

## PART VII. THE MANAGEMENT OF WILD RUMINANTS

Wild ruminants are a most important group of game animals on the North American continent. The number of field and laboratory studies of wild ruminants and their habitats must surely exceed that of any other group of wild species. Because so much is known about them, a scientific approach to management is possible, based on sound biological knowledge.

Why, if so much is known about wild ruminants, is management often such a controversial subject? Because there is a considerable emotional attachment to them--especially to deer--by many segments of the public. These attachments include a very strong love of the hunt at one extreme and an equally strong, completely protective, love of the hunted at the other extreme.

It is easy to be so intent on current problems that time is not made available to put all our knowledge and understanding together. Each study of some particular facet of wild ruminant biology, such as behavior, reproduction, habitat conditions, or range use becomes almost an entity by itself. Sometimes the findings appear to be applicable only to relatively small geographical areas or to special conditions. There are many basic biological functions that are common to different species and their habitats, however. Only the numerical values representing these functions differ between species and areas.

So many aspects of human endeavor have been advancing in the decades of the 60's and 70's, and the management of wild ruminants should be no different. Scientific management must focus on the animal-environment relationships if we are to be professionally competent, both in biology and technology, for animal and environment are interrelated and are inseparable.

PARTS I through VI have brought information together on the fundamental biology of wild ruminants and PART VII brings information and references together to produce a picture of where we are in their management. Some of that information may appear complicated, and many of the details are. They must be presented and used, however, because these details occur within a framework of basic ecological laws, laws of nature that man cannot repeal.

No system of management will result in long-term success if basic ecological laws are ignored. Scientific management should include options which are best described as ecological alternatives, and from these alternatives one chooses what one wants to do. The "demands" of special interest groups for saving all deer, for outlawing hunting, for unrealistic season dates, or any other wish or desire of an individual or group should be scrutinized in relation to ecological alternatives, and ecologically unrealistic ones rejected. Further, it must be made abundantly clear why such demands are not within the realm of ecological alternatives.

Since the wants of different segments of society are often contradictory, compromises between the best course of action and a less desirable course may be necessary. This is acceptable if such compromises are within the limits of ecological alternatives.

Deer, elk, moose, and other ruminants are poor politicians; they do not understand the will of the people. They relate to their environment at a fundamental, functional level, and if it is the wish of the people to make a housing development out of a forested area, the animals will react according to basic instincts and move out, with no understanding of the intentions and good will of the people who move there.

The five CHAPTERS in this PART VII emphasize habitats and people. Management of wild ruminant habitats is discussed in CHAPTER 21. Biologically-based species management is discussed in CHAPTER 22. Improper range use is discussed in CHAPTER 23. Sociological and economic considerations are discussed in CHAPTER 24; this CHAPTER should be the subject of a book by a farsighted and broadly-educated author. Research needs--a chance for me to speculate and philosophize--are discussed in CHAPTER 25.

The last of 7 PARTS, it is my wish that each of you will recognize the roles of and use the first 6 PARTS in your management deliberations, whether in the classroom or the research and management office of your state or province.

# GLOSSARY OF ANIMAL CODE NAMES

Wild ruminants are referred to in this PART by a 4-character abbreviation from the family, genus and genus-species. These are listed below under Abbreviation.

Scientific names of North American wild ruminants are those used in BIG GAME OF NORTH AMERICA, edited by J.C. Schmidt and D. L. Gilbert (1979: Stackpole Books, Harrisburg, PA 17105, 494 p.), and may be different from the scientific names given in the original literature.

The abbreviations used for North American wild ruminants are listed below.

