QUAIL MANAGEMENT ON FORESTED LAND

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Bobwhite quail populations reached an all-time high during the first quarter of this century. Since the second quarter they have declined in number. During the first quarter practically all of our farming, over most of the bobwhite's range, was done on small farms which resulted in the large proportion of "edge" which filled the life needs for bobwhite. With the advent of clean farming about 1925, and with the more recent increase in mechanized farming, bobwhite is finding it increasingly difficult to fare well on most farm land.

The tremendous increase in cattle production since World War II, through improved pastures, has also contributed greatly to poor living conditions for quail in the South. This is especially true on farm land and other lands subjected to heavy livestock use.

These changes in our land use are also changing the habits of quail. They are using forested land more and more. As a consequence, more hunting is being done in our woods and forests. Farmers, despite the efforts of professional game managers, have not — and perhaps never will — sacrifice their land, time and money to produce quail; nor can they afford to. Sportsmen have not yet been willing to put up the needed money to induce the farmer to lay aside enough of his land for quail or improve the habitat. Indeed, habitat conditions are getting worse.

Modern farming and modern quail management are seldom practiced on the same piece of land. Where else then can we practice quail management?

The bobwhites themselves have given us pointers. Since it is a fact that quail hunting is becoming more and more a woods or forest operation, it appears that we must look to forested land for quail production and management.

Southern forests, like farm land, have undergone great changes. The demands of two world wars for forest products have been great. As a result, most of our forests have been cut-over, some of them several times. Since World War II, it has been highly profitable to practice forestry. A great many landowners throughout bobwhite's main range are now growing trees on land that was formerly small farms. Modern methods of forestry are now intensively and extensively practiced — resulting in more forested land.

Although some forestry practices are not beneficial to quail, we find that many bobwhite management techniques can be applied on a large segment of southern forests with little conflict with forest management. In fact, some management techniques such as burning and strip plowing complement forest management and woodland grazing by livestock. Thus, it appears quail management on forested land offers us a chance to retrieve some of the habitat lost to modern farming and pasture improvement.

On some forest land, of course, quail habitat betterment cannot be practiced without great cost through the loss of timber or the removal of dense stands of scrub hardwoods, nor is quail management practical on forests of all hardwood.

Pine forests or a mixture of pine and hardwoods are the best types for management. A large portion of southern forests are of these types. The longleaf pine *(Pinus australis)* type extending along the Gulf and Atlantic Coasts from Texas to Virginia, including part of Florida, offers great opportunity to combine forestry with quail production. According to Wahlenberg (1946), the original longleaf pine belt covered from 30 to 60 million acres but now comprises only 15 to 20 million acres. This shrinkage was due to clearing for settlements, farming, and to clean cutting.

The rolling longleaf pine lands support an open-type forest interspersed with springheads, swamps, bay galls, ravines, and small streams — a condition naturally suited to quail. Quail can now be found throughout this type land in varying population densities, depending upon the suitability of local areas for the birds. Good populations, frequently the equal of good farm habitat, exist deep in the forests remote from cultivated land. For example, a pre-hunting season census in 1951 at Eglin Field, Florida, revealed a population density of one bird to 6 acres. This area is normally subjected to light hunting. In south central Louisiana on cut-over and forested longleaf pine land, inventories have been made annually since 1947 during the hunting season. The average population density for four years was 1 bird to 20 acres, fluctuating from 1 bird to 10 acres in 1949 to 1 bird to 39 acres in 1947. If a pre-season inventory had been made, the population density would have been higher. Stoddard (1931) found woodland populations of 1 bird to 4 acres. Figures for farm land habitat are not available for the same general areas as those given above but Goodrum (unpublished data), using 200 men on a drive census in 1937 in Nacogdoches County, Texas, found 1 bird to 6 acres. It is well known that on unmanaged farm land quail populations seldom exceed more than 1 bird to 4 acres.

Quail populations on forest land appear to fluctuate in number from year to year to a greater degree than on farm land. On fair to good farm land habitat, wild foods are supplemented by domestic crops which tend to stabilize the population, whereas, on forested land the birds are dependent entirely on wild foods. For example, it is a well known fact that longleaf pine, the seed of which is an excellent quail food, produces a heavy seed crop only one year in seven. The oaks and many others also appear to produce good seed crops in certain years, but little is known about the highs and lows of seed production.

