

Endangered Species UPDATE

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

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THE UNIVERSITY OF MICHIGAN
School of Natural Resources



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Avoiding the Triage Question

by Bryan G. Norton

The triage formulation is intimately linked with the species-by-species approach to preservation, and the species-by-species approach is a natural outgrowth of the world view on which nature is seen as a warehouse of raw materials to be protected because they may prove useful in the technological production of commodities or for aesthetic "consumption."

The magnitude of the problem of disappearing species viewed worldwide, dwarfs resources currently available to address it. By the end of the century, experts predict, as much as one species will be lost every hour. Faced with shrinking budgets and accelerating extinction rates, environmental managers agonize over which species to save. Different criteria for placing value on species - ecological, economic, aesthetic, cultural - compete with one another, and controversy abounds. One proposal for sidestepping direct debates about the value of species is to adopt a system of triage, which takes its name from the French policy of sorting wartime casualties into three categories for medical treatment: those with superficial wounds that do not require immediate attention; those with wounds too serious to make treatment efficacious; and those in the middle range, having serious but treatable wounds.

Once the issue is formulated in this manner, it seems obvious that efforts toward species preservation are best concentrated in the third category. Scarce funds and energies should be targeted at saving those species that are both in need of saving and susceptible to being saved. But the most arresting formulation of an issue is not always the most illuminating one; it will be useful to stand back from the triage formulation, which casts the problem of setting priorities as one of sorting species into

categories, and ask whether there are other, more fruitful ways to look at the problem.

What Is the Endangered Species Problem?

The endangered species problem is not a single problem. It is more accurately seen as four closely related problems: (1) what should be done when a species' population becomes so depleted as to threaten its continued existence; (2) what should be done to keep relatively healthy populations from declining and thereby falling into the threatened category; (3) how to avert, or at least slow, the predicted and potentially cataclysmic reduction of biological diversity over the next few decades; and (4) how to slow the trend toward conversion of natural systems to intense human use?

In the triage formulation the priorities problem is most naturally associated with question (1) because it considers threats to individual species. Once threatened, species require management initiatives designed to protect and nurture them, individually. But the goal of protecting biological diversity should not be reduced to the goal of protecting remnant populations of threatened species. If one thinks about the endangered species problem in this way, there is a tendency to treat it as merely a problem of protecting genetic

diversity, with each species regarded as a repository for a set of genes. Indeed, some preservationists speak as if the protection of species involved little more than preserving samples of seeds and germ plasm.

Biological diversity is a much broader concept than genetic diversity. Biological diversity is constituted not merely by the number of species, subspecies, and populations extant, but also by the varied associations in which they exist. A species existing in an ecosystem represents not a static but a changing pool of adaptations, a whole series of different genetic dynamics and varied evolutionary trajectories. Diversity of biological life is also a valuable aesthetic and cultural resource. To perceive biological diversity only in terms of a diverse gene pool is to ignore the whole range of aesthetic and cultural values dependent upon varied landscapes.

Loss of genetic diversity is a manifestation of the deeper problem of decreasing biological diversity. As natural habitats are altered, converted, and simplified, many species suffer a decline in their number of independent populations. Attempting to protect genetic diversity through the protection of a few remnant populations will result only in a continual scramble to save individual species. A broader approach, by recognizing the forces that bring species to a threatened stage,

should keep more species from requiring individual attention. The triage formulation of the priorities issue would, in the process, be circumvented. Society would no longer face an interminable series of difficult choices among threatened species. Rather, the problem would be viewed holistically as one of halting the tendency toward habitat destruction and loss of biological diversity.

Nature as Habitat vs. Nature as Warehouse

Viewed in its most general terms, the problem of endangered species raises questions about the sort of relationship modern technological societies can and should have with nature. Will we see ecosystems as human habitats, as associations on which human life depends? If so, we will see them as having a holistic integrity that must be protected. Or will we see natural objects as no more than commodities available for use in the production of goods and services? Nature is then seen as a warehouse of consumable supplies.