## CLASS: MAMMALIA

### ORDER: ARTIODACTYLA

### Abbreviation

#### FAMILY: CERVIDAE

cerv

GENUS: Odocoileus (deer)

od--

SPECIES: O. virginianus (white-tailed deer)

odvi

O. hemionus (mule deer)

odhe

GENUS: Cervus (Wapiti, elk)

ce--

SPECIES: C. elaphus

ceel

GENUS: Alces (moose)

SPECIES: A. alces

alal

GENUS: Rangifer (caribou)

SPECIES: R. tarandus

rata

#### FAMILY: ANTILOCAPRIDAE

GENUS: Antilocapra

SPECIES: A. americana (pronghorn)

anam

#### FAMILY: BOVIDAE

bovi

GENUS: Bison (bison)

bi--

SPECIES: B. bison

bibi

GENUS: Ovis (sheep)

ov--

SPECIES: O. canadensis (bighorn sheep)

ovca

O. dalli (Dall's sheep)

ovda

GENUS: Ovibos

SPECIES: O. moschatus (muskox)

obmo

GENUS: Oreamnos

SPECIES: O. americanus (mountain goat)

oram

The abbreviations used for European wild ruminants are listed below.

CLASS: MAMMALIA

ORDER: ARTIODACTYLA

Abbreviation

FAMILY: CERVIDAE

GENUS: Capreolus (roe deer)

cerv

SPECIES: C. capreolus

ca--

GENUS: Dama (fallow deer)

caca

SPECIES: D. dama

da--

GENUS: Cervus (Wapiti, elk)

dada

SPECIES: C. elaphus (red deer)

ce--

GENUS: Alces (moose)

ceel

SPECIES: A. alces

alal

GENUS: Rangifer (caribou)

SPECIES: R. tarandus

rata

FAMILY: BOVIDAE

GENUS: Bison (bison)

SPECIES: B. bonasus

bibo

GENUS: Capra (ibex, wild goat)

cp--

SPECIES: C. aegagrus (Persian ibex)

cpae

C. siberica (Siberian ibex)

cpsi

OTHERS

Abbreviations for a few other species and groups of species may appear in the reference lists. These are listed below.

Axis axis (axis deer)

axax

Elaphurus davidianus (Pere David's deer)

elda

Cervus nippon (Sika deer)

cen

Hydropotes inermis (Chinese water deer)

hyin

Muntiacus muntjac (Indian muntjac)

mumu

Moschus moschiferus (musk deer)

momo

Ovis nivicola (snow sheep)

ovni

Ovis musimon (mouflon)

ovmu

Ovis linnaeus (Iranian sheep)

ovli

Rupicapra rupicapra (chamois)

ruru

big game

biga

domestic sheep

dosh

domestic cattle

doca

domestic goat

dogo

domestic ruminant

doru

herbivore

hrbv

mammals

mamm

three or more species of wild ruminants

many

ruminants

rumi

ungulates

ungu

vertebrates

vert

wildlife

wldl

wild ruminant

wiru

## ORGANIZATION OF REFERENCE LISTS

Extensive reference lists, based on computer-assisted searches back to 1970 and manual searches of literature published prior to 1970, are included in each of the PARTS. The lists are organized in a functional way for use in the library rather than in the conventional alphabetized-by-author way, with the information necessary for locating the references in libraries given in abbreviated, one-line form. The reference books listed after each PART, CHAPTER, and TOPIC contain background information for the material covered, and may contain specific information for several of the UNITS and WORKSHEETS.

The headings for the lists of BOOKS are:

TYPE PUBL CITY PGES ANIM KEY WORDS----- AUTHORS/EDITORS-- YEAR

The TYPE of book could have either an author (aubo) or an editor (edbo). Publishers (PUBL) and CITY of publication are given with four-letter mnemonic symbols defined in the GLOSSARY. The PAGE column gives the number of pages in the book; ANIM refers to the species discussed in the book (given as a four-letter abbreviation of genus and species), and KEY WORDS lists key words from the title. The AUTHORS/EDITORS' names and YEAR of publication are given in the last two columns. Thus all of the essential information for finding each book in the library is given on just one line.

Serial publications that pertain to each division are listed with a slightly different format. (Serials are identified by a five-character, generally mnemonic code called CODEN, published in 1977 BIOSIS, LIST OF SERIALS (BioSciences Information Service, 2100 Arch Street, Philadelphia, PA 19103).

