

# Endangered Species UPDATE

*Including a Reprint of the latest USFWS  
Endangered Species Technical Bulletin*

*January/February 1989 Vol. 6 No. 3&4*

THE UNIVERSITY OF MICHIGAN

**School of Natural Resources**



## ***In this Issue:***

Creating an  
Endangered  
Ecosystems Act

The Reauthorization  
of the Endangered  
Species Act

Protection  
Recommended for  
Three Plants and  
One Insect

Federal Investigation  
Documents Illegal  
Trade in Parrots

# Creating an Endangered Ecosystems Act

by  
Constance E. Hunt

As human beings progress towards an understanding of natural law and an existence that is harmonious with the rest of nature, the vast web of interconnections that bind all life gradually come into focus. In this age of global environmental concern, it should therefore become obvious that efforts geared exclusively towards protecting a single species are necessary, but not sufficient, to preserve our natural heritage. Species are members of ecological complexes. Thus, attempts at snatching individuals from the jaws of extinction are analogous to treating the symptoms of a disease without curing the disease itself. This nation needs legislation that would offer protection to native communities, such as an Endangered Ecosystems Act.

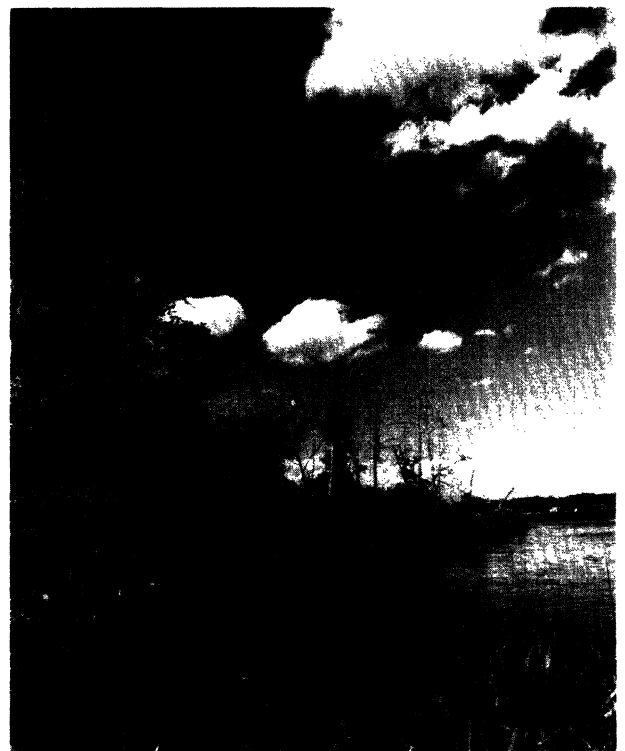
Ecosystems are abstract entities, with boundaries that mesh and blend with each other. The fact that they do not exist in isolation from one another makes the identification of their limits as absolute units in the field difficult, if not impossible. In general, however, an ecosystem is an interacting system, formed by living organisms and the abiotic environment, through which energy flows and nutrients are recycled. To a great degree, an ecosystem is self-regulating (Naveh and Lieberman 1984, Curtis 1979). The functioning of an ecosystem causes physical and chemical changes in non-living components of the earth, affecting the nature of the soil, the chemical composition of the atmosphere, and the climate on a local level (Milne and Milne 1971).

An endangered ecosystem is an individual unit comprised of a defined assemblage of organisms, the specific membership of which remains fairly constant and is labelled by the ecosystem type (i.e. all coniferous old-growth forests or all native tallgrass prairie) and, which is in decline with regard to the amount of area it occupies

throughout the United States. According to the Office of Technology Assessment (OTA)(1987), maintaining ecosystems is the only way to ensure the continued viability and evolutionary processes of organisms in these areas. (Conversely, the precipitous decline of ecosystems may result in an increase in the number of federally endangered species.) The OTA estimated that between 21 and 51 percent of major terrestrial ecosystems in the United States are not protected in the Federal domain. (This range depends on the size and number of each ecosystem type thought to be needed for adequate protection.) Ehrenfeld (1970) once stated that: *Most of the natural communities that are particularly threatened and in need of preservation, the original communities that first came with the land and identify it, are in or near a climax stage. The built-in stability of these communities is often sufficient to overcome small challenges to their integrity, but...man is not limited to small challenges.*

