

Contents

<i>List of Tables</i>	<i>ix</i>
<i>Checklist of Mammals of Rocky Mountain National Park and Vicinity</i>	<i>xi</i>
1. Introduction	1
Organization	2
Explanation of Terminology	4
Measurements	6
Acknowledgments	6
2. What is a Mammal?	7
Historical	7
Anatomical	8
Reproductive and Developmental	10

3. Mammalian Distribution	13
The Ecological Context	13
Elevational Distribution	14
Faunal Relationships of Rocky Mountain National Park	26
4. How to Observe Mammals	31
5. Order Soricomorpha	39
6. Order Chiroptera	49
7. Order Primates	71
8. Order Lagomorpha	75
9. Order Rodentia	89
10. Order Carnivora	149
11. Order Artiodactyla	205
Appendices	
I. Key to Mammals of Rocky Mountain National Park and Vicinity	227
II. Glossary	237
III. Derivation of Scientific Names	243
Literature Cited	247
Approximate Conversion Factors, Metric-English Measurements	264

1

INTRODUCTION

This is a handbook of mammals of Rocky Mountain National Park and adjacent areas. Its purpose is to help visitors increase their understanding and appreciation of the mammals of the area by describing their diversity, their habits, and their complex relationships with the natural environment.

The more we know about our surroundings, the more we can enjoy them. The more we enjoy any resource, the more tenacious we are in protecting it for our own continuing enjoyment and that of generations to come—generations of people and generations of pine squirrels! I hope that this handbook will not only serve visitors but will also serve our native fauna and its precarious habitat.

The fauna of any area is a dynamic assemblage. Some species undergo seasonal migrations. Others disappear to enter hibernation or dormancy.

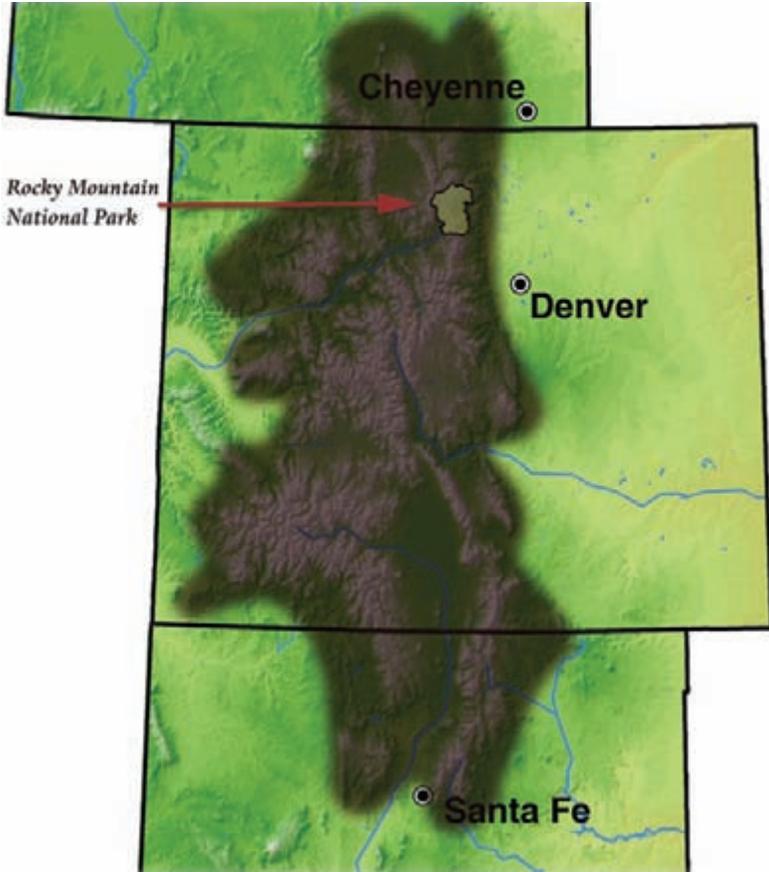
Geographical ranges change on time scales of years or millennia, as climatic change leads to changes in the resource base. Superimposed on these natural patterns are changes in response to human involvement—deliberate or not—in native ecosystems.

