

## Conclusions and Recommendations



During the course of preparing this book, several important philosophical issues regarding the conduct of inventory and monitoring projects and the use of the resultant data came to the attention of the editors. Some were discussed at length by the workshop participants or grew out of conversations with colleagues about declining amphibian populations and the need for long-term studies; other issues arose as we worked with the material in the book itself. Each of these matters bears on the activities of and should be considered by people who study amphibian biodiversity. We present these issues here, along with our conclusions and recommendations.

### The importance of inventory data

The field data gathered during amphibian inventory and monitoring studies have special importance. These data, rather than the summary statistics or analyses of them, form the bases for evaluating the statuses of amphibian species over broad areas and for determining whether their populations are changing. These data are used to compare species richness among assemblages, for evaluating the importance of specific habitats and sites for maintaining species, and for making conservation and management-related decisions about amphibians. It is essential, therefore, that the data be available for use by scientists, conservationists, managers, and others. Unfortunately, most scientific jour-

nals discourage publication of basic data, including raw data on presence and abundance.

We urge scientific societies and editors to adopt a policy of including original inventory and monitoring data in articles published in their journals. We also recommend that archives be established to house the data derived from inventory and monitoring studies and to make them available to qualified users. Such data should have been gathered in standard ways and not be otherwise available.

The Society for the Study of Amphibians and Reptiles (SSAR) has made a commitment to archive data taken on field trips organized by regional herpetological societies in the United States. We commend the SSAR for this effort and encourage other persons, organizations, and agencies to develop similar data repositories. The IUCN/SSC Declining Amphibian Populations Task Force will serve as an interim repository for data provided by its collaborating working groups, but a more permanent solution is needed. Clearly, organizations and agencies whose responsibilities include the management of areas for the maintenance of biodiversity or the protection of species need to address this issue. The Center for Environmental Data Management, a centralized data repository that is an integral part of the proposed U.S. National Institutes for the Environment, may provide such a solution.

### Flexibility and insight

Some of the very features that make amphibians a key group for understanding biological diversity and allow them to serve as indicator species of the quality of their environments also constrain aspects of their study. For example, most amphibians are active primarily during specific periods of the year and only under certain weather conditions; studies done at these times will be most informative and most comparable

among sites. Studies must be scheduled, therefore, with an appreciation of these activity patterns and with sufficient flexibility to accommodate the variable weather conditions that influence them. We are especially concerned that personnel from government agencies may wish that amphibian studies be accomplished during specific periods for reasons unrelated to science, not realizing, for example, that variations in seasonal weather patterns could invalidate the results. The vagaries of amphibian activity patterns can also be accommodated with long-term studies. Such studies provide additional, important information on population dynamics, and we encourage government agencies and other institutions to make commitments to support long-term investigations. Only with an appreciation of amphibian activity patterns and the factors that control them, and an understanding of population processes derived from long-term studies, can we hope to make progress in comprehending the role of amphibians in the natural world.

### Modification of techniques

In this book, we have assembled current information on techniques known to be successful for the inventory and monitoring of amphibians. Data derived from similar studies using the same techniques, as described, should be comparable. We urge, therefore, that all users follow to the letter the procedures indicated. On the other hand, we realize that some techniques will require modification in some situations, so investigators should not hesitate to modify a technique *if the change is truly an improvement*. In such situations, however, it is critical that the investigator clearly explain any change and the reasons for it, so that it may become part of the standard procedure for the future. We urge investigators to send us information on changes that have been clearly demonstrated to improve techniques, so that we can include the changes in

subsequent editions of this book. Other suggestions and comments are also welcome and should be sent to Amphibian Techniques Book, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0162 USA.

### Comparisons with previous studies

Some users of this book may wish to sample amphibian populations at specific sites for comparison with previously published data. Such efforts were recommended by participants at the Declining Amphibian Populations Workshop (Anonymous 1991a) as a source of information on the status of certain amphibian populations. If the sampling technique used in the original study does not correspond exactly to a procedure outlined in this book, we nevertheless recommend that the investigator use one of the techniques discussed in Chapter 6, selecting the one most similar to the original and most appropriate for the target population or habitat. The information obtained will serve as a baseline against which data from future monitoring or inventory efforts can be compared. When the original sampling methodology is unknown, the investigator should use common sense in selecting an appropriate sampling technique.

### Epilogue

When we began this project more than three years ago, we were largely motivated by our perception of the need for standardized sampling

techniques. We were concerned about a possible global decline of amphibians and concluded that only through the use of standardized techniques could the size and consequences of such a loss of amphibian diversity be rigorously assessed. This volume is the culmination of our efforts to present in a useful format the best approaches available for measuring amphibian diversity. Some people may believe that we are trying to legislate research techniques. If recommending standardized protocols for sampling in order to facilitate rigorous, quantitative cross-sample comparisons is viewed as legislating techniques, then perhaps we are guilty. It was never our intent to bypass or slight any promising sampling technique, and from our perspective, we have not.

We experienced great excitement in assembling this book, because we realized that we were potentially making a significant contribution to amphibian inventory and monitoring studies and, thereby, to the understanding and conservation of these animals and their habitats. We hope that our enthusiasm for this project will carry over to our readers and that they will be stimulated to use these techniques in the field. Only through the continued study of amphibian diversity and habitats will we come to understand the place of these organisms in the natural environment. Nonprimate life-forms have complex and important roles to play in the maintenance of nature, a fact of which we have grown increasingly aware over the past decade as our understanding of the nature and interdependence of ecosystems has increased. Amphibians are among the significant players, and we encourage everyone to accord them the respect and attention they deserve.

