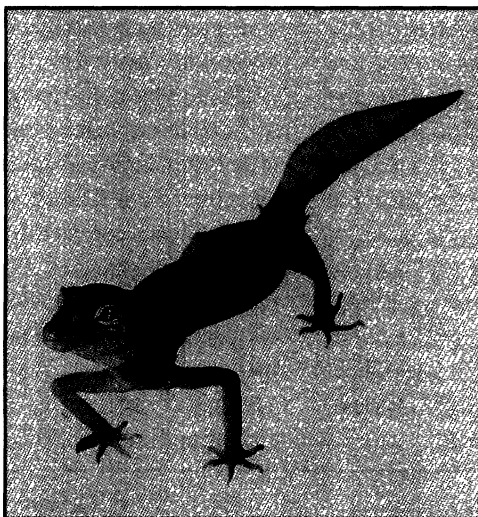
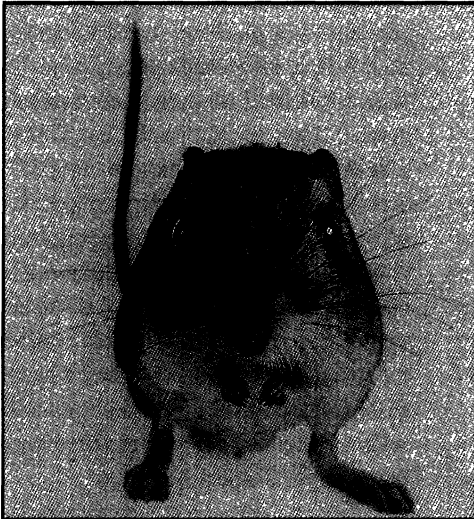


# Endangered Species UPDATE

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School of Natural Resources and Environment  
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# Improving Habitat Conservation Planning: The California Natural Community Conservation Model

Michael A. O'Connell and Stephen P. Johnson

The early 1980s marked an important change in the way the federal Endangered Species Act (ESA) was implemented on private land. Using the lessons learned from a project on San Bruno Mountain on the San Francisco Peninsula, Congress amended Section 10(a) of the ESA in 1982 to include a provision that has come to be known as Habitat Conservation Planning (HCP).

This provision allowed private landowners and developers, while in the course of their business, to incidentally "take" (harm or kill) a protected species by destroying some of its habitat. In exchange for this permission they were required to create a conservation plan with assured funding that, through avoidance, minimization and mitigation, left the species as a whole no worse off. The intent of this provision was both to relieve some of the burden on private landowners stemming from the strict prohibitions of the ESA and to create a planning process that facilitated conservation of species in ways not possible through prohibitions alone (e.g., habitat restoration, management).

The HCP provision was infrequently used throughout the 1980s except for a dozen plans in California and one each in Texas and Florida. But, through encouragement and promotion by the Clinton Administration and its increasing appeal to private landowners, a conservation planning explosion has occurred over the last five years. U.S. Fish and Wildlife Service (FWS) statistics show nearly 400 plans completed or in development by the end of 1996 (FWS 1997).

This article takes a critical look at the limitations, for conservationists, private landowners and local governments, of the Section 10(a) legal framework for conservation of biodiversity. It contrasts this with the California Natural Community Conservation Planning (NCCP) program, an effort to move beyond traditional HCPs toward greater conservation and economic outcomes through an ecosystem-based planning

model. Finally, it suggests that while ecosystem conservation is occasionally possible under current law, it would be far better to use the lessons learned from NCCP to create an explicit framework of policies that defines and enables key elements of ecosystem-based planning.

## HCPs: Can we do better?

HCPs have come under increasing scrutiny as their use has grown. Bean et al. (1991) published the first review of the provision, a case study analysis that suggested many improvements for implementing HCPs. Several other similar works followed, and, by 1996, most of the national environmental organizations were conducting their own studies of Section 10 and its implementation.

Recent attention to HCPs as a conflict resolution and conservation tool has also generated controversy from nearly all quarters. The environmental community has generally perceived HCPs as undermining the strict protections afforded species under the ESA, while the private sector has complained of costly and uncertain outcomes of the planning process. Many local elected officials have been particularly loath to accept Section 10, at least the way it has historically been implemented, since it has the effect of inserting the FWS into the local land-use planning process, with little input from them or the community. Table 1 identifies many of the concerns expressed about conservation planning by the private sector and environmental community.

Regrettably, most of these criticisms are true. About 85 percent of HCPs are for single landowners, single species and relatively small areas. This project-by-project approach to permitting defines the historical implementation of Section 10 by the FWS. Although the FWS recently began encouraging large-scale HCPs (such as the Balcones Canyonlands plan for several hundred thousand acres around Austin, Texas, and the Plum Creek Timber plan in Washington for more than 400,000 acres) these have been the exception. Not only is it difficult to demonstrate conservation benefits from plans that encompass a small portion of a species range, but it is almost impossible to attain the standards and goals envisioned by the ESA and the environmental community with a piecemeal approach to protection based on listed species.

Even harder to prove have been the private sector benefits offered by Section 10(a) permits. It is no secret among those who study conservation planning that the guarantees and efficiencies (collectively known as "assurances") promised by HCPs are what brings private landowners to the table and keeps them there (Dwyer et al. 1995). This fact is even beginning to be appreciated among the grassroots environmental community. Yet, most of the assurances under Section 10 are fairly narrow and short-term. For example, the current law only allows take permits for listed species. The FWS currently lists 1,050 U.S. species as threatened or endangered; including former Category 2

Environmental Community	Regulated Community
Little funding for plans and "no surprises"	Lack of certainty
"Jeopardy" too weak a standard	Unreasonable costs
Few public participation opportunities	Imbalanced allocation of costs
Ineffective management provisions	Agreements not reliable
Poor oversight of plan implementation	Science lacks rigor
Small ownerships lead to fragmentation	Planning process not predictable
Species focus too narrow	Implementing not streamlined
Lack of credible scientific input	Not enough public funding

Table 1. Expressed concerns of stakeholders regarding Section 10 HCPs.

candidates, more than 4,000 species may be listed in the future (FWS 1997). None of these unlisted species is eligible for a take permit under an HCP in the current law. In many areas of the United States, the number of at-risk species is so great that as a plan is completed for one species, more become listed, rekindling the controversy. Clearly, all these species require conservation action, but the ESA currently offers little incentive or assurances for private landowners to undertake it until the last possible moment.

Local governments who have assumed a coordinating role in an HCP process have often been frustrated as well. For example, Riverside County, California, began a habitat conservation planning process in 1988. When it was finally completed, after nearly seven tumultuous years, it provided land-use planning assurance for a single species, the Stephens' kangaroo rat (*Dipodomys stephensi*). During that time, the Riverside fairy shrimp (*Streptocephalus woottoni*), the California red-legged frog (*Rana aurora draytoni*), and the California gnatcatcher (*Poliophtila californica*) were all listed. Despite reaching a solution for the kangaroo rat, Riverside County and its private landowners were left on the hook for these and potentially other species. The process also left many local officials and stakeholders with deep-seated animosity toward federal involvement in the local land-use planning process on private lands under the ESA.

### An ecosystem-based approach to conservation planning

Do such stakeholder criticisms mean that conservation planning is unworkable? Should we abandon it in favor of litigation and conflict? From the conservation side, we think absolutely not. One look at history (or the Los Angeles Basin) shows who wins when species conservation and economic progress butt heads.

