FORUM

A Model for Improving Endangered Species Recovery Programs

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ABSTRACT / This paper discusses common organizational problems that cause inadequate planning and implementation processes of endangered species recovery across biologically dissimilar species. If these problems occur, even proven biological conservation techniques are jeopardized. We propose a solution that requires accountability in all phases of the restoration process and is based on cooperative input among government agencies, nongovernmental conservation organizations, and the academic community. The first step is formation of a task-oriented recovery team that integrates the best expertise into the planning process. This interdisciplinary team should be composed of people whose skills directly address issues critical for recovery. Once goals and proceoures are established. the responsible agency (for example, in the United States, the US Fish and Wildlife Service) could divest some or all of its obligation for implementing the plan, yet still maintain oversight by holding implementing entities contractually accountable. Regular, periodic outside review and public documentation of the recovery team, lead agency, and the accomplishments of implementing bodies would permit evaluation necessary to Improve performance. Increased cooperation among agency and nongovernmental organizations provided by this model promises a more efficient use of limited resources toward the conservation of biodiversity.

Governments around the world are presently acting to conserve the planet's declining biodiversity.

KEY WORDS: Endangered species: Management; Policy; Recovery plan; Recover team: Organizational structure.

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One example is the US Endangered Species Act (ESA). It is a strong document (Rohlf 1991, Bean 1992), yet analyses suggest that it could be improved (Yaffee 1982, US General Accounting Office 1988, Kohm 1991). The problem is not so much with the act itself, but with its implementation (Duda 1991. Gibbons 1992, O'Connell1992). Endangered species res-

toration often occurs in a sociopolitical environment of uncertaintv, complexity, and public scrutinv, and such an atmosphere can produce a multitude of administrative challenges (Lindblom 1980, Yaffee 1982, Clark and Harvev 1988, Clark and others 1989).

Programmatic difficulties are experienced by many organizations, and, in endangered species management, they seem to cut across species and geographical lines. Common recurring obstacles include: slow decision making, decisions made without the benefit of expertise outside the dominant organization, decisions based on politics and favoritism at the expense of scientific knowledge, rewarding organizational loyalty while penalizing creativity and initiative, faulty information flow through inadequate communication channels or conscious communication blockage, failure to develop plans with concise objectives that can be used to clearly evaluate progress toward a goal, deviating from a plan during implementation, and impeding effective action with an overly rigid or conservative organizational hierarchy (Allison 1971, Phenicie and Lvons 1973, Yaffee 1982, Rolhf 1991). These pitfalls, to the degree that they exist in any endangered species program, must be overcome.

This paper discusses obstacles to implementation of endangered species programs and suggests how they might be avoided. In doing so, we present what we see as a "model." Because there are sociopolitical similarities that span biologically dissimilar circumstances, our model could be adapted to a wide variety of situations. On a broader scale than individual endangered species, the model presented here can also be applied to ecosystem, park, and public land management.

A Problem Definition

In this section. we first describe why it is important to understand organizational issues that affect the use of biological knowledge. Indeed, by failing to recognize these issues. an individual can unwittingly become part of the obstacle to effective recovery. Second, we discuss organizational and cultural structures that cause and perpetuate poor performance. Third and fourth, we examine ways that organizational obstacles hinder formulation and implementation of a sound plan. Fifth, we explain why it is important to improve efficiency and effectiveness of recovery programs.

Why We Need to Understand Organizational Issues

All organizations, including wildlife and land management agencies that shape and enact endangered species recovery programs, are afflicted by common problems. Often. wildlife biologists mistakenly believe that each recovery effort is unique, but in reality, the common thread of organizational structure may account for 50-75% of the way that individuals behave in any group (Galbraith 1977). Put simply, similar advantages or disadvantages will appear in programs with a similar design regardless of the endangered species. In this light, we can learn valuable lessons by examining both foreign and domestic endangered species programs. other programs with similar tasks and environments, and the structure of organizations in general (Loucks 1992).

Most people working directly with endangered species are highly trained in the biological sciences but may have little exposure to organizational and policy theory. They are. therefore, often unable to diagnose problems in organizational structure and behavior or to develop effective solutions to those problems (Clark and Kellert 1988, Kellert and Clark 1991, Clark and others 1992).

