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Home range size for white-tailed deer can be from 60 to 800 acres or more.

Quail need vegetation less than 6 inches tall for roosting.

Turkeys prefer to nest in rangeland in high conditions.

Integrating deer, quail and turkey habitat

Robert K. Lyons and Tim F. Ginnett*

Many wildlife enterprises today are interested in managing for more than one species. However, when managing for more than one species, no one species can be maximized because some habitat needs cannot be provided simultaneously. To be successful in multi-species management, land holders must understand the habitat needs of all desired species and plan carefully. With proper management, white-tailed deer, bobwhite quail, and Rio Grande turkeys can be integrated into one wildlife enterprise.

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White-tailed deer

Habitat

Good white-tailed deer habitats contain three key elements:

- Water;
- Nutritious forage in the form of browse (tender shoots, twigs and leaves of trees), forbs (herbs other than grass), and mast (hard fruits such as acorns and mesquite pods); and
- Cover.

Deer select their home ranges to include all of these key elements. Home range size for a single deer may be as small as 60 acres or as large as 800 acres or more. Does typically have smaller home ranges than bucks.

Water

Of all the nutrients important to deer, the most critical is water. Deer obtain water from three major sources: vegetation, metabolism and surface water. Vegetation may contain as little as 10 percent or as much as 75 percent water, depending on the kind of plant, temperature, time of year, and amount of recent rainfall. The metabolism or breakdown of carbohydrates, fats and proteins inside the animal also releases water. However, deer rarely can meet their water needs solely from vegetation and metabolism.

A good deer habitat contains accessible, well-distributed, reliable sources of surface water. The amount a deer needs each day depends on the outside temperature, the animal's physical condition, and the amount of water it gets from vegetation and metabolism. For example, lactating does can require more water than bucks or non-lactating does.

Forage

The diet of white-tailed deer in Texas is varied and changes with the seasons (Figure 1). They prefer forbs and mast, which are highly seasonal and can vary greatly from one year to the next, depending on precipitation. Throughout the year, however, the nutritious shoots and leaves of woody browse plants constitute the staple portion of the diet.

Hiding cover is especially important during fawning season.

Good deer habitat provides plenty of all three preferred food types, forbs, mast and browse. Because forbs produce better in open areas, the habitat should contain a mosaic of brushy and open areas, with between 40 and 60 percent in clearings.

Cover

Deer need cover where they can hide and escape from predators, and where they can be protected from the elements. Fortunately, the same browse species that provide deer with a stable food supply can also serve as hiding cover, particularly if there are dense mottes (scattered clumps of trees or shrubs) or thickets. Larger trees such as mesquite or oak can provide needed shade during hot weather.

Hiding cover is especially important during fawning season, when does leave their fawns hidden while they go off to forage for themselves. Water sources and clearings also should have high-quality cover nearby. Good cover is essential along drainages and creeks, where deer travel heavily.

Management guidelines

Woody cover

To encourage forb production, try to maintain at least 40 but no more than 60 percent of your land in clearings. The best way to create clearings for wildlife is roller chopping. Although shrubs grow back faster after roller chopping than other methods, this is really an advantage because shrub regrowth offers better nutrition to the animal and provides hiding places for fawns and nesting sites for birds.

Rootplowing is much less desirable because it lowers the diversity of shrub regrowth. If roller chopping is not an option, disking is probably the next best choice because it encourages the regrowth of more kinds of shrubs.

Whichever method you choose, it's best to leave irregularly shaped openings no more than 200 yards wide at any point, as deer dislike venturing too far into open areas. Deer prefer openings of about 25 acres in total area. Leave brush intact in drainages and for at least 75 yards on both sides because these are often the most important travelways for deer.

Grazing

Cattle grazing generally benefits white-tailed deer because it creates open spaces for forb production. However, there is potential for competition for these forbs. On a yearly basis, cattle consume about 12 percent forbs in their diet, compared to 36 percent for white-tailed deer. In spring, cattle forb consumption may increase to 25 percent, compared to 52 percent for white-tailed deer.