The answer lies instead in the focus of the planning process. It must shift from listed species to ecosystems, one of the two main goals of the ESA according to the statute's purpose clause. In our experience, most everyone agrees that instead of waiting until the last minute to begin conservation activities in response to the threat of legal action under the ESA,

we should focus scarce financial resources on communities of species, the habitats they utilize, and the ecological processes that sustain them to achieve the highest chance of success. Concentrating on ecosystem-based planning, instead of planning for habitat of a species, is the appropriate ecological approach, scale and timing. This idea does not mean we should abandon critically imperiled species in favor of a "broad brush" approach to conservation. However, it is partly the effect of painting with a very narrow brush that has led to many of the conservation crises we now face. A true ecosystem-based model would enable conservation of both species and ecosystem level biodiversity.

Ironically, despite its stated goal of conserving "...the ecosystems on which (those) species depend," implementation of the ESA currently offers little to achieving this purpose. The law contains few incentives to encourage advance planning by private landowners and the threat of additional restrictions may encourage some to destroy habitat instead (Wilcove et al. 1996). Those who do plan for species on their land have been frequently "rewarded" by little certainty that their actions will be enough to endure through future species listings. This has led many to oppose listings altogether. Combined with an endangered species program where only the most critically imperiled species receive protection (Wilcove et al. 1993), this approach only intensifies the conflict. Rather than avoiding problems caused by last-ditch efforts to save species, many private stakeholders have turned instead to fighting the entire ESA system. Although this hasn't been successful yet, it has created a political environment openly hostile to legitimate conservation goals.

### Natural Community Conservation Planning: A better approach

To our knowledge, there is only one effort in the country that is designed to create a more comprehensive and ecosystem-based conservation system. The Natural Community Conservation Planning (NCCP) pilot project in southern California is an attempt to create a program for the entire range of an endangered ecosystem—the coastal sage scrub—and all the

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Cover: Stephens' kangaroo rat (*Dipodomys stephensi*); barefoot banded gecko (*Coleonyx switaki*); desert bighorn sheep (*Ovis canadensis nelsoni*). Photographs ©Susan Middleton & David Liittschwager.

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Issue	Section 10(a)	NCCP
1. Planning Scope	1. Project-by-project	1. Biological Regions
2. Biological Scope	2. Single species or groups of listed species	2. Ecosystems and natural communities
3. Focus of Conservation	3. Highly imperiled species	3. Pre-listing; Preventative
4. Scientific Input	4. Agencies and consultants	4. Independent scientists
5. Institutional Involvement	5. Agencies and applicants	5. Local; State; Federal; Public; Private landowners
6. Public Participation	6. Little or none	6. Workgroups; Hearings; Public comment
7. Use of Agency Resources	7. Processing hundreds of individual permits	7. Servicing and enforcing several large-scale plans
8. Preserve Design	8. Fragmented set asides	8. Large habitat blocks
9. Duration	9. Short-term permits	9. Long-term or perpetual
10. Land Management	10. Relies on permittee	10. Independent; Adaptive; Required by agreement
11. Monitoring/Oversight	11. Passive; Relies on permittee	11. Active by agencies; Oversight by public
12. Landowner Assurances	12. Short-term, narrow	12. Predictable, broad
13. Conservation Standard	13. "Jeopardy"	13. No net loss habitat value; Contribution to recovery

**Table 2. Comparison of Section 10(a) and NCCP conservation concepts.**

species that inhabit it, both rare and common. The NCCP planning area covers 6,000 square miles in five counties, and is expected to result in more than 300,000 acres of large habitat blocks preserved under permanent conservation management.

NCCP is a large step forward from traditional HCPs under Section 10 in many ways (see Table 2). It focuses protection efforts on an entire ecosystem rather than exclusively on listed species and, as such, it covers both occupied and essential unoccupied habitat as well as natural processes. The program is supported by a foundation of conservation guidelines developed independently by a team of conservation scientists and made regulatory by a federal rule. The California state law that authorizes the program identifies a conservation standard of "no net loss of habitat value" for completed plans, a considerably higher benchmark than for losses allowed under the "jeopardy" standard by which HCPs are ultimately judged. Public participation is also a key feature of the program and stakeholders at all levels have been able to engage in development of plans. Perhaps most importantly, NCCP is a means to coordinate the conservation management of entire landscapes with diverse public ownerships, an outcome rarely possible under Section 10.

From the private landowner perspec-

tive, NCCP has much to offer that HCPs cannot. In exchange for taking a considerably broader approach to habitat protection than the law requires, the assurances offered by NCCP are long term and far broader than those provided under Section 10. Most significant, landowners who participate are given the guarantee that if additional land or dollars are required beyond the original agreement, due to future species listings or unpredicted needs, the public will foot the bill. The program streamlines state and federal species regulations into a single package with clear and predictable requirements (contrary to suggestion, NCCP does not give landowners "free license" to use their land, they still must comply with a host of other local non-biological restrictions). Because of wide institutional involvement in the program, the costs of land protection and management are shared among local, state, federal and private entities. Participation is voluntary, in the sense that landowners who wish to pursue separate 10(a) and state-level permits instead of NCCP are free to do so. Few have.

For local governments, ecosystem-based planning under NCCP brings welcome relief from constant federal involvement in land development projects. Resources of the FWS are stretched to the brink reviewing every project potentially affecting listed species and the FWS has

had little success in enforcing ESA prohibitions on habitat taking, particularly for essential but unoccupied habitat. Yet, the law currently has no clear means to devolve federal authority for enforcement and implementation to the local level. NCCP is a politically acceptable way to return land-use control to the local level through a legal contract—in whatever way the community wants to implement it, as long as it meets the criteria of the ESA. If performance under the contract is unacceptable, control can be suspended or terminated if necessary.

### **Enabling ecosystem-based planning**

The California NCCP is a pilot project testing an ecosystem-based approach to conservation planning. Clearly, in comparison to traditional HCPs, the new concept is desirable from many angles. How can this type of conservation be enabled? One point is certain, the current ESA wasn't specifically designed to do it. NCCP was authorized by the California Legislature and linked to the state endangered species law. Federal participation was possible only through a special rule issued under Section 4(d) when the California gnatcatcher was listed that creatively stretched Section 10(a) around the framework of ecosystem conservation goals under NCCP. The ESA allows this regulatory

*(Continued on UPDATE p. 14)*

# Economics and the Endangered Species Act

Jason F. Shogren

When Congress passed the Endangered Species Act (ESA) of 1973, it was explicit in stating that economic criteria should play no role in species listings or in the designation of critical habitat. The U.S. Supreme Court supported this stand, ruling in *Tennessee Valley Authority v. Hill* that "... it is clear from the Act's legislative history that Congress intended to halt and reverse the trend toward species extinction whatever the cost." It was not until the amendments to the ESA in 1978 that economics first entered into the ESA. Under Section 4, the Secretary of the Interior may "take into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat." Under Section 7, a Federal agency, State Governor, or permit or license applicant may apply to the Secretary for an exemption from the ESA given the availability of reasonable and prudent alternatives to the agency's proposed action, taking into account "the nature and extent of the benefits" of the action and proposed alternatives. In addition, four executive orders (EOs 11821, 12291, 12630, and 12886) requiring the assessment of costs and benefits of different regulatory actions have forced policymakers to acknowledge that economics matters.

Today it does not take an economist to see that economic issues are critical to the ESA debate. With a large fraction of endangered or threatened species inhabiting private land (75 percent according to a 1993 estimate by The Nature Conservancy), a significant portion of the ESA costs are borne by private property owners, while the ESA benefits accrue to the entire nation. Assessing costs and benefits in endangered species protection, however, is not a simple concept. If an economist was asked what he or she knows about the national costs and benefits of the ESA, "not much" would be the truthful response. Economists know that a wedge exists between private and public values. From society's perspective, endangered species with limited com-

mercial or consumptive benefits are undervalued by market prices, and thus there is pressure to use the private services at the expense of the public services. Most non-economists understand this intuitively, however, and economists do not know the magnitude of this private-public wedge because of a lack of data. There is no national estimate of the transaction costs of species protection, opportunity costs to property owners of restricted property rights, and opportunity cost of public funds used in species recovery. The few regional studies, each focusing on a particular species, suggest that distribution may be of more concern than efficiency, i.e., how the economic "pie" is split between people changes, but not the size of the pie. In addition, there is no national estimate of the economic benefits, either private or social, of most of the nearly 1000 listed species. The species-by-species estimates that do exist are subject to technical questions that limit their usefulness for policy analysis.

