The Endangered Species Act at Twenty-five

by Jason F. Shogren and John Tschirhart

In 1973, the United States Congress passed the Endangered Species Act (ESA) to shelter threatened and endangered species from the pressures of human activity on private and public land. The Act acknowledges that species have "ecological, educational, historical, recreational and scientific value" unaccounted for in the course of "economic growth and development" (ESA, Sec. 2). At the time, this language seemed harmless enough, and the Act passed with little or no opposition—390-12 in the House and 92-0 in the Senate.

But to say the ESA has proven to be controversial might be the environmental understatement of the decade. First, the Act significantly broadened the scope of species protection. It makes every species, subspecies, and discrete populations (restricted to vertebrates) of plants and animals eligible for protection by being listed either as endangered or threatened (those likely to become endangered). Not surprisingly, the list of endangered and threatened species expanded from 114 in 1973 to nearly 1,200 in 1999. Plants make up two-thirds, of the listed species. Second, the original language of the Act implies that all species will be protected regardless of costs. The ESA thus reversed the previously held doctrine that species protection would be "practicable and consistent with primary purposes" of land use. The Supreme Court upheld this new view in *Tennessee Valley Authority* v. *Hill*, stating that "...it is clear from the ESA's legislative history that Congress intended to halt and reverse the trend toward species extinction—whatever the cost."

Broader scope and unfunded mandates fan the flame of controversy because the ESA epitomizes the classic quandary of diffuse benefits and concentrated costs. The benefits of protecting endangered species accrue to the entire nation, while a sizable share of costs fall on private landowners. About half of the listed endangered species rely on private land for 80 percent of their habitat. Some landowners complain about the high costs of complying with the ESA and demand compensation for compliance. Some defenders of the ESA agree—they see compensation as the way to bring private land into the fold of species protection. But other landowners want nothing to do with compensation, for they fear further public erosion of private control; and many pro-ESAers view compensation as a plot to paralyze the Act through the backdoor of underfunding. This tangled web of compensation has stalled the reauthorization of ESA since 1992. Congress has proposed several bills; none has passed.

No one sees a quick end to the ESA controversy. At the end of the day, society is left with difficult economic choices—choices that affect and are affected by biological needs and political realities. Working through this tangle requires more explicit attention to how economic incentives affect all sides of the debate.

Biological needs, political realities

Today, the ESA lists over 1,200 species as endangered or threatened in the United States (table 1). By 1997, the data show that the U.S. Fish and Wildlife Service designated eight U.S. species of animals and plants as "recovered" and removed seven species from the list because they were designated "extinct." Recovery plans guide the conservation efforts for 886 species, including 519 ESA-approved plans. Some plans address conservation for multiple species. A 1994 Government Accounting Office report to Congress listed the status of threatened and endangered species as follows: 42 percent stable or improving, 34 percent declining, 1.0 percent extinct, and 23 percent unknown. Species downlisted from endangered to threatened include the Aleutian Canada goose, the greenback cutthroat trout, the Virginia round-leaf birch, and the bald eagle.

Uncertain cause-and-effect and time-scale differences make an assessment of the ESA difficult. Species stability or improvement may not be solely attributed to the ESA—other factors such as increased per capita wealth may have aided improvements. In addition, shifts in species distributions, abundance, and extinction can take centuries. Many of the species currently protected by ESA have gradually retracted from historic geographic boundaries and declined in abundance over the past five hundred years. Natural or "background" extinction rates, established from the fossil record over thousands of years, further cloud the cause of species decline. Thus, twenty-five years is a short time to judge the effectiveness of a law that begins working only after species face imminent danger of extinction.

Table 1. Box Score of Threatened and Endangered Species (as of 31 March 1999)

Group	Endangered		Threatened		Total	Species
	U.S.	Foreign	U.S.	Foreign	Species	with Plans
Mammals	60	251	8	16	335	49
Birds	75	178	15	6	274	77
Reptiles	14	65	21	14	114	30
Amphibians	9	8	7	1	25	11
Fishes	70	11	40	0	121	88
Snails	18	1	10	0	29	20
Clams	61	2	8	0	71	45
Crustaceans	17	0	3	0	20	12
Insects	28	4	9	0	41	27
Arachnids	5	0	0	0	5	5
Animal subtotal	357	520	121	37	1,035	364
Flowering plants	540	1	132	0	673	494
Conifers	2	0	1	2	5	2
Ferns & others	26	0	2	0	28	26
Plant subtotal	568	1	135	2	706	522
Grand total	925	521	256	39	1,741	886[a]

Source: U.S. Fish and Wildlife Service, Division of Endangered Species, 1999.
[a] There are 519 approved recovery plans; some plans cover more than one species, and some species have more than one plan.

