

Wildlife Management Notes



No. 2 **BOB-WHITE QUAIL**

HABITAT REQUIREMENTS

Bobwhite quail require interspersed thickets, native prairie, and to a lesser extent, woodlands and cultivated lands, depending on which part of the state the birds are in. Under optimum conditions, 30 to 40 percent of a quail's home range should be composed of native prairie. In forested areas, an open overstory and moderately sparse ground cover are essential components of good quail habitat. Cattle grazing at light or moderate stocking rates is beneficial and, in more mesic tallgrass prairie areas, is necessary to maintain high quality bobwhite quail habitat. Habitat on central and western Oklahoma native prairie tends to be more conducive to higher quail populations because of limited tree cover or sparse ground cover.

Open areas of herbaceous plants or cultivated crops are used for feeding. Areas that have been burned green up early and provide good insect habitat. Good brood habitat has some overhead cover, but allows travel corridors at ground level for young chicks to move around freely. Dense tallgrass prairie is poor brood habitat. Less than 75 percent herbaceous cover (i.e., at least 25 percent bare ground) is necessary for free movement of broods and ease of food searching.

Quail habitat in forested areas may be improved through thinning, timber harvest, and prescribed burning. Cross timbers (forested areas in central Oklahoma dominated by post and blackjack oak) interspersed with tallgrass prairie can provide good quail habitat when burned at 1- to 2-year intervals and grazed. Managed pine forests can provide good quail habitat, depending on stand density and fire management history. Burning and logging reduce ground litter that hinders growth of quail foods. The amount of food produced depends on density of the stand, percent cover of forest canopy, amount of litter, time since burned, inherent soil fertility, and degree of use by livestock.

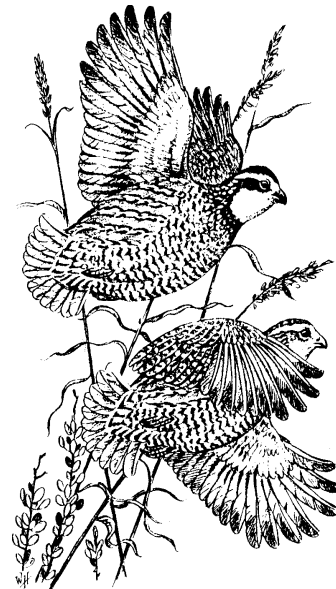
Regeneration areas initially provide excellent habitat but decline in quality as canopy closure occurs and overstories develop. Dense mid-rotation pine stands are

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poor quail habitat as are large contiguous blocks of closed canopy hardwoods. Pine-dominated stands will improve as quail habitat toward the end of rotation or following thinning and burning when the canopy is opened up. Hardwood stringers can be important in managed pine forests because they provide some habitat diversity and an additional food source.

FOOD

Quail diets vary and consist of insects; seeds of native forbs, grasses, cultivated crops, and fruits; and seeds of shrubs and trees. Providing food variety is one key for good quail management. Insects are high in protein and are eaten in spring, summer, and fall, especially by adult females. Because of high protein requirements, insects are the primary food for quail broods during their first few weeks of life.

Important Food Plants by Region

Oklahoma has been divided into 16 distinct habitat types. However, food habits are known for only a few of the major habitat types (see Table 1). The oak-hickory type occurs predominantly in the northeast part of the state but also along river and stream corridors in southeast and central Oklahoma. The pine-hardwood region is restricted to the southeast part of the state. The cross timbers and tallgrass prairie habitat types extend through the central part of the state into western Oklahoma. Some consider the cross timbers as part of the oak-hickory forest. The other habitat types occur in western Oklahoma.

HOME RANGE AND CARRYING CAPACITY

Depending upon habitat, the range of quail coveys averages 20 to 40 acres and rarely exceeds 80 acres. During the “fall shuffle,” in western Oklahoma, individuals may move up to 40 miles to establish a new home range. This dramatic movement explains how quail are able to disperse into new habitats and may be particularly important for colonizing regeneration areas in densely forested areas. Quail numbers vary from about 1 quail per acre on intensively managed, excellent habitat to 1 quail per 40 acres in poor quality habitat and areas with low intensity management. Managed oak-hickory stands support considerably fewer quail. Quail numbers are generally highest following stand regeneration in forested areas but decline as canopy closure occurs and overstories develop. Quail management in large blocks of unbroken forest is generally not a viable option without extensive timber harvesting and prescribed burning.

