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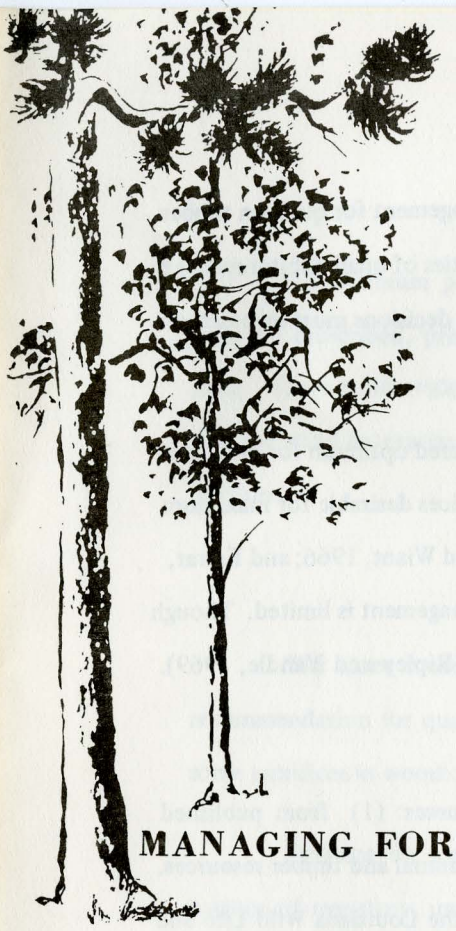

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MANAGING FOR QUAIL AND TIMBER IN LONGLEAF PINE FORESTS

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Coordination of bobwhite quail and timber management in longleaf pine forests involves some compromises. This paper discusses major points of conflict and approaches to adjustment to achieve desirable production of both resources.

The longleaf timber type has always been considered the outstanding habitat for the southern bobwhite quail. The open-growing habit of the stands and the species' tolerance to fire favor the development of a low understory containing many food plants. The patch farming that formerly prevailed provided additional sources of food close to cover. In such habitat, populations of about one quail per acre were common, a level which appears to be near the maximum which can be sustained.

In recent decades, farming in the longleaf pine region has declined, and major areas of open land have reverted to forest. The demand for longleaf pine sawtimber, veneer logs and pulpwood is strong, and wood production on these lands may be worth $10 to $50 per acre annually. Thus, financial interest as well as the public's concern with wildlife and wood supplies requires exploration of the possibilities for dual management.

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To what extent are the two objectives compatible? What are the impacts of management for quail on timber production? What are the costs in reduced timber production from specific intensities of quail habitat management, and their benefits in terms of harvestable quail? Logical land management decisions must be based on answers to such questions.

Unfortunately, such answers are not readily available. Situations considered optimum for quail production have been reported by Stoddard (1931) and Rosene (1969). General practices desirable for maximum production of longleaf pine have also been outlined (Wahlenberg, 1946; Walker and Wiant, 1966; and Farrar, 1968), but information on quail or pine production at intermediate levels of management is limited. Though the mathematical models are available, the input data are lacking in most cases (Ripley and Yandle, 1969).

Source of Information

The information considered in this report was gathered from two sources: (1) from published references, and (2) from consultation with managers and researchers in both the animal and timber resources. Messrs. Dan Lay of the Texas Parks and Wildlife Department; Robert Murry of the Louisiana Wild Life and Fisheries Commission; Walter Rosene, formerly of the Bureau of Sport Fisheries and Wildlife, U. S. Department of the Interior; Lewis Weaver of Kaul Lumber Company; Carroll Perkins of International Paper Company; Roy and Ed Komarek of Greenwood Plantation; Dr. Herbert Stoddard of Tall Timbers Research Inc.; Judge Harley Langdale of Langdale Company; and my Forest Service colleagues at the Southern and Southeastern Forest Experiment Stations shared their experience with me. Some also reviewed drafts of this paper.