## Costs of species protection

The best measure of economic loss is opportunity cost—the foregone opportunities due to restrictions on the use of property due to listings, designation of critical habitat, and recovery plans. Opportunity costs include the reduced economic profit from restricted or altered development projects including agriculture production, timber harvesting, minerals extraction, and recreation activities; wages lost by displaced workers who remain unemployed or who are re-employed at lower pay; lower consumer surplus due to higher prices; and lower county property and severance tax revenue. Currently, there is no national estimate of the difference in actual economic growth with the ESA and potential economic growth without the ESA.

Opportunity costs have been estimated for a few high-profile, regional ESA conflicts such as the northern spotted owl. One study estimated that an owl recovery plan that increased the survival odds to 91 percent for a

population of about 1,600 to 2,400 owl pairs would decrease economic welfare by \$33 billion (1990 dollars), with a disproportionate share of the losses borne by the regional producers of intermediate wood products, a relatively small segment of the population (Montgomery et al. 1994). If the recovery plan tried to push a goal of 95 percent survival odds, costs increased to \$46 billion. Another study estimated the short-run and long-run opportunity costs to Washington and Oregon of owl protection at \$1.2 billion and \$450 million (Rubin et al. 1991). Short-run costs include the value of timber foregone plus the additional costs of displaced workers, whose numbers range from 13,272 lost jobs by 1995 to over 28,000 by 2000. Long-run costs include chiefly the value of the timber foregone, and assume that displaced workers find other positions at similar wages.

Opportunity costs have also been estimated for critical habitat designation in the Virgin River basin for the woundfin, Virgin River chub, and Virgin spinedace, and in the Colorado River basin for the razorback sucker, humpback chub, Colorado squawfish, and bonytail (Brookshire et al. 1994, 1995). Three conclusions emerge from these studies. (1) The difference in total economic output with and without critical habitat designation is relatively small, e.g., 0.0016% of the present value of the baseline stream of output for Washington County, Utah. Similar results hold for earnings income, tax revenues, and employment. (2) The impact of critical habitat designation is not evenly distributed across the states in the basin, as streamflow requirements may negatively impact recreation, electric power production, and future consumptive use in some states but enhance these activities in other states. (3) The potential national impacts of the designation are negligible.

Opportunity costs also exist with public programs, because resources devoted to species conservation could have been spent on something else viewed as

potentially more valuable to the general public. The U.S. Department of Interior estimated that the potential direct costs from the recovery plans of all listed species were about \$4.6 billion (U.S. Fish and Wildlife Service 1990). The General Accounting Office (GAO; 1995) compiled estimates of the predicted direct outlays needed to recover selected species, including the costs of implementing the most important, "high priority," recovery actions. The GAO reported on 58 approved recovery plans, finding that 34 plans had a total cost estimate for carrying out the recovery, 23 plans had cost estimates for the initial three years of recovery, and 1 had a cost estimate for one part of a twelve part plan. The total for the 34 plans with complete cost estimates was approximately \$700 million, with estimates for single plans ranging from a 1994 cost of \$145,000 for the White River spinedace to a 1991 estimate of about \$152 million each for the green sea turtle and loggerhead turtle. Estimates of costs for the 23 plans with initial three year estimates ranged from a 1990 estimate of \$57,000 for the Florida scrub jay to a 1991 estimate of \$49.1 million for the black-capped vireo, with a total three year cost for all 23 plans of over \$350 million. "High-priority" actions accounted for about \$223 million of the total.

Of the money actually expended on endangered species recovery by federal and state agencies between 1989 and 1991 (1989 was the first year data were published), over 50 percent was spent on the top ten species: bald eagle (\$31.3m), northern spotted owl (\$26.4m), Florida scrub jay (\$19.9m), West Indian manatee (\$17.3m), red-cockaded woodpecker (\$15.1m), Florida panther (\$13.6m), grizzly bear (\$12.6m), least Bell's vireo (\$12.5m), American peregrine falcon (\$11.6m), and whooping crane (\$10.8m) (Metrick and Weitzman 1996). Over 95% of identifiable expenditures have been on vertebrates, suggesting that visceral characteristics have a bigger role than scientific characteristics in public spending decisions on individual species.

In addition to direct public spending, private expenditures add to the cost of ESA implementation. These expenditures include the time and money spent

on applications for permits and licenses, redesign of plans, and legal fees. National estimates for these expenditures do not exist for the ESA. As a possible benchmark, private firms fighting over Superfund spent an estimated \$4 billion through 1991 (Dixon 1995).

### Economic benefits of species protection

#### Use values

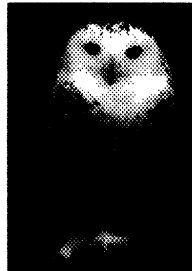
Economists have suggested that economic value has two parts, use and non-use values. Some use values of species are straightforward, for example, the economic value of current commercial, consumptive, and recreational use. Commercial and recreational harvesting of species are perhaps the most straightforward benefits to estimate, given a visible market price. For example, commercial and recreational salmon fishing in the Pacific Northwest helps support 60,000 jobs and over \$1 billion in personal income in the regional economy (Irvin 1995). Commercial recreation can also be non-consumptive, as with the \$200 million California whale watching industry.

The value of other commercial uses can be more difficult to measure and involves the issues of substitution and adaptation. Economic value depends on the number of available substitutes, and one's ability to adapt around scarce goods. The more substitutes that are available, the less scarce the good, and the less value a person places on the good. This is the classic diamond-water paradox—why are diamonds sometimes more valuable than water? Because if there are plenty of substitute water sources, the value of one additional lake is relatively low. In a place like the arid western U.S., however, where

there are few substitute water sources, water is scarce and very valuable. The same holds true for endangered species. If one sub-species of, for instance, a snail can substitute for another snail sub-species in the production of some new drug, the value of the first snail is lower than if the second snail did not exist.

Additionally, if I can adapt such that the scarce good is no longer needed for either consumption or production, its value to me decreases. If I can learn to live without a good, by changing my preferences or my production technology to exclude the good that is scarce, what I am missing is no longer valued as highly. If I cannot change my life and live without the good, it will be highly valued by me.

An example of these concepts is in the potential use of new species in pharmaceutical research. If one species substitutes for another in potential market success, the value of extensive genetic exploration declines as the odds increase that a firm will find a profitable substitute quickly. For example, assume that 250,000 species are sampled with 10



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new products expected to result, \$300 million spent in research and development, \$450 million in revenue produced over the life of the new products, and a 10% discount rate. In this case the maximum value of a species is estimated at \$9,400 (Simpson et al. 1996). This value declines to less than \$0.0000005, however, given an order of magnitude increase in the probability of a successful "hit."

#### *Non-use values*

Estimating non-use values is more problematic and controversial. Most people are unfamiliar with many services provided by endangered species. As a reasonable proxy to how people in the U. S. may view the issue, a recent survey revealed that over 70 percent of Scottish citizens were completely unfamiliar with the meaning of biodiversity (Hanley and Spash 1993). This lack of realization of the services provided by species makes estimating non-use values especially problematic. How do we assign economic value to goods that most people will never directly use and may not even recognize exist, and are the tools we use to estimate these benefits accurate?

