

SUMMARY

In 1960, a field test was made of a bait designed to control the imported fire ant. The bait consisted of 0.125 per cent of kepone in peanut butter applied at the rate of 3.5 grams of kepone in 6 pounds of peanut bait per acre. Heavy mortality of quail occurred following treatment. Tremors and other symptoms of poisoning implicated kepone as the cause of death, but the mode of entry, whether through the bait or through poisoned insects was unclear. Subsequent laboratory tests indicated that quail very likely could not be killed by feeding poisoned insects, but were readily killed by exposure to the bait when it was prepared as it was for the field test.

REFERENCES CITED

- George, John L. 1958. The program to eradicate the imported fire ant. The Conservation Foundation. New York. 39 p. Proc.
- Hart, Dennis and T. R. Mitchell. 1947. Quail and pheasant propagation. Wildl. Mgmt. Inst. Washington. 71 pp.
- Hays, Sidney B. and F. S. Arant. 1960. Insecticidal baits for the control of the imported fire ant. Jour. Econ. Entomology 53 (2) : 188-191.
- Nestler, R. B. and W. W. Bailey. 1941. Bobwhite quail propagation. Conservation Bull. 10, U. S. D. I., Fish and Wildlife Service. 50 pp.
- Smith, John C. 1961. The relative effects of kepone baits on the imported fire ant, bobwhite quail and dairy cows. Unpub. Master's Thesis. Auburn University, Auburn, Alabama.

CHANGING CONCEPTS AND NEEDS IN WILDLIFE MANAGEMENT

By HAROLD E. ALEXANDER

Arkansas Game and Fish Commission

This paper is an attempt to review, in a general way, some of the achievements of the business we call "wildlife management", and some of our failures to achieve its purposes and needs. Since the subject of this discussion encompasses large and ramifying problems and possibilities, and is related to a vast interplay of forces which are not directly subject to our control, we can in such a discussion, only touch on some of the highlights. Much more will remain to be said.

In a little more than a half century we have seen tremendous changes in our surrounding world. Within that time our population has more than doubled, vast acreages of land and water have been altered from their original condition, and we have developed the tools and techniques to change the total environment of men and animals radically and permanently. The majority of our people have become urbanized and transient. Each day we move mountains, cut down whole forests, drain more marshes and wetlands, and engineer vast alterations in the world about us; and we have developed the means and techniques to effect even greater changes in the future to the extent that we may live in a man made world. From an agrarian "horse and buggy" way of life, we have emerged into a high speed, mechanized and specialized society. Like travelers speeding along a highway, we have lost sight of many of our goals and objectives, while concentrating on the dangers of momentary and sudden oblivion. To avoid losing our way, it is essential that we stop occasionally to determine our position and re-establish our destination. Without reappraisal, we tend to become lost in a maze of single objectives, each of which leads to a dead end or a blind alley.

In making such a reappraisal, we need to determine, first, just what we are after; whether we simply want to produce more game, fish or fowl, or whether we want to fuse all the single objectives we have, as a people, into that fundamental goal directed at preservation of an adequate en-

vironment for man. In achieving single purposes, which limit our vision, we often lose sight of the road ahead and in so doing, fail to give attention to that destination which is concerned with human welfare. The goal of those of us in the wildlife field is, fundamentally, to save and perpetuate many things for many people. This has been defined as making "the world safe for its diversity" (Anon 1962). We must keep our eyes fixed ahead on this purpose even though we wander and diversify our efforts in arriving at that end.

All this is very high sounding and may seem unrelated to what we do. If we look back at the record, however, I think we will see that we have often nullified our efforts in following leads which took us into those blind alleys to which I have referred.

LOOKING BACKWARD

The idea of conserving resources of any kind goes back only a short time. Theodore Roosevelt, as we all know, was among the first dynamic proponents of saving natural resources, including wildlife, in this country. Before that time, it was largely assumed that all resources were either inexhaustible or that each man had the right to take of those resources as freely as he saw fit. The development of a "high standard" of living, in a material sense, called for accelerating resource use, and constant production and use of goods to satisfy new desires and create profits. The conservation idea did, however, "catch on". We did begin to realize that some resources would disappear if we didn't act to save them.

The conservation idea first was applied to those things we needed for material development—minerals, soil, plants, water, and animals. Pengelly (1962) points out that resource conservation problems are of two types, "Survival" and "Enjoyment", and he refers to the "enjoyment" type as "the qualities that enrich our lives . . . space to live in and space to play in, wild scenery to enjoy and wild animals to observe, hunt or photograph". He comments further that textbooks deal with the "standard subjects" leaving out ". . . the conservation of human resources . . ." referred to as "social capital."