In the warehouse view, nature is seen as a self-replenishing supply of goods and services; humans assume they can go to it and find what they need when they need it, drawing on its resources without fear of depletion. If the population of some species falls below a danger point, thereby threatening access to it as a commodity, then that

species is "listed" for special concern; it is isolated from normal interaction with humans, saved for future consumption. It is never asked why human beings cannot normally cohabit with other species or why more and more species suffer precipitous declines in population.

The warehouse view is widely held these days. Nature is no longer seen as the human habitat. It is no longer seen as a producer, sustainer, giver of life. Nature can produce, but humanly manipulated monocultures do it more efficiently. Nature can provide an endless variety of genetic resources, but these can be better protected in gene banks. Nature can provide aesthetic experiences, but it's easier to get them in zoos. Humans are not seen as one species, like others, inescapably dependent on natural systems. Technology increasingly insulates humans from the ways in which they depend on nature. Nature becomes not a place to live, but a repository of raw materials to be extracted and used in technological forms of production.

It is not necessary to undertake a metaphysical critique of the nature-as-warehouse approach. The triage formulation of the priorities problem is, in a practical sense, a test case for that approach. The triage formulation is intimately linked with the species-by-species approach to preservation, and the species-by-species approach is a natural outgrowth of the world view on which



loggerhead sea turtle hatchling

photo by Donna Dewhurst, USFWS

Endangered Species UPDATE

*A forum for information exchange on
endangered species issues*

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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 Kathryn Kohm at the number listed below.

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Cover:

Alabama cranebrake pitcher plant
(*sarracenia rubra* var. *alabamensis*)

photo by Randy Troup

nature is seen as a warehouse of raw materials to be protected because they may prove useful in the technological production of commodities or for aesthetic "consumption." But the triage formulation fails. More and more species are threatened by habitat destruction caused by technological advances and by expanding human populations; smaller and smaller proportions of species that require protection will receive it. The triage formulation leads to insoluble problems. Resources are not available to protect, on an individual basis, all the species that will be threatened by a policy permitting wholesale conversion and alteration of natural systems. Worse, in many species-rich and highly threatened areas including much of the tropics, conservation biologists lack even rudimentary lists of species existing there and have almost no knowledge of the life requirements of the individual species. The world view that sees nature as a warehouse of commodities is not, in the long run, conducive to the goal of species preservation, especially in cases such as these—one cannot protect, individually, the contents of a warehouse if one lacks even an inventory of those contents.

Habitat Protection

Instead of asking, "Which species should be saved?" we should ask in-

stead, "How might agencies best spend the resources available to protect biological diversity?" Habitat or ecosystem protection provides a more promising approach to preserving species than activities designed to protect species individually.

The advantages of a holistic, ecosystem approach are numerous. Protection of large areas from human alteration serves as a reminder that human life grew out of and is sustained by the productive forces of nature. It treats species not as commodities held in waiting, ready at hand to provide goods and services as the need arises, but as having an independent existence of their own, drawing upon resources available in the natural communities to which they also contribute. Habitat protection provides opportunities to encounter species not only in zoos and botanical gardens, but also in natural settings, leaving room for unexpected encounters with other species that can jar the senses and the sensibilities.

Above all, the habitat protection approach has a reasonable chance of success. Funds and efforts expended to protect species by protecting ecosystems and habitats are far more likely to be successful in the long run. In isolation from their habitat, species require great amounts of care. Managers often lack the knowledge and resources necessary to provide substitutes

for the services provided naturally in undisturbed ecosystems. The ecosystem approach protects species before they reach critical stages and require individual attention. Addressing the problem in less acute stages leads to more efficiency per dollar spent. Efforts of this sort address not just the problem of how to save species once they have become severely endangered. They address all four forms of the endangered species problem simultaneously, by keeping healthy populations from undergoing decline, by protecting biological diversity generally, and by placing limits on how natural systems are altered for human use.