As a result, issues of organizational structure and behavior are usually avoided or misunderstood by biologists who prefer to plunge into the necessay physical work. Many people feel it is difficult to address organizational issues when so much needs to be accomplished in the field and laboratory (Phenicie and Lyons 1973). In such circumstances, problems are often conveniently blamed on "biopolitics" or "personalities" (Jackson 1986, Clark and Cragun 1991). However accurate these labels may seem, blaming organizational ineffectiveness on biopolitics and personalities does not provide a suitable problem definition to develop an effective solution (Schon 1983). No one denies the presence of political motivations in many individuals. but appropriate organizational structure can significantly decrease the adverse effects of egocentric behavior. Unless biologists recognize and address organizational issues. even obviously rational solutions to conservation problems mav be avoided. altered. or misused (Phenicie and Lvons 1973. Yaffee 1984).

In other words. conservation biologists must develop the scientific capacity necessary to collect and evaluate technical information, but this must be combined withthe skill to effectively inject that knowledge into the planning and implementation processes (Clark and others 1992). This may require extensive consultation with a social scientist, much the same as consulting a statistician about experimental design, but a better understanding of organizational processes will greatly enhance the efficiency and effectiveness of recovery by managing the mechanisms

rather than focusing only on individual personalities or technical issues.

Existing Organizational Cultures and Structures

The culture and structure of the responsible government agency or nongovernmental organization will greatly affect the outcome of any conservation program (Clark 1986, Reading and others 1991). All organizations have their own cultures or ways that their members view and respond to the world they face (Bvars 1984). An organization's culture can determine how its members perceive goals or even what goals they seek for the organization and themselves (Warwick 1975, Byars 1984). The members of the organization consciously or unconsciously select people with similar perspectives (Janis 1972). A homogeneous work force makes internal functions efficient by reducing the potential for conflict, but it also reduces creativity by limiting decisions to familiar faces and procedures (Clark 1986). Organizational cultures can survive administrative changes bv built-in strategies of hiring and promotion (the good-old-boy system).

In his study of organizational behavior, Harrison (1972) found three typical cultures: task-oriented cultures, which reward achievement of goals; power-oriented cultures, which strive to consolidate control of programs, power, and money; and, role-oriented cultures, which are concerned with legitimacy, hierarchy, and status. The latter two are rigid bureaucracies that place procedural correctness, rather than performance, as a primary goal (Clark and others 1989). Rigid bureaucracies also allow individual members to hide from accountability under the umbrella of the organization and its actions.

Many of the federal and state agencies charged with endangered species management have a hierarchical structure because they began as regulatory bodies. For example, state game and fish agencies originated to govern hunting and fishing, and although state nongame programs have been developing, the primary focus of these agencies is still the enforcement of game laws and establishment of harvest limits.

When routine and familiar tasks are the main function of an agency, rigid structures can be productive and efficient (Clark 1986, Perrow 1986), but endangered species programs are uncertain, complex, and strongly influenced by factors outside of the traditional organization's control-conditions that require rapid assimilation of new information and the implementation of creative, cost-effective solutions (Janis 1972). When such programs are managed with a rigid structure, an agency will usually experience limited efficiency and effectiveness toward endangered species recovery. If the dominant organization in a multi-organizational program is strongly oriented toward a power or role culture, the resulting plan is likely to have some objectives incongruent with recovery goals of the species.

Organizational Obstacles to Good Planning

The policy-setting process can be hindered by factors such as not using science effectively, avoiding problem recognition, and stacking advisory groups.

Not *using* science effectively. Early stages of endangered species recovery programs are often characterized by insufficient knowledge to develop a confident course of action. When biological data are scarce, unequal power, rigid organizational hierarchies, traditional philosophies, and dominant personalities can play significant roles in a program. Snyder and Snyder (1989) documented a number of instances where unsubstantiated ideas became established in planning as a result of these factors for the California condor (Gymnogyps calfornicus) recovery program. Other cases where available data were not used effectively in planning were discussed bv Montgomery (1990), Hamilton (1992), and Marshall (1992). A critical, but constructive, outside review could prevent adoption of plans that misuse or ignore scientific data. An outside review could also assure that future data were collected scientifically.

