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Conservation Biology Monographs: A Citation Analysis

by

Chad E. Buckley

Abstract

Conservation biology is a multidisciplinary subject of recent origins. Analysis of cited monographs from the journal *Conservation Biology* resulted in a list of 47 monographs which were heavily cited for this discipline. Over half of these were from related disciplines such as ecology, genetics, evolution, population biology, statistics, and natural resource management.

Introduction

While natural resource conservation and wildlife management have had a long history, the discipline of conservation biology only formally began in the 1980's with the formation of the Society for Conservation Biology. The former fields have tended to focus on management of resources for human use, whereas conservation biology emphasizes maintenance of the integrity of entire ecosystems (Aplet et al. 1992). Ehrenfeld (1995) stated that conservation biology could be distinguished from its predecessors on the basis of "its multidisciplinary scope and its admitted character as a mission-oriented crisis discipline."

Because of the multidisciplinary nature of conservation biology, books that deal with this specific topic alone would not be expected to be sufficient to meet all of the needs of researchers in the subject. The challenge for librarians with collection development responsibilities in this discipline is to identify books from related subject areas that can be of use to conservation biologists. Such related subject areas include genetics, population biology, physiology, biogeography, veterinary medicine, natural resources management, and social sciences (Soulé 1985).

Broadus (1977) suggested that citations are good predictors of demand and that references in official publications of scholarly and professional organizations are the better predictors. Thus, monographs heavily cited in *Conservation Biology*, the research journal of the Society for Conservation Biology, could be considered to comprise a core list of books for this discipline. Viera (1990) listed monographs and periodicals which she considered important for conservation biology, but they were selected on a subjective basis. This paper attempts to quantitatively

identify by means of citation analysis a group of English-language monographs needed to support research in conservation biology.

Methodology

Data were compiled for English-language monographs appearing in the literature cited section of any article, essay, letter, or book review in eight issues of the journal *Conservation Biology* (Table 1).

Volume # (Issue #) [Year]	Number of Items with Cited References
1(1) [1987]	10
1(2) [1987]	7
4(1) [1990]	12
4(2) [1990]	10
7(1) [1993]	27
7(2) [1993]	29
10(3) [1996]	35
10(4) [1996]	48

Table 1. Issues of *Conservation Biology* analyzed for citations.

Because conservation biology is a relatively young discipline and its flagship journal has not been in existence long, these issues were selected in order to determine those monographs that have been considered important since the discipline's inception. The sample is not random, but was chosen to include representative issue numbers every three years from the journal's inception

to the present. The sample is therefore likely to be biased toward monographs published recently, since the number of articles and literature cited sections published per issue has increased over the past decade.

The number of times each monograph title appeared in a literature cited section was totaled for each issue. A specific chapter cited from a monograph was recorded as one citation for that monograph. Types of monographs included in this citation analysis included books, theses, dissertations, unnumbered conference proceedings, and federal and state government documents. Numbered conference proceedings were excluded from this analysis because of their serial nature. Citations for each monograph in all analyzed issues of the journal were then totaled and sorted in descending order. Those monographs cited five or more times were selected for inclusion in this list because they represented approximately the top five percent of those cited.

Results

Forty-seven monographs, each of which was cited five or more times, were selected as for inclusion in this bibliography. Together, these 47 monographs (3.2% of 1,451 cited) accounted for approximately 20% of the 2,200 total citations in the eight issues of *Conservation Biology* analyzed. Cited monographs were published between 1968 and 1996, with almost half published since 1990. The bibliography of core monographs is arranged on the basis of decreasing number of citations, given in brackets. References to other monographs in the bibliography are indicated in square brackets, e.g. [#25]. The most recently available edition of a monograph is listed even if earlier editions were cited.

Discussion

Many of the monographs identified by this citation analysis could be expected to receive significant use in libraries supporting programs in conservation biology. Twenty-four of the 47 titles deal specifically with the concepts of conservation or biodiversity. Other monographs fall into a number of subject areas including ecology, genetics, evolution, statistics, population biology, human ecology, natural resource management, and public policy. These works from related subject areas are not easily identified apart from a study such as this. Many titles useful to conservation biologists would be missed by library collection developers if only books on specific topics such as biodiversity, conservation, endangered species, and extinction were acquired.

Many of these books were not previously listed by Viera (1990). Only two of the books on this core list were among the eleven books on her suggested list of additional resources. However, a figure detailing events and publications in conservation biology (Viera 1990, p. 96 [derived from Brussard 1985]), did include seven titles which were among the most heavily cited monographs in this study.

Many authors of these heavily cited monographs, including E.O. Wilson and M.E. Soulé, were previously identified as being often cited by researchers publishing on the topic of biodiversity (Alger 1996). Alger suggested that some heavily cited authors were present on his list because they had written books dealing with biodiversity in a general sense. The results of this citation analysis appear to corroborate Alger's hypothesis. This study found that several general books on conservation biology edited by Soulé were among the most heavily cited by authors in *Conservation Biology*.

While it is true that monographs do not play as great a role in the sciences as do journals, many monographs were heavily cited by authors in *Conservation Biology*. The most-heavily cited titles were symposia proceedings produced under editorial direction. These monographs contained numerous contributed papers. In this aspect, they are very similar to the journal literature even though they are formally monographs. Chapters from such books were often cited by authors of articles in *Conservation Biology*. In this study's methodology, a monograph with individually authored chapters could be cited many times in the literature cited section of one paper, whereas a book written by one author could be cited only once per paper. This method of

citation analysis is therefore likely skewed toward producing higher citation counts for books produced under editorial direction. Indeed, only 14 of the 47 monographs included in this list were not produced under editorial direction. Further research is needed to identify the best way to weight monographs produced under editorial direction to make their citation counts more directly comparable to those for simple monographs.