It would appear, then, that when the question of priorities is posed as one of how best to expend funds and efforts, the answer is clear. They should be expended to protect as many and as varied types of natural systems as possible.

A Comprehensive Effort Outlined

A national effort is necessary to attack all four of the endangered species problems listed above in a coordinated manner. The central offensive in such a campaign should be the protection of habitat. Domestically, this would require development of a set of categories identifying types of habitats and



black footed ferret

photo by Tim Clark

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ecosystems and efforts to ensure that several systems of each type in each geographical locale receive protection.

Organizations like the Nature Conservancy and other private ecosystem protection groups have already done much to identify areas where more protection is necessary and have efforts under way to provide it. Federal and state governments should cooperate by offering financial assistance, by helping to coordinate ongoing efforts, and above all, by limiting the use of publicly owned lands that are appropriate for habitat protection. Private owners of lands requiring protection could be compensated with other less sensitive and perhaps more economically productive public lands in a program of land trading.

What is needed is an over-arching authority that has responsibility for matters of biological diversity more generally. It should have both domestic and international responsibilities and its main function will be to gather information and to devise means to protect habitat. This authority should cooperate fully with state agencies and private land-protection groups worldwide. It is essential that the U.S. government reassert its world leadership in the effort to conserve biological diversity.

It is known that an extinction event of epic proportions is coming, indeed, that it is underway. It is not known how to stop it, but it can be slowed by saving as much habitat as possible in as large preserves as possible. This requires holistic thinking—success will depend on saving intact ecosystems. Attempts to evaluate species individually lead to judgments that some species for which we know no use are not worth the cost of protection. If enough such decisions are made in any given ecosystems, it will be destroyed by increments and other, valuable species that depend on the ones that were sacrificed will eventually die out as well.

The folly of evaluating individual species economically and deciding that some are not worth saving defies scientific understanding of ecosystems—The large, spectacular species that are designated for protection exist at the top of the biotic pyramid, dependent on the

ones below them. Humans, as the spectacular and large species that is presumably at the top of the list for preservation, also rests upon the less spectacular species that creates biomass and oxygen, and regulate the climate.

And thus a variety of practical and prudential arguments point away from the species-by-species approach to conservation. Similarly, these same arguments militate against formulating the priorities question mainly as one of rating individual species as having high or low priority for protection. Priority should be placed on saving habitats—this approach provides maximal protection for as many species as possible.

Once conservation efforts are shifted from a species-by-species approach to a more holistic one, there will still be an important place for efforts to protect remnant species and populations: many species are already too threatened to survive merely through habitat protection and, despite our best efforts to protect their habitats, others are likely to become threatened in the future. When there are recognized reasons for treating a particular species as having special economic, cultural, aesthetic, or ecological value, there are special reasons to protect it, which may justify protection and recovery programs.

But it is a mistake to think of an office devoted to listing and protecting already endangered species as the core of a national program of species preservation. The emphasis of the Office of Endangered Species should therefore shift considerably, with less effort expended in listing species and no assumption made that every endangered species be given special protection. Indeed, the listing process might be phased out. This may imply abandoning some species now identified as endangered and allowing events to take their course. But more species will be saved by efforts directed at habitat protection than by efforts to identify, list, and develop recovery programs for each individual endangered species. Scaling down the listing process would, presumably, free resources for a coordinated campaign to protect habitats.

Since the bulk of threatened spe-

cies are found in other parts of the world, especially in the tropics, a complete endangered species protection policy must address the problem globally. Obviously, the U.S. government cannot act unilaterally within the boundaries of another nation. But supported by funds and efforts by the United States, programs of international cooperation could make a tremendous difference in setting aside preserves of undisturbed habitat throughout the world.

It may be protested that the task set is too large, that it would cost too much in lost developmental opportunities. But I believe that, compared to the benefits (considered in the broadest terms over the longest run), a comprehensive policy to protect biological diversity may represent a remarkable bargain for the human species.

