
PRINCIPLES OF WILDLIFE MANAGEMENT

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THE DATA BASES OF WILDLIFE MANAGEMENT

It is a common pastime in many organizations to collect vast quantities of data on a routine basis . . . with the vague intention of submitting them to analysis one day . . . the piles of useful stuff in the files get more comprehensive, and out of date, as the years go by. Pious intentions to analyze some day are of little value. If data are not worth analysis at a suitable near date they are rarely worth collection. . . . Data should be collected with a clear purpose in mind. Not only a clear purpose, but a clear idea as to the precise way in which they will be analysed so as to yield the desired information.

M. J. Moroney

WILDLIFE MEASUREMENTS
DATA AND ANALYSIS FOR
EXTENSIVE MANAGEMENT

DATA AND ANALYSIS FOR
INTENSIVE MANAGEMENT
PRINCIPLES

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and quality of their habitat, or wha
be expected to provide the best b

However, the wildlife manager
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everything. He or she may wish to
and exactly how much food they r
provides. But managers may be m
parameters, or the methods may p

For some management objectiv
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than knowing the weight of deer b
that certain key browse plants are.

Wildlife managers must select
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the most important management de
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In addition, the data base should l
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be limiting the herd. Or if objective
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may have little value compared to
nesting success. In this case, both
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data.

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acre or the percent of shrub stems l
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difference between locations, popula

Wildlife management consists of controlling the number, distribution, and quality of wild animals, either directly—as by manipulating hunting seasons—or indirectly—as by manipulating wildlife habitat. Management decisions (perhaps to liberalize hunting regulations, plant food patches, or control-burn shrub fields) should be based on some knowledge of the target population and/or of its habitat. Acquiring the information necessary to make correct decisions is part of the wildlife manager's job. The manager must allocate some time and budget to measuring the abundance of animals, their reproductive success, the quantity and quality of their habitat, or whatever population or habitat characteristics can be expected to provide the best basis for management decisions.

However, the wildlife manager can never know all he or she would like to know about the target population or its habitat. A manager cannot measure everything. He or she may wish to know exactly how many animals are present, and exactly how much food they require, and exactly how much food the habitat provides. But managers may be unable to devise methods for measuring these parameters, or the methods may produce highly variable data or be too costly.

For some management objectives, precise and expensive population or habitat data may be unnecessary. Comparatively crude data may suffice. Rather than knowing the number of animals in a population, it may be sufficient to know if the population is declining, is increasing, or is approximately stable. Rather than knowing the weight of deer browse per acre, it may be sufficient to know that certain key browse plants are, or are not, being overbrowsed and damaged.

Wildlife managers must select the population or habitat parameters to be measured and used as a basis for management. Selecting this data base is one of the most important management decisions. The decision should be influenced by (1) the objectives of the management program, (2) the availability, cost, and precision of methods for measuring various population and habitat characteristics, and (3) the budget of time and money for population and/or habitat analysis. In addition, the data base should have a meaningful relation to management objectives. For instance, if objectives are to provide a maximum sustained harvest from a deer herd, there would be little value in measuring the use or abundance of winter browse in a habitat where winter forage is not considered to be limiting the herd. Or if objectives are to adjust the harvest of waterfowl to annual variations in production of young birds, a census of winter populations may have little value compared to data on breeding-ground populations and nesting success. In this case, both sets of data may be useful, but if there are budget limitations, management should spend its effort attaining the most useful data.

The data gathering process will, of course, provide an estimate of some population or habitat characteristic such as the average number of rabbits per acre or the percent of shrub stems browsed by deer. Most often, it is equally important that some measure of data variation also be obtained. This permits statistical analysis of the data and evaluation of the significance of any observed difference between locations, populations, or years.

WILDLIFE MEASUREMENTS

The data bases for wildlife management are (1) population indices, (2) population censuses, (3) measures of habitat factors, and (4) indices of ecological density of the target population.

Population Indices

Population indices serve as a data base for many state programs of game management. They are also used to monitor changes in the abundance of non-game birds. Common population indices are hunter success data (e.g., percent of hunters killing a deer, number of small game harvested per hunting trip and estimated total harvest of cottontails in a state) and roadside-count data (e.g., number of animals seen per mile along selected routes traveled under standardized conditions, and roadside whistle counts of quail and crow counts of pheasants). Indices provide useful data for extensive programs of management. It is assumed that trends in the index values reflect, with "reasonable" accuracy, trends in abundance of the target population. The validity of this assumption has not always been tested.

The intelligent use of population indices requires an awareness of possible relationships between index values and population abundance (Fig. 18.1). An ideal population index is related to population abundance in a 1:1 ratio (Fig. 18.1a). Thus, a 30 percent change in population abundance causes a 30 percent change in the index value. Further, an ideal index provides consistent data, alleviating the expense of many replications and providing for detection of small changes in population abundance.

Indices may also relate to population abundance in ratios other than 1:1 (Fig. 18.1b). Thus, a 50 percent change in animal abundance may cause only a 10 percent change in the index value. Or the relation between the index and population abundance may not be linear, resulting in indices of little value either at high population abundance (Fig. 18.1c) or at low population abundance (Fig. 18.1d).

