

GAME AND FISH SURVEY METHODS

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Within the last several years considerable attention has been focused on wildlife sampling surveys throughout the Southeast Region. In the present resume of current survey procedures it might be well to briefly examine the background of this interest.

Game and fish surveys in the past were principally limited to study areas or otherwise to relatively small populations, and in many cases censuses of the entire population were possible. These censuses were subject to bias in collection and census techniques, but presented no real problem of sampling error. Many fisheries surveys and a few game surveys early developed this problem of sampling error with the techniques of population estimation through band and tag returns. Fisheries surveys fared much better in the development of analytic procedures for the evaluation of sampling data than did game surveys, although many researchers had neither the background nor inclination to apply those procedures that were available.

This picture is rapidly changing. More and more research papers present statistical statements of results. More wildlife students now receive some statistical training, and more wildlifere are now critical of untested data. These changes are generally due to the normal maturing of the science of Wildlife Management, yet a single management trend seems largely responsible for these rapid changes, particularly in game surveys, in the Southeast.

Wildlife regulatory agencies have for some years been approaching a system of adjustable regulations; regulations varying with the status of the species, often on an annual basis. This system requires periodic estimates of relative population levels and harvest over extensive areas. These estimates could be gotten only through sampling surveys, and the call counts, road counts, bag checks, and other techniques were developed. Some statistical methods were applied. Along came the Southeastern Dove Study and a personal interview survey in Tennessee, and suddenly the southeastern region was survey and statistics conscious. Within the next few years several states set up statewide projects to determine annual game harvest and other items available from sampling surveys.

Many of the survey personnel had little or no prior training or experience with sampling surveys or statistics. They got their experience the hard way — by digging it out of statistics books, by consulting with statisticians, by earnest discussion and arguments with each other and with personnel in other lines of game work. As a result, not only the survey workers are statistics conscious, but so are many of the other game and fish personnel who have come in contact with these programs.

This surge in interest in surveys and statistical analysis is applaudable, and we must take care that it remain so. We must be critical of survey techniques and completely objective in our analysis of survey data. We must be extremely careful in drawing inferences from our data. We must also be critical of the necessity of any survey and of the clarity of its objectives. The initial responsibility for this care lies, of course, with the researcher. However, the final responsibility lies with the administrator.

There is no doubt that the administrator is the key man in any research program. It is he who must recognize the necessity of any survey and secure the budget from which it can operate. His is the responsibility of approving survey design and procedures, and of judging the results. He must not accept without question any conclusions offered by his researchers, but rather must be sufficiently versed in the basic principles involved that he be able to critically evaluate the results.

This is not a case of research passing the buck to administration, but rather a case of reminding research and administration, alike, of this responsibility.

The discussion of the basic techniques in wildlife surveys is limited in this paper for several reasons. First, the writer is thoroughly familiar with only those surveys with which he has worked, and feels incapable of delving into the intricacies of many of the other survey techniques. Second, it is felt that a paper involving such intricacies is somewhat out of place in a general session: that special interest sessions are the place for specialized subjects.

MAIL SURVEYS

Mail surveys have assumed an important role in the present administration of game and fish, primarily because they are the most inexpensive method of obtaining information that may be evaluated with existing statistical techniques. Several important sources of bias are present.

Bias of non-response is due to the tendency for the more successful persons to answer the questionnaire more readily than the less successful ones. At the present this bias must be accounted for by a series of mailings followed by an interview sample of the non-respondents. The interview phase adds considerable cost to the survey, and the entire procedure of follow-up mailings and interviews involves a considerable period of time — usually some four or five months.

Bias of memory is equally as important and much more difficult to evaluate. Few people remember exactly how much game they killed or how many fish they caught or how much money they spent, and the greater the time lapse between the event and the estimate, the greater the bias is likely to be.

