

SOME INTERRELATIONS OF WILDLIFE MANAGEMENT AND FOREST MANAGEMENT¹

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The close relationship between forestry and wildlife management is obvious. Nevertheless, the idea that forestry practices are necessarily opposed to the production of game has many adherents. Even a few game managers seem to hold this view. It is refreshing, therefore, to find an outstanding authority in the field taking the position that, in general, the forest wildlife problem must be approached from the standpoint of maximum land use and that forestry plays an important part in this use. Every forester dealing with land-use problems will find Professor Hosley's paper of great interest.

FEW foresters need to be told of the increasing use of wildlife for both recreational and aesthetic purposes during the past decade. The U. S. Senate Wildlife Committee in 1931 estimated that the numbers of hunters and fishermen had increased four hundred per cent in the last ten years. This committee reported the results of a survey by the Southern Newspaper Publishers' Association showing that in fourteen of the southern and southwestern states the numbers of hunters and fishermen equalled the combined numbers of baseball and football fans and golf players. In 1933 494,000 licensed hunters in New York state took a game crop valued at \$2,268,000 (1). And, of course, one of the greatest uses of wildlife comes from the enjoyment incidental to simply seeing it.

Any rational approach to the forest wildlife problem must be from the standpoint of maximum land use. There are likely to be few cases where the production of wildlife alone can be justified on any large, public area, for many years at least. It can be made an important part of the total use, however, by correlating the work for the improvement of wildlife conditions with that for timber production, recreational developments, fire protection, etc. Conflicts in practice are bound to arise, but if concessions are

made from all the major viewpoints, the end values in terms of all uses can be greatly increased.

The ecology of the animal is the first complex to be considered. Each species has its own particular food habits which vary with each season and each region. Each requires particular kinds of cover which often are also a seasonal problem. Each must have the proper conditions for increase, such as good nesting cover, areas where insects are available to young birds, etc. There are also many special requirements such as grit for certain birds and probably vitamin or mineral needs for others (7). The energy needed by the drumming cock grouse or the minerals and vitamins needed by the laying hen are other good examples.

The other complex is the ecology of the forest. The various types from old-field and cut-over lands through the different ages of hardwoods, conifers, and combinations of the two, all have their uses for wildlife. In a wildlife management plan, the succession, both plant and animal, developing with age of the stands is one of the most important considerations. A pure white pine plantation is fine cover for the cottontail rabbit from the time it closes in until a dead length² of a couple of feet is developed, after which this use practically ceases. The same plantation

¹This is essentially the paper presented at the meeting of the New York Section, Society of American Foresters, Albany, N. Y., February 8, 1936.

²Length of bole on which the branches have been killed.

may be used as cover for the ruffed grouse from the time the rabbit abandons it until it is cut. On heavier soils the same stand will develop a hardwood advance growth and many herbs will come in as it matures, thus providing both food and cover for the deer and grouse.

Density of stocking which can be changed by thinnings in the stands is a very important factor, since it largely controls fruit crops and the development of undergrowth, as well as timber size and quality.

Mixed stands are obviously more favorable for wildlife than pure ones, because of the greater variety of food, cover, and other environmental conditions to be found there.

One of the axioms of wildlife management is that all the types necessary for the needs of a given species must be within the area covered by its range, which, of course, is a strong argument for diversity of types (7).

The idea that forestry practices are necessarily opposed to the production of game is not new. The English have felt the supposed antagonism and analyzed the real problem as one of planned forestry operations keeping in mind the needs of the game species (8). It also seems that our own silviculture and management can be made to prove the fallacy of this supposed antagonism.

The first requirement for combinations of forestry and wildlife work is a plan for operations on each tract setting forth what will be done for the development of both resources (10). Not all stands can be made to contribute a maximum of wildlife any more than all can be made to produce a maximum of timber. To make the most of a tract, the natural or potential type units which will support a given wildlife species must be recognized and efforts concentrated on these. For instance, under Massachusetts conditions, a white-tailed deer is quite content over

the period from spring until deep snows come on a hilltop overgrown with brush, briars, wild herbaceous growth, and a few pines under which beds can be made. But, unless there is an area nearby, preferably on a south or east slope or in a swamp, where coniferous stands give greater protection during severe winters, the deer will leave and go far enough to find these conditions. And, whether such a coniferous stand will be used as winter shelter depends also on the availability of hardwood browse, ground hemlock, or other suitable food near at hand (4).

