspaper accounts for the rumors, and maintained that the escaped primates, mostly rhesus and cynomolgus mon-

## Not Enough to Save the Bay

Despite the scenes of destruction televised to the world, Andrew was not the widespread environmental upheaval some ecologists feel the ecosystem needs. According to John Ogden, director of the Florida Institute of Oceanography, who flew over the region in the days immediately after the storm, the damage was remarkably focused. The storm left a path across the Everglades "as if it had been a 20-mile-wide tornado," he told *Science*. From the air, Ogden could see a clearly defined, east-to-west line of defoliated trees and battered grasses up against trees and grasses that are still green and tall.

While the sharply confined path of damage was good news for homeowners lucky enough to live outside it, it was bad news for a problem that has plagued Florida Bay, a body of water bounded by the Everglades to the north and the Keys to the south. The entire south Florida ecosystem, from the Everglades through the coral reef tract just off Florida's eastern shore, has been described as stagnant, and many



**A 20-mile-wide tornado.** The storm was not extensive enough to flush sediments and nutrients from Florida Bay.

researchers believe it needs to be flushed out by a powerful storm.

Florida Bay has become hypersaline and choked with sediments and nutrients because much of its fresh water supply has been diverted to the needs of the human population. Many researchers believe these conditions are contributing to the 20-square-mile algal bloom that is choking western Florida Bay. The "dead zone" in the bay has become a very public symbol of the decline of the entire Florida seascape. Since 1987 the bay has been hit by frequent sea grass dieoffs. The dieoffs, principally affecting turtle grass (*Thalassia*), help fuel larger algal

blooms. Mike Durako of the Florida Department of Natural Resources, who flew over the area the day after the storm hit, says there is no evidence that the storm had broken up the bloom. Andrew, he says, "didn't have enough rain, didn't have enough [storm] surge, and moved through too fast" to clean out the system.

—D.C.T.

keys, were pathogen free. Using humane traps, Wagner hopes that a large fraction of the escaped monkeys can be recovered. According to Robert Whitney, deputy surgeon general and former director of the National Center for Research Resources at the National Institutes of Health (NIH), some 200 of Wagner's animals were part of an NIH-sponsored program to develop a colony of monkeys known to be free of retroviral infection that could be used for AIDS research. Whitney says the damage to the Florida facility "sets the program back about a year."

As for the botanists, many of their losses could be irreplaceable. Fairchild Tropical Garden, located between Miami and Homestead, right in the middle of the most devastated area, used to have one of the world's greatest collections of tropical plants, particularly palms and cycads—plants with a palm-like appearance that can live up to 1000 years. Fairchild was growing 127 of the 204 described genera of palms and 130 of 150 known species of cycads, most of which are rare or

endangered. The garden was "absolutely devastated by the storm. There isn't a plant that was untouched," says William Klein, the center's director. Klein estimates that 50% to 75% of the collection is seriously damaged and "much of it has been destroyed." Precisely how much has been killed won't be known for some time because some of the trees will die slowly. Klein is now assessing the damage with the help of teams of botanists from other U.S. institutions, including the Missouri Botanical Garden. They began by selecting the trees most likely to survive—"it gives a whole new meaning to triage," says Klein—and treating them with fungicides to prevent infection in badly bruised and broken tissues. Fairchild has established a restoration fund to help replant the destroyed collection.

Fairchild, which was established in 1938, is part of a national network of 25 botanical gardens administered by the Center for Plant Conservation (CPC). The CPC maintains the National Collection of Endangered Plants, a

genetic collection of about 400 endangered species. "The collections are literally priceless," says Don Falk, CPC executive director, "because they represent some of the last genetic diversity of these threatened plants."

According to Falk, Andrew should serve as a reminder to ecologists not to put all their eggs in one basket. "We're so accustomed to human actions causing massive environmental destruction that we tend to forget that the natural world is capable of doing the same thing," says Falk. "It's a sobering lesson for people concerned with conserving biodiversity that we need to have as many areas in as many parts of the world protected."

