



*Photo courtesy of the Missouri Department of Conservation*

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## Quail Habitat: Putting the Numbers in Perspective

As wildlife biologists, we often help people manage habitat for quail on their property. Every property is different, but areas with good quail numbers have one thing in common: quail-friendly habitat structure.

The plant community on the property is especially important, but what plants do you need? It's great if you know plant species beneficial to quail, but if you're not a botanist, don't sweat it. Just learn to recognize and manage for structure. If you've got the right structure, chances are the right plants will be present.

### Basic Quail Habitat

Quail need several basic elements for good habitat:

- grass clumps for nesting,
- weedy areas for brood rearing,

- shrub cover for protection from the elements and predators,
- herbaceous vegetation for night-time roosting, and
- bare ground mixed in with it all.

But how much of each cover type do quail need and how can you make that happen on your property? First, evaluate the current condition of the habitat on your land by using a quail habitat appraisal guide. If you don't have a habitat appraisal guide, see the reference links at the end of this article. Guides linked there can help you determine the recommended percentages of each of the following critical habitat components required by quail.



Basically, you need the following amounts and types of cover:

- **70%–80% Nesting, Brood-Rearing, and Roosting Cover:** herbaceous cover consisting of perennial forbs (wildflowers) and legumes, annual weeds, scattered bunch grasses, and ample bare ground under the canopy of the herbaceous vegetation
- **5%–30% Woody Cover:** shrubs, brush piles, and short trees

These numbers are a starting point. But because it is difficult to visualize what this looks like on the ground, below are the basics for managing land for quail.

### Nesting, Brood-Rearing, and Roosting Cover

Quail need weed patches with scattered bunch grasses that grow in clumps. Quail typically build nests in grass clumps using residual grass from the previous year. Each clump should be about 12 inches in diameter and at least 12 inches high. Research from Missouri and Iowa suggests that quail prefer to nest in grassy areas within 75 feet of an edge (e.g., a road right-of-way, crop strip or food plot, disked strip, shrub thicket, etc.). For this reason, it is important to manage areas of herbaceous vegetation to provide ample nesting, brood-rearing, and roosting cover throughout the field, especially on large fields with dense grass.

Most Conservation Reserve Program (CRP) fields in the Midwest consist of dense stands of grasses. Large, unmanaged grass fields, even if planted to warm-season grasses, have moderate to poor nesting and brood-rearing habitat, because bobwhites rarely venture far into large fields of grass with no other habitat structure.

In contrast to large fields of dense grass, fields with low grass-clump densities in a matrix of forbs and shrubs are mostly “edge” as far as quail are concerned. In this kind of field, birds have easy access to the entire field, because all nests are within good brood-rearing habitat. Proximity to brood-rearing cover is very important, since the parent and chicks will leave the nest soon after hatching, and the chicks need insect-rich feeding areas that offer easy mobility.

Research suggests that bobwhite nest productivity peaks when grass density of 12-inch diameter clumps reaches about 300 per acre. Put another way, this amounts to just less than one basketball-sized clump in a square with 10-foot sides (Figure 1). The rest should be bare ground under a canopy of shrubs, forbs, annual weeds, and legumes.

Most fields in the Midwest once considered to have good nesting, brood-rearing, and roosting cover now have too much grass and not nearly enough forbs and bare ground. Research shows quail densities peak two to three

years post-planting, when the fields are quite weedy. By the fourth year, as the grasses mature and thicken, quail numbers decline. If you have fields of warm-season grass and the quail aren't responding as expected, one of two things may be the cause:

- there are no quail in your area to find the habitat, or
- the grass is too dense and most of the field is not suitable as nesting and brood cover.



*Photo courtesy of Rob Chapman*

**Figure 1a.** Optimal nesting, brood-rearing, and roosting cover should consist of scattered clumps of native grass in a matrix of forbs, legumes, and shrubs. Note the distance between the clumps of big bluestem and little bluestem and the abundance of common ragweed and partridge pea between the grass clumps in this photo. Scattered shrubs enhance protection from the weather and predators.



*Photo courtesy of Rob Chapman*

**Figure 1b.** Prescribed burns enhance nesting, brood-rearing, and roosting cover for quail. The dark clumps are clumps of little bluestem, which serve as potential nesting sites for quail and other ground-nesting birds. The spaces between the grass clumps are where forbs will grow and improve insect availability for growing chicks. Set up burn units in patches and burn on a two- to three-year rotation to prevent burning all habitat the same year.

Crop fields, pastures, and their edges were weedy when quail numbers were at historic highs in the early to mid-20<sup>th</sup> Century. Before we had large farming equipment and herbicide-resistant crop technology, many field borders and fence rows were full of shrubs, brush, and annual weeds (e.g., ