

Rebuilding the Ark

Toward a More Effective Endangered Species Act for Private Land

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The Problem: Endangered Species Are Losing Ground

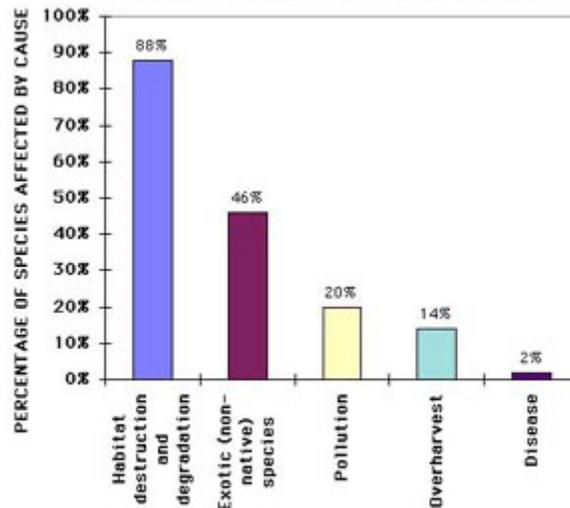
The achievements of the Endangered Species Act are apparent to anyone who has watched a peregrine falcon sweep across the sky or marveled at a grizzly bear ambling across a meadow. But for every species that is rebounding due to the act, there are several more that are still declining. This is especially true for species that depend largely or entirely on private land for their habitat. Protecting rare animals and plants on private land is the greatest challenge for the Endangered Species Act.

Take the case of the red-cockaded woodpecker. A century ago, this little black-and-white woodpecker was one of the most common birds in the vast longleaf pine forests that stretched across the southeastern United States. Frequent fires (caused by lightning) kept the forest floor clear of most shrubs and hardwood saplings, allowing a rich carpet of grass to grow up among the tall, old pines. Red-cockaded woodpeckers thrived in this environment, and their raspy call notes must have been a familiar sound to those who lived in or near the forest. But as logging and farming claimed an increasing share of the big trees, the woodpeckers began to disappear. When Congress passed the Endangered Species Act in 1973, the red-cockaded woodpecker was one of the first animals added to the list of protected species. Yet in recent decades, its numbers have continued to decline. During the 1980s alone, populations of red-cockaded woodpeckers dropped by 23 percent, bringing this rare bird closer than ever to extinction. ¹

In at least two respects, the red-cockaded woodpecker is not unique. First, like the vast majority of other endangered species, it is endangered by the destruction and degradation of its habitat.² In fact, habitat loss is far and away the most frequent cause of species endangerment – much more so than problems such as pollution and overhunting (*see*

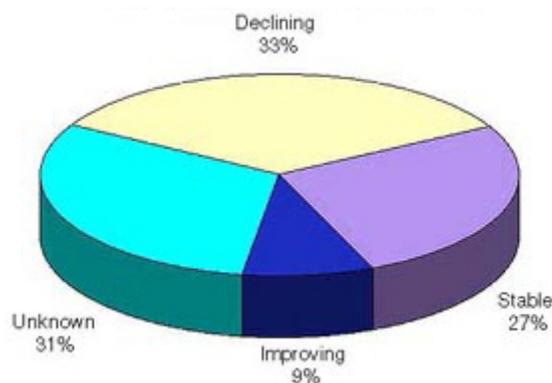
Figure 1). Second, the red-cockaded woodpecker is declining *despite* protection under the Endangered Species Act – a common plight of vanishing species. According to the most recent assessment by the US Fish and Wildlife Service, fewer than a tenth of all listed species for which it is responsible are actually improving in status. Nearly four times that number are declining. And for about a third, the Fish and Wildlife Service simply lacks the resources to determine how they are faring (*see Figure 2*).³

Figure 1: Causes of Endangerment For Imperiled Species in the U.S.



Habitat loss is far and away the greatest threat to endangered species. Introduced (exotic) species that compete with, prey upon, or otherwise adversely affect rare species are the second most important threat. Pollution and excessive hunting and harvesting rank lower. Source: Environmental Defense Fund (The data in this figure are taken from the U.S. Federal Register and cover all U.S. species listed or proposed for listing as of December 31, 1995).

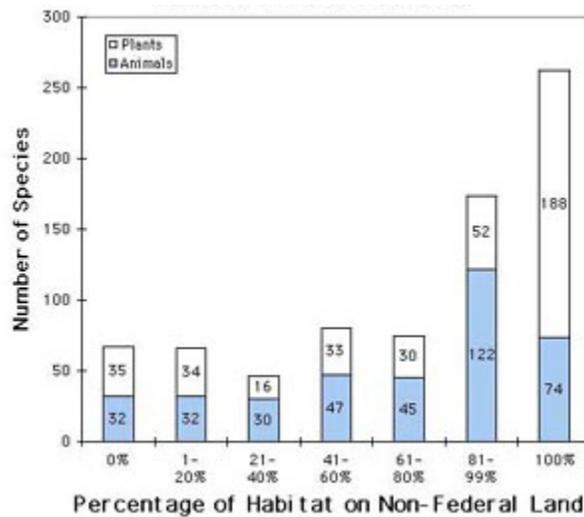
Figure 2: Status of Listed Species.



Despite protection under the Endangered Species Act, far more threatened and endangered species are declining than improving. For nearly a third of the listed species, the U.S. Fish and Wildlife Service lacks the resources to determine how they are faring. Source: U.S. Fish and Wildlife Service (1994).

