THE CONSERVATION RESEARCH PROGRAM OF THE ILLINOIS NATURAL HISTORY SURVEY

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APPLIED programs in the field of biological science are seldom, if ever, developed without the aid of years of patient, so-called unapplied, researches. If we assume that the present applied renewable natural resources program of the Illinois Natural History Survey is a feature of its work during the past decade, then we must acknowledge as the foundation of this newer program a previous half-century of basic, varied and monumental biological research by S. A. Forbes, former Chief of the Survey and past president of this Academy of Science, and his associates.

The early program of the Natural History Survey and its predecessors tends to separate into two phases of activity. One of these may best be characterized as a faunistic and floristic survey of Illinois, and resulted in such comprehensive reports as *The Ornithology of Illinois* by Robert Ridgway, and *The Fishes of Illinois* by S. A. Forbes and R. E. Richardson. The less inclusive reports are too numerous to mention specifically. They are varied in content, ranging in scope from broad biological surveys of certain local areas, both land and water, to detailed studies of species. This basic survey of the flora and fauna of the state is still in process of completion, but the emphasis rests today on groups of smaller organisms about which less is known.

Another phase of this earlier program of the Natural History Survey may be truly considered as economic biology, and the threshold of what now is referred to as wildlife resources management. I refer here primarily to a series of papers on the food of birds and fishes, and on the numbers and distribution of birds in various sections of the state. This early work on the food of birds, by S. A. Forbes, has been referred to by Weed and Dearborn (1903) in their book entitled *Birds in Their Relations to Man* as furnishing "the basis for the modern development of economic ornithology," and by McAtee (1917) who states in a more recent publication that this work, together with the work of another early ornithologist, is the foundation "of the scientific method of studying the economic value of birds." The Survey bulletins of Forbes and Gross (1921-1923) are representative of the present census technique of today's game management studies. A series of reports on forestry in Illinois from 1910 to 1926 certainly paved the way to a great extent for the introduction of public ownership and management of forested lands in Illinois and state forestry agencies now in existence.

Beginning in about 1934, in addition to a continuation of efforts to complete basic surveys of the flora and fauna, special emphasis began to be placed, in the sections of the Survey dealing with fish, game and forests, upon the management of these resources. Management, whether of fish, game, fur bearers, or forests, is the act of making such resources produce sustained crops. These crops may be for recreational uses, a combination of recreational and utilitarian uses, or complete utilitarian uses. When we arrive at the point of complete utilitarian uses of our wildlife resources, we have entered the field of animal husbandry.

Although certain aspects of wildlife management have been practiced in Eurasia for a long time, the altering in America of environments or ranges according to biological principles, for greater productivity of desired renewable natural resources, is comparatively recent. This is understandable on the basis that our culture is young and we are close to generations whose almost total existence was taken from the woods, waters and soils of our domain. Even today, in the midst of a great industrial development, as individuals we cling to a heritage of public rights in renewable natural resources, particularly forests, fish and game, and through intimate personal con-

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tact with these resources preserve a culture which is peculiarly American.

In a paper presented in the General Session of this Academy in 1934, I gave a six-point summary of my ideas held at that time for a land utilization program in Illinois for forestry, wildlife and recreation. It is cheering to note that there have been worthwhile accomplishments under each of these points, including the establishment of a National Forest in southern Illinois, additional state and county forests, expansion of the state park system, establishment of upland game and migratory waterfowl sanctuaries, and the ending of large-scale promotional and exploitational schemes detrimental to renewable natural resources. These developments during the past decade have been the result of the activities of many agencies and individuals, but I am happy to state that, within the state, the Natural History Survey has played an important, often pivotal, part in each of them.

As previously mentioned, special emphasis upon the management of the state's renewable natural resources by the Natural History Survey dates from about 1934, the year in which the first game technician was appointed to the staff. Although an aquatic biology section was functioning long prior to this date, its program, too, became subject to reorientation along management principles about this same time. In 1935 a Mid-Western Wildlife Conference was organized at Urbana, sponsored by the Survey, to serve as a clinic and clearing house for the views and conclusions regarding wildlife resources investigations in the central states region.

The next big step in organization for renewable natural resources research came in 1937, when appropriations were obtained to increase the staff, construct field laboratories, and establish experimental areas. This program was again augmented in 1938, in cooperation with the Illinois State Department of Conservation and the U. S. Fish and Wildlife Service under the Federal Aid in Wildlife Restoration Act.

