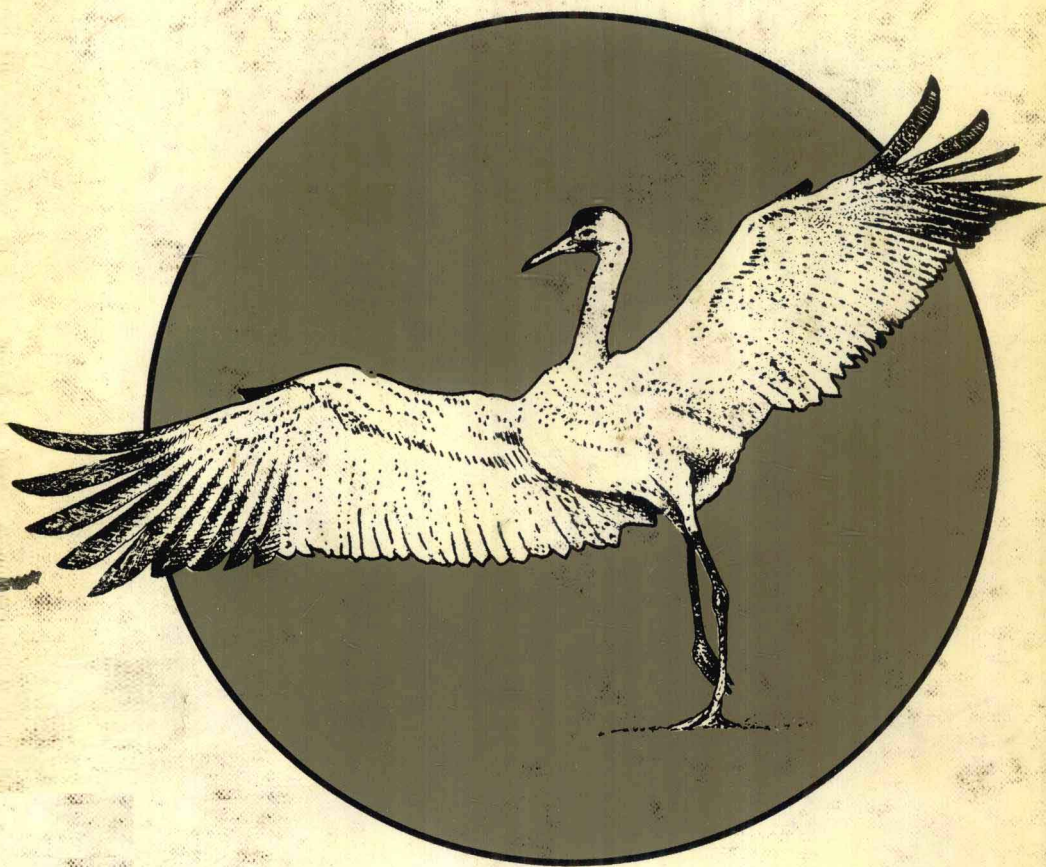


Wildlife Management

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Wildlife Management

A Series of Books in Animal Science

G. W. Salisbury, Editor

Preface

This is a book about wildlife and people. It describes people's potential role in using, benefiting from, preserving, and managing the wildlife resources of the world. At its center is the professional wildlife manager. Throughout, the need is expressed for rational management of natural resources in general, but particularly of wildlife, for wildlife is a synthetic indicator of how well we are managing all of our resources.

I have tried to present an overview of wildlife management, placing more emphasis upon naming the parts of the problems than upon detailing processes and solutions. Some readers are likely to judge the book long on diagnosis and short on prescription. Their perception is accurate. It is no more proper for a person having read an introductory text on wildlife management to prescribe a land treatment for wildlife than for a pre-med student having read an introduction to medical science to prescribe for a friend's ailment. To prescribe without *mastery* of the wildland sciences is to engage in land-health quackery.

The book is designed to assist instructors of introductory college and university courses in wildlife management. No course prerequisites are assumed. Courses in basic statistics and ecology will enhance the usefulness of the text. The text is intended to accompany creative college and university presentations, and some topics may require an instructor's assistance. Boxes demonstrating computations are included for more advanced students. Depending on the

instructor's emphasis, sections of the text may be omitted without loss of continuity.

This text is also expected to be helpful in career guidance, in improving citizen involvement in environmental projects, and in increasing appreciation of the wildlife resource and its social and environmental milieu. I trust it will be useful to commissioners and public decision makers, land use planners, and, in general, people who love the outdoors.

Part I, Chapters 1 through 5, presents the basic principles of wildlife management, progressively integrated. In Part II, general case approaches are taken for an individual species, a species group, a habitat group, and a managerial function. Part III discusses people, both as users of the wildlife resource and as makers of wildlife management policy. Within these chapters are discussions of research, decision making, and future orientations. The intent of the chapters in Parts II and III is to expand on the basic concepts, to give examples, to show how the material of the first five chapters can be integrated, and to provide insight into the approaches that have been or may be taken to wildlife management.

