THE USE OF FIRE IN QUAIL MANAGEMENT

WALTER ROSENE, JR., U. S. Fish and Wildlife Service, Patuxent Research Refuge, Laurel, Maryland located at Gadsden, Alabama

Proc. Annu. Conf. Southeast. Assoc. Game & Fish Comm. 8:116-120

Fire has been a factor in the hunting of American wildlife for hundreds of years. DeSoto, on his journey through the Southeast in 1539, found Indians frequently using fire to flush game from the woods or canebrakes. Fire was also used regularly by Indians to drive game into favorable places for the kill.

Although burning by Indians was practiced as an aid to hunting rather than for habitat management, it undoubtedly resulted in maintaining areas of open forest which permitted quail to survive in the absence of extensive logging and farming. The use of fire in the United States primarily in the interest of game management is a relatively recent development. Stoddard was one of the first in this country to recommend burning for quail management. He clearly differentiated between wild fire and controlled burning, recognized that burning should not be too severe, and that the primary use for which the land is managed should receive top consideration in determining local policy concerning burning. He also pointed out that timber species differ in resistance to fire, but indicated that some stands, notably longleaf pine, could be burned so as to yield benefits to both forester and game manager.

In 1947, the Fish and Wildlife Service undertook the task of appraising the wildlife values of certain land-use practices advocated by the Soil Conservation Service. On study areas selected for this work there was widespread employment of fire to improve and maintain quail habitat and thus excellent opportunity existed for appraising its varying effects upon quail populations.

Seven areas were selected for this study. Three of these areas, totaling 4,331 acres are located in Alabama, and four aggregating 5,893 acres are situated in South Carolina. Two of the Alabama areas are in the Black Belt soil province and the other five study areas are in the Coastal Plain. Each area is part of a large quail preserve where owners, members and employees cooperate in taking the winter quail census and in establishing management practices. Numbers, rather than plantation names, are used to designate areas to avoid unwanted publicity. Production of timber was given consideration in each of the areas studied, but forestry practices generally were modified in the interest of quail production.

EFFECTS OF BURNING

Alabama 1 and 2

These semi-open areas are located in the Black Belt, where with management it is possible to maintain relatively high quail populations. Most of the soils are alkaline, and native legumes grow in abundance. The topography is gently rolling, with sufficient surface drainage, but imperfect internal drainage on many soil types. Approximately one-half of each area is covered with pine, and the remaining land is in fields. The predominant pine is loblolly *(Pinus taeda).* Trees are

distributed irregularly in blocks or wood lots with little understory. Comparable amounts of land are tilled by tenants on each area.

In the winter of 1948 - 49 the quail population per 100 acres on Alabama 1 was 3.70 coveys and on Alabama 2 it was 3.27. Since then the two areas have received different treatment. Spring burning from 1949 through 1954 was neglected on Alabama 2, because of heavy work schedule while on Alabama 1, a full burning program for quail management was carried out during the entire study period. Practices used on Alabama 1 included the disking of strips approximately 30 feet wide through broomsedge *(Andropogon virginicus)* fields and subsequently burning between alternate strips. The burning program was carried out each spring between February 20 and March 15. This treatment permitted selected burning of from 40 to 60 per cent of the area.

By the winter of 1953 - 54 the quail population on Alabama 1 had increased from 3.70 to 4.36 coveys per 100 acres. The vegetation and general appearance of that area was largely unchanged throughout the six-year observation period.

In the absence of fire on Alabama 2, ground cover became thick, native legumes decreased and the number of hardwood sprouts increased. By the hunting season of 1953 - 54 the quail population had declined from 3.27 to 0.65 coveys per 100 acres. It was difficult for dogs to hunt the area and the coveys of quail were hard to find.

Alabama 3

This area of 3,360 acres is mostly in timber, with approximately 15 per cent of the entire tract consisting of open, cultivated fields. The fields are not uniformly distributed through the area; most large fields being in one part of the plantation with only small level areas cleared in the remaining woodland. The rolling and rough topography makes it difficult to disk strips through the area. Therefore, on this area fires sometimes get out of control because of insufficient firebreaks.

Keeping stands of timber sufficiently open is a major problem in woodlands managed for quail. Loblolly, the predominant pine species, seeds well on this plantation. Fire exposes the soil and results in a thick growth of seedlings so that a second burning is necessary to thin the stand. Under these conditions, production of quail has averaged 2.36 coveys per 100 acres for four years out of the last five. During the other year, uncontrolled fire in the spring burned most of the plantation and quail production was cut almost in half.

Late burning apparently has depressed the quail population below expectations in four of the last five years. Age determination of juveniles has shown that a large segment of the population has hatched late in summer, indicating either a shortage of nesting cover in the spring and early summer or a loss of early nests. Judicious use of fire is one essential in quail management on this plantation; excessive use has been demonstrated to be detrimental to quail.

South Carolina 1

Management practices have been much the same on this area since 1949. Each year a part of the area has been burned, but the extent and intensity of burning has been insufficient to yield maximum benefits as a quail management practice.

The fall population in 1949 - 50 was 2.62 coveys per 100 acres, following a low of 1.82 the preceding year, and by 1953 - 54 had declined gradually to 1.94. The drop was attributed to increase in cover density. Had fire been eliminated entirely from this area, the quail population undoubtedly would have become so low in a few years that hunting would have been discontinued.