There seems to be no silvicultural operation which cannot influence wildlife to advantage, if properly used.

At present cuttings are, in many cases, a minor phase of forestry on public lands, but they are bound to become more important as the younger stands mature. These cuttings, where hardwood is present either as mature trees or advance growth, produce suitable nesting and summer and fall feeding conditions for ruffed grouse; and also may be used in summer and fall as a source of food by the pheasant as well as being a year-round food supply for the deer and the cottontail (3).

Weedings and improvement cuttings in young hardwoods prolong for a period of ten to twenty-five years the usability of the stands by the deer and cottontail and, if care is taken to favor plants valuable to wildlife at this stage, the start of a long-continued production of food can be made from such species as black cherry, red oak, *Amelanchier*, and yellow birch.

In England the earliest plantation thinnings were made in order to produce better conditions for game. From both the standpoints of good growth and improved conditions for wildlife, thinnings are the most important cultural operation in any dense stands beyond the sapling stage. They are also one of the most neglected measures in our older planted stands as well as in the hardwoods on the better sites. Thinnings have several beneficial

results for wildlife. The trees in thinned stands produce earlier and larger crops of seed; the openings produced by the removal of trees are very valuable, and the opening-up of the stand produces earlier and heavier development of advance growth hardwoods, shrubs, and herbs useful as food by wildlife. Under Harvard Forest conditions, dense white pine stands which have never been thinned are likely to have no advance growth hardwoods before an age of fifty to sixty years is reached, while thinning can reduce this age to around forty years. It is interesting to note that in a study of the winter habits of the white-tailed deer in Massachusetts, it was found that of the eleven most-used species of food plants, nine were found in the older natural pine stands. In variety of these foods, the pine type was surpassed only by old fields which had not yet reached the forest stage, and was equalled by the young hardwood and pine-hemlock types (4).

A conception held by many is that dense stands held to great age without cuttings are the gospel of silviculture and that, therefore, wildlife suffers as a result of forest management. Any forest under sustained yield must have frequent cuttings and the present tendencies toward selective logging and natural regeneration make the creation of many openings even more a part of the operations. Dense, stagnated stands do exist, but their lack of treatment is no more good silviculture than it is good wildlife management.

The planting of conifers is, of course, the forestry practice most often criticized from the wildlife standpoint. All agree that a certain amount of conifers is necessary for wildlife and the effect on game seems to be determined by the percentage of the land planted, the interspersions of the plantings with other necessary types,

the species planted, and the later treatment as described previously. Conifers are necessary as protection for many animals. Winter records have shown a young pine stand to be much warmer during periods of low temperatures than hardwoods or open land and wind movement is, naturally much less in the pine.³ Also, the need for conifers for concealment is obvious. The interspersions can be controlled by careful planning of plantings. In the matter of species used, European experience coupled with observation of what cases we have in the Northeastern states points to the desirability of mixing European larch groups with other conifers on sites where this species grows well (6). This is not only very desirable from a silvicultural standpoint, but, speaking of conditions in Scotland where the important woodlot-using game species is the pheasant, Orde-Powlett says, "European larch, whether planted pure or in mixture with beech or Scots pine, forms a first-rate covert. During the first two or three years it forms an ideal and quiet nesting site, better in every way than the old coppice, and more attractive to pheasants than hedgerows and roadsides. . . . From about the fourth year until the eighteenth or twentieth year—sometimes until the twenty-fifth year—a larch plantation forms the very best type of covert, attractive to pheasants, easily driven, and from which they can be readily flushed. Even when it has passed the covert-forming stage, larch, pure or in mixture, promotes the formation of a type of soil rich in pheasant food, and it may be noted parenthetically that pheasants are a valuable enemy of the larch sawfly" (8). Throughout the Northeast it has been found that as larch stands approach middle age, they develop an herbaceous ground cover. Some of them are even used as pastures (6). Although the pheas-

³Turberville, H. W., Winter relations of the ruffed grouse to the forest in North Central Massachusetts. Harvard Forest, unpub. Ms.

ant is not a forest bird with us, the larch stands are used by the ruffed grouse, and this tree appears to have great possibilities in breaking up the uniformity of plantations of other coniferous species by providing a different set of environmental conditions.