Specific career information is not included in this book because of (1) the breadth of wildlife management described, (2) the changing status of agencies and requirements, (3) the uncertainty of licensing and certification, and (4) the strong dependence of wildlife management employment on government-funded programs and organizations.

Study questions and references are provided at the end of each section to guide the student and to stimulate further thought and reading. The selected references show the source of the concepts and research conclusions and suggest gateways to a vast literature. No attempt is made to provide an inclusive set of references on any topic.

This book is mostly about terrestrial wildlife, but fish are often grouped with other vertebrate fauna as wildlife. Fisheries management and wildlife management share many principles and problems and are often cooperatively performed by the same people. There are great similarities and parallels between fish management and wildlife management. However, there are significant differences in the factors of the environment, regulations, control, and management practices. All of these differences cannot be treated adequately in one brief introductory book. Chapter 8 highlights the similarities and introduces major unique fishery concepts.

I have concentrated on North American wildlife management, but I believe that wildlife principles are basically the same regardless of the country or the species. Governments, agencies, laws, and international policy greatly influence wildlife populations, which are usually far removed from the sites, the time, and the people participating in forming policy. Through awareness of the consequences of such decisions and attention to reducing undesirable consequences, world wildlife will be better preserved and managed.

I appreciate the assistance in many ways of the wildlife and fisheries faculty of Virginia Polytechnic Institute and State University. However, I take full responsibility for the presentation. It must be recognized that wildlife management is a relatively young and dynamic field, approached from many perspectives by many professions, and therefore there is no universal theory. There is dogma, of course, but even this changes.

I am grateful to some of my students who daily teach me and who dampen my pessimism about the fate of humankind and wildlife in the world today. I have appreciated the advice and assistance of Harvey C. McCaleb, Gunder Hefta, and Patricia Brewer of W. H. Freeman and Company. Joan Westcott's editorial work was masterful and invaluable. I am very grateful to my wife for editorial assistance and for typing much of the final manuscript. She and my daughters deserve more than my thanks and acknowledgment for their support, encouragement, and sharing of burdens related to this book.

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Blacksburg, Virginia

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PART I

*PRINCIPLES AND
CONCEPTS*

Chapter 1

The Resource and Its Management

What is wildlife? This is a good question without a good answer. There are no clear taxonomic or even behavioral boundaries defining wildlife, so a dictionary will be of little help. Wildlife certainly must include game animals and songbirds. Some people argue about whether fish are wildlife. Past the seldom-debated anchor points, wildlife may also include, depending on local policy and purpose, wild horses, urban rats, introduced zebras, salamanders, porpoises, and butterflies. The often fruitful debates over the definition of wildlife center on such practical questions as who is willing and sufficiently competent to work with a species, which agency has responsibility under the law (or desires it), and what species fall within the purview of various disciplines and universities. In effect, then, society determines what constitutes wildlife. In view of the changing definitions of wildlife, it is not surprising that debate continues about the proper body of knowledge and the principles of wildlife management.

Some years ago a bill was introduced into Congress to change the name of the U.S. Biological Survey to the U.S. Wildlife Service. The encompassing word had fared well until a fisheries commissioner, apparently fearing loss of visibility and thus congressional support, succeeded in getting the name amended in the final hour to the U.S. Fish and Wildlife Service. This political ploy has resulted in wildlife connoting terrestrial animals.

Wildlife usually refers to wild or semidomesticated terrestrial vertebrates. The species most often mentioned are those that provide benefits (or detriments)

for human society, notably game animals. Recently, vertebrate pests have been included as major wildlife forms, largely because of lagging research and professional involvement in this area. Butterflies may also be included, but it is to be hoped that applied entomologists will assume responsibility for their management. Wildlife is not wildflowers or lichens, nor is it nematodes. Viruses are quite wild but they are hardly wildlife. There is a danger of opening a conceptual umbrella so wide that it covers all biology and then discovering the topic of interest has been defined away. Wildlife is always what some individual or group with a purpose decides it to be. In other words, the definition of wildlife is a decision. It is best conceived as a contextual definition: *that population is wildlife, manage it!*

In this book wildlife and fisheries management are separated because (1) wildlife has grown through usage to connote terrestrial forms and (2) there is a major literature, as well as professional group, that finds sufficient difference in problems and solutions to discriminate between the two. Special fisheries concepts are treated in Chapter 8. Elsewhere, the reader will, I hope, allow me to use wildlife loosely, usually to denote terrestrial forms, but also to imply that the topic is relevant to managing both aquatic and terrestrial forms of wild animals. Where major differences exist in their management, I shall specify "fisheries."