A number of the cited monographs focused on specific species or regions. These titles might not be of widespread interest to all conservation biologists. Often, one or two articles in *Conservation Biology* on a specific topic contained citations to several chapters from a narrowly focused book, such as *Tigers of the World* (10 citations). Such monographs appear on this list because they were cited often, possibly by only a few authors. These monographs may, however, discuss novel methodologies that could be adapted for use in other regions or with other species.

This quantitative citation analysis has identified 47 books which were important to authors publishing in the journal *Conservation Biology* between the years 1987 and 1996. These monographs should be of interest to librarians having collection development responsibilities for this discipline, as well as to practicing or aspiring conservation biologists.

Literature Cited

Alger, Jeff. 1996. Can RANK be used to generate a reliable author list for cocitation studies?

College and Research Libraries 57(6):567-574.

Aplet, Gregory, Richard Laven, and Peggy Fiedler. 1992. The relevance of conservation biology to natural resource management. *Conservation Biology* 6(2):298-300.

Broadus, Robert. 1977. The applications of citations analyses to library collection building.

Pages 299-335 in Melvin Voigt and Michael H. Harris, eds., *Advances in Librarianship*, Vol. 7.

New York: Academic Press.

Brussard, Peter. 1985. The current status of conservation biology. *Bulletin of the Ecological Society of America* 66:9-11.

Ehrenfeld, David. 1995. Conservation biology. Pages 147-48 in Robert Paehlke, ed., *Conservation and Environmentalism: An Encyclopedia*. New York: Garland Publishing.

Extinction countdown for US plants. 1989. *BioScience* 39(4):276.

Soulé, Michael. 1985. What is conservation biology? *BioScience* 35(11):727-734.

Viera, Ann. 1990. Brief guide to conservation biology and its literature. *Science and Technology Libraries* 10(4):93-107.

Annotated Bibliography of Conservation Biology Monographs

-1-

[47 Citations]

Soulé, Michael E., ed. *Conservation Biology: The Science of Scarcity and Diversity*.

Sunderland, MA: Sinauer Associates, Inc., 1986. 584 p. LC 86-1902. ISBN 0-87893-794-3.

This important book was the second to have the title “Conservation Biology.” It has provided a solid foundation for the developing discipline since its publication. It grew out of the Second Conference on Conservation Biology, held in May 1985, and sponsored by the School of Natural Resources, University of Michigan. This conference shortly preceded the establishment of the Society for Conservation Biology. The book contains twenty-five contributed chapters in six sections, with each section preceded by a short overview by Soulé, one of the founders of the discipline. The chapters cover a wide range of significant conservation biology topics, including population viability, patterns of diversity and rarity, habitat fragmentation, community ecology, conservation of sensitive habitats, and conservation in relation to human motivations and cultures. Many of these chapters can now be considered classics and should serve as excellent introductions to the subject for newcomers.

-2-

[44 Citations]

Soulé, Michael E., ed. *Viable Populations for Conservation*. Cambridge, UK: Cambridge

University Press, 1987. \$21.95 pa. 189 p. LC 86-33438. ISBN 0-521-33657-0.

For a variety of reasons, as populations of endangered species become smaller, they tend to become more susceptible to extinction. A minimum viable population (MVP) is the estimated population size which has a certain probability of long-term persistence and adaptation, e.g. a

95% chance of persisting for 1,000 years. This sometimes controversial concept takes into account environmental fluctuations, catastrophic events, genetic variability, and demographic factors such as reproductive rates and migration. The effective design of nature reserves depends in part on consideration of viable populations. A reserve that is too small or too fragmented may ultimately doom a population to extinction. This book's ten contributed chapters, including an introduction and conclusion by Soulé, provide a very effective overview of population viability. However, because no two species are exactly alike, "this book contains no simple prescriptions for calculating MVP's." (p. 182) This volume is partly the outgrowth of a workshop held at the University of Michigan, in October 1984.

-3-

[33 Citations]

Schonewald-Cox, Christine M., et al., eds. *Genetics and Conservation: A Reference for Managing Wild Animal and Plant Populations*. Menlo Park, CA: Benjamin/Cummings Publishing Co., 1983. [Biological conservation series; 1] 722 p. LC 83-3922. ISBN 0-8053-7764-6.

Preservation of genetic diversity is one of the foremost concerns of conservation biologists. This volume was one of the seminal works in the discipline and is the outgrowth of the Man and the Biosphere symposium and workshop "Applications of Genetics to the Management of Wild Plant and Animal Populations," held in Washington, D.C., on August 9-13, 1982. The symposium's aim was the preservation of the evolutionary potential of species. In order for a species to survive, it must be able to adapt to changes in the environment. Its long-term ability to do so is dependent on the genetic diversity within and among populations. Individual fitness, or reproductive success, is also related to genetic heterozygosity. On a more

utilitarian note, loss of genetic diversity may deprive humans of the use of valuable food crop genes or medicinal chemicals. Twenty-five contributed chapters are presented in five sections, each with an introduction by the editors, with chapters covering such topics as isolation of populations, extinction, founder effect, genetic bottlenecks, inbreeding depression, hybridization, and natural diversity. Six appendices are also included.

-4-

[22 Citations]

Soulé, Michael E., and Bruce A. Wilcox, eds. *Conservation Biology: An Evolutionary-Ecological Perspective*. Sunderland, MA: Sinauer Associates, Inc., 1980. \$34.95 pa. 395 p. LC 79-26463. ISBN 0-87893-800-1.

This was the first major monograph published on the specific topic of conservation biology. It is the result of the First Conservation Biology Conference held at the University of California-San Diego and the San Diego Wild Animal Park, in September 1978. Like the books discussed previously, this one also focuses on the causes of extinction, habitat fragmentation, and evolutionary change in small populations. Several chapters examine the important topic of tropical forest ecology because “tropical habitats are more sensitive, less resilient and in greater danger of complete destruction than temperate or boreal habitats.” (p. xi) The book’s nineteen contributed chapters also include a well-rounded look at special problems and techniques related to captive propagation and the reintroduction of captive-bred animals into the wild.