Avoiding early problem recognition. Similarly, the development of a plan can be delaved because organizational representatives may be reluctant to admit that there are any problems beyond what they themselves can handle. Some agency representatives are concerned with public image, and they may be afraid that problem recognition will be construed as a sign of weakness and an invitation to public criticism; some even feel a proactive approach could invite criticism for doing something at a time when "nothing needed to be done." As a result of this attitude, action can be delayed until it is absolutely certain that there is an emergency. This approach must be changed. Crisis management is more expensive, has a lower probability of success, and deflects funds from proactive strategies that could prevent future catastrophes (Wemmer and Derrickson 1987).

"Stacked" recovery team. "Stacked" (biased) advisory groups are sometimes established by representatives of a dominant, control-oriented organization to recommend politically self-interested actions, thus lending a veneer of credibility and legitimacy to the plan or program. These stacked groups can be composed

of members of the dominating agency or people who first and foremost desire cooperative relations with that agency (sometimes at any cost), instead of task-oriented specialists focused on finding solutions to the problems. Such groups often make decisions in areas where they have little expertise.

An examination of 32 recovery plans showed that 77% of the formal representation originated in federal or state agencies; nongovernmental conservation group representation was only 11%, and university representation was only 8%. Clark and Harvey (1988) discussed the early black-footed ferret (Mustela nigripes) recovery program structure that produced an advisory team almost exclusively composed of agency personnel with no ferret experience, and King and others (1977) and McFarlane (1992) discussed similar circumstances for the red-cockaded woodpecker (*Picoides borealis*) recovery team.

If decisions of stacked advisory groups are influenced by top-level agency personnel distant from the species, those decisions are more likely to reflect agency and political concerns rather than task-oriented recovery goals (Clark and Harvey 1988). Often political and recovery goals are similar, but if they happen to differ, agency goals may actually override recovery goals (e.g., Snyder and Snyder 1989). As a result. recovery programs can become powerful tools for legitimizing and enhancing organizational and individual power (Warwick 1975, Clark and Harvey 1988, Clark and Kellert 1988).

In situations where recovery requirements and agencv philosophies conflict, the dominant agency may also redefine the problem in terms of its provincial goals or philosophies. The literature discusses how such behavior: (1) delayed the onset of captive breeding in the black-footed ferret recovery effort (May 1986, Weinberg 1986, Clark and Westrum 1987. Clark and Harvey 1988); (2) allowed clear-cutting instead of uneven-aged timber management in red-cockaded woodpecker foraging areas, a practice that fragments habitat surrounding traditional colony sites (Jackson 1986, 1987, McFarlane 1992); and (3) impeded important California condor research (Snyder 1986, Snvder and Snyder 1989).

Stacked advisory groups can also publish reports that are a selection of highlights from meetings instead of complete documents (Loucks 1992). These highlight reports can bias study results or meeting conclusions and further limit the ability of outside expertise to evaluate the program. They can also affect the public's perception of the program. In addition, a stacked advisory group can limit critical evaluation to fine-tuning the dominant organization's original plan. This may give the impression that there is a critical review, but without evaluating the soundness of the initial path of action.

In an extreme example of stacked teams, a group representing diverse organizations has been eliminated and replaced by one or two individuals contracted to formulate plans. In 1982 the red-cockaded woodpecker recovery team was disbanded and an employee of the US Forest Service, an agency then being investigated under a jeopardy opinion for their management of the species, was contracted to revise the recovery plan. A multidisciplinary committee of specialists, appointed by the American Ornithologists' Union, was critical of the recovery plan and the mechanism by which it was developed (Ligon and others 1986).