More than half of the species in the U.S. that are protected by the act have at least 81 percent of their habitat on non-federal land (see Figure 3). Between a third and a half of the protected species do not occur *at all* on federal land. ⁴ Based on data compiled by the Fish and Wildlife Service and the General Accounting Office, endangered species on private land appear to be faring much worse than their counterparts on federal land. For listed plants and animals found entirely on federal land, approximately 18 percent are judged to be improving; the ratio of declining species to improving species is approximately 1.5 to 1. ⁵ (see Figure 4a) In contrast, for species found entirely on private property (excluding property owned by non-profit conservation groups), only 3 percent are improving, and the ratio of declining species to improving species is 9 to 1. ⁶ (see Figure 4b) Even more troubling is the fact that the Fish and Wildlife Service does not know the status of over half of the species found exclusively on private land, perhaps a reflection of the reluctance of many private landowners to allow conservation officials onto their land to assess how endangered species there are faring.

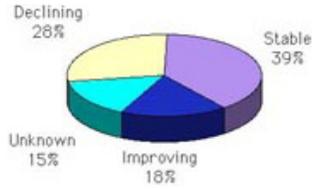
Figure 3: Extent of Dependence of Threatened and Endangered Species on Non-Federal Lands.



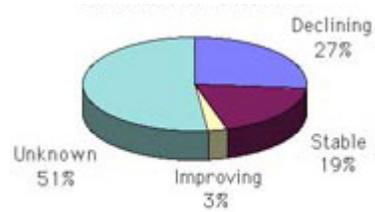
A large majority of threatened and endangered species in the United States finds most of their habitat on land that the federal government does not own. Source: U.S. General Accounting Office (1994).

Figure 4a: Status of Threatened and Endangered Species Found Entirely on Federal Land.

Figure 4b: Status of Threatened and Endangered Species Found Entirely on Private Land.



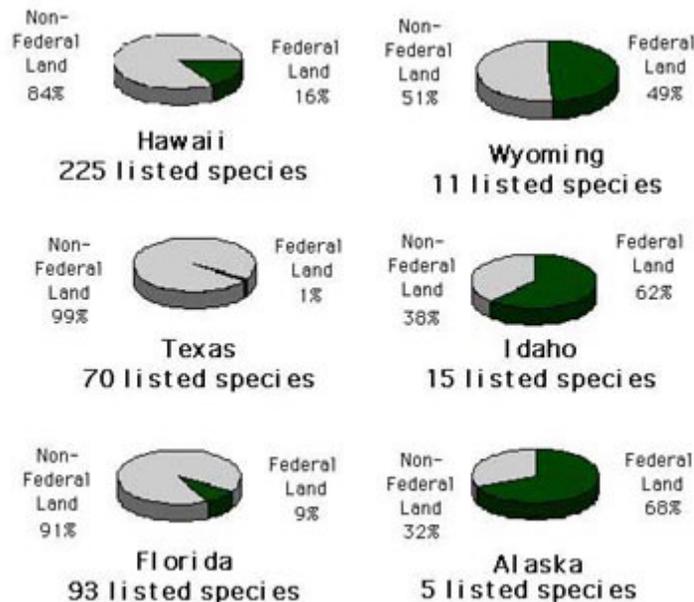
If their habitat is entirely on federal land, declining species outnumber improving species by a ratio of about 1.5 to 1, among those for which the U.S. Fish and Wildlife Service has data. Source: U.S. General Accounting Office (1994); U.S. Fish and Wildlife Service (1994).



If their habitat is entirely on private land, declining species outnumber improving species by 9 to 1 among those for which the U.S. Fish and Wildlife Service has data. The status of nearly half of these species is not known. Source: U.S. Fish and Wildlife Service (1994).

Some of the states with high numbers of endangered species have relatively little federal land within their borders. This fact underscores the importance of developing effective new strategies for private land. In contrast, some of the states with relatively few endangered species have a very high proportion of their land in federal ownership (see Figure 5). Even in states containing significant amounts of federal land, there are often many listed species whose habitats are entirely or primarily on non-federal land. These are further reasons why any strategy that works well only on federal land is simply insufficient. In this report, we discuss the reasons why the Endangered Species Act in its present form has failed to protect more species on private land. We also propose a variety of solutions to this problem.

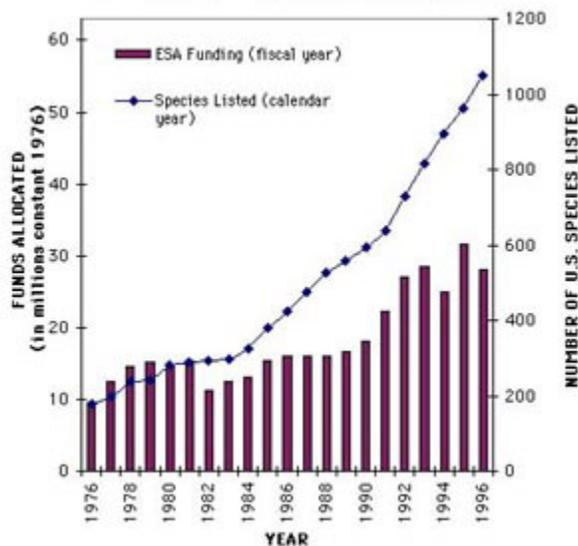
Figure 5: Land Ownership in Selected States and Number of Listed Species.



