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The Endangered Species Act and Hands-on Species Restoration

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The Peregrine Fund is among the most experienced non-governmental organizations in hands-on restoration of endangered vertebrate species in the United States. Our group began working toward restoration of the peregrine falcon a few years before the enactment of the Endangered Species Act of 1973 (ESA) and have since played an important role in progress toward recovery of the endangered northern aplomado falcon, California condor, many endemic avian Hawaiian species, and several foreign species that are listed as endangered under the ESA, in particular the Mauritius kestrel and harpy eagle. We have also been involved in using section 10(j) experimental populations for releases of California condors in Arizona and Safe Harbor permits with the northern aplomado falcon restoration in Texas.

Given the breadth of our experience, we feel that we are well situated to comment on the ESA on its thirtieth anniversary. We begin by briefly reviewing the recovery programs in which The Peregrine Fund has participated.

Peregrine Falcon—The peregrine restoration effort was the largest species recovery program ever accomplished, extending throughout much of North America, lasting more than three decades, and even including collaboration with Europeans. The primary cause for the peregrine decline was DDT/DDE-induced eggshell thinning and reproductive failure (Cade et al. 1971). The use of DDT was banned in Canada in 1969 and in the United States in 1972 (Cade and Burnham 2003a). With the ban of DDT and the resultant decrease in environmental levels of the DDT-type compounds, where adequate populations of peregrines continued to exist numbers increased without assistance. Where the peregrine had been completely extirpated or greatly reduced (80-90%), release of captive-raised falcons re-established populations throughout most of its former range. The American peregrine falcon was removed from the endangered species list in 1999.

The Peregrine Fund expended an estimated \$13.4 million toward peregrine restoration with about half from public and half from private sources. At the height of the restoration effort we annually expended about \$800,000.

Why did Peregrine restoration succeed? First and foremost, the cause of decline of the species (DDT) was greatly reduced in the environment. Second, about 7,000 falcons were

released to the wild where peregrine populations were extirpated or greatly reduced (Burnham and Cade 2003*b*). This was facilitated by widespread cooperation and support led by a core group of dedicated peregrine enthusiasts, mostly falconers, who possessed considerable knowledge about the species. Peregrine restoration was largely a privately led enterprise. Third, state wildlife departments and federal land management agencies contributed importantly to the recovery program (Burnham and Cade 2003*a*).

Fourth, although restoration of the peregrine would have occurred even if the ESA had not existed, it is unlikely to have achieved the same level of success. The ESA provided a platform for cooperation, particularly among government agencies, and added a new source of funding, although much of it was consumed by government bureaucracy and not used for actual recovery implementation. The Section 6 funding to the states may have been the most important financial aspect for overall recovery. An annual appropriation earmarked by Congress for The Peregrine Fund for a number of years was also very important and enhanced our level of participation (Cade 2003). Finally, despite the FWS having the authority for implementing the ESA, and a number of their biologists contributing importantly to the recovery program, as an agency the FWS had a limited role, and its law enforcement division, which was in charge of issuing permits as well as enforcing regulations, was regularly an obstacle to recovery actions (Burnham and Cade 2003*b*).

Northern Aplomado Falcon—The FWS listed the northern aplomado falcon as endangered in 1986. The species had been lost from the United States as a breeding species by the early 1950s. It had previously occurred in the southwestern states of Texas, New Mexico, and Arizona. Although present in portions of southern Mexico, the aplomado falcon had declined throughout much of its range in northern Mexico. The disappearance of the aplomado falcon was likely the result of changing land management practices which reduced both the quantity and quality of the favored grassland habitat. The widespread use of DDT and other persistent pesticides may have prevented re-colonization. Improved land management and re-emergence of suitable habitat created a potential opportunity for species restoration. The Peregrine Fund began to experiment with captive breeding of this species in 1978 patterned after the successful peregrine propagation effort. In cooperation with the Mexican government, 25 nestling aplomado falcons were collected from the wild and a captive-breeding population was established. This program has produced 1,130 young, of which 1,004 have been released back into the wild (Jenny et al. 2004). Following an experimental release project (1984-1989), a full-scale restoration program began in 1990. The first breeding pair resulting from these releases was discovered in 1995, and in 2004 at least 39 territorial pairs had become established. Based on observations of unbanded birds and the difficulty of locating nests, many undiscovered pairs must exist. This new population is known to have successfully fledged more than 179 young. The recovery plan suggests that the aplomado falcon be downlisted to “threatened” status when 60 breeding pairs have been established (USFWS 1990). Currently more than halfway to this goal, we could expect to propose downlisting within the next decade. We are also monitoring and conducting research on small extant populations in Chihuahua, Mexico (Montoya et al. 1997).

