

PART VI. POPULATIONS AND THE CONCEPT OF CARRYING CAPACITY

A large amount of attention has been given to populations and carrying capacities by wildlife managers. Management efforts are generally directed toward keeping numbers within the carrying capacity of a range. For wild ruminants, this usually means that numbers are in balance with the food supply. In the early years of management, neither numbers nor the quantity of forage were known, but the conditions of the range could be evaluated by those with experience in the field. Now, subjective evaluations are not enough. Biologists and managers are expected and sometimes required by law to have reasonable estimates of numbers. This is a difficult assignment as no simple field method for making population estimates exists.

The three CHAPTERS in this PART VI include information on the population characteristics that result in population growth curves, and on the factors causing deviations from an idealized population growth curve. Characteristics of individuals--weight, metabolism, reproductive potentials, thermal exchange, forage intake, and more--have been discussed in PARTS I through V, and the effects of changes in these characteristics are evaluated in relation to changes in populations in this PART VI. This approach results in an understanding of the roles of variations in these factors in the population dynamics of wild ruminants. Further, management decisions are often based on the effects of these variations. A severe winter, for example, alters the age, weight, metabolic, and reproductive structures of a wild ruminant population, and changes in hunting regulations are often made as a result of these changes.

The different roles of various members of a population of wild ruminants affect the carrying capacity of the range. Rather than consider carrying capacity as "a minimum number . . . , " it should be considered as a dynamic concept, a balance between resources required and resources provided. This approach, discussed in Moen (1973), recognizes the different roles of various members of a population and allows one to evaluate the effects of different population structures on changes in balances of resources required and resources supplied.

This PART includes CHAPTER 18, POPULATION STRUCTURES, CHAPTER 19, POPULATION ESTIMATES AND PREDICTIONS, and CHAPTER 20, CALCULATIONS OF CARRYING CAPACITY. These chapters include methods for determining the effects of differences in the characteristics and requirements of wild ruminants in relation to range characteristics, all of which have been discussed in the previous PARTS.

LITERATURE CITED

- Moen, A. N. 1973. Wildlife ecology. W. H. Freeman Co., San Francisco. 458 pp.

REFERENCES, PART VI

POPULATIONS AND THE CONCEPT OF CARRYING CAPACITY

BOOKS

TYPE	PUBL	CITY	PGES	ANIM	KEY WORDS-----	AUTHORS-EDITORS--	YEAR
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--	the deer of north america	taylor,wp,ed	1956
aubo	stac	hapa	128	od--	if deer are to survive	dasmann,w	1971
aubo	omcc	eaill	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
aubo	stac	hapa	386	ceel	elk of north america	murie,o,j	1959
aubo	wiwe	eaill	125	ceel	the elk	madson,j	1966
aubo	ucap	beca	209	ceel	tule elk	mccullough,dr	1971
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		rata	bar-ground carib, keewatin	harper,f	1955
edbo	uaec	ortn	1250	rata	envir of cape thomp, alask	wilimovsky,nj,ed	1966
aubo	qupr	oton	339	rata	migratory, barren-ground c	kelsall,jp	1968
aubo	stac	hapa	238	anam	the pronghorn antelope	einarsen,as	1948
aubo	utop	toon	957	bibi	the north american buffalo	roe,fg	1951
aubo	thcr	nyny	242	bibi	the buffalo	haines,f	1970
aubo	aakn	nyny	339	bibi	time of the buffalo	mchugh,t	1972
aubo	swap	atoh	374	bibi	the buffalo book, saga ani	dary,d	1974
aubo	coup	itny	248	ov--	mt sheep, man, norther wil	geist,v	1975
edbo	bccl	pipa		ov--	the wild sheep, north amer	trefethen,jb	1975
aubo	usgp	wadc	242	ovca	the bighorn of death valle	welles,re; welles	1961
aubo	usfw	wadc	8	ovca	desert bighorn sheep	anonymous	1966
aubo	qupr	oton	166	obmo	muskoxen in canada	tener,js	1965
aubo	ropr	nyny	129	many	wildlife in alaska, ecolog	leopold,as; darli	1953
aubo	rmna		75	many	range relatnships: lit rev	capp,jc	1968
aubo	blsp	loen	308	many	guide, study of productivi	golley,fb; buechn	1968
aubo	whfr	sfca	458	many	wildlife ecology	moen,an	1973
aubo	utop	toon	438	many	the mammals of canada	banfield,awf	1974