Critics complain that non-use value acts as a surrogate measure of environmental preferences, rather than for the particular species in question. One study, for example, showed the average perceived benefits from preventing 2,000 birds from dying in oil-filled ponds was no different than the value from preventing 20,000 or 200,000 birds from dying (Desvousges et al. 1992).

In other studies, a bimodal distribution of values has been observed. The distribution of hypothetical willingness to pay for non-market goods such as species conservation is split between those who see no reason to pay anything (due to either low value or their willingness to "free ride" on other people's bids) and those who want to pay their fair share—typically about \$40, an amount similar to the level they give to some charities.

The contingent valuation survey (CV) has been used to measure benefits of a non-market good such as an endangered species. The results suggest that

the average person's lump sum willingness to pay ranges from \$12.99 to \$254 for sea turtle or bald eagle preservation. The average individual's annual willingness to pay ranges from \$6 to avoid the loss of the striped shiner to over \$95 to avoid the loss of the northern spotted owl.

A piecemeal species-by-species approach, however, overestimates total ESA economic benefits because it does not address potential substitution and adaptation possibilities. Adding the average person's benefits elicited in 18 CV surveys suggests that he or she would be willing to pay about \$953 to protect 18 different species (Loomis and White 1996). Multiplying this payment by the number of U.S. households (about 75 million) gives a total benefit estimate of \$71 billion. This estimate is roughly 1% of the 1995 U.S. Gross National Product, for less than 2% of all threatened and endangered species. Clearly this estimate is inflated, and shows that a better understanding of the relationship between the values for species and their substitution/adaptation possibilities is necessary before any national estimate of non-use values will be useful in the ESA debate.

#### **Conclusion**

More economic thinking about how the ESA has affected our economic system, for better or worse, is a research priority. Economists have not yet estimated the national costs or benefits of the ESA, and no one has even dared to guess, given the complexity of the ESA debate. Furthermore, we need to address a broader question of social order: how we trade secure property rights and protection of endangered species. One person's inalienable right to protect endangered species will need to be balanced against another's inalienable right of self-determination. A better understanding of the economic costs, benefits, trade-offs, and opportunities should fuel a more informative debate over ESA reauthorization.

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## The Elimination of the Category 2 Candidate Species List: A Prescription for Environmental Train Wrecks

Until recently, the U.S. Fish and Wildlife Service (FWS) maintained two categories of species considered candidates for listing under the Endangered Species Act (ESA). These categories aided the FWS, other agencies and the public to identify and protect species in trouble before the formal, and typically more expensive, protections of the ESA were either necessary or available. The FWS has now eliminated one of these categories, which has reduced by over 95% the number of candidate species. In doing so, the FWS has taken a step backward in the effort to avoid the environmental and economic crises typified by the northern spotted owl (*Strix occidentalis caurina*) saga, despite the fact that Secretary of Interior Bruce Babbitt has often given the avoidance of such "train wrecks" as a prime objective of ESA implementation.

### Background

Although designed by Congress to protect *all* species that are endangered or threatened, the ESA has never achieved this mandate since its passage in 1973. To the contrary, there has always been a long line of species and sub-species that require the ESA's protection but have not yet been formally listed as endangered or threatened. These species, therefore, are not afforded any binding protections.

In an effort to provide some measure of conservation for these many species, in 1980 the FWS developed a candidate species list. This list contained all species "being considered by the Secretary for listing as an endangered or threatened species but not yet the subject of a proposed rule" (50 C.F.R. § 424.02(b)). Like the endangered and threatened species lists, the candidate species list is periodically published in the Federal Register. These Notices of Review contain the names of all candidate species and "invite comment from all interested parties regarding the status

of the species named" (50 C.F.R. § 424.15(c)).<sup>1</sup>

Until 1995, species in Notices of Review were placed in two principal categories. Category 1 (C1) species are those species "for which the FWS has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species [but for which listing is] precluded at present by other listing activity" (59 Fed. Reg. 58,982, 58,983 (1994)). In other words, the FWS has already concluded the species are threatened or endangered, but can not yet issue proposed rules to list them. The FWS currently lists 182 such species (61 Fed. Reg. 7,596 (1996)).

The vast majority of the candidate species, however, were Category 2 (C2) species. These were species "for which information now in the possession of the FWS indicates that proposing to list as endangered or threatened is possibly appropriate, but for which persuasive evidence on biological vulnerability and threat are not currently available to support proposed rules" (59 Fed. Reg. 58,982, 58,983 (1994)). Thus, the FWS had concluded these species *might be* currently threatened or endangered, but more information was necessary before a final conclusion could be reached. According to the most recent C2 Lists, more than 1,700 plant species and 1,900 animal species warranted this designation (58 Fed. Reg. 51,544, 51,545 (1993); 59 Fed. Reg. 58,982, 58,984 (1994)).

### The value of the C2 List

The C2 List served several critical functions. As a compilation of species

in some danger, it provided the FWS, other federal and state agencies, the conservation community, and land developers with an indispensable tool for the conservation of species. More specifically, the C2 List played three important roles.

(1) *Notifying the public about which species require attention.* Congress itself has noted the importance of notifying the public and other agencies about candidate species, describing Notices of Review as "important land use planning and habitat protection tools for state and federal agencies, private conservation organizations, private landowners and the scientific community [because] the advanced notice that a species may be listed in the future reduces the potential for serious conflict later with other activities" (S. Rep. No. 478, 100th Cong., 1st Sess. 7-8, 1988). In addition, each Notice of Review encourages consideration of candidate species in environmental planning. Including C2 species in these Notices of Review identified which species might be listed as endangered or threatened in the future. The FWS thus sought to *avoid* the need for formal listing by providing advance notice of the need for voluntary conservation actions. Without such notice, there is no comparable way for the potential "train wrecks" to be perceived and avoided by federal, state, and private parties.

(2) *Providing a measure of species protection within the FWS's own programs.* Over the years, the FWS incorporated the C2 List into many of its ESA programs. For example, the ESA requires "status surveys" in order to determine which species require

<sup>1</sup> Since the initial list of plant species submitted by the Smithsonian Institute was published in the Federal Register in 1975, there have been twelve published Notices of Review. See 45 Fed. Reg. 82,480 (1980) (plant listing); 47 Fed. Reg. 58,454 (1982) (initial vertebrate listing); 48 Fed. Reg. 53,640 (1983) (plant listing); 49 Fed. Reg. 21,664 (1984) (initial invertebrate listing); 50 Fed. Reg. 39,526 (1985) (plant listing); 50 Fed. Reg. 37,958 (1985) (vertebrate listing); 54 Fed. Reg. 554 (1989) (first combined animal listing); 55 Fed. Reg. 6,184 (1990) (plant listing); 56 Fed. Reg. 58,804 (1991) (animal listing); 58 Fed. Reg. 51,144 (1993) (plant listing); 59 Fed. Reg. 58,982 (1994) (animal listing); 61 Fed. Reg. 7,596 (1996) (first completely combined listing, eliminating Category 2).



formal listing (16 U.S.C. § 1533(b)(1)(A)). According to the FWS handbook titled *Endangered Species Program: Candidate Species Guidance*, the list of C2 species provided the foundation from which the FWS sorted and ranked species for status surveys (FWS 1994).

In addition, under Section 7 of the ESA, federal agencies must consult with the FWS to insure that their actions are not likely to jeopardize the continued existence of any endangered species (16 U.S.C. § 1536(a)(2)). As part of this process, the agency requests from the FWS a list of the species which may be affected by the planned action (50 C.F.R. § 402.12(c)). Among the list of species which the FWS provides are candidate species, which used to include C2 species (*Id.* at § 402.12(d)). As the FWS has explained, this process "provides a focus on the overall health of the local ecosystem" (FWS 1994, p. 3-4). Since the Section 7 process is the formal vehicle by which federal agencies can avoid further harming populations of species that might be formally listed, including consideration of C2 species in the Section 7 process likely resulted in fewer listings under the ESA.