Bryan G. Norton is professor of philosophy at Georgia Institute of Technology. This article was adapted with editorial assistance from Claudia Mills, from his book, *Why Preserve Natural Variety?* Princeton University Press, 1987. An earlier version was published in *QQ*, the quarterly of the Institute of Philosophy and Public Policy, University of Maryland.

Catching Up on The Update's Publication Schedule

As you may notice, this month's issue of the Update contains two reprinted issues of the Endangered Species Technical Bulletin. Due to the recent reorganization of the Office of Endangered Species, the ESTB'S publication schedule has been somewhat irregular. As soon as we receive materials from the FWS, we reprint them and send them along to you. This month, we received two reprints. In the interest of getting the bulletin to you sooner rather than later, we have combined the June and July issues. We hope to return to our regular schedule this Fall. Until then, we appreciate your patience.

Book Review

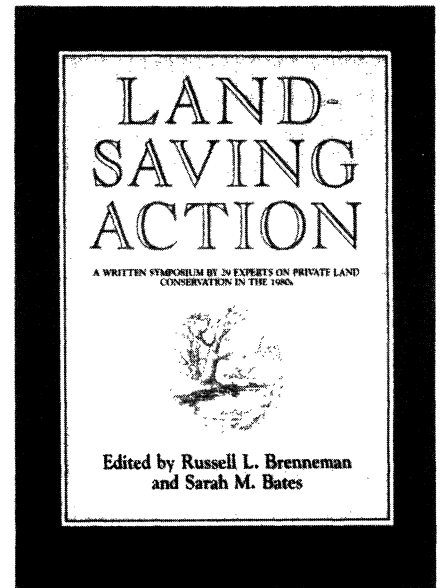
Land-Saving Action edited by Russel L. Brenneman & Sarah M. Bates

As land trusts gain increasing prominence in the United States, they have come to play an important role in species preservation efforts. Whereas the creation of refuges, parks, and wilderness areas has traditionally been associated with the public sector, privately funded land trusts have grown increasingly sophisticated in supplementing government programs and developing alternative, innovative acquisition and management strategies for species and habitat protection.

Land-Saving Action, a collection of 35 articles, is one of the most recent books on the subject. Although the role of land trusts in endangered species conservation is not specifically discussed (this is one of the book's weaknesses), the book serves as a practical reference that conveys both the spirit

and the techniques of land trust activity.

The book is a product of the first gathering of land trust activists in 1981. There are articles on specific trusts as well as essays discussing such issues as how and when to form a land trust, how and why to acquire federal and state tax-exempt status, the options for acquiring and managing land, and the appraisal of rights in land. Various authors explore the use of land trusts to manage and protect farmlands, forestlands, scenic areas, and urban lands. Shorter pieces by prominent land trust leaders are intermixed with articles by land trust attorneys on land rights, the acquisition process, and taxation. As such, *Land-Saving Action* provides much of the background information for those interested in habitat and species conservation through private initiatives.



Land-Saving Action is published by Island Press, Star Route 1, Box 38, Covelo CA 95428. hardcover \$64.95, softcover \$34.95.

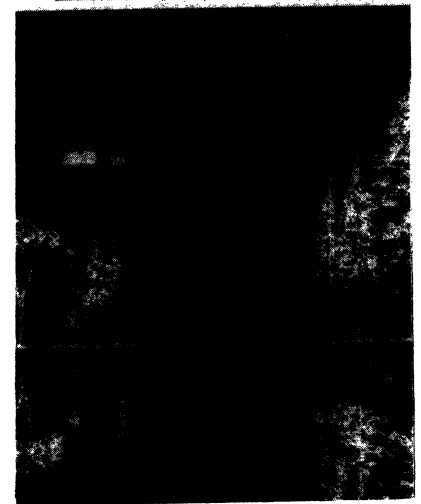
Private Options: Tools and Concepts for Land Conservation Montana Land Reliance and the Land Trust Exchange

Private Options: Tools and Concepts for Land Conservation is a collection of over fifty short articles co-edited by the Montana Land Reliance and the Land Trust Exchange. Like *Land-Saving Action*, *Private options* explores the land-trust movement's traditions, motives, and objectives, and points out problems land trusts face. Yet it is primarily designed as a practical handbook for practitioners in the field. In the preface, the editors introduce the book as a smorgasbord of tools and techniques that have been developed by over 500 land trusts across the country.