The preceding statements about past accomplishments and more recent advancements in the organization of the Natural History Survey for researches in the field of the renewable natural resources of Illinois have, perhaps, brought to mind questions regarding the general objectives of such a revised program and also regarding recent results from these investigations.

One of the phases of any investigation of valuable renewable natural resources is the establishment of accurate and impartial data regarding each resource as a guide to insure its preservation or its management on a maximum or sustained yield basis. Seldom do we find the simplest of the required basic data available or in such form that they can be utilized without reworking. When dealing with wildlife management problems, we must have reliable information concerning a large number of matters. For instance, in the case of each wildlife species involved, we need a close approximation of its numerical abundance, its distributional pattern within the state, what constitutes its most favorable natural breeding territory; and we need to know if there are measurable swings over a period of years from low to high populations and back again. We need to know about the breeding seasons of the species involved; and much other biological information. It must be understood that for best management results each species of fish, fur bearer, migratory waterfowl, upland game bird, or other renewable natural resource unit, must be studied separately in respect to such matters, and then again from the standpoint of its relation to its total environment.

Although the sum total of these investigations is a big and long-time order for any agency, many of the techniques necessary to secure the data, as well as much of the desired information and needed basic generalizations, are being obtained at a comparatively rapid rate. Thus it happens that even in the midst of a youthful program and the establishment of necessary preliminary basic data, the Survey is now actively pursuing some phases of the ultimate objectives of a state-supported renewable resources study; namely, the development of practical methods and information for resources preservation and utilization for the benefit of the general public. In support of this statement, it is possible to cite many examples where the results obtained to date are accomplishing their purposes. I have time to mention only a few such instances, selected to show the variety of

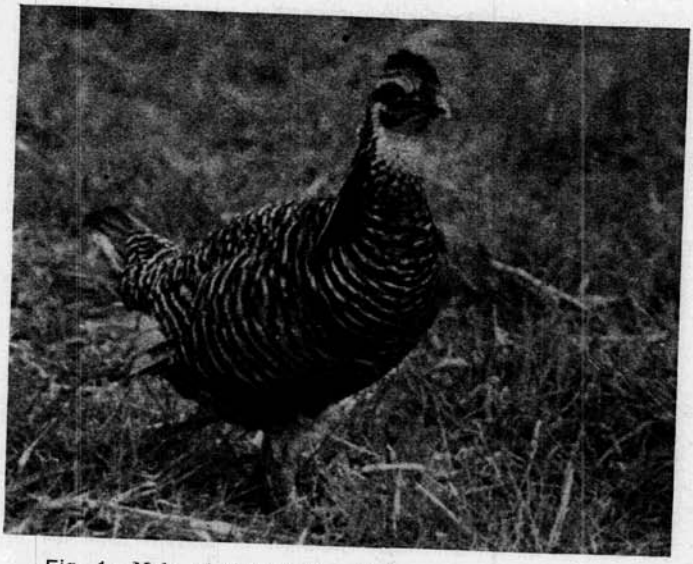

Fig. 1.—Male of the prairie chicken, once an abundant and valuable bird in Illinois, now in need of protection and further study.

ways in which scientifically acquired renewable natural resources information can be utilized to attain desirable goals.

Studies of the prairie chicken reveal that efforts directed toward the management of this splendid bird, so familiar to the early settlers in Illinois, must of necessity focus almost entirely around the preservation of a small number of remnant flocks, and any proposals for the removal of this game bird from the list of protected birds under present agricultural conditions should be opposed. Furthermore, favorable nesting territory is such that any grandiose schemes for the propagation and release of the prairie chicken in numbers throughout the state, with the hope of permanently supplementing game birds for hunting purposes, is foredoomed to dismal failure. Our studies of prairie chickens, therefore, may already be confidently used to prevent undesirable game law legislation and unwise expenditures of conservation monies.

Information in hand concerning rabbits, which, by the way, are an important item in the meat diet of many families in certain parts of this state, gives us an altogether different type of conclusion. In the management of this resource we can recommend a limited amount of utilization along with preservation. We now know that great fluctuations exist in the abundance of this animal from year to year, and that this rise and fall in numbers, over a period of years, is a normal expectation. It is sound management, therefore, to recognize that the cropping of this resource — an estimated 3,000,000 pounds went to market annually preceding 1937—could be considerably increased, at least in certain peak years, without permanent impairment of our necessary basic breeding stock.