The application of the "survival" resources principle to wildlife management has resulted in our attempts to calculate wildlife values and benefits in terms of numbers, or pounds or dollars worth, and this system has left us in the position of accepting "fringe benefits", after all other postulated economic and monetary desires were satisfied, which in many cases has left us holding an empty sack, and ignoring basic human needs.

Leopold was among the first to concern himself with the preservation of environments in which wildlife forms could live. Prior to his monumental work "Game Management" (1933), the efforts of conservation-minded scientists were largely directed at classifying living forms and at preserving dried specimens for future generations to compare and classify. Wildlife was either looked upon as inexhaustible or doomed to extinction. In his book, Leopold reviewed the history of game management, or rather attempts at preservation. He took us, chronologically, through the formulation of restrictions and laws limiting wildlife use, through the development of refuges, game farms, efforts to preserve wildlife through elimination of predators, and up to the earliest efforts at area management; and he ended his observations by concluding that man must develop an "ecological consciousness" and awareness of his relation to all living things if he was to save these resources and himself.

Wildlife management, as we interpret it, really began about the time of the establishment of the wildlife research units some 25 years ago. There were, of course, numerous practitioners before that time, but wildlife management as a profession developed with the establishment of a positive system of education to train biologists and managers. Since then, we have in some respects come a long way. In others, we have failed or floundered about, without accomplishing our purposes. Let us look at some of our failures and accomplishments. Some of both have been due to forces over which we have had no control; others were undoubtedly due to misdirected efforts or motivations or both.

We can take credit for doing away with many practices which were useless or even detrimental. Such misdirected efforts as large scale stocking, indiscriminate killing of carnivores, "Buck" laws, and undue restrictions on hunting have given or are gradually giving way to the knowledge that these practices are ineffectual or even detrimental. Improvements have come about as a result of the applications of knowledge and research to action. We have some shining examples of the applications of research findings carried on by wildlife biologists. We have, for example, the work done by State and Federal agencies who became concerned with the effects of pesticides on wildlife. It is largely due to these investigations that there has come about a concern over the use of poisons to control what we believe to be noxious organisms. Although the use of poisons which contaminate our environment continues, the growing public awareness of the problem is the first step toward control. This has been and is a most important contribution to knowledge and its use, and we can take much credit for what has been learned.

We can also look at increases in some of the more desirable (from our viewpoint) species with assurance that we may have them with us for a long time. The white tailed deer is one example. We can assume credit for getting them "restored" to huntable numbers, but I think we must realize at the same time that after we gave them a "boost" through protection and stocking, they came back largely under their own "steam", particular needs. With proper management, we should have and be able and because environments resulting from the uses of land fitted their to hunt deer for a long time to come.

Much of our recently acquired knowledge has, in a sense, been used to limit or prevent unwise courses of action; which have changed with new circumstances. This is demonstrated by the buck law, once valid, but now a detriment to good practices. In general, one of our most pertinent contributions is the use of knowledge to educate, to create a better understanding of goals, needs and purposes, and public recognition and acceptance of what is better or best. This education in understanding is possibly our most difficult task.

On the other hand, we have not even begun to solve some of the major problems confronting us, and in some directions we seem to be progressing backward. Each day we are confronted with the accelerated impact of increasing human use of resources and particularly land use, for "practical" profit motives, which serve single objectives or the interests of a few; or are dedicated to "multiple use" purposes, meaning their dedication to the interests of a particular group or interest. Some uses cancel out other uses. You cannot, for example, pollute a river and have it serve quality recreational purposes at the same time. Carver (1961) in discussing the proposed dedication of lands to wilderness, observed that "you can't put a mule, a miner, and a picnicker on the same ground at the same time", which observation pretty well describes the fallacy of any consistent application of this concept.

Too, we have not been able to evaluate or instill the concept of quality considerations, ignoring the obvious tenant that enjoyment, happiness, and cultural betterments are benefits to be derived from resources, individually and collectively, and that these considerations are of great importance.

