

Endangered Species UPDATE

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

September 1994 Vol. 11 No. 11

School of Natural Resources and Environment
THE UNIVERSITY OF MICHIGAN



In this Issue

What Role for Economic
Considerations in Species
Conservation Policy?

The Bald Eagle and Gray
Whale: Progress in
Recovery

Gone But Not Forgotten:
Why Have Species
Protected by the ESA
Become Extinct?

Administrative Changes to
Improve the Endangered
Species Act

What Role for Economic Considerations in Species Conservation Policy?

by

Stephen Polasky

If one is a supporter of a strong policy to conserve species, the rise of the property rights movement and the recent election of Republican majorities in both the House and Senate might be discouraging. In some important ways, the current political climate is more hostile to species conservation efforts than it was several years ago. However, the message of recent events is more complex than a simple call to repeal conservation goals. After all, there is no groundswell of support for promoting extinction of species. What has occurred, though, is an increased attention to the conflict, real and imagined, between species conservation and economic activity.

The Role Of Economics

The role that economic considerations should play in species conservation decisions is quite controversial. Should actions that push a species toward extinction or forestall recovery from threatened or endangered status be allowed because of economic factors? Can actions that affect species conservation be regulated to the same degree on private land as they are on public land? These issues have been thrust to center stage by recent events including the spotted owl/logging controversy in the Pacific Northwest and recent Supreme Court decisions on environmental and land use regulations and private property rights (*Lucas v. South Carolina Coastal Council* [112 U.S. 2886 (1992)], *Dolan v. Tigard* [512 U.S. (1994)]). In what follows, I discuss several issues related to potential conflicts between economic activity and species conservation from the viewpoint of an economist. I focus on two of the most contentious issues in the intersection of economic activity and species conservation: a) the issue of "balance" between

economic activity and species conservation, and b) the issue of "takings" of private property, i.e., whether compensation must be paid to property owners when actions to conserve species lower property values.

Before doing so, I want to clarify several points about economic analysis. Economic analysis is concerned primarily with "efficiency." An outcome is efficient if it is impossible to increase the welfare of any individual or group without simultaneously lowering the welfare of others. Efficiency and increases in employment or in income, as measured by gross domestic product (GDP), are not the same thing. There may be decisions that increase employment and income as conventionally measured that are nonetheless inefficient. For example, using unemployed loggers to clearcut old growth forests might increase employment and income but lower social welfare. Such a result will occur if those who value old growth forest would prefer to pay loggers more to not cut the forest than the loggers would earn by cutting it. An action is judged to be efficient if the sum of *all* benefits exceed the sum of *all* costs of the action. Even those costs and benefits that cannot be valued by market transactions, such as the value of walking in an old growth forest or knowing that certain species have been conserved, are to be included in the efficiency analysis. In practice, trying to measure non-market values is quite difficult. There is a very active research program at present to develop and apply techniques for non-market valuation.

On a related point, if the current state of affairs is inefficient, it will be possible to promote species conservation while at the same time increasing the value of economic activity. For example, solving the "tragedy of the commons" in fisheries can increase the

income derived from fishing as well as increase fish populations (e.g., Clark 1990, chapter 2; Gimbel 1994). It may also be more effective to conserve species while they are still common rather than after they become threatened or endangered (e.g., Csuti et al. 1987; Scott et al. 1991). If society can have its cake and eat it too, policy prescriptions are not difficult to write (though getting them enacted may be another story.) Once an inefficiency is identified, policies that reduce inefficiency can allow every group in society to gain.

The most difficult policy decisions are those that require a tradeoff between various goals, i.e., when increasing species conservation comes at the cost of lower economic activity, or increasing economic activity comes at the cost of increasing extinction threats. In what follows, I discuss policy analysis in cases where there are difficult choices that require tradeoffs between species conservation and jobs, income or property values.

Is the Tradeoff Bald Eagles vs. Greed or Jobs vs. Fungi?

