

Biological Diversity Program Underway 'In Earnest'

Editor's Note: Bill Gregg was one of six "leading members of the scientific community" (according to the AIBS Forum, Vol. 36, No. 3) who testified at a May hearing of the U.S. House of Representatives Science and Technology Subcommittee on Natural Resources, Agricultural Research and the Environment. The focus on loss of biological diversity "served to educate the Subcommittee members on the decline in biodiversity both nationally and internationally," the AIBS publication stated.

By Bill Gregg

Loss of the planet's biological heritage as a result of human influences is of mounting national and global concern. Managers of protected areas face new challenges in dealing with changes brought about primarily by loss of natural habitat, introductions of non-native species, and chemical pollutants. Our mission and experience uniquely qualify the NPS to play an important role in reversing the decline.

Last fall, the Director asked a special task force to review the Service's role in conserving biological diversity, and to serve as a forum for ideas on ways to strengthen our capability to meet the challenge. The task force's report, which will be edited for general distribution later this year, will provide a basic reference for developing an NPS plan for preservation of biological diversity. The plan will recommend policies and guidelines, program goals, and a multiyear implementation strategy. The Associate Director, Natural Resources, is establishing a team of NPS scientists and resource managers and planning will begin in earnest this fall.

The Director set aside NRPP funds this spring for projects to familiarize NPS personnel and park visitors with the issue, and to develop methodologies for assessing the status of biological diversity in units of the System. This year's program has four components:

Development of Public Education Materials

In cooperation with Interpretation and Natural Resources, Mike Whatley, interpretive specialist at Cape Cod NS, was detailed for three months to Natural Resources-WASO to prepare a brochure for park distribution on the ecological, cultural, economic, and ethical dimensions of the biological diversity issue, and the NPS role in "managing a diverse portfolio of biological resources" as a legacy for humanity.

To lay the groundwork for expanding our interpretive programs, Ohio State University is inventorying available materials on biological diversity and evaluating them for use in NPS public communication programs.

The university also is designing a survey questionnaire, which the Director will send to field units early this fall, to characterize our existing interpretive programs, determine the interest of park interpreters in particular topics, and identify priorities for developing media and activities relating to biological diversity. The survey is being modeled upon an earlier OSU project to provide information for developing our "Clearing the Air" program, scheduled to get fully underway next year, and intended to improve our communication on issues relating to air quality, visibility, and acidic deposition in NPS areas.

Inventory and Conservation of Historic Fruit Trees

Since early Colonial days, dozens of fruit tree cultivars have been planted in the U.S. Some continue to be widely grown, others, no longer cultivated, have been used in developing modern varieties, still others have simply fallen into disuse or been lost. In a recent

NPS training course on integrated pest management for historic orchards, participants identified 20 historic orchards still being maintained in NPS areas, dating from as early as 1752. The actual number of NPS units containing such historic genetic resources is unquestionably greater.

This two-year project, to be carried out by researchers at UMass in cooperation with NARO, will develop an automated database based on a Servicewide resource inventory, provide taxonomic identification of the cultivars, evaluate the contemporary commercial importance of the cultivars, assess needs for conservation and propagation, and recommend management alternatives. The project provides for cooperation between natural and cultural resource specialists, and park interpreters, in demonstrating the important role of NPS units in conserving genetic resources.

Ecosystem Conservation Data Base

Conservation of biological diversity will require cooperation between NPS and other entities responsible for managing areas contiguous with NPS areas as well as noncontiguous areas of similar or complementary habitat. Bioregional cooperation is likely to become the mainstay of successful conservation and management. To help provide basic information on existing and potential contributions of federal, state, and private administrators, the NPS is providing partial support for a MAB project to assess gaps in the representation of ecosystems in the nation's protected areas, as well as to determine the protection status of these ecosystems.

Using digital base maps (1:2 million scale) provided by the U.S.G.S., existing ecological classifications, and maps of protected area systems, researchers at U/Colo and Fla/St/U are developing an information system that will enable users to tailor maps and analyses of protected areas for applications at a wide range of map scales. The first publication from this project, due later this year, will provide a preliminary assessment of the representation of potential natural vegetation types in tracts administered by 11 federal agencies.

Next year's outputs are expected to include a more detailed assessment of gaps in the NP System, as well as the results of a pilot project in Florida based on larger scale resource maps and a statewide survey of the management objectives of the state's protected areas. As more state and regional information is incorporated, the database will become a powerful tool for conservation planning, as well as for coordinating monitoring and research on biological diversity.

Research on Boundary Influences

The ability of NPS areas to preserve biological diversity is increasingly influenced by changing conditions across park boundaries. Natural ecosystems, continuous over vast areas at the time many parks were established, are being fragmented by complex patterns of human uses and activities. Administrative boundaries once significant only on maps are now significant on the ground in their effects upon patterns of genetic exchange and species distribution between parks and surrounding areas.

This multi-year project will apply concepts of conservation biology and landscape ecology to develop and test a methodology for evaluating changing conditions across park boundaries. The project will rely heavily on remote sensing and geographic information system technologies to describe and quantify these conditions for Western Region parks selected on the

basis of available GIS and inventory data. By integrating ecological, physical, sociological, and landscape variables along park boundaries, it will be possible to test and evaluate hypotheses on how both natural and human-influenced boundaries affect the abundance, productivity, and distribution of particular species and communities.

The concept for the "boundary model" was developed by Christine Schonewald-Cox and her colleagues at our U/Cal-Davis CPSU (see Spring 1987 issue of *Park Science*). Development and testing of the model will involve close collaboration with the NPS Geographic Information Systems Unit, the U/Cal/Berkeley remote sensing group at the University's Space Laboratory, researchers at a number of universities, and participating parks.

Anticipated applications of the boundary model should help parks address a broad range of planning and resource management issues, including:

- identifying priorities for inventory and monitoring of biological diversity
- assessing the changing impact of external land uses, in time and space, on species and communities
- assessing the ecological risk associated with proposed management strategies within and near the park
- determining where rare, threatened, or endangered species are most likely to become isolated or lost
- evaluating the effectiveness of the park's location, size, shape, and habitat patterns in preserving biological diversity
- classifying segments of the park's boundary according to their vulnerability to particular types of human impacts
- developing priorities for land purchases and exchanges
- coordinating the planning of "buffer areas" with adjacent landowners
- planning corridors for wildlife migration
- identifying priorities for mitigating loss or damage to wildlife habitat

This year's work will focus primarily on identifying hypotheses to be tested, selecting parks for pilot studies, obtaining and synthesizing relevant information for the parks and adjacent lands, and developing a detailed research plan. However, a project will be initiated at Organ Pipe Cactus National Monument, where planning for testing the boundary model has been underway for two years with partial support from the U.S. MAB Program. The park offers a field situation for comparing different boundary conditions, because it is bordered on three sides by natural desert scrub subjected to varying disturbance, principally from grazing, and on one side by intensive agriculture. Pressures are increasing outside the park, while, inside the park, natural communities are recovering from the previous impacts of grazing, which was recently terminated.

The research will look at how the composition and distribution of plant communities have changed within two kilometers of the park boundary during the last decade of rapid change in patterns and intensities of human influences, and will establish a baseline for future monitoring. The work is being coordinated by Peter Warren of the Arizona Nature Conservancy, who has 13 years' experience in the analysis of southwest vegetation.

Gregg is MAB Coordinator for the National Park Service.