FOREST WILDLIFE CENSUS METHODS APPLICABLE TO NEW ENGLAND CONDITIONS[1]

IT would be difficult to find any sizeable, successful manufacturing concern conducting its business without knowing what raw materials it has in stock, what production can be maintained, and what profits can be taken out of the enterprise. But the production of wildlife, a business aggregating several million dollars in New England each year, is run in most places with only a guess as to this basic information, and yet with the hope of good results. Just as the timber estimate is the basis for intelligent timber management plans, repeated censuses are necessary in order to manage effectively any area for the production of wildlife. To quote Aldo Leopold on the subject of censuses: "Measuring the response of game populations to changes—deliberate or accidental—in their environment is the big purpose. Continuous census is the yardstick of success or failure in conservation." (3). In addition to giving the initial breeding stock on an area, repeated censuses show the increase or decrease in population; the allowable kill can be calculated from them; and, if carried out at different seasons, they are a check on movements, seasonal mortality, and use of different types of vegetation.

There are three general types of census methods, and many variations. The first of these is that of direct enumeration, by totals or samples. This is the most accurate method, and gives real quantitative results. A second method is based on estimates of total populations from banding or otherwise marking the animals, releasing them, and getting the percentage of the total kill represented by marked individuals. This method is one which is usable on migratory species, and is simple in operation. However, it is dependent upon the accuracy of the returns from hunters, and will be much more useful when all states get accurate kill records each year. The third general type is that of indirect observation through indices of one kind or another, such as the number of animals taken by a given number of traps set one night in different sections, birds flushed per hour by a dog, etc. This kind of census is never anything but a relative figure in either time or place, but is useful as such, and can sometimes be carried on with other work (2).

For censusing some of our New England species there are methods used enough to be of proven worth, but with other species we don't know even how to attack the problem. In the latter cases intensive study of the animal may show some peculiarity which will allow it to be censused.

Deer drives over definite areas by a line of drivers working toward a line of observers have been used generally over the country, especially since C.C.C. crews have been available to furnish the large numbers of men needed. This method is necessarily limited to sample areas, which makes it very necessary that someone well qualified should pick samples representative of the region. The areas must be of known size and definitely bounded by such features as roads, water, fire or power lines, etc. The general plan of operation is for a straight line of drivers to start at an appointed time on one boundary of the tract, moving across and forcing the deer either back through the line

[1]Report of New England Section Sub-committee on Fish and Game Management. The Committee states that Dr. R. E. Trippensee of Massachusetts State College was very helpful in revising the manuscript.

or out between observers stationed on all sides of the area except the one where the driving line started. The drivers must be close enough to see each other in the densest cover encountered. They should not be over two chains apart, and preferably not more than one chain. The foreman should have, in advance, a good working knowledge of the topography and timber types in order to determine the interval between drivers. The line must be kept straight to avoid straggling and breaks between drivers; and to accomplish this, foremen should be either stationed at intervals in the line, keeping direction by compass and watching the drivers, or else moving back and forth along the line to keep it straight. Another method of accomplishing this is to re-form the drivers along painted lines parallel to the starting line. The observers must be absolutely quiet; but the more noisy the drivers are, the better. The observers watch on one previously designated side, only as far as the next man, and tally deer crossing on this side. The drivers tally all animals crossing back through the line; and since there is no cause for quietness, it is best to check each animal with the driver on the other side in order to avoid duplications in the tally and to make sure none is missed. The drive should be carried out when hardwood leaves are off. The fall period just before the hunting season has given best results. The method is limited in its accuracy by the keenness of the drivers and observers, so they should be picked carefully. A type map of the area driven is very useful in evaluating results. This method is the standard in Region 9 of the Forest Service, and has proven satisfactory in use wherever properly carried out (7).

In regions where deer yard, they can be censused either by counting the tracks leading to the yard through the first deep snow or, in some cases, by observation of the animals in the yards after they are all there (3).

A reasonably accurate census can be made in regions where there are no yards by tracking on new snow. Parallel lines are run by compass covering the area at intervals of 1,000 feet or less, according to snow depth and density of cover. When tracks are found, they are followed until the direction of travel and the number of animals are certain. This latter point is important because as many as four ainmals may walk for some distance in what appears to be one set of tracks. Allowance must, of course, be made for recrossings of the same set of tracks, and a type map on which they can be plotted is a great help. The method is useful with low densities of population, but with heavy stockings, unraveling the tracks is hopeless.

Patrol inventories, counting deer seen per hour from automobiles driven over back roads, have been tried but given up as unsatisfactory, due to the large number of complications affecting the results. Some of these are traffic ahead of the patrol car, time of day, visibility, differences in quietness of patrol cars, season, local migrations of deer, etc. (7).

In the report on Wild Animal Damage to New England Forests (1), a Committee of this Section in 1931 outlined a method for getting rough deer population figures for a state from kill records over a period of years.

The state of Maine uses its deputy wardens to make up each spring an estimate of the deer, moose, and beaver for the towns in their districts. This information is obtained incidental to law enforcement work; and although an individual warden may be high or low on the estimate for his district, the figures for the entire state are of considerable value. This method is, of course, most useful in regions where deer and moose yard.

