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Application of Conservation Biology Research to Management

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Abstract: *We conducted a survey of all primary authors of "Contributed Papers" and "Research Notes" in Conservation Biology from 1987 to 1998 to assess the perceived effectiveness of published management recommendations. No systematic survey has previously assessed the degree to which authors believe that resource managers are using the growing body of research published in Conservation Biology. In March 1999, we sent surveys to 667 authors of 790 published papers, asking whether their papers included management recommendations, whether such recommendations have been used in practice, and why they believed they have or have not been used. We received completed surveys from 198 authors of 223 papers. The percentage of papers that included management recommendations increased from 1987 to 1991, then stabilized at about 75%. Author perception of the use of management recommendations generally increased over the 5 years from 1994 to 1998. Initiatives of federal, state, and local agencies were the most often-cited cause of successful implementation of management recommendations, accounting for over half of all such cases. Our survey suggests that authors in Conservation Biology have increased the use of explicit management recommendations in their papers and that authors believe their recommendations are being used to an increasing degree.*

Aplicación de la Investigación sobre Conservación Biológica en el Manejo

Resumen: *Llevamos a cabo un sondeo de todos los autores principales de "aportaciones en manuscritos" y "notas de investigación" de la revista Conservation Biology entre 1987 y 1998 para evaluar la efectividad percibida de las recomendaciones de manejo publicadas. Ningún sondeo sistemático previo ha evaluado el grado al cuál los autores creen que los manejadores de recursos están usando la creciente investigación publicada en Conservation Biology. En marzo de 1999, enviamos encuestas a 667 autores de 790 manuscritos publicados, preguntándoles si sus publicaciones incluyeron recomendaciones de manejo, si estas recomendaciones han sido puestas en práctica, y las razones por las cuales ellos creen que sus recomendaciones han sido o no han sido usadas. Recibimos las encuestas completadas de 198 autores de 223 manuscritos. El porcentaje de publicaciones que incluyeron recomendaciones de manejo incrementó entre 1987-1991, y posteriormente se estabilizó en aproximadamente un 75%. La percepción de los autores sobre el uso de las recomendaciones de manejo ha incrementado por lo general en los últimos cinco años (1994-1998). La iniciativa de las agencias federales, estatales y locales fue la causa más frecuentemente citada para la implementación exitosa de recomendaciones de manejo, abarcando más de la mitad de todos los casos. Nuestro sondeo sugiere que los autores de Conservation Biology han incrementado el uso de recomendaciones explícitas en sus publicaciones y que los autores creen que sus recomendaciones están siendo usadas cada vez más.*

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The conservation biologist who stops with developing information takes the grave risk that it will remain forever at that stage—a benign lump of slick pages in one journal among thousands of others on the shelves of libraries and offices.

J. W. Thomas and H. Salwasser (1989)

Introduction

We examined the perceptions of conservation biologists regarding how effective their published research results have been in affecting resource management and conservation efforts. Conservation biology has been described as a “mission-oriented” and “new and synthetic” discipline (Soulé & Wilcox 1980; Aplet et al. 1992). Implicit in such ideals is the desire for greater integration between the main practitioners of conservation: scientific researchers and resource managers (Temple 1992; Meffe 1998). Conservation biology crystallized as a discipline not only because of the growing perception of an extinction crisis, but also because of a perceived gap between professional ecologists and resource managers (Meine 1995). Two objectives of the Society for Conservation Biology, printed in every issue of *Conservation Biology*, are (1) “the publication and dissemination of scientific, technical, and management information” and (2) “the encouragement of communication and collaboration between conservation biology and other disciplines...that study and advise on conservation and natural resource issues.” One approach to assessing the Society’s progress in these areas is to measure the perceived attainment of such objectives by researchers.

Few members of the Society would question the need for greater integration of research and management. The findings of Fleishman et al. (1999), from a survey of about 20 conservation scientists, provide valuable insight into the obstacles that conservation biologists face when seeking to implement their findings. To assess how well the Society has encouraged the integration of science into resource management through *Conservation Biology*, we developed a survey to examine the perceptions of conservation biologists by asking if they believe their published recommendations have been used by managers and why they felt such recommendations have or have not been used.

We present the results of a mail survey of all primary authors (hereafter referred to as authors) of “Contributed Papers” and “Research Notes” in *Conservation Biology* from 1987 to 1998. Our goals were to (1) determine how frequently explicit management recommendations were included in papers, (2) assess authors’ perception of whether such recommendations have been used, and (3) summarize the reasons that authors believe their recommendations have or have not been used.