The Concept of Wildlife Management

Wildlife management is

*the science and art
of making decisions and taking actions
to manipulate the structure, dynamics, and relations
of populations, habitats, and people
to achieve specific human objectives
by means of the wildlife resource.*

This long and cumbersome definition has many implications.

Wildlife management is evolving from an art form to a science. Perhaps it will never become a science, but every effort should be made to encourage this evolution. The art of wildlife management is observable in a few areas around the country where a manager's unique touch shows through. There are agency meetings and political encounters in which one feels in the presence of an artisan, so adroitly are discussions and decisions handled. There are wildlife areas similar in character to others that produce quite different social benefits under the managerial control of a special manager. All managers are more or less artful. The emergence of wildlife as a science does not destroy managerial artistry but increases the predictability of systems, reduces risks, allows the transfer of knowledge and exchange of techniques, and enables resource benefits

to be experienced widely, rather than only on those areas where there are managers of genius or of more than 20 years of experience.

Wildlife management is a decision science. Its appropriateness is measurable by the rightness of decisions that are made. Managers earn their wages by making decisions. Weather may change, animals may escape, or a laborer may do a poor job, but these all occur after a decision is made. The goodness of a decision bears little relation to whether, or how well, it was carried out. Of course, wildlife managers do actively work afield, and their actions need to be judged to decide whether they are actually wildlife management and, if so, how well executed.

The object of this decision making is *control*. Management is a cybernetic or control function, guiding systems toward objectives. It requires analyzing, designing, and tending systems. Unless change results that is significantly different from that which would occur without the presence of the manager, no management has occurred. Wildlife managers are not paid to watch the grass grow or populations change. They must strive to be in control of systems. Whatever obstacles are placed in their paths, whether drought, poachers, or the constraints of a shortsighted law, they must work to increase their effectiveness in meeting the objectives set forth. In most wildlife systems nature is provident. Game will be produced. The managerial function is measured in the difference between the benefits the system would produce naturally and those it produces under the wildlife manager's guidance.

There are essentially two kinds of management: *active* and *passive*. Active management manifests itself in positive measures such as *increasing* pheasant populations through planting food patches, or elk populations through making prescribed burns of rangelands to produce food; *stabilizing* some populations through specifying harvest dates and methods while stabilizing food production; *decreasing* some populations by harvesting deer, for example, deer that are damaging orchards, using chemosterilants to reduce disease-carrying fox populations, and poisoning selected flocks of blackbirds or sugar cane rats.

Passive management is the prevention of certain actions or letting natural developments take their course. Wilderness preservation provides opportunities for rangelands and forests to reach mature stages essential for some wildlife species. No overt act (other than legal designation, boundary marking, and surveillance) is needed. In fact, attempts to speed up the maturing of a forest by irrigation or fertilizers may produce results undesirable for the species being managed.

No matter what kind of wildlife management is being practiced, consideration must be given to three fundamental and mutually exclusive characteristics of animal populations, habitats, and people—namely, structure, dynamics, and relations. *Structure* refers to the classes and hierarchies used to describe systems and name their parts. It includes sex, age classes, and weight groups. *Dynamics*

are always expressions of rates, changes, and differences and include growth, mortality, birth, and range expansions. *Relations* are cause-and-effect pathways or changes and interactions, including, for example, social breeding behavior, soil-moisture relations, competition for light, and student-teacher responses. These three fundamental characteristics provide an organization and checklist for managerial actions.

The manager works with populations, habitats, and people. Populations are typically emphasized, for the manager deals with wild animals, often uncoun- ted, over large areas. While knowledge of individual animals is essential, the man- ager works to generate benefits from the group, not the individual animal. Individuals are the subject of veterinary science and zoo keeping.

Habitats are emphasized. Wildlife is almost ubiquitous, so there is a fine line between general environmental management and habitat management. The difference is in the emphasis and in the intent. The wildlife manager is not working to alter environments in general, but to alter the homes of animals to achieve certain pre-stated wildlife-related objectives. Unless this difference in the objectives is known at some level (although it may not be apparent to everyone), it is impossible to distinguish a wildlife manager from a forester, range manager, or farmer.

The third part of the wildlife system is also subject to manipulation. People may be manipulated, as they are daily, by advertising, teaching, and laws. The wildlife manager may change perceived levels of importance of game, may get people to vote or support a cause, or may concentrate hunting to eliminate range problems resulting from high population densities.

Modern wildlife management is objective-oriented. Unless a set of objectives is specified *before* actions are taken, then there is no way to evaluate them. For actions to be adjudged “wildlife management” these actions must be seen to achieve wildlife-related objectives. They must pertain specifically to the wildlife resource. Objectives are stated in terms of specific desired benefits that should result from decisions. There may be many benefits and losses from any action on the land, such as building a hunter access trail or a fishing pond. Those that are produced by or derived from the wildlife resource are the interests of the field of wildlife management.