Some states with many endangered species have relatively little federal land within their borders. Some of the states with few endangered species have a high proportion of their land in federal ownership. Even in states with significant amounts of federal land, there are often many endangered or threatened species whose habitats are entirely or primarily on non-federal land. Source: U.S. Bureau of the Census (1994); U.S. Fish and Wildlife Service (1996a).

The most common explanation for why more endangered species aren't improving is a lack of money. In fact, funding for the endangered species program of the Fish and Wildlife Service (in constant, inflation-adjusted dollars) has increased nearly three-fold since 1976. However, the number of endangered species has increased more than five-fold during this same period (see *Figure 6*). Consequently, the amount of money available *per species* has actually decreased. The inescapable result is that the Fish and Wildlife Service is being asked to do more with less. Presently, only a small fraction of the protected species are improving. The decline in the amount of dollars available per species makes it unlikely that significant increases in the number of improving species will occur in the foreseeable future.

Figure 6: Funding Allocated for Endangered Species Act and Number of Species Listed.



Since 1976, federal funding for the endangered species program of the U.S. Fish and Wildlife Service (in constant, inflation-adjusted dollars) has increased significantly. But the total number of endangered and threatened species has grown at a much faster rate. Consequently, the U.S. Fish and Wildlife Service has less money per species to spend on conservation. Source: U.S. Fish and Wildlife Service. 1996 species total current through 10/31/96.

Unfortunately, there is no guarantee that future funding levels for the Fish and Wildlife Service will be enough to overcome this disparity. Past efforts to boost Fish and Wildlife Service funding significantly have not met with great success, in part because of the controversy surrounding the impact of the Endangered Species Act on private land. We believe increased funding for endangered species protection is more likely if the act is made to work better and less contentiously on private land. Doing so will require a number of changes.

Why Are We Losing the Battle Against Extinction?

Punishing good stewardship. – Until recently, one of the most vexing problems with the Endangered Species Act had been the way in which it discouraged private landowners from doing more than the law required to benefit rare plants and animals. Many landowners are

capable of helping endangered species by creating, restoring, or enhancing habitat on their land, but are unwilling to do so. Their unwillingness often stems from the fear of new restrictions. They are afraid that if they take actions that attract new endangered species to their land or increase the populations of the endangered species that are already there, their "reward" for doing so will be more regulatory restrictions on the use of their property. In its most extreme manifestation, this fear has prompted some landowners to destroy unoccupied habitats of endangered species before the animals could find it. One landowner, referring to the presence of red-cockaded woodpeckers on a small section of his property, announced, "I cannot afford to let those woodpeckers take over the rest of the property. I'm going to start massive clearcutting." ⁷;

EDF developed a solution to this problem, which the Fish and Wildlife Service adopted in April 1995 under the name of "safe harbor." This new policy essentially says to landowners, "If you are willing to improve your property for endangered species by doing more than the law requires, you will not be penalized for doing so." Participating landowners retain the right to undo those voluntary improvements should they wish to make some other use of their land in the future. Safe harbor was an instant success in the Sandhills of North Carolina, where non-industrial forest landowners, horse farms, resorts, and residential property owners have enrolled over 20,000 acres. Populations of red-cockaded woodpeckers on participating lands are expected to double as a result of voluntary management by the owners. ⁸; The safe harbor policy has been widely praised by a variety of interest groups; indeed, it may well be the only recent endangered species policy that has received favorable reviews in both *Audubon* magazine and *Farm Bureau News*. ⁹;

Declining but as yet unlisted species pose another problem for conscientious landowners. Before a species is officially listed, it receives no protection under the Endangered Species Act. A landowner who discovers such a species on his or her property can destroy its habitat without violating the act. He has no incentive to take any actions that would keep the species on his property or increase its numbers. If he takes actions beneficial to the species but the species is added to the protected list anyway (because, for example, his neighbors did not take similar actions), the result will be that his land is subject to more stringent regulation than it otherwise would be, while the neighbors who eliminated the species from their property before it was listed escape any regulation at all. For this reason, most landowners have a disincentive to protect species before they are listed. This disincentive – and the habitat destruction that stems from it – could be one reason why so many species are teetering on the very brink of extinction by the time they receive protection under the Endangered Species Act. ¹⁰;

We believe many landowners would be willing to protect candidate declining species and their habitats, *if* the government could offer them reasonable certainty with respect to future restrictions on their property. The Fish and Wildlife Service's authority to give such assurances under existing law is severely constrained, however. The Fish and Wildlife Service cannot – and should not – commit itself never to list a species in the future. Nor can it exempt anyone from the requirements of the act in the event that a species covered by a pre-listing agreement is later listed as "Endangered," although it may be able to give reasonable assurances if the species is only listed as "Threatened."

No path to recovery. – Many people are surprised to learn that the Endangered Species Act does not absolutely prohibit activities that harm listed species. For purely private actions such as logging, farming, and building on private land, the key requirement is found in Section 9 of the act, which prohibits the "taking" of a threatened or endangered animal. ¹¹; Fish and Wildlife Service regulations interpret this taking prohibition to include actions that degrade occupied habitats of listed species. However, it is not by any means an absolute prohibition. Under Section 10, a private citizen or company wishing to engage in an activity that could incidentally harm an endangered species – for example, by clearing a forest containing northern spotted owls to build a shopping mall – may apply to the Fish and Wildlife Service for a permit to do so. To obtain the

permit, the applicant must agree to "minimize and mitigate the impacts" of the proposed activity on listed species "to the maximum extent practicable." These mitigation measures are spelled out in a habitat conservation plan (HCP) that the applicant prepares and submits to the Fish and Wildlife Service.