One of our greatest needs is the proper orientation of our efforts to needs and purposes. Looking back, I think we can see much misdirected effort and much concern with matters having relatively little relation to the compelling problems we face. In an effort to determine the scope of our interests and professional concerns, two major abstracting journals "*Wildlife Review*" and the "*Biological Abstracts*" were periodically examined for evidence of interests and trends as indicated by papers published on wildlife, ecological and conservation subjects. No effort was made to conduct a complete review of these abstracts, since this entailed efforts beyond the scope of this paper. Rather, this review can best be described as a "spot check", spaced at random over the past 15 years. Too, in a cursory survey of this type, it was not possible to classify every paper or study under a precise category. Many titles do not lend themselves to accurate classification, or their direct relation to the categories encompassing our interests was tenuous or indefinite. This "check" did, however, demonstrate one thing. There was vastly more concern with and effort given to particularized studies aimed at obtaining data on segments of

the larger categories of interest, than with evaluation of purpose or concern with the solution of problems which dominate patterns of resource use, and which prevent or inhibit the perpetuation of wildlife and resources referred to as "enjoyment" resources. The papers covering the fundamental concepts of conservation, its purposes or philosophy, in other words, its basic objectives, were few and far between. Likewise, concern with research methods or education was apparently of far less significance to the professional worker than his preoccupation with techniques of management, wildlife control, food habits, life histories or disease. Indications are that his primary interests and efforts were given to compiling data on various limited segments of his special field of endeavor. Now we can assume that this is the way science works, piece by piece, but somewhere there must be an effort to tie these pieces into a comprehensive whole, or relate them to the problems of conservation, and these efforts were minor and few in number.

It was also apparent that major problems affecting wildlife were given comparatively little attention by authors contributing to the professional journals. These abstracts do not represent the sum total of professional work, but they are, I believe, representative of his dominant interests, and demonstrate allocations of time and effort to what professionals believed to be the proper application of their knowledge.

Another discrepancy appears in evaluating the relation of efforts to purposes, if we can assume that our purpose is resource conservation. This is exemplified by the relatively limited amount of work done to establish criteria for the determination of intangible or quality values, or balance scarcity and diminishing supplies to increased worth and sentimental values. We have, it seems, become so "intimidated by (a) . . . hard boiled approach to life" that we feel "sheepish about acknowledging the existence inside of (us) of that which distinguishes us most from the ape" (Anon 1962). Admittedly, the creation or delineation of standards of this kind is difficult in the extreme. But we must acknowledge that we are certain to lose many of those things we cherish unless we evaluate and establish standards of measurement for sentimental and esthetic values, and educate people to recognize these standards.

Looking back at the things we have written about and published, we note that abstracts presented in *Wildlife Review* fifteen years ago (1946 and 1947) were mainly concerned with such subjects as management techniques, wildlife control, food habits, diseases, and life history data. During those years (in 7 volumes), there were only two references to philosophy or purposes, 16 on education, and 13 topics concerned with research evaluation and technique. It is notable that, although the preservation of ducks was then as now a problem of major concern, only two papers discussed wetlands and drainage, while there were 62 titles on such subjects as food habits, specification and movements. Even then, we were painfully aware that the preservation of wetlands was the key to the perpetuation of waterfowl. With this consideration in view, why didn't we do more work to demonstrate and prove the absolute necessity of breeding grounds to ducks?

Further along, in 1954 and 1955 (6 volumes), we find 7 references to wetlands in this abstracting Journal, and 153 have reference to ducks in general. Again, in 1960 and 1961 (6 volumes), we find 13 references to wetlands, and 153 references on waterfowl food habits, or other life history details. Our increased interest in waterfowl and awareness of their critical situation is apparent, but what about the problem of saving ducks?

We have already noted that we recognize the significance of basic data, but what could be more basic to waterfowl conservation, our declared objective, than the preservation of habitats essential to their existence? We must also admit that the forces of destruction, dedicated to other purposes, are stronger and better entrenched, but at least we might give more of our time and efforts to the basic problems, unless, like the early systematists, we are mainly interested in saving a few museum specimens. It is axiomatic that without information to substantiate our arguments, we cannot make a case for the preservation of wildlife or anything else.

Today, as evidenced by the subjects of our published papers, we note that a large part of our concern still seems to be with particularized investigations of

foods, habits, movements, life histories and other detailed and limited, single objective "studies". We have, I believe, avoided or failed to give the larger part of our professional efforts in solving basic problems in conservation. As I have observed there are some notable exceptions. Our concern with pesticides is one example, and another is the increasing concern with water problems and such nebulous considerations as wilderness and even space. The pressures about us are directing awareness to these intangible needs.

To make our point, we need more research of the right kind, and directed at crucial problems. Nace (1957) has observed that ". . . knowledge is costly, but it is cheap compared to the cost of ignorances", and further, "The important need is not for massive accumulations of data, but for *understanding*."

