

THE BIOLOGY AND MANAGEMENT OF WILD RUMINANTS

CHAPTER TWENTY-TWO

BIOLOGICALLY-BASED SPECIES MANAGEMENT

by

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CHAPTER 22. BIOLOGICALLY-BASED SPECIES MANAGEMENT

The earth has a finite supply of space and food resources that never runs out? Of course not. Space is rather fixed; there are only so many acres of land on which to live. Food is a renewable resource, but a variable in time as food resources change with the seasons, and animal requirements change too. Thus, one must look at resources and requirements, both changing, in order to understand ecology of any species, including wild ruminants.

Before the settlement of North America, wild ruminant populations were affected by predation, weather, snow accumulations, fires set by lightning, blow-downs, decadent forest stands, beaver meadows, etc., plus hunting by native tribes. Some Indian tribes carried on agriculture to a considerable extent, while others depended almost entirely on hunting and fishing. Some tribes managed deer range by fire, but carefully protecting their territory from hunting by others, by prohibiting hunting at certain seasons, and, in at least one instance, appear to have had a buck law (Silver 1957).

The native human population was sparsely distributed. Hunting pressure was nothing like it is now, nor were hunters equipped with the superior weapons of today.

Predators had a much more important role in population dynamics, and they were much more widely distributed in presettlement times than now. Panthers, more common in the west, were also found along the Atlantic coast. Wolves were likely the most important of all predators. They were much feared by the Europeans, and were nearly exterminated. They were a menace to the livestock of the settlers, and competed with the settlers for wild game.

The numbers of large predators such as panthers and wolves have been decreasing every since colonial days, and today relatively few remain in the United States.

The history of wild ruminant populations varies in different parts of the country. There was a span of as much as 200-250 years between dates of settlement in various regions. Roads, boats, and then the railroads affected the rates of settlement, and hence the use of the land. In New Hampshire, for example, early settlers arrived in the interior around the beginning of the 18th century with their belongings on their backs. They did not intend to establish farming communities, but to get rich from the fur trade and precious metals. This materialized, and subsistence farming sprung up out of necessity. Clearing the forests was difficult, however, and very few settlers were able to comply with the provision of their grants that one or two acres be cleared annually by every claimant. Furthermore, until the close of the French and Indian wars in 1760, they were so busy fighting with Indians and with each other over conflicting boundaries (both the Colonies of Massachusetts and New Hampshire having granted the same land to different parties, for example) that they had little time for agriculture. They lived largely from hunting like the Indians before them, and

deer became scarce from overhunting. There were no restrictions on the manner and season of taking; it was a matter of survival, and the scarcer game became, the harder it was hunter (Silver 1957). Meanwhile progress in agriculture was slow, and deer were all but wiped out by the mid-1800's (Silver 1968).

Minnesota, not permanently settled until the mid-1800's, had three distinct vegetation zones. The evergreen forest, with pines, white spruce, balsam, and white birch on the uplands and black spruce, tamarack, and white cedar in the swamps, originally covered the northeast third of the state. The deciduous forest with oaks, maples, and ash, covered a diagonal strip across the state from the southeast to northwest, forming a transition zone between the evergreen forest and the prairies. The tall-grass prairie covered the southern and western one-third of the state. Pioneers were involved in lumbering and farming, with agriculture increasing and lumbering decreasing by the early 1900's.

The evergreen forests were habitat for woodland caribou prior to the peak of lumbering about 1900. After these forests were cut and burned, white-tailed deer moved in from the south and west, encouraged by the growth of shrubs and small trees that followed lumbering operations. Meanwhile, deer, elk, bird, and bison were exterminated from the agricultural regions due to hunting and the shift to agriculture.