Finally, under Section 10 of the ESA the FWS, in some circumstances, may issue a permit for the "take" of listed species, where the take is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (16 U.S.C. § 1539; 50 C.F.R. § 17.22(b)). In order to acquire such a permit, an applicant must submit, and the FWS must approve, a conservation agreement called a Habitat Conservation Plan (HCP). C2 species were routinely considered in these HCPs, which was entirely consistent with Congressional intent:

*[T]he purposes and policies of the ESA are far broader than simply providing for the conservation of individual members of listed species. . . The conservation plan will implement the broader purposes of all of [the fish and wildlife statutes] and allow unlisted species to be addressed in the plan (H. R. Rep. No. 835, 97th Cong., 2d Sess. 30, 1982).*

Moreover, to the extent the FWS provides assurances regarding future

mitigation measures for HCPs that purport to consider *all* the species in an affected area, the consideration of C2 species is critical (Walley 1996). Without a list of relevant C2 species, HCPs are more likely to fail to address declines in unlisted species in the future.

(3) *Encouraging other agencies to take action on behalf of these species.* Because the FWS encouraged other agencies to consider C2 species in environmental planning, agencies throughout the federal government incorporated these species into their planning documents. Both the U.S. Forest Service and U.S. Bureau of Land Management (BLM) incorporated consideration

Administrative Procedure Act (APA), which directs all federal agencies to provide opportunities for public notice and comment when promulgating a rule. Plaintiffs sought the reinstatement of the C2 List, and compliance with both the NEPA and the APA.

On October 11, 1996, the parties settled the litigation. Pursuant to the settlement, the FWS published a notice soliciting public comment concerning changes to the C2 List (61 Fed. Reg. 48,875 (1996)). Numerous commenters urged the FWS either to retain the C2 List or to at least replace it with a system that would perform the same critical conservation functions. As the

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***...the FWS has taken a step backward in the effort to avoid the environmental and economic crises typified by the northern spotted owl crisis...***

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of C2 species into their own manuals for agency programs, making consideration of such species a routine aspect of agency planning (BLM 1988; Forest Service 1991). Additionally, federal agencies routinely considered the effects their activities might have on C2 species when preparing environmental impact statements as required under the National Environmental Policy Act (NEPA).

#### **Elimination of C2 List and resulting litigation**

On July 19, 1995, without any public participation or comment period, the FWS announced the elimination of the C2 List. According to the FWS, "[t]he designation of C2 species as candidates resulted in confusion about the conservation status of these taxa" (61 Fed. Reg. 7,596, 7,597 (1996)). Consequently, on February 28, 1996, the FWS published a Notice of Review which contained no list of C2 species (*Id.*).

On April 1, 1996, a coalition of environmental groups and individuals filed suit over this decision. The plaintiffs claimed that by eliminating the C2 List, the FWS had failed to comply with the NEPA and the notice and comment requirements of the

commenters explained, whatever confusion the C2 List caused could easily be rectified without eliminating its vital role in species' conservation.

On December 5, 1996, however, the FWS published a notice making a final decision to eliminate the C2 List (61 Fed. Reg. 64,481 (1996)). According to the FWS, species lists such as those compiled by state natural resource agencies and Natural Heritage Programs more accurately reflect species' status than the C2 List, and these lists will be used to track species that require attention. The lists to which the FWS referred include a significantly larger number of species than those that were on the former C2 List, and, if these species were to become C1 species, they might receive even more attention than species which were formerly in C2 status.

The FWS, however, failed to articulate how these lists will be used to substitute for the many functions of the C2 List. There is no assurance that they will be included in Section 7 consultations or Section 10 conservation planning. There is no indication that they will be provided to agencies to incorporate into their programs or to use in compliance under the NEPA. Additionally, there is no mechanism for

***(Continued on UPDATE p. 14)***

# AZA Species Survival Plan Profile: The Mona/Virgin Islands Boa

Peter J. Tolson  
Miguel A. García

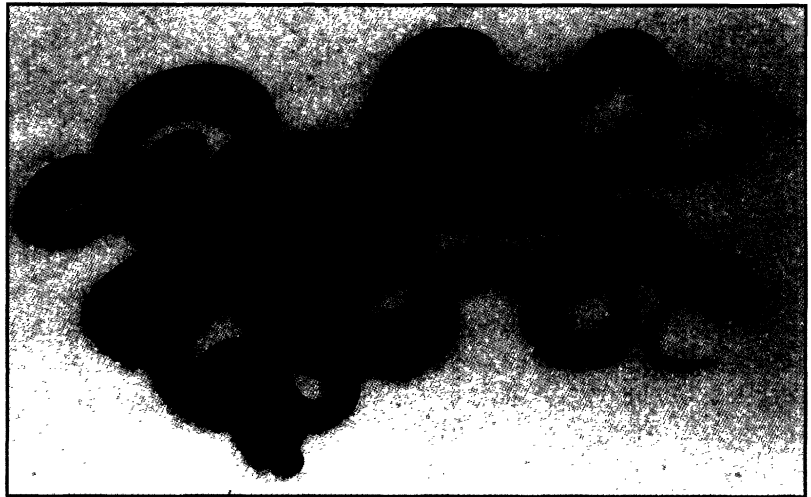
*A U.S. /Puerto Rico Partnership Seeks to Recover an Endangered Boa*

The Mona boa (*Epicrates monensis monensis*) and the Virgin Islands boa (*Epicrates m. granti*) are endemic to Isla Mona and the Puerto Rico Bank, respectively. While the Mona boa is confined to Isla Mona, the Virgin Islands boa inhabits a constellation of islands from Puerto Rico eastward into the British Virgin Islands. Both boas are small, attractively mottled brown snakes that live in coastal forest. Their nocturnal habits and retiring nature make them largely inconspicuous and difficult to locate. As a result, the boas have rarely been the victims of direct human persecution. In fact, when conditions are favorable, this species can exist in high densities on small islands. However, large-scale habitat destruction and the introduction of exotic mammalian predators (e.g., rats, cats) have put these taxa in extreme peril over most of their range. The Virgin Islands boa is listed as endangered and the Mona boa as threatened under the Endangered Species Act.

The Mona/Virgin Islands boa Species Survival Plan® (SSP), set up in 1990, initially emphasized management in captivity. The focus has recently shifted to management of wild populations. Findings from a comprehensive research program indicated that active management of extant populations in the field was more likely to lead to the recovery of the species than a captive propagation program. The U.S. Fish and Wildlife Service (FWS) Caribbean Field Office, the Departamento de Recursos Naturales y Ambientales de Puerto Rico (DRNA), and the Division of Fish and Wildlife, U.S. Virgin Islands (USVI) cooperated in the development and publication of the FWS Recovery Plan for each subspecies (FWS 1984, 1986). The Recovery Plan resulted in the first reintroduction of American Zoo and Aquarium Association (AZA) SSP reptiles into the wild.

## Field studies

One of the first steps in implementing recovery activities was intensive survey work at localities likely to harbor previously unknown populations (FWS 1984, 1986). The offshore cays of Puerto Rico and the USVI, the majority of which are free of cats and mongooses and have large tracts of littoral forest, were surveyed by staff of the Toledo Zoological Gardens (TZG). A previously undescribed population of the Virgin Islands boa was discovered on Isla Culebra, Puerto Rico. However, no additional populations have been discovered on other Puerto Rican or USVI cays.



Four neonate Virgin Islands boas (*Epicrates monensis granti*) born at the Toledo Zoological Gardens in 1986. Photograph courtesy of A. Weber.