When a federal activity is halted by invocation of the Endangered Species Act, frequently it is the habitat of an endangered species that is threatened by the proposed action. When habitat loss is the true problem, the action too often proceeds without being stripped of its potential menace to the environment, while 'band-aid' efforts are made to lessen its impacts on the species.

Before 1981, for example, changes in the Colorado River's aquatic habitat brought the Colorado squawfish, humpback chub, and bonytail chub to the brink of extinction. The U.S. Fish and Wildlife Service refused to acquiesce to any further federal development that would significantly add to the depletion



of flows from the Colorado River until it had sufficient information to assess the needs of the fish in terms of timing and quantity of flows. By 1981, however, pressure from western water interests was great enough to change the service's position. These water brokers argued that the service should not hold up projects when it could not demonstrate that the projects would jeopardize the endangered species. For the next four years, therefore, the service allowed water development projects to proceed unopposed while they attempted to gather information on the projects' impacts and the ecological

requirements of the fish. Instead of instituting a more natural water management regime to restore aquatic habitat conditions, researchers yanked many of the fish from the river and bred them in captivity. Meanwhile, fish habitat in the Colorado continued to decline, riparian ecology deteriorated as well, and Congress considered more plans for water development on the river (Senate Committee on Environment and Public Works, Subcommittee on Environmental Pollution 1985).

The situation is similar in the Platte River basin. The Fish and Wildlife Service designated critical habitat for the whooping crane, but the species' recovery is now largely dependent on a captive breeding program. This breeding effort, which began in 1967, has met with success; but meanwhile, populations of two more bird species that depend on essentially the same Platte River riparian habitat, the Spotted Sandpiper and interior Least Tern, have declined to the point where protection under the Endangered Species Act is warranted. While the service is pursuing schemes to protect these species, it refuses to issue jeopardy opinions for Corps of Engineers permits that would permit the construction of two water supply dams proposed in the basin by the city of Denver.

As a species nears extinction, the costs involved in recovering the species increase. Where mere restrictions on development in a certain habitat type may be sufficient to protect the species early in its decline, the expensive facilities and personnel required for feeding, breeding, and studying a chronically endangered species offer only dim hopes for its recovery later on. While the funds and energies of responsible agencies are expended on attempting to resuscitate the fading species, the species' habitat in the wild may continue to decline, bringing still more species to the brink of extinction. If the endangered species is successfully reared in captivity, biologists may proudly march out of their labs with a potentially growing population of the species, only to find that no habitat exists to support it.

Early protection of potentially endangered species is not the only ration-

ale for endangered ecosystems legislation. Many ecosystems harbor unique associations of plant and animal species. Although these species may exist in large numbers in other associations in different regions of the country and therefore are not candidates for the endangered species list, the associations are entities in themselves and should be preserved.

The population decline of Bell's vireos in Arizona, for example, is an indicator of deteriorating health of desert riparian ecosystems. Although the species is not in danger of extinction, the habitat is. The Apalachicola River in northwestern Florida has lost its populations of sturgeon and striped bass, largely because their riverine environment was greatly disturbed by dam construction and alterations for barge traffic (Livingston 1984). Is the existence of these fishes in other waterways sufficient justification for the death of the Apalachicola ecosystem?

Habitat shrinkage causes or contributes to the extinctions of wildlife species. The last known continental population of the Ivory-billed Woodpecker, a bird specifically adapted to life in mature bottomland hardwood forests, disappeared in 1948 when the 120 square mile Singer tract in Louisiana was cleared for soybean cultivation.

