

## INVENTORY, SURVEILLANCE AND MONITORING

Inventory Methods Used for Some Animal Groupings and have mentioned some basic inventory techniques. Let's look briefly at some animal groupings and see what inventory techniques have been used for them. Bats: Mist nets may be set up around a pond in a form of trap effort-success indice.'

Visual estimates may be made as bats leave the cave entrance at dusk. Some colonies contain over a million bats and visual estimates become difficult. A more refined

method has included systematic-timed photographs of the column of bats as they leave the caves and counting of individuals in the print.

For roosting bats the entire surface area of the roost may be determined and portions of the surface photographed and individuals counted. The photographic method is suitable for bats that hang from the ceiling in a single layer. Some species of bats hang in clusters composed of several layers and for these it is necessary to take samples of the surface area with a net and actually count the number of bats

involved. Constantine' used four inventory methods. He counted bat pellets in trays, estimated numbers of roosting bats, used recapture ratios and the number of bats trapped. Carnivores: Wolves have been censused from aircraft. Auditory counts of howling packs or individuals have been used to establish the presence of wolves or wolf packs.

**General observations,** including locating dens, studying tracks and other signs, have been used to inventory foxes on small areas **Woods'** used a scent post method to estimate relative numbers of foxes in the

southeast. This type of inventory appears to be the most practical for detecting population densities conducive to rabies epizootics. Bounty records, fur harvest records and reports of rabid animals have been used as indices to trends or relative densities in foxes and other carnivores. The validity of these indices are questionable because factors other than the abundance of the organism may become predominant.

A variety of methods were used by Verts to inventory skunks. Illinois and Iowa state policemen and rural mail carriers made statewide

counts of striped skunks along the highway. These counts were made during a 24-hour period and were used as relative indices to abundance. Verts measured population trends on 516 square miles using steel traps for a capture-effort index. He also used the Petersen Index on a smaller study area.

### **Miscellaneous**

#### **Small Mammals**

Workers in New Zealand determined an index of abundance for opossums based on catch per trap effort.<sup>3</sup> On smaller sample areas (Double Sampling) they determined the total population by trapping until the population was

exterminated. They estimated absolute density of opossums by comparing the index of abundance with the same index on other areas where total population had been determined.

**Live-trapping** of small rodents like deer mice has been a suitable method for determining population levels. Live traps are placed at 50-foot intervals to saturate a study area.

Trapping continues until nearly all the unmarked animals have been marked. The distances of their movements are determined and then divided by 2.

This figure was used to determine the acreage which was sampled.'

#### **Birds**

Many of the techniques used by wildlife managers to survey birds have already been mentioned. Most of these provide information on relative abundance rather than a true census. Hickey' indicated the statistical design for many of these indices have rarely been described; and the reliability of most of the results remains to be determined.

Kendeigh" felt that territorial mapping was the most practical method of censusing the total breeding population of birds in a given area. The Bureau of

Sport Fisheries and Wildlife currently coordinates the breeding bird survey of North

America. Each one-degree block of longitude and latitude (about 70 by 55 miles) is sampled by one or more routes. Each route direction and starting point is permanently established and was originally selected at random. They are standardized with 50, three-minute stops, at one-half mile intervals. Birds heard and seen are counted. These routes provide an index to trends.

#### **Deer**

Because of the wide distribution and economic importance of deer, census techniques for them have received more attention than for any other game animal. Almost all survey techniques

have been tried on deer. Some of those which have not been previously mentioned will be discussed now. Aerial surveys have been used as a census approximating a total count in terrain of moderate relief in prairie areas<sup>1</sup> and coastal marshes.” Winter surveys and counting in early morning and late evening seem best. In New York state, aerial surveys were tested in deciduous forest habitat on a herd of known size within an enclosure. Surveys were made during the winter, generally with snow on the ground.

In only three of the 13 surveys did the observer succeed in seeing as many as

half of the deer known to be present.

A recent addition to aerial survey techniques has been the development of infra-red scanning devices. Croon<sup>2</sup> used infra-red scanning devices from an airplane to census deer in the **George Reserve** enclosure in Michigan. By this method 98 deer were located as compared to 101 counted in a drive census. “Under the right conditions, infra-red scanning will probably give better results over large areas than any other technique available at present. However, the inability of infra-red to penetrate green leafy canopy, variability of animal

and background apparent temperatures depending upon weather and other factors, difficulty in distinguishing between species of animals, and high initial cost of the scanning device are substantial limitations to the use of this technique.”