OBJECTIVES, HISTORY AND ORGANIZATION OF THE SOUTHEASTERN COOPERATIVE STATISTICAL PROJECT

By LEONARD E. FOOTE
Wildlife Management Institute
and
C. W. WATSON
U. S. Fish and Wildlife Service

Basic objectives of the Southeastern Cooperative Statistical Project are the same as those of its successful forerunner of similar design, the Southeastern Cooperative Deer Disease Investigation. Both projects furnish cooperators the consultative and diagnostic services of specialists, and both projects are designed to undertake basic research in complex problems of regional significance. Both projects provide high quality technical specialists whose services probably would not be secured by a single state.

The Cooperative Statistical project grew primarily from recognition of the need for better quantitative data from Southeastern Forest Game Research projects. Prior to formulation of the Forest Game Research Committee of the Southeastern Section of the Wildlife Society, many of us had sought statistical assistance at a number of different institutions in the South. For analysis of mourning dove data, Harold Peters and Leonard Foote contacted George W. Snedecor, who was a guest consultant at Auburn, and statisticians in the School of Agriculture and Department of Mathematics at the University of Georgia and at Georgia Tech. Other fishery and wildlife biologists in the Southeast, some 8-10 years ago were doing the same. Walter Rosene was securing aid on analysis of quail populations data from statisticians at Auburn, Edward Hueske was consulting with The Georgia School of Business Administration statisticians on various Federal Aid fishery projects, Dan Russell was trying to secure aid on analysis of dove populations data from statisticians at a small Kentucky college, Louisiana retained the services of a statistician at L. S. U. for its biologists, Phil Goodrum was seeking assistance on forest game problems from U. S. Forest Service statisticians, and Scott Overton and Leonard Foote were securing help from Dr. Finkner and his associates at North Carolina State. There were certainly others. The Ames, Iowa, symposia on sampling and creel census more recently have underlined the needs in fishery management, as have the work of Victor Lambou, John Moyle and others.

The chief difficulty, 8-10 years ago, and we speak from personal experience, was the inability of mathematical, industrial, economic, and even of some agricultural statisticians, to understand our fish and wildlife problems. These statisticians are used to experiments with a high degree of control, plots small, replications many, biases known, sampling a mathematical certainty, populations sedentary, frames and universe finite, and coefficients of variation of 20% or less. No such nice packages are fish and wildlife problems, with many confoundings, large plots, replications few, appropriate sampling undevised, populations motile, frames often unknown, universes infinite, and coefficients of variation mountainous—273% for one census method tested (and abandoned) for mourning doves. With significant help from Dr. Finkner and his associates, the national mourning dove call count now has a within-plot coefficient of variation of about 25% and total coefficient of variation of 75% on the 700-odd routes censused annually. Currently, a stratified random sampling design is being devised to further reduce that national figure and give data of greater precision from the same sampling effort.

This, after all, is the objective of use of statistical principles in fish and wildlife work: to yield quantitative data of known precision for application to management problems. Anyone fortunate enough to attend the International Association and American Fishery Society meetings in Philadelphia and Clearwater, must have come away with the realization that, for effective compromise at the multiple-resource-use bargaining table, the fish and wildlife administrator

must be armed with quantitative data of high precision. Without these data, other competitors for land and water space will not yield to our needs.

Certainly, an overall objective of the Cooperative Statistical Project will be to assist its cooperators in the design of fish and wildlife projects which will yield quantitative data of known precision for management applications.

By comparison with techniques used by one of our competitors for land space—the Forestry profession—our fishery and wildlife appraisals are rough indeed. It was the inadequacy of quantitative techniques for appraisal of squirrel numbers in relation to different forestry practices and appraisal of mourning dove harvest in relation to different hunting regulations, that initiated the interest of the Southeastern Association. Mr. Frank Barick of the North Carolina Wildlife Resources Commission was appointed Association representative at a meeting in Raleigh to discuss research on these two problems. The dove hunter harvest study, financed by the Welder Wildlife Foundation, The U. S. Fish and Wildlife Service, and The Wildlife Management Institute, envisions assistance from the states in field-testing of appraisal techniques. The squirrel problem centered around analysis of effects of den boxes on area carrying capacity in a North Carolina study. It also involved a census technique which would furnish Georgia reliable population estimates in relation to varying degrees of forest timber stand improvement. Inadequacies of squirrel census techniques had been discussed previously by the Statistical Subcommittee of the Forest Game Research Committee, with a concluding recommendation that the census procedure be worked out experimentally before undertaking the TSI portion of the investigation. There was little point in testing the effect of a 10% reduction in forest products profit through modification of TSI, if we couldn't determine squirrel numbers. This would have been a good example of an experience without an experiment.