-5-

[15 Citations]

Olney, Peter J.S., et al., eds. *Creative Conservation: Interactive Management of Wild and Captive Animals*. London: Chapman & Hall, 1994. \$99.95. 517 p. LC 93-33949.

ISBN 0-412-49570-8.

To the uninitiated, the reintroduction of captive-bred animals back into the wild offers endless possibilities for saving endangered species. In reality, captive breeding and reintroduction programs are not the panacea they appear to be. This volume contains a wealth of information needed for making informed decisions related to threatened or endangered species. Several chapters examine issues unique to this topic, including reproductive technologies, disease risks associated with reintroductions, criteria for reintroductions, and training programs for zoo biologists in developing countries. Also included are case studies of reintroduced endangered species from around the world. This book contains updated versions of papers originally presented at the Sixth World Conference on Breeding Endangered Species, held in Jersey, England, on May 4-6, 1992. The theme of the conference was “The Roles of Zoos in Global Conservation.”

-6-

[12 Citations]

Burgess, Robert L., and David M. Sharpe, eds. *Forest Island Dynamics in Man-Dominated Landscapes*. New York, NY: Springer-Verlag, 1981. [Ecological Studies; 41] 310 p.

LC 81-2248. ISBN 0-387-90584-7.

Fragmentation of formerly uninterrupted habitats into isolated patches is recognized as a major problem by conservation biologists. This book builds on R. MacArthur and E.O. Wilson's theory of island biogeography. It is the outgrowth of a symposium organized by the Ecological Society of America and the American Institute of Biological Sciences, held at Michigan State University, in August 1977. The editors note the structural complexity which makes island biogeography theory difficult to apply directly to terrestrial landscapes. “Unlike islands in

seascapes, habitat islands in man-dominated landscapes are not surrounded by a matrix that is de facto alien to their terrestrial biota.” (p. 4) Twelve contributed chapters, in addition to an introduction and summary by the editors, discuss minimum critical size of ecosystems, biogeography of forest islands, edge effect, recolonization, and seed dispersal.

-7-

[12 Citations]

Frankel, Otto H., and Michael E. Soulé. *Conservation and Evolution*. Cambridge, UK: Cambridge University Press, 1981. 327 p. LC 80-40528. ISBN 0-521-23275-9.

“Genetic principles for the conservation of all forms of life” (p. vii) form the basis for this book. The authors give an excellent overview of many concepts that would become the cornerstones of later books on the subject. Both the wild and domesticated are considered. Chapters of the book written primarily by Soulé focus on patterns of extinction, population genetics, design of nature reserves, and captive propagation, while those by Frankel examine genetic conservation in botanical gardens, crops, and livestock. The authors differentiate between the concept of conservation, which allows for the potential of continuing evolution, and preservation of individuals or groups. They state that “zoos and gardens may preserve, but only nature reserves can conserve.” (p. 4)

-8-

[11 Citations]

Clark, Tim W., et al., eds. *Endangered Species Recovery: Finding the Lessons, Improving the Process*. Washington, DC: Island Press, 1994. 450 p. \$48.00 cloth; \$25.00 pa. LC 94-18097. ISBN 1-55963-271-2; 1-55963-272-0 pa.

Case studies detailing the problems with recovery programs for high-profile endangered birds and mammals make up the bulk of this recent book. Recovery plans are designed to restore populations of endangered species to a viable state. Yet, “official recovery plans have generally been a disappointment” and “have had a discouraging tendency to become obsolete within months or even weeks of the time they have been finalized.” (p. 196) The eighteen contributed chapters in this volume provide an overview of the Endangered Species Act and discussions of ways to improve planning and implementation of recovery programs. This book is the outgrowth of a small conference held at the University of Michigan, on January 8-9, 1993, and is “the first to engage not only biologists but social scientists in the analysis and discussion of endangered species conservation. In doing so, it seeks an interdisciplinary explanation for the weak performance of endangered species recovery efforts and an explanation of alternatives.” (p. 10)

-9-

[11 Citations]

Falk, Donald A., and Kent E. Holsinger, eds. *Genetics and Conservation of Rare Plants*. New York, NY: Oxford University Press, 1991. \$55.00. 283 p. LC 91-10735. ISBN 0-19-506429-1.

Many plants are critically endangered. It was estimated that 680 U.S. plant species might go extinct between 1989 and 2000 (Extinction 1989). Despite the peril facing plant populations conservation efforts and media attention have primarily focused on large vertebrates. This volume is the outgrowth of the Conference on the Genetics and Conservation of Rare Plants, coordinated by the Center for Plant Conservation and held at the Missouri Botanical Garden in St. Louis, in March 1989. “Since rare plant species are still poorly represented in the published literature, the Center sought to establish a scientific basis for conservation.” (p. viii) Fourteen contributed chapters focus on basic plant population biology, viability of rare plant populations,

assessment of genetic variation, and models and large-scale strategies for conserving plant genetic diversity. This is the only book on this list to deal specifically with the conservation of rare plants, although [#3] and others touch on the subject.

-10-

[10 Citations]

Nitecki, Matthew H., ed. *Extinctions*. Chicago, IL: University of Chicago Press, 1984. \$30.00 cloth; \$16.00 pa. 354 p. LC 84-40253. ISBN 0-226-58689-8; 0-226-58690-1 pa.

It is important to remember that extinction is not a recent phenomenon. Species have been going extinct since the dawn of time. Human-caused extinction, however, is poised to reach unprecedented levels. This book is based on papers presented at the Sixth Annual Spring Systematics Symposium sponsored by and held at the Field Museum of Natural History in Chicago, on May 13-14, 1983. Eight contributed chapters discuss both mass and “normal” extinctions resulting from catastrophic events, human influence, competition, and habitat fragmentation. One interesting chapter examines the hypothesis that some mass extinctions of large mammals at the end of the Pleistocene were closely tied to the dispersal of *Homo sapiens*. The impetus for this book is “the possibility that through human activities we may be entering into a new kind of mass extinction.” (p. 1)

-11-

[10 Citations]

Noss, Reed F., and Allen Y. Cooperrider. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Washington, DC: Island Press, 1994. \$48.00 cloth; \$27.50 pa. 416 p. LC 93-48895. ISBN 1-55963-247-X; 1-55963-248-8 pa.