Safe Harbors have been critical to our success in Texas where more than 97% of the habitat is privately owned. This conservation tool represents the “carrot,” rather than the “stick” approach to species recovery. Most landowners value wildlife but are concerned about land-use restrictions that could arise as a result of the ESA. The Safe Harbor program for this falcon now includes 57 counties in Texas and has more than 1.6 million acres of habitat enrolled. It has provided access to suitable habitat for the recovery of the aplomado falcon while protecting landowners from restrictions associated with the ESA through an incidental take permit (Jenny 2003).

The mechanics of a Safe Harbor are, however, difficult to explain to landowners, and agreements are primarily negotiated as a result of personal trust developed between the landowner and field personnel of The Peregrine Fund. Key to the success of this effort is that The Peregrine Fund, rather than the government, is the broker for these agreements.

Efforts are also underway to establish an aplomado falcon restoration program in New Mexico and Arizona. Unlike Texas, these states have large areas of public lands on which the Safe Harbor cannot be legally applied. A proposal to allow for the establishment of an “experimental nonessential population” designation (see explanation below) is being processed to facilitate development of a restoration program in those states. Both state wildlife agencies and the FWS support the concept, but some environmental groups oppose the proposed designation and are threatening litigation to stop its potential use. As an ESA-listed species, the falcon is seen by some as a convenient tool to restrict activities such as grazing, energy development, and recreation on public land through a “critical habitat designation” for the falcon.

The Peregrine Fund has accomplished all aspects of this hands-on recovery, and our involvement has been 93% privately funded. We anticipate having raised and expended more than \$8.5 million on this project through FY04 with annual expenditures of over \$1.1 million.

Why is this program succeeding in Texas? First, the probable causes of the aplomado falcon’s decline may no longer exist and suitable habitat is again present. Like the successful peregrine restoration, there has been almost universal cooperation. The program is largely a privately led endeavor implemented by a highly motivated and dedicated core group of people, the state wildlife agency is supportive, considerable private funding is being contributed, and private and public land managers are engaged. Lastly, the Safe Harbor program allows for the vital participation of private landowners by reducing concerns associated with the ESA.

California Condor—Only 27 condors existed in 1987 when all wild condors were brought into captivity. In November 2003, the first successful reproduction occurred in the wild when condors released by The Peregrine Fund in Arizona bred and fledged a chick, the first California condor flying in nature untouched by human hands in over two decades.

The probable causes for the condor decline were a reduced food base (loss of the large

mammals during the Pleistocene compressing their range to the Pacific Coast from southern Canada to Baja California, Mexico), human persecution, probable DDT/DDE-caused eggshell thinning during the 1950s and 1960s, and lead poisoning (Kiff et al. 1979; Pattee et al. 1990). Lead poisoning remains an unresolved problem (Cade et al. 2004).

At the request of the FWS and California Condor Recovery Team, The Peregrine Fund agreed in 1993 to develop a captive-breeding facility and a release program in northern Arizona. In August 2004, we held 55 condors (14 nestlings and 41 adults) in the captive flock and managed 53 condors in Arizona, of which 47 were free flying; two nestlings and the remaining four were in holding facilities awaiting release. These birds represented 40% of the total world population.

The release of condors in Arizona was made possible through use of section 10(j) of the ESA as an “experimental non-essential population.” This allows for the establishment of a population of a listed species with fewer ESA restrictions than would otherwise be imposed on land use and other human activities in the area. By using this exemption, and after the FWS signed an agreement saying the condors would be removed if the special status was changed, most of the fears expressed by the local communities and landowners were reduced to the point they agreed to support, or at least not to oppose, condor releases. Since then we have enjoyed excellent local, private sector support and cooperation.

The Peregrine Fund’s participation in the condor program is funded by a mixture of about 50:50 public and private funding. We anticipate expending \$6.6 million dollars from FY93 through FY04 with annual expenditures now exceeding \$1.1 million. There has also been \$1.5 million in facility construction costs.

Why is the program succeeding in Arizona? With the exception of mortality from ingesting animals shot with lead pellets and bullets, the natural environment in northern Arizona and southern Utah is well suited for condors (Cade et al. 2004). By using the 10(j) exemption within the ESA, the local people and communities are supportive, as are the Arizona and Utah state wildlife departments.

Endangered Hawaiian birds—Hawaii has more threatened and endangered species than any other state. The causes of decline of avian species and extinctions are attributed primarily to three factors—loss of habitat, introduced disease (malaria and pox) and their vectors, and introduced predators (rats, cats, and mongoose). At the request of the FWS, in 1993 The Peregrine Fund agreed to establish a release program for the endangered ʻalala or Hawaiian crow on the island of Hawaii. This followed litigation by environmental groups against the FWS and the landowner upon whose land the last wild crows persisted. The landowner kept people out believing proposed government actions would result in the extinction of the crow. The legal settlement resulted in (1) the landowner allowing access to the property and (2) the implementation of a FWS-managed restoration program for the crow.