"Can we tell our grandchildren there once was something beautiful called a bald eagle, but we're sorry, it was inconvenient or too expensive for us to save?" (Mollie Beattie, Director of the U.S. Fish and Wildlife Service (FWS), *Corvallis Gazette-Times*, Jan. 11, 1994)

"How many billions of dollars are we willing to spend to save fungi, insects and bacteria we've never heard of..." (Senator Bob Packwood, *Corvallis Gazette-Times*, Sept. 30, 1994)

Recently, two newspaper articles about restoring salmon runs in the Pacific Northwest caught my attention.

One article described stream restoration efforts costing \$70 million in the Rogue River watershed in southern Oregon (The New York Times, Nov. 15, 1994). Several days later, another article reported that a plan to remove two dams on the Elwha River in Washington in order to restore the salmon run would probably not occur because the projected cost of \$200 million was too high (The Oregonian, Nov. 18, 1994). One project was deemed too costly, while the other was not. At what point, if ever, should society decide that it would be too costly to prevent extinction of a species, or to promote the recovery of an endangered or threatened species?

One possible answer to this question is that economic considerations should never be considered when extinction of a species is at stake. Certain parts of the Endangered Species Act (ESA), notably the 1973 version of section 7 that prohibited government agencies from taking actions that might cause extinction, are in accord with the view that there should be no allowance for balancing economic concerns against extinction threats. In *TVA v. Hill* [437 U.S. 153, 184 (1978)], the Supreme Court stated: "The plain intent of Congress in enacting this statute was to halt or reverse the trend toward species extinction, whatever the cost."

The view expressed in the *TVA v. Hill* decision was not official policy for long, however. Shortly after the decision, Congress amended the ESA, authorizing the formation of the Endangered Species Committee. The purpose of the Committee is to decide whether to grant an exemption from section 7 prohibitions against agency actions. The following conditions have to be met before an exemption may be granted:

- i) there are no reasonable and prudent alternatives to the agency action;
- ii) the benefits of such action clearly outweigh the benefits of alternative courses of action consistent with conserving the species or its critical habitat, and such action is in the public interest;
- iii) the action is of regional or national significance; and

iv) neither the Federal agency concerned nor the applicant made any irreversible or irretrievable commitment of resources prohibited by subsection 7(d). (16 U.S.C. § 7(h)(1)).

While the exemption process allows consideration of economic factors, the practical significance of this process has been minimal. Other than two decisions shortly after its creation (Tellico Dam and Grayrocks Dam), the Committee has been called upon to make a decision on only one other occasion, that being whether to allow timber sales in critical habitat for the northern spotted owl.

While much attention has been given to the role that economic considerations should play in section 7 deliberations, most of the decisions where economic considerations affect species conservation decisions fall under different provisions of the ESA, notably critical habitat designation and recovery planning. In critical habitat designation, economic consequences of designation may be considered in the decisionmaking process:

"The Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned." (16 U.S.C. § 4(b)(2))

Further, recovery plans must include estimates of the cost and time required to complete the plan. Even in those provisions of the ESA process where economic consequences are not supposed to enter, such as the listing decision, there is evidence that economic factors affect the outcome:

"One cannot escape noticing the irony in an FWS report that a recent survey turned up none of the four endemic Tombigbee River freshwater mussels the service listed as endangered in 1987. Completion of the Tennessee-

Endangered Species UPDATE

A forum for information exchange on endangered species issues
September 1994 Vol. 11 No. 11

John Watson Editor
Eric Lane Editorial Assistant
Christian Synderman Editorial Assistant
Nicole Shutt Subscription Coordinator
Terry Root Faculty Advisor

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 and policy analyses for endangered species, theoretical approaches to species conservation, and habitat protection. 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. For further information, contact the editor.

