

19 Hands-on Restoration

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The Peregrine Fund is one of the most experienced nongovernmental organizations (NGO) in hands-on restoration of endangered vertebrate species in the United States. The organization began working toward restoration of the American peregrine falcon (*Falco peregrinus anatum*) several years before the Endangered Species Act of 1973 was enacted (Cade et al. 1971; Burnham and Cade 2003; Cade 2003) and has since played an important role in the recovery of the endangered northern aplomado falcon (*Falco femoralis septentrionalis*) (Jenny 2003; Jenny et al. 2004; Montoya et al. 1997), California condor (*Gymnogyps californianus*) (Cade et al. 2004), many endemic avian Hawaiian species (Kuehler et al. 1995, 1996, 2000, 2001), and several nonnative species listed as endangered under the Endangered Species Act (ESA), in particular the Mauritius kestrel (*Falco punctatus*) and harpy eagle (*Harpia harpyja*). Most people agree abstractly with the importance of saving species from extinction. Problems arise, however, in defining what that means and how to achieve that objective. This is particularly true when legal requirements for preserving species conflict with human desires for resources.

Lessons for Species Recovery

The Peregrine Fund collaborates with state and federal agencies and other NGOs to prevent species extinction and to restore viable wild populations (Burnham 1997). Our work under the ESA serves as the basis for several lessons about what is and is not successful.

Species Restoration and the Endangered Species Act

Species cannot be successfully restored unless the reasons for the species decline are successfully mitigated. In our experience, conservation actions

under the ESA have seldom significantly ameliorated the causes of population declines. For example, the Endangered Species Act had little impact on habitat improvement for recovery of the peregrine because the insecticide DDT had been banned prior to passage of the act in 1973, and the peregrine was already protected by state and federal laws. Similarly, the California condor was protected against human persecution by the State of California and the federal Migratory Bird Treaty Act before passage of the ESA, and no actions have been taken to reduce the presence of lead, a major cause of mortality in this species (Kiff et al. 1979; Pattee et al. 1990; Cade et al. 2004). Changes in ranching and land management practices that allowed aplomado falcon restoration in Texas occurred before the falcon was listed under the ESA. And the act has yet to produce any measurable effects on the causes for declines and extinctions of endemic Hawaiian species. These examples suggest that the additional direct and indirect (habitat) protection provided under the ESA does not enhance recovery. In the case of endemic species in Hawaii, however, the act may yet have a positive effect if the right corrective actions are taken to improve habitats at biologically significant scales (removal of exotic herbivores and predators).

Most endangered species depend significantly on habitats found on private lands; some occur only on such lands (Bean and Wilcove 1997). Hawaii (225 listed species) and Texas (70 listed species) have only 16 percent and 1 percent, respectively, of federal land (Wilcove et al. 1996). The use of safe harbor agreements and nonessential experimental population status can reduce the concerns of private landowners and users of federal lands thus making it easier to work with ESA-listed species. Creating incentives for private landowners is critical in many cases to the recovery of endangered species (Brook et al. 2003).

Benefits of Species Listing

Just the threat of listing can provide benefits but also cause problems for a species. For example, peregrine falcons were taken from the wild shortly before the passage of the ESA in 1973 by individuals who knew that peregrines would be listed as endangered under the new act and thus their legal taking for any purpose would become impossible; later, these birds became the foundation for the captive population and restoration program of peregrine falcons (Burnham 2003).

Listing focuses attention on a species and can increase support for conservation actions on its behalf, as was the case with the peregrine falcon. The threat of listing has caused state wildlife departments and federal land management agencies to develop plans to address concerns and benefit species such as the greater sage-grouse (*Centrocercus urophasianus*). Even without the ESA and

listing, however, there was significant support for the conservation of the peregrine and California condor.

On the other hand, it is commonly acknowledged that the petition for listing the black-tailed prairie dog (*Cynomys ludovicianus*) resulted in large-scale poisoning of prairie dog colonies by landowners who feared intrusion on their property by the U.S. Fish and Wildlife Service (USFWS). Other examples of negative responses to listing include the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) and red-cockaded woodpecker (*Picoides borealis*) (Brook et al. 2003; Pickrell 2004). Brook et al. (2003) found that listing did not enhance the prospect of survival for listed species on private property.

Once a species is listed as threatened or endangered, delisting is difficult, even when the species no longer meets listing criteria. Delisting the Arctic peregrine from threatened status, for instance, took about three and a half years from the publication of the delisting proposal to the final *Federal Register* notice. Likewise, the American peregrine falcon delisting process required four years and three months (Burnham and Cade 2003). Opposition to delisting is often motivated by a desire to continue habitat protective measures mandated by the listing of a species.

