Summary

Improving the environment is the most certain way to increase the size and the stability of quail populations. Good tall grass nesting cover in early spring when weather conditions are most favorable for breeding is a common habitat deficiency. Where nesting cover in the form of grass clumps (averaging 8 inches tall and 12 inches in diameter) were 250 to 500 or more per acre, breeding populations were high—one quail per 4 acres. Early yield also was high (one brood per 15 to 34 acres), as were fall populations (one quail per 2 to 4 acres). Woody cover, native seed-producing forbs, improved water facilities and protection from hunting in February are other management considerations.

What You Can Do

If you ranch in the gently rolling, semi-arid plains bordering the lower Rio Grande, chances are good that your property supports one and perhaps two kinds of quail: the Texas bobwhite (Colinus virginianus texanus) and the chestnut-bellied scaled or “blue” quail (Calipepla squamata castanogastris). In this brief discussion I shall emphasize the general needs of bobwhites. With appropriate qualifications, generalizations will hold for blues also.

Both bobwhites and blues are favored game birds. Both can be sources of additional income. Good quail lands in Texas currently lease to hunters for about $2.50 to $6.00 per acre per year.

The only quail management programs which withstand testing in the hard crucible of time are those which emphasize improvement of the environment. Also Leo, the father of game management in North America, knew this when he wrote:

If there is any breeding stock at all, the one and only thing we can do to increase a crop (population) is to make the environment favorable. This is a mathematical axiom which holds true for all classes of game at all times and places. It is a fundamental truth which the conservation movement must learn if it is to attain its objective (Leopold in Allen 1962).

Knowing that the only way to increase quail is to improve the environment is one thing. Knowing what actions are most likely to produce best results, however, is something else. Management is especially difficult when the basic limitations are climatic.

The effects of the sometimes salubrious and sometimes harsh southwestern climate clearly show in population size. "Highs" are usual in years when rainfall is atypically generous; population "lows" accompany drought. Droughts of varying duration and severity are common in the region (Lehmann 1969). Can we possibly reduce their impact? I believe we can, especially by helping quail to breed more successfully before the dry, oven-like conditions of mid-summer set in.

For quail in the southwest, early success is especially crucial. Average annual rainfall is only about 25 inches.* Bobwhites fare best where annual rainfall is much higher—more than 40 and less than 63 inches (Vischer 1950 in Rosene 1969). Reproduction is most successful where air temperatures, April through August, average 32 degrees C (90 degrees F) (Roseberry and Klimstra 1984). By July, temperatures in South Texas average 35 to 37 degrees C (95 to 98 degrees F). Daytime highs exceeding 38 degrees C (100 degrees F) are not unusual. Near Laredo in 1979, afternoon temperatures exceeded 38 degrees C for 49 consecutive days. Dry, hot weather jeopardizes every phase of the reproductive process—egg laying, incubation, hatching, renesting and survival of young (Case 1972, Rosene 1969).

Rainfall in South Texas, however, normally produces two relatively "wet" periods. The first is from May through June when 4 to 9 inches of rainfall are normal. The second wet period, 4 to 8 inches, is in early fall, around September and October. Management seeks to derive greater benefit from the rains falling in May and June (18 to 31 percent of annual total). Quail cooperate by nesting early if they can.

As Herbert Stoddard (1931) wrote many years ago, males first show interest in hens during warm spells in early February. In early February, of course, virtually all quail are living in coveys. Stoddard suspected that the exchange of birds between coveys accelerated in February. Banding studies in South Texas proved this to be true (Lehmann 1984). Sex ratios within individual coveys were more even, a condition which facilitated pairing before coveys subsequently disintegrated.

* Unless otherwise stated, meteorological data were obtained from the U.S. Weather Bureau records as summarized in The Texas Almanac, State Industrial Guide and The Atlas of Texas.
Usually by late February, certainly by early March, newly formed pairs were still living in coveys. A growing desire for privacy was apparent; however, pairs rested increasing distances from parent coveys in midday. By mid-March, spirited fighting resulted when pairs and covey nuclei were forcefully bunched, as for drive-trapping.