As the acreage of natural habitats decreases, the number of animals whose home range needs are satisfied by the remaining available habitat also decreases. Predators at the top of the food chain, such as grizzly bears and wolves, require habitats ranging in size from 50 to more than 100 square miles, respectively (Burt and Grossenheider 1976). The loss of predators from a region often triggers booms in populations of prey species, such as deer and elk, that quickly outgrow the capacity of the ecosystem.

The same valuative arguments for preserving individual species, such as their importance in providing the world with future genetic resources and their values as sources of scientific knowledge, as portions of our children's rightful inheritance, and even as creatures with an inherent right to exist, apply to the preservation of ecosystems as well.

## Endangered Species UPDATE

*A forum for information exchange on  
endangered species issues*

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Rob Blair.....Editor  
Dr. Michael Soulé.....Faculty Advisor  
Yu Man Lee.....Production

### *Instructions for Authors:*

The Endangered Species UPDATE welcomes articles related to species protection in a wide range of areas including but not limited to: research and management activities for endangered species, theoretical approaches to species conservation, and habitat protection and preserve design. Book reviews, editorial comments, and announcements of current events and publications are also welcome.

Readers include a broad range of professionals in both scientific and policy fields. Articles should be written in an easily understandable style for a knowledgeable audience. Manuscripts should be 7-10 double-spaced, typed pages. For further information please contact Rob Blair at the number listed below.

### *Subscription Information:*

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These values cannot be economically quantified, so when land and water use decisions are made under pressure from participants in the marketplace, such as irrigation equipment companies or real estate developers, the nonmonetary values of species and ecosystems are often not considered.

Why our natural heritage is worth preserving is summed up in the following statement:

*We conceive of biota of the planet earth not as life viewed by man but as life viewed by a larger, more inclusive perspective. When we do so, we attribute a value to the whole that is greatly enriched by all the complex contacts and interrelationships of the parts, man being one of those parts (Cobb 1980).*

A move by our society to create a network of protected ecosystems throughout the United States might go a long way towards not only protecting species, but towards understanding and appreciating the natural heritage of our land and bringing our society closer to a harmonious relationship with nature. Such a network might be best achieved using existing federal authorities and relying primarily on cooperation between levels of government and the private sector, rather than acquisition of land.

How might we begin to protect our heritage of ecosystems? Endangered ecosystem legislation would establish ecosystem preserves to be managed largely under cooperative agreements between agents in both the private and public sectors. The three major components of such a program would include research, protection, and restoration.

## Research

An endangered ecosystems act would appropriate federal funds to supply matching grants to the states for the purpose of surveying and designating ecosystems as endangered (in danger of complete extirpation) and threatened (close to becoming endangered). The surveying and designation work would be done on a state-by-state basis by committees consisting of representa-

tives from federal resource management agencies, state conservation agencies, the research community, and any interested private sector groups such as conservation organizations, homebuilders associations, and livestock and timber companies. The state natural resource agency would be the logical lead agency. The committees would address issues such as the biological diversity of proposed ecosystem types; the relative scarcity of these types on state, regional, and national scales; the minimum size of units necessary to preserve the majority of species dependent on that ecosystem; and the land and water uses that are compatible or incompatible with the preservation of the ecosystem. Once the most sensitive ecosystem types were identified, the committees would develop maps illustrating their location throughout the state. The committees would also propose land and water use guidelines to be applied for the protection of threatened and endangered ecosystems.

In some states, much of the data necessary to begin the process of identifying and designating areas for preservation under an endangered ecosystems program already exists in the form of natural areas inventories and Geographical Information System data bases. "Hot spots" of species and community endemism could be identified using gap analysis, as suggested by Scott *et al.* (1988). Field reconnaissance would verify the existence and condition of these areas, suggest land treatments in surrounding areas that would contribute to the preservation of qualified areas, and help to identify degraded sites for potential restoration.