A longitudinal study of an isolated population of the Virgin Islands boa was initiated in 1984. Lasting nine years, the effort yielded demographic and ecological information from more than 650 captures of over 300 marked individuals. Analysis of the ecological information indicated that boas were most successful in habitat that had few or no exotic predators and was primarily composed of relatively dense vegetation with an interlocking canopy (Tolson 1988). Further studies (Chandler and Tolson 1990) elucidated the foraging strategies of these snakes. Ecological work was later expanded to include field research in 1991-92 on the ecology and demography of the Virgin Islands boa on Isla Culebra, Puerto Rico and the USVI. Current SSP research is concerned with analysis of survivorship of different age classes of the reintroduced population of the Virgin Islands boa and ecological studies of the Mona boa. Data gathered from the latter will be used to revise the FWS Mona Boa Recovery Plan (FWS 1984).

## Captive management and reintroduction

A captive breeding program using the Virgin Islands sub-species was initiated by TZG in 1985. The first successful captive breeding occurred in 1986 (Tolson 1989) with subsequent publication of the AZA-sanctioned Regional Studbook in 1987, and development of the SSP. The SSP program emphasizes short-term maintenance in captivity for the production of snakes for reintroduction programs. The basis for this management strategy was developed under the FWS Recovery Plan for the Virgin Islands boa (FWS 1986). These efforts were coupled with a comprehensive reproductive research program using the Cuban boa (*E. angulifer*) and the Haitian boa

(*E. striatus*) as models, which established the proximate environmental and social factors critical for reproduction in this species (Tolson and Teubner 1987; Tolson 1994). The reproductive program has been very successful, producing more than 100 offspring from ten founders. Representatives of two populations of the Virgin Islands boa, one from Puerto Rico and one from St. Thomas, USVI, are being managed in captivity as two separate genetic units (i.e., individuals from the two populations are not cross bred) as each population exhibits a distinct coloration. These two populations have lately been shown to exhibit differences in mtDNA restriction enzyme cleavage sites (Gach, Tolson and García, unpublished data). A breeding program for the Mona boa, used primarily for reproductive research on this taxon, was initiated in 1995.

Exotic predators pose the greatest danger to successful reintroduction efforts. Cats, which prey on adult boas, are already ubiquitous on St. Thomas, USVI. A study to assess the status of the Isla Mona feral cat population and the magnitude of the impact of cat predation on Isla Mona wildlife has been initiated by the DRNA with assistance from the SSP. A rodent poisoning program was initiated on three islands identified as potentially suitable for reintroduction (i.e., Congo Cay, USVI; Cayo Ratones and Isla Monito, Puerto Rico). Elimination was attempted through three rounds of anti-coagulant poisoning spaced six months apart. Rats have been eliminated on Cayo Ratones, while on Congo Cay rats were undetected for two years after poisoning but have since returned. The poisoning of Isla Monito's rats is still in progress.

The careful background work and planning described above resulted in reintroduction of 28 zoo-born snakes on Cayo Ratones, Puerto Rico, in August 1993; an additional seven were released in November 1994. Six of the released snakes were implanted with radiotransmitters to monitor their activities. The reintroduction effort, funded by the AZA Conservation Endowment Fund, has been an outstanding success. Quarterly monitoring during the first year, funded by the FWS, established minimum survival estimates of 82.6% through August 1994. Reproduction occurred at least twice in the reintroduced population during the first breeding season, and all of the seven offspring known to have been born on the cay were recaptured at least one year after their birth.

### Conservation outreach programs

To ensure expertise is transferred to local conservation authorities and students, the TZG has worked closely with the DRNA in all phases of the recovery process. DRNA biologists have accompanied field research parties on most research and management activities, and Puerto Rican students are given first priority for employment as field assistants. Three DRNA biologists visited the TZG in 1992 to gain skills in basic boa husbandry and techniques for reproduction. A mentoring program was implemented in 1995 with the Center for Reproduction of Endangered Species at the University of Puerto Rico at Humacao and

has resulted in exchange visits of the TZG conservation, curatorial, and veterinary staff to Humacao, and visits of two professors and a technician from the University of Puerto Rico to TZG.

### Conclusion

The conservation program for these two boas has collected critical demographic, ecological, and reproductive information and has documented the status of several key populations of the boa. Expertise has been shared with local university and management staff as well as with the wider conservation community through papers and presentations. Perhaps most significantly, a successful short-term reintroduction of the species to a locality within their historical range has provided valuable insights into strategies useful in snake reintroductions. Future activities include: (1) monitoring the reintroduced population of the Virgin Islands boa for a full 10 years; (2) collecting additional data on the Mona boa; and (3) increasing management efforts on Isla Mona (e.g., restoring degraded forest habitat and controlling exotics).

### Acknowledgments

Support for the conservation of the Mona/Virgin Islands boa has been provided by the U.S. Fish and Wildlife Service; the Institute of Museum Services-Conservation Project Support; the AZA Conservation Endowment Fund; the Departamento de Recursos Naturales y Ambientales, Puerto Rico; the Walt Disney Company through the AZA Conservation Excellence Campaign; the Division of Fish and Wildlife, U.S. Virgin Islands; and the Toledo Zoological Society. The authors are grateful to Carlos E. Diez, Valerie Hornyak, Luis O. Nieves, James P. Oland, Pablo M. Reyes, Jorge Saliva, and our many colleagues from the Departamento de Recursos Naturales y Ambientales, Puerto Rico and the Toledo Zoological Gardens who have given so selflessly to this project.

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# Conservation Spotlight: African Wild Dogs

Once numbering in the hundreds of thousands, the African wild dog (*Lycaon pictus*) is now one of the African continent's most endangered animals. It is believed that fewer than 5,000 wild dogs currently exist in the wild, and their range has declined from 33 to 15 countries. The largest populations exist in Botswana, Zimbabwe and Tanzania. The initial population reduction came during the early part of the century as a result of a very successful extermination campaign led by ranchers who feared the loss of livestock. Today, the effects of diseases (e.g., rabies, canine distemper, and parvovirus) spread by domestic dogs are having an even more devastating effect on wild dog numbers. Of additional concern is inbreeding due to the formation of genetically distinct groups of dogs in the southern and eastern regions of their current range.

Wild dogs are about the size of a German shepherd, have long legs, large ears and mottled fur of browns, black and white. They live in tightly bonded social groups or packs of 2 to 30 individuals led by a dominant male and female. Pack members exhibit well-defined greeting behaviors, the most obvious being affectionate face licking.

Recent research has shown the wild dog to have behaviors verging on classic altruism. This is particularly evident in pup raising, which is a pack effort with males shouldering much of the responsibility. In fact in one instance, following the death of a pack female, male pack members were observed successfully raising her pups from the age of five weeks.

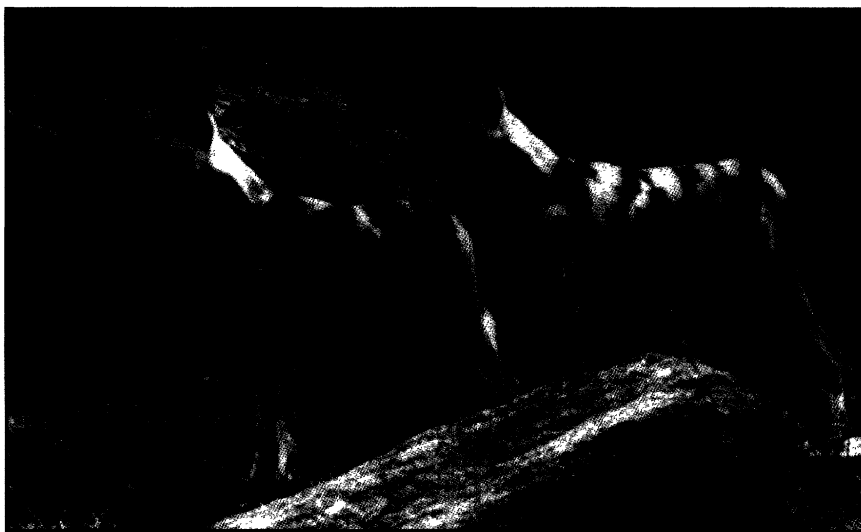
Perhaps the most obvious expression of the wild dogs' altruistic tendencies is their feeding style. After a prey animal has been successfully brought down, each pack member is allowed to eat. The feeding scene is a peaceful one rather than a savage frenzy. Disabled pack members share alongside more able adults, and pups receive regurgitated food from any adult in the pack. This behavior is uncharacteristic of other large carnivores, such as lions, which often fight over a carcass, jostling with each other for access to food.