There is the suspicion, and some evidence that too many professional scientists of all types are mainly concerned with establishment of their reputations by multitudinous if "minuscule" writings, and their progress has been compared with "that of the squid, which moves rapidly backward, at the same time emitting large quantities of ink". (Kopac 1961.)

Sears (1961) has stated that "One may mine a cul-de-sac with thoroughness, but unless he knows why he is doing it, and has facilities for getting his product out in some sensible relation to the (problem) . . . his efforts are likely to be wasted." More attention to acquiring data directed at the key problems in resource use and preservation and their purposes, and less "ink" emitted while progressing backward might help in the conservation of wildlife, and the preservation of an environment of "quality" for man. Most of our problems are due to the impact of mechanized man on environment. To create "understanding" of the biological relationship of wildlife and man to environment, and feeling or desire to preserve "diversity" in a changing world—these are our purposes. We must have hindsight and foresight, which add up to knowledge, to work toward these ends.

LOOKING AHEAD

Udall (quoting Leopold) stated that ". . . all history consists of successive excursions from a single starting point to which men return, again and again, to organize, to start another search for a durable set of values". In this discussion of needs and concepts, we have taken a brief look backward. We have noted progress and shortcomings. We have reached a point both in time and in our professions where we need to take stock and reorganize our purposes to meet changing circumstances and the needs of the future which bear down upon us. The horizon of the future is immense. Sears comments that ". . . biological science is not only expanding into realms of the infinitely small, but broadening into the baffling and difficult realm of the intangible". We have large responsibilities, and meager tools to accomplish what needs to be done. Our problems include ecological, social, political and economic considerations. In these respects, they are no different from the problems confronting other men in our time.

Looking back we can see our mistakes, and looking forward we can see, if we look closely, some of the things that need to be done. Among these things is the need for "generalization" of our efforts if we are to "put our jigsaw pieces of information into meaningful patterns". (Bates 1960). In discussing our past efforts, we have noted the multiplicity of our interests and our apparent preoccupation with a "piecemeal" approach to conservation. With reference to the enormous number of scientific papers written and published, it has been stated that if "placed end to end they will reach to utter confusion" (Zirkle 1961). To avoid this "utter confusion" we must concentrate our efforts, in the future, on the more critical issues. If we don't, some of the things we want to save will no longer be objects for concern. They simply won't exist.

We need intensified efforts to gather information on basic issues affecting resources. This is particularly needed in the field of water resources. With our present system of developments, with single or limited objectives, we are, to quote Voigt (N. D.) "freezing water into inflexible patterns of use". Water developments are "terribly" permanent. Clawson and Fox (1961) have observed that "if we build a dam that floods out a beautiful river valley, we have foreclosed its use for recreation (and scenic appreciation) . . . forever". This

points up the need for protecting the intangibles which are part of our heritage and contribute to our physical, emotional and spiritual welfare. In the light of population pressures, even the problem of "space" conservation has become a matter of immediate concern.

We can, if we wish, ignore this reference to quality preservation and stick closely to the task of producing more game. We can do this expediently on game farms, but artificiality reduces quality and the product becomes "common-place". Shooting tame ducks cast from a ramp can never equal the rewards in body and spirit that comes to the man who takes his birds over a misty wild marsh at dawn.

In the future, we need to heed that admonishment to become "generalists." We must have sufficient understanding of other sciences so that the efforts of all scientists can be merged towards the common goals of human betterment. Overspecialization warps our vision, and we lose sight of that goal we should keep in view—the preservation of "diversity" to meet the needs of men. We must, somehow, arrive at better systems for using all we know.

We should look upon "preservation" of natural resources as having equal importance with what we term management. There are some things we can't improve. In support of this concept Pengelly (1962) said, "There are some resources, however, that cannot be purchased or created, and these are the immediate cause of concern. Space is such a resource and quality is its attribute. The . . . headlong trend toward mass use or mass abuse of every square foot of the globe poses serious threats both to our standard of living and to our survival as a people . . . , blind development may degrade our society rather than enhance it".

We need to be more concerned with education in resource appreciation and use. In a sense, all of us must be educators, since our integral relationship with the earth and its resources must, to some degree, become generally understood, or we face the degradation of our environment and ourselves.

Problems needing immediate and concerted attention include more intensive studies of pesticides, of water resources, of social factors in resource use, establishment of standards for evaluating "quality" values, and immediate action to preserve natural environments for wildlife and men. Our singleminded objectiveness is leading us into fixed courses of actions which, once taken, are irreversible. We need refreshment of "spirit and mind" as well as clothing, food and shelter. Good habitat for wildlife has qualities that are also necessary to our well being.