For some years there has been a lively controversy in this state regarding the soundness of the time of the open season for the hunting of squirrels; another resource which, without attracting much public attention, makes a considerable contribution to the meat diet of many families, particularly in the central and southern parts of this state. The settlement of this argument depends upon the definite establishment of information pertaining to the time and duration of the breeding season in different game zones. It would seem to most people, because of the commonness of squirrels, that trustworthy information about breeding seasons would be already available, but this was not so when Natural History Survey studies, made in cooperation with the State Department of Conservation and the U. S. Fish and Wildlife Service, were begun. Investigations are now in course

Fig. 2.—Through the banding of waterfowl, Illinois Natural History Survey wildlife technicians gather data on migration habits, travel lanes, kill and survival ratio, and other data that will lead to recommendations designed to prevent depletion of these valuable birds that suffered following the first World War.

of completion which will give authoritative answers to the questions involved, and thus serve to influence game law legislation which will insure proper hunting seasons, and thereby the intelligent cropping of this resource.

At this time, a detailed report on the fur resources of Illinois is in preparation. The fur bearers are now known to contribute about $1,000,000 annually to the income of Illinois families, chiefly in the low income group where it is most

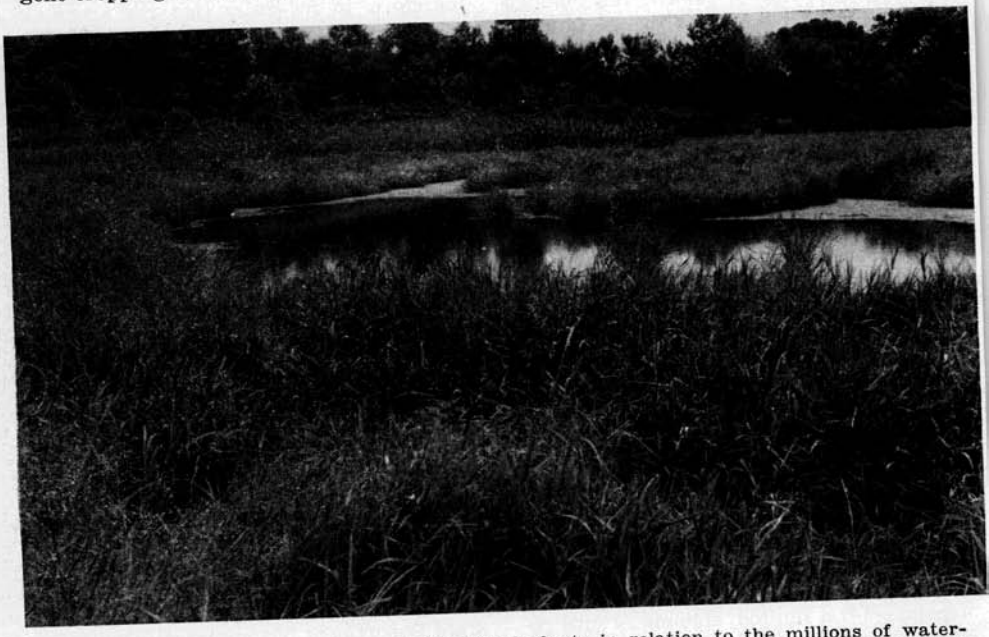

Fig. 3.—The place of native waterfowl food plants in relation to the millions of waterfowl that use the Mississippi-Illinois flyway is being studied by the Illinois Natural History Survey. Shown here is a bed of rice cut-grass, one of the best of the native plants.

Fig. 4.—For effective management of small artificial lakes, techniques must first be developed in experimental bodies of water. The recording thermograph shown here is one of the instruments by which Illinois Natural History Survey technicians study the influence of temperature on fish production.

needed. If anything is ever to be done toward a managed increase of this important resource, this report will be basic to that undertaking.

The data obtained in the course of the Survey's fisheries investigations have been quite revolutionary and counter to many generally held ideas concerning ways to improve fishing. This phase of research management investigations is gradually approaching the techniques of a more mature animal husbandry program.