But Andrew proved that even the best protection sometimes isn't enough. "I'm 53," says Miami's Wagner. "If I live to be 253, I hope I never see something like this again."

—Donald C. Torrance

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## INDIRECT COSTS

### GAO Lays Out Some Options

When Representative John Dingell (D-MI) started turning up evidence early last year of indirect cost abuses, he unleashed Congress's financial watchdog—the General Accounting Office (GAO)—and set it loose on the universities' books. Last week, GAO told Dingell what it had discovered\*: A set of accounting rules so complex that the government and the universities have a great deal of trouble following them; accounting systems in the universities that are generally so lax that auditors have so far identified \$400 million in unallowable costs that have been billed to the government; and oversight by federal agencies that has been so "inadequate" that problems have been allowed to fester for years. In short, the same problems that Dingell has been hammering away at for the past 18 months. GAO does, however, offer some suggestions for dealing with the problems that could stir considerable debate.

First, it points to widespread discrimination. The Department of Health and Human Services (HHS) negotiates the indirect cost rates of most universi-

\*System for Reimbursing Universities' Indirect Costs Should be Re-evaluated, GAO, August 1992.

| INDIRECT COST RATES    |                |                 |
|------------------------|----------------|-----------------|
|                        | Average Rate % | Range %         |
| <b>Type of school</b>  |                |                 |
| Public                 | 46             | 34 to 66        |
| Private                | 61             | 39 to 82        |
| <b>Auditing Agency</b> |                |                 |
| ONR                    | 59             | 34 to 74        |
| HHS                    | 50             | 36 to 82        |
| <b>Overall</b>         | <b>52</b>      | <b>34 to 82</b> |

| IMPACT OF A 50% CAP   |                     |           |           |                               |
|-----------------------|---------------------|-----------|-----------|-------------------------------|
|                       | Schools with losses |           |           |                               |
|                       | Total               | Number    | Percent   | Total Reduction (\$ millions) |
| <b>Type of school</b> |                     |           |           |                               |
| Public                | 88                  | 17        | 19        | 25                            |
| Private               | 49                  | 36        | 73        | 197                           |
| <b>Total</b>          | <b>137</b>          | <b>53</b> | <b>39</b> | <b>222</b>                    |

| IMPACT OF A 50% FLAT RATE |            |           |                      |           |                      |                             |
|---------------------------|------------|-----------|----------------------|-----------|----------------------|-----------------------------|
|                           | Decrease   |           |                      | Increase  |                      |                             |
|                           | Total      | Schools   | Amount (\$ millions) | Schools   | Amount (\$ millions) | Net Reduction (\$ millions) |
| <b>Type of school</b>     |            |           |                      |           |                      |                             |
| Public                    | 88         | 17        | 25                   | 69        | 127                  | (102)                       |
| Private                   | 49         | 36        | 197                  | 9         | 11                   | 186                         |
| <b>Total</b>              | <b>137</b> | <b>53</b> | <b>222</b>           | <b>78</b> | <b>138</b>           | <b>84</b>                   |

NOTE: Based on fiscal year 1989 rates. SOURCE: GAO

ties, setting rates that generally do not match the expenses claimed by the universities. The Office of Naval Research (ONR), in contrast, negotiates the rates for 39 institutions, including Stanford and the Massachusetts Institute of Technology, and generally provides full reimbursement for legitimate costs, GAO says. GAO's recommendation: assign a single agency to deal with the universities on indirect costs and use a consistent set of accounting rules.

The accounting office also examined what would happen if the government were to adopt a couple of widely discussed policies: Cap all indirect cost rates at the current average of 50%, or establish a consistent 50% flat rate for every institution. The results are shown in the accompanying tables. In either case, the private universities, which generally have higher indirect cost rates (top chart), would fare relatively badly. GAO doesn't actually recommend either of these two options, but it says they both bear further investigation.

A task force headed by the Office of Management and Budget is currently scheduled to recommend changes to the indirect cost rules late this month. Nobody is expecting it to come up with solutions quite as radical as those laid out by GAO, however.

—Colin Norman