COVER

Nesting Cover

Bobwhites begin nesting in Oklahoma after covey break-up in April. Tall and mid-height warm-season grasses from the previous season must be available for nesting at that time. Height of grasses must be tall enough (6 to 8 inches) to conceal quail; therefore, grazing management should insure only light to moderate use of the grasses

Table 1. Important Food Plants by Region

	Oak/ Hickory	Pine/ Hardwood	Cross Timbers/ Tallgrass Prairie	Mixed/Short- grass Prairie	Shinnery Oak	Sand Sage
Herbaceous						
beefsteak plant	X	X	X			
corn	X	X	X	X	X	X
crabgrass	X	X	X	X	X	X
crotons	X	X	X	X	X	X
cowpeas				X		X
dayflower		X	X	X	X	X
desmodiums	X	X	X			
dock	X	X	X	X		X
dropseeds			X	X	X	X
foxtail	X	X	X	X	X	X
goats beard			X			
golden waxweed		X	X	X	X	
ground cherry	X	X	X	X		
hemp sesbania		X	X			
hog peanut	X	X	X			
Johnson grass	X	X	X	X	X	X
lambquarter	X	X	X	X	X	X
lespedezas	X	X	X			
love grasses	X	X	X	X		X
milk pea	X	X	X			
panicums	X	X	X	X	X	X
partridge pea	X	X	X	X		X
paspalum	X	X	X	X	X	X
pencil flower	X	X				
pigweed	X	X	X	X	X	X
pokeweed	X	X	X			
queens delight			X	X	X	X
ragweeds	X	X	X	X	X	X
smartweeds	X	X	X	X	X	X
snakeweed			X		X	X
sorghum	X	X	X	X	X	X
soybeans	X	X	X			
sprangletops			X	X		
spurges	X	X	X	X	X	X
sumpweed	X	X	X			X
sunflowers	X	X	X	X	X	X
tephrosia	X	X	X			
three-seeded mercuries	X	X	X		X	X
vetch	X	X	X	X	X	X
wheat/rye			X	X	X	X
wild beans	X	X	X	X		X
wild peas	X	X	X			
Woody (seeds, fruit)						
ash	X	X	X			
blackberry	X	X	X			
blackgum	X	X				
black locust			X	X	X	X
cherry	X	X				
chittamwood	X	X	X	X	X	X
dogwood	X	X	X	X		
elderberry	X	X	X			
grapes	X	X	X	X	X	X
hackberries	X	X	X			
maple	X	X				
sweetgum	X					
oak (acorns)	X	X	X	X	X	X
poison ivy	X	X	X	X		
sumac	X	X	X	X	X	X

by livestock in nesting areas. At least 30 percent of a quail management area should be managed as nesting habitat. In forested and brushy areas, quail generally nest within 50 feet of an opening or an edge. **Often, lack of nesting cover and brood rearing habitat limits quail populations, rather than lack of food.**

Protective Cover

This cover is used for loafing and is necessary for escaping from predators. Low-growing woody plants and upright-growing forbs are used for this type of cover because they provide dense overhead screening and persist during cold weather when thermal protection is needed. Protective cover should be composed of living, low-growing woody plants. Plum, blackberry, sumac, and buckbrush provide the best protection because they are persistent over a number of years. Brush piles provide only temporary protection, although they last longer than dense herbaceous plants such as ragweed. Protective cover should be thick several feet above the ground, to protect quail from aerial predators, but relatively open at ground level to permit movement. The protective cover area (covert) should be between 10 and 30 feet in diameter. At least one covert is necessary within the bobwhite's home range. One covert per five acres is necessary for intensive management. Five to 20 percent of the bobwhite's home range should be in dispersed clumps of brush or shrub cover.

WATER

Surface water is not essential but may be used when available. Quail obtain needed water from succulent vegetation, wild fruits, insects, and dew on ground vegetation. Metabolic water is produced during digestion and provides an additional source of water. Ponds, creeks, and overflow from windmills produce micro-habitats that can provide green, succulent vegetation and insects during dry or unfavorable weather conditions.

STANDARD MANAGEMENT PRACTICES

As a basic guideline, timber stands of 40 acres or more should be established in pine and hardwood types. Units of this size are appropriate in other habitat types (e.g., tallgrass or shortgrass prairie). However, recent research indicates that larger stands may be more important for other species. In areas of large blocks of timber, smaller stands will be of limited benefit to quail. Small units of different habitat types, stages of succession, or different land use can be beneficial in grassland situations. Small, dispersed, odd areas of native prairie or brush land are particularly important in landscapes that are dominated extensively by cultivated crops.