These percentages may not seem to indicate potential competition. However, this comparison takes on a new light if actual quantities are compared. In spring, a 1,150-pound cow eating 2.5 percent of her body weight in forage consumes about 29 pounds of dry forage a day. If 25 percent of that forage is forbs, she would eat about 7 pounds of forbs.

In comparison, a 100-pound deer consuming forage at 3.5 percent of her body weight eats about 3.5 pounds of dry forage, of which about 2 pounds would be forbs. If the cattle and deer in this example were eating the same forbs, the deer would be at a distinct disadvantage. To reduce this potential competition, implement a grazing system that provides spring rest to all pastures over a period of several years or save 5 percent as reserve pastures.

Water

Water should be well-distributed throughout the habitat. Under intensive grazing, fence off separate waterers for deer and other wildlife to maintain adequate cover around the water source. Deer prefer to drink from ground-level sources rather than raised troughs. Small earthen ponds or shallow, concave concrete pads replenished by a drip or float system can provide a water source easily accessible by all wildlife species.

Feeding

Supplemental feeding, provided in the form of corn or pelleted feeds, is a popular management activity in Texas. There is a potential problem if your goal is to encourage bobwhites and turkeys also. Open-choice deer feeders attract raccoons and other potential predators of ground-nesting birds. There is evidence that placing feeders in nesting habitats can increase the rate of predation on quail and turkey nests because of the