Methods

In March 1999, we sent a 2-page survey to 667 authors of 790 “Contributed Papers” and “Research Notes” (volumes 1–12). (Volume 12, no. 6, was not available when we prepared our survey.) In cases where one author had multiple papers, authors were asked to complete a survey for each paper. Authors were asked whether their paper contained management recommendations and, if so, to describe the three most important of these. Authors used their own words to characterize why management recommendations have or have not been used; our survey did not present discrete choices. We pooled author responses into several categories (see results). By 1 June 1999, we had received surveys from 198 authors of 223 papers (a 28% return rate).

Results

Of 223 papers for which we received surveys, 173 (78%) contained management recommendations and 50 (22%) did not, with the percentage of papers including management recommendations increasing from 1987 to 1991 and leveling off since then (Fig. 1). Between the first 4 years (1987–1990) and the next 4 years (1991–1994), the number of papers with recommendations grew by 9%, and between 1995 and 1998 this number grew by 8%. During this last 4-year period (1995–1998), 82% of all papers contained at least one management recommendation. When asked whether they believed that their recommendations were being used, in 164 cases (54%) authors answered in the affirmative, in 68 cases (22%) authors did not believe that their recom-

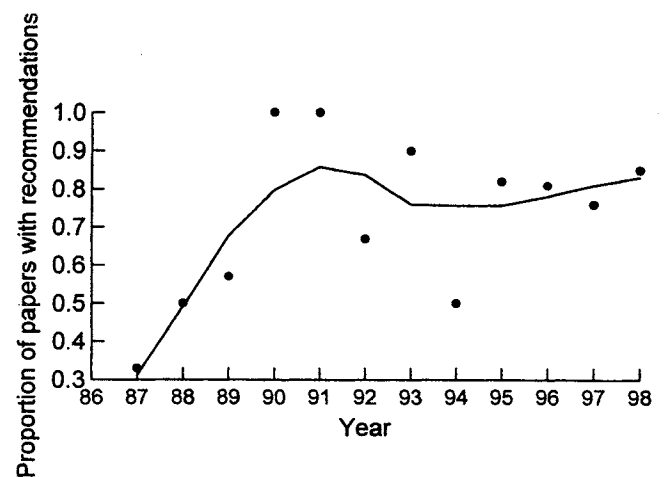


Figure 1. Proportion of papers published in *Conservation Biology* that include management recommendations for each year between 1987 and 1998. A LOWESS (locally weighted) regression line is included.