Time will not permit me to go into further detail concerning the many and varied projects in the renewable natural resources field now under investigation by the Natural History Survey. The re-

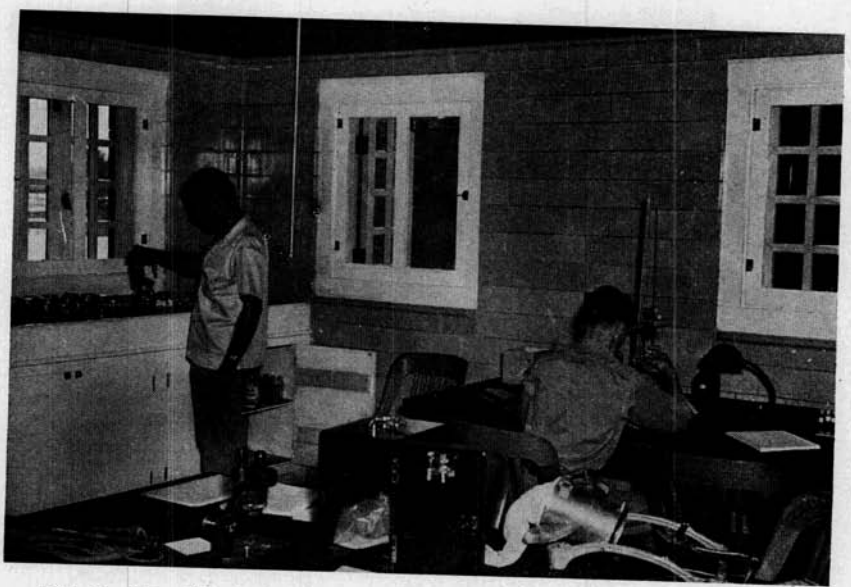

Fig. 5.—Two fish technicians at work in the new Illinois Natural History Survey laboratory at Ridge Lake, near Charleston. Oxygen content of water and other scientific data are determined as part of the experimental program that will lead to recommendations for improved growth rates of fish in small artificial lakes.

sults from this work are rapidly accumulating, and I am certain that they are destined to influence profoundly the preservation and utilization of the state's renewable resources; in fact, this scientific basis for state action is already taking place.

In an earlier part of this paper, while broadly reviewing the general objectives of the Survey's present applied program, I called attention to the youthfulness of these investigations. This is an admission that in many instances we are involved in a long-time program, and that from many problems now under investigation no conclusions can be drawn for some years to come. Cyclic fluctuations cannot be determined by a year or two of observations, nor can game management policies for our most intensively farmed areas be promulgated on the basis of study areas two or three years old, with plantings which require some years for mature growth. Determinations of balanced fish combinations to be used in stocking new reservoirs and the best methods of cropping must be tried in many localities and under varying conditions. All such programs demand a reasonable amount of continuity and time.

Now, just when we are virtually getting started on a new program of practical management studies of resources, the greatest war of all time is thrust upon us. If it took a major depression to awaken Americans to the realization that renewable natural resources are important to our well-being, and that we must initiate scientifically planned researches to insure their continued existence and use, I feel safe in asserting that this war will drive home to all the absolute necessity of our varied resources to our standards and ways of living. Some resources, to be sure, are more important, at least for the moment, than others, but it is all of them

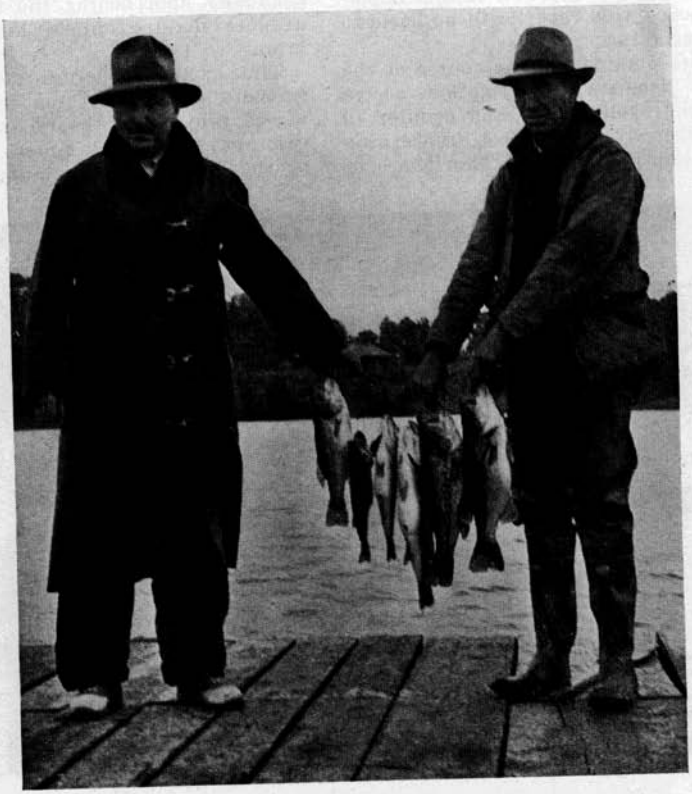

Fig. 6.—Properly managed artificial lakes in Illinois can produce good catches of bass and other desirable fish, as shown by this scene at Lake Glendale, in the Shawnee National Forest.

together, each in its place, which have made the United States the envy of the rest of the world, and the nation which we cherish today.