Dual Management in the Longleaf Pine Forest Type

Where timber production is the primary objective, longleaf pine is best managed in evenaged stands by clear-cutting or shelterwood systems. Generally the intolerant longleaf tends to be more widely spaced than the other southern pines. Regeneration may be from seed trees, direct seeding, or planting, usually preceded by site preparation involving burning, mechanical chopping, or disking. At least one prescribed burn is usually required to control brown-spot disease before height growth starts. After the trees are 10 - 15 feet tall, burns to reduce fuel and control understory vegetation may be needed at intervals of 3 to 4 years. To produce sawlogs at age 40 to 60 years, one or two pulpwood thinnings after age 15 are desirable. Some stands are not thinned, but are harvested for pulpwood at less than 40 years.

The well-being of bobwhite quail depends on the adequacy of food and cover within the covey range. Suitable habitats are usually occupied by commensurate numbers of birds. Nevertheless, to reach maximum

quail populations some degree of predator control is advisable.

In a forest, cover is usually adequate. The amount of food will be a function of many factors, some of them intricately interrelated. "Pinelands of open, parklike type containing short deciduous undergrowth are often greatly favored by bobwhites, being very productive of important feeds," Stoddard wrote in 1931. He also stated that such woodlands may occupy 50 to 70 percent of the land on some shooting preserves. If the woods are too dense, ground vegetation will not grow and Stoddard recommends thinning. Wahlenberg (1946), quoted Stoddard as saying that dual use of the land for wildlife and timber should be carefully fitted into the natural pattern of open, brush, and wooded areas. Obviously, the silvicultural measures applied to the forest will largely determine not only its timber output but also its productivity for quail (Stransky and Halls, 1967).

Recommendations for improving and maintaining the food production of quail ranges usually include: (1) supplemental feeding, (2) restriction of cattle grazing, (3) prescribed burning and (4) reduction of growing stock by cutting. The general expectation is that these measures do increase quail numbers, but there are few studies that actually show their effects (Burger and Linduska, 1967). Since each of these measures is more or less unique in its effect on timber production, as well as on the abundance of quail, it is desirable to consider them individually.

Supplemental Feeding

Food plots, usually consisting of annuals and perennials in strips, are widely advocated to supplement quail foods available from woodland, even where habitat is relatively favorable. Plantings generally are of kobe or bicolor lespedeza and brown-top millet, and are intended as food supplements from late fall to early spring. Food plots also improve hunting, since coveys tend to concentrate in their vicinity.

Quail habitat was optimum in woodlands intermingled with patch farmlands, as was common prior to 1940. Weedy fields and fallow and abandoned cropland afforded food in abundance. Under such conditions, "food plots" may have occupied up to 25 percent of the habitat (Stoddard, 1931). This, however, may have oversupplied the food needed for a maximum sustained quail population. Lay (1952), who was concerned mostly with improving quail habitat on farms, advocated fallow plowing of fields and firelanes (along with prescribed fire, cover plantings, and food plots). He stated that quail need to be considered on less than 5 percent of the acreage; good populations can be produced where the rest of the area contributes little more than cover. This figure might serve as a guide in accommodating quail in forests. The 5 percent of the area to be devoted to food production could be spaced out in small plots and disked or plowed annually. Several large

quail preserves maintain only one food plot, of 1/8 - to 1/4 - acre, for every 40 acres of woodland, or 0.3 to 0.6 percent.

Mechanical site preparation and disking of firelanes retard sucession and thereby also favor plants suitable for quail (Rosene, 1969).

Food plots support no trees, and hence reduce timber production approximately in proportion to their area. If food plots for optimum quail production range from less than 0.3 percent to about 5 percent of the forested acreage, their cost to timber production should not exceed these levels. If their area can be met in part by firelanes and other necessary permanent openings, it should be proportionately less. Even on quail preserves that provide adequate food for maximum quail production, cost to timber production should be well under 1 percent of full potential tree growth.