The opening essay by former Interior Secretary Cecil Andrus outlines the tremendous potential for private sector

involvement in land preservation, and the role of such efforts in the environmental movement as a whole. The remainder of the book is organized in nine sections including: skills in marketing, negotiation, and land evaluation; economic strategies and tactics for purchasing easements and taking advantage of tax incentives; public/private relationships in land conservation; organizational design strategies, and resources available to land trust organizations. Although some of the papers are rather narrow in scope and address only specific technical issues, the collection as a whole provides an interesting look at the development and future directions of the land trust movement.

PRIVATE OPTIONS:



Private Options: Tools and Concepts for Land Conservation is published by Island Press: Star Route 1, Box 38, Covelo, CA 95428. softcover \$25.00.

Drought, Deluge, and Endangered Species

by Dennis D. Murphy & Stuart B. Weiss

As if society needed a reminder of its dependence on the vicissitudes of climate, 1988 has become the year of the drought — delivering crop failures, water rationing, and soaring utility bills. While the present drought is most noteworthy for its grand geographic extent, it can hardly be considered an anomaly. Indeed, since similar conditions occurred over several year periods in the 1880's and again in the 1930's, it is tempting to hypothesize a 50-year "cycle" of drought events. Regardless of our hypotheses and predictions, however, the ecological and conservation significance of droughts, deluges, and other climatic extremes lies in their unpredictability. Clearly, climate has played major roles in shaping the distributions and abundances of many of our threatened and endangered species. We must consider this role, and its stochastic nature, to best protect species and areas of conservation concern.

Paul Ehrlich and his colleagues at Stanford monitored populations of checkerspot butterflies (genus *Euphydryas*) across the western United States for more than a decade preceding the 1975-77 California drought. The diversity of responses to the drought recorded for geographically and ecologically widely-separated populations underscored the danger of generalizing about the effects of environmental phenomena based on observations of just a few populations - even within a taxonomic species. Populations of the threatened bay checkerspot butterfly (*Euphydryas editha bayensis*) in central California grasslands declined precipitously or went extinct when their annual larval hostplants senesced extremely early. At the same time, populations of an alpine subspecies (*E. editha nubigena*) actually increased when the light snowpack melted early. In drought years, while low elevation

growing seasons shorten, growing seasons at high elevations tend to advance, and even lengthen.

Climatic extremes can be especially devastating to species with narrow distributions and highly restricted resource requirements. Even mild climatic fluctuations can mean local extinction for small populations within remnant habitats. Many species survive environmental extremes in but a fraction of their natural geographic distribution; once habitats are lost, "shifting mosaics" of populations can be disrupted, and what historically would have been temporarily vacant patches become permanently lost habitat. Endangered aquatic species with fragmented, localized distributions may be severely affected by drought, especially in regulated river systems where the conflicts between power generation, irrigation, domestic use, and wildlife seldom are resolved in favor of wildlife.

Drought can also set the stage for catastrophic epiphenomena that can threaten vast numbers of species across wide areas. For example, severe drought during the El Nino/Southern Oscillation event (ENSO) of 1982-83 led to extensive forest fires which raged for months in the normally moist Indonesian rainforests of Kalimantan. Fires of this nature may recur on a time scale of centuries, yet must be considered in conservation planning.

While the 1982-83 ENSO global climatic sequence desiccated the western Pacific, it brought deluge to the eastern Pacific. California received two to three times its normal precipitation, affecting a wide variety of species. Snowmelt at high elevations came late or not at all, and some of the same alpine checkerspot butterfly populations that thrived during the drought went extinct. Bay checkerspot butterfly populations which usually had increased in size fol-

lowing wet years, underwent severe declines due to the lack of winter sunshine. The ENSO also furthered the already precipitous decline of the Sacramento River winter-run of the chinook salmon, now a candidate for endangered species listing. Yet, high spring and summer flows allow smolts of other seasonal salmon runs to escape irrigation diversions, leading to central California's recent successful ocean salmon season in 1987.