Concessions to the war effort must, and will, be made by all individuals and every normal program. Already, the Survey is reorienting its program to aid the war effort as best it can. The renewable resources of both state and nation will contribute their share in the support of our cause in the form of food, clothing, and in many other forms.

As an example of this support, let me cite the case of one renewable natural resource scarcely mentioned heretofore in this address; namely, forest products. It has been stated by Ovid Butler, of the American Forestry Association, that each of our forests must give at least five trees to equip and maintain each man in our armed forces. These trees are used to give him his living quarters and training camp, the wooden crating necessary to ship him food, clothing, tanks and guns, for the making of high explosives, bombers and battleships; in fact, virtually every piece of equipment necessary to wage modern war.

While we must open our resources to the nation in its time of greatest need, we must be on guard, also, to prevent

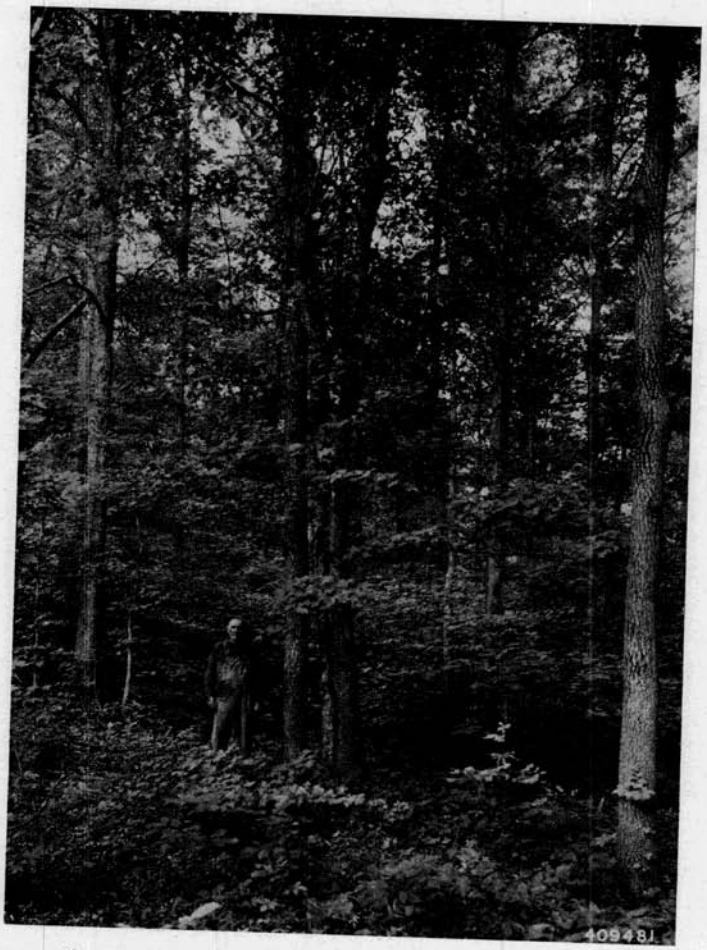

Fig. 7.—Stand of white oak timber in the Shawnee National Forest, southern Illinois. Publicly and privately owned forestry resources of the state can contribute materially to the war effort, but exploitation that is unnecessary and permanently injurious should be studiously avoided.

exploitation that is unnecessary and permanently injurious. Many proposals are apt to be put forward under the guise of the national war effort which are valueless, and they must be rigorously opposed by technical agencies.

Although I will not have time to elaborate upon this subject, the recreational uses of wildlife resources will contribute greatly during the coming months to make our war efforts successful. The benefits from outdoor recreation are exceedingly difficult to evaluate in dollars and cents, but, nevertheless, we know that mental and physical health is expensive to rebuild and that some recreation is essential.

I cannot resist closing this address with a prophecy; to wit, that after the war renewable natural resources programs will be sponsored by the state and nation more than ever before. These programs to be worth anything should have the guidance of experienced scientific organizations. Such agencies cannot be assembled over night. So, let us hope that while giving everything necessary to win the war, we will have the vision to preserve the essentials in scientific endeavors as the spring board for our country's rejuvenescence after the war.

(This talk was followed by a colored motion picture showing activities of the Illinois Natural History Survey relating to research on wildlife resources.)