In addition to being far from absolute, the taking prohibition in Section 9 does not begin to reach many of the threats that imperil the long-term survival of rare species on private land. It does not, for example, protect the currently unoccupied habitat that could aid in a species' recovery or that may be needed to replace current habitat lost to natural succession. Nor does it provide a means of reconnecting already fragmented landscapes to reduce the likelihood of losing small, isolated populations to chance events. And it is virtually powerless to halt the ravages caused by introduced species that compete with, prey upon, or otherwise adversely affect rare species, despite the fact that introduced species threaten the survival of almost half of all listed species (see *Figure 1*). Moreover, no provision of the law compels, induces, or provides incentives for a private landowner to do any of the things that may be necessary to maintain a population of an endangered species over time. Maintenance activities such as prescribed burning, removal of non-native vegetation, or control of predators or introduced species are necessary for the long-term protection of many endangered species and their habitats.

Even landowners who are willing to do these things on behalf of endangered species may be deterred by the cost of doing so. The act lacks any mechanism for public sharing of the private costs associated with habitat management. Yet without active management, populations of many endangered species will perish as surely as if the land itself had been paved or plowed.

Given these limitations on the act's ability to protect species on private land, is it reasonable to shift the responsibility for recovery entirely to federal land? The answer is no. First, as noted earlier, a great many endangered species simply do not occur on federal land or have the majority of their populations elsewhere. Second, as is the case on private land, protection of listed species on federal land is far from perfect. More listed species are declining than improving (see *Figure 4a*).

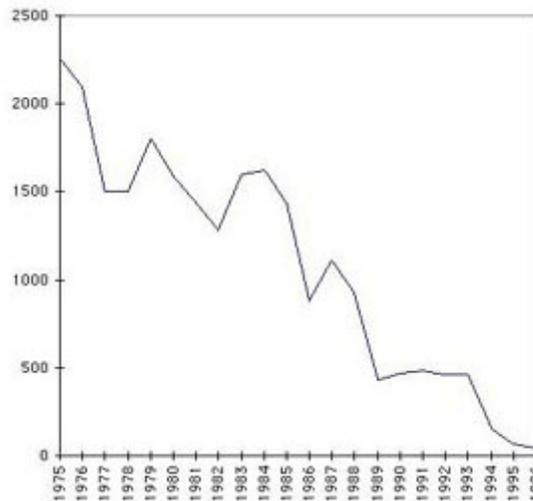
For federal agencies, the act's key requirement is found in Section 7, which requires the agencies to ensure that actions they authorize, fund, or carry out – such as federal timber sales, highway construction, etc. – do not jeopardize the continued existence of any threatened or endangered species. Although this provision has benefited numerous species by restraining federal agencies from undertaking destructive projects, it stops well short of a prohibition against any further erosion of a species' habitat or population. Federal actions (including private actions for which a federal permit is required) that result in the incidental loss of protected species and their habitats are routinely approved.

Thus, the present-day Endangered Species Act does not provide a blueprint for recovery of endangered species, especially those that depend on private land. The provisions of the law pertaining to both private (Section 10) and federal (Section 7) activities allow actions that erode species and their habitats, provided that erosion does not cross the uncertain line of causing jeopardy to the continued existence of a listed species.¹² The common affliction of both these provisions is that they seek only to minimize and mitigate the harmful impacts of new development on biological diversity. Neither requires that the survival prospects of the species in question be enhanced as a result of mitigation for projects that receive approval.

The near-extinction of the Attwater's prairie-chicken provides a compelling example of the inadequacy of the Endangered Species Act for rescuing species that occur largely on private land. Restricted to the coastal grasslands of southern Texas, the Attwater's prairie-chicken has been protected as an endangered species since 1967, but its numbers have declined steadily nonetheless – from 2,254 birds in 1975 to only 42 in 1996 (see *Figure 7*).¹³ Yet another

example can be found with the population of threatened Bay checkerspot butterflies at Stanford University's Jasper Ridge Biological Preserve. Jasper Ridge contained a large population of Bay checkerspots when the species was listed as "Threatened" in 1987, but by the spring of 1996, the butterflies had disappeared from the site. The immediate cause was a combination of weather extremes (drought followed by deluge) that proved too much for the butterflies. But their disappearance from Jasper Ridge may well have been abetted by the preserve's increasing isolation from other Bay checkerspot populations. At one time, there were populations of Bay checkerspots in a number of areas near the preserve. The destruction of these populations made it virtually impossible for Bay checkerspots to re-establish themselves on Jasper Ridge – despite the efforts of the University to protect the habitat in the preserve.

Figure 7: Attwater's Prairie-Chicken Population, 1975- 1996.



Protected as an endangered species since 1967, the Attwater's prairie-chicken has suffered a decline in numbers from 2,254 birds in 1975 to only 42 in 1996. The species lives largely on private land. Source: U.S. Fish and Wildlife Service (Undated, 1992, 1996b).

Inadequate mitigation. – Given the inherent limitations of the Endangered Species Act with respect to saving species on private land, any tendency on the part of the Fish and Wildlife Service to be lax in its administration of the law will compound the problems facing rare species. Environmentalists often contend that enforcement of the Endangered Species Act has been weak or sporadic. There is, however, no way to determine how many people violate the act and get away with it. Anecdotal evidence suggests this may be a significant problem, but not surprisingly, few people have come forward to brag about their success in thwarting the law. A more tangible problem is the willingness of the Fish and Wildlife Service to demand precious little in the way of mitigation when approving actions harmful to listed species.