Restriction of Cattle Grazing

Livestock compete directly with quail for food and also tend to impair cover for escape, roosting, and nesting. They consume grasses and other plants, and reduce their seed production. For optimum quail production, elimination or heavy restriction of cattle grazing is usually recommended. Since even heavy grazing does not usually eliminate quail, it can perhaps be assumed that, if other factors are held constant, quail habitat should improve somewhat in proportion to forage left unused. Thus a cattle reduction which doubles the unused forage may double quail populations on range where food is critical.

Livestock usually have little effect on pines, although their browsing tends to reduce development of understory shrubs competing with pine growth. Forest grazing is a marginal resource, bringing little or no direct income to most woodland owners. Any income from lease of grazing rights is small in proportion to the value of timber products. Restriction or elimination of grazing would appear to cause no reduction in timber growth and little revenue loss. Other than the expenses incurred for control, grazing reduction is not likely to increase costs of growing timber.

Prescribed Burning

For optimum quail food production, prescribed fires at about 2-year intervals are generally recommended. The important thing is to burn often enough to prevent heavy growth of brush that interferes with the legumes and other forbs on which quail depend. Late winter burning, which is best for quail, would be compatible with silvicultural needs within the limitations of suitable burning weather.

For optimum production of longleaf pine after trees reach sapling size, fires at intervals of 3 to 5 years are prescribed, primarily to prevent excessive fuel accumulation and establishment of a woody understory. There is no evidence that more frequent controlled burning would reduce tree growth. Assuming then that the quail enterprise would bear their cost, additional burns for quail would involve no cost to timber production.

Reduction of Growing Stock

The three measures so far discussed have only a slight impact on timber production. The fourth recommendation for quail management - - that is to maintain the forest in open condition - - probably entails some sacrifices in wood output.

Drawing on long research and managerial experience, Rosene (1969) emphasizes that a delicate balance of overstory, understory, and ground cover is necessary for good quail management. His best indicator of tree density is the number and kind of plants growing beneath the overstory. He recommends that best quail habitat carry at least 30 percent less tree basal area than is usually advocated as full silvicultural stocking. On average to poor sites he suggests that basal areas should be near 60 square feet per acre.

Farrar (1968) studied production of longleaf pine in stands of various densities. He showed that on average sites near maximum volume growth can be attained in stands with 60 to 80 square feet of basal area. His results generally confirmed earlier studies by Evans and Gruschow (1954) and Gaines (1951). Farrar's (op. cit.) investigations also show that growth rate does not necessarily vary in proportion to the amount of growing stock, and that above about 60 square feet per acre volume growth increases only slightly with increased stocking.

Though perhaps less so than for loblolly or slash pines, short rotations and relatively wide tree spacings seem likely to become characteristic of longleaf pine silviculture. Commercial plantings at spacings of 6 x 8 or 8 x 10 feet provide no more than 544 or 900 trees per acre. Stands with site index 80 may average 655 trees and about 70 square feet of basal area per acre at age 30 years; if cut at that time they should yield about 36 cords of pulpwood (Wahlenberg, 1946; and Walker and Wiant, 1966).

The effect of stand reduction for quail will depend largely on what level of growing stock provides optimum habitat. If the optimum is not below the level at which sites are fully occupied, stands may respond

by adding the same total growth to fewer trees. If quail require a lower level of pine overstory, the reduction would curtail output of wood. Here, essentially, is the area where compromise is necessary, and land managers require data on which to base decisions. If 60 sq. ft. of basal area is the maximum for optimum quail habitat, and 80 sq. ft. is the minimum for near optimum wood growth, how many quail would be produced at 80 sq. ft.? How much wood at 60 sq. ft.? How much of each at 65 or 75 sq. ft.?

Short Rotations

In the absence of defined optima for either timber or quail production, it is helpful to consider the opportunities for quail under two extremes of management for timber. A longleaf pine forest managed for sustained yield of pulpwood in evenaged stands with a rotation period of about 30 years may be considered as one extreme. In such a forest, about 1/30 of the area would be harvested each year. The cutover site would be prepared by burning and probably by mechanical treatment, and promptly reseeded or planted to pine.