Subscription Information:

The *Endangered Species UPDATE* is published approximately nine times per year by the School of Natural Resources and Environment at The University of Michigan. Annual rates are \$23 for regular subscriptions, and \$18 for students and senior citizens (add \$5 for postage outside the US). Students please enclose advisor's signature on university letterhead. Send check or money order (payable to The University of Michigan) to:

Endangered Species UPDATE
School of Natural Resources
and Environment
The University of Michigan
Ann Arbor, MI 48109-1115
(313) 763-3243

Cover: Dr. Dee Boersma and a juvenile magellanic penguin. Photo courtesy of the Wildlife Conservation Society, New York, NY

The views expressed in the *Endangered Species UPDATE* are those of the author and may not necessarily reflect those of the US Fish and Wildlife Service or The University of Michigan.

Production of this issue was made possible in part by support from the Chevron Corporation and the US Fish and Wildlife Service Division of Endangered Species Region 3.



printed on recycled paper

Tombigbee Waterway effectively sealed their fate; only after that project's completion did the FWS conclude that it was safe to list these species, whose obituaries can now be readied for future publication. Listing the Alabama flattened musk turtle was also delayed beyond the deadlines specified in the act, while the FWS reportedly assured the state's congressional delegation it would never be the basis for clamping down on water pollution from the coal industry." (Bean 1991, p. 41)

Other examples are given by Houck 1993, pp. 285-296, and Thomas and Verner 1992, p.628.

Though it is clear that economic considerations are not ignored in the current ESA, there is sentiment among many members of Congress that economic factors are not given sufficient weight in the ESA. Shortly after the election, Senator Packwood was quoted as saying:

"I think we now have the votes to change it so people count as much as bugs.... We have to change it so that time to time we can weigh the situation and consider the possibility that a species will disappear." (Corvallis Gazette-Times, Nov. 27, 1994)

An ESA reauthorization bill introduced by Representative Tauzin (HR-1490) would require that the economic impacts of critical habitat designation and of recovery plans be assessed.¹ If the costs exceed the benefits of designating an area as critical habitat, the area would be excluded. The main alternative ESA reauthorization bill introduced by Representative Studds (HR-2043) and Senators Baucus and Chaffee (S-921) is much closer to the current ESA in the weight it gives to economic factors vis-a-vis biological factors.

All policy decisions involve economic considerations either explicitly or implicitly. The question remains, however, if economic factors are to be considered explicitly, what weight should be given to these factors in species conservation policy? My view is that the weighting should reflect the aggregate desires of members of society

because choosing the direction of policy is a social decision.² Discerning the desires of the general public is no easy task as economists and others have discovered. There is no direct evidence on the relative value individuals place on species conservation versus other goods and other goals. Also, the relative value varies enormously among different individuals. Indirectly, there are hints of the weighting that individuals use in the outcome of elections or in the level of voluntary contributions to various groups such as The Nature Conservancy.

Economists have used non-market valuation techniques, in particular contingent valuation surveys, to gain evidence of the relative support of species preservation. There are a number of contingent valuation studies that estimate individuals' willingness to pay to protect species (e.g., Boyle and Bishop 1986; Hagen et al. 1992; Stoll and Johnson 1984). Typically these studies ask a number of individuals questions such as "Would you be willing to pay \$X to protect species Y?" or "How much would you be willing to pay to protect species Y?" The interpretation and reliability of the results of these surveys for understanding individuals' preferences for species conservation or other non-market values is subject to heated debate both within and outside of the economics profession (for example, see the exchange between Kahneman and Knetch 1992 and Smith 1992). Stevens et al. 1994 claim that answers to questions about the existence value of species are more tied to feelings of what is a fair share and contributing to a good cause than with the value of the existence of the species itself. (For more extensive criticisms of the contingent valuation approach see Hausman 1993).

At present, there is no generally accepted solution on how to obtain objective evidence of the relative importance of species conservation versus other goals. Given the strong views on the subject held by different groups in society and the lack of objective evidence, the issue of how to balance economic factors in species conservation decisions will likely to continue to be debated far into the future.

Is it Taking Species or Taking Property?