The Role of Recovery Teams

Following enactment of the Endangered Species Act, four regional recovery teams were established for the peregrine falcon. The teams were assigned the task of writing (and updating) recovery plans as well as advising the USFWS. Although there were multiple recovery teams for the peregrine, each was a manageable size and largely composed of peregrine experts. The teams advised on strategic programmatic issues as requested by the USFWS. In large part, they did the jobs requested of them, and their contributions facilitated restoration.

Another success story is the working group to recover the aplomado falcon. Although a recovery plan was written for the aplomado falcon (USFWS 1990c), a recovery team was not established. Instead, effective coordination was accomplished through regular communication among municipal, state, federal, and private cooperators, and most aplomado falcon experts are actively involved in recovery actions.

Other efforts have been less effective. For example, in California, the condor recovery team gradually evolved from a small group of experts focusing on strategic issues to a large group of stakeholders attempting to micromanage restoration actions. As a result, the effectiveness of the restoration program was diminished for a time; the situation has subsequently improved. In Hawaii, where conservation issues are nearly overwhelming and in need of quick action, recovery teams took over ten years to update and draft two recovery plan revi-

sions (ʻalala, the Hawaiian crow (*Corvus hawaiiensis*), and Hawaiian forest birds) that are only now being reviewed by the public.

Organizational structures called *working groups* were formed in many states to coordinate peregrine recovery actions (Burnham and Cade 2003). Participants were drawn from state wildlife departments, NGOs such as the Peregrine Fund, federal land agencies, and affected private landowners. Working groups are often brought together by state wildlife agencies to plan and fund recovery actions. Meetings tend to be informal, congenial gatherings, with participants frequently adjourning afterward to local bars to share a few beers.

The Players in Species Restoration Programs

For any given species restoration program, there can be many stakeholders, at several levels. Although national, and even international, cooperation is sometimes needed to implement restoration programs, successful programs generally require the input of nearby local communities, including landowners and other interested individuals. Species restoration programs require trust to succeed. Often, people do not trust governments but do trust other people. Such trust cannot be legislated; rather, it develops gradually, over time and through interactions among concerned parties.

The help of state wildlife agencies in facilitating and supporting species recovery has been key to the success of many programs, including peregrine recovery programs (Oakleaf and Craig 2003). This holds true for current efforts with the aplomado falcon in Texas, the California condor in Arizona and California, and the forest birds in Hawaii.

Successful restoration programs also require extensive participation by the private sector, along with support of local communities. In the case of the peregrine falcon, private organizations spearheaded recovery efforts, but they also collaborated closely with state wildlife and federal land management agencies where jurisdiction overlapped. Recovery programs for the aplomado falcon in Texas and the California condor in Arizona similarly involved significant participation by private organizations. In Hawaii, leaders in restoration programs within the private sector include the Zoological Society of San Diego, the Nature Conservancy, Kamehameha Schools, the Silversword Foundation, and public-private partnerships such as the Olaa-Kilauea Partnership.

The Science behind Recovery

Knowledge of an at-risk species' biology and ecology, the reasons behind its decline in population, and its primary limiting factors (e.g., winter habitat, food during breeding) are crucial (Scott, Goble, et al., this volume; Lomolino,

forthcoming). Considerable knowledge about the peregrine falcon, based on research and centuries of the species use in falconry, existed at the time of its listing. Further research documented population trends and causes of decline (Newton 2003). This information ultimately facilitated its recovery. There was also substantial additional research (often funded by federal land managing agencies) that was rarely used by the biologists actually engaged in recovery actions. Much of this work consisted of due-diligence studies that agencies believed were necessary to comply with requirements of the ESA and the National Environmental Policy Act (Act of January 1, 1970). A similar situation has developed with aplomado falcon restoration in New Mexico. Prioritizing expenditure of the limited ESA funds for information gathering is an important but often neglected task.

Programs often tout their use of "best available science" to guide species recovery, but scientists, lawyers, and other professionals are fallible and can find it difficult to separate personal opinion, bias, and agendas from pure science (Burnham and Cade 1995). Nevertheless, the need to keep science free from political alliances is critical (Brussard et al. 1994; Scott et al. 1995).

Funding and Species Recovery

Hands-on restoration programs are expensive; therefore, every effort should be made to prevent species from declining to a level requiring such action. Recovery costs increase dramatically when moving from managing a species in a functional ecosystem to conducting highly focused, hands-on species restoration (Conway 1986).