Because of this dynamism—and because some species are simply difficult to observe—it is nearly impossible to list and describe accurately an entire fauna for a particular area, especially an area as complex and diverse as Rocky Mountain National Park. Of the seventy-two species described in this book, about sixty have been documented in Rocky Mountain National Park or Arapaho National Recreation Area by museum specimens and/or confirmed observations of animals or their certain sign. Of that number, at least four species (gray wolf, grizzly bear, river otter, bison, and perhaps the wolverine) have been extirpated within historic time. (The river otter now has been restored on the west side of the national park.) The moose was of occasional natural occurrence in northern Colorado in the latter half of the nineteenth century. The animals were introduced in North Park in recent years by the Colorado Division of Wildlife, and moose are now residents of Rocky Mountain National Park.

Organization—The bulk of this handbook is composed of accounts of the species of mammals occurring in or adjacent to Rocky Mountain National Park and Arapaho National Recreation Area (or are strongly suspected to occur or have occurred there within historic times). Accounts of most species treat distribution and habitat, appearance and field recognition, and natural history. Accounts (usually somewhat abbreviated) are provided for species not yet documented in the area but whose presence may eventually be detected, given ongoing habitat change, including direct and indirect human interference.

Wherever possible, data in accounts of species are from local studies. Selected references are provided for each species. These citations will lead interested readers to useful reviews or technical monographs. In keeping with an orientation toward a lay audience, text citations are few. For more information on any of the species described, see Fitzgerald et al. (1994). An attempt has been made to cite recent review papers and books. Fortunately, most of the species discussed in this book have been reviewed in *Mammalian Species*. That series is published by the American Society of Mammalogists. Accounts are authoritative and succinct and they cite the detailed sources from the primary research literature. All are available gratis on the Worldwide Web, from an archive maintained by Professor Virginia Hayssen at Smith College (<http://www.science.smith.edu/departments/Biology/VHAYSEN/msi/default.html>).

Although our interest is focused specifically on mammals of Rocky Mountain National Park and immediately adjacent areas, this handbook has



Sketch map of parts of Wyoming, Colorado, and New Mexico, showing in shaded relief the geographic context of this handbook—the Southern Rocky Mountains. After Adams (2003), used by permission.

far wider application (see map). It applies without exception to mountainous parts of north-central Colorado and adjacent Wyoming. Elsewhere in the Southern Rockies a similar fauna is present, although there is a gradual attenuation of the ranges of some species southward. In mountainous areas to the north and west (in the Middle Rocky Mountains of Wyoming and Utah), our coverage becomes progressively less complete. The reader interested in mammals of Colorado as a whole should consult Fitzgerald et al. (1994), or Lechleitner (1969). Mammals of the Great Plains to the east were treated by

Jones et al. (1983, 1985), and Armstrong (1982) described mammals of the Colorado Plateau to the west.

A rather extensive, general introduction precedes the accounts of species. *What Is a Mammal?* describes mammals in general and attempts to put the local fauna in temporal perspective with respect to other vertebrate animals. *Mammalian Distribution* establishes the fauna in its spatial context. Comments on ecological distribution are intended to aid the reader in selecting those areas of Rocky Mountain National Park best suited to the development of certain mammalian communities. *How to Observe Mammals* offers a few hints for the would-be mammal watcher.

Explanation of Terminology—This is intended as a popular handbook. By “popular” I do not imply that it is intended as a “best seller” but that it was written for laypeople without extensive formal training in biology. Nonetheless, some scientific vocabulary has been used, and scientific names are included for each species. Why?

First, why not? Certainly not to impress—and not to discourage—the interested amateur. As paleontologist H. E. Wood once observed, “The justification for the technical terminology of any specialty is not to serve as a hog latin by which initiates may mystify and exclude *hoi polloi*.” Rather, technical vocabulary allows precise statements where the simpler or more familiar words of everyday language might be misleading. Technical terms are defined in a glossary (Appendix II) near the end of this handbook.

What about scientific names? Here again, precision is the overriding criterion. A scientific name permits unequivocal reference to a particular species. Vernacular (“common”) names often do not. Consider as an example the vernacular name “gopher.” To the biologist, the word “gopher” connotes a pocket gopher, any member of the family Geomyidae. “Gopher” in this sense is not a very restrictive term—there are some forty species of pocket gophers. However, some people use the term “gopher” to designate any burrowing rodent. The “Golden Gopher” of Minnesota is not a geomyid but the 13-lined ground squirrel. That same species is called “gopher” (or “picket-pin”) in northeastern Colorado. In northwestern Colorado, however, the 13-lined ground squirrel is called “corn weasel”; in that area “picket-pin” designates the Wyoming ground squirrel, a widely different kind of ground squirrel. In Florida, “gopher” does not refer to a mammal at all but designates a kind of tortoise. That leaves the Floridian pocket gopher without a common name, so some locals call them “salamanders”!