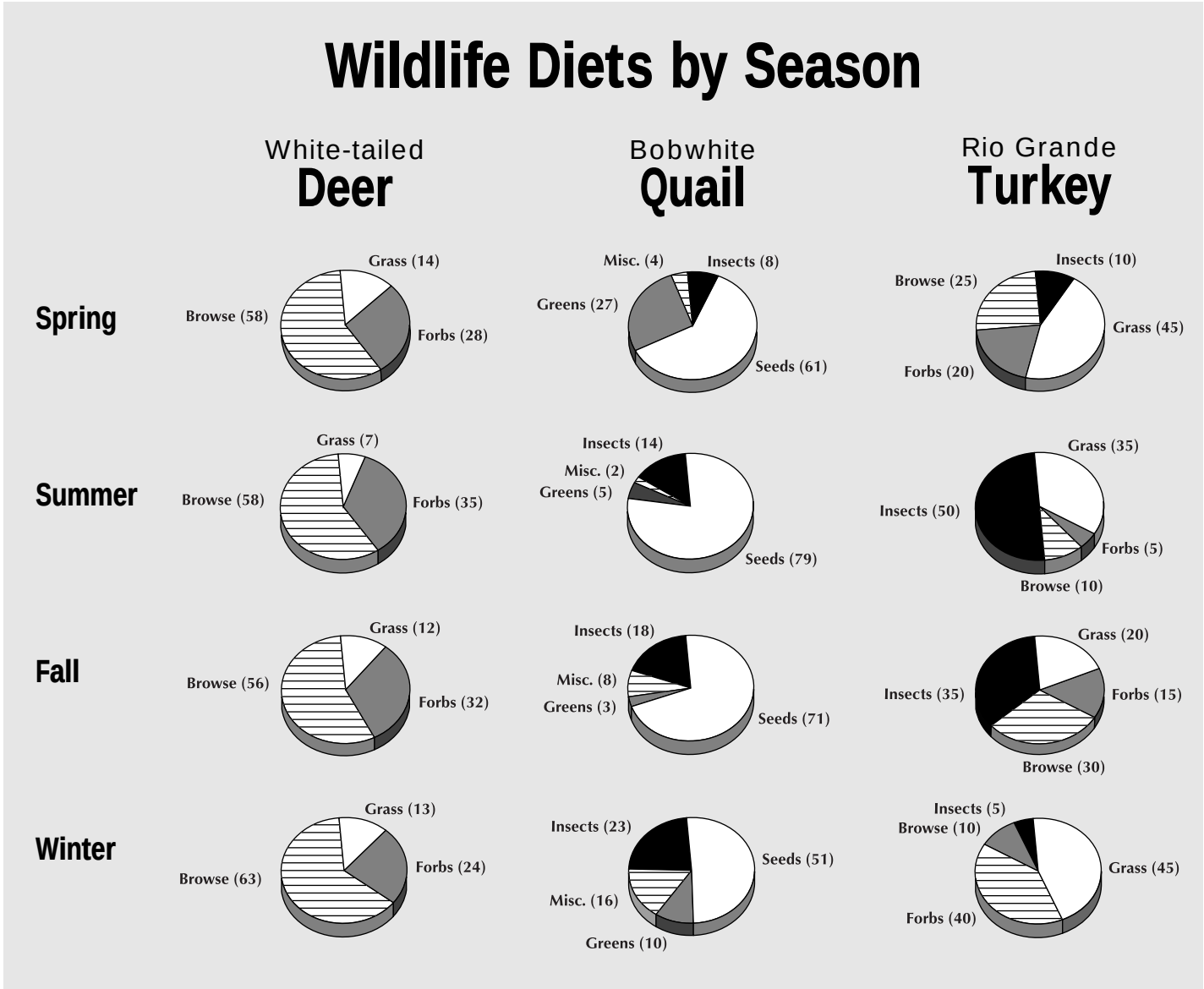

Figure 1. Average seasonal diet composition by percent grass, browse, forbs (wildflowers, weeds, etc.), insects, and miscellaneous material for white-tailed deer (Edwards Plateau and South Texas), bobwhite quail (South Texas), and Rio Grande turkey on rangeland (adapted from Vallentine 1990, Lehmann 1984, Barnes et al., 1991).

greater number of raccoons and other nest predators.

Bobwhite quail

Habitat

Like all wildlife, bobwhite quail need a diverse habitat: many plant species and cover types; small blocks of cover well mixed with small blocks of different types of cover; brush and trees of several ages; and essential cover types near each other.

Habitat also must provide food. For quail, the habitat must supply many seeds and insects (Figure 1).

Breeding and nesting habitat

During March, April and June, males need whistling perches, usually 6 to 12 feet tall and occurring at a density of one per one-twentieth of an acre (47 by 47 feet; about half the size of a basketball court). These perches are used to establish territory and attract mates.

Perennial grasses provide excellent nesting cover. Early-nesting hens need dormant standing grasses. This residual cover is even more important in dry years. Nesting clumps should be about 8 inches tall and 12 inches in diameter, with more than 250 per acre (one per 13-by-13-foot area; about the size of an average bedroom).

Chicks need cover that allows them freedom to move at ground level and provides overhead concealment. Ideal sources of this cover are single-stem forbs with bushy canopies, for example, broomweed, ragweed, and croton. This kind of cover is a haven for insects, an important part of the chick's diet. Chick cover should be located near midday loafing areas.

General habitat

Essential to quail are loafing areas that provide safe, comfortable resting sites between morning and evening feeding periods. Although they can use taller grasses and forbs, quail prefer woody plants because they provide cover all year. A good loafing area has:

- A dense, thorny brush canopy about 1 foot or more above the ground and with about a 6-to 7-foot diameter;
- Ground bare or sparsely covered with vegetation; and
- Low-growing herbaceous plants outside to provide a view in all directions.

Warm- and cool-season cover differ. In fall and winter, almost any brush clump will do. But in summer, quail need tall brush species with dense canopies to help them stay cooler.

For travel and feeding, bobwhites can use tall and short grasses and forbs, and low brush and bare ground. This part of the habitat should be sprinkled over the landscape.