## Protection

Committee maps depicting the location and approximate extent of the endangered and threatened ecosystems would provide candidate sites for the protection of these ecosystems. For threatened ecosystems, federal resource management agencies would develop local guidelines restricting land and water uses that the committees find incompatible with ecosystem preservation. Such guidelines for riparian habi-

tats, for example, would create buffer zones where logging would be prohibited, restrict livestock grazing, and prohibit the use of all-terrain cycles. These guidelines would be incorporated into long-term planning documents for agency units and thus subjected to public scrutiny.

Endangered ecosystems on federal land would be managed by guidelines more restrictive of land and water use than those for threatened ecosystems. The guidelines would make preservation of the ecosystem's self-sustaining biological integrity the primary management goal. In endangered riparian ecosystems, for example, no structural alteration of streams would be allowed.

The legislation would prohibit federal subsidies to development in areas identified as threatened or endangered. In endangered ecosystem preserves, the legislation would also prohibit the granting of federal permits for development, such as Federal Energy Regulatory Commission permits to construct small hydropower dams and Corps of Engineers permits for wetland fills.

Endangered ecosystem legislation would also authorize grants to the states. These would include funds to set up and manage an endangered ecosystems program, funds for technical assistance to local governments and landowners to apply land treatments (such as soil erosion control measures and means of enhancing the quality of stormwater runoff) within the watersheds of protected ecosystems, funds for the acquisition of land to be managed by the state or donated with appropriate management restrictions to local conservation groups or park districts, and funds for the purchase of easements and leases of land. State program managers may decide to establish non-profit corporations that would accept donations of land, leases, and easements from private landowners in exchange for tax credits.

## Restoration

Endangered ecosystems legislation would encourage federal agencies to restore degraded areas containing endangered ecosystems. Grants to states

(Continued on UPDATE page 4)

could be used by the states and local government to restore these ecosystems on land owned by the state, local governments, and the private sector. Candidate restoration areas may be identified using historical records and aerial photographs.

Local governments may be reluctant at first to participate in a restoration program, but might be reminded of the benefits that could accrue to their communities by restoring and protecting rare ecosystems. Communities may be upgraded by the provision of open space through restoration programs. Environmental awareness and education would be advanced by involving community groups and local schools in restoration and management programs. Areas set aside to protect endangered ecosystems would serve other objectives, as well. Prairie areas, for example, filter stormwater and prevent soil erosion. Wetlands reduce flood damages. Riparian corridors contribute to surface water quality, provide linkages for dispersing wildlife, and provide recreational greenways (Dreher *et al.* 1988)

### Planning Criteria

Natural resource managers must consider several criteria when planning to protect threatened and endangered ecosystems. Some of these are described below.

- Ecosystems protected under this legislation should be significant on a national level. For example, areas such as tallgrass prairies, old-growth conifer forests, and southwestern riparian woodlands that are becoming increasingly rare throughout the United States would receive protection under such a law.

- Ecosystems preserves must include areas with native communities of plants and animals if they are to represent America's natural heritage. It may be possible to restore degraded communities to a previous species composition and balance through the implementation of management and monitoring programs.

- Ecosystems are often best pro-

tected using the core-buffer-transition zone formula employed by biosphere reserves (see Endangered Species UPDATE Nov./Dec. 1988). Buffer and transition zones offer opportunities to manage land in a way that is considerate of the protected ecosystem while permitting other watershed activities to be dominant. For example, if a residential area exists in a buffer zone for a wetland preserve, local governments might require that all stormwater entering the preserve from sewer systems first pass through sedimentation basins and grassed swales. Abrupt edges on ecosystem preserves may exacerbate several counter-productive conditions. In contiguous natural habitats, for example, individuals of various species generally disperse across home-range borders. More cosmopolitan organisms existing in monocultures (agricultural fields and timber stands, for example) or in urban environments outside of unbuffered preserves may disperse into the preserves and be sources of parasites, predators, and competition that the protected ecosystem cannot stand. On the other hand, organisms protected within the reserve may be sources of problems for land managers outside of preserves if no buffer area exists. For example, waterfowl and egrets may devastate grain fields if they disperse outside an unbuffered wetland preserve to find additional food sources. Toxic substances used in the management of areas adjacent to ecosystem preserves may find their way into these preserves if no buffer area exists. Pesticides and road salts are examples of substances that may pose threats to organisms within preserves. Finally, human impacts on local climates and watershed hydrology may gradually unravel the ecology of protected areas if they are not surrounded by buffer and transition zones.