The headings for the lists of SERIALS are:

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

The volume and issue numbers (VO-NU) are given after the CODEN entry, followed by beginning page (BEPa), ending page (ENPA), species discussed (ANIM), key words from the title (KEY WORDS), AUTHORS, and YEAR.

Specific authors and dates of publication can be located quickly by scanning the two right-hand columns. If the author's name fits in the 17 characters, some character spaces are left blank. If there are two authors and all of the first author's name and part of the second author's name fits in the 17 character spaces, the second author's name is truncated at the right margin of the author column. If there are more authors that do not appear in the author column due to lack of space, a slash (/) is added in the 17th space of the column.

References cited in the text material and in the WORKSHEETS are given under LITERATURE CITED in the traditional format (author, date, title of article, journal, volume, issue number, and page numbers).

A third category, OTHER PUBLICATIONS, may be included at the beginning of PARTS or in the CHAPTERS. This category contains references to publications that are not authored or edited books or serials listed by BioSciences Information Service. Examples are "Transactions of the Northeastern Deer Study Group Meetings" and "Biannual Pronghorn Antelope Workshop, Proceedings." Both of these contain many articles on deer and pronghorns, respectively, but are not included in the one-line abbreviated form. Such publications are listed by titles, which should make it possible to locate the publications in libraries.

#### HOW TO USE THIS SYSTEM

The one-line format used to list references makes it possible to list several thousand references in a minimum amount of space. The logic of the one-line entries in the reference lists is based on the order of decision-making when finding literature. First, the references are grouped according to biological functions and relationships discussed in this book. Second, species of interest are selected. Third, journals containing references to be read are located in the library. Fourth, the publications are located in the journals. The use of this reference list format in the library will confirm the logic of this arrangement. Call numbers and stack levels should be added in the margins so references may be quickly located in a particular library.

CODEN entries are identified by the full title of the serial publication and its country, territory, or commonwealth of origin in the APPENDIX. CODEN entries in the serial lists are alphabetized. This results in some of the full titles being out of alphabetical order. Since the user of this book will usually work from CODEN to consult the list of full titles in the APPENDIX, this disorder will result in nothing more than occasional inconvenience. Most of the full titles will be near alphabetized, so the CODEN for a specific serial can be quickly found by scanning the appropriate part of the list.

Serials, including journals and report literature, constitute the major portion of the literature on wild ruminants. Scientists are urged to publish their findings in recognized journals so the results of their work are readily available.