A fine example of inadequate mitigation can be found in the recently-approved Red Oak Habitat Conservation Plan (HCP). Several years ago, the Red Oak Timber Company purchased 1,016 acres of Louisiana forest land that contained two groups of red-cockaded woodpeckers occupying 137 acres. The company logged all of the forest land not inhabited by the woodpeckers and then sought a Section 10 permit from the Fish and Wildlife Service to log the rest. The government acquiesced, issuing an incidental-take permit after first capturing the woodpeckers and releasing them at a nearby military base. The Red Oak Timber Company paid \$8,800 to cover the relocation costs and to install and monitor several artificial nesting cavities in a nearby national

forest – roughly the value of the timber harvested from five to six acres of the 1,016-acre property. Moreover, this money paid for habitat enhancement measures that the Forest Service should have been taking anyway under the Endangered Species Act.

Ecosystems versus species. – Many scientists and others believe that the Endangered Species Act's current focus on individual species is inadequate for stemming the tide of extinction threatening America's fauna and flora. They have argued that the goal should be to conserve entire assemblages of species – an ecosystem approach to conservation. To some extent, the Fish and Wildlife Service has tried to squeeze this approach into the act, most notably in connection with ongoing efforts to protect the coastal sage scrub ecosystem of southern California, which contains several dozen local, rare, or declining species. The resulting conservation plans have been met with a mixture of lavish praise and harsh criticism, depending upon the audience. This mixed verdict should come as no surprise; there is little in the current law in the way of guidance for designing and evaluating a multi-species ecosystem plan.

Difficulties of Enforcement. – Enforcing the Endangered Species Act on private land is difficult for a variety of reasons. The most fundamental of these is the difficulty of access to such lands, not simply by enforcement officials, but even by biologists seeking a better understanding of how protected species are faring on such lands. For more than half the species that occur exclusively on private land, the Fish and Wildlife Service is unable to assess whether they are improving, declining, stable, or even still present (*see Figure 4b*). This major information void undercuts not only the enforceability of the act, but also the opportunity to carry out recovery activities cooperatively with landowners.

A separate, but no less significant, enforcement problem is that landowners who wish to comply with the law are sometimes unable to get a clear and timely explanation of what they can and cannot do with their property. In part, this is the result of the government's very limited resources to respond to landowner queries, but it has a deeper dimension as well. For only a handful of species have conservation agencies developed detailed guidance that translates the Endangered Species Act's most basic requirement for landowners into specific "do's and don'ts." In the absence of such guidelines, the government's broad proscription against "significant habitat modification or degradation [that] significantly impair[s] essential behavioral modifications" is unintelligible to many landowners. Unable to understand what is required of them, many either refrain from activities that could have been undertaken without harm to a species, or carry out activities unaware that they may transgress the law's requirement.

A Menu of Possible Solutions

The shortcomings of the Endangered Species Act cannot be solved by money alone (although increased federal funding is an obvious part of the solution). In order to make the act work more effectively on private land, the following changes are needed:

- Create incentives to reward good stewardship.
- Strengthen the mitigation requirements for habitat conservation plans under Section 10.
- Take action earlier to protect declining species.
- Remedy existing enforcement problems.
- Build a scientifically-sound approach for protecting ecosystems and their resident species within the overall framework of the act.

Creating incentives for private landowners. – This may be the most important reform of all. The greatest gains for endangered species on private land are likely to come from the creation of economic incentives that reward landowners for their good stewardship. Changes in the federal

tax code, in particular, are needed. To pay federal estate taxes, the inheritors of large land holdings often are forced to sell, subdivide, or develop the property, resulting in the loss of wildlife habitat. In cases where the property could be managed to benefit endangered species, the heirs should be given the opportunity to defer part of the estate taxes by entering into a management agreement with the Department of the Interior. Also, as currently written, the federal tax code seldom allows landowners to deduct the costs associated with maintaining or restoring the habitats of endangered species (e.g., prescribed burning, weed control, etc.). Were landowners allowed to claim a tax deduction or credit for these costs, more of them might be inclined to undertake such steps.

The safe harbor policy may provide another means of creating real incentives for habitat restoration. At present, landowners who enroll in safe harbor programs receive no financial benefit for doing so. What they receive in return for their commitment to improving habitats for endangered species is the right to "undo" those improvements later by developing the habitat they restore or enhance. It may be possible to create an economic incentive for landowners to enroll in such programs – if they can sell their safe harbor rights to another landowner needing to offer mitigation for some planned activity on the latter's land. ¹⁴; The result of creating this market for endangered species "credits" may be mitigation that actually offsets the detrimental impacts of permitted activities, rather than mitigation that simply sanctions a steady deterioration in the amount of habitat available for endangered species, as is the case today. ¹⁵;

Finally, the federal government funds a number of incentives programs aimed at encouraging farmers, ranchers, and small woodlots owners to protect wetlands, forests, soils, and water quality. To date, no effort has been made to target these programs to areas where endangered species are likely to benefit. This could change as a result of the 1996 Farm Bill, which provides funding for a variety of habitat restoration projects. While none is directed exclusively toward endangered species, endangered species are certainly not precluded from consideration. These and other programs would be even more useful for endangered species conservation if they paid a premium for lands harboring endangered species.