The behaviors that maintain close social bonds between pack members are a large factor in the decline of wild dogs; the close contact and associated licking promotes the spread of introduced diseases. Research efforts aim to gain information such as

identification of social, ecological and demographic factors that affect pack reproductive success, breeding populations and population viability. Of additional interest is why wild dogs utilize such large territories and the interaction between wild dogs and other large predators.

Two of the projects currently under way in Africa to conserve and increase the number of wild dogs are supported in part by the One With Nature conservation program at the Philadelphia Zoological Garden, one of only 18 zoos in North America that maintains this species. The Botswana Wild Dog Research Project, in the Moremi Wildlife Reserve, is headed by Dr. J. Weldon McNutt. Kim McCreery and Dr. Robert Robbins lead research focused on the population of dogs in Hwange National Park, Zimbabwe. The projects are located in two very different ecosystems and are using technology such as global positioning systems and DNA analysis to track and learn more about wild dog biology and behavior. Information gained through research will be valuable in the development of conservation strategies for this species.

For additional information on the African wild dog research projects or the Philadelphia Zoological Garden's One With Nature program, contact Reg Hoyt, Vice President for Research and Conservation, or Heidi Jamieson, Director of International Projects, Philadelphia Zoological Garden, Philadelphia, PA 19104. Tel: (215) 243-1100. (excerpts from S. Rotz Mamakos, *AZA Communiqué*, Dec. 1996)



African wild dog (*Lycaon pictus*). Photograph courtesy of Heidi Jamieson, One With Nature, Philadelphia Zoological Garden.

# NEWS FROM ZOOS

## Cuban Crocodiles Thriving

Approximately 600 Cuban crocodiles (*Crocodylus rhombifer*) were reintroduced to the Lanier Swamp on the Isla de la Juventud, Cuba, in 1994 and 1995. The crocodiles were bred in a Cuban crocodile farm and tagged for future study. In 1996, the American Zoo and Aquarium Association's (AZA) Cuban Crocodile Species Survival Plan® (SSP) participated in a field monitoring program led by Flora y Fauna, Cuba's conservation agency. The Cuban Ministry of Industrial Fisheries and the IUCN/SSC (World Conservation Union/Species Survival Commission) Crocodile Specialist Group also joined the effort to capture tagged individuals. Life history data were collected and the growth, health, and dispersal of the released population was assessed. Two of the ten captured crocodiles were of unknown origin. Based on their sizes and the fact that the species is believed to have been extirpated from the island close to forty years ago, it is believed that the two crocodiles are offspring of the reintroduced animals. The captured animals and the population appear to be thriving. The AZA Crocodylian Advisory Group has identified priority projects that will further the development of the Cuban Crocodile SSP. The SSP plans to continue its participation in the *in situ* recovery efforts in Cuba with possible future reintroductions into two freshwater locations.

## New England Designated for Participation in Coastal America Partnership Program

The New England Aquarium has been designated as a non-federal facility to participate in *Coastal America: A Partnership for Action*. This program, coordinated by the President's Council on Environmental Quality, has been designed to address coastal problems by facilitating collaboration and cooperation among the public and private sectors, through the sharing of information, pooling of field expertise, and combining of management skills and resources. Because one-third of the U.S. population lives in coastal areas, the threat to the ecological health and sustainability of coastal environments is fast becoming a serious issue. Coastal America's challenging goal is to restore, protect and maintain coastal resources, while moving forward with economic growth. The New England Aquarium will be the site of Coastal America's Regional Coastal Ecosystem Learning Center and will function as an official U.S. government distribution point for Coastal America's approved educational and outreach materials on aquatic habitats. Additional AZA member aquariums are under consideration.

## Attwater's Prairie Chicken and Wyoming Toad Become SSPs

Petitions for the Attwater's prairie chicken (*Tympanuchus cupido attwateri*) and the Wyoming toad (*Bufo hemiophrys baxteri*) to participate in the AZA's Species Survival Plan program have been approved by AZA's Wildlife Conservation and Management Committee. The Attwater's prairie chicken numbered only 68 individuals in the wild in 1995. A cooperative captive breeding effort between the U.S. Fish and Wildlife Service (FWS), Texas A&M University and several AZA institutions has been underway since 1992 to assist in the species' recovery. The Wyoming toad is unique in that it has never been found outside a 50 kilometer radius of the city of Laramie, Wyoming. Pesticides, habitat loss and increased predation are believed responsible for the decline of this rare species, which was listed as endangered by the FWS in 1984.



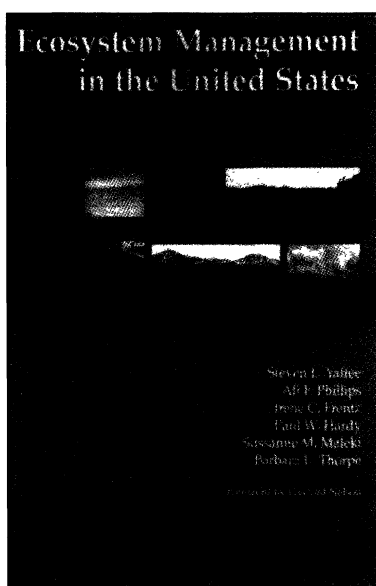
Photo by Jeffrey Hartman, ©Viewz



Photo by R. Andrew Odom  
Toledo Zoological Gardens

## Ecosystem Management in the United States

By Steven L. Yaffee, Ali F. Phillips, Irene C. Frentz, Paul W. Hardy, Sussanne M. Maleki, and Barbara E. Thorpe. 1996. Island Press, Washington, D.C. \$30. 352 pp.



*Ecosystem Management in the United States* presents the first broad characterization of ecosystem management on-the-ground in the United States. As the subtitle, "an assessment of current experience," implies, there is little rhetoric and plenty of project-level description in the volume. In fact, less than 50 pages of the book are analytical; the balance of the text presents two-page descriptions of 105 ecosystem management projects from all regions of the country along with contact information for over 500 other projects.

The book's strengths are as a catalog and contact list for ecosystem management projects. There is no better source of information for the "what," "where" and "who" of U.S. ecosystem efforts. For answering "why" and "how" questions, however, the book is less useful. Critical assessment is limited for two reasons: (1) most projects are still in the early stages of implementation; and (2) the two-page project descriptions are too short to convey the level of detail needed to answer complex questions about ecosystem management practice. There is nothing the authors can do about the fact that most ecosystem management work hasn't been implemented long

enough to allow for fine-grained assessment. On the other hand, the book would have benefited from a more limited selection of project reports with more in-depth descriptions of each. The chief weakness of the authors' approach is that the catalog attributes of the study overwhelm the assessment aspects.

There are several characteristics of ecosystem management that, nevertheless, emerge from the authors' broad-scale approach. Using bar graphs to present cumulative responses to several key questions, the authors portray concisely a large volume of information. The following seemed to me to be the most useful insights from the study.