Hands-on restoration can also require long-term action. Restoration of the peregrine took about three decades, restoration of the aplomado falcon will likely require two decades, that of the California condor may extend a half century or more, and restoration of Hawaiian bird species may continue indefinitely. Obtaining sufficiently long-term funding for such projects is difficult because the private sector and the government eventually tire in their support.

Annual appropriations for threatened and endangered species conservation have never approached the limits authorized by Congress. Such funding must compete with other budgetary demands. Furthermore, increases do not necessarily mean more dollars for actual recovery actions because developing and maintaining the bureaucracy to implement the complex regulations associated with the ESA are expensive. Although public funds are critical, we believe that species recovery programs in which individuals and organizations assist financially are more likely to succeed than those that are supported only by government funding. Dollars contributed for restoration actions reflect the acceptance and commitment of the public.

Permitting and Species Recovery

ESA regulations are complex, especially in regard to permitting (Burnham and Cade 1995). Permits and the permitting process have discouraged species conservation action and hindered research and recovery action. Although the USFWS is trying to simplify the permitting process, existing regulations and other statutory protections, such as the Migratory Bird Treaty Act (Act of July 3, 1918) and the Wild Bird Conservation Act (Act of October 23, 1992), limit what can be accomplished without additional legislative changes.

Recommendations for Species Recovery

We recommend that the Endangered Species Act be restructured to emphasize incentives rather than regulations. Below, we offer specific recommendations on listing and delisting species, recovery planning and implementation, research, regulations and permitting, revisions to the Endangered Species Act, and biome conservation.

Listing and Delisting Species

The U.S. Fish and Wildlife Service has emphasized listing as a primary means of protecting imperiled species. Although we understand the importance of listing at-risk species, petitions for listing should only be accepted from established experts on the species under consideration. Delisting should also be a priority if for no other reason than to showcase proof of success. In reality, delistings are often held up for a variety of reasons. The bald eagle (*Haliaeetus leucocephalus*), for example, was originally proposed for delisting ten years ago, but action has been held up owing to concern about the adequacy of habitat protection after delisting—a misapplied application of the “precautionary principle.” It would be better to transfer ESA decision making about species status, listing, and delisting to an independent panel of experts on each species, appointed by the National Research Council of the National Academy of Sciences (see Cade 1998; Greenwald et al., this volume).

Recovery Planning and Implementation

Recovery planning and implementation should be substantially restructured to clarify the roles of the various parties.

First, recovery teams should be composed of small groups of biologists (seven to nine individuals) selected on the basis of their scientific knowledge of the species in question and the threats it faces. When individuals are included

in a representative capacity, all organizations (particularly governmental organizations) will seek representation; the result will be a team that is inefficient, expensive, and difficult to manage. USFWS staff should be precluded from serving on teams, although exceptions may be made for species experts; USFWS interaction with recovery teams should be limited to facilitation of team activities and recommendations for recovery.

Second, the recovery plan should be brief, requiring only a few pages to outline the problem and make general recommendations on the recovery goals for downlisting and delisting the species. Detailed documents requiring years to write result in plans that are outdated before they are finished and thus are of limited value (Burnham and Cade 2003). Short plans also simplify revision and updating as new information becomes available.

Third, the sole task of the team should be to write the recovery plan. Recovery teams should recommend, not implement, species recovery. By allowing the recovery team to focus on planning for species recovery, they can avoid entanglement in the desires and political interests of stakeholders and thus produce a better plan.

Fourth, after the recovery plan is developed, stakeholders should meet to discuss its implementation. It is at this point that input, needs, recommendations, and involvement of stakeholders should occur. From these discussions, an implementation agreement can be developed between the USFWS, local communities, and other interested parties; recovery plans should be implemented much as habitat conservation plans are. Although complete agreement among all involved may not be possible, if stakeholders know where they stand and what is to happen, the potential for collaboration is increased. For both the California condor releases in Arizona and aplomado falcon restoration in Texas, agreements were developed for implementation of recovery actions as part of the 10(j) and safe harbor agreements.

Fifth, a working group is a useful organization to facilitate recovery if participants are limited to entities that actively contribute to the restoration effort. It functions best when led by the organizations or individuals engaged in the recovery action in cooperation with appropriate governmental agencies. Implementation should be accomplished by those best qualified in the private sector and in state and federal wildlife agencies. To the extent possible, private landowners should be included and compensated for their participation in recovery efforts.

Sixth, the role of USFWS should be limited to oversight and facilitation rather than implementation of restoration projects and programs. USFWS administrators continue the transition from ESA enforcers to recovery facilitators. Land management agencies should take the lead in recovery implementation. Finally, state governments and wildlife agencies should be given increased

responsibility for implementing recovery. In the long term, much of what the USFWS is attempting to accomplish should be transferred to qualified state agencies. Conservation of endangered species needs to become a local desire and focus.