Other biases also enter into the survey picture to varying degrees of importance. Prestige bias is the term applied to the hesitancy to admit to poor success, and there is a natural tendency to suppress information on game taken illegally. These cases are sometimes humorously apparent when an interviewee's wife will say, "Now, Henry, you know you didn't kill but one little ol' squirrel," or "Now you did, too, kill a turkey last year." It seems that wives have little respect for their husband's prestige, and I wonder just how much effect a wife's presence has on a man's estimate of his expenditures. There does not seem to be much that can be done about these biases, however, and attention should be focused on the biases of memory and non-response.

The bias of memory can be reduced by elimination of delay in survey procedure. Improved survey procedures can also increase the volume of response, and it is hoped that the bias of non-response will prove sufficiently constant that correction factors may be applied and make possible the elimination of the interview phase and possibly part of the follow-up mailings. This solution is simple in statement, but complex in execution, and the answers are not yet to my knowledge available. Several researchers are working on these problems at the present time.

BAG CHECKS AND CREEL CENSUS

The term "creel census" has been used for a number of methods of collecting daily fishing data, methods involving voluntary or compulsory reporting of daily catch by the fisherman as well as for the method involving actual checks by the person collecting the data. The term "bag check" has not been so loosely used and connotes a collection of daily data by actual contact in the field, although the methods of reports of daily success submitted by hunters have been used to collect game kill data. For the purpose of this discussion, both bag check and creel census will be defined as the random collection of daily kill or catch through the actual contact of the hunter or fisherman while participating or immediately after participating in the sport.

Thus the two systems become as one and possess common advantages and weaknesses. Advantages are principally: 1) on the spot collection of kill and catch and effort data, 2) accurate collection of species, age or sex composition of the kill or catch, and 3) the collection of relative success and pressure expended by the various license categories and by the unlicensed groups. Other items such as crippling loss, opinions, and expenditures may also be included in special cases.

Weaknesses of both methods lie primarily in the difficulty in collecting a representative sample of hunters or fishermen. Hunters and fishermen using different methods and pursuing different species are unequally contactable. In the estimation of relative effort expended for the different species and in the allocation of effort divided between two or more species this unequal contactability causes considerable difficulty. The logical solution is that coefficients of contactability be determined for the various species included in the study.

In my opinion, bag check studies of single species produce biased data due to the tendency for the data collectors to concentrate their efforts in areas where the success for that species is highest and to neglect the effort expended for that species in the marginal areas.

Again in my opinion, the bag check or creel census will produce the best results when confined to one of two basic frameworks: 1) A controlled random system in which rigid time schedules are set up by which the data collectors cover the area under study. This system is adaptable to accurate studies of fairly large areas and to studies of from one to many species. It is also possible to determine hunting or fishing pressure from this design. This type of creel census has been used in Florida for several years, and is proving to be satisfactory. 2) An uncontrolled random system in which all field personnel collect bag check or creel census data from all hunters and fishermen contacted, primarily in the course of law enforcement or other activities. This system has been used in a number of states and has proven to be an inherently satisfactory procedure for collecting hunting success data. To date no satisfactory method has been developed by which hunting pressure can be estimated through this system, although a sound but untested idea has been advanced. In Florida, a few of the enforcement personnel do a good job of recording this data, but a large number do not make the effort. Several of the other states seem to have better success. A statewide creel census of this type was recently inaugurated in Florida but cannot yet be evaluated.

PERSONAL INTERVIEW SURVEYS

Personal interview surveys have been used to collect a great many items of information of interest to Game and Fish Agencies. Principal advantages lie in the more complex patterns of questions that are impractical for use in mail surveys, in the methods of probing for poorly remembered information and in the virtual absence of misinterpretation and incomplete data when the interview staff is properly trained. Disadvantages are the size of staff required and the expense involved. It has been illustrated that results of interview surveys are different from the results of mail surveys, yet there is no positive assurance that the difference is entirely due to greater accuracy on the part of the interview survey.