Better mitigation. – Although the goal of the Endangered Species Act is to bring about the eventual recovery and delisting of species facing the threat of extinction, the act's mitigation requirements (as spelled out in Sections 7 and 10) are not explicitly linked to that goal. Rather, they require only that adverse effects on listed species from private land activities be mitigated "to the maximum extent practicable," without regard to whether what is "practicable" will fully offset the harm allowed. As a result, the Fish and Wildlife Service sometimes undercuts recovery efforts by accepting paltry mitigation for harm done to listed species, as exemplified by the Red Oak HCP and numerous Section 7 biological opinions. The Fish and Wildlife Service's willingness to allow landowners to mitigate activities on private land by paying for habitat improvements on federal land strikes us as an especially pernicious trend. It undercuts conservation efforts on private land, and it reduces the pressure on federal agencies to seek adequate funding from Congress to carry out their endangered species responsibilities.

We believe it is both feasible and desirable that mitigation measures approved as part of Section 7 consultations and Section 10 HCPs actually enhance the prospects of survival and recovery for species of concern. As a practical matter, this result can be most readily achieved when the activities to be mitigated encompass a large area and involve multiple landowners.

Done right, habitat conservation planning in such situations offers the possibility of advancing the goal of recovery – or, at the very least, staving off extinction – by restoring degraded habitats; reconnecting fragmented landscapes; actively managing currently occupied habitat to maintain its seral stage; preserving unoccupied habitat to replace habitat lost to succession or natural disasters; controlling harmful, introduced species; and leveraging sorely needed funds from the private sector to supplement grossly inadequate federal resources.

There is a "deal" to be struck here: In general, landowners and developers will undertake these activities only in exchange for permission to build upon, log, farm, or otherwise alter portions of existing endangered species habitats. That is the nature of a Section 10 HCP. Whether the trade-offs involved in any particular plan are appropriately balanced may be – and often has been – the subject of rancorous dispute. Those disputes, however, should not overshadow the fact that the tool of habitat conservation planning is essential if the task of conserving imperiled species on private land is to be accomplished. Because of the inherent limitations to the prohibition against taking listed species, it is often possible for a species to be better off with a smaller amount or a different arrangement of habitat, *provided that habitat is properly managed over the long term*, than it is with a larger amount of habitat that is steadily, inexorably becoming unsuitable through neglect. ¹6;

For single projects on small tracts of land, the goal of enhancing survival and recovery prospects through mitigation is far more challenging to achieve. On the one hand, the opportunity to identify offsetting beneficial activities is severely constrained by the small size of the project. On the other hand, considerations of equity create strong pressures to accommodate the desires of the small landowner. In such circumstances, a net benefit for the conservation of biological diversity might be achieved, with substantially lower transaction costs, by allowing such landowners to contribute toward an already established mitigation program for the same or other species, with the amount of the contribution tied to the significance of the negative impact of the landowner's proposed project.

Taking action earlier. – The Fish and Wildlife Service must be quicker to list disappearing plants and animals. Delaying protection until species are nearly extinct increases the cost of recovery and the risk of failure. It also reduces the options available to the Fish and Wildlife Service for protecting species at less social or economic cost. Part of the problem, however, may be beyond the agency's control. The Fish and Wildlife Service has limited resources to devote to endangered species, and money spent listing new species may come at the expense of enforcement, habitat acquisition, or recovery planning for species that are already on the list. Congress, which controls the purse strings, is unlikely to provide much more funding for the act until some of the controversy has subsided. Adopting the incentives recommendations in this report would go a long way toward reducing the level of controversy associated with private land, thereby increasing the likelihood of more funding from Congress.

Removing the disincentives that discourage landowners from protecting declining *but as yet unlisted* species could lead to earlier, better protection for them. The Fish and Wildlife Service can use its authority under Section 4(d) of the act to assure landowners who enter into satisfactory pre-listing agreements that those agreements will encompass the totality of their obligations in the event the species is later listed as "Threatened." To date, the Fish and Wildlife Service has not promulgated generic regulations pursuant to Section 4(d) that would provide this assurance. It should do so. Extending the Fish and Wildlife Service's authority to provide a similar assurance regarding species subsequently listed as "Endangered" will require a change in the act itself.

Remedying the enforcement problems. – For the red-cockaded woodpecker, the northern spotted owl, the bald eagle, and a few other species, the Fish and Wildlife Service has developed detailed guidelines that translate the generic prohibition against harming protected species into specific, readily understandable descriptions of what landowners can and cannot do. The absence of such guidelines for most species leaves landowners uncertain of their obligations, sometimes produces exaggerated and unnecessary fears, and undermines the government's ability to enforce the Endangered Species Act successfully.

To improve its enforcement capability and to facilitate greater voluntary compliance on the part of landowners, conservation agencies should develop detailed guidelines for other listed species. First priority should be given to species potentially affected by forestry, ranching, or farming

activities, since it is the relationship of these activities to the act's prohibitions that are often most uncertain. By contrast, the conversion of natural habitat to urban or suburban development is generally not accompanied by such uncertainty (largely because the affected habitat is totally and irreversibly altered by such development).