The variation of index values may not be homogeneous over all ranges of population abundance (Fig. 18.1e), reducing the usefulness of the index at some levels of abundance. It is likely that some population indices being used in wildlife management have both a nonlinear relation to animal abundance and nonhomogeneous variance (Fig. 18.1f).

For an ideal population index the relationship between expected index values and population is stable from year to year and from place to place. However, many factors may bias the index-population relationship. These factors should be considered and eliminated if possible. Thus, roadside counts of cottontail rabbits may always be conducted on the same set of roads on windless mornings during the first two weeks of June. This standardization of the roadside count should eliminate some sources of variation that are not consistent among places

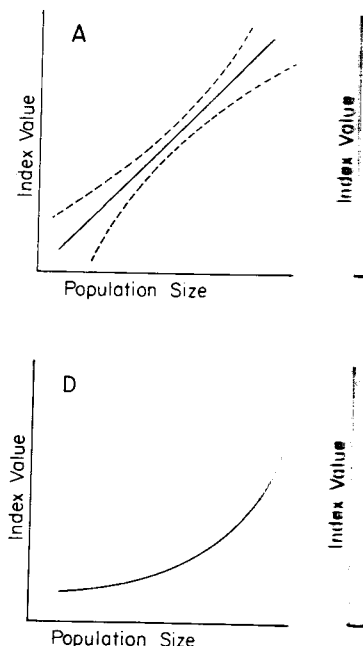


Fig. 18.1 Possible relationships between Index Value and Population Size. Dashed lines represent magnitude explanation.

or years. But some bias cannot be eliminated. For example, a reduction in cottontail habitat abundance may reduce the number of cottontails seen on a roadside count. If the vegetation is unchanged and the roadside count is conducted on the same opening day of the season may cause a bias in the index value of high game abundance.

Despite these serious deficiencies, population indices are used for monitoring trends in wildlife populations over long periods (Fig. 18.2).

Population Census

A census provides an estimate of the total number of animals in a population. A population may be defined as a group of animals of a certain species within a certain area. A census is difficult and, therefore, expensive and/or secretive.

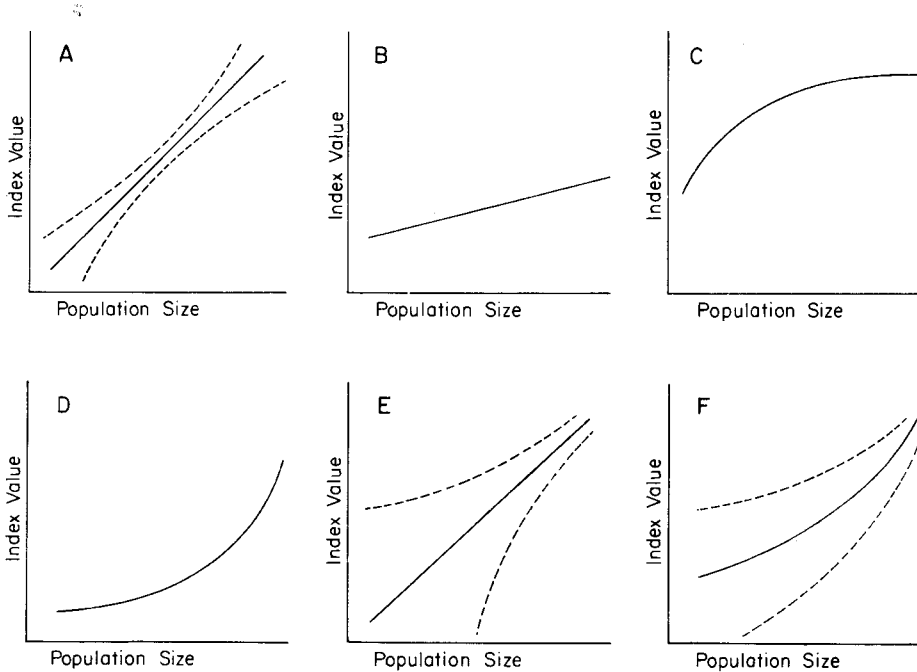


Fig. 18.1 Possible relationships between population-index values and population size. Dashed lines represent magnitudes of variation of index values. See text for further explanation.

or years. But some bias cannot be controlled. Increasingly intensive land use may eliminate cottontail habitat in farm fields, causing a reduction in rabbit abundance. This reduction may not be reflected in roadside counts if roadside vegetation is unchanged and "roadside rabbits" are as abundant as ever. Weather can be an important uncontrollable source of bias. Poor hunting conditions on opening day of the season may cause a drop in hunter success, even during a year of high game abundance.

Despite these serious deficiencies, population indices are important for monitoring trends in wildlife populations, especially trends over large areas and/or over long periods (Fig. 18.2).

Population Census

A census provides an estimate of the number of animals in a defined population. A population may be defined as a certain class (species, sex, age, alive, or dead) of animal within a certain area at a certain time. Most wildlife populations are difficult and, therefore, expensive to census because most animals are mobile and/or secretive.