This book is in keeping with the characterization of conservation biology as a crisis discipline. Decisions regarding conservation cannot be put off until all of the facts are in. The authors “believe it is time for conservation biologists to stick their necks out and state openly what they do know about the science and art of conservation. They must offer guidance to society for conserving biodiversity in the face of uncertainty.” (p.xxv) Their goal is to “translate the principles, techniques, and findings of conservation biology and other ecological sciences to policy makers, land managers, landowners, conservationists, and the public at large.” (p. xxiv) Chapters cover such topics as the definition of biodiversity and its significance, related ecological and geological concepts, conservation strategies, nature reserve design, management of various types of ecosystems, monitoring of biodiversity, and conservation barriers and priorities.

-12-

[10 Citations]

Tilson, Ronald L., and Ulysses S. Seal, eds. *Tigers of the World: The Biology, Biopolitics, Management, and Conservation of an Endangered Species*. Park Ridge, NJ: Noyes Publications, 1987. \$64.00. 510 p. LC 87-12204. ISBN 0-8155-1133-7.

The tiger is one of those charismatic mega-vertebrate species which is often the focus of conservation efforts. While tiger conservation is associated with some issues unique to large carnivores, many of the principles in this book should be applicable to other species and other regions of the globe. This volume contains forty-six papers presented at a symposium held in Minneapolis, Minnesota, on April 13-17, 1986, and sponsored by the Minnesota Zoological Garden and the IUCN/SSC Captive Breeding and Cat Specialist Groups. Contributors are from the United States, Europe, and Asia. Chapters discuss systematics and taxonomy of tigers,

extinction, status and management in the wild and in captivity, reproductive biology, white tigers, and conservation strategies.

-13-

[10 Citations]

Wilson, Edward O., and Frances M. Peter, eds. *Biodiversity*. Washington, DC: National Academy Press, 1988. \$24.50 pa. 521 p. LC 87-32439. ISBN 0-309-03739-5.

Biodiversity generally refers to the richness of species or ecological communities in a region or in the entire world. The potential loss of much of the world's biodiversity is one of the principal concerns of conservation biology. Because much of this loss is expected to be the result of human activities, conservation of biodiversity has become a keystone of international environmental policy. The fifty-seven contributed chapters in this volume discuss loss of biological diversity, economic arguments for preservation, case studies from specific habitat types, restoration ecology, policies, and environmental philosophy. This noteworthy book resulted from the National Forum on BioDiversity, held in Washington, D.C., on September 21-24, 1986, and convened by the National Academy of Sciences and Smithsonian Institution.

-14-

[9 Citations]

Paquet, Paul C., and Arlin Hackman. *Large Carnivore Conservation in the Rocky Mountains: A Long-Term Strategy for Maintaining Free-Ranging and Self-Sustaining Populations of Carnivores*. Toronto, ON: World Wildlife Fund Canada, 1995. \$10.00 pa. 52 p.

“Long-term prospects for large carnivores are poor.” (p. ii) The continued survival of these species is made problematic by such factors as low population densities, large home ranges, isolated habitat fragments, and direct conflicts with humans. Many carnivore species have also

been the subjects of eradication and control efforts in the past. A major benefit associated with the conservation of these well-known endangered species is an umbrella effect whereby other lesser known species sharing the same habitat are protected as well. The strategy contained in this slim volume details objectives for conservation of large carnivore species in the Rocky Mountains and emphasizes cooperative partnerships among all involved parties.

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[9 Citations]

Pickett, Steward T.A. and P.S. White, eds. *The Ecology of Natural Disturbance and Patch Dynamics*. Orlando, FL: Academic Press, 1985. \$49.00 pa. 472 p. LC 84-18599. ISBN 0-12-554521-5.

Plant and animal distributions are not determined by human actions alone. Natural processes also have profound effects on wild populations. The topics discussed in this volume are closely related to the recently developed discipline of landscape ecology [#25]. Twenty-one contributed chapters examine natural disturbance in various habitat types, adaptations of plants and animals to disturbance, and the effects of patch dynamics on communities and ecosystems. A comprehensive 70-page bibliography is also included.

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[8 Citations]

Anderson, Anthony B., ed. *Alternatives to Deforestation: Steps Toward Sustainable Use of the Amazon Rain Forest*. New York, NY: Columbia University Press, 1990. \$72.00 cloth; \$22.50 pa. 281 p. LC 89-24034. ISBN 0-231-06892-1; 0-231-06893-X pa.

Tropical deforestation has emerged as one of the greatest environmental problems of this century. Not only is the potential loss of biodiversity staggering, but large-scale deforestation

may also be altering global climate patterns. Tropical forests are often cleared for cattle ranching, exposing relatively infertile soils. However, sustainable use of tropical forests can yield economic benefits for the human population without diminishing “the long-term productive capacity of the land.” (p. xi) Seventeen contributed chapters cover rainforest management and agroforestry, landscape recovery, and regional development in Amazonia. The papers contained in this volume were originally presented at an international conference held in Belem, Brazil, on January 27-30, 1988.

-17-

[8 Citations]

Harris, Larry D. *The Fragmented Forest: Island Biogeography Theory and the Preservation of Biotic Diversity*. Chicago, IL: University of Chicago Press, 1984. \$25.00 cloth; \$13.95 pa. 211 p. LC 84-144. ISBN 0-226-31763-3; 0-226-31764-1 pa.