- Endangered ecosystems programs managers might plan corridors into their systems. Properly designed corridors of open space would allow migration of native species between ecosystem preserves and other parcels of open space, such as forest preserves, state parks and federal lands. If a habitat parcel is connected by corridors to other

habitats suitable for colonization, dispersal out of an area is usually balanced by dispersal into that area (Janzen 1986). Conversely, if the habitat immediately adjacent to an ecosystem preserve is inhospitable, without corridors, the emigrants from the preserve will probably not survive, and no source of immigrants will be available to replace them. Corridors would also link recreational areas, making them more suitable for backpackers, hikers, bicyclists, and horseback riders.

- Ecosystem preserves must be established taking into account the potential for global climate changes triggered by the accumulation of carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons in the earth's atmosphere. In the United States, this generally means preparing for a shift in biological communities to the north. Thus, designers of these preserves must consider whether the ecosystems they are attempting to protect are likely to migrate northward, whether sufficient space exists to the north to support them, whether precipitation will be likely to support them, whether the species within the reserve have the capacity to migrate quickly enough to survive climatic change, whether soils and other resources north of a protected area are adequate to support migrating ecosystems, and whether land ownership patterns will permit changes in preserve boundaries (Peters 1988).

- When allowances are made for buffer and transition zones, linking corridors, and compensation for anticipated global warming, it is likely that many proposed ecosystem preserves will cross jurisdictional boundaries. Therefore, a complex system of overlapping authorities may be necessary to protect these areas. A considerable amount of interagency cooperation, as well as cooperation between the public and private sectors, will be needed to protect endangered ecosystems.

Cities are expanding and humans are claiming more land. Ecosystems are being squeezed and cut into parcels incapable of supporting viable populations, and watersheds are being altered so that native plant communities can no

(Continued on UPDATE page 5)

# Book Review

## Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates

Edited by Jared Verner, Michael L. Morrison and C. John Ralph

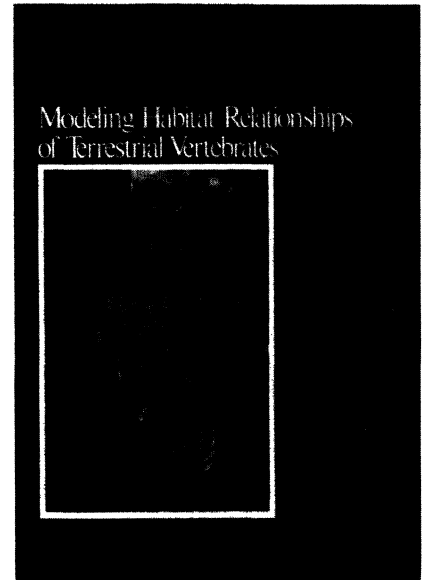
The conundrum of explaining how an animal fits into its environment has been a challenge to both academic researchers and wildlife managers in recent years. Managers have been required to assure the long-term maintenance of all species in their management areas while researchers have been attempting to offer ways to successfully achieve such this goal. The result of these two missions has been a concerted effort to develop successful models that delineate the relationship between specific animals and their environments.

In the fall of 1984, the Wildlife Society and the U.S. Forest Service sponsored an international symposium to address the development and application of models intended to predict responses of wildlife to changes in their habitat. The result of this symposium

was *Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates*.