Are restrictions on the use of private property for species conservation purposes a taking of private property for which compensation must be paid? Or, is there a responsibility for private landowners not to harm wildlife? There are many unanswered legal questions about the nature of private property rights with respect to species conservation. There are also many questions about what the next Congress will do about this issue. The ESA reauthorization bill introduced by Tauzin would require compensation to landowners when species conservation under the ESA substantially deprived them of the economic worth of their property. Currently under the ESA, no compensation is required. No compensation is required under the alternative reauthorization bills introduced by Studds, Baucus and Chaffee.

The standard economic approach to an issue such as takings is due to work of Nobel laureate Ronald Coase (Coase 1960). According to Coase, as long as the two parties in an environmental dispute can bargain or trade with each other, an efficient outcome will occur. Ability to bargain or trade is essential for efficiency. Whether one party initially is given the right to damage the environment or is enjoined from doing so is unimportant for efficiency. Suppose that rights are granted to private property owners to do whatever they wish on their property even though their actions may lead to extinction of some species. If it is more important to the wildlife trustees (a government agency or conservation group) to prevent harm to a species than it is to the property owner to carry out her intended action, a bargain can be struck in which the wildlife trustee pays the property owner not to do the action that would harm the species. On the other hand, suppose that initially a property owner has no right to harm an endangered species. A property owner who wished to undertake an action that harmed an endangered species would have to offer the wildlife trustees compensation that more than offset the harm done to the species. In either case, if

species conservation is more valuable than actions inconsistent with conservation, conservation will occur; otherwise it will not. Defining property rights will affect the distribution of rewards between private property owners and the wildlife trustees but will not affect whether an efficient amount of conservation takes place.

Despite the result given in the previous paragraph, the amount of conservation undertaken will generally be a function of which party is granted property rights (Varian 1993, pp. 546-551). Defining the property rights in a different manner will change the wealth of the private property owners and the wildlife trustees. Granting rights to private property owners will mean that payments will have to be made for any conservation program that harms the economic interests of a property owner. Since compensation must be paid, the budget constraint for the wildlife trustees will be far tighter. Unless the wildlife trustees can increase their budget sufficiently, less conservation will occur when rights are granted to property owners.

The discussion so far has implicitly assumed that both parties, landowner and wildlife trustee, are fully informed about all relevant aspects of the issue. In particular, this means that the wildlife trustee would know about all of the species that dwell on a parcel of private property, as does the landowner. What happens, as is more realistic, when the wildlife trustee has very little knowledge about what species exist on which parcels of land? In this case, the incentives to gain and reveal information about species whereabouts are quite different under the two different property rights regimes. Under the current ESA, landowners have incentives to "shoot, shovel, and shut up." Keeping information about the location of endangered or threatened species out of the hands of government employees can save landowners money and regulation-induced headaches. Under the alternative approach where the government compensates for any species conservation actions taken, there is no incentive to hide information (as long as compensation reflects the lost value to the landowner). Gaining the trust and cooperation of landowners is an impor-

tant element of a successful conservation program. Using carrots instead of sticks, while more expensive, does have the advantage of securing cooperation.³

Giving private property owners the right to compensation will probably improve the flow of information and the degree of cooperation between private property owners and wildlife trustees. It will also drain wildlife trustee budgets. In all likelihood, going this route would lower the total amount of conservation activity but might allow conservation to be better targeted.