This was one of the first books to apply island biogeography theory to forest management, the other being [#6]. This volume specifically focuses on the vertebrates and forests of the Pacific Northwest. “As the only remaining expanse of virgin forest in the conterminous United States, the old-growth Douglas fir represents a unique challenge to our planning ability and commitment to conservation.” (p. 5) The authors discuss forest ecology, changes in old-growth forest distribution, animal communities, island biogeography, genetic resources, and forest management strategies.

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[8 Citations]

Leopold, Aldo. *A Sand County Almanac, and Sketches Here and There*. New York, NY: Oxford University Press, 1968. \$25.00 cloth; \$9.95 pa. 226 p. LC 87-22015. ISBN 0-19-505305-2; 0-19-500777-8 pa.

Aldo Leopold is considered by many to be the father of wildlife management. His attitude toward wildlife evolved from involvement with predator control efforts in the Southwest to an understanding of the ecological principles which govern animal populations. This classic inspirational work provides an ethical and philosophical framework for wildlife conservation. An initial series of essays details the author's observations of nature on his Wisconsin farm throughout the seasons. Additional essays describe other regions, as well as Leopold's philosophy of wilderness and his land ethic. "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." (p. viii)

-19-

[7 Citations]

Cody, Martin L., and Jared M. Diamond, eds. *Ecology and Evolution of Communities*. Cambridge, MA: Belknap Press of Harvard University Press, 1975. \$19.95 pa. 545 p. LC 74-27749. ISBN 0-674-22446-9.

This book is the result of a memorial symposium at Princeton University in honor of noted ecologist Robert MacArthur. Core ecological concepts developed or refined by MacArthur include "species diversity, relative abundances of species, species packing, competition and niche theory, life histories and strategies of single species, and island biogeography." (p. viii) Especially important to conservation biology was the development of island biogeography theory. The eighteen contributed papers in this volume discuss various aspects of community

ecology. Several focus on species diversity and biogeography. Also included is a comprehensive two-page bibliography of MacArthur's publications.

-20-

[7 Citations]

Crow, James F., and Motoo Kimura. *An Introduction to Population Genetics Theory*. New York, NY: Harper & Row, 1970. 591 p.

Although publication of this book preceded the development of conservation biology by a decade, it still has much to offer today. This text focuses on wild plant and animal populations and is primarily aimed at the graduate student or advanced undergraduate. It expands upon Sewall Wright's pioneering work [#33]. Chapters discuss population growth, inbreeding, assortative mating, selection, populations in equilibrium, finite populations, stochastic processes, and distributions of gene frequencies. This volume requires careful reading and study, for "the theory of population genetics is largely mathematical." (p. 2) A 59-page bibliography is also included.

-21-

[7 Citations]

Gunderson, Lance H., et al., eds. *Barriers and Bridges to the Renewal of Ecosystems and Institutions*. New York, NY: Columbia University Press, 1995. \$50.00. 593 p. LC 94-35061. ISBN 0-231-10102-3.

This book examines social learning by institutions in response to crisis situations and public pressure. It grew out of a three-year research project established to determine whether institutions can learn and how ecosystems respond to management actions. Twelve contributed chapters include six case studies on management of complex regional ecosystems. Four

additional essays by social scientists examine ecosystem management in developing countries, management of organizations, sustainable development, social learning, and barriers to personal and organizational learning.

-22-

[7 Citations]

Ryman, Nils, and Fred Utter, eds. *Population Genetics & Fishery Management*. Seattle, WA: Washington Sea Grant Program (Distributed by University of Washington Press), 1987. \$17.50 pa. 420 p. LC 86-19042. ISBN 0-295-96436-7.

Many marine fish populations have drastically declined in recent years. Much of this is due to overfishing. Freshwater species have also suffered, often because of habitat destruction. As fish populations decline, effective management requires that genetic conservation measures be taken into account. This book's fifteen contributed chapters discuss inbreeding, genetic variation within populations, hatchery stocks, hybridization, mitochondrial DNA, and conservation of genetic diversity. This volume expands on a series of lectures presented by Ryman at the University of Washington School of Fisheries in the fall of 1982.

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[6 Citations]

Carbyn, Ludwig N., et al., eds. *Ecology and Conservation of Wolves in a Changing World*. Edmonton, AL: Canadian Circumpolar Institute, 1995. [Occasional publication series; 35] \$119.63 cloth; \$65.55 pa. 620 p. ISBN 0-919058-92-2; 0-919058-93-0 pa.

The wolf is one of the most studied wildlife species in the world and has been the focus of many conservation efforts. Much attention has recently centered on wolves because of reintroduction efforts in Yellowstone National Park and in North Carolina. This volume

comprises the proceedings of the Second North American Symposium on Wolves, held in Edmonton, Alberta, on August 25-27, 1992. Fifty-five contributed papers focus primarily on wolves in North America and discuss status, recovery programs, predator-prey interactions, behavior, social interactions, population dynamics, genetics, taxonomy, diseases, and research and management techniques.

-24-

[6 Citations]

Clark, Tim W., and Steven C. Minta. *Greater Yellowstone's Future: Prospects for Ecosystem Science, Management, and Policy*. Moose, WY: Homestead Pub., 1994. \$11.95 pa. 160 p. LC 93-77118. ISBN 0-943972-20-5.

As the world's first national park, Yellowstone has long served as something of a model for other parks. Management of the park has evolved from a utilitarian focus to greater compatibility with natural processes. Because many of Yellowstone's wildlife species range outside of the park's boundaries, the authors of this book advocate management of the region's entire ecosystem as a solution to the problems that have resulted from traditional natural resource management in the park. They examine the historical, political and social factors that affect proposed ecosystem management of the Greater Yellowstone Ecosystem. Five case studies include analyses of large carnivores, fire policy, and wildlife disease. This volume grew out of the "Barriers and Bridges for the Renewal of Regional Ecosystems" conference.