Scientific uncertainty opens the door to the political realities underlying the ESA. The resources that society devotes to habitat protection and other biological needs exact an opportunity cost: these resources could be used to satisfy other human demands. And because governments at all levels help allocate these resources, interest groups inevitably fight for or against devoting resources to the ESA or compete for the resources by lobbying legislatures, filing law suits, and conducting illegal activities. In addition, local, state, and federal agencies are pitted against one another over jurisdiction and resource availability.

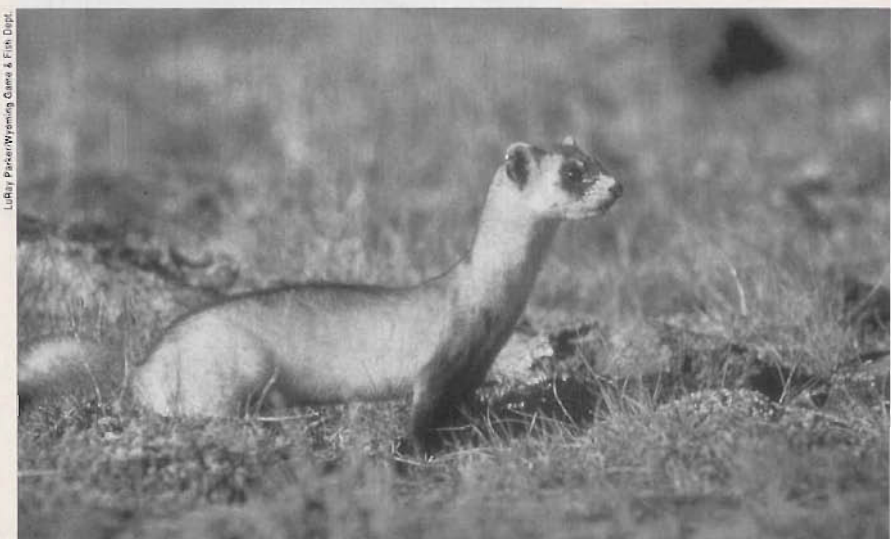

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Table 2. Total Expenditures on Endangered Species, Federal and State Governments, 1989–93

Taxonomic Group	Federal (in 1000s)	All States (in 1000s)	Total (in 1000s)
Mammals	$742,828.7	$66,260.5	$809,089.2
Birds	268,388.6	120,233.4	388,622.0
Reptiles	50,794.2	18,139.5	68,933.7
Amphibians	1,257.4	141.8	1,399.2
Fish	222,744.1	5,195.1	227,939.2
Snails	1,322.4	86.1	1,408.5
Mussels	7,533.3	1,145.4	8,678.7
Crustaceans	627.6	78.5	706.1
Insects	11,365.6	2,939.6	14,305.2
Arachnids	3,035.7	21.3	3,057.0
Plants	18,014.6	4,142.4	22,157.0
All Groups	$1,327,912.2	$218,383.6	$1,546,296.0

Source: Cash, D., et al. "The Database on the Economics and Management of Endangered Species (DEMES)." *Endangered Species Protection in the United States: Biological Needs, Political Realities, Economic Choices.* J. Shogren and J. Tschirhart, eds. New York: Cambridge University Press, forthcoming 1999.

Three highly publicized examples of interest group and government conflicts revolve around efforts to protect the northern spotted owl and various species of salmon in the Pacific Northwest, and to reintroduce the timber wolf to Yellowstone Park. Conflicts such as these cause costly litigation among business, environmental, and government groups, including litigation between government agencies. Some groups see their ability to protect their investments or their privacy threatened by too many ESA mandates, while others envision their natural heritage jeopardized by too few mandates. Regardless, both groups see the Act as going beyond species protection in that the ESA has proven to be a powerful tool to control land use.