Literature Cited

- Bean, M. 1991. "Looking Back over the First Fifteen Years," in *Balancing on the Brink of Extinction: The Endangered Species Act and Lessons for the Future*, K.A. Kohm (ed.). Washington, DC: Island Press.
- Boyle, K.J. and R.C. Bishop. 1986. "The Economic Valuation of Endangered Species of Wildlife," *Trans. North American Wildlife and Natural Resource Conference* 51:153-161.
- Clark, C.W. 1990. *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*, 2nd edition. New York: John Wiley & Sons, Inc.
- Coase, R.H. 1960. "The Problem of Social Cost," *The Journal of Law and Economics* 3: 1-44.
- Csuti, B.A., J.M. Scott, and J. Estes. 1987. "Looking Beyond Species-Oriented Conservation," *Endangered Species Update* 5(2): 4.
- Gimbel, K.L. (ed.) 1994. *Limiting Access to Marine Fisheries: Keeping the Focus on Conservation*. Washington, DC: Center for Marine Conservation and World Wildlife Fund US.
- Hagen, D.A., J.W. Vincent, and P.G. Welle. 1992. "Benefits of Preserving Old-Growth Forests and the Spotted Owl," *Contemporary Policy Issues* 10:13-26.
- Hausman, J.A. (ed.) 1993. *Contingent Valuation: A Critical Assessment*. Amsterdam: North Holland Press.
- Houck, O.A. 1993. "The Endangered Species Act and Its Implementation by the U.S. Departments of Interior and Commerce," *Colorado Law Review* 64(2): 277-370.
- Hudson, W.E. (ed.) 1993. *Building Economic Incentives into the Endangered Species Act*, 2nd edition. Washington, DC: Defenders of Wildlife.
- Kahneman, D. and J. Knetch. 1992. "Valuing Public Goods: The Purchase of Moral Satisfaction," *Journal of Environmental Economics and Management* 22(1): 57-70.
- Scott, J.M., B. Csuti, K. Smith, J.E. Estes, and S. Caicco. 1991. "Gap Analysis of Species Richness and Vegetation Cover: An Integrated Biodiversity Conservation Strategy," in *Balancing on the Brink of Extinction: The Endangered Species Act and Lessons for the Future*, K.A. Kohm (ed.). Washington, DC:

Island Press.

- Smith, V.K. 1992. "Arbitrary Values, Good Causes, and Premature Verdicts," *Journal of Environmental Economics and Management* 22(1): 71-89.
- Stoll, J. and L. Johnson. 1984. "Concepts of Value, Nonmarket Valuation, and the Case of the Whooping Crane," *Trans. North American Wildlife and Natural Resource Conference* 49: 382393.
- Thomas, J.W. and J. Verner. 1992. "Accommodation with Socio-Economic Factors Under the Endangered Species Act - More than Meets the Eye," *Trans. North American Wildlife and Natural Resource Conference* 57: 627-641.
- Varian, H.R. 1993. *Intermediate Microeconomics: A Modern Approach*, 3rd edition. New York: W.W. Norton & Co., Inc.

¹The Senate version of the bill (S-1521) was introduced by Senators Shelby and Gorton.

²That may mean that great efforts are made for certain species, such as the bald eagle, but minimal efforts are made for other species, such as some fungi and insects that do not serve an important function in either economic or ecological spheres.

³For more on building incentives into conservation strategy see Hudson 1993.

Stephen Polasky is an Associate Professor in the Department of Agriculture and Resource Economics, Oregon State University, Corvallis, OR 97331-3601

Report From the Field

Gone But Not Forgotten: Why Have Species Protected by the Endangered Species Act Become Extinct?

by Margaret McMillan
and David Wilcove

The success of the Endangered Species Act (ESA) is reflected in the many rare plants and animals that are slowly rebounding. But, as critics of the Act are quick to note, there is a less happy side to the story. The Fish and Wildlife Service (FWS) has officially removed seven species from the endangered list because of persuasive evidence they are now extinct. At least double that number of species are widely believed to have perished despite protection under the ESA, but the FWS has yet to formally remove them from the list. Why did they vanish?

We compiled a list of all U.S. animals either currently or formerly listed as Threatened or Endangered that are, in all likelihood, now extinct. Our goal was to determine when and why they disappeared. We limited our investigation to animals because, in general, they are better monitored than plants. Our initial list of extinct species was taken from a 1988 General Accounting Office study of the ESA (GAO 1988), which we updated with information published in technical and popular articles and in the Federal Register. We then investigated the dates and causes of the disappearance of these species. Sources of information included FWS technical reports and recovery plans, the Endangered Species Technical Bulletin, notices in the Federal Register, and various books and news accounts. In some cases, we contacted scientists with expertise in individual species to fill gaps in our knowledge.

It is essentially impossible to prove that a species no longer exists, and some animals thought to be extinct may eventually be rediscovered, as happened with the Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*). Thus, our decision to classify some species as extinct must be considered tentative, pending further searches for them.