Following the initial successful release in the wild of captive-raised crows (Kuehler et al. 1994, 1995), FWS requested The Peregrine Fund assume a larger role in the recovery effort for endangered Hawaiian birds. Working with FWS, the State of Hawaii, the Hawaiian Congressional delegation, and others, federal funding was secured, and we constructed a captive-breeding facility near Hawaii Volcanoes National Park on the Big Island, assumed management of and renovated a state-owned facility on Maui (Olinda), and began working with the other endangered Hawaiian birds. From 1993 to 2003, the program hatched and raised 518 chicks of 14 endemic taxa, eight of which are listed as endangered (Kuehler et al. 1996, 2001). Three endangered species have been released to the wild, totaling 97 individuals—60 puaiohi (Kuehler et al. 2000), 27 `alala (Kuehler et al. 1995), and 10 palila (Lieberman and Hayes 2004). Released individuals of the puaiohi are confirmed breeding in the wild (Tweed et al. 2003). We transferred the entire program (facilities, staff, etc.) to the Zoological Society of San Diego (ZSSD) after completing the construction and renovation of the propagation facilities, developing technology for management, breeding, and release of a host of species, and having developed a competent staff.

The Peregrine Fund expended approximately \$3.5 million for construction during its involvement, of which most were public funds. Annual operating expenses are now approximately \$920,000 less overhead costs which are not charged by the ZSSD.

Despite continued successes at the captive-breeding facilities, many of the released Hawaiian crows have died. All of the released crows that survived have been brought back into captivity to protect the remaining genetic diversity. The continued survival of the last two known wild crows remains in doubt, and as a species the Hawaiian crow is possibly extinct in the wild.

Why has avian species restoration in Hawaii not experienced the success of the other programs? First and foremost, the reasons for decline and extinction of species have not been successfully reduced or eliminated. Captive flocks and breeding may prolong the existence of these species but do nothing for their preservation in nature. Although there has been some progress on several fronts (Department of Forestry and Wildlife 2004), not enough progress has been made in Hawaii to change significantly the long-term prognosis for most native Hawaiian avifauna. There must be a serious commitment to landscape-wide habitat management measures if success is to be achieved (Scott et al. 2002). Species can be saved and success is possible, but only with a commitment of effective action commensurate in scope and effort to the reasons for the declines and extinctions.

International Endangered Species—Some species are listed under the ESA as endangered despite being extra-limital to the United States. Two of those species with which The Peregrine Fund worked are the Mauritius kestrel and the harpy eagle. The Mauritius kestrel, once reduced to only two breeding pairs in a remnant pocket of native habitat, has made a spectacular recovery and nearly 1,000 birds now exist in the wild ©. Jones pers. comm.). This was a highly cooperative project with national and international support and involvement. The primary causes

of the kestrel's decline were loss of habitat and introduced exotics. Both problems still exist. The kestrel's adaptive nature, however, facilitated recovery once captive-hatched young were introduced into modified habitats and gained access to alternate, exotic prey (Cade and Jones 1993, Jones et al. 1991).

For this restoration project The Peregrine Fund provided financial and technical assistance, including the participation of a senior staff member during the breeding season to handle egg incubation and the hatching and rearing of young kestrels. Mauritius kestrels were also brought to our Boise, Idaho, facility and bred. Our attempts to return their progeny to Mauritius for release proved to be extremely difficult because of cumbersome FWS permitting and obtuse bureaucrats. Even though permit applications began a year in advance, the captive-produced young could not be exported to Mauritius at the correct age for release. The regulations did not accommodate the biology of the species or recognize that the birds belonged to the Government of Mauritius. We finally transferred the kestrels to propagators in Great Britain to bypass the ESA permit bureaucracy.

The harpy eagle was propagated in the United States, and five young were sent to Panama and released as part of a pilot project to develop restoration techniques for large forest eagles. Hoping to avoid the permitting problems experienced with re-exportation of the Mauritius kestrel, the FWS issued a permit that would expedite export and import of harpy eagles. Despite this modification in permit policy, and for the long term, it was decided breeding eagles in the U.S. for release in Latin America was impractical. A captive-breeding facility was established in Panama, and all of the eagles were transferred there. Released captive-bred eagles are now independent of human care in Panama and Belize as we consider beginning a restoration program for the species in Central America.