Escape cover can be provided by either moderately dense brush or taller herbaceous plants. Frequent patches of bare ground are needed throughout the habitat, a concern in areas with more than 30 inches of annual rainfall because of potential grass production. Bare ground makes it easier for quail to move and find seed. To avoid predators, quail need vegetation less than 6 inches tall for roosting.

Management guidelines

Woody cover

The amount of woody cover that quail need depends on location. More is needed in areas with frequent disturbances, flat topography, heavy grazing, low food supplies, sparse herbaceous vegetation or brush with low-quality cover. Coveys need to be never more than 50 to 75 yards from brush, requiring a minimum brush cover of about 15 percent with well-dispersed plants (Table 1). Twenty-five percent brush is acceptable if it is not too tall (mostly 2 to 3 feet).

Also important are brush patterns. Typical patterns include strips, blocks and brush mottes. Block treatment patterns, where large blocks of land are cleared, eliminating cover over a wide area, can be the most detrimental to quail habitat.

For quail habitats, choose brush treatment methods carefully. Top-removal methods are best for maintaining the proper age of brush. Plant-removal methods are also effective. Even rootplowing is acceptable if used cautiously.

Herbicides can be used with caution. Do not use non-selective, broadcast herbicide treatments: They can decrease loafing cover when few brush species are present. However, herbicides applied as individual plant treatments offer great selectivity and flexibility for brush management.

For quail, the habitat must supply many seeds and insects.

Herbicides affect forbs in different ways. Forbs may:

- Decrease temporarily because of herbicide kill;
- Decrease from increased grass production; or
- Increase because competitive brush has been removed.

Prescribed burning can also be used to manage quail habitat, but again, with caution. Use the coolest fire consistent with brush management goals to reduce harm to quail.

Grazing

Bobwhite quail need a mixture of range conditions (poor to excellent) that provide food, cover, or both (Table 2). The right range condition for quail depends on location. In areas with deep soils, a long growing season and high annual rainfall (more than 30 inches), range condition should be fair to good. However, for areas with poor soils, low and variable rainfall, and short growing seasons, it is better for range condition to be good to excellent. Grazing can be used to manage these condition classes for proper quail habitat.

If grazing is continuous, gauge it to rainfall. With less than 20 inches of annual rainfall, grazing should be light. Grazing can be heavier in areas with more than 40 inches of rainfall. You can use grazing systems to improve range condition. However, the uniform grazing promoted by some systems is undesirable for quail habitat.

Rainfall and amount of brush also interact with grazing. Grazing must be light in areas with only 15 percent brush, because herbaceous plants

Table 1. Quail habitat structure guidelines and management suggestions (adapted from Guthrey 1986).

Structural component	Amount	Management practices
Bare ground	30 - 60%	
Too little	<25%	Disk, burn, increase grazing pressure
Too much	>70%	Reduce grazing pressure, remove soil disturbance, seed cover plants
Brush cover	15 - 25%	
Too little	<15%	Plant shrubs, build brush shelters, manage for shrub seedlings, let brush re-establish
Too much	>25%	Reduce with herbicides, fire, or mechanical methods
Brush height	1 - 5 feet tall	
Too tall	>5 feet	Reduce height with top removal or burning; maintain 5-15% pasture in mottes or strips of older brush
Grass clumps suitable for nests	1 - 3 % cover of pasture	
Too little	<1%	Reduce grazing pressure, adopt grazing system, plant native or introduced grasses, half-cut brush
Too much	>3%	Increase grazing pressure, burn, disc

must provide more of the travel and escape cover. Heavier grazing is acceptable in areas with a diversity of brush species and height classes. For areas with less than 30 inches of rainfall, stocking rates must be light; above 30 inches, rates can be moderate.

Rio Grande turkey

Habitat

Turkeys may be one of the best illustrations of the idea that wildlife need variety in their habitat. These animals need different kinds of habitat for breeding and nesting; for brood-rearing; and in fall and winter. The need for habitat variety is illustrated in the turkey's diet, which varies considerably by season. (Figure 1).

