when the first park service director Stephen Mather in 1925 reportedly blew up a sawmill in Glacier National Park after the owners failed to remove it after repeated warnings. The foundation encourages the purchase of land even if the acreage would encompass privately owned lots. Partial protection is better than none, according to the report.

- There are "hundreds" of repair and restoration projects to be undertaken. Money is needed, for example, to stabilize dunes, and repair forts.
- The parks must cooperate with local and state governments and others to tackle pollution problems that originate outside the park. The report points out that oil and gas leasing in Yellowstone threaten the grizzly's habitat and that water pollution is a problem at Everglades and Mammoth Caves.

The scientific basis to evaluate these problems, however, is generally very weak, according to park service scientists and managers. John Dennis, a biologist and 12-year veteran of the park service, said at the AAAS meeting that the park service currently spends about $18 million or 3 percent of its operating budget on natural and social science research and monitoring, which is far too little, he says.

Air pollution is believed to be a significant problem, even for parks located seemingly far away from urban areas. Visibility in the Grand Canyon, the Smokies, Yosemite, and other parks is deteriorating. At Sequoia, ozone is believed to have caused moderate to severe damage to more than one-third of the trees at concentrations that are less than limits set by the Environmental Protection Agency.

Solutions to the air pollution problem in the parks are difficult because the exact nature and source of the pollution is often largely unknown. The parks' air quality program was created 9 years ago, and now has a yearly budget of $3.9 million for the entire park system. Just 29 of the 48 national parks that are larger than 6000 acres currently measure air pollutants. Even so, not all the important contaminants are monitored. Park service scientist William Malm testified that although nitrous oxides and particulate matter are significant sources of air pollution in the West, none of the parks test for them."

There are gaps in other kinds of data too. Only ten parks have undertaken detailed studies of the pollution's impact on fauna. None of the Alaskan national parks currently measure the quality of air or water to establish baseline data to evaluate any biological changes. The park service just recently started to measure acidity levels in lakes and streams. The database of the park service is "inadequate," Malm said.

Academic scientists conduct research in the parks, but their findings are frequently irrelevant to park management, according to Robert Barbee, the superintendent of Yellowstone, the nation's first national park and one with a host of complex problems. Barbee, who received his training in zoology and wildlife management, said at the AAAS symposium that research in the parks "has only recently been accepted as having a role in management, and it hasn't quite made the grade even yet. Research was never part of the service's mission."

Conservation groups were encouraged when Mott met last week with their leaders and senior park managers at Yellowstone and vowed to protect the parks. In fact, the park service under his direction ordered for the first time limited access to Yosemite this past weekend to prevent overcrowding. He also pledged to add more land to the park system in the future. Mott stated, "We've got to err on the side of preservation."—**MARJORIE SUN**

# GM Buys Hughes for $5 Billion

On Tuesday 4 June, the Howard Hughes Medical Institute (HHMI) sold the Hughes Aircraft Company, its only asset, to General Motors for somewhat more than $5 billion. The sale makes the medical institute the nation's largest private philanthropy. It also marks an important step for General Motors which began a strategy of diversification last year with the purchase of Electronic Data Systems, a data-processing company and major supplier to the military. Hughes Aircraft, a leader in electronics and satellite communications, is the seventh largest contractor to the Defense Department.

In anticipation of the successful sale of Hughes Aircraft, the medical institute has been poised for growth (*Science*, 7 June, p. 1178). It currently supports some 200 Hughes scholars at official HHMI units on 17 research campuses and is evaluating ways of spending its new funds. HHMI president Donald S. Fredrickson, former director of the National Institutes of Health, estimates that, on the basis of the General Motors deal, the institute will have $200 million to spend this year, double present expenditures and four times the amount it dispersed in 1983.

General Motors bought Hughes Aircraft with $2.7 billion in cash and 50 million shares of its new Class H common stock. According to a statement from the auto company, the new Class H stock "provides a means of maintaining the highly successful Hughes Aircraft Company as an independent and separate subsidiary, while simultaneously combining the company with GM's automotive electronics businesses and a portion of GM's defense operations." The acquisition is expected to "accelerate the rate of application of electronics" into General Motors cars and is seen as a way of increasing the company's competitive position vis-a-vis foreign industry, particularly in Japan.

General Motors chairman Roger B. Smith says U.S. industry must succeed in developing highly efficient new forms of manufacturing and management, dependent on computers. "At the present time, throughout industry worldwide, there is only limited systems engineering expertise in this new area of computer-integrated manufacturing," he said in a statement. "The Hughes Aircraft Company is one of the few organizations that has extensive experience in systems engineering."

While General Motors looks to the future in the automotive and defense industries, the medical institute is thinking about areas in biomedical research that need more support now and that will be at the forefront a decade from now. "Molecular biophysics" is one it has identified in the latter category; "molecular medicine" is one that is targeted for attention in the near term. The influence of HHMI on the direction of biomedical science is likely to be substantial as it pours new money into the enterprise. Fredrickson estimates that in the future Hughes may be supporting as much as 10 to 15 percent of basic biomedical research in the United States.

—**BARBARA J. CULLLITON**