The personal interview survey definitely has a place in Game Agency administration, although not on a sustained basis as with mail surveys, bag checks and creel census. A survey such as recently conducted in Tennessee can provide data impossible to collect by the other methods here discussed, particularly in the realm of landowner attitudes and opinions and in the status of land in regard to hunting permitted. This type of survey is also capable of providing population estimates for at least quail and relative population levels and occurrence of other species, provided that the farms in the study area are small enough that the landowner has a fairly accurate conception of population levels.

POPULATION SURVEYS

Sampling surveys of game populations are much in vogue in the southeastern region at the present time. These include call counts for quail and doves, squeak counts for squirrels, track counts for deer and road counts for doves and deer. These methods generally provide population indices, although attempts are being made to estimate population levels through these procedures. Many variables are involved, and these techniques are still in the investigative stage.

KILL AND CATCH DATA

Kill data are best collected by mail surveys, by the field check systems or by a combination of these systems. These data must include both kill per unit of effort and total hunting pressure, even if indices only are desired. For example, in comparing the 1951 - 52 and 1952 - 53 dove seasons in Florida, there was no appreciable change in kill per day but a nearly 40 percent increase in hunting pressure. Annual changes in statewide kill seem slight for most species; hence annual estimates are usually necessary for research only. Periodic statewide estimates every four or five years will suffice for most species for most management and administrative needs.

Statewide catch data could also be collected by the use of mail surveys, but the problem of bias of memory is much greater than with kill data, as fishing effort is not limited to a short period of time. Perhaps a system of staggered quarterly surveys would be the answer, although a good statewide creel census would be a better answer. Here again, it is unlikely that management or administration would need annual catch estimates.

POPULATION DATA

At the present time the need for accurate annual game population estimates is confined to the needs of the particular research being conducted. As the relationships between population level, regulations, hunting success and hunting pressure have not yet been satisfactorily defined, there is no justification for annual statewide population surveys for management purposes. Too, the available inventory methods are not developed to the point that the annual change in statewide populations may be reflected with any degree of accuracy, at least until after the deadlines for most regulatory meetings. If general population levels are desired for publicity purposes, it is likely that the game status reports from field personnel, such as used in Kentucky for several years, are sufficient.

ECONOMIC DATA

Considerable emphasis has been placed in recent years on the economic importance of hunting and fishing. As statewide estimates of hunting and fishing expenditures are of administrative and public relations value and of no particular value in management and management research, it is unlikely that the collection of these data would be feasible more than once every five years. On limited areas, particularly areas of multi-purpose management or development, this picture changes considerably, and economic data becomes more important.

Statewide mail surveys can be used satisfactorily in the estimation of hunting expenditures, but are less satisfactory for fishing expenditures due, again, to the span of time involved. Perhaps, for the practical uses of statewide estimates of expenditures, this element of bias is unimportant. The approximate level of expenditure, or some concept of this level, is usually what is desired. On the areas of particular interest, however, a much greater degree of accuracy is necessary, and it is often desirable to allocate this expenditure to the various species involved.

Here the only procedure that seems to me to be practical is an extension of the bagcheck-creel census methods to include expenditures. With this procedure it is possible to get expenditures by species, for the area in question, and per unit of catch or kill; to include data for unlicensed groups; to eliminate the problem of time and bias of memory; and, when the controlled random method of contacting is used, to provide total expenditures for the area. This general approach has been used in surveys of fishing expenses on single bodies of water, and has produced satisfactory results.

SUMMARY

This paper has attempted to present briefly the present status of sampling survey techniques in game and fish work in the Southeast, and to evaluate the values and uses of these surveys.

In summary, it is certain that sampling surveys have many potential uses in fish and game management, although survey techniques and other research have not yet reached the point at which these surveys may be fully utilized. At the present time the major need for sampling surveys is in research.

It is urged that research and administration, alike, adopt a critical attitude toward survey procedures, the treatment of survey data, and the necessity and objectives of proposed surveys. Just as important, it is urged that extreme care be exercised in drawing inferences and conclusions from survey data.