Distribution of turkeys in Texas is controlled mostly by precipitation (15 to 35 inches) necessary for roost tree growth. Two key factors in turkey habitat are trees and grass. Turkeys have an annual home range of 370 to 1,360 acres and often use the same winter roost sites every year.

Breeding and nesting habitat

Open areas are typically used for mating; in about 80 percent of observations, hen and gobbler mating occurred in herbaceous vegetation 4 to 8 inches tall. During nesting, turkeys need screening cover nearby, usually about 3 feet tall. Suitable habitat can be found in small openings in woods, along wooded roads, and edges between grass and woods.

Annual production of South Texas turkeys fluctuates dramatically, apparently according to rainfall. Rain in August and September appears essential to establish soil moisture and spring plant growth for food and nest-concealing cover. Poult survival appears unaffected by low rainfall, but nest predation is higher in dry years.

Brood-rearing habitat

During the first eight weeks after hatch, three essential habitat elements must be available within a small area:

- Plenty of insects for poults to eat;
- Cover allowing turkeys to forage frequently during the day; and
- Cover to hide poults but allow hens to spot predators.

Table 2. Various range condition classes and their value for quail habitat illustrate the need for a mixture of condition classes (adapted from Guthrey 1986).

Condition class	Nesting cover value	Food value
Excellent	Excellent	Poor
Good	Good	Fair
Fair	Fair	Good
Poor	Poor	Excellent

The weekly home range during brood-rearing is usually less than 75 acres; the total summer home range is about 250 acres. Key ingredients in this kind of habitat are herbaceous and woody vegetation. Herbaceous vegetation should be 12 to 24 inches tall, or an average of 20. Poults appear to forage most efficiently with grass standing crops of 530 to 2,700 pounds per acre. Trees are important to poults for shade, escape cover, and shelter from rain. Poults begin roosting at 2 weeks old on limbs 6 to 9 feet above ground. At 4 weeks, they are strong fliers and go to taller trees.

Fall and winter habitat

The key elements needed in fall and winter are food and roosting cover. Roost trees tend to be the tallest trees available regardless of species. The most common roost trees are live oak, hackberry, pecan, cedar elm, cottonwood and willow. There appears to be no preference for live or dead trees. Roost trees average about 40 feet tall with a range of 8 to 50 feet. They have large spreading crowns with spreading, horizontal branches 1 to 2 inches in diameter.

Management guidelines

Woody cover

Turkeys use at least 30 woody species for mast and 21 for roosting. Wide-crown, high-canopy species are used for loafing and shade. Shrubs, half-shrubs, and some trees are used for nesting cover. Woody plants also provide escape cover.

Large cleared blocks are poor habitat. Conversely, turkeys do not thrive in dense, brushy areas or extensive closed-canopy forests. The upper limit of brush cover appears to be about 50 percent.

Guidelines for woody cover management include:

- Do not remove mast-producing food plants.
- Do not remove known roost trees.
- Do not rootplow.
- Do not leave openings larger than half a mile across.
- Leave scattered trees and small stands on about half the treated area and blocks of brush with scattered openings on the remainder.

Grazing

Improper grazing can affect turkeys in many ways: Eggs can be trampled; nests can be abandoned; nest predation can be increased; turkeys may choose poor nest sites; the nest microclimate may be altered; less food may be available; and movement patterns may be changed. Trampling is not a practical concern unless stock density is less than 1 acre per animal unit (1,000-pound cow with her calf for a production year). Nest predation results from lack of cover. Hens usually choose ungrazed or lightly grazed areas for nesting. However, herbaceous cover can become too dense or tall for nesting.

Allowing some grazing appears to be better than having none at all. It has been suggested that landowners provide exclosures grazed every 4 to 5 years in dry areas and every 2 to 3 years in wetter areas. Suggested size of these grazing exclosures is from 100 to 500 acres for every 3,000 to 5,000 acres of rangeland. Other suggestions:

- Restrict grazing in the exclosures to July and August. Use moderate grazing intensity on the remaining areas.
- Leave vegetation 18 to 24 inches tall with adequate interspaces.
- Roadside or railroad rights-of-way can substitute for some exclosures.