Even-aged management with either sawtimber or pulpwood rotations may be used for pine types. Shorter rotations provide abundant grasses, forbs, and fruit at more frequent intervals, but hard mast from trees may be eliminated unless clumps of hardwoods are retained through cutting cycles. Uneven-aged management systems are not recommended because the understory and midstory structure that develops creates unsuitable conditions for quail.

Areas that are clear-cut should generally exceed 40 acres (especially to meet the habitat requirements of area-sensitive song birds), should have irregular or linear contours, and should be well dispersed. Newly regenerated areas with related openings will substitute for grasslands and cultivated fields normally used by quail. Very open plantations from pulpwood size to mature sawtimber can meet cover requirements for quail through woody resprouts that develop following fire or thinning. A high degree of interspersed and distribution of age classes benefits quail. New regeneration areas can provide good to excellent quail hunting for 3 to 4 years or until trees and shrubs become too thick or tall. These areas then become poor quail habitat until the stand is thinned and burned. Sapling pine stands can be used as escape cover if located adjacent to open mature stands that are burned at 1- to 3-year intervals.

In pine types, at least 20 percent of a square mile or at least 20 percent of the basal area in mast-producing hardwoods should be developed or retained. These can be interspersed within the stand or in key areas. Some hardwoods should be retained within the stand for diversity and other species of wildlife. These areas should be excluded from prescribed burning only if quality hardwoods are a management objective.

In cross timbers and prairie habitat types, extensive use of herbicides should be avoided in a given pasture management system. Herbicides kill forbs, which provide food and screening cover. Allowing odd brushy areas to develop helps provide protective cover. Livestock grazing is important to maintain quail habitat and is absolutely essential in tallgrass prairie. Uneven use of pastures will benefit quail by providing nesting habitat and cover. Introduced forages, particularly fescue and bermuda, are detrimental to quail. They do not provide appropriate habitat structure, cover, or food.

Prescribed burning is essential for quail management. It produces open park-like stands of timber in all forested habitat types. It can also be used as a brush management tool to manage woody encroachment in prairies. However, covert areas should be protected from fire unless they are expanding to the detriment of other land use objectives.

Forest Regeneration

Even-aged timber management practices such as seed tree, shelterwood, or clear cut harvesting are all appropriate for quail management. They are preferable to uneven-aged practices in pine stands. Uneven-aged practices such as selective cutting and group selection provide few benefits for quail in either pine or hardwood stands. Stands should be regenerated in elongated or irregular shapes to maximize habitat interspersed and to meet the requirements for food, nesting cover, and brood rearing cover. Pine seedlings should be planted at least 10 feet apart to maintain a grass/forb component longer and to possibly eliminate the need for pre-commercial thinning. When longer rotations are used (longer than 50 years), a hardwood component should be retained within the stand for future mast production and for other species of wildlife. Hardwood clumps 1/2 to 1 acre in size should be retained as key areas for cover and food species within the pine stand at a maximum of 1/4-mile intervals. Oak species that produce small acorns, such as post oak and blackjack oak, are used by quail and should also be

retained. There is no justification for retaining red oaks over white oaks within a given stand.

Following regeneration on good sites, the grass/forb stage predominates in the understory for 5 to 6 years or until canopy closure occurs. On poor sites, herbaceous production peaks in 3 to 5 years then declines after canopy closure. After canopy closure, herbaceous plants become very sparse and provide little value for quail, unless thinning and prescribed burning treatments are applied. Regeneration areas provide an essential bare ground component for broods. Log landings should be retained as openings, and native plants should be allowed to regrow rather than seeding with non-native plants. Also, periodic strip-discing of log landings retains bare ground areas for brood rearing habitat

Intermediate Treatments

In forested areas, quail prefer open park-like pine stands or park-like oak woodlands in the cross timbers. Soft mast (fruit and berries) and seed-producing understory plants in stream bottoms, inclusions (small areas of different habitat within a stand), and coverts should be retained. Odd brushy areas or thickets within stands provide habitat diversity and loafing areas. Fire keeps stands open and encourages herbaceous undergrowth. Shading provided by trees will keep the appropriate herbaceous plant interstices (spacing). The best food management practices are those designed to increase seed production by native quail food plants or provide insect habitat. Periodic disturbance such as strip-discing, prescribed fire, or thinning is essential to provide annual forbs for seed production and insect habitat. Dense stands of small oaks in stream bottoms, inclusions, and other key areas should be thinned to enhance hard mast (nuts and acorns) production. Other mast-producing species such as sweetgum, ash, sumac, dogwood, blackgum, black haw, cherry, plum, and maple should be retained. Mid-rotation pine stands and oak-hickory stands are poor quail habitat unless opened up considerably (less than 60 ft²/acre basal area) by thinning and burning.