Discussion

Most people agree with the importance of saving species from extinction. Problems arise in defining what that means and how to achieve that objective. This is particularly true when legal requirements for preserving threatened and endangered species are in conflict or competition with human needs and desires for resources. We have been fortunate in our ability to limit the conflict associated with our recovery efforts. One important reason is we work cooperatively and collaboratively to prevent extinction and restore viable wild populations for those species on which we are focused (Burnham 1997).

Most endangered species depend significantly on habitats found on private lands; and some only occur on such lands (Bean and Wilcove 1997). Hawaii (225 listed species) and Texas (70 listed species) have only 16% and 1%, respectively, of federal land (Wilcove et al. 1996). Use of Safe Harbor and experimental non-essential population status reduce concerns of private landowners and users of federal lands, thus making it easier to work on ESA-listed species. Creating private landowner incentives are critical to endangered species recovery in many cases

(Brook et al. 2003).

The designation of critical habitat may be most useful and justified when it is applied to special, localized habitats that are 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 springs snail). However, when it is applied to major habitat units on a wide scale encompassing millions of acres (e.g., old growth forest for the spotted owl or the proposed designation of major reaches of the Chihuahuan Desert in southern New Mexico for the largely non-existent 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 conveys little additional protection to a listed species that is not covered under other provisions of the ESA. Considering the high costs involved in designating critical habitat and defending against lawsuits associated with it, the benefits of designating critical habitat for the conservation of listed species appear to be problematic, even unjustified.

Lessons

What can be learned from our experience about species restoration and the ESA? Of primary importance is that successful species restoration cannot occur unless the initial reason for population declines and extinctions are significantly reduced or mitigated. For those species with which we have had experience, conservation actions under the ESA have **not** importantly affected the causes of population declines. Use of DDT was banned prior to the ESA of 1973 and the peregrine was otherwise already protected by state and federal law. Before passage of the ESA, the California condor was protected against human persecution by the State of California and the Migratory Bird Treaty Act (MBTA); habitat protection was never an important issue, but no actions to reduce the presence of lead have been taken. Changes in ranching and land management practices allowing for possible aplomado falcon restoration in Texas occurred before the falcon was listed under the ESA. There have yet to be any measurable effects on the causes for declines and extinctions of endemic Hawaiian species resulting from the ESA. Therefore, the additional direct and indirect (habitat) protection provided by the ESA has not enhanced recovery of those species with which we have worked, although in Hawaii it 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).

Has listing a species as endangered benefitted restoration? For the peregrine it probably did by attracting attention, accelerating and enhancing its restoration, although the eventual recovery was likely to have occurred irrespective of the ESA (Burnham and Cade 2003a). Having the peregrine falcon listed as an endangered species increased support.

The role of the ESA in the recovery of other species with which we have worked is less certain. Restoration actions for the California condor in Arizona and aplomado falcon in Texas are being accomplished using tools that essentially remove most protective restrictions imposed

by the ESA. Without these tools it is unlikely that either program would have been possible -- certainly not at the current level. The successful expansion of the aplomado falcon restoration program into New Mexico and Arizona will also be aided by the experimental, non-essential population designation being applied there.

In species restoration efforts in Hawaii, the ESA has facilitated the expansion of funding from the FWS to build facilities for the captive propagation, as well as transferring funds to the State via Section 6 allocation, but it has done little to correct the root causes of species endangerment.

Just the threat of listing can cause both benefits and problems for a species. Prior to the anticipated passage of the ESA in 1973, several private individuals took peregrines from the wild; they later became the foundation for the captive population and restoration program. People knew such taking would become impossible after the ESA was passed and the peregrine became listed (Burnham 2003). 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. Even without the ESA and listing, however, people concerned about the peregrine and grouse would have worked for their conservation. On the negative side, it is common knowledge that the petition for listing the black-tailed prairie dog resulted in large-scale poisoning of their colonies by landowners who feared intrusion on their property by the FWS. Other examples included the Preble's meadow jumping mouse and red cockaded woodpecker (Brook et al. 2003, Pickrell 2003). 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, its delisting from the ESA is far more difficult, even when it no longer meets the criteria for "threatened" or "endangered." So few species have been delisted as a result of the ESA that procedures are largely unfamiliar. To delist the Arctic peregrine from threatened status took about three-and-a-half years from the publication of the delisting proposal to the final Federal Register notice. The American peregrine falcon delisting process required four years and three months. First was a Federal Register notice considering delisting, then three years later a notice of the proposed delisting, and a year later the actual delisting (Burnham and Cade 2003b). Opposition to delisting of the American peregrine falcon occurred largely from organizations that commonly use litigation to further their environmental agenda and individuals who had made a career working on peregrine restoration. Still to be delisted is the bald eagle which has not met the ESA criteria for "threatened" or "endangered" for many years.