Interior New York State, the hunting ground of the Iroquois, was first occupied by white man about the middle of the 18th century--not far from the same time many of the central towns in New Hampshire were settled. Here, however, lumbering rivaled the fur trade from the start. In 1850, New York produced one-fifth of all the lumber cut in the whole country. At that time, the central Adirondacks was one of the major deer concentrations in the northeast. Darwin (1874) quotes an article in the December 1869 issue of "The American Naturalist" in which the writer, who has hunted for 21 years ". . . in the Adirondacks where the *Cervus virginianus* abounds." According to dates given, the writer heard of "spikehorn bucks" about 1855, and describes them quite thoroughly. Darwin concluded that the first spikehorn was a freak of nature, but it provided its possessor with such a competitive advantage that its offspring rapidly gained on common bucks and were expected to "entirely supercede them in the Adirondacks."

The conclusions are amusing, both for the quickness of Darwin to use the appearance of spikehorns as evidence of natural selection, and the ignorance of nutrition which, due to high deer populations in the mid-1800's, was inadequate.

Present knowledge and understanding permits rational biologically-based management programs. Different types of seasons permit a greater or lesser degree of control over sex and age ratios as well as over the total number of deer. Without the large predators, some form of hunting is essential to prevent overpopulation of most wild ruminants. Regulations vary between species, between states, and often within states by districts or management areas. Techniques such as selective cutting, strip cutting, and clearings furnish forage adjacent to winter cover. Costs may be kept to a

minimum by completing cutting regimes that are both good forestry and beneficial to wildlife.

This CHAPTER 22 includes descriptions of the concept of sustained yield (TOPIC 1), use of harvest reports (TOPIC 2), specific population manipulation (TOPIC 3), and case studies of different species (TOPIC 4).

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Darwin, C. 1874. The Descent of Man and Selection in Relation to Sex. Rand, McNally & Company, New York. 672 p.

Silver, H. 1957. A History of New Hampshire Game and Furbearers. Survey Report No. 6, New Hampshire Fish and Game Dept., Concord. 466 p.

Silver, H. 1968. In The White-tailed Deer of New Hampshire, H. R. Siegler, Ed. Survey Report No. 10, New Hampshire Fish and Game Dept., Concord. 256 p.

REFERENCES, CHAPTER 22

EXAMPLES OF BIOLOGICALLY-BASED SPECIES MANAGEMENT

BOOKS

TYPE	PUBL	CITY	PGES	ANIM	KEY WORDS-----	AUTHORS/EDITORS--	YEAR
edbo	blsp	oxen	....	----	scientif mgt for conservat	duffey,e; watts,a	1971
aubo	rokp	loen	597	cerv	deer,great britain, irelnd	whitehead,gk	1964
aubo	fost	nyny	426	cerv	antelope, deer, north amer	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	stac	hapa	....	odhe	pp.449-482, management of	hunter,gn; yeager	1956
edbo	unbp	line	605	odhe	mule, black-tailed, no ame	wallmo,oc	1981
aubo	oxup	loen	215	ceel	herd, red dee, 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
edbo	codw	deco	84	ceel	western states elk wrkshop	denny,rn	1977
aubo	cite	oxen	74	ceel	ecology of red deer	mitchell,b; stai/	1977
aubo	uwyp	lawy	294	ceel	n amer elk: ecol,behav,mgt	boyce,ms; hayden-	1979
edbo	wimi	wadc	....	ceel	ecology,mngmnt, n amer elk	thomas,jw; towel in pr	
aubo	utop	toon	280	alal	north american moose	peterson,rl	1955
aubo	stac	hapa	238	anam	prngrhn antlp & its mngmnt	einarsen,as	1948
aubo	stac	hapa	225	anam	hunting pronghorn antelope	popowski,b	1959
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	rowa	loen	....	bovi	wild oxen, sheep, goats of	lydekker,r	1898
aubo	nyzs	nyny	254	bibi	amer bisn; exterml, restor	garretson,ms	1938
aubo	blhp	....	15	bibi	the unvanquished buffalo	collins,hh,jr	1952
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--	the great ark of the wild	clark,jl	1964
edbo	winp	nyny	....	ov--	wild sheep of modrn n amer	trefethen,jb	1975
aubo	usgp	wadc	242	ovca	the bighorn of death valle	welles,re; welle	1961
aubo	uchp	chil	383	ovca	mount sheep: behavr, evolu	geist,v	1971
aubo	coup	itny	248	ovca	mt sheep, man, norther wil	geist,v	1975
aubo	qupr	oton	166	obmo	muskoxen,biol,taxon,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	behavr & its relatn to mgt	geist,v; walther,	1974
edbo	stac	hapa	494	many	big game, n amer, ecol,mgt	schmidt,jl; gilbe	1978
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
aubo	dodo	nyny	1220	game	v 3, lives of game animals	seton,et	1929
aubo	cscs	nyny	481	game	game management	leopold,a	1933
aubo	mhbc	nyny	479	wldl	wildlife management	trippensee,re	1948
aubo	macm	nyny	274	wldl	pp.122-39, wildlife manage	gabrielson,in	1951
edbo	scru	nyny	174	biga	records of n amer big game	boone & crockett	1952
aubo	macm	nyny	250	wldl	wildlife conservation	gabrielson,in	1959
aubo	dche	boma	120	wldl	wildlife mgmnt & conservat	trefethen,jb	1964
aubo	codw	deco	209	biga	1976 colorado biga harvest	denny,rn	1977