Thinning

Pre-commercially thinning pine or hardwood stands helps regulate tree stocking density and species composition and prolongs benefits of forest regeneration areas. Dense sapling or pole-size stands are poor quail habitat and are examples of poor forest management. Thinning should be followed with fire in these stands.

THINNING FOR QUAIL:

A. Thin early to densities less than optimal for maximum timber production. Thin to a basal area less than or equal to 60 ft²/ac and follow with prescribed fire, to maximize understory plant production.

B. After desired height growth is attained, thin frequently (every 8 to 10 years) to control tree stocking, to renew understory grasses and forbs, to reduce midstories, and to hasten the development of full crowns in the overstory.

C. Maintain a variety of tree species suited to the site for both soft and hard mast

production. Do not remove shrub species or species that never attain codominant or dominant canopy positions (e.g., black haw, chittamwood). Prescribed fire will control future species composition to some extent.

D. Thin to release the full crown around selected dominant oaks and hickories. This will enhance mast production when mast is present in pine stands or in hardwood key areas or hardwood stands.

E. Use low intensity summer burns to thin dense natural regeneration under shelterwood or seed tree systems, but this should be performed before stands become “dog hair” thick.

Prescribed Burning

Prescribed burning is an excellent technique for improving quail habitat in all habitat types. Prescribed burning is essential to maintain brood rearing habitat in forested areas and to stimulate legume seed production. Fire favors plants such as partridge pea, beggarweed, and other legumes. Legumes often comprise up to 20 percent of the ground cover in burned, open, forested areas. Prescribed burning can create open park-like stands, maintain natural openings, and renew herbaceous vegetation or halt woody encroachment in prairie areas. When these areas are interspersed with numerous small streams or branch bottoms, ravines and sandy, rocky, or oak ridges, opportunities for management are unlimited.

The area being managed should be subdivided so that only a portion of the total area is burned each year. This will ensure that adequate escape and nesting cover is available on adjacent unburned areas. Annual burning of mature pine stands is also beneficial. In tall grass prairie, livestock grazing and use of strip discing is essential to provide brood rearing habitat. Plum thickets or sumac thickets should be protected unless they are becoming too extensive.

Fire topkills small-stem midstory hardwoods and allows for resprouting of desirable woody plants such as grape and poison ivy. Fire also reduces litter that suppresses forbs and grasses and promotes fruiting of some types of understory shrubs. Fire at 1-year intervals lowers soft mast production and may increase grass production.

PRESCRIBED BURNING FOR QUAIL:

A. Make first burns in young shortleaf or loblolly stands when trees are at least 10 feet tall. Growing season burns may be used in dense natural shortleaf stands.

B. Burn at 1- to 3-year cycles to maximize forb and grass production. More frequent intervals (cycles shorter than 3 years) will increase grass and forb production but will lower soft mast production. Burn some areas at frequent intervals (every 1 to 2 years) and adjacent areas at 3-year intervals for best juxtaposition of habitats.

C. Burn from January through March or September through October.

D. Do not burn riparian areas or bottomland areas where quality hardwood management is an objective.

E. Optimal burn size is about 40 acres, although larger areas may be burned.

F. Disc around plum thickets or other covert thickets to protect from fire.

G. Do not reseed the entire length of fire guards if erosion is not a problem. Allow native annual forbs to reestablish.

Direct Improvements to the Habitat

FOOD PLOTS

Direct habitat improvements such as food plots should not be viewed as a cure-all. Food plots in extensive closed-canopy forests provide little benefit to quail. Planted openings only rarely compensate for yearly and seasonal fluctuations in food supply and may be predator traps. Their value is limited to winters when ice or snow cover limit food availability. Here, they may lower winter mortality of quail. A combination of plants that mature in late fall or early winter are best for quail. Plants such as corn, cowpeas, millet, mung beans, sorghum, soybeans, or wheat do well in food plots for quail when mixed with locally adapted clovers. Legumes are particularly beneficial because they attract insects. **Be aware that most legumes do not grow well in central and western Oklahoma.**

One-eighth- to 1/4-acre annual and perennial food plots should be planted adjacent to brushy cover in areas with little cropland and permanent food and cover. Simply strip-discing and **not** reseeding may well be a better practice than planting crops because many of the desirable native forbs are not grazed by livestock and are adapted to the site. In agricultural areas, small unharvested areas of crops should be left adjacent to woodlands, and fall tillage of grain crop residue should be eliminated if possible.