Either stacking or eliminating recovery teams allows one group to limit the role of others and consolidate its power (Clark and Harvev 1988). Reducing the influence of scientists outside the dominating agency assures control of information and management of legitimacy (Clark and Westrum 1987). Indeed, the representatives of the dominating organization may be threatened by people with alternative ideas and evict them from the recovery program. When self-legitimization is a goal, there are rarely constructive methods of resolving conflicting opinions, and expulsion can be accomplished by erecting a complicated set of bureaucratic hurdles (including denying research permits). One of the most famous examples is the Craighead's grizzly bear (Ursus arctos) research in Yellowstone National Park. In that case, valuable long-term studies by independent researchers were terminated and agency personnel replaced the independent scientists (Hornocker 1982).

Organization Obstacles to Good Implementation

Even an excellent plan must be implemented well. Implementation can change established plans significantly, thus giving implementing organizations and personnel a great deal of power (Lindblom 1980, Yaffee 1982, Clark and others 1991, Clark 1992). It is, therefore, important that plans be defined as clearly as possible and that there be a critical review of performance all along the implementation process. Organizational representatives that implement plans can reduce the efficiency of an established plan by deliberate delay tactics, by yielding to parochial political pressures. and by preventing a critical review of their actions.

Deliberate delay. If representatives of the implementing agencv do not agree with the established strategy, execution can be delayed by failing to allocate sufficient funding (or allocating funding in an

ineffective manner); by suddenly producing last-minute obstacles, which could have been easily resolved with an earlier analysis (often called sand-bag management); by intentionally not collecting necessary data despite earlier agreements to do so; and by other means.

Yielding to local political pressures. Implementation can be affected by local political and economic pressures that may not necessarily perceive recovery as beneficial (Lindblom 1980, Greenwalt 1988, Rohlf 1991). Overexploitation of natural resources may provide short-term benefit to a regional economy despite long-term biological, social, political, and financial consequences. In the United States, the ESA supposedly precludes agencies from considering economic or political factors during the process of identifying species in danger of extinction (Gibbons 1992), but it fails to preclude these same inhibitive factors from affecting the planning and implementation of recovery efforts. For example, land hosting the last known red-cockaded woodpecker colony in Holly Springs National Forest was traded to a developer (Jackson and others 1977), and property values combined with legal threats negatively influenced the implementation of the habitat conservation plan for the Coachella Valley fringe-toed lizard (*Uma* inornata) (O'Connell 1992).

In reality, the ESA has not even always succeeded in precluding economic and political factors from the initial listing process. Because of pressure from the US Department of Interior and the timber industry, the US Fish and Wildlife Service did not list the northern spotted owl (Strix occidentalis) as threatened until recently (US General Accounting Office 1989).

Preventing critical review. Organizational representatives may be reluctant to critically review their own implementation performance if self-legitimization is a priority (Yaffee 1982). Channels permitting outside critiques can be closed, or the critique can be impeded by presenting a huge document combined with a very brief time period allowed for evaluation and comments. Another ploy is selecting a biased evaluating team, whose purpose is to produce a positive review and discredit any alternative assessments. When objective evaluation of performance is not permitted, neither individuals nor organizations can be held accountable for their actions. As a result, the recovery plan may be executed inefficiently or actually diverted from the predetermined path.

Reasons to Improve Efficiency

There are six reasons to improve efficiency and effectiveness of endangered species recovery programs. and some are obvious. First, programs that experience even a moderate amount of success are imitated by other programs, but it should be noted that the biological aspects of some species may partially mask programmatic weaknesses. A poor organizational model may demonstrate progress toward recovery on one species but provide disastrous results if applied to a species which has less biological margin of error (e.g., slower reproductive rate, smaller effective population size, fragmented habitat, etc.).

Second, successful programs with organizational weaknesses use a larger proportion of resources (time, money, etc.) than necessary, and those resources could be applied to other equally pressing conservation problems. Many programs are already impaired by insufficient funding for research or management, making efficiency a necessity (Lindblom 1980, Loucks 1992).

Third, if the species occurs in the jurisdiction of more than one agency, the lack of a comprehensive plan reduces interagency cooperation (for example, the first combined meeting of the US and Canadian Whooping Crane Recovery Teams was not held until October 1991; 1992 Endangered Species Technical Bulletin Vol. XVII Nos. 3-8, p. 3). Instead, there can be duplication of effort or important tasks left undone. Poorly defined programs (or stacked recovery teams) can also create unproductive conflict between representations of the different agencies. The resulting antipathy may create distrust and unnecessary delays in future decisions for that particular species or create delays for the next threatened species involving the same agencies.