Many landowners affected by the Act fear ceding control of their resources and privacy to state and federal governments. Although the federal government devotes only a small portion of its budget to the ESA, the dollars it does spend can overwhelm local communities set against ESA policies or stimulate local communities favoring ESA policies. Table 2 shows spending by federal and state agencies on endangered species broken down by taxonomic groups. Because the ESA specifies that listing is legally required to be based on science, funds would hopefully be allocated according to the biological needs of preservation. But evidence suggests that funding frequently follows interest group politics and "pork" spending (see, for example, Ando).

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Economic choices

In the end, questions of listing and habitat protection come down to the fundamentals of decision making—accurately assessing the risks of extinction, weighing benefits against opportunity costs, and understanding impediments and incentives for voluntary species protection. The need to understand these fundamental issues has pushed economics, welcome or not, into the middle of the reauthorization debate. Why economic behavior needs to be better integrated into the ESA still puzzles many noneconomists who equate economics with financial and commercial concerns. This is unfortunate in that we need to stress that economics and conservation biology have the same underlying guiding principle—choice under scarcity. And that by better accounting for the basics of economic behavior in ESA policy formation we can hopefully reverse the trend that has often led to ineffective and, in some instances, counterproductive conservation policy. For example, a few days before the Fish and Wildlife Service listed the golden-cheeked warbler, a firm owned by Ross Perot hired workers to destroy hundreds of acres of oak and juniper—habitat to the warbler (Mann and Plummer). Pointing out that we can save more species with fewer resources once economics is addressed may seem obvious to economists, but to many people it is not so clear.

Economic behavior matters to species protection for at least three reasons (Shogren et al.). First, economic behavior matters because economic circumstances (for example, relative prices, per capita wealth) influence the risks faced by a species and thus whether a species should be listed as endangered. Most people agree with one side of this argument. The common perception is that people's quest for development and commercial profits destroys habitat and endangers species—full stop, end of discussion. But this sentiment gives only half of the story. On the other side, people like nature, a preference that leads to the private creation or protection of habitat. Relative land prices and wealth influence private landowners' ability to set aside land for habitat protection. Risk assessment that does not account for private citizen and community response to wealth or relative land prices, as it affects habitat preservation decisions, will underestimate risk in some regions and overestimate risk in others.

This fairly contentious point says that economics has a bigger role to play than just helping find cost-effective solutions. We are saying that the biological sciences cannot ignore economic parameters in their models of risk—a point not obvious or acceptable to many people. But it is correct if you believe that economic and ecological systems are jointly determined. We are pointing out a problem of omitted variable bias that exists in the prevailing risk assessment–risk management bifurcation underlying ESA policy. One can justly characterize the current ESA mindset as following three linear steps: (1) financial and commercial quests put a species at risk; (2) biology determines whether a species should be listed as endangered; and (3) economics then can be used to find cost-effective remedies to reverse this trend. We question step 2—listing decisions based only on biology. The precision of species risk assessment can thus be increased by using both biological and economic parameters as determinates of endangerment. Whether the extra precision is worth the cost of more information is an empirical question.

Second, economic behavior matters because scarcity is a reality. Society may place greater value on other goods and services created from scarce resources than on the last species these resources might preserve. Choices between species protection and other programs must be made. Making good choices requires that we estimate the benefits and costs of proposed programs. Even very intangible, difficult-to-measure values, such as moral imperatives to protect earth's inhabitants, must be recognized. Policy makers and regulators already implicitly weigh benefits and costs. Explicitly incorporating more formal methods to help discriminate between and among species and other programs will provide greater openness and transparency in how we choose to rank listing decisions and implement recovery plans.

What costs and benefits, for instance, arise from saving the endangered Dehli Sands flower-loving fly in California? The costs have included $4 million to relocate the site of a new hospital in San Bernardino County. Many people probably would echo the words of Colton, California, city attorney Julia Biggs: "I consider myself an environmentalist, but this is offensive to me. This is not some sylvan glen.... This is not a lion, tiger or bear. Or even an owl. This is a fly." The contrary voice says that the original hospital site provides critical habitat more scarce and irreplaceable than other potential areas of hospital construction. Dragging these disparate perceptions of costs and benefits into an explicit benefit-cost framework can shed light on the pros and cons of alternative options.