Norway spruce forms cover which, in Scotland, holds the pheasant up till the stand is around thirty years of age, but from the fifteenth year on, it is next to impossible to get the birds out (8). This makes a certain amount of spruce useful under our conditions as escape cover. The cottontail rabbit uses it for a considerably longer period than it does white or red pine and the snowshoe hare feeds on the browse when available.

Where cuttings have been made on the better soils, it is often possible to select groups of good seedling or seedling-sprout hardwoods, planting only the remainder with conifers, thus developing a groupwise mixture.

The part played by fleshy fruits in the nutrition of our wildlife species is only imperfectly understood, but it is certain that, when available, such foods as the wild grape, apple, hawthorn, etc., form a large part of the fall and early winter food of the grouse, pheasant, squirrels, deer, rabbit, and many kinds of song birds. Such food-bearing plants can often be released with little effort from overtopping growth, adding much to the wildlife possibilities of the tract. Where funds are available for reforestation, plantings of food species of the shrub and tree types in groups or along the borders of wood roads, fire lines, etc., are very much worthwhile. Such plantings should be made only with species which are known to hold their fruit locally until it is really needed by wildlife and which are known to be used by the species of wildlife in the vicinity. Fruits, such as some of the hawthorns, which remain firm and bright on the ground until spring are also very valuable. These plantings are

bound to require some releasing from time to time.

One of the things which may not be as critical in other regions as in central and southern New England is the question of control of the kill to keep wildlife populations headed toward full stocking instead of toward a sparse breeding stock too thin to encourage further hunting. What a strong factor this control can be is shown by experience with white-tailed deer on the George Preserve of the University of Michigan. On 1,280 acres of abandoned farm land a planting of two bucks and three does has increased in eight years so that in 1934-35 a crop of 150 animals was taken off and a stocking of 128 left. Whether the population of a given area is increasing or not can be shown only by repeated censuses. The work of the U. S. Forest Service in the Lake States is outstanding in this direction (9, 10).

Aside from the mechanics of forest wildlife work some other things seem equally necessary in personnel and administration. The men who plan and carry out the work must be trained in both forestry and wildlife management and must appreciate the values of both in order to carry out a rational program. All too often one resource is developed totally ignoring the other. This personnel must be able to diagnose conditions for both wildlife and forest species and to visualize the future ecology of both. A research type of mind is necessary in order to continually make observations of value and to interpret their meaning from a management standpoint.

In a technic as young as that of wildlife management, the tendency is always to generalize from limited information gained, oftentimes from a set of conditions quite different from those in question. Fifty miles often separate conditions of climate, vegetation, soils, and stocking of wildlife which are radically different and, in details at least, every area is a

case in itself. Local study is as necessary with wildlife as it has proven to be in forestry.

There is also sometimes a tendency both in forestry and wildlife work to think that a few improvements can be made on an area and that conditions will then continue to be favorable indefinitely. Only by continued operations can we hope to get anything like the best results from cultural work.

Supposed panaceas of one kind or another are much more spectacular than analyses of ecological conditions or improvement of environmental conditions; but when we are told that some measure will solve all the ills of one or more wildlife species, it is best to be skeptical. When we consider the obviously greater value of the fundamental information gained by the biological surveys being carried out by the Conservation Department on the different drainage systems of New York with that resulting if an equal amount were spent, say, on a wholesale stocking of all sorts of waters with legal sized fish, the results in terms of long time recreation for the people of the state are obvious. If good fortune favored the policy, the indiscriminate stocking might produce a greater total catch for a year or two, while the survey shows where the water conditions are such that fish of a particular species can be expected to live, where they can propagate naturally, how much food is available, and hence how many fish can live in a given length of stream, what can be done to improve conditions, what diseases are present, and many other facts, all of which must be known for rational fisheries management.

Forestry has succeeded fairly well in spite of all sorts of simple remedies pro-

posed for its various ills, and we will hope that wildlife management will be as fortunate.

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