We identified 17 currently listed animals that are probably extinct (Table 1); an additional 7 species have been removed from the endangered species list by the

FWS because of persuasive evidence of extinction. Of these 24 species, at least 11 were extinct before the ESA was passed in 1973; they were added to the list in the hope that a few individuals might still persist, but this did not prove to be the case. An additional four species were probably also extinct by the time the law was enacted, but unconfirmed reports raise the possibility they persisted beyond 1973. Two species (Amistad gambusia, bridled white-eye) were already extinct by the time they were listed.¹ The Guam broadbill was listed at almost the exact time of the last sighting of this species. Three more species (blue pike, longjaw cisco, Mariana mallard) were alive when listed, but their populations were so low that very little could be done to save them.

That leaves three species (Maryland darter, Kauai o'o, dusky seaside sparrow) that were alive at time of listing and after passage of the ESA with enough individuals to make recovery a possibility, although one might argue this point in the case of the Kauai o'o and Maryland darter. There is little question, however, that the dusky seaside sparrow could have been saved were it not for human error, lax enforcement of the law, and other non-biological factors. Its population was estimated at over 2,000 individuals around the time it was listed (Walters 1992).

Although 24 currently or formerly listed animals are now thought to be extinct, most vanished before the ESA was enacted or had such small populations at time of listing that recovery was all but impossible. The three species that might have been saved but were lost stand in contrast to the approximately 155 listed animals whose populations have either stabilized or increased with protection under the Act (U.S. FWS 1992). The data on extinctions do not support the notion that the Act has been a failure, but its record of success could be improved if protection came sooner to

declining species.

Literature Cited

- General Accounting Office. 1988. Endangered Species: Management Improvements Could Enhance Recovery Program, General Accounting Office, Washington, DC.
- Kenyon, K.W. 1980. No man is benign: The endangered monk seal. *Oceans* 13(3):48-54.
- Lowe, D.W. 1990. The Official World Wildlife Fund Guide to Endangered Species of North America. Beacham Publishing, Washington, DC.
- Miller, R.R., J.D. Williams, and J.E. Williams. 1989. Extinctions of North American fishes during the past century. *Fisheries* 14:22-38.
- Minckley, W.L., G.K. Meffe, and D.L. Stolz. 1991. Conservation and management of short-lived fishes: The Cyprinodontoids. Pp. 247-282, in Minckley, W.L. and J.E. Deacon. *Battle Against Extinction*. University of Arizona Press, Tucson, AZ.
- Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest Bird Communities of the Hawaiian Islands: Their Dynamics, Ecology, and Conservation. *Studies in Avian Biology* No. 9, Cooper Ornithological Society. Allen Press, Lawrence, KS.
- U.S. FWS. 1975. Blue Pike Recovery Plan. U.S. Fish and Wildlife Service, Fort Snelling, MN.
- U.S. FWS. 1982. Culebra Island Giant Anole Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, GA.
- U.S. FWS. 1985. Tubercled-Blossom Pearly Mussel, Turgid-Blossom Pearly Mussel and Yellow-Blossom Pearly Mussel Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, GA.
- U.S. FWS. 1990a. Marianas Fruit Bat and Little Marianas Fruit Bat on Guam Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR.
- U.S. FWS. 1990b. Native Forest Birds of Guam and Rota of the Commonwealth of the Northern Mariana Islands Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR.
- U.S. FWS. 1992. Endangered and Threatened Species Recovery Program. Report to Congress. U.S. Fish and Wildlife Service, Washington, DC.
- Walters, M.J. 1992. *A Shadow and a Song: The Struggle to Save an Endangered Species*. Chelsea Green Publishing Co., Post Mills, VT.
- ¹ The listing of Amistad gambusia reflected an error in taxonomy. The FWS listed it in 1980 with the belief that it survived in captivity. The Service subsequently discovered that all captive stocks were actually hybrids between Amistad gambusia and closely related species; it was therefore extinct before it was listed.