TYPE	PUBL	CITY	PGES	ANIM	KEY WORDS-----	AUTHORS-EDITORS--	YEAR
aubo	saco	phpa	837		principles of anim ecology	allee,wc; emerso/	1949
aubo	dove	nyny	465		elements of mathemati biol	lotka,aj	1956
aubo	prup	prnj	342		dynamic programming	bellman,r	1957
aubo	saco	phpa	546		fundamentals of ecology	odum,ep	1959
aubo	isup	amia			of predation and life	errington,pl	1967
edbo	oost	neth	611		phenom, preda order, natur	den boer,pj; grod	1970
aubo	wbse	phpa	574		fundamentals of ecology	odum,ep	1971
aubo	grpc	lmia	130		time to cry wolf	mccann,lj	1972
aubo	hapr	nyny	506		estimati, animal abundance	seber,gaf	1973
edbo	acpr	loen	358		p 183-246, appli biol, v 1	cosher,th,ed	1976
aubo	dohr	stpa	361		biblio of quantita ecology	schultz,vll; ebe/	1976
aubo	utnp	kntn	186		guides, study of anim popu	tanner,jt	1978

SERIALS

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
CAFGA	22--3	155	246	od--	od distrib & variat, calif	cowan,im	1936

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AMNAA	67--1	45	64	odvi	kinds of <u>odocoileus</u> , arizo	hoffmeister,df	1962
BLJYA	24...	194	194	odvi	near ft smith, nrth w terr	kuyt,e	1966
JOMAA	21--3	271	282	odvi	newly located herd, pacifi	scheffer,vb	1940
JOMAA	40--2	251	252	odvi	furth incidenc in colorado	harrington,fa,jr	1959
JOMAA	44--4	518	522	odvi	do they occur in n e calif	adams,l	1963
JOMAA	53--4	907	909	odvi	range extension, se washin	o'farrell,tp; hed	1972
WLMOA	15...	1	62	odvi	ecol, manage, llano b, tex	teer,jg; thomas,/	1965

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
CAFGA	36--4	343	365	odhe	in chaparral forest, calif	cronemiller,ep; /	1950
JWMAA	24--3	265	271	odhe	cassia herd of south idaho	mcconnell,br; dal	1960

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AMNAA	97--1	230	232	ceel	prehistori range extension	curren,cb,jr	1977
TWASA	43---	5	23	ceel	the elk in early wisconsin	schorger,aw	1954
VILTA	3---3	177	376	ceel	stud, scandin; ecol invest	ahlen,i	1965
WLMOA	16---	1	49	ceel	status and ecology, califo	harper,ja; harn,/	1967
WLMOA	23...	1	66	ceel	the sun river elk herd	knight,rr	1970

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JOMAA	34...	396	397	alal	n amer's most westerly moo	brooks,jw	1953
JOMAA	49--3	528	529	alal	occu near pt barrow, alask	chesemore,dl	1968
JOMAA	53--1	129	138	alal	northern limits in w canad	kelsall,jp	1972
NCANA	101-1	51	65	alal	distribu, habitat & status	dodds,dg	1974
NCANA	101-1	81	100	alal	dist, hab selec in nc n am	krefting,lw	1974
NTRLA	21...	38	41	alal	wilderness moose	peek,jm	1970
WSCBA	29...	16	17	alal	the moose returns	dahlberg,b1	1964

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JOMAA	49--2	344	345	rata	archaeol evid in ny & mass	guilday,je	1968
NCANA	83	225	234	rata	hstry, dist, anal pop, mgt	moisan,g	1956
PCZOA	1	206		rata	postglac dispersal, americ	banfield,awf	1964

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDW-----	AUTHORS-----	YEAR
BNMFD	12---	1	103	anam	the antelope of new mexico	russell,tp	1964
CAFGA	30--4	221	241	anam	pronghorn antelop in calif	mclean,dd	1944
JOMAA	38--3	423	423	anam	prngrhn in pioneer missour	mckinley,d	1960
NMWIA	9....	6	8	anam	some answers about antelop	larsen,pa	1964

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JOMAA	8....	60	61	bibi	altitude limit of bison	warren,er	1927
JOMAA	36--3	470	471	bibi	altitud record, nrth color	beidleman,rg	1955
PAPCA	112-4	299	305	bibi	bis, human occup ohio vall	jakle,ja	1968
QJFAA	17...	228	232	bibi	occurren of bison, florida	sherman,hb	1954
TJSCA	7---2	130	135	bibi	bison beyond the pecos, tx	reed,ek	1955

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AMNAA	24	505	580	ov	distrib, variation, n amer	cowan,im	1940

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AZWBA	1----	1	153	ovca	desert high sheep, arizona	russo,jp	1956
CAUDA	30--3	92		ovca	bighorn range extended	anonymous	1968
IGWBA	1----	1	154	ovca	the bighorn sheep in idaho	smith,dr	1954
JWMAA	34--2	473	475	ovca	abundan & distri in n amer	spalding,dj; mitc	1970

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
					ovda		

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JWMAA	34--1	1	15	obmo	muskox, nunivak is, alaska	spencer,dl; lensi	1970