A study of the food habits of 3,053 bobwhites collected on forested land during the fall and winter in south central Louisiana over a 5-year period has shown that they feed heavily on tree and shrub mast, especially *Quercus* spp., *Pinus* spp., and Sweetbay *(Persea palustris).* In years when these species fail to produce normal crops of seed, the quail must depend on a variety of woodland herbaceous plants. Important species are patridge pea *(Chamaecrista* spp.); beggar's lice *(Desmodium* spp.); common lespedeza *(Lespedeza striata);* butterfly pea *(Centrosema* spp.); panic grass *(Panicum* spp.); paspalum *(Paspalum* spp.); goat's rue *(Tephrosia* spp.); milk pea *(Galactia* spp.); nutrush *(Scleria* spp.); and goatweed *(Croton* spp.). The utilization of these plant seeds vary greatly from year to year and from locality to locality. On unmanaged land these species, more often than not, do not provide ample food in late winter.

Good production of wild foods on forested land is determined largely by weather conditions, the cyclic nature of the food plants themselves, and land-use practices such as burning and grazing. Our records show that heavier seed crops

are produced on most of the above species when rainfall is well distributed during the growing season from April to October. There appears to be some exceptions. For example, goatweed *(Croton* spp.) apparently will do well when good rains come during the early growing period, but it can withstand drought in late summer. It is interesting to note that Frye (1948), working on heavily cut-over Caribbean pine *(Pinus caribaea)* land in Florida, found that poor quail crops came when there was excessive rain in summer, which is the reverse of our findings.

In addition to the influence that rainfall seems to have on the plants utilized by quail, our quail population studies indicate that rainfall seemingly influences the percentage of young in the quail population each year. In 1948 there was only 15.6 inches of rainfall during the growing season. Fall and winter wing examinations showed only 59 percent young in the quail population that year. In 1949 there was 30.3 inches of rain during the growing season, and 79 percent young in the quail population that fall and winter. The low production in 1948 was probably caused by a sharp reduction in Vitamin A content of the food consumed during the dry year. Nestler (1946), Nestler, Derby, and DeWitt (1949), and Lehmann (1952) have presented data to show that lack of Vitamin A seriously affects reproduction and survival. Furthermore, their investigations have shown that plants growing under drought conditions produce far less Vitamin A than plants grown with sufficient rainfall.

Although rainfall greatly influences quail food production, land-use practices are perhaps of tantamount importance. Our studies indicate that burning, grazing, plowing, planting, timber cutting and fertilizing all have profound effects on quail and their food plants. Time will not permit a detailed discussion of these land-use practices, but we do know that drought conditions can be mitigated to some extent through habitat manipulation. Our study indicates that burning and plowing helps to reduce heavy grass "roughs" so that good quail plants can thrive. A check for the important forb quail food plants, selected from the quail-craw analysis work, on longleaf pine land shows twice as many stems on one-year burn areas as on four-year grass roughs. Two- and three-year grass roughs supported more quail food plants than did the four-year or older roughs. Likewise, plants grown on burned or plowed strips were more vigorous and better seed producers. As would be expected, a greater variety of green food is produced on burned and plowed ground thus making more Vitamin A available.

Experimental quail management on longleaf pine forest land at the Eglin Air Force Base, Florida, has demonstrated that planted bicolor lespedeza, common lespedeza, and partridge pea will do well under a fairly thick canopy of pine.

Experimental work now being done on the Kisatchie National Forest, Louisiana, indicates that judicious burning and fertilizing can be used to advantage in increasing desirable quail food plants, especially partridge pea, common lespedeza and beggar's lice.

On farm land, wildlife managers are frequently limited in their application of the above land-use practices in the quail management program. But on forest land, the entire acreage involved can be treated with one or a combination of the above techniques without serious conflict with the primary uses of timber and cattle production. Quail on forest land are mostly found along creeks, springheads and adjacent land. They are comparatively scarce on large areas covered with dense stands of grass, especially those areas where woody cover and pine trees are absent, or nearly so. Additional cover and food can be provided in such areas by

plowing, planting bicolor, partridge pea and common lespedeza in strips at about one-quarter mile intervals. It appears that best quail use of an area can be obtained when such strips lead away from the smaller creeks, bay galls and springheads. Strips planted to common lespedeza can be grazed thus benefiting quail and cattle. Partridge pea is eaten little by cattle except when heavily fertilized. Cattle must be excluded during the first and possibly the second main growing season of bicolor after which some of the plants will be out of reach of cattle. Cattle, however, can be expected to cut down on seed yield through browsing of the plants. The pine trees themselves furnish food and create good growing conditions for other quail food plants, especially beggar's lice, milk pea, poison oak *(Toxicodendron quercifolia),* mealy bean *(Strophostyles* spp.), and goat's rue.

CONCLUSIONS

Food-habit studies, ecological investigations of quail food plants, quail inventories and experimental demonstrations on heavily cut-over and forested longleaf pine land show the practicality and feasibility of quail management on this type of forest land. There appears to be less conflict with quail management and forestry and grazing on forest land than on farm land. With the decline of quail on farm land, it seems certain that we must look to forested land to retrieve reductions in quail populations that have resulted from modern methods of farming.

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