If the recommendations made elsewhere in this report are implemented, the enforceability of the act will be enhanced in yet another way. Safe harbor agreements, pre-listing conservation agreements, and other cooperative arrangements with private landowners will typically confer upon conservation agencies a right to monitor compliance with the agreement through periodic inspection. Such cooperative relationships serve as a foundation for trust and information-sharing between landowners and conservation officials. They also provide a means, far more effective than currently exists, of tracking what is actually happening on the private landscape. Developing such cooperative relationships with some private landowners will enable conservation agencies to concentrate their limited enforcement resources more effectively on other lands where traditional enforcement efforts may be needed. Advances in technology, including the use of satellite imagery to track land-use changes, may also facilitate more effective enforcement where access is otherwise unavailable.

Protecting ecosystems. – The Endangered Species Act should provide a mechanism for habitat-based planning to protect, restore, and enhance the ecosystems upon which endangered species and declining species depend. This is not an easy goal, for it requires simultaneous consideration of the broad-scale ecological processes (including hydrology, nutrient cycling, and natural disturbances) that are essential to the well-being of ecosystems and the finer-scale needs of particular rare or sensitive species. We advocate the selective use of indicator species – plants and animals that collectively serve as indicators of the health of ecosystems – coupled with individual consideration of any endangered, threatened, or rare species that have ecological requirements significantly different from those of the indicators. Such plans must provide reasonable certainty that the ecosystems in question will be maintained in sufficient quality, quantity, and distribution to support the species typically associated with them, without jeopardizing any of the endangered, threatened, or rare species.

Conclusion

After nearly a quarter-century, the Endangered Species Act has achieved many important successes, but it has fallen well short of what is needed if the tide of vanishing species is to be stemmed. A few species have fully recovered, and many more have been saved from what would have been almost certain extinction. But for the vast majority, progress towards recovery has been slow and uncertain at best. The Endangered Species Act's record is not one of failure, but of a pioneering law that has revealed its limitations. In its present form, the act certainly will not suffice to preserve America's imperiled wildlife in the face of mounting demands for land and natural resources.

Re-authorization of the act has been stalled for the past four years. One consequence of this legislative impasse has been the perpetuation of a *status quo* that serves no one – not the environmentalists who desire a more effective law, not the regulated interests that chafe under its restrictions, and most especially not the species themselves, a great many of which continue to decline. We believe that many of the ideas discussed in this report have the potential to satisfy both sides, and in doing so, move the process of re-authorization and revision forward. Change inevitably entails some risks, but a lack of change will guarantee significant failure.

Notes

[1] The history and ecology of the red-cockaded woodpecker are discussed in detail in McFarlane (1992). Information on population declines during the 1980s is from James (1995).

[2] In this report, we use the term "species" as it is defined in the Endangered Species Act: to include all species, subspecies, and vertebrate populations that are protected by the act.

[3] See U.S. Fish and Wildlife Service (1994). This report contains the best available published data on the current status of listed species. Nonetheless, we recognize there may be inaccuracies in these data, and we strongly support a more intensive monitoring program for listed species.

[4] The figure of one-third is based on a survey of Fish and Wildlife Service personnel conducted by the U.S. General Accounting Office (1994). We have not attempted to confirm these data, which are based on estimates rather than true measurements of habitat. The figure of one-half is taken from Stein et al. (1995).

[5] To identify species found entirely on federal land, we took the list of species for which the U.S. Fish and Wildlife Service was responsible as of May 10, 1993 (the data used by the U.S. General Accounting Office for its analysis) and eliminated all species that the GAO identified as having any habitat on *non*-federal land, as well as two extinct species.

[6] This breakdown of species on private land combines information from U.S. Fish and Wildlife Service (1994) and U.S. General Accounting Office (1994).

[7] *Wall Street Journal*, April 2, 1993; p. A10.

[8] M. Cantrell, U.S. Fish and Wildlife Service, pers. comm.

[9] See Williams (1996); Manning (1996).

[10] See Wilcove et al. (1993).

[11] Listed plants receive almost no protection on private land because there is no prohibition against taking them. The disparate protection afforded animals as compared to plants on private land has no basis in biology.

[12] Aquatic species are often harmed by activities on adjoining land. The Endangered Species Act thus far has had relatively little impact on those activities, although it has changed the behavior of water resource agencies in a beneficial way.

[13] A small population in captivity offers some hope that its extinction may be averted.

[14] For more details on how such a market might operate, see Bonnie and Bean (1996).

[15] For such a market to work, there must be a rigorous monitoring and enforcement program to ensure that credits and debits are properly tabulated and that the terms of all agreements are met.

[16] A species for which this might be true is the red-cockaded woodpecker. It requires pine forests with an open understory. In pre-colonial times, frequent, low-intensity fires sparked by

lightning burned through the forests and keep the understory clear of competing oaks and other hardwoods. Today, most forest fires in the southeast are quickly suppressed upon discovery. For the woodpeckers to persist, landowners must be willing to use prescribed burning or physically remove hardwoods from the understory. A thousand acres of longleaf pine that are not burned will provide far less habitat for the woodpeckers over the long term than will 500 acres that are regularly burned.

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Appendix

Case Studies

The following three case studies are examples of endangered species that could benefit from the recommendations in this report.

San Joaquin Kit Fox

This small, nocturnal fox has been listed as an endangered species by the federal government since 1967. It was once a relatively common resident of California's San Joaquin Valley, ranging from above Modesto in the north to near Bakersfield in the south. Its preferred habitat is grasslands in the vicinity of freshwater marshes and alkalai sinks. Much of this habitat has been destroyed over the course of this century, first for agriculture and later for residential, commercial, and industrial development. Other threats facing the San Joaquin kit fox include overgrazing, poisoning, off-road vehicles, and mortality caused by cars and trucks. By 1930, the San Joaquin kit fox had been eliminated from the northern part of its range. Today, it occurs along the west side of the San Joaquin Valley in Merced County and in Kern and San Luis Obispo counties. Isolated populations also occur in Tulare County and in three counties outside its originally surveyed range: Monterey, Santa Barbara, and Santa Clara counties. The total population is less than 7,000 individuals.