Rosene (1969) suggests that quail habitat would be adequate only in the first or second year following harvest. The loblolly-shortleaf pine type tends to restock more rapidly than longleaf. Working in this type in Texas, Lay and Taylor (1943) found quail most abundant in the third to the ninth year after timber harvest. Quail declined to near zero in tall, thick stands over 15 years old.

Normally, height growth of longleaf pine will not begin until the third or fourth year, and some four or five more years will elapse before the closing crown canopy reduces understory growth to negligible amounts. Thus, during the 30-year cycle, the regeneration period provides essentially open conditions for some 6 to 10 years. Thereafter the stands would generally be closed. They would still provide cover for wildlife but food would be limited, since the understory would be sparse and the pines too young to produce seed.

For at least half of the 6 - to 10 - year regeneration period, the habitat under optimum evenaged silviculture probably is near optimum for quail; during the year of cutting, and the last 2 to 3 years before crowns close the habitat is perhaps half as effective. Thus, if cutting areas are well located, optimum silviculture on a 30-year rotation should keep at least 10 percent of the land in full production of quail food, plus 10 percent in partial production.

Size and location of cutting areas will largely determine whether these openings support optimum quail populations. Rosene (1969) suggests that timber cutting should be avoided during the hunting and nesting seasons. If very extensive stands of dense pine eliminate quail over large areas, isolated cutting areas

will be reoccupied too slowly to make effective use of the favorable habitat. If regeneration areas are too large, and site preparation is intensive, only the margins may be habitable, the interior being unoccupied for want of adequate cover. A major step towards dual-purpose management would be to schedule regeneration cuttings in blocks small enough to afford adjacent quail cover, and located so as to disperse areas of favorable habitat widely throughout the forest property. Such a step should not reduce the area in effective timber production. The major costs would stem from whatever reduced efficiency in field operations might result due to smaller and more scattered regeneration areas.

Sawtimber Rotations

Management of longleaf pine for sawtimber and other large products is another possibility. Here rotations may be up to 60 or 80 years, and thinnings would be made at 5 - to 10 - year intervals.

Regeneration would require about the same site preparation and regeneration period as for shorter rotations, although more dependence might be placed on natural seed sources. A much smaller proportion of the area in the regeneration stage at a given time would afford less quail food, but there would be periodic thinnings. These will tend to increase ground vegetation, including quail food plants; repeated heavy thinnings, with prescribed burning, can produce the "open, park-like stands" recognized as ideal quail habitat.

Farrar's (1968) findings suggest that near optimum timber growth is possible at growing stock levels not far above those suggested for optimum quail range. Although more detailed study may indicate a need for some adjustment, it seems likely that silvicultural thinnings under such management may provide high quality habitat on at least as large a proportion of the forest as will be available under short rotation.

Research Needs

It seems probable, then, that without sacrifice of growing stock or timber production, but with control of cattle grazing and silvicultural prescribed burning, longleaf pine forests can be managed so that at least one acre in 6 or 7 is highly productive of quail food at any given time; over most of the remaining acreage frequently burned pine stands would afford additional unevaluated quail range. The productive range would be at least 30 times the proportion in game food plantings on most managed quail preserves; food and habitat might equal or exceed the needs for optimum quail stocking. Reduced timber stocking would be justified only if it were determined that this percentage of land in optimum quail food production is insufficient to support optimum quail populations.

Land managers need quantitative data in both the silvicultural and quail habitat fields. Most urgently required is information on:

(1) Quail populations or quail food production as affected by overstory density, especially in the range between 40 and 80 square feet of pine basal area per acre.

(2) Quail potential under various levels of cultural operations, cutting, site preparation, and burning.

(3) Longleaf pine growth rates, as affected by tree age, size and stand density, especially for trees 6 to 15 inches dbh and in the density range from 40 to 80 square feet of basal area per acre.

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