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
IGWBA	2----	1	142	oram	life histry & mgt in idaho	brandborg,sm	1955

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AMNAA	79--2	346	363		paleoecol lg mammal, alask	guthrie,rd	1968

CODEN	VO-NO	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JOMAA	38--3	422	422		caca roe deer in new york	manville,rh	1957

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
CPSCA	5--4	212	213		cenl distrib in maryland & virg	flyger,v; davis,n	1964
JOMAA	41--1	140	140		cenl on islands in marylnd & va	flyger,v	1960

OTHER PUBLICATIONS

Proceedings of the White-tailed Deer Disease Symposium
 Proceedings of the White-tailed Deer in the Southern Forest Habitat Symposium
 Transactions of the Annual Meeting of the Northeast Deer Study Group

Proceedings of the North American Moose Conference

Proceedings of the International Reindeer/Caribou Symposium

Proceedings of the Biennial Antelope States Workshop
 Transactions of the Interstate Antelope Conference

Transactions of the North American Wild Sheep Conference
 Transactions of the Desert Bighorn Council

Proceedings of the International Mountain Goat Symposium

Proceedings of the Annual Conference of Western Association of State Game & Fish Commissioners
 Transactions of the Congress of the International Union of Game Biologists

LIST OF PUBLISHERS - PART VI

aakn	Alfred A. Knopf	New York	nyny
acpr	Academic Press	New York	nyny
bccl	Boone and Crockett Club	Pittsburgh, PA	pipa
blsp	Blackwell Scientific Publications	London	loen
coup	Cornell University Press	Ithaca, NY	itny
dohr	Dowden, Hutchinson, & Ross	Stroudsburg, PA	stpa
dove	Dover Publishing Company	New York	nyny
grpc	Graphic Publishing Company	Lake Mills, IO	lmia
hapr	Hafner Press	New York	nyny
huho	Hurd Houghton	New York	nyny
isup	Iowa State University Press	Ames, IA	amia
macm	MacMillan Co.	New York	nyny
nhfg	New Hampshire Fish & Game Department	Concord, NH	conh
omcc	Olin Mathieson Chem. Corp.	E. Alton, IL	eail
oost	Oosterbeek	The Netherlands	neth
prup	Princeton University Press	Princeton, NJ	prnj
qupr	Queen's Printer	Ottawa, Ontario	oton
rmna	Rocky Mountain Nature Association and Colorado State University		
rokp	Routledge & K. Paul	London	loen
ropr	Ronald Press	New York	nyny
saco	Saunders Publishing Company	Philadelphia, PA	phpa
stac	The Stackpole Company	Harrisburg, PA	hapa
swap	Swallow Press	Athens, OH	atoh
thcr	Thomas Crowell Co.	New York	nyny
uaec	U. S. Atomic Energy Commission	Oak Ridge, TN	ortn
ucap	University of California Press	Berkely, CA	beca
ukap	University of Kansas Press	Lawrence, KA	laka
usfw	U. S. Fish & Wildlife Service	Washington, D. C.	wadc
usgp	U. S. Government Printing Office	Washington, D. C.	wadc
utnp	University of Tennessee Press	Knoxville, TN	kntn
utop	University of Toronto Press	Toronto, Ontario	toon
wpsc	W. B. Saunders Co.	Philadelphia, PA	phpa
whfr	W. H. Freeman Co.	San Francisco, CA	sfca
wiwe	Winchester-Western Press	East Alton, IL	eail

GLOSSARY OF CODE NAMES, PART VI

Code names (CODEN) of Serials are defined in a GLOSSARY OF CODENS at the end of each CHAPTER. The GLOSSARY below includes the CODENS listed as Serials in this PART VI. It is a miniature version of the lists given at the ends of CHAPTERS.

AMNAA American Midland Naturalist
AZWBA Arizona Game and Fish Department Wildlife Bulletin

BLJYA Blue Jay
BNMFD New Mexico Department of Game and Fish Bulletin

CAFGA California Fish and Game
CAUDA Canadian Audubon
CPSCA Chesapeake Science

IGWBA Idaho Department of Fish and Game Wildlife Bulletin

JOMAA Journal of Mammalogy
JWMAA Journal of Wildlife Management

NCANA Naturaliste Canadien, Le
NMWIA New Mexico Wildlife
NTRLA Naturalist, The (Leeds)

PAPCA Proceedings of the American Philosophical Society
PCZOA Proceedings of the International Congress of Zoology

QFJAA Quarterly Journal of the Florida Academy of Science

TJSCA Texas Journal of Science
TWASA Transactions of the Wisconsin Academy of Sciences, Arts, and Letters

VILTA Viltrevy

WLMOA Wildlife Monographs
WSCBA Wisconsin Conservation Bulletin