With the ruffed grouse, the method de-

veloped by R. T. King of the University of Minnesota, and adopted by the Michigan Conservation Department and by the Forest Service for Region 9, is giving good results following considerable use. The area to be censused is laid off into 40-acre blocks by compass lines marked so they can be followed in later observations. All these 40 lines and half of the boundaries are followed out by a trained game man, each bird flushed being recorded by a serial number, with flushing distance from the observer and the location plotted on a field map. Where the strips intersect and a bird is flushed near the same location a second time, it is recorded only once. The red and gray color phases and the size of the birds help in determining the number of those flushed a second time. No censusing is done during blizzards, rain, high winds, or when the brush is very wet. In case an area of four sections (2,560 acres) cannot be completed without breaks of two days or more, the census is started over again. This area can be covered in five man-days under Lake states conditions (7). The estimate of the grouse population is best computed by first making up a table of the cover types, by age classes and densities of stocking, for the sample area. Then the area of strip covered (twice the average flushing distance times length): the total area in a particular type, density, and age class = the number of birds flushed: the total population of this same unit; or stated differently,

$$\frac{\text{total area} \times \text{birds flushed}}{\text{area of strip covered}} = \text{total population.}$$

Birds estimated for the different densities of stocking and age classes are added to get the type totals, and these are added into a grand total for the census area.[2]

A method used during the present year on about 1,000 acres at Petersham was to make a total census, using a bird dog and recording on a type map birds flushed and roosts or tracks seen. Working in this way, it was soon found that under early winter conditions, only the types containing conifers had any appreciable numbers of birds in them, and the bulk of the time was accordingly spent on these types. The first census of the area was made at the rate of about 200 acres per eight-hour man-day. This method is, of course, useful only with observers who know grouse, and a good dog that can be well controlled is practically a necessity.

R. T. King has developed a method of censusing based on the habit of the grouse hen of trying to lead an intruder away from her brood of chicks. Using this means of easily locating the birds, either sample strips or plots are covered, under Minnesota conditions, during the week when pink ladyslippers begin blooming, when the large-toothed aspen leaves are half out, and black ash buds are just bursting. The width of strip is taken as twice the average flushing distance. The number of hens observed is used as representing the female part of the plot population, and the total obtained for the whole area by using the best estimate available for the sex ratio. The number of males can be checked by the number of nonfeigning birds flying a good distance when flushed. The method is applicable for only a week or two, but has the advantage of giving a good idea of nesting success for the year. Of course, unmated females or those unsuccessful in hatching tend to upset the accuracy of the method, and just before and during the low points of the cycle of abundance the population is apt to be excessively male (3).

The number of drumming males can be used as a rough index of abundance

[2]Wakeman, M. C., in a letter written to the sub-committee chairman and describing the use of the method in Michigan.

if, again, the sex ratio is known. This method can be used from the first real spring weather until June 1, and the drumming is most regular at shorter intervals near sunrise and sunset or just after a storm. The ventriloqual effect of the drumming is least at the end of the performance. This method is especially useful with sparse populations, or in areas where cover is limited to scattering woodlots (6).

Hunting records such as are occasionally available for a locality, giving the birds flushed by a given hunter per hour, are valuable comparisons between years. They have little value as far as showing average conditions, because a good hunter avoids poor covers.

Censusing the cottontail rabbit or snowshoe hare by any reliable method is still something for the future. The abundance of tracks is, of course, a good indication of the number of rabbits, and with low population densities may make a fair census; but where the animals are abundant, it is difficult to make even an intelligent guess as to numbers. Kill records such as those maintained by Pirnie in Michigan are very valuable where they can be accurately obtained for a given area (5).

Woodcock breeding in an area may be roughly censused by listening for the nuptial flights of the male at favorable nesting locations, such as near wet hardwood runs, alder swamps, etc. These flights occur at dusk, and at Petersham are most common during late April and early May.

Little has been done to determine methods of censusing furbearing mammals. Valuable local information can be obtained from professional trappers who know the animals in their region well enough to make a good estimate of the numbers.

R. P. Holdsworth and J. P. Miller, working on the Mount Toby Forest of Massachusetts State College, developed a very valuable method of getting population and seasonal movement data while doing other work on the forest. Any wildlife or signs of it observed were recorded on type maps, one for each of the four seasons. Observations were made continuously by the Forest Superintendent, and by any others who happened to be working on the tract. These notes over a period of several years have given some very good information on populations and the seasonal use of different cover types. The method is one which has considerable promise on any managed forest where wildlife is an important interest.

J. P. Miller, who has been carrying on wildlife research work at Mill Village, N. H., for the Biological Survey, has modified the method used at Mount Toby, mainly through the use of a system of north-south and east-west lines gridironing the census area at intervals of four hundred feet. The censusing is done at as regular intervals as possible by specially trained C.C.C. enrollees. They cover the tract by irregular lines of travel until they find the ruffed grouse, which are the main interest from the management standpoint. They record on a mimeographed form all the signs noted for all species. These notes are referenced to the grid lines and are transcribed in the office to the seasonal type maps. Repeated observations have shown how many grouse are in a particular area, and have been the means of tracing not only the total populations through the year but also the mortality and, in many cases, its causes.

Wherever banding or marking can be done with any species being managed, the chance should never be missed, because of the many possibilities for information which the returns may show. Where a chance is offered for marking enough of any one species to make a good sample of a local population, the banding

returns compared to the total kill indicate very well the total population as worked out by Lincoln for ducks. In this calculation, the number banded: total population = the number of banded kills: the total kill (4).

Our census methods of today are sadly lacking for many of our important species, and we can only look hopefully to the increasing activities in wildlife research for the knowledge of habits which will allow us to get the fundamental information on populations with which to make a beginning in sound management.

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