The fall shuffle, that period in early fall when coveys move about extensively in search of adequate winter quarters, is well documented (Stoddard 1931; Leopold 1933; Lehmann 1984). Less well known is a companion phenomenon – dispersal from winter territories in early spring (Lehmann 1984). During spring dispersals, quail on our study areas moved from brushland to semi-prairie. Several factors probably influenced that movement. Predators were less numerous in the semi-prairie and newly sprouted leaves on mesquites (Prosopis glandulosa) and granjeno (Celtis pallida) improved protection. In comparison to brushy range, semi-prairie offered more food in the form of winter weeds. Where did March-moving bobwhites anchor when spring dispersal was over? The highest nesting densities, one bird per 4 acres, were in semi-prairie where satisfactory nesting cover was most abundant.

In the Canelo Pasture of King Ranch, the best nesting cover was where bluestem grass (Schizachyrium), balsam (Elyonurus) and giant needle (Aristida) numbered 150 to 500 clumps per acre. The clumps averaged 8 to 9 inches tall and 12 inches in diameter.

Range grasses do not grow 8 inches tall by March. To be satisfactory for early nesting, therefore, grass cover must be carried over from the preceding year. Ranchers who graze conservatively have nesting cover in March when the weather is most favorable for nesting. Resulting benefits are likely to continue beyond nesting time.

A logical question asks if high breeding populations of tall grass range reproduced well. The answer is that early production in tall grass range was higher than anywhere else. By mid-summer, broods averaged one per 15 acres in 1949, one per 15 acres in 1950 and one per 33 acres in 1951. It may be remembered that 1951 was the most severe year in the "big" drought of the 1950s.

High summer densities do not inevitably persist to hunting season. But those of our study areas did, and with remarkable regularity. The tall grass semi-prairie with mid-summer densities averaging near one quail per acre in late July had autumn densities which averaged one per 2.5 acres in 1949, one per 0.9 acres in 1950 and one per 3.7 acres in 1951. On the basis of data collected over 18 breeding seasons, 1940-1975, early-hatched quail comprised 92 percent of hunting season populations (Flatalik and Lehmann, unpublished data).

Research findings indicating the importance of early breeding on the King Ranch were reinforced by studies elsewhere. On the basis of an 8-year study in North Central Texas, 1962-1967, Gore et al. (1970) found that 9,096 of the young quail in hunters' bags hatched by July 15. Cooke (1977) found that 90 percent of the quail harvested on the Chaparral Wildlife Management Area in LaSalle and Dimmit counties, 1973-1975, were on the ground by the end of July. In 1943, at the end of two seasons of study in Jim Hogg County, I wrote, "A successful spring nest produced about 14 chicks, a summer nest about nine and a late summer nest only seven. Late nests, therefore, produced only half as many young as did early nests." This constitutes a potent argument for management for high early production. Nothing before or since has caused me to modify that view.

On our study areas on King Ranch, tall grass range – bluestems, balsam and giant needle grass – were 50 to 85 percent of the plant community. In medium grass range, tall perennial grasses were 8 to 15 percent of the cover. In short grass range, tall perennials were 10 percent or less of the ground covering.

Although some tall grass cover is virtually essential for high quail reproduction in spring, medium and short grass cover also are needed. Quail range most likely to be continuously satisfactory, in fact, has tall grass "islands" about 5 to 15 acres in size scattered among medium and short cover islands of similar size. On King Ranch, where tall grasses dominated over 50 percent of the total area, quail populations were highest and most stable. Medium grass occurred over 40 to 60 percent of the total area, and the short grass over 10 to 15 percent. More research is desirable, but the above proportions of total range in tall, medium and short grass, well interspersed, seems a good mix to aim for.

In addition to tall grass, quail also require woody cover. Deep shade, as provided by tall mesquites, granjeno and huisache (Acacia farnesiana), become increasingly important as spring changes to summer. By late summer, when the first winter hawks begin arriving, and through to the following April, low, densely branched shrubs are highly important for their protection and good visibility. The best nesting territory on King Ranch had at least one good shade area per 8 acres and at least one headquarters covert per 25 acres. The canopies of these woody plants, covering 2.5 to 5 percent of the total area, hardly competed seriously with the grass resource.

In the bobwhite winter range, good quality herbaceous cover substitutes to a degree for sub-par woody cover and vice-versa. In the droughty southwestern environment, however, woody cover is the most dependable habitat component. Anyone planning additional brush control would be wise to save necessary woody cover in strips or mottes along fence lines, along drainageways, surrounding wet-weather lakes and low spots, on hill tops and wherever else quail are desired as permanent residents. And while 2.5 to 5 percent of land in woody cover may suffice for bobwhites, 30 to 40 percent of total acreage in brush is desirable for deer, javelina and wild turkeys.
Quail, naturally, cannot live by cover alone. Pastures must also offer an adequate year-long food supply. If the soil is sandy or sandy loam and the grazing animals are cattle and horses, chances are good that the food needs of quail are already largely satisfied.