## REFERENCES, PART VII

## THE MANAGEMENT OF WILD RUMINANTS

## BOOKS

TYPE	PUBL	CITY	PGES	ANIM	KEY WORDS-----	AUTHORS/EDITORS--	YEAR
aubo	fost	nyny	426	cerv	antelope, deer of n america	caton,jd	1877
aubo	rokp	loen	597	cerv	deer of g. britain, irelan	whitehead,gk	1964
aubo	huho	nyny	426	od--	deer, antelope of america	caton,jd	1877
edbo	stac	hapa	668	od--	deer of north america	taylor,wp	1956
aubo	stac	hapa	128	od--	if deer are to survive	dasmann,w	1971
aubo	vipr	nyny	194	od--	deer of the world	whitehead,gk	1972
aubo	omcc	eail	107	odvi	the white-tailed deer	madson,j	1961
edbo	nhfg	conh	256	odvi	the white-tai deer, new ha	siegler,hr	1968
aubo	ucap	beca	567	odhe	a herd of mule deer	linsdale,jm; tomi	1953
edbo	unbp	line	605	odhe	mule, black-tailed, no ame	wallmo,oc	1981
aubo	oxup	loen	215	ceel	herd, red deer,stud, behav	darling,ff	1937
aubo	stac	hapa	386	ceel	elk of north america	murie,oj	1959
aubo	wiwe	eail	125	ceel	the elk	madson,j	1966
aubo	ucap	beca	209	ceel	tule elk	mccullough,dr	1971
aubo	cite	oxen	74	ceel	ecology of red deer	mittchell,b; stai/	1977
edbo	wimi	wadc	....	ceel	ecology and management	thomas,jw; towei	INPR
aubo	uwyp	lawy	294	ceel	n amer elk: ecol,behav,mgt	boyce,ms; hayden-	1979
aubo	utop	toon	280	alal	north american moose	peterson,rl	1955
aubo	macm	nyny	300	rata	bar-gr car of north canada	pike,w	1892
aubo	ukap	laka	163	rata	bar-ground carib, keewatin	harper,f	1955
aubo	qupr	oton	339	rata	migratory, barren-ground c	kelsall,jp	1968
aubo	stac	hapa	238	anam	prngrn antlp & its mngmnt	einarsen,a	1948
aubo	stac	hapa	225	anam	hunting pronghorn antelope	popowski,b	1959
aubo	rowa	loen	....	bovi	wild oxen, sheep, goats of	lydekker,r	1898
aubo	utop	toon	991	bibi	n amer buffalo, wild state	roe,fg	1970
aubo	thcr	nyny	242	bibi	the buffalo	haines,f	1970
aubo	aakn	nyny	339	bibi	the time of the buffalo	mchugh,t	1972
aubo	swap	atoh	374	bibi	the buffalo book, saga ani	dary,d	1974
aubo	ucap	beca	316	bibi	n amer bison, evol, classi	mcDonald,jn	1981
aubo	uopr	nook	247	ov--	great ark of the wld sheep	clark,jl	1964
aubo	uchp	chil	383	ov--	mt sheep, behavior, evolut	geist,v	1971
aubo	coup	itny	248	ov--	mt sheep, man, norther wil	geist,v	1975

TYPE	PUBL	CITY	PGES	KEY WORDS-----	AUTHORS EDITORS--	YEAR
aubo	uchp	chil	383	ovca mount sheep: behavi, evolu	geist,v	1971
aubo	usgp	wadc	242	ovca the bighorn of death valley	welles,re; welle	1961
aubo	qupr	oton	166	obmo muskoxen in canada	tener,js	1965
aubo	haho	nyny	85	obmo oomingmak, expedi, nunivak	matthiessen,p	1967
aubo	doup	nyny	318	many americ anim; popular guide	stone,w; cram,we	1902
aubo	cscs	nyny	347	many our big game	huntington,d	1904
aubo	cscs	nyny	1267	many life hist northern animals	seton,et	1909
aubo	ropr	nyny	129	many wildlife in alaska, ecolog	leopold,as; darli	1953
edbo	holt	nyny	264	many records of n a big game an	boone & crockett	1958
aubo	ropr	nyny	547	many mammals of north america	hall,er; kelson,k	1959
aubo	ucap	beca	586	many wildlife of mexico	leopold,as	1959
aubo	vipr	nyny	304	many wildlife in america	matthiessen,p	1959
aubo	repu	nyny	335	many principals of mammalogy	davis,de; golley,	1963
aubo	blsp	loen	308	many guide, study of productivi	golley,fb; buechn	1968
aubo	jhpr	bamd	769	many mammals of the world	walker,ep; paradi	1968
aubo	whfr	sfca	458	many wildlife ecology	moen,an	1973
aubo	utop	toon	438	many the mammals of canada	banfield, awf	1974
edbo	iucn	mosw	940	many behav & its rela to mngmnt	geist,v; walther,	1974
aubo	dalt	laen	271	dada fal de: histor, distr, bio	chapman,d; chapma	1975
aubo	repu	nyny	1023	dome bioenergetics and growth	brody,s	1945
edbo	coup	itny	1463	dome duke's physiol domest anim	swenson,mj	1970
aubo	acpr	nyny	202	ungu reproductive behav, ungula	fraser,af	1968