Mr. Barick, in July 1958, recommended that the Association consider a cooperative approach to fish and wildlife problems involving statistical application. The need for statistical services was discussed at the business meeting of the Association at the Louisville Southeastern conference in October 1958, and the S. E. Directors appointed a committee to review the problem. The Committee, chairmaned by Chester Phelps of Virginia, reported favorably at the spring business meeting of the Association in Atlanta in April 1959, and selected the North Carolina State College Institute of Statistics to undertake the project.

The Institute of Statistics has had experience with fish and wildlife problems of a statistical nature. In addition to considerable continuous aid to Leonard Foote on Mourning Dove data analysis and sampling, the Institute has assisted Walter Rosene on quail counts, Lloyd Webb of South Carolina on deer track counts, Scott Overton of Florida on a variety of problems, Frank Barick and Stuart Critcher of North Carolina on game-kill surveys, Kenneth Chiavetta of North Carolina on deer pellet counts, Jack Crockford and Charles Marshall of Georgia on squirrel counts, Dan Russell of Kentucky on mourning dove counts, and Walter Crissey, Earl Atwood, Edward Hueske, and others of the Fish and Wildlife Service on waterfowl and other problems. Members of the Institute of Statistics staff have also aided in designing population sampling and dynamics studies of fresh water mussels for George Scruggs, and in design and analysis of deer track count studies for Francis Lueth in Alabama. For the 1958-1959 academic year, the Institute of Statistics employed Dr. Douglas Chapman, a leader in the field of quantitative studies of fish populations. Starting in 1955 at the Daytona Beach Meeting, representatives of the Institute have attended most of the Southeastern and North American Wildlife Conferences. On the staff of the Institute are qualified individuals of diverse primary training well equipped to handle any problems in the statistical area.

Currently 9 states have entered into the program on a pro-rata basis for a total budget of $15,000. The program and studies will be conducted under the guidance of an administrative board composed of three representatives of the cooperating states, Chester Phelps of Virginia, Herbert Stern of Louisiana and E. B. Chamberlain, Jr. of Florida, with Dr. C. W. Watson, representing the Fish and Wildlife Service, and Dr. A. L. Finkner, representing the Institute of Statistics. Under terms of the cooperative agreement and contract, one-half time will be spent in design of statistical procedures and analysis of data for

the cooperating states. In the southeastern region there are approximately 35 P-R and 30 D-J projects which have statistical sampling and analysis problems. A minimum amount of coordination among states in cooperation with the Institute of Statistics will permit evaluation of techniques on population and harvest appraisal methods of regional significance. For example, several states have farm fish pond sampling projects which are testing methods of appraising these populations. Here minimum coordination and similar statistical design will provide comparable data from which suggestions suitable for the entire region may be made.

The remaining half time will be devoted to basic research into statistical methods needed by all of our states in fish and wildlife research and management. Different types of model populations, and methods to sample them, may be constructed and then with state cooperation, field tested. To us, this is the heartwood of the program, and the area from which, in the long run, we can expect to realize the greatest returns.

The Institute of Statistics will undertake theoretical and methodological investigation of such basic problems as those dealing with response and nonresponse errors in mail surveys, sampling and estimation problems in field checking sportsmen, and population indices and their value in estimating population totals or changes in population levels. The latter includes sampling of fish ponds, reservoirs, and streams by electric seines, nets and chemicals, and sampling of wildlife populations by sight and auditory counts, tracks, pellets and other field signs. These are the indices upon which our recommendations for management are based.

We see a productive future for this program. It will take time to build understanding because, to a certain degree, the biologist must become statistician, and the statistician, biologist. Reasonable continuity has been provided in the Cooperative Statistical Project Design because application of quantitative methods of known precision to fish and wildlife problems will require both new statistics and new biology, neither of which is developed in a minute.

Efficient handling of suitable statistics in research is a mark of maturity in a profession. Perhaps this will become the outstanding contribution of the Cooperative Statistics Project. Thanks.

USE OF MACHINE METHODS IN PROCESSING FISHERY DATA

By VICTOR W. LAMBOU
Louisiana Wild Life and Fisheries Commission
Baton Rouge, Louisiana

INTRODUCTION

Most fishery management agencies are faced with the problem of an ever-increasing workload and a demand for more accurate and reliable information (Leeper, Stern, and Lambou, 1958). Research programs are being expanded and their standards are rapidly rising, necessitating more detail and complex analyses of data. Because of this, there is a need for: (1) machine manipulation of data and (2) improvement in the design and analyses of experiments. These are two distinct problems; however, they are related. This report will be primarily concerned with the need for machine manipulation of data.

ADVANTAGES OF MACHINE METHODS OF HANDLING DATA

Why are machine methods of handling data desirable? As previously stated, research programs are expanding and their standards are rising; while at the same time, there is a shortage of trained fishery personnel. Therefore, it is desirable that the efficiency of the individual fishery worker be increased. This can often be accomplished by using machine methods of handling data. Machines