If choice winter foods such as goatweed (Croton), partridge pea (Cassia), ragweed (Ambrosia), sunflower (Helianthus) and horsemint (Monarda) are inconspicuous, they may be increased readily by strip plowing or by spot burning in fall or winter. Supplementary feeding may be necessary in times of severe drought, but we fed quail on one part of the King Ranch only once in 26 years (winter of 1950-1951). Widespread feeding in recent times is not so much to help quail through the winter, but rather to concentrate quail for easier killing. New Mexico prohibits supplementary feeding because of abuse; I often wish for stricter control in Texas.

On the premise that quail are fully able to satisfy water needs with dew, moisture from water-rich fruits such as ripe cactus tunas and from insects, water development has been largely ignored as a management tool. Recently, however, interest has increased. Many ranchers are modifying livestock troughs and storage reservoirs to provide wildlife drinking and bathing facilities at ground level (Lehmann 1984). The low price of plastic lines has stimulated some to pipe water from wells miles away. Encouraging early results will be followed with great interest. A word of caution, however: well water should be tested to determine its salinity. Unlike cattle, quail are reluctant to drink brackish water.

The question of predator control invariably arises wherever quail management is considered. Coyotes, raccoons, opossums and skunks (principally broad-striped) are efficient nest predators which should not be encouraged where high quail populations are wanted. The most effective way to avoid excessive predation on nesting quail, however, is to provide good nesting cover early, in time for early nesting and renesting if necessary. If and when intensive predator control is called for, landowners should solicit the services of government predator control specialists. And in this age when virtually anything is being transplanted that hunters will pay to shoot, it is wise to remember that feral hogs are also nest predators.

As usual when native quail populations are local, pressure develops for planting pen-reared quail. Those who desire to perpetuate healthy native bobwhites should avoid introducing inferior mongrel stock. Hatchery quail do little or nothing to speed the recovery of wild populations; in fact, they may introduce disease. Both avian pox and blackhead now occur in wild quail in the southeast after releases of pen-reared stock (Davidson et al. 1982).

A growing army of hunters paying ever-higher prices for hunting leases – and landowners who do not wish to further cripple the goose which lays golden eggs – are asking an increasingly pertinent question: How many quail can be harvested from a ranch of known size without jeopardizing population levels in the following year? For semi-arid rangeland, we presently cannot provide a good answer.

On the ranches and plantations I have studied, maximum possible harvest was never the primary objective. Harvest, carefully adjusted to actual availability on the basis of quarterly censuses, was calibrated to remove no more than 40 to 60 percent of total fall population. If an error was to be made, it should be on the side of taking too few birds rather than too many.

We were aware, of course, that quail cannot be stock-piled indefinitely (Errington and Hammerstrom 1936:301-443). We also knew that the annual turnover rate in quail, as largely indicated by wing studies, is high (70 to 80 percent) (Rosene 1969). But as Starker Leopold (1977) emphasized, adult to young ratios, as indicated by quail wings, tell little or nothing about the actual size of the population. Nor do wings tell us how many quail, if any, can be safely removed.

Until much more is known about actual sizes of pre-hunting and post-hunting populations, generalizations to the effect that "Hunters can't hurt a quail population," "Most quail will be wasted if not shot," "Fully 90 percent of all quail die by December," etc., should be taken for what they are – overly simplified half-truths.

Having long considered wing shooting with bird dogs the ultimate hunting experience, I feel sympathy for those who measure the success of a hunt (or the value of a hunting lease) on the basis of numbers of birds slain. As a sportsman and as a landowner, I frankly am uncomfortable with hunting regulations which allow quail to be shot on the ground, from vehicles or on baited private roads. I especially question the wisdom of allowing quail hunting to be continued through the last weekend in February. We know that early breeding is crucial for high annual production in semi-arid lands. After viewing the advanced development of quail reproductive organs in February, 1985, many thoughtful sportsmen voluntarily stopped hunting. Until thoroughly sound research proves that quail hunting in February is not a sound practice, it is hoped that others will follow their lead.

**Literature Cited**