Fourth, if there is inadequate planning, recovery programs that span agency jurisdictions or geographic boundaries may not be designed to produce the reliable knowledge necessary to rapidly recover the species. Many recovery programs that reintroduce or translocate species over a broad geographic/jurisdictional range have had the learning process slowed by noncomparable, or incomplete, scientific designs. Because these types of data do not often meet qualifications for publication, peer review of the program is inhibited.

Fifth, small populations are very vulnerable to collapse because of genetic disorders, demographic events, habitat erosion, and environmental catastrophes. Without prompt and effective action, small populations move one step closer to extinction each passing day. Any delays, or diversions, in planning or implementation (as discussed in the previous two sections) only make recovery more difficult. Yaffee

(1982) discussed species that have gone extinct because of delays or inappropriate use of science.

Sixth, when representatives of an organization restrict creative input and receive self-orchestrated positive reinforcement for their behavior (e.g., stacked recovery groups or limited critical review), there can be grave repercussions. Through internal self-deception, the organization can actually harden its position, further polarize the political situation, and jeopardize species recovery.

We argue that the efficiency and effectiveness of recovery programs must be improved. Many countries offer legal protection for endangered species, but do not specify procedures for developing and implementing recovery plans. For example, in the United States, the ESA does not specify how the Secretary of Interior will ensure (under Section 4) that protective actions will actually be accomplished. In response, we offer some ideas to address those issues.

A Proposed Solution

Our model is divided into two simple parts: forming and executing a plan. It employs a continuously functioning recovery team that integrates the best expertise (whether government or nongovernmental) into the planning process, introduces accountability and oversight into all phases, and encourages effective implementation.

Formulating a Plan of Action

Only a knowledgeable, experienced team can respond quickly to the uncertainty of endangered species management. The development and implementation of recovery plans requires extreme flexibility, an ability to respond to changing circumstances (and mistakes), and an ability to quickly take advantage of new opportunities and technologies. For this reason, a recovery plan alone should not replace a team. Recovery plans serve an important function, but they are difficult to keep up to date because of rapidly evolving knowledge combined with a cumbersome approval process. We advocate that recovery plans address general goals and that the recovery team meet at least annually (but more often if necessary) to formulate recommendations for crucial issues.

The team should always include recognized biologists who have substantial hands-on experience with the species. Representation from the full range of biological perspectives can also contribute skills in areas such as genetics, habitat restoration, disease, or necessary biological techniques. Equally important, social scientists can assess values and attitudes, economists can predict economic benefits and costs, education/public relations experts can present the program to the public and raise necessary funds, and legal skills may be necessary in some situations. This nonbiological expertise can address specific problems in their respective fields that can be very critical to a successful recovery program. Composition of the team should be fluid enough to include advice from any needed perspective.

The recovery team should not include members, and much less be chaired by a member, whose primary function is to represent an agency. Individual participation on the team should depend on the best scientific or technical skill available, and not the best skill available inside the dominating agency. Political appointees pushing personal or organization agendas will divert attention from recovery requirements. It is important, however, that all participants on the team are aware of the political constraints in which agencies operate.

We recommend that national scientific organizations or worldwide conservation organizations compose a data base of qualified specialists to aid in the formation of recovery teams. These recommendations should be published for public knowledge and comment. The national agency mandated with responsibility for directing the recovery of endangered and threatened species could cooperate with these organizations to form recovery teams.

Team members should be protected from outside interference (Clark and Westrum 1989). Free flow of ideas and information is essential so that criticism can be raised and evaluated in a rational way. The team should operate on a consensus basis and recommendations should be biologically and politically viable. It can be difficult to unify diverse perspectives, goals, and values, but an effective coordinator can enhance the exchange of information and ideas and keep participants on an equal footing (Clark and Harvey 1988, Clark and others 1989). Clark and others (1989) suggested the recovery team function as an organization parallel to the managing agency or agencies, as has been done in private businesses. That is a suggestion that we endorse.