Margaret McMillan and David Wilcove are with the Environmental Defense Fund, 1875 Connecticut Ave. NW, Washington, D.C. 20009

Table 1: Extinct Animals Currently or Formerly on Federal Endangered Species List

Species	Causes of Extinction	Date	References ¹
Extinct before passage of ESA			
Sampson's Pearly Mussel ² (<i>Epioblasma sampsoni</i>)	Habitat loss, pollution, siltation	c. 1930	ESTB, August 1983
Tubercled-blossom Pearly Mussel (<i>Epioblasma torulosa torulosa</i>)	Habitat loss, pollution, siltation	1969	Lowe 1990; U.S. Fish and Wildlife Service 1985
Turgid-blossom Pearly Mussel (<i>Epioblasma turgidula</i>)	Habitat loss, pollution, siltation	mid-1960s	Lowe 1990; U.S. Fish and Wildlife Service 1985
Yellow-blossom Pearly Mussel (<i>Epioblasma florentina florentina</i>)	Habitat loss, pollution, siltation	mid-1960s	Lowe 1990; U.S. Fish and Wildlife Service 1985
Scioto Madtom (<i>Noturus trautmani</i>)	Unknown	1957	Lowe 1990
Tecopa Pupfish ² (<i>Cyprinodon nevadensis calidae</i>)	Habitat loss, hybridization	1970	Miller et al. 1989; GAO 1988
Kauai Akialoa (<i>Hemignathus procerus</i>)	Uncertain; Habitat loss, introduced species likely causes	1965	Lowe 1990; Scott et al. 1986
Molokai Creeper (<i>Paroreomyza flammea</i>)	Habitat loss, introduced species	1963	Lowe 1990
Santa Barbara Song Sparrow ² (<i>Melospiza melodia graminea</i>)	Habitat loss	1959	GAO 1988; ESTB, November 1983
Caribbean Monk Seal (<i>Monachus tropicalis</i>)	Hunting, human disturbance, disease	1952	Kenyon 1980
Little Mariana Fruit Bat (<i>Pteropus tokudae</i>)	Uncertain; Overhunting, habitat loss, introduced species, typhoons likely causes	1968	U.S. Fish and Wildlife Service 1990a
Probably extinct before passage of ESA			
Culebra Island Giant Anole ³ (<i>Anolis roosevelti</i>)	Presumably habitat loss	1932	U.S. Fish and Wildlife Service 1982
Bachman's Warbler ⁴ (<i>Vermivora bachmanii</i>)	Probably habitat loss	mid-1960s	ESTB, July-Aug. 1991; Lowe 1990
Ivory-billed Woodpecker ⁵ (<i>Campephilus principalis</i>)	Habitat loss, hunting	early-1950s	Lowe 1990; ESTB, May 1985
Eastern Cougar (<i>Felis concolor cougar</i>)	Hunting, reduced prey abundance	1920s	Lowe 1990; ESTB, Jan.-Feb. 1989
Extinct before listing			
Amistad Gambusia ² (<i>Gambusia amistadensis</i>)	Habitat loss, hybridization	1970s	J. Williams, U.S.FWS, pers. comm.; Minckley et al. 1991
Bridled White-Eye (<i>Zosterops conspicillatus conspicillatus</i>)	Introduced species	1983	U.S. Fish and Wildlife Service 1990b
Possibly alive after listing and after passage of ESA			
Guam Broadbill (<i>Myiagra freycineti</i>)	Introduced species	1984	U.S. Fish and Wildlife Service 1990b
Alive after listing and after passage of ESA			
Blue Pike ^{2,6} (<i>Stizostedion vitreum glaucum</i>)	Overfishing, pollution, introduced species	1974	Miller et al. 1989; U.S. Fish and Wildlife Service 1975
Longjaw Cisco ^{2,6} (<i>Coregonus alpenae</i>)	Overfishing, introduced species, hybridization with related species	1975	Miller et al. 1989; ESTB October 1983
Maryland Darter (<i>Etheostoma sellare</i>)	Presumably habitat loss, water pollution, overcollecting	1986	R. Bartgis, Maryland Natural Heritage Program, pers. comm.; Lowe 1990; ESTB, June 1986.
Dusky Seaside Sparrow ² (<i>Ammodramus maritimus nigrescens</i>)	Habitat loss	1987	Walters 1992; ESTB, May-June 1987
Kauai O'o (<i>Moho braccatus</i>)	Habitat loss, introduced species	1988	K. Rosa, U.S.FWS, pers. comm.; Lowe 1990
Mariana Mallard ⁶ (<i>Anas oustaleti</i>)	Hunting, introduced species, habitat loss	1981	J. Engbring, U.S. FWS, pers. comm.; ESTB, Aug. 1982 and Feb. 1978