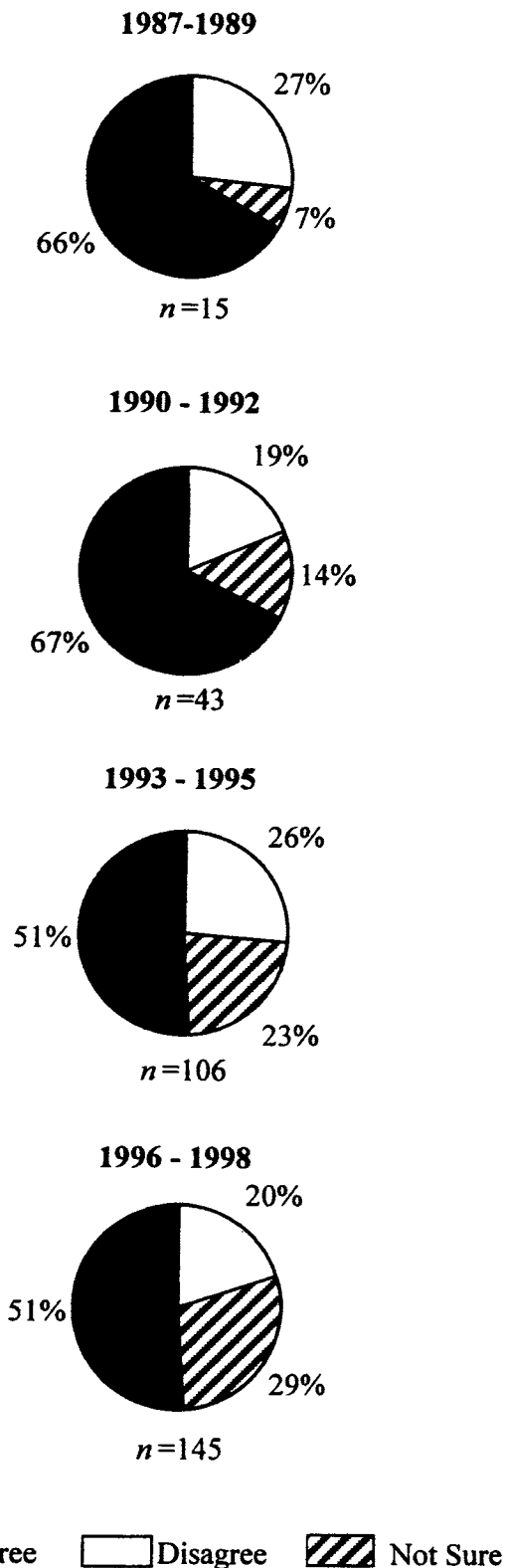


Figure 2. Summary, for four time periods, of the percentage of primary-author responses to the statement "Your recommendation was used/applied in management." Authors had the following potential responses: agree, strongly agree (here, pooled), disagree, strongly

recommendations were being used, and in 73 cases (24%) authors were not sure. The proportion of recommendations that authors believed were being used remained virtually unchanged until a decline in the period of 1993 and beyond (Fig. 2). When we looked at the proportion of authors who believed that their recommendations were being used against the total respondents, exclusive of those that were unsure, we found that authors' perceptions of use of recommendations has fluctuated but increased in the years from 1994 to 1998 (Fig. 3).

We asked authors to identify the primary reason they thought their recommendations were or were not used. Most reasons fit clearly into one of the categories reported below. Some authors gave multiple reasons, and in such cases we used all reasons given in our analysis. Authors who thought that their management recommendations *were* used attributed it to "agency initiative" ($n = 52$, 25%), "agency recognition of problem" (all cases in which some agency action regarding the management recommendation was pending; $n = 52$, 25%), "recommendations easily understood" ($n = 24$, 12%), "good timing" ($n = 18$, 9%), "involvement of a threatened or endangered species" ($n = 13$, 6%), "nongovernmental organization initiative" ($n = 13$, 6%), and "recommendation for continued research" ($n = 12$, 6%). Eighteen (9%) surveys contained no response, and two (1%) listed reasons that could not be easily categorized.

When authors were asked to identify the primary reason they thought that their recommendations *were not* used, they attributed it to "neglect of issue by agency" ($n = 31$, 41%), "insufficient training (of managers) for implementation" ($n = 14$, 18%), "lack of funding" ($n = 8$, 11%), "public opposition" ($n = 7$, 9%), and "lack of infrastructure" ($n = 6$, 8%). Ten (13%) surveys listed reasons that could not be easily categorized.

A substantial number (78) of authors stated that they did not know whether their recommendations were used. These authors attributed this uncertainty to "use not measurable" ($n = 27$, 35%), "too early to say" ($n = 24$, 31%), and "no interest by others (i.e., managers)" ($n = 8$, 10%). Twelve (16%) surveys contained no response to this question, and six (8%) listed reasons that could not be easily categorized.

Discussion

The increase in inclusion of management recommendations in research papers suggests that authors and/or editors have recognized and responded to the need for a

disagree (here, pooled), and not sure ($n =$ number of management recommendations made by authors that responded to the survey).

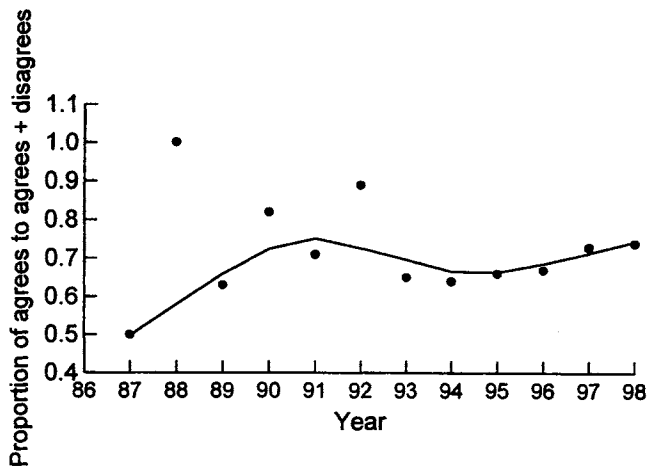


Figure 3. Proportion of "agrees" to "agrees + disagrees" for primary-author responses to the statement "Your recommendation was used/applied in management" when recommendations for which authors expressed "not sure" are excluded. A LOESS (locally weighted) regression line is included.

