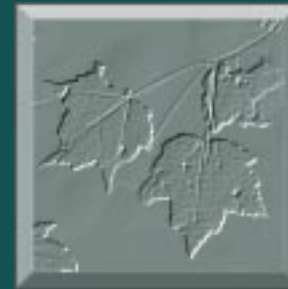


# Our Living Resources

**A Report to the Nation on the  
Distribution, Abundance, and Health of  
U.S. Plants, Animals, and Ecosystems**



**U.S. Department of the Interior  
National Biological Service**





# Our Living Resources

*A Report to the Nation on the  
Distribution, Abundance, and Health of  
U.S. Plants, Animals, and Ecosystems*

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The nation's biological resources are the basis of much of our current prosperity and an essential part of the wealth that we will pass on to future generations. Like other forms of wealth, biological diversity constitutes a resource that must be conserved and managed carefully. Proper management of any resource requires (1) inventorying and monitoring the resource, (2) understanding the factors determining its supply and demand, and (3) analyzing options for current and future uses of the resource. Inventory and monitoring is the essential first step in taking stock of the wealth represented in our living resources and planning for their conservation and use.

This report, *Our Living Resources*, is the first product of the Status and Trends Program in the National Biological Service. The report compiles, for scientists, managers, and the lay public, information on many species and the ecosystems on which they depend. As a first step toward a consistent, large-scale understanding of the status and trends of these resources, this report brings together for the first time a host of information about our nation's biological wealth, highlighting causes for both comfort and concern.

The report provides valuable information about causes for the decline of some species and habitats. It also gives insight into successful management strategies that have resulted in recovery of others. The report will also serve as a useful guide for identifying research needs by revealing information gaps that must be filled if we are to achieve a more comprehensive understanding of both current conditions and the anticipated impact of change.

The mission of the National Biological Service is to work with others to provide the information and technologies needed to manage and conserve the nation's biological resources. As the biological science arm of the Department of the Interior—with neither regulatory nor resource-management responsibilities—NBS has as its primary responsibility serving the biological science needs of other Department of the Interior bureaus.

NBS also has a broader role of working with other federal agencies, states, universities, museums, private organizations, and landowners in a "National Partnership" to ensure that a more comprehensive and consistent approach is taken to providing information about the nation's biological resources. All of the players in this new partnership have long and rich histories of collecting and interpreting biological information. The National Biological Service will work with its partners to supplement and integrate this scientific information and make it more accessible.

*Our Living Resources* is a prime example of NBS's partnership approach. Authors are drawn from more than 15 federal agencies, 15 state agencies, 25 universities, and 13 private organizations. In some cases, individual papers are themselves products of interagency or intergovernmental partnerships.

Statistically reliable information on the status and trends of biological resources is an essential step towards better stewardship of our nation's biological wealth. Equally important is an intensive research program aimed at understanding what factors are responsible for biological changes and the incorporation of that understanding into resource management and policy decisions. NBS works closely with resource managers and other decision makers to analyze how natural forces and human activities affect biological resources and to predict how alternative management and policy decisions might improve or degrade those resources.

NBS is committed to providing better information and making that information easily accessible not only to those who manage and regulate how we use natural resources but also to every American who makes economic use or seeks recreation or simply cherishes the beauty of our living resources. More reliable information and better access to that information will result in better and fairer decisions and a more prosperous future for all Americans.



H. Ronald Pulliam  
Director, National Biological Service

## Preface

This report is the first of a series of reports on the status and trends of the nation's plants, animals, and ecosystems. It represents an effort to bridge the gap between scientists and resource managers, policy makers, and the general public. Usually, scientists tend to write for scientific journals and communicate with other scientists; this report attempts to collect a great variety of scientific data and interpret it for the nonscientist while maintaining the full credibility of the data.

The articles included represent both invited and contributed papers; that is, where we could

identify specific subject experts, we invited them to submit papers, and we also accepted papers contributed by other authors. Following scientific tradition, each article submitted was peer-reviewed, usually by three anonymous scientific reviewers. The articles are often abridged from a complete scientific treatise, but each article contains references and personal contacts if the reader is interested in pursuing the subject in greater depth. Finally, we recognize that this report is incomplete and that more status and trends data exist than we were able to uncover or incorporate into one volume.