-25-

[6 Citations]

Forman, Richard T. T., and Michel Godron. *Landscape Ecology*. New York, NY: John Wiley & Sons, 1986. \$72.95. 619 p. LC 85-12306. ISBN 0-471-87037-4.

Landscape ecology only recently emerged in the 1970's as a discipline in the United States. It is primarily concerned with the study of large-scale spatial patterns in nature. In addition to biology, landscape ecology draws on the fields of geography and land-use planning. The authors of this text discuss the concept of landscape and related topics including general ecological principles, patches, corridors, matrices and networks, heterogeneity, landscape dynamics, and management of landscapes. This book should serve as an excellent introduction to the subject for any conservation biologist.

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[6 Citations]

Higuchi, Hiroyoshi, and Jason Minton, eds. *The Future of Cranes and Wetlands: Proceedings of the International Symposium Held in Tokyo and Sapporo, Japan, in June 1993*. Tokyo: Wild Bird Society of Japan, 1994. 181 p.

Seven of the world's fifteen crane species are listed as threatened or endangered, including the well-known whooping crane of North America. This makes the cranes one of the most imperiled of any bird family. Many of these species have been adversely affected by loss of wetland habitat for breeding, wintering, and migration. These conference proceedings present twenty-five contributed papers which discuss ecology, habitat analysis, migration routes, and conservation of primarily Asian crane species. A major component of many papers was satellite tracking.

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[6 Citations]

Kohm, Kathryn A., ed. *Balancing on the Brink of Extinction: The Endangered Species Act and Lessons for the Future*. Washington, DC: Island Press, 1991. \$34.95 cloth; \$22.95 pa. 318 p. LC 90-5031. ISBN 1-55963-007-8; 1-55963-006-X pa.

The Endangered Species Act (ESA) of 1973 has become a very controversial piece of legislation. Proponents praise its originality and the successful recovery of such species as the bald eagle. Critics contend that the act is not effective, that it places undue limits on economic growth, and that personal property rights have been trampled in the ESA's name. A great deal of negative attention has resulted from efforts to save the snail darter and the spotted owl. Recently, much of the discussion about the ESA has centered around managing entire ecosystems, rather than just attempting to recover a single species. This book evolved from a special issue of *Endangered Species Update*. It includes the original eight papers from this issue plus fourteen additional contributed chapters covering the history, implementation, and other pertinent aspects of the ESA.

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[6 Citations]

Martin, Paul S. and Richard G. Klein, eds. *Quaternary Extinctions: A Prehistoric Revolution*. Tucson, AZ: University of Arizona Press, 1984. \$40.00 pa. 892 pp. LC 83-18053. ISBN 0-8165-1100-4.

Many large mammal species became extinct near the end of the Pleistocene Epoch of the Quaternary Period. This book attempts to resolve the debate over whether these megafaunal extinctions were the result of overhunting by prehistoric humans, climatic changes, or both. It provides much more in-depth information than the single chapter on the subject in [#10]. This book's thirty-eight chapters cover various aspects of large mammal extinctions in all regions of

the world, with sixteen chapters on North America. Some discussion of extinctions of avifauna and plants is also included.

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[6 Citations]

Ruggiero, Leonard F., et al., eds. *The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States*. Fort Collins, CO: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, 1994. [General technical report; RM-254] 184 p. SUDOC A13.88:RM-254.

This text provides detailed discussions of the biology of the small carnivores named in the title, along with an extensive literature review for each species. Given the lack of information available for conservation planning for these species, additional research is needed before management strategies can be formulated. This is illustrative of the state of much of conservation biology. Managers must often deal with a paucity of information on endangered species. This volume contains an excellent discussion of the limitations of available information. Research strategies and specific information needs are presented for each species.

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[6 Citations]

Servheen, Christopher. *Grizzly Bear Recovery Plan*. Missoula, MT [Bethesda, MD]: U.S. Fish and Wildlife Service, 1993. 181 p. SUDOC I49.2:G88/3.

Efforts to restore the grizzly bear are often controversial because of this species' need for large wilderness areas and its direct conflicts with human beings and livestock. This volume is a revised version of the recovery plan originally approved in 1982. It outlines the actions and recovery objectives deemed necessary to delist this well-known species from threatened status.

The plan also details the bear's current status, estimated cost, and an implementation schedule. The plan has been criticized because of its focus on maintaining small, isolated populations.

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[6 Citations]

Verner, Jared, et al., eds. *Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates: Based on an International Symposium Held at Stanford Sierra Camp, Fallen Leaf Lake, California, 7-11 October 1984*. Madison, WI: University of Wisconsin Press, 1986. \$141.50 pa. 470 p. LC 85-40769. ISBN 0-299-10520-2.

This volume contains the proceedings of a symposium of the same name sponsored by the Pacific Southwest Forest and Range Experiment Station of the USDA Forest Service, et al., and organized by the San Francisco Bay Area Chapter of the Wildlife Society, et al. The sixty contributed chapters promote the use of models for evaluating wildlife-habitat relationships.

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[6 Citations]

Western, David, and Mary C. Pearl. *Conservation for the Twenty-First Century*. New York, NY: Oxford University Press, 1989. \$19.95 pa. 365 pp. LC 88-18773. ISBN 0-19-507719-9.

This volume examines “the diversity of approaches unified by a common interest in conserving nature” and “review[s] the future prospects for wildlife and habitat with a view to identifying those approaches and techniques required to secure their place through the twenty-first century.” (p. ix) Rather than malign future human development, its authors attempt to find a balance between conservation and development. Included is a Conservation Agenda of action items needed for development of long-term strategies for conserving biodiversity. The thirty-three contributed chapters in this book provide an excellent overview of most of the important

issues in conservation biology and comprise the proceedings of a conference titled “Conservation 2100: A Fairfield Osborn Symposium,” held in New York, on October 20-23, 1986.

-33-

[6 Citations]

Wright, Sewall. *Evolution and the Genetics of Populations: A Treatise*. Chicago, IL: University of Chicago Press, 1968-1978. 4 vols.