No timber management practices other than controlled burning were carried on during the study. The amount of tilled land increased in 1949, when parts of many of the broomsedge fields were broken up. This probably contributed to the increase in that hunting season, although there were declines in the following years.

South Carolina 2

The land-use on this plantation changed more than on the other study areas. In 1948 - 49, the area was managed in the interest of quail as well as for timber and farm products. Fire was used judiciously in the woodlands, and open fields were cultivated under the old system of tenant farming.

Since then, the system of land-use has not been conducive to quail production. One-half of the area was devoted to timber production only and the other half to pasture and cropland. Open fields on the timber side were all planted to pines. All trees, except a few for shade, were cut on the other tract. Brush was cleared, and the largest part of this half of the plantation was in the process of being established as improved pasture. The remaining fields were reserved for cropland. Fire was excluded from all parts of the plantation.

Quail populations on this area in the fall, 1950, consisted of 2.43 coveys per 100 acres. By the 1953 - 54 hunting season they had declined to 0.81. The timbered part has become too dense to be desirable for quail nesting in summer, and winter populations are low. The farmed half still contains coverts suitable for nesting, but by winter the birds hatched there move onto adjoining land where ample food is available.

Lack of controlled burning was doubtles one of the factors which contributed to the decline of quail. With proper burning in the woodland part of the plantation it is probable that higher quail populations could be maintained.

South Carolina 3

The history of this tract helps explain why its population has fluctuated. Several years before the present study was initiated the plantation was logged, a practice which usually produces good nesting and food conditions, as it opens up the area. Records show that a large number of quail coveys were present following the removal of timber. Subsequently, most of the area has been kept in woodland as only soils around the edge are suitable for cultivation. A thick stand of second growth stems followed logging operations and quail populations declined to 1.13 coveys per 100 acres by 1949 - 50. Some pulpwood was removed in subsequent years, but not enough to open up the forest and make it desirable for quail.

Such burning as was done intentionally did not thin the vegetation sufficiently to produce desirable quail environment. However, in the spring of 1950 a wild fire swept through the area. In the fall of 1950 quail population remained at the 1949 level but in the fall of 1951 it increased to 2.07 coveys per 100 acres. In 1952 - 53

the population further increased to 3.40. On this area it appeared that fire opened up a second growth woodland and made it more desirable for quail.

South Carolina 4

On this plantation fire has been used to excess and populations have declined because of lack of nesting cover. The central part of the area consists of wet pineland with cultivated fields around the periphery. Each spring, the manager attempts to burn as much of the area as possible with the idea that undesirable vegetation will be suppressed. Though in normal years the vegetation on the wetter soils does not burn, the years of 1952 and 53 were abnormally dry and spring fires swept through the entire tract. In 1951 - 52, there were 3.40 coveys per 100 acres, in 52 - 53, 2.12, and in 53 - 54, 1.92.

SUMMARY AND CONCLUSIONS

1. On two areas, annual controlled burning was an important factor in maintaining high quail populations.
2. On one area not subjected to burning for three years and on another for five, quail declined 66 to 80 percent respectively.
3. Fire used to excess on one plantation was the important factor contributing to decrease in quail populations over a three-year period.
4. On one area a heavy burn in a woodland, too thick to support more than a meager number of birds, resulted in an increase in quail numbers.
5. On one area which was relatively open and maintained so by fire, excessive fire one year cut the population in half the following winter.

High production of quail depends upon a number of factors. To increase the population, the game manager must determine the most important limiting factor and the best way to overcome them. Where food and cover conditions need correcting, controlled fire can oftentimes be used to advantage. On the other hand, if improperly used, fire can be seriously detrimental.

ACKNOWLEDGMENTS

The cooperation of plantation owners, managers, guides and helpers made this study possible. Even though they remain anonymous in this manuscript their invaluable assistance deserves especial recognition. Dr. Alexander C. Martin, Mr. A. L. Nelson and Dr. Frederick H. Dale of the Patuxent Research Refuge, Laurel, Maryland, read the manuscript critically and offered valuable suggestions.

LITERATURE CITED

Allen, D. L. 1954. Our wildlife legacy. Funk & Wagnalls Co., New York, N.Y. 422 pp.

Frye, O. E. 1954. Aspects of the ecology of the bobwhite quail in Charlotte County, Florida. Ph.D. thesis. Dept. of Biol., Univ. of Fla., Gainesville, Fla. 364 pp.

Stoddard, Herbert L. 1931. The bobwhite quail. Its habits, preservation and increase. Charles Scribner's Sons, New York, N.Y. 559 pp.

Stoddard, Herbert L. 1936. Relation of burning to timber and wildlife. N. Amer. Wildl. Conf. 1: 399-403.

Stoddard, Herbert L. 1939. Cooperative Quail Study Association. 7th annual report 1937 - 38. 31 pp.

Swanton, John R. 1946. Indians of the southeastern United States. Smithsonian Inst., Bureau of Amer. Ethnology, Bull. 137. 943 pp.

Wahlenberg, W. C. 1946. Longleaf pine. Its use, ecology, regeneration protection, growth, and management. Charles Lathrop Pack Forestry Foundation, Washington, D. C., 429 pp.