- Protect low, thorny brush for nest cover.
- Adjust grazing intensity to local and individual range situations. Lighter grazing or no grazing may be needed in drier areas or where range condition class is fair or poor.

Water

Water development guidelines for turkeys include:

- Provide ground-level ponds or catchments.
- Fence small, ground-level waterings to exclude livestock.
- Maintain water in deferred pastures with rotational grazing.
- For short-duration grazing, maintain fenced waters at least 0.25 miles from main livestock water.
- If ground-level water is used for livestock, fence part to maintain ground cover.
- In arid areas, use waters suitable for ground-nesting birds, for example, gallinaceous guzzlers.

Common habitat characteristics

White-tailed deer need more brush than quail because their food supply centers on it. Grazing management generally should be less intense than for quail. Management for quail can be expected to have a neutral to positive effect on white-tailed deer.

It may be more difficult to manage for both quail and turkeys because their habitat needs differ. Turkeys need about the same amount of brush as deer, but brush management is a greater concern for turkeys because roosts must be preserved. Turkeys need clearings near roosts to be able to take flight. Brushy travel lanes should be maintained into roosts. These lanes should be 30 to 60 yards wide and enter roosts from two directions.

Turkeys do best with more mature stands of brush, whereas quail prefer brush less than 5 years old. Turkeys prefer to nest in rangeland in high condition. Turkey hens need clumps of residual grass about 2 feet in diameter and 1.5 feet tall; quail need 8x12-inch clumps. Nesting turkeys appear to seek ungrazed pastures or those in a grazing system.

Distribution of turkeys in Texas is controlled mostly by precipitation.

Most management for quail favors turkeys. However, disking and burning should be used with caution. Although foods stimulated by these practices are not of great importance to turkeys, the habitat structure created could be beneficial. If done on small, scattered plots, these practices could increase diversity, benefitting turkeys.

Management for deer, quail, and turkeys requires careful planning. To be successful, this management must meet the minimum needs for each species. This approach means about 40 to 60 percent brush cover for deer and turkeys. The grazing program should encourage taller grasses for turkeys, minimize competition between deer and cattle, and provide habitat essential to deer and quail. Disking edges between standing brush and cleared areas will benefit all three species.

For more information

Some information in this publication is taken from these sources:

Barnes, T.G., R.K. Heitschmidt, and C.A. Taylor. 1991. *Wildlife*, pp 179-190. In: R.K. Heitschmidt and J.W. Stuth (eds.). *Grazing Management: An ecological Perspective*. Timber Press. Portland, OR.

Beasom, S. L. and D. Wilson. 1992. Rio Grande turkey, pp 306-330. In: Dickson, J.G. (ed.). *The Wild Turkey: Biology and Management*. Stackpole Books. Mechanicsburg, PA.

Halls, L,K. (ed.). 1984. *White-tailed Deer: Ecology and Management*. Stackpole Books. Harrisburg, PA.

Guthrey, F.S. 1986. *Beef, Brush, and Bobwhites: Quail Management in Cattle Country*. Caesar Kleberg Wildlife Research Institute. Kingsville, TX.

Lehmann, V.W. 1984. *Bobwhites in the Rio Grande Plain of Texas*. Texas A&M University Press, College Station.

Payne, N.F. and F.C. Bryant. 1994. *Techniques for Wildlife Habitat Management of Uplands.* McGraw-Hill, Inc. New York, NY.

Porter, W.F. 1992. Habitat requirements, pp 202-213.In: Dickson, J.G. (ed.). 1992. *The Wild Turkey: Biology and Management.* Stackpole Books. Mechanicsburg, PA.

Vallentine, J.F. 1990. *Grazing Management*. Academic Press, Inc., San Diego, CA.

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