Do recovery teams contribute to species restoration? Following enactment of the ESA four regional recovery teams were established for the peregrine falcon to write (and update) recovery plans and to advise the FWS. Although there were multiple recovery teams for the peregrine, they were of manageable size and were largely made up of peregrine experts and others appointed to expedite recovery within agencies. They advised only on strategic programmatic issues as requested by the FWS. In large part they did the jobs requested of them and their contributions

facilitated restoration. They functioned under the 1974 guidelines developed by the head of the FWS Office of Endangered Species, Keith Schreiner, “What a recovery team is and is not—What a recovery team does and does not.”

The FWS contracted to have a recovery plan written for the aplomado falcon (USFWS 1990) but no recovery team was created, nor was one needed. Effective coordination has been accomplished through regular communication among municipal, state, federal, and private cooperators and most aplomado falcon experts are actively involved in recovery actions. Also, the recovery program is fairly straightforward.

The function and composition of the California condor recovery team has changed over time from a small group of experts focusing on strategic issues to a large group of stakeholders attempting to micro manage restoration actions. The value of the team to implementation of restoration program diminished with those changes. In Hawaii, where the conservation issues are nearly overwhelming, recovery teams required over ten years of discussion to update and draft two recovery plan revisions (ʻalala and Hawaiian forest birds) that are just now being reviewed by the public.

A secondary, and many times more important level of organization than recovery teams, are what have come to be called “working groups.” Largely through the leadership of state wildlife departments, working groups were formed in many states to coordinate and expedite peregrine recovery actions (Burnham and Cade 2003*b*). These were largely informal groups of cooperators, usually within a single state, that gathered as needed to make plans to facilitate and help fund recovery actions. Participants were from state wildlife departments, who usually helped organize the meetings with The Peregrine Fund or other leading private organizations, federal land agencies, and private property owners where peregrines were to be or were being released. These were congenial gatherings frequently followed by everyone adjourning to a local bar to have a few beers together. This arrangement still largely applies to the aplomado falcon. In the case of the California condor in Arizona the working group has been formalized by the FWS and has gone from a small group of cooperators to a large, formalized, growing body of mostly agency people led by the FWS. As with the condor recovery team its function has transformed from program facilitation to micro-management.

Recovery plans written for the peregrine by the teams comprised four different original documents and later a couple of updated revisions, one of which was never finalized before the falcon was delisted. The four documents varied in length and detail as did their ultimate value to the recovery efforts (for more detail see Cade and Burnham 2003*b*). The recovery plan for the aplomado falcon, written by a single author, provides a good review of the falcon’s biology and explicit suggestions for recovery along with criteria for downlisting. A recovery plan for the California condor program was first approved in 1975 and revised, then re-approved in 1996. The revised California condor plan provides a list of potential recovery actions but was written prior to when condor releases began and is now outdated. There is no apparent value for revision.

Fortunately, recovery plans are not mandated for ESA-listed extra-limital species.

Who has been involved in species restoration programs? A currently popular term is “stakeholder.” We interpret this term to mean those individuals and organizations that have a stake in, or could be affected by, restoration actions. Although national and even international cooperation and coordination have been needed to implement restoration programs, working with stakeholders, including local people, landowners, and communities where actions are to occur, has been very important to the successful projects in which we have been involved. Species restoration programs require trust to succeed. Having the buy-in and trust of those people and communities was critical to implementation and the long-term success of the program. People often do not trust governments; they do tend to trust other people. Trust cannot be legislated; it only develops over time and through experiences with others.

In Arizona, early opposition to California condor releases resulted largely from restrictions imposed on timber harvest and resultant job losses after petitions for listing the northern goshawk were filed, even though the goshawk was never listed. An early public hearing on the proposed condor release had uniformed, armed law enforcement officers present. After a private meeting between the Arizona governor and The Peregrine Fund, arranged by a supportive local rancher, and a final public meeting in which we stated we would not participate in this project without the support of the local communities, public trust developed and the project moved forward.

Involvement of state wildlife agencies in species restoration has been important. Even if the state did not have a hands-on role, their involvement was important to facilitate and support recovery efforts. With the peregrine program the roles of states varied greatly, but, where a successful program existed, the state wildlife department was supportive and involved (Oakleaf and Craig 2003). This remains true for the current efforts with the aplomado falcon in Texas, the California condor in Arizona and California, and the forest birds in Hawaii.

Successful restoration programs with which we have been involved have also enjoyed extensive participation by the private sector. The private sector had the leadership role in peregrine restoration, but state wildlife departments and federal land management agencies were also integral. A similar situation exists for the aplomado falcon in Texas and California condor in Arizona. In Hawaii, in addition to the participation by ZSSD, leaders in restoration programs within the private sector have been The Nature Conservancy, Kamehameha Schools, the Silversword Foundation, and public-private partnerships such as the Olaa-Kilauea Partnership. The Mauritius kestrel recovery, probably the most dramatic restoration of a raptor ever accomplished, was privately led, and the same has been true for efforts with the harpy eagle in the Neotropics, although in both cases local governments are supportive and helpful much as states have been in the U.S.