Most ecosystem management efforts are indeed youthful—59% of the projects were started since 1991. The U.S. Forest Service, U.S. Fish and Wildlife Service, and the U.S. Bureau of Land Management (in that order) have initiated most federal efforts. State agencies are also very involved with ecosystem management, a fact that the authors highlight. The National Park Service has not been very involved, despite national parks being obvious places to experiment with an ecosystem approach.

Managers in this assessment suggest that the twin goals of ecosystem protection and restoration are what drive projects. Those who remain skeptical about the use of ecosystem management may be confusing ultimate goals with the strategies that agencies are using to attain protection and restoration of ecosystems. What stands out in the study is that 61% of managers are using increased stakeholder involvement as a main strategy for achieving their goals. This is where ecosystem management has a great chance of democratizing resource management decision-making.

It is little wonder that success in these young projects is described in terms of improved communication and cooperation. The process of doing ecosystem management is changing how

people relate to each other over resource decision-making, and there is a profound relationship between what we want to do (goals) and how we choose to do it (process). Positive ecological outcomes from ecosystem management will not be realized until cooperative forms of decision-making are in place.

Managers describe collaboration as the most vital component of these projects, yet they also place political support at the bottom of the list of factors facilitating progress. It is no secret that the current Congress is not friendly toward ecosystem management, even as a greater number of citizens become involved and support the new approach. The question is—which force will win out? Are conservative lawmakers capable of quashing this movement in spite of growing grassroots support? What about the negative effects, surely to persist in the short-term, of reduced funding levels?

It remains to be seen whether ecosystem management will become a successful model of resource conservation. The managers contacted for this assessment state that early stakeholder involvement and a flexible use of science in management are key elements to success. Yet, powerful stakeholders can usually thwart any process if they wish to do so, and both environmentalists and developers often attempt to use science to suit their own purposes. Ecosystem management will never be a textbook approach to resource management. This book provides a snapshot of how we have begun to move away from unsustainable methods of working with nature toward what is still uncharted territory.

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**(C2 continued from UPDATE p. 8)**

public notification concerning which species are on these various lists. Until these species become C1 candidates—and the FWS does not indicate how that might occur—former C2 species will be lost from public view, at least until a crisis is imminent.

### Conclusion

Former Director of the FWS Mollie Beattie (1996) once said:

*All of us would agree that the most opportune time to conserve species and their habitat is before the protections of the Act are necessary. In fact, one of the shortfalls of how natural resources were previously managed was that not enough emphasis was placed on candidate conservation. . . . By being proactive, we hope to preclude the listing of many species in the future.*

Unfortunately, in eliminating the C2 List the FWS is failing to ensure that species facing threats will receive the proactive attention they deserve. As a result, the status of species is more likely to deteriorate and we can expect to see more, not fewer, "train wrecks" in the future.

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**(NCCP continued from UPDATE p. 3)**

bridge only for threatened species. So while it may be possible to work within the existing federal law in some cases, the full benefits of ecosystem conservation (such as protecting unlisted animals and natural processes) are difficult to realize without the broad scope provided by NCCP. Rather than testing the outer legal limits of Section 10(a), it would be far better to provide an explicit statutory framework that defines the key elements of ecosystem conservation.

Relying strictly on prohibitive regulation to achieve conservation has left us short of our goals, because it is an inherently reactive approach. What is needed, instead of a broader, more imposing regulatory process (such as the proposed Endangered Natural Heritage Act; see *Endangered Species UPDATE* June 1996), is a better, more comprehensive, voluntary planning tool to complement regulations on take of listed species under the ESA. Such a program could be designed based on learning and improving upon the experiences of NCCP and would be an advance alternative to the strict prohibitions of the ESA. This new planning tool would not be a substitute for those prohibitions and should not preclude future listings—it was, after all, the threat of listing the California gnatcatcher that brought most parties to the table in NCCP. We continue to believe that a strong, clear, yet narrow ESA is an essential component of a comprehensive biodiversity conservation policy. But, unlike Section 10(a), which is both limited and rarely engaged early enough, the new planning provision would give everyone an opportunity to get off the track to extinction before the train wreck while providing far more conservation than possible using prohibitive policies alone.

### Conclusion

Does the ecosystem-based approach to conservation have imperfections? Of course. It is far more complex scientifically and politically than species-by-species planning. Changing from the old trench-warfare paradigm may be a painful shift for many people. Even more important, while promising to make considerable resources available for conservation, ecosystem-based planning demands new and bigger

sources of funding to be successful. This country has provided large amounts of compliance funding for the Clean Water Act and the Clean Air Act, but has yet to offer a similar commitment for the ESA. It is time we do so.

Ecosystem-based planning like NCCP is also not the best solution for every situation. It works best in urbanizing areas or for resource use that depends on long-term regulatory predictability, like water supply and delivery. Overlaying maps of these economic issues with the location of species listings nationwide, however, shows that many contentious private land issues could be addressed by this concept. In the current political climate, any solution that advances conservation aims must also provide answers to the problems faced by private landowners and other stakeholders. Ecosystem-based conservation planning offers the ability to achieve significant environmental gains beyond the *status quo* while accommodating the needs of landowners and local governments.

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# Bulletin Board

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## Conference on Economics and the Endangered Species Act

A 3-day conference at the University of Wyoming, April 24-26, 1997, will explore the social underpinnings of endangered species protection. The conference will address questions of costs and benefits incurred by individuals and society as a result of Endangered Species Act (ESA) protection, and how society should best regulate species management. The first day will take a broad look at society and endangered species regulation from the perspective of economics, political science, and conservation biology. A general audience, including students, faculty, and policymakers, is invited to attend.

The second and third days will focus specifically on the economics of endangered species regulation. These talks will be more technical, focusing on economic models of regulation and empirical examinations of costs and benefits of the ESA. It is hoped that addressing these topics will add insight into the ongoing debate on ESA reauthorization. For more information contact Jason Shogren, (307) 766-5430 or (202) 395-5012; or Maureen Morrison, (307) 766-2571, Department of Economics and Finance, University of Wyoming, Laramie, WY 82071-3985.

## National Habitat Conservation Planning Conference: Call for Papers

Habitat Conservation Planning (HCP) will be the focus of a conference May 17-18, 1997 in Washington DC. Sponsored by the National Wildlife Federation, the conference will focus on what works and what needs further attention with the HCP process. Experts from government, conservation groups, universities, and industry will discuss topics such as how HCPs fit the purpose of the Endangered Species Act, current case studies, and the prospect for combining species recovery with regulatory certainty for landowners.

The registration fee for the conference is \$79 (reduced rates are available). For conference information contact Jeffrey Hunter at Tel: (703) 790-4093; E-mail: hunter@nwf.org.

The *Endangered Species UPDATE* will consider publishing papers written for the conference, and other papers may be published as conference proceedings or in a law journal. Authors interested in submitting a paper to the *UPDATE* should contact the editor for guidelines. Tel: (313) 763-324; E-mail: esupdate@umich.edu.

## Russian Conservation News

Russian Conservation News is a quarterly journal focusing on conservation in the former Soviet bloc. Issues covered include rare and endangered species, legislation, protected areas, and environmental education. Articles are written by experts from throughout the region. A one year individual subscription costs \$15; other rates apply. Contact PEEC/RCN, RR 2, Box 1010, Dingmans Ferry, PA 18328. Tel: (202) 778-9573; E-mail: rcn@igc.apc.org.

## Red List Updated

The Species Survival Commission of the World Conservation Union (IUCN) has released an updated "Red List" using revised criteria for determining the risk of extinction. Species are listed as either critically endangered, endangered, or vulnerable, based on the rate of a species' population decline over the past ten years. Copies are available from IUCN Publications Services Unit, 219C Huntingdon Rd., Cambridge, CB3 0DL, UK; Fax: (44) 1223-277-175; E-mail: iucn-psu@wcm.org.uk.

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

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# Endangered Species UPDATE

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