In forested areas, log landings, unused logging roads, and skid trails may be sown with clover or legumes. Serecia or bicolor lespedeza are not recommended. Naturally reestablished vegetation is preferred if soil erosion is not a problem and if the landowner can wait for natural establishment. Some areas should be left as bare ground. A variety of woody and herbaceous seed producers in the forest should be the goal of planting new vegetation. Long firebreaks 12 to 30 feet wide can be created. These should be plowed or disced, fertilized and planted to quail foods in 100-foot sections along every 500 feet of firebreak. However, natural native plant regeneration is *much* less expensive and is probably as good.

PERMANENT OPENINGS

In large, solid blocks of pine, oak-hickory, or cross timbers, permanent openings should be established and maintained. However, unless adjacent stands are open, use of these openings will be limited. Power lines, pipelines, field and forest roads, old home sites, creeks, seeps and ponds, special use areas, and cultivated land should be considered as clearings for quail. Planted openings should be located near brushy cover along a ridge, transition zone, or upper slope in the vicinity of stream bottoms or nesting cover. When feasible, areas of understocked tree stands of poor form or quality should be selected.

PROTECTIVE COVER

Covert areas should be established across the property if necessary. Brush-hogging, mowing, or discing small areas in open fields helps to maintain early succession. However, brushy cover at forest edges or in drainages should be allowed to develop. Quail need nesting and overhead brush cover distributed within their home range. Large, loose brush piles in tee-pee fashion should be constructed, and native shrubs should be planted in areas where cover is scarce. Covert areas must be protected from fire. Mowing or brush-hogging is not recommended during early nesting season (May-June).

If pastures must be mowed for weed control, strips next to woody cover should be left unmowed or mowed only on a rotational basis. Mowing is often uneconomical. Spraying pasture for weed control can be detrimental to bobwhites by removing a valuable food source and screening cover. Weed problems are best managed with fire and grazing. Converting native prairie to introduced forages can also be detrimental. Small areas (10 acres or less) in large expanses of open fields or prairies should be brushed, chopped, chained, mowed, or disced. Discing small areas near brushy cover to encourage annual forbs and grasses is also a good technique that benefits quail. Open fields adjacent to woodlands should be planted to native grasses and legumes. Also, odd areas should be allowed to grow up in brushy thickets, and fence rows should be left uncleaned.

In forested areas, where drainages are more than 1/4 mile apart, understory woody vegetation can be released by thinning the drainage overstory for thicket development. Where possible, woody coverts within transition zones should be retained and protected from fire.

OTHER SPECIES THAT BENEFIT FROM BOBWHITE QUAIL MANAGEMENT

Numerous other game and non-game species with similar habitat requirements benefit from quail management. Rather than focusing solely on quail, management plans should emphasize the communities of which quail are a part.

Park-like Pine or Old Fields/Prairie

American goldfinch
white-tailed deer
meadow lark
wild turkey
indigo bunting
grasshopper sparrow
red fox
red-tailed hawk

Early Regeneration

American goldfinch
white-tailed deer
yellow-breasted chat
wild turkey
indigo bunting
white-eyed vireo
gray fox
bluebird

Hardwood Woodlands

eastern wood pewee
blue-gray gnatcatcher
indigo bunting
wild turkey
fox squirrel
raccoon
white-tailed deer

MANAGEMENT OPTIONS / SIP COST-SHARE OPPORTUNITIES (See your Forest Stewardship Planner for details.)

Low Intensity

Mowing and discing (SIP-2,4,8; MW4, SD3, PL3)
Planting food and cover (SIP-8; DH3, FP3, NG3, SL3, WA3)

Mid Intensity

Mowing and discing (SIP-2,4,8; MW4, SD3, PL3)
Planting food and cover (SIP-8; DH3, FP3, NG3, SL3, WA3)
Brush pile construction (SIP-8, BP3)
Prescribed burning (SIP-8; PB3, PB4)

High Intensity

Mowing and discing (SIP-2,4,8; MW4, SD3, PL3)
Planting food and cover (SIP-8; DH3, FP3, NG3, SL3, WA3)
Brush pile construction (SIP-8, BP3)
Prescribed burning (SIP-8; PB3, PB4)
Creating forest openings (SIP-8, SO3)
Wildlife thinning (SIP-8, HT3)

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