Research and Recovery

Having the best possible information is important to guide recovery actions for species (Ruckelshaus and Darm, forthcoming), but research should not be perceived as recovery action. The primary value of research is to (1) define the reason(s) for the species' decline, (2) determine the factors limiting populations, and (3) help support and guide restoration. Recovery should include monitoring to evaluate the success or failure of restoration actions. Federal land management agencies should carefully evaluate use of ESA funding and support recovery actions first and research second.

Regulations and Permitting

Regulations related to the ESA are complex and often overlap with those of other laws and treaties (Burnham and Cade 1995); they should be reduced and simplified. A comprehensive permit (inclusive of all applicable laws) should be developed, eliminating the need for multiple permits and reports. Every effort should be made to increase the flexibility, efficiency, and effectiveness of the ESA.

Revisions to the Endangered Species Act

The ESA should be amended to provide objective definitions for "threatened" and "endangered" that incorporate specific criteria (Mace and Lande 1991) and emphasize the degree of jeopardy and urgency (Cade 1998). The "threatened" category in particular is too vague as presently defined.

The overlapping meanings and functions of "harm" and "critical habitat" need to be reexamined. The designation of critical habitat may be most useful when it is applied to special localized habitats critical to species survival, such as nest sites that limit the number of breeders (e.g., peregrine falcons) or springs that serve as the entire distribution area for a species (e.g., Bruneau Hot springsnail [*Pyrgulopsis bruneauensis*]). When it is applied to major habitat units on a wide scale encompassing millions of acres (e.g., old-growth forest for the northern spotted owl [*Strix occidentalis caurina*] or the proposed designation of major reaches of the Chihuahuan Desert in southern New Mexico for the

largely nonexistent aplomado falcon), then its use becomes questionable, even though protection of such large areas may be justified in a broader, more inclusive environmental context. Critical habitat provides little additional protection to a listed species. Moreover, designation of critical habitat lasts only as long as the species requiring it remains listed (Doremus and Pagel 2001); therefore, it is not a permanent solution to habitat protection and, in fact, can become a disincentive for species recovery. Considering the high costs involved in designating and defending critical habitat against lawsuits, the benefits appear to be problematic, even unjustified.

We recommend that the definition of "critical habitat" established by the 1978 congressional amendment be rescinded and that the definition of "take" and "harm" be suitably modified to encompass all requirements for protection of essential habitat of listed species. Where essential habitat is needed for protection on private lands, owners should be compensated through a system of purchases, leases, easements, or other economic incentives.

The act should be amended specifically to authorize safe harbor agreements. Section 10(j) should be clarified by including the "open-minded" safe harbor concept for application in a mixed land status of federal, state, tribal, and private properties.

The ESA should also include conservation and research organizations, universities, and private landowners as cooperators. Ultimately, conservation will not be accomplished by government alone. Private sector cooperation and leadership will determine the fate of many endangered species (Burnham and Cade 2003). Section 6 of the ESA should be amended to recognize this fact by authorizing funding for NGO participation.

Biome Conservation

Unless the ESA is modified or until the nation has a law focused on habitat and biome conservation, endangered species will continue to suffer from lack of private sector and landowner support. This will continue to produce conflicts over designation of "critical habitat," "take," and other punitive measures; and litigation will continue to consume dollars critically needed for recovery actions. Congress should consider passage of a new law dealing with habitat and biome conservation. A first step would be to inventory all public lands, nonprofit conservation holdings, and private land with conservation easements to determine the potential to conserve the various ecoregions and associated species. Key to this inventory would be use of gap analysis where habitats and the known and potential distribution of species are mapped (Scott et al. 1988).

Conclusion

Our experiences confirm that hands-on restoration efforts are expensive and that recovery is unlikely without a highly focused effort that has the support of the states and private sector. In those successful efforts in which we have been involved (aplomado falcon, peregrine falcon, Mauritius kestrel), the limiting biological factors were substantially reduced or eliminated over landscape scales. The ESA provided a platform for cooperation, particularly among government agencies, and added a new source of funding. Section 6 funding to states was particularly important. The section 10(j) experimental population provisions of the act have also assisted in recovery efforts both by allowing greater flexibility and by helping to build trust and support among private and state groups. Safe harbor agreements were critical to the success of aplomado recovery in Texas (Jenny 2003); we found greater support when NGO, rather than agency, personnel negotiated the agreements. Bureaucratic red tape (particularly in the permitting process) can be an obstacle to recovery (Burnham and Cade 2003).

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