SERIALS

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
MDCBA	5----	1	64	odvi	w-tailed deer of minnesota	erickson,ab; gunv	1961
MDCRA	14---	1	80	odvi	michigan white-tailed deer	jenkins,dh; bartl	1959
RWLBA	6---2	153	325	odvi	w-t deer of the adirondcks	townsend,mt; smit	933
RWLBA	6---2	327	385	odvi	wntr, spr obsrv, adirndcks	spiker,cj	1933
WCDBA	14---	1	282	odvi	white-tailed deer, wiscons	dahlberg,bl; guet	1956

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AZWBA	3----	1	109	odhe	in arizona chaparral	swank,wg	1958
CAFGA	26--2	139	166	odhe	calif deer, rcky mt mule d	mclean,dd	1940
CFGGA	8----	1	163	odhe	life hist, managemt, calif	taber,rd; dasmann	1958
CGFPA	4----	1	39	odhe	lit review, mvmnts & captr	siglin,rj	1965
CGFPA	7----	1	26	odhe	literature review on behav	dorrance,mj	1967
JOMAA	37--2	143	164	odhe	behavior, populatn ecology	dasmann,rf; taber	1956

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
UCPZA	88---	1	209	ceel	tule elk: hist, behav, eco	mccullough,dr	1969
WLMOA	16---	1	49	ceel	status, ecol, roosevel elk	harper,ja; harn/	1967
WLMOA	24---	1	66	ceel	the sun river elk herd	knight,rr	1970

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AMNAA	52--2	392	399	alal	observ in yellowstone park	mcmillan,jf	1954
BEHAA	20--3	377	416	alal	behavi in british columbia	geist,v	1963
FUNAA	8....	40	43	alal	moose habits and habitat	rush,wm	1946
JOMAA	39--1	128	139	alal	summr obsrvtns, behv,ontar	de vos,a	1958
MUZPA	25---	1	44	alal	the moose of isle royale	murie,a	1934

alal continued on the next page

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
NCANA	101--	1	436	alal	ecol, proc inter sym, pt 1	bedard,j	1974
NCANA	101--	437	735	alal	ecol, proc inter sym, pt 2	bedard,j	1974
VLUBB	22-15	74	82	alal	[elk behav, leningr, russ]	timofeeva,ek	1967
ZOOLA	41-14	105	118	alal	ecol behav popula dynamics	denniston,rh	1956