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## In Memoriam



*Edward Terhune LaRoe III*

Senior science editor Ted LaRoe died of cancer October 19, 1994, having shepherded this report almost to its completion. Had he lived to see *Our Living Resources* published, he would not have lingered to bask in its accomplishment. He would have moved on to new projects, new plateaus, for Ted always had a vision, a sense of where he was going. He also had a vision for the National Biological Service, which he was instrumental in helping to create.

Ted was bright, creative, inquisitive, inspiring, and a man of many accomplishments. His scientific leadership was evident in his active role in issues relating to wetland science, global climate change, coastal resources, ecosystem-based management, and, of course, NBS. Above all, he was a champion of scientific integrity, which, we trust, is evident in this report. We hope he would have been pleased.

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We extend our sincere appreciation to all who helped produce this report. Especially important were the science editors—Austin K. Andrews, Raymond J. Boyd, Glenn R. Guntenspergen, Russell J. Hall, Michael D. Jennings, Hiram W. Li, Michael J. Mac, William T. Mason, Jr., O. Eugene Maughan, Roy W. McDiarmid, Carole C. McIvor, J. Michael Scott, William K. Seitz, Thomas J. Stohlgren, Benjamin N. Tuggle, Wayne A. Willford, and Gary D. Willson. They served by coordinating reviews, including the peer reviews of articles within their sections. In addition, they each provided an overview to the material in their sections. Assisting with overviews were Gregor T. Auble and B.D. Keeland.

Carl Anderson, Michalann Harthill, Deborah E. Peck, Helen V. Turner, and Sherri L. Hendren each provided tremendous technical support. Contributing expertise in graphics were Nicholas R. Batik, Mary A. Helmerick, Dave Opp, Diane K. Baker, Janine J. Koselak, and M. Jennifer Kapus. Technical editors—Mary Catherine Hager, Beverly Kerr-Mattox, and Kristie A. Weeks—dedicated months to the

editing of individual articles. Technical typists Deany M. Cheramie, Dana M. Girod, and Tiffany Alexander Hall assisted by keyboarding, correcting, and proofreading. Technical typist Judy Zabdyr helped in the final stages as did proofreaders Rhonda F. Davis and Lori E. Huckaby, under the direction of editor Beth A. Vairin, who also reviewed the report. Librarian Judy K. Buys performed numerous bibliographic searches to verify citations, and Marilyn Rowland indexed the report. Robert E. Stewart, Director of the National Biological Service's Southern Science Center, graciously allowed the use of his staff, space, and equipment to produce this report, as did Lawrence Bembry, Director of the Bureau of Land Management's Service Center. We are also grateful to all those who gave permission to use their slides and graphics.

Finally, we would like to thank the authors, the peer reviewers, and the state, federal, and private agencies who so willingly gave of their time and data. Without their hard work and cooperation, this report would not have been possible.

## Acknowledgments

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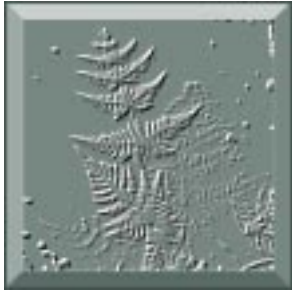
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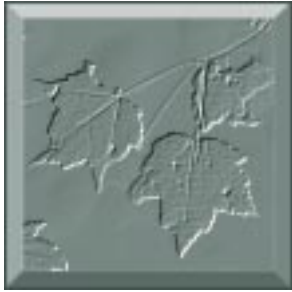
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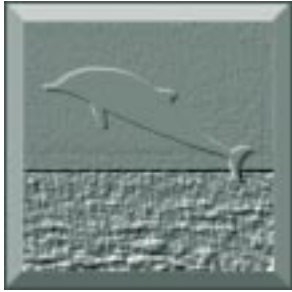
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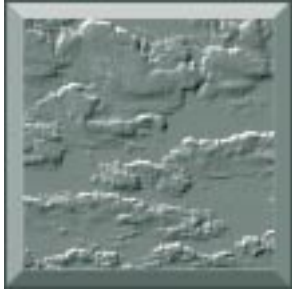
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