What biological knowledge and type of science is needed for recovery? Knowledge of species in

jeopardy is very important, including information on basic biology and ecology and, in particular, knowing why populations have declined and what are the primary limiting factors (e.g., winter habitat, food during breeding, etc.). Fortunately for the peregrine falcon, before populations declined considerable knowledge existed about the species from research and publication and through centuries of its use in falconry. Further research was then accomplished documenting the level of population declines and trends and to determine the cause (Newton 2003). All of this information ultimately benefitted recovery. Also accomplished, but at considerable expense and of no useful value for recovery, were habitat evaluations and other “research,” mostly funded by federal land management agencies and many times accomplished by individuals with limited knowledge and experience about raptors in general and peregrines in particular. Resulting reports were rarely used or even opened by biologists accomplishing actual recovery actions. Much of this work consisted of due-diligence studies agencies believed necessary to comply with requirements of the ESA and the National Environmental Policy Act. Agencies also expended funds to accomplish surveys of peregrines in areas where they were known not to exist and in some cases never had existed. A similar situation has developed with aplomado falcon restoration in New Mexico. Prioritizing expenditure of the limited ESA funds for information gathering is very important but has often been done without careful consideration.

Use of “the best available science” to guide species recovery is touted, but although the scientific method is pure, scientists, lawyers, other professionals are subjective humans. Common sense and honesty cannot be legislated, and one cannot remove personal opinions, bias, conflicts of interest, and agendas from endangered species issues. Particularly for scientists, the public values and appreciates honesty (including admitting errors), accuracy (stating clearly what is known and not known), and integrity (not allowing results to be misrepresented or used in an unprofessional manner) (Burnham and Cade 1995). The need to keep objective, unbiased science, however relevant to societal problems, free from political alliances is critical (Brussard et al. 1994). Unfortunately many times this is not the case (White and Kiff 1998).

How much funding is needed for species recovery? We provide approximate dollar amounts expended for U.S. restoration projects in which we have been involved. The amounts reflect only those aspects of a restoration program which we accomplished and not the total amount expended by all involved. For hands-on restoration in the U.S., The Peregrine Fund probably expended over half of all moneys for the peregrine and nearly all spent so far for the aplomado falcon. Hands-on restoration programs are expensive and every effort should be made to prevent species from declining to a level requiring such action to cause recovery or to prevent extinction. Expense for recovery increases 10,000-fold when one moves from management where the species exists as part of functional ecosystem maintenance to highly focused hands-on restoration (Conway 1986).

Hands-on restoration can also require long term actions. Restoration of the peregrine took about three decades, aplomado falcon restoration will likely require two decades, California condor restoration may extend a half century or more, and Hawaiian bird restoration many not

have an end point. Obtaining sufficiently long term funding for such projects is very difficult as the private sector and government both tire in their support of such projects.

Annually the FWS expresses a need for additional dollars for endangered species, and most years the Congress responds favorably, although they are criticized by many environmental organizations for not doing enough. Annual appropriations have never approached the limits authorized by Congress, in particular endangered species funding has to compete with other overall budgets set by the Office of Management and Budget. Increases provided to the FWS do not necessarily mean more dollars for actual recovery actions, as developing and maintaining the bureaucracy for implementing the complex regulations associated with the ESA are expensive. Although public funds are critical and appropriate for species recovery programs, we believe that programs in which individuals and private organizations are willing to assist financially, demonstrating their support, are more likely to succeed than if they are supported only by government funding. Dollars contributed in support of restoration actions for a species reflect the buy-in and commitment of the public, and even the nation. Obviously, some species are more appealing than others and less difficult for which to find support, but it should be possible to develop a constituency for most species with enhanced private sector goodwill and involvement.

How does permitting action affect species recovery? The ESA and its implementing regulations are extensive and complex, especially in regard to ESA permits (Burnham and Cade 1995). Permits and the permitting process have discouraged species conservation actions and hindered research and recovery actions. Although the FWS is trying to simplify the permitting process, the existing regulations and other related acts (MBTA, Wild Bird Conservation Act, etc.) limit what can be accomplished without legislative changes. Although most new administrations promise to reduce the complexity and enhance the function of the FWS regulations, the bureaucracy resists and largely remains unaffected as it continues to grow.