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
BPURD	2----	1	215	rata	ecol, caribou, prudhoe bay white,	rg; thomso/	1975
CWRSB	38----	1	71	rata	biology, kaminuriak popula	dauphine,tc,jr	1976
UABPA	3----	1	44	rata	behav of barren-ground car	pruitt,wo	1960
UABPA	8----	1	82	rata	ecology, managment, sweden	skunke,f	1969
WMBAA	10A--	1	79	rata	prelim investigation, pt 1	banfield,awf	1954
WMBAA	10B--	1	112	rata	prelim investigation, pt 2	banfield,awf	1954
WMBAA	12---	1	148	rata	caribou, continued studies	kelsall,jp	1957
WMBAA	15---	1	145	rata	barrn gr carib, coop study	kelsall,jp	1960

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
AMNAA	43--2	257	354	anam	life hist, ecol, rng use, tex	buechner,hk	1947
CAFGA	30--4	221	241	anam	prong-hornd antlp in calif	mclean,dd	1944
CGFPA	3----	1	28	anam	litera revi on prong behav	prenzlow,ej	1965
CGFPA	17---	1	16	anam	some behav patterns of the	prenzlow,ej; gil/	1968
JOMAA	3----	82	105	anam	the prong-horn	skinner,mp	1922

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
NPSMD	161--	1	161	bibi	bison, yellowston nat park	meagher,mm	1973

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
AMNAA	24--3	505	580	ov--	distribut, variat, no amer	cowan,lmct	1940
AZWBA	1----	1	153	ov--	desert bighorn	russo,jp	1956
WLMOA	4----	1	174	ov--	united sta, past to future	buechner,hk	1960

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
AMNAA	56--2	297	324	ovca	ecology of mountain sheep	mccann,lj	1956
CAFNA	77--2	77	94	ovca	behavior of a bighorn herd	blood,da	1963
CJZOA	46--5	899	904	ovca	ovda,delay soc, phys matur	geist,v	1968
IGWBA	1----	1	154	ovca	stat, life hist, mgt, idah	smith,dr	1954
JOMAA	18--2	205	212	ovca	prelim study, yllwstn n pk	mills,hb	1937
JOMAA	20--4	440	455	ovca	bighorn sheep of texas	davis,wb; taylor,	1939
JOMAA	24--1	1	11	ovca	notes on life histor, colo	spencer,cc	1943
SCBUB	35--6	29	76	ovca	survey, sierra nevada high	jones,fl	1950
WGFBA	1----	1	127	ovca	wyoming bighorn study	honest,rf; frost,	1942
WLMOA	4----	1	174	ovca	bighorn sheep in the u s	buechner,hk	1960
XNFSA	6----	1	242	ovca	bighorn of death valley	welles,re; welles	1961

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
XNFSA	5----	1	238	ovda	the wolves of mt mckinley	murie,a	1944

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
WMBAA	9----	1	34	obmo	prelim stud,ellesmr is,nwt	tener,js	1954

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
CAFNA	81--1	1	22	oram	obsrvtns,kootenay nt pk,bc	holroyd,jc	1967
CGFPA	8----	1	23	oram	literature review, ecology	hibbs,ld	1966
IGWBA	2----	1	142	oram	life history, mgtmt, idaho	brandborg,sm	1955

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
MRLTA	41--3	34	40	dogo	feral goats, british colum	geist,v	1960

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
PZSLA	142-1	129	163	dosh	study, feral pop, st kilda	boyd,m; doney,jm/	1964

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JTBIA	2----	1	63	68	----- environments of anim, plan	browning,to	1962
QRBIA	22----	283	314	----	life tabs, natrl pop anim	deevey,es	1947

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Proceedings of the North American Moose Conference (Fifth conference in 1968)

Proceedings of the International Reindeer/Caribou Symposium (First meeting in 1977, second in 1980)

Proceedings of the Biennial Antelope States Workshop

Transactions of the Interstate Antelope Conference

Transactions of the North American Wild Sheep Conference (Second meeting in 1976)

Transactions of the Desert Bighorn Council (Annual meeting beginning 1957)

Proceedings of the International Mountain Goat Symposium

Proceedings of the Annual Conference of Western Association of State Game & Fish Commissioners (Annual conference beginning 1921)