Vol. 1: *Genetic and Biometric Foundations*. \$46.00. ISBN 0-226-91049-0.

Vol. 2: *The Theory of Gene Frequencies*. \$50.50. ISBN 0-226-91050-4.

Vol. 3: *Experimental Results and Evolutionary Deductions*. \$53.00.

ISBN 0-226-91051-2.

Vol. 4: *Variability Within and Among Natural Populations*. \$43.00.

ISBN 0-226-91052-0.

This is a classic work on population genetics and biometrics by one of the leaders in the field. Wright is best known for his “shifting-balance” theory of evolution. The four volumes in this set are heavily mathematical in nature and beyond the grasp of most novices. Wright discusses gene frequencies, inbreeding, artificial and natural selection, mutation, genetic variability, polymorphisms, and speciation. This set remains a valuable reference for population geneticists some twenty years after it was published.

-34-

[5 Citations]

Browder, John O., ed. *Fragile Lands of Latin America: Strategies for Sustainable Development*. Boulder, CO: Westview Press, 1989. 301 p. LC 88-20803. ISBN 0-8133-7705-6.

“Fragile lands are lands that are potentially subject to significant deterioration under agricultural, silvicultural, and pastoral use systems.” (p. 11) Such lands comprise approximately 87% of the total area of Latin America. It should therefore be considered imperative that sustainable land-use practices be adopted in these regions. This volume is a collection of seventeen revised papers originally presented at the “Symposium on Fragile Lands of Latin America: The Search for Sustainable Uses,” held during the 14th Congress of the Latin American Studies Association, on March 17-19, 1988, in New Orleans.

-35-

[5 Citations]

Carbyn, Ludwig N., ed. *Wolves in Canada and Alaska: Their Status, Biology and Management*. Ottawa, ON: Canadian Wildlife Service, 1983. [Report series; 45] 135 p. ISBN 0660113783.

This volume, along with [#23], provides an excellent detailed examination of the wolf as a conservation case study. Twenty contributed papers comprise this proceedings of the first Wolf Symposium held in Edmonton, Alberta, on May 12-14, 1981. The authors discuss wolf taxonomy, current status, management, population dynamics, genetic considerations, and livestock depredation. This volume should be of use to any conservation biologist working with large predators.

-36-

[5 Citations]

Chepko-Sade, B. Diane, and Zuleyma T. Halpin, eds. *Mammalian Dispersal Patterns: The Effect of Social Structure on Population Genetics*. Chicago, IL: University of Chicago Press, 1987. \$55.00 cloth; \$19.95 pa. 342 p. LC 87-6026. ISBN 0-226-10266-1; 0-226-10268-8 pa.

Dispersal of individuals has direct bearing on the design of nature reserves and the genetic health of populations. Corridors may be needed between fragmented habitat remnants in order to allow for gene flow between populations. The nineteen contributed chapters in this volume examine dispersal patterns in both small and large mammals, including humans. The major focus is on the relationship of dispersal to social organization, population genetics, and evolution. This book is based on the symposium "Patterns of Dispersal Among Mammals and Their Effects on the Genetic Structure of Populations," presented at the annual meeting of the American Society of Zoologists held in Denver, Colorado, on December 27-30, 1984.

-37-

[5 Citations]

Fowler, Charles W., and Tim D. Smith, eds. *Dynamics of Large Mammal Populations*. New York, NY: John Wiley & Sons, 1981. 477 p. LC 81-115. ISBN 0-471-05160-8.

Effective conservation requires a sound understanding of why populations fluctuate in numbers. Birth, death, immigration, and emigration are the major demographic processes affecting populations. The twenty-three contributed chapters in this book focus on population dynamics of large-bodied terrestrial and marine mammals. Many of the chapters are species-specific, but may nevertheless be of general interest to conservation biologists. This book is based on papers presented at a conference at Utah State University, in Logan, on May 25-27, 1978.

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[5 Citations]

Hagan, John M. III, and David W. Johnston, ed. *Ecology and Conservation of Neotropical Migrant Landbirds*. Washington, DC: Smithsonian Institution Press, 1992. \$48.00 cloth;

\$29.95 pa. 609 p. LC 91-15396. ISBN 1-56098-113-X; 1-56098-140-7 pa.

Precipitous population declines have been noted in recent years for many songbird species which winter in the Neotropics, although recent research has documented stable or increasing numbers for some species. Population declines may result from habitat destruction on the wintering grounds, habitat fragmentation in the United States, pesticides, acid rain, or nest parasitism by cowbirds. This book is based on a symposium hosted by the Manomet Bird Observatory at Woods Hole, Massachusetts, on December 6-9, 1989. Its fifty-one contributed chapters discuss populations trends of Neotropical migrants, nonbreeding and breeding season factors, and conservation priorities. Included is a Spanish abstract for each chapter.

-39-

[5 Citations]

International Union for the Conservation of Nature. *Caring for the Earth: A Strategy for Sustainable Living*. Gland, Switz.: IUCN, 1991. \$20.00. 228 p. LC 92-190579. ISBN 2-8317-0074-4.

The principal goals of this strategy are to encourage an ethic for sustainable living, to improve the quality of human life, to conserve the Earth's resources and biodiversity, and to integrate conservation with economic development. One hundred thirty-two action items needed to implement the strategy are described in detail. Eight appendices complete the volume. This important document is the successor to the World Conservation Strategy published by the IUCN, United Nations Environment Programme, and World Wildlife Fund in 1980. It also laid the groundwork for the Earth Summit held in Rio de Janeiro in 1992.

-40-

[5 Citations]

Lawton, John H., and Robert M. May, eds. *Extinction Rates*. New York, NY: Oxford University Press, 1995. \$32.00 pa. 233 p. LC 95-169009. ISBN 0-19-854829-X.