Recommendations

Although the actual changes to the ESA over the years have been few, through litigation, regulation, and the attitude of some FWS staff it has evolved from having the appearance of an incentive-based to a punitive-based law. In recent years, there has been an attempt to change the appearance to one of incentive by development of the 10(j) and Safe Harbor programs, although their effectiveness is diminished through increased bureaucratic complexities being imposed by FWS staff (Bean et al. 2001). Reversing this trend through simplification and modification of associated regulations, if not changing the ESA itself, is necessary. The attitude and approach of FWS staff, by and large, must also change.

We provide the following specific recommendations relative to the ESA. Our general overriding recommendation is refocusing the act on incentives versus punitive actions related to

endangered species conservation and restoration. This should be emphasized in relation to private property, state authority, and to greatly reduced litigation.

Listing and Delisting Species Under the ESA—Petitions for listing should only be accepted from established experts on the species under consideration. The emphasis by the FWS has been on listing species under the ESA. Despite FWS efforts, many potential candidate species are reportedly still awaiting action, mainly because of budgetary constraints imposed by the Congress. Although we understand the importance of listing species that are truly in jeopardy, delisting should also be a priority, even if for no other reason than proof of results and success; but delistings are often held up for a variety of reasons. The bald eagle, for example, was originally proposed by FWS for delisting 10 years ago, but action has been held up by those who are concerned about the adequacy of habitat protection after the eagle is removed from the list—a misapplied application of the “precautionary principle.” It would be better to transfer all 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).

Recovery Teams—Recovery teams should **not** be implementing bodies for species recovery, and members should understand they serve at the pleasure of the FWS and are only advisory. Teams should be comprised of a small group of biologists, no more than seven to nine individuals selected on the basis of their scientific understanding of the species and its threats. When individuals are included to represent agencies, etc., all organizations (particularly governmental) wish representation on the team, resulting in very large teams that become inefficient, expensive, and difficult to manage. Teams should not be led by or have FWS participation unless a FWS staff person happens to be a leading expert on the species. When FWS staff are placed in leadership roles with recovery teams they can attempt to dictate policy and make unilateral decisions, circumventing the team’s value and purpose. FWS staff affiliation with teams should be only for facilitation of team activities.

Recovery team membership should be carefully screened to avoid conflicts of interest. This precaution is especially important when recovery team recommendations could result in the awarding of contracts to recovery team members or their organizations. Also, teams should have the choice to meet privately (without FWS) or to invite others, including the general public, to meetings. If all meetings are public, however, meaningful discussion by team members can be impaired. The primary function of a recovery team is to write a recovery plan and submit it to the FWS for approval. After that it may be disbanded, or at the discretion of FWS it may continue to serve in an advisory capacity, annually reviewing overall strategic issues.

Recovery Plans—The recovery planning process has the greatest value when there has been limited consideration for a species’ recovery. The process tends to help organize thoughts and actions and set goals. The actual plan, we believe, should be brief—only a few pages stating the problem and providing general recommendations and direction to reach stated recovery goals for

downlisting and delisting. Long detailed documents requiring years to write with a long approval process usually result in plans that are outdated even before they are finished and of limited value (Burnham and Cade 2003b). Shorter plans help simplify revision and updating based on new and better information as recovery programs progress. They are also easier to understand. Plans should not be detailed budgetary documents with dollar amounts, as their projections may be unrealistic, and no one active in the recovery pays any attention to them.

Implementation Agreement—We recommend that after the above-described species recovery plan is developed by the biological experts of the recovery team, stakeholders should meet and discuss the implementation for a species' recovery. Public meetings should occur much as they do for implementation of an “experimental non-essential population” and Safe Harbor. It should be at this level that input, needs, recommendations, and involvement of stakeholders occur. From these discussions an implementation agreement can be developed between the FWS, local communities, and other interested parties, much as habitat conservation plans are accomplished. These meetings and the agreement should result in stakeholder buy-in. Although total agreement among all involved may not be possible, if people know where they stand and what is to happen the potential for collaboration is much more likely. 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. By allowing the biological experts (recovery team) and the recovery plan to focus on what is necessary for species recovery and not to become entangled in the desires, political interests, etc., of stakeholders, a better plan would result and a more functional recovery team would exist to advise on strategic biological recovery issues. Working groups should then help facilitate recovery implementation, to be accomplished by the most qualified and appropriate individuals and organizations.

Working Groups—The working group is a useful organization to **facilitate** recovery if participants are limited to those actually contributing to the restoration effort. It functions best when led by the organizations/individuals actually accomplishing most of the recovery action and in cooperation with appropriate state wildlife agencies. FWS leadership is unnecessary unless its staff are actually involved in the restoration project.