This book, a compilation of 58 papers, addresses the challenge of modeling wildlife-habitat relationships. Its editorial focus is evenly split between the researcher's point of view, that of developing wildlife-habitat models, and the manager's point of view, that of applying habitat models in management situations. The book is divided into several sections including:

- Development, Testing, and Application of Wildlife-Habitat Models
- Biometric Approaches to Modeling
- When Habitats Fail as Predictors
- Predicting Effects of Habitat Patchiness and Fragmentation
- Linking Wildlife Models with Models of Vegetation Succession



*Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates* is published by The University of Wisconsin Press, 114 N. Murray Street, Madison, WI 53715. \$17.50 Clothbound ©1986 470 pp.

(Continued from UPDATE page 4)

longer compete with alien species. The nation will be truly bankrupt if the Pacific Northwest no longer harbors stately old-growth forests and The Prairie State has no native prairie. Leadership at the federal level is necessary if we wish to preserve the natural heritage of the United States.

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Constance Hunt is author of the recently released book *Down by the River: The Impact of Federal Water Projects and Policies on Biological Diversity* published by Island Press.

## The Next Step: Part Two

by Kevin Bixby

Editor's Note: *This is the second part of Kevin Bixby's essay exploring the limitations of the Endangered Species Act in preserving biological diversity and in restoring native fauna*

The Endangered Species Act's protection is limited to listed species. This excludes many species, such as the river otter, which have declined but not to the point of imminent extinction. The inclusion of subspecies and "distinct population segments" in the Act's definition of species would seem to allow for the listing and recovery of extirpated populations, but this liberality is offset by the Act's implicit assumption that extinct taxa cannot be recovered. For example, the eastern cougar (*Felis concolor cougar*) is listed as endangered. Since the subspecies is now assumed to be extinct by most authorities, recovery efforts have ceased and the eastern cougar will probably be delisted. The logic of this approach seems to be that it is better to have no cougars at all than the wrong variety, despite the fact that even experts have difficulty distinguishing among cougar subspecies. If cougars ever return to the eastern half of the country, it will not be under the auspices of the ESA. While this fidelity to taxonomy may be a correct legal interpretation of the Act, its accord with the sentiment which led to the Act's passage is debatable.

The ESA has justifiably become something of a sacred cow, but we should resist the temptation to saddle it with all of our conservation goals. We need a new and sturdier legislative vehicle. I suggest a National Conservation Act or something similar in which Congress declares it a national priority not only to prevent extinctions, but to protect remaining plant and animal diversity *and* restore species to their historic ranges where possible. Some

will object that it is impractical to reintroduce troublesome species like the grizzly bear and gray wolf into their former haunts, but feasibility is in the eye of the beholder. More than one-third of the nation is managed by federal agencies, much of it still in a relatively natural condition. What better use of the public lands than wildlife restoration? Congress should direct federal land management agencies to make wildlife restoration and protection a high priority, if not the highest.

Skeptics should ask why we need another law when we can't even do a good job implementing the ESA. The answer is that we need laws to catalyze our moral development. The interplay of law and societal values is intriguing. Both seem to stimulate and shape the other; neither can advance much in any direction independently of the other. Laws give weight to ethical views, but if the ethical view lacks some threshold of public acceptance, it cannot be formalized in law. The ESA was ahead of its time. The subsequent problems we've had implementing the Act reflect the difficulties of forging a social consensus behind a moral commitment made prematurely. We simply weren't ready as a nation to say that a tiny fish was worth more than a multimillion dollar construction project, for example. But the Act has not played an entirely passive role in this consensus-building process. It has provided a legal substrate upon which an evolving wildlife ethic could coalesce. Once passed, it became a potent force for legitimizing the view that all forms of life have a right to exist.

Conservation is a matter of defining the reasonable limits to human needs, and of reserving the rest of the world for other species. It is fundamentally a moral, not a technological issue. Conservation will succeed not because

the law says it must, but because individuals believe it should. We can't equip every red wolf born in the wild with a radio-controlled tranquilizer collar to make sure that it doesn't stray out of the refuge. Sooner or later people will have to reconcile themselves to having red wolves living among them if red wolves are to survive in the wild.