If benefits cannot be easily or reasonably estimated, government policy should find the least-

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expensive path to a desired target. Three examples underscore how cost-effective policies can improve resource allocation. First, policies which recognize the heterogeneity of land values rather than using standard homogenous valuations can substantially cut the costs of species protection. A second example focuses on diminishing returns. The northern spotted owl can be saved relatively inexpensively with a reasonably high probability. But researchers estimate the cost to improve the odds of survival to 92 from 91 percent at $3.8 billion (Montgomery, Brown, and Darius). Is the extra percentage worth it? A third example of least-cost programs follows the old adage that "an ounce of prevention is worth a pound of cure." Prevention strategies such as landscape conservation, the establishment of parks and reserves, and the enactment of habitat may prove more cost-effective than species recovery programs that protect only one species.

The third reason why economics matters for endangered species protection is because economic incentives guide human behavior. Endangered species inhabiting private land can be protected if economic incentives encourage landowners to preserve their property. Currently, the ESA provides some regulatory incentive for landowners to cooperate with species conservation policy through Habitat Conservation Plans—plans that allow a landowner

to alter habitat under certain management restrictions. But current financial incentives may prod landowners to prevent government biologists from looking for listed species on private property, or to destroy habitat for listed species, or to "take" listed and potentially listed species. These actions may result in direct harm to listed species and destruction or reduction in the value of habitat, and they may increase the costs of designating habitat and species recovery. Agencies or private parties can attempt to prevent such actions by providing incentives for landowners to cooperate through compensation for "takings," rather than creating disincentives through permits or criminal penalties.

Imperfect information confounds the design of preservation policy. On private land, the government needs landowner cooperation to gain the information necessary to administer conservation policy. Some landowners can escape regulation altogether by withholding biological information from government officials. If this is the case, effective conservation policy may need to buy information rather than sell fear with permits and fines. But here is the rub. The agency should lower the payment to lessen the incentive for some landowners to take advantage of their private information, but smaller subsidies result in fewer acres set aside for habitat. On net, the realized habitat will be less than desired, or the desired habitat will be more expensive than justified. Research on the economics of imperfect information suggests that a combination of mechanisms might be needed to help society reach a better level of species protection. Compensation, government or conservation group purchases of land or development rights, insurance programs, tax breaks, and tradable rights in habitat conservation might all be needed.

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Charting a future course

Twenty-five years ago Congress established the ESA to address the risk of species extinction. And while a quarter century is a short time to judge the overall effectiveness of the Act, enough data and knowledge exist now to suggest how economics can help improve the ESA in both listing decisions and recovery plan development. First, the decision to list a species as endangered can be improved by accounting for economic circumstances in species risk assessment. Human actions and reactions help determine risk and its consequences; omitting these factors from risk assessment can bias estimates of risk. Second, the benefits and costs of protection should frame the ESA policy debate. Reality dictates that the net benefits of preservation be weighed against the net benefits of other important societal objectives. Third, the ESA will be more effective by creating the economic incentives to implement the desired level of species preservation in a least-cost manner. Economic incentive schemes can and have worked. Making these schemes more cost-effective will require additional information on economic opportunity costs and biological effectiveness. But we also recognize that sometimes compensation is not enough—landowners want their privacy respected, their prior stewardship efforts acknowledged, and their ability to protect their investment unrestricted.

This suggests that we should explore the option in which landowners are provided the opportunity to sell private shares of critical habitat rights on the open market without opening themselves up to public access. Similar to the real estate market, private-sector bioeconomic appraisers would assess the biological quality of the critical habitat rights offered for sale. Sellers would then post their offer to sell a given habitat right for a given price, subject to private appraisal. Information not essential to the transaction would remain confidential. Such a market could complement already existing programs that use a bilateral negotiation landowner-by-landowner approach.

As we begin the next millenium, some scientists argue that our biological systems could undergo profound and rapid changes resulting in extinction of many species. Better let it be said that we were not adrift in a sea of interest groups and political

infighting, but rather that we used the best biological and economic knowledge we had to chart our course.

For more information

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