Scientific names prevent the confusion inherent in a loose system of common names. Scientific names are formulated and proposed under stringent international rules to which the systematic biologists of the world all subscribe voluntarily. Each species of animal or plant has a unique name. The

complete name of a species consists of two words. The first word (capitalized) designates the genus to which a species belongs. The western jumping mouse is in the genus *Zapus*. Often a genus comprises several species and the generic name in common indicates close evolutionary affinity of one species with another. The second word (not capitalized) is unique and refers to a single species, such as *Zapus princeps*. Because they are written in a foreign language, Latin, scientific names are conventionally printed in italic type.

What is an animal species? To the layperson (and to most zoologists on a day-to-day basis), species are groups of individuals that look alike. In most—but by no means all—cases this definition is quite adequate. Some species look very much alike, especially externally (the Colorado and Uinta chipmunks are examples in Rocky Mountain National Park). However, individuals within a species may look very different from one another. Siblings from the same litter may differ widely in color or pattern. For example, Abert's squirrels (*Sciurus aberti*) may be black, brown, or gray. "Red" foxes (*Vulpes vulpes*) may be reddish, grayish (the "cross" phase), or "silver" (actually a "frosted" black). "Black" bears (*Ursus americanus*) may be brown, whereas brown bears (*Ursus arctos*, also called grizzly bears) may be blonde.

In addition to local differences between individuals, species vary geographically; in the eastern United States and Canada, our "red" squirrels, *Tamiasciurus hudsonicus* (also called chickarees or pine squirrels) are indeed reddish in color, but in the Southern Rockies, most individuals are not red at all but a sort of bluish brown. Clearly, a criterion for species more meaningful than mere appearance is needed. Today zoologists consider species to be groups of actually or potentially interbreeding individuals, reproductively isolated from other such groups. That is, species are defined by reproductive continuity, not merely by appearance.

This book is about species of mammals (with brief comments on the families and orders in which the species are classified). Recognized scientific names are used to allow a fixed point of reference for those who might wish to read more about a particular species in the technical literature. For those who are interested, the derivations of scientific names (where known to me) are included in Appendix III. Vernacular names usually follow R. Baker, Bradley, Bradley, et al. (2003). (That checklist is available online, gratis, from the Museum of Texas Tech University; <http://www.nslr.ttu.edu/publications/opapers/ops/op229.pdf>.) Where appropriate, alternative common names are included to facilitate conversation with local naturalists.

Orders, families, and genera are treated in traditional phylogenetic sequence (following R. Baker, Bradley, Bradley, et al. 2003). Ordinal names and comments on diversity within orders follow Wilson and Reeder (2005). Species within genera are arranged alphabetically. Descriptions of continental

ranges are based on Hall (1981) and those of ranges in Colorado are based on Fitzgerald et al. (1994), which updated maps from Armstrong (1972).

Measurements—Measurements are of Coloradan animals (generally following Armstrong 1972). Some incidental measurements are in the so-called English system, but measurements of mammals are given in metric units, the so-called SI System (abbreviated from the French *Système International d'Unités* because the system was invented by the French during the Enlightenment). Abbreviations for SI units are as follows: mm = millimeter, cm = centimeter; m = meter; km = kilometer; g = gram; kg = kilogram. This two-system arrangement should not prove confusing, and it may be instructive. The metric system is the world scientific standard and, except in the United States, has become the official commercial standard as well. Philosophically, the metric system is far more satisfying than our traditional system of measurement. The meter is based (roughly) on the circumference of Earth rather than on the length of some forgotten monarch's arm. Also, once one gets accustomed to "thinking metric," it is a much easier system to use than the English system because everything is based on multiples of ten: 10 millimeters to the centimeter, 100 centimeters to the meter, 1,000 meters to the kilometer, 1,000 grams to the kilogram, 1,000 kilograms to the metric tonne. Conversion factors and a table of English-metric equivalents appear in the back of this book.

Acknowledgments—Numerous readers made comments or corrections on earlier editions of this book (see Armstrong 1975, 1987). For this revision, Catherine Driscoll provided recent observations on status of bighorn sheep; Park Service resource manager Jeff Connor facilitated access to the observations of numerous visitors and Park Service personnel who have contributed to the wildlife observation files at RMNP-HQ. Dr. James B. Benedict of the Center for Mountain Archeology, Ward, Colorado, provided literature and insights on human prehistory.

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