Projected extinction rates receive a great deal of attention in the media and are often used to bolster attempts to protect the environment. This book attempts to establish an empirical basis for providing accurate estimates of current and future extinction rates. Authors discuss historical extinctions, population dynamics, molecular phylogenies, biological models, and the effects of human enterprise on biodiversity loss. This book is derived from a Royal Society of London discussion meeting on "Estimating Extinction Rates," held on October 27-28, 1993. The fourteen contributed chapters in this volume expand only slightly on the original papers published in the *Philosophical Transactions of the Royal Society, Series B*, 344(1307):1-104, 29 April 1994.

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[5 Citations]

Minckley, Wendell L., and James E. Deacon, eds. *Battle Against Extinction: Native Fish Management in the American West*. Tucson, AZ: University of Arizona Press, 1991. \$50.00. 517 p. LC 91-6977. ISBN 0-8165-1221-3.

This volume is billed as the "first compilation on the application of principles of the new science of conservation biology to fishes." (p. xiii) While the snail darter is probably the best known endangered fish species in the U.S., pupfishes have also been the focus of concerted conservation efforts in the face of increasing human demands for water in the West. This book contains twenty contributed chapters originally presented at a symposium of the same name held at Death Valley National Monument, Furnace Creek, California, on November 17-18, 1988, in commemoration of the twentieth anniversary of the Desert Fishes Council. The authors discuss

the politics and biology of conserving fishes, especially desert species, of western North America.

-42-

[5 Citations]

Phillips, Robert L., and Charles J. Jonkel, eds. *Proceedings of the 1975 Predator Symposium: Held in Conjunction with the American Society of Mammalogists 55th Annual Meeting, June 16-19, 1975, University of Montana, Missoula*. Missoula, MT: Montana Forest and Conservation Experiment Station, University of Montana, 1977. 268 p. LC 77-22048.

Several previously discussed books [#12, #14, #23, #30, #35] dealt with special problems related to conservation of predators. This book includes nineteen contributed papers examining the basic biology of large carnivores. Such information is needed for making informed conservation decisions. Topics covered include predator-prey relationships, predator control and management, livestock depredation, behavior, interspecific relations with other predators, nutrition and food habits, and population dynamics. Endangered and threatened species discussed include timber wolves and mountain lions.

-43-

[5 Citations]

Posey, Darrell A., and William L. Balée, eds. *Resource Management in Amazonia: Indigenous and Folk Strategies*. Bronx, NY: New York Botanical Garden, 1989. [Advances in economic botany; 7] \$59.00 pa. 287 p. LC 89-9392. ISBN 0-89327-340-6.

Like [#16], this book focuses on Amazonia, a region considered to be a hot spot of biodiversity. "This volume demonstrates the diversity of ecosystems and vegetation types which exist in Amazonia and how people have adapted to them." (p. iv) It is the outgrowth of the

symposium “Resource Management by Indigenous and Folk Peoples of Amazonia,” held at the 1985 Annual Meeting of the American Anthropological Association in Washington, D.C. It includes papers by cultural anthropologists, archaeologists, botanists, ecologists, and geographers. Sixteen contributed chapters, including twelve case studies, discuss agricultural systems practiced in Amazonia, ethnobotany, history, and the management of forests and other ecosystems of the region.

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[5 Citations]

Robinson, John G., and Kent H. Redford, eds. *Neotropical Wildlife Use and Conservation*. Chicago, IL: University of Chicago Press, 1991. \$74.50 cloth; \$29.95 pa. 520 p. LC 90-44430. ISBN 0-226-72258-9; 0-226-72259-7 pa.

Twenty-eight contributed chapters, most of which are based on a lecture series presented at the University of Florida in the fall of 1987, discuss the use and conservation of Neotropical mammals, birds, and reptiles. This book covers subsistence hunting, market hunting, wildlife farming and ranching, sport hunting, and other commercial uses.

-45-

[5 Citations]

Sokal, Robert R., and F. James Rohlf. *Biometry: The Principles and Practice of Statistics in Biological Research*. 3rd ed. New York, NY: W.H. Freeman and Co., 1995. \$50.00. 887 p. LC 94-11120. ISBN 0-7167-2411-1.

Basic statistical analysis is used to support analysis of research in all fields, and conservation biology is no exception. It is therefore not surprising that a statistics text is highly cited by authors of research studies. This text is aimed at the academic biologist and designed

either to accompany a lecture course or for self-study. It covers the application of statistics to the analysis of biological data, including normal distributions, hypothesis testing, analysis of variance, regression, and correlation.

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[5 Citations]

Soltis, Douglas E., and Pamela S. Soltis, editors. *Isozymes in Plant Biology*. Portland, OR: Dioscorides Press, 1989. [Advances in plant sciences series; 4] \$35.95. 268 p. LC 89-11739. ISBN 0-931146-13-5.

An enzyme occurs in several different forms, each having slightly different structures and properties, but retaining the same overall function. Isozyme studies have shed much light on systematics, evolution, plant breeding, and genetic variability within and among populations. Twelve contributed chapters discuss the importance of isozymes, or isoenzymes, to the study of plant population genetics.

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[5 Citations]

World Resources Institute. *Global Biodiversity Strategy: Guidelines for Action to Save, Study, and Use Earth's Biotic Wealth Sustainably and Equitably*. Washington, DC: World Resources Institute, 1992. \$19.95 pa. 244 p. LC 92-60104. ISBN 0-915825-74-0.

This document was produced by the World Resources Institute, World Conservation Union (IUCN), and United Nations Environment Programme, and resulted from research and consultation beginning in 1989 involving six workshops and more than 500 people. The strategy describes 85 action items focusing on policy reforms, reduction of resource consumption, integration of conservation into international economic policy and development, encouragement

of local stewardship, strengthening of protected areas, conservation of species and genetic diversity, increasing appreciation of biodiversity, dissemination of information, and promotion of biodiversity research.

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¹ International Union for the Conservation of Nature

² World Resources Institute