1. ESTB refers to the Endangered Species Technical Bulletin, published by the U.S. Fish and Wildlife Service.

2. Officially delisted by Fish and Wildlife Service due to extinction.

3. Considered extinct by GAO (1988); the evidence of its extinction is not completely convincing to us.

4. Date of last confirmed sightings on breeding grounds; subsequent reports from migratory and wintering grounds are unconfirmed but may be valid.

5. U.S. populations only; may persist in Cuba.

6. Alive after passage of ESA but so rare that survival was unlikely.

Bulletin Board

Sophie Danforth Conservation Biology Fund

The Sophie Danforth Conservation Biology Fund awards grants of up to \$1000 each year to institutions or individuals working in conservation biology. Projects and programs that enhance biodiversity and maintain ecosystems receive the highest funding priority. Field studies, environmental education programs, development of techniques that can be used in a natural environment and captive propagation programs that stress an integrative or multi-disciplinary approach to conservation are also appropriate. Proposals for single species preservation, initial surveys, or seed money for technique development are not appropriate.

Applications require a two page curriculum vitae as well as a form which can be obtained from the address below, and must be submitted by May 1, 1995.

For further information please contact: Dr. Anne Savage, Director of Research, Roger Williams Park Zoo, Elmwood Ave., Providence, RI 02905, Phone (401) 785-3510, Fax (410) 941-3988.

iMAGiNE!Yellowstone Arts Exhibit 1995

Yellowstone National Park invites all 4th through 12th graders to participate in its 1995 Arts Exhibit by sharing their personal thoughts, expressions, or artistic creations on the subject of species extinctions.

In the spirit of artist-explorers like Thomas Moran, thousands of young artists from across America have since 1988 imagined Yellowstone, what it has been and might become. Their creations inspired others to race with wind-whipped fires, howl with wolves, and surge upward on geyser plumes. Through their work they have expressed the value of parks and the significance of ecosystems.

iMAGiNE!Yellowstone challenges young people to see themselves and their relationship to the natural world in new and innovative ways. Any art medium, style, and size is acceptable. However, written entries should be limited to three pages, and entries must be relevant to Greater Yellowstone. The 1995 exhibit will show in the park beginning in May. For more information call (307) 344-2265.

CITES COP9 Results

The ninth meeting of the Conference of the Parties (COP9) to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) was held November 7-18, 1994, in Fort Lauderdale, Florida. Among the resolutions decided upon were the establishment of guidelines for inclusion of species in Appendix III, consolidation and updating of all CITES resolutions, and replacement of the 1976 criteria and 1979 proposal format for documenting inclusion of species with clear and more scientifically objective criteria.

For more information on COP9, see the U.S. Federal Register notices published on November 4 and 8 or contact the U.S. Fish and Wildlife Service, Office of Scientific Authority, 725 Arlington Square Bldg., Washington, DC 20240; (800) 358-2104.

Announcements for the Bulletin Board are welcomed. Some items from the Bulletin Board have been provided by Jane Villa-Lobos, Smithsonian Institution.

Endangered Species UPDATE

Non-Profit
Organization
U.S. POSTAGE
PAID
Ann Arbor, MI
Permit No. 144

School of Natural Resources and Environment
The University of Michigan
Ann Arbor, MI 48109-1115