THE BIOLOGY AND MANAGEMENT OF WILD RUMINANTS

CHAPTER EIGHTEEN

POPULATION ESTIMATES AND STRUCTURES

by

Aaron N. Moen

Professor of Wildlife Ecology

Department of Natural Resources

College of Agriculture and Life Sciences

Cornell University

Ithaca, N.Y. 14853

and

Certified Wildlife Biologist

(The Wildlife Society)

Published by

CornerBrook Press
Box 106
Lansing, N.Y. 14882

Library of Congress Catalog Number 80-70984

CONTENTS OF CHAPTER EIGHTEEN

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Populations consist of N individuals. The number, N, exists, whether it is known to the biologist or not. In fact, it is almost always unknown for free-ranging animals, and the sampling problems associated with censusing are, in most cases, great.

The number of animals may be estimated most accurately for large animals living in a range with no overhead vegetation. Large ruminants on the prairie, such as bison, and on the tundra, such as muskox, may be counted very accurately. Deer, elk, and moose are much more difficult to count because they are often under plant canopies. No matter how difficult it may be to count or estimate N, however, some number N is to be recognized as a biological reality. TOPIC 1 focuses on different ways to estimate populations.

Populations may be divided into groups and classes of individuals with common characteristics. It is customary to divide populations of wild ruminants into two categories--sex and age--when analyzing population dynamics. Sex ratios are obviously important when predicting the reproductive potential of a population as a whole. Age is used in predicting natality and mortality rates. Age may not be a good predicter of natality and mortality rates for different areas since both natality and mortality rates are affected by the physical conditions of the animals, which is affected by range conditions. Weights may be a better basis for predicting natality and mortality rates.

Biomasses of populations have been considered by ecologists interested in the relationships between various trophic levels in ecosystems. The biomass of an individual, a function of both age and range conditions, is of value in understanding relationships between the animals and their range, for it is a basis for estimating metabolism, forage intake, and reproductive rates. Perhaps age and weight combined are the best predicters of natality and mortality rates. Age and weight-based population structures are discussed in TOPIC 2.

There may be hesitation on the part of some persons to come up with estimates of numbers in a population. Sampling problems are present whenever populations are estimated over large land areas. Many other biological and statistical problems also exist in the collection of population data. Nevertheless, it is absolutely necessary to come up with some estimate of N, since the expression

$$[(?) + (?)(\text{reproductive rate}) = ?]$$

is not an acceptable base to work on. Rather,

$$[(N) + (N)(\text{reproductive rate}) = N+],$$

where N should represent a best estimate of the number of animals in a population, is. Further, N must also be broken down into best estimates of numbers in sex, age and weight groups when dealing with population dynamics.

This CHAPTER provides ideas and formats for estimating populations and determining population structures. Try the ideas and formats out, using data in the published literature, and your understanding of factors affecting population changes will increase.

REFERENCES, CHAPTER 18

POPULATION ESTIMATES AND STRUCTURES

BOOKS

TYPE	PUBL	CITY	PGES	ANIM	KEY WORDS----------	AUTHORS/EDITORS--	YEAR
edbo	olbo	edsc	152		numbers of man and animals	cragg,jb,ed; piri	1955
aubo	uchp	chil	281		intro to study of anim pop	andrewartha,hg	1961
edbo	wiso	wadc	419	wldl	wildlf invest tech, 2nd ed	mosby,hs,ed	1963
edbo	saco	phpa	388		readin in pop, commun ecol	hazen,we,ed	1964
aubo	amel	nyny	183		quantitv and dynam ecology	kershaw,ka	1964
aubo	jwis	nyny	200		the biology of populations	macarthur,rh; con	1966
aubo	whfr	sfca	416		wildlife management	giles,rh,jr	1978
aubo	utnp	knte	186		guide to stud, anim popula	tanner,jt	1978