Endangered species programs would also gain credibility if team decisions were published and periodically subjected to critical review by recognized specialists not employed by the lead agency (Goldstein 1992, Marshall 1992). This policy review is necessary to ensure a continuous focus on biologically sound management (the National Science Foundation, National Institute of Health, and the US Environmental Protection Agency have established such protocols). There should also be no constraints on publicly dis-

cussing recovery team decisions. After all, public tax money pays for a large part of the program. and the public deserves to know how their money is spent.

Much of the above-mentioned process for endangered species decision making has been implemented in Canada, with nongovernmental organizations contributing a great deal of scientific expertise (Prescott and Hutchins 1991). In the United States, the recovery of Pacific salmon species addressed geographical. political, and economic problems, and it focused on ecosystem needs in endangered species recovery policy (Volkman 1992). That council consisted of a group of specialists, not representatives of dominating agencies; they designed recovery efforts as a series of testable hypotheses and quickly adapted management strategies (Volkman 1992). Similarly, from 1985 to 1988, an ad hoc team staffed by members of the Captive Breeding Specialist Group (IUCNISSC)and the American Association of Zoological Parks and Aquariums provided expen advice to the Wyoming Game and Fish Department and the US Fish and Wildlife Service that was critical in the inception and early success of the black-footd ferret captive breeding effort (Miller and others 1993). The National Research Council has been recently asked by the US Fish and Wildlife Service to form committees and make recommendations for several endangered species' recovery programs.

Once the recovery team has outlined priorities, it would send those recommendations to the national agency mandated to direct recovery of threatened and endangered species (if the recovery effort is international, then an international, interagency working group could coordinate). It is important that national (international) policy be determined at the national (international) level. The formation of national (international) policies, however, does not imply exclusion of local concerns, but rather their integration into a larger consistent whole. Clearly, management needs can not be solved by a single "cookbook" approach, as many endangered species occur in a wide variety of habitats and climatic conditions, and those situations cannot be reasonably managed by a single "recipe."

Executing the Plan

When assigning implementation tasks, the national agency or interagency working group mandated to direct recovery may wish to divest some (or all) of its responsibilities to other organizations. For example. responsibility for captive breeding may be given to professionally managed zoological parks; field research may be allocated to private conservation organizations or independent researchers; or a local population may be managed by a local wildlife agency. If this occurs, the implementing organization should accept responsibility for its role via a contractual arrangement with the lead agency. The contract would reduce the probability of policy change during implementation and would help assure that all parties clearly understand their responsibilitiesand commitments.

For example, in the United States, such a contractual arrangement could function through the US Fish and Wildlife Service permitting process and the Section 6 funding that the US Fish and Wildlife Service allocates to state agencies involved in endangered species recovery efforts. The permitting process could function with proposals published in the Federal Register for comment, or comments on proposals could be supplied to the US Fish and Wildlife Service by the recovery team.

The contractual arrangement would include a review of progress by the recovery team at least annually and, in case of a crisis, on an emergency basis. Reviews are necessary to: (1) evaluate performance bv the contractor and (2) redirect policy recommendations. If the individual or organization handling a task did not attempt to meet the contractual arrangement, then the agency mandated to direct recovery could terminate the relationship and extend funding and permits to another individual or organization. While it mav be difficult to prevent serious deviation by implementing organizations, the review process would allow the situation to be quickly identified.

In conclusion, these changes would link authoritvy with responsibility and that would heighten overall performance in any recovery effort. With no expert team. no review, and no accountability, the situation can become tyrannical, and it will likely produce many of the pitfalls discussed in the first part of this paper. This does not mean that an inefficient program would not make progress toward recovery. There are recovery efforts that are considered successful by many people, but that still encounter programmatic problems (admittedly, success has various definitions over differing time frames and different contexts). The point is, even "successful" programs may have their efficiency handicapped by organizational problems. It is, therefore, our belief that significant improvements can be made to many recovery programs by addressing organizationally the variables that define the very basis of operation.

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