Dealing with climatic extremes well may be the biggest challenge facing conservation biologists. Even consideration of normal month to month variability poses problems: how many restoration projects have failed in the short-term because "it didn't rain when it was supposed to?" Conservation plans to ensure the persistence of endangered species must include guidelines for protection against "50 year" droughts or "100 year" floods. Ideally, of course, we should be concerned with "500 and 1000 year" droughts and floods. Regional weather history should be examined for variability and climate extremes. Extrapolation from the most extreme year in a monitoring period to a "worst case" scenario is risky and should be tempered with an understanding of long-term and infrequent climatic events. As populations of butterflies wink out with the drying of their hostplants, and as wildfires consume over one million acres of Alaska wilderness in 1988, we are reminded, yet again, that our best conservation efforts will always be challenged by an uncertain climate.

Contributions to the Technical Notes section are welcome. Articles should be three double-spaced typed pages in length and focus on issues in species conservation research. Materials should be sent to: Kathy Freas, Center for Conservation Biology, Stanford University, Stanford, CA 94306 (415) 723-5924.

Bulletin Board

New Publication on Tropical Rain Forests

Tropical Rainforest: Diversity and Conservation, a new book edited by Frank Almeda and Catherine M. Pringle, is now available from the California Academy of Sciences. The volume contains the entire proceedings of a two-day symposium held at the California Academy of Sciences in September 1985. The papers reflect an international geographic emphasis on the New World tropics. Papers address tropical forest diversity, the potential value of tropical species, effects of ecological isolation, applied aspects of tropical biology, and the important information to be learned from ethnobotanical studies. The book costs \$30.00, plus \$2.25 per order for postage and handling. To order write: Publications Office, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118.

International Sea Otter Symposium

The first International Sea Otter Symposium, cosponsored by the government of India and the IUCN Otter Specialist Group, will be held in Bangalore, India, from October 16-19, 1988. The

purpose of the meeting is to increase the knowledge and conservation of the otter species and their habitats throughout Asia. The program will include formal summary papers on otter research and conservation throughout the world, sessions on captive breeding, workshops on Asian otter identification and survey techniques, and reports of the status of otters throughout India and Asia. Papers are invited on all aspects of Asian otter biology and conservation. Wildlife and zoo biologists and conservation and government representatives are invited. For more information, contact Conference Chairman, Pat Foster-Turley, Marine World Foundation, Marine World Parkway, Vallejo, CA 84589, USA.

35th Annual Systematics Symposium

The 35th annual Systematics Symposium is scheduled for October 7-8, 1988 at the Missouri Botanical Garden. The organizing theme of the Symposium is Conserving Biological Diversity - Prospects for the Twenty First Century. Speakers include David R. Given (CSIR, New Zealand), Donald A. Falk (Center for Plant Conservation), Alan

R. Templeton (Washington University, Missouri), Stanley Temple (University of Wisconsin, Madison), and Michael Soule (University of Michigan). The registration fee is \$35.00 or \$30.00 for students. For more information write to: Systematics Symposium, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63116-0299, Phone (314)577-5167.

Brochure on Biosphere Reserves

U.S. Man and the Biosphere Program is offering a full-color brochure on biosphere reserves. The brochure contains a map of the international network of biosphere reserves in relation to the world's biomes on one side, and a description of the characteristics, functions, and uses of biosphere reserves, the selection process, and history of the biosphere reserve program on the other side. The Secretariat has a limited number of brochures available for free distribution. To order, contact: Phyl Rubin, OES/ENR/MAB, Department of State, Washington, D.C. 20520; (202)632-2784.

Bulletin Board information provided by Jane Villa-Lobos, Smithsonian Institution and the Journal of the Society for Conservation Biology

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