In the ESA we took a major step forward just by acknowledging the existence of bounds to the use of the

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**The Endangered Species Act has justifiably become something of a sacred cow, but we should resist the temptation to saddle it with all of our conservation goals. We need a new and sturdier legislative vehicle.**

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world by humans. Drawing the line at the edge of extinction, as we did with the ESA, was fairly easy because it seemed to call for little sacrifice on our part. But adhering to that line has proved surprisingly difficult. Drawing the line anywhere else will undoubtedly be more difficult since we are as selfish as any other species. Regardless of the difficulty we have in implementing them, we need laws to convince us that the line can and should be drawn with more generosity on our part.

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Kevin Bixby is an environmental writer based in Las Cruces, New Mexico. If you would like to contribute an opinion piece, write the editor of the UPDATE.

# Bulletin Board

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## Plant Conservation Newsletter

A new publication has recently been launched to disseminate information on island floras and their conservation. The *Island Plant Conservation Newsletter* attempts to bring managers and scientists working on natural areas together to share ideas and results. The first issue includes notes on techniques to control invasive species in Hawaii, including both biological controls and herbicidal treatments, news on recently established protected areas, and a list of recently published material on island conservation. It is intended to include notes on rare plants and restoration attempts in future issues. For details write: Prof. C.W. Smith, Dept. of Botany, University of Hawaii at Manoa, 3190 Maile Way, Honolulu, Hawaii 96822.

## Black-footed Ferret Trust Fund

In January 1989, a trust fund to aid recovery of the black-footed ferret was created with initial deposits of \$71,200 from the Wyoming Wildlife Federation, Wyoming Game and Fish Commission, and National Wildlife Federation. The trust fund will serve as a depository of all privately raised donations on behalf of the black-footed ferret recovery program. The Foundation will manage the

trust fund at the discretion of the Wyoming Game and Fish Commission and the U.S. Fish and Wildlife Service.

All donations are tax-exempt and all monies will be used directly to benefit the ferret's recovery. Donations to the Black-Footed Ferret Fund are encouraged. Contributors will receive regular status reports on ferret recovery and annual accounting of the Ferret Fund's Activities. Send contributions to the Black-Footed Ferret Trust Fund c/o Wyoming Game and Fish, Cheyenne, Wyoming 82002.

## Desert Conference XI

The 11th annual Desert Conference will be held April 21-23, 1989 at the Malheur Field Station adjacent to the Malheur National Wildlife Refuge south of Burns Oregon. Conservationists from Oregon, Idaho and Nevada will meet to enjoy field trips exploring the geology, archeology, botany, and wildlife where the northern boundary of the Great Basin meets the Steppe lands. The theme is 'Layers of Time in the Great Basin'. Participants will hear and take part in presentations by scientists, natural resource experts, artists, and conservationists. Citizen activists workshops will focus on grazing, In-

terim Management of identified wildlands, heap leach mining and will deal with both management obligations and legal remedies to problems in these areas. Because of the isolated nature of the Malheur Field Station, all attendees must pre-register. For more information contact: Desert Conference XI, PO Box 1005, Bend, Oregon 97709.

## U.S. Plants in Danger

A study by the Center for Plant Conservation (CPC), a private non-profit organization in the United States, revealed that 253 plant taxa may become extinct within the next five years, and an additional 427 taxa may become extinct in ten years. Moreover, 73 percent of these occur in only five states and territories—California, Florida, Hawaii, Puerto Rico, and Texas. These areas have been considered "Priority Regions" due to the high degree of endangerment and will be the focus of a "Priority Regions Program", a comprehensive approach to conserving the most endangered plants of these five areas before further extinctions occur.

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*Bulletin board information provided in part by Jane Villa-Lobos, Smithsonian Institution.*

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# Endangered Species UPDATE

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