Conservationists must confront three harsh realities in their efforts to recover the San Joaquin kit fox. First, over 80 percent of its habitat is on non-federal land. Second, the San Joaquin Valley is one of the nation's most important areas for agriculture and petroleum development; the surface and subsurface value of the land is enormous. Therefore, there is little prospect that large acreages of privately-owned land can be purchased and set aside on behalf of the kit fox. Third, some landowners in the San Joaquin Valley are believed to be destroying unoccupied habitat (legally) to prevent kit foxes and other endangered species from moving onto their property. On the bright side, however, there is some evidence that kit foxes can coexist with some types of grazing and agriculture, provided those activities do not seriously degrade fox habitat. It may also be possible to restore habitat by changing some grazing or farming practices.

The Fish and Wildlife Service's *San Joaquin Kit Fox Recovery Plan* recommends the use of tax incentives and conservation easements to encourage private landowners to protect and restore fox habitat. Even in the absence of these recommendations, the Fish and Wildlife Service's safe harbor program can be used to assure landowners that if they take steps to restore kit fox habitat, they will not incur added regulatory burdens as a result. The 1996 Farm Bill may provide funds for habitat restoration through its various incentives programs. Improving the effectiveness of the Endangered Species Act on private land will be the key to saving the San Joaquin kit fox.

Red-cockaded Woodpecker

Unlike most woodpeckers, the red-cockaded woodpecker lives in extended family groups called "clans." A clan consists of a mated pair, the current year's offspring, and various "helpers"-- typically male offspring from previous years that assist their parents with incubation, feeding, and brooding duties. It is the only North American woodpecker that digs its nesting cavities exclusively in live trees; these are typically old pine trees infected by a heartwood-decaying fungus.

A century ago, the red-cockaded woodpecker was a common resident in the vast pine forests that stretched across the southeastern United States. It lived in forests where frequent, low-intensity fires sparked by lightning kept the understory clear of competing hardwoods. But as logging and farming claimed an increasing share of the big trees, and as fire suppression allowed hardwoods to grow tall, the woodpeckers began to disappear. The red-cockaded woodpecker was one of the first species to be protected when Congress passed the Endangered Species Act in 1973. Since that time, however, its population has continued to decline--by 23 percent during the 1980s alone. It is one of our most imperiled birds.

There is, however, some reason to be cautiously optimistic that this species can be saved. Hundreds of thousands of acres of southern pine forests potentially could be restored to benefit the red-cockaded woodpecker. Doing so might require prescribed burning and hardwood removal to open up the understory, installation of artificial cavities to create nesting sites, and even the translocation of young woodpeckers to sites where they once occurred but died out. Many of these activities are being carried out in the Sandhills of North Carolina under the auspices of the Fish and Wildlife Service's safe harbor program. More than 20 landowners have expressed a willingness to restore woodpecker habitat if they can do so without incurring additional restrictions on the use of their land. Similar programs are in various stages of development in other parts of the southeast. Restoration of woodpecker populations on private land is critical to meeting the goals set forth in the Fish and Wildlife Service's *Red-cockaded Woodpecker Recovery Plan*.

One of the biggest challenges is providing some financial reward to landowners who undertake habitat restoration. Activities such as hardwood removal, prescribed burning, and the installation of artificial nesting cavities cost money, and landowners may be unwilling to undertake them without some form of compensation. Buying and selling of safe harbor credits and providing landowners with a tax deduction for management activities are two possibilities.

Florida Panther

Florida's state animal is one of North America's rarest mammals. Only 30 to 50 individuals are thought to remain in the wild, concentrated in four areas south of Lake Okeechobee. At one time, however, the Florida panther (a race of the mountain lion) ranged from eastern Texas or western Louisiana and the lower Mississippi Valley east through the southeastern states, including Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, and parts of Tennessee and South Carolina. Like the other mountain lions that once lived in the eastern United States, the Florida panther fell victim to hunting and habitat loss. In its last stronghold in southern Florida, the principal threats to its survival include the continued destruction of natural and semi-natural areas for intensive agricultural and urban development, collisions with motor vehicles, and mercury poisoning. The remaining population is so small that inbreeding and other genetic problems are thought to be lowering the panther's reproductive fitness. The Fish and Wildlife Service has brought in mountain lions from other parts of the country to add genetic diversity to the Florida panther population.

Private lands play an important role in the conservation of the panther; approximately 53 percent of land currently occupied by Florida panthers is privately owned. Some forms of agriculture, such as native-range ranching and sustained-yield forestry, are tolerable to panthers; intensive agriculture, such as citrus groves and vegetable farms, is not. Conservationists are concerned that owners of ranchland and forestland will be forced (or seduced) into selling their property for residential development or intensive agriculture. Accordingly, the 1993 *Florida Panther Habitat Preservation Plan*, prepared on behalf of the Florida Panther Interagency Committee, recommends a variety of tax incentives to enable ranchers and forest owners to keep possession of their land. These include relief from federal estate taxes in exchange for a permanent conservation easement on the property and a tax exemption for lands on which wildlife habitat is maintained.