Federal Agencies—The role of the FWS should strictly be oversight and facilitation, not implementation of restoration projects/programs. The attitude of FWS administrators should change from that of ESA enforcers to endangered species recovery facilitators. They should try to find ways to make species recovery possible rather than using the ESA as a vehicle to control actions of other agencies and the private sector. Land-holding agencies should be primarily engaged in support of recovery implementation. The Act states that all departments and agencies should use their authorization in furtherance of the Act.

States—State governments and wildlife agencies should be given an increased responsibility for ESA species recovery implementation. In the long term, much of what the FWS is attempting to accomplish should be transferred to qualified state agencies, along with related funding.

Conservation of endangered species needs to become a local desire and project. Local people are more likely to trust state wildlife agencies and governments which are usually more readily accessible and sensitive to their concerns than the federal government. States better understand local situations and are more likely to work locally and to cooperate with the private sector.

Restoration Implementation—Actual implementation of recovery actions should be accomplished by those best qualified in the private sector, state wildlife agencies, and federal agencies. As much as possible, private landowners should also be included and compensated for their participation in actual recovery efforts.

Research and Recovery—Having the best possible information is important to guide recovery actions for species, but research should not usurp or 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, as appropriate. A part of recovery should be to monitor recovering populations to help evaluate the success or failure of restoration actions. Monitoring should primarily be focused on the actual species, not habitat or other factors. Federal land management agencies should carefully evaluate use of ESA funding and support actual recovery actions first and research secondarily. Research should be left to those whose function is research.

Regulations and Permitting—Regulations related to the ESA are extensive and complex and overlap with those for other laws and treaties. This is especially true for permitting (Burnham and Cade 1995). Regulations should be reduced, streamlined, and simplified. Included in this should be removal of all extra-limital species from the ESA. A comprehensive permit (inclusive of all applicable laws) for qualified organizations should be developed eliminating the need for multiple permits, applications, and reports. Individuals outside of government should be engaged to help find solutions and promote change. Every effort should be made to increase the flexibility, efficiency, and effectiveness of the ESA. .

Funding—Future increases in ESA funding appropriated for the FWS and other federal agencies should be focused primarily on implementation of recovery actions and be designated to qualified state wildlife agencies and for private sector initiatives. An audit of how current funding has been and is being used by the FWS and other federal government agencies should be accomplished as a first step to find ways to reduce bureaucracy and move more dollars to accomplish effective action for species restoration.

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, land owner support, resulting from conflicts over designation of "critical habitat," "take," and other punitive measures, and litigation will continue to stymie recovery and consume dollars critically needed for recovery actions. The Administration and Congress should consider passage of a new law dealing with habitat and biome conservation. A first step would be to inventory all

public lands, non-profit 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).

To achieve ecoregion conservation and management we must realize that although sustainable multiple use of public lands is possible, it is frequently not practical in situations where economic uses conflict with non-consumptive uses. Identifying a priority use or uses is important. It is unrealistic to think that one area of land can be managed to benefit equally every potential use or user. Some land is better suited for livestock grazing or more important for mineral development, while other areas may be most important for the winter range of deer or elk. Activities do not necessarily have to be mutually exclusive, but prioritization is needed most of the time. A law focused on ecoregion conservation and management where habitat debate and resolution could occur would make it possible to re-focus the ESA on endangered species, which was its original intent.

ESA-Consideration should be given to altering and to creating objective definitions for “endangered” species to emphasize their level of jeopardy and urgency (Cade 1998). Many species listed as endangered or threatened have different levels of threat and need for immediate action to prevent extinctions. The “threatened” category is too vaguely defined and should be eliminated.

The Safe Harbor is not specifically permitted by the ESA now; it is a concept of policy largely based on the 10(j). The Safe Harbor should be included as an integral part of the ESA and the 10(j) should be amplified and clarified by including the “open-minded” Safe Harbor concept for application in a mixed land status of federal, state, tribal, and private properties. Section 10(j) rules may be too rigid to really engender cooperation by private, tribal, and even some federal (Department of Defense) landowners for restoration projects.

The overlapping meanings and functions of “harm” and “critical habitat” need to be reexamined. Presently the definition for “take” varies among FWS offices. At one office an endangered species permit is required to conduct even a “hands off” survey for aplomado falcons. We recommend that the definition and provision 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 needs for protection of essential habitat of listed species. Where essential habitat needs protection on private lands, owners should be compensated through a system of purchase, leasing, easements, or other economic incentives.

The ESA addresses cooperation between the federal government and the states. It would be a better law if it included conservation and research organizations, universities, and private landowners as cooperators. We believe the ultimate success or failure for conservation of all species will not be dictated or accomplished by government alone. Private sector involvement,

commitment, cooperation, and leadership are crucial and will ultimately determine the success or failure of saving endangered species (Burnham and Cade 2003*b*).

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