ESTIMATING WILDLIFE POPULATIONS

To establish and to appraise management practices, wildlife managers must estimate the sizes of wildlife populations. For game species, such inventories are ideally taken 3 times a year: during the breeding season, after the young are born or hatched and before the start of the hunting or trapping season, and after the hunting or trapping season. In practice, population estimates are usually done only once a year, at best, because of manpower and funding shortages.

Wildlife managers use 4 general approaches to estimate population sizes of wildlife: total counts, incomplete counts, indirect counts, and mark-recapture methods. We shall examine each of these methods and detail some of their advantages and disadvantages.

COMPLETE COUNTS OR TOTAL COUNTS

A complete count, or total count, counts every member of a population. Where populations of large species occur in open areas, such as waterfowl on lakes, seals on breeding beaches, or pronghorns on shortgrass prairie, aerial counts of most individuals are possible, especially with the aid of photography. Sometimes, wildlife managers can count deer in enclosed populations using a drive approach: a large group of people crosses the enclosure in a line, counting all deer that pass in each direction. Distances between the members of the drive crew are critical for success because all deer must be counted, even those hiding. Nonetheless, wildlife managers seldom use this approach because lack of funds or personnel usually make censussing an entire population impractical or impossible and, in addition, such an undertaking disturbs, and can even destroy, the population or its habitat. Even when used, this approach is usually expensive.

INCOMPLETE COUNTS

An incomplete count involves counting part of a population and

then extrapolating to the entire population.

Quadrats may be established in a sample area and an attempt made to count all the individuals in each quadrat. A "deer drive" census, using large sized quadrats, can be an effective way to estimate deer populations on wooded areas.

Stationary observers stand along 3 sides of a quadrat and count all deer leaving and entering the area in front of a drive crew walking across the quadrat from the 4th side. The total number of animals is then calculated as the sum of the animals leaving the area ahead of the drive crews plus the animals passing back through the drive line minus the animals entering the quadrat through one of the sides or through the drive line. As with complete counts, distances between observers and between members of the drive crew are critical for success.

INDIRECT COUNTS

As it is often impossible to obtain accurate, visual or auditory counts of the animals in a population, wildlife managers use indirect signs of the animals present as indices of relative abundance. An index of population indicates relative size of a population and shows population trends (up, down, stable) but does not provide an actual estimate of the number of animals.

Examples of indirect counts include counting numbers of muskrat houses, counting scats (fecal pellets) of deer and rabbits, and counting numbers of nests or den sites in a given area. Sometimes counting the number of birds heard singing is considered an incomplete count and sometimes it is considered an indirect count.

MARK-RECAPTURE METHODS

These methods are used extensively to estimate populations of fish, game animals, and many non-game animals. The approach was first used by Petersen (1896) to study European plaice in the Baltic Sea and later proposed by Lincoln (1930) to estimate numbers of ducks. Petersen's and

Lincoln's method is often referred to as the Lincoln-Petersen Index, even though it is not an index but a method to estimate actual population sizes. (Should it not be the Petersen-Lincoln Estimate?). Their method involves capturing a number of animals, marking them, releasing them back into the population, and then determining the ratio of marked to unmarked animals in the population.

Population density
Population density is the number of individuals per unit geographic area, for example, number per square meter, per hectare, or per square kilometer. This variable affects a number of other population variables.