Nace (1959) commented that (resources) "must be managed with the understanding that there will be a tomorrow—and a very long one—we hope", and Udall, speaking before the White House Conference on Conservation (1962) commented, that the piecemeal approach of the past toward resource problems will not suffice for the 1960's. We are in a period of last chances—the overriding need of man "for an environment that will renew the human spirit and sustain unborn generations . . . requires sacrifices of short term profits".

There are straws in the wind that suggest that we have, at least, heard these admonitions. We have a job to do, and we must keep our attention on a broadening horizon and try to meet the challenges of the future. The path ahead is strewn with difficulties for all men living in these times.

REFERENCES CITED

- Anon, "A Community of Hope and Responsibility", *Sat. Rev.* June 16, 1962, pp. 12-14.
- Bates, Marston, "The Forest and the Sea", The New American Library, 1960.
- Carver, John A., Jr., "Miners Get Dutch Uncle Talk For Opposing Wilderness Bill", *Nat. Wildlands News*, Nov. 1961, p. 4.
- Clawson, M. and Irving Fox, "Your Investments in Land and Water", *American Forests*, 67(1): 5-10 and 53-56.
- Kopac, Milan, Jr., "Cellular Biology", *Bio. Abst.* 36 (8): XII-XIII, Apr. 1961.
- Nace, R. L., "Address Before the Texas Water Conservation Ass." Dallas, Texas, Oct. 19, 1959, pp. 1-9.

- Pengelly, W. Leslie, "The Art of Social Conservation", paper presented at Am. Conf. of Central Mts. and Plains States, Section, Wildlife Society, Aug. 17, 1962.
- Udall, Stewart L. "Proceedings, White House Conference on Conservation", Washington D. C. May 24-25, 1962.
- Voigt, William, Jr., "Water Policy Problems East and West", Paper, available from U. S. F. and W. Ser., n. d.
- Zirkle, O. Conway, "Genetic Biology", Bio. Absts. 36(8) : XVI—XVII, Apr. 1961.
- Wildlife Review—Subject Survey.
- Biological Abstracts—Subject Survey.

ALABAMA'S PREDATOR STUDIES

By FRANCIS X. LUETH

Game Biologist, Alabama Department of Conservation

Predator studies, in Alabama, were initiated on July 1, 1956. These studies are being continued. The object is to provide information on population densities, movements, longevity, etc., on predatory animals found on the various management areas of the state.

These studies also provide an activity for the various area managers during the non-farming and non-hunting seasons.

Method: The innate trapping ability of the "refuge managers" varies considerably. As many as 12 different individuals may be trapping in any short period of time. Any method used in the setting and running of traps should be a measure of animal populations rather than a measure of the individual's ability to trap.

After testing a number of methods, the following was adopted:

Site selection: A roadway running through the area of study is selected for a trap-line. A location near one end is chosen as a starting point, and a permanent number applied to a tree or post nearby. Other locations are selected strictly on a mileage basis, and they are usually located .1 mile apart. They, too, are marked as "permanent trap locations" which may be retrapped year after year. Some areas have more than twice as many sites as the manager has traps. On these areas, odd-numbered sites may be run one time and even-numbered sites another time.

This method has been used by other investigators and gives relatively uniform results regardless of the experience of the trapper. It also takes less time to set a series of traps than to select new trap sites each time. The catch per trap-night averages somewhat less when using this method than when trap sites are selected. It also is less selective as to species of animals. However, in tests using an "experienced trapper" the catch per trap-day was about the same because the trapper would set fewer traps.

Traps: Number 2 double spring steel traps are used. The trap is placed near the edge of the road at the numbered trapsite. A fire rake has been found to be a satisfactory tool for preparing the ground to set the trap. The trap is first covered with waxed paper. Then it is covered with sawdust, for concealment. Cracklings are scattered around the edge to serve as bait. Baits appear to affect the kinds of animals caught, and cracklings are used as a standard bait because of their relative low cost and ease of obtaining. They do not need to be fresh. A three or four foot pole is attached to the trap to act as a drag.

Length of settings: When this program first got underway, the area manager was requested to set for 10 consecutive nights. This required him to visit the trap line on at least one Saturday and one Sunday.

In order to determine on which day of setting the most animals were taken, the data from one area were examined. Oak Mountain Wildlife Management

¹ (A contribution of Federal Aid in Wildlife Restoration Project, Ala. 35-R).