A Short History

Although the history of wildlife management goes back hundreds of years, as attested by Marco Polo’s reports from the thirteenth-century court of Kubla Khan, the first textbook on game management was published in 1933 by Aldo Leopold. Leopold came from a forestry background, and his terminology and concepts have strongly influenced the development of wildlife management. In the United States, game management emerged from a mixture of protectionist

law enforcement, foresters with a European gamekeeper orientation, range and agricultural interests, professional soil conservationists, and a host of perceptive naturalists and early ecologists. U.S. wildlife management has from the first reflected the old Magna Carta provision that made wildlife the property of the state and not of the landowner.

Fisheries and game interests have proceeded along intertwining pathways, fisheries science beginning long before the game production sciences. They meet where field personnel must enforce both game and fish laws, stock fish in one season and develop habitats in another, and educate the public, which includes hunters and fishermen. Yet funding, environments, and techniques of research and management are different in the two fields, and thus the divergences are also quite real. Intertwining pathways, with overlaps and occasional points of identity, give the best picture of the relations between the two. The differences are emphasized, or not, by the approach taken to the subject.

The Wildlifer

There are university-educated wildlife management experts employed to do wildlife management. These people typically hold master of science degrees. They are called wildlife managers, wildlife technicians, wildlife biologists, wildlife conservationists, or some specialist title such as wildlife researcher or waterfowl biologist. This terminology largely results from civil service differences in the various states. I typically refer to these paid practitioners of wildlife management as *wildlifers*.

There are real problems with such a word because there are many people interested in and working in wildlife management—enforcement personnel, lobbyists, administrators, fiscal experts, enthusiastic students, educators, very well-informed and supportive citizens who actively manage their yards, and sportsmen who manage their lands and farms to enhance wildlife populations. There are research lab technicians, field workers, and media specialists. There are legal, organizational, and administrative reasons to develop a tighter terminology and to certify various levels of education and managerial competency for these practitioners in the field of wildlife management. There are few other reasons for doing so; therefore a wildlifer is any person who aspires to achieve increased knowledge or mastery of wildlife management (as defined previously).

Approaches to Wildlife Management

There are many viable approaches to the study of wildlife management. Adoption of any one will aid the neophyte, but a multidimensional approach is strongly recommended for the maturing student.

The *species approach* is particularly useful for the manager who is responsible for a management unit and can compile a list of wildlife species. With the list in hand, the manager can proceed to study each species and its special management problems. In large areas or those with very long lists, however, this task is practically impossible. Table 1-1, an outline of the subgroup “big game species,” shows how immense the task can become. Studying representative forms is sometimes a practical alternative, especially for managers in agencies or companies that transfer employees frequently from one territory to another.

Some agencies persist in grouping species under such blanket categories as “upland game,” “waterfowl,” and “big game.” Is not a deer upland game as well as big game? Where do songbirds fit within such a species-habitat-taxonomic aggregate? The problem may seem trivial on the surface, but once the categories are fixed by use in budgets or embedded in university course structure, they can influence thinking about wildlife management, as well as allocation of funds. In the long run, the name can result in inefficiencies and failure to achieve maximum benefits from the available wildlife resource.

The *biome approach* stresses the similarities of processes and principles in the major, globally recognizable ecological communities. There are eight major biomes: deciduous forest, coniferous forest, tundra, grassland, desert, chaparral, tropical savanna, and tropical forest. Studies focus on the differences between these areas, on comparisons of ecological processes and their rates, and on unique or overlapping species groups. Mastering the structure and dynamics of more than one biome in a lifetime is unlikely. In practice, managerial study and techniques are rarely biome-specific. However, biomes provide a powerful organization for ecological studies and descriptions.

The *techniques approach* takes a particular tool or technique and seeks out ways it can be used with various species, in various biomes, or for particular problems. Examples of techniques that have been profitably employed are the eye-lens weight method of aging animals, the use of anesthetizing drugs on animals, and the sonar detection of fish populations. The techniques approach may result in great redundancy, but it tends to be very practical. Its primary drawback is not emphasizing objectives. When one is working with a hammer, there is a temptation to treat everything as if it were a nail.

The *land health approach* derives from an analogy, suggested by Leopold (1949), between the wildlife manager and the medical doctor. According to this analogy, the manager is a sophisticated general practitioner, who, aided by experts and research, diagnoses, prescribes, and treats the ills of the land. These diseases may be inherent as well as caused, latent as well as overt or symptomatic. Techniques are needed for improved diagnosis as well as for cures. Education and prevention are as important as curative action. The analogy is very rich, and the student is encouraged to explore it and to discover where it, like all analogies, fails.