more explicit link between research and management applications. This is an encouraging pattern because it directly addresses both of the Society's goals mentioned above. The proportion of authors who believe that their recommendations are being used (excluding authors who answered "not sure") increased over the years from 1994 to 1998. There was also a steady increase in the number of authors who were unsure about whether their recommendations are being applied to management. We offer some explanations for these patterns. First, the perception of increased use of published recommendations may reflect a real increase in their use by managers. This suggests that the journal reflects a real trend in increased communication between researchers and managers, but an assessment of the managers' perceptions is needed to clarify this trend. Second, time elapsed since a paper's publication may be positively related to the use of any recommendations contained in the paper. This would account for the temporal increase in authors who were unsure of the use of their recommendations. We suggest that the strength of this relationship may decline as time since publication lengthens and papers become somewhat less relevant to current management conditions.

When authors believed that their recommendations were being used, they attributed it most often to "action by a public agency" (50%). Other reasons, such as "involvement of a threatened or endangered species" (6%) also suggest action by a public agency. Although the dominance of agencies in implementing recommendations is not surprising, the fact that no other explanation for use approached agency action is noteworthy. After agency involvement, the next most common reason for

the use of recommendations was that the recommendation was "easy to understand" (12%).

When authors believed that their recommendations were not being used, they attributed it most often to "neglect by agency responsible for management" (41%). For almost 20% of recommendations, authors believed that agency personnel were insufficiently trained to implement their recommendations. Thus, in about 60% of the cases where authors believed that their recommendations were not used, public agencies were seen as responsible for this lack of implementation.

When authors were not sure whether their recommendations were used, they most often cited "use not measurable" and "too early to say" as the reasons. Authors may not be aware of the use of their recommendations for a variety of reasons, including ambiguity in the use of recommendations, lack of contact with managers, or changes in the authors' research focus over time. The use of some types of management recommendations is not easily measured. For example, one author summarized a recommendation as "reserve design needs to take into account the patchy distribution of organisms," and then acknowledged the difficulty of assessing the use of such a broad recommendation.

Our survey was designed to identify the most important reasons why authors felt that their recommendations have or have not been used. We do not suggest that there is a direct relationship between the publication of a recommendation and its implementation. A single paper in *Conservation Biology* rarely determines whether a recommendation is used; in most cases, the issue is much more complex. Moreover, the inclusion of recommendations is an imprecise measure of the authors' inclination to recommend or apply research results; authors may not include management recommendations in their papers but may make recommendations in other contexts, such as agency reports and direct advice to managers. Other factors may have influenced the authors' propensity to respond to our survey. For example, authors who believe that their recommendations have been used may be more likely to respond than authors who have witnessed little use of their published findings.

Our results highlight the perception of many authors that federal, state, and other public agencies play a large role in the application of their recommendations or research findings. Public agencies tend to be staffed with professionals trained primarily as resource managers, whereas academically based researchers, usually with little or no training as managers, tend to make up a large proportion of authors in *Conservation Biology*. Although academic research provides a means of improving our understanding of the processes and mechanisms that affect biodiversity, researchers often have surprisingly little interaction with managers who make decisions on the ground. At the root of the division between these two groups are fundamental differences between what

could be called their professional cultures, often resulting in the failure of information obtained from scientific inquiry to be considered in management decisions.

The production of ever-greater volumes of results, no matter how "applied" they may purport to be, is not the ultimate goal of the Society for Conservation Biology. Rather, the Society's unique mission is to synthesize research and management into a dynamic new tool for the conservation of biodiversity. Although we primarily polled researchers, our results provide valuable insights into the perceptions of researchers that can help us move ahead in our efforts to increase communication between researchers and managers. We propose that researchers make a greater effort to consider management questions when developing research priorities and to facilitate the process of information transfer by learning how to ask managers what information is needed and in what format. Academics need to cultivate professional relationships with the people managing the biodiversity we all hope to conserve. As one respondent to our survey wrote, "If scientists (especially academics) are not willing to forsake their labs and get down to the planning department's offices to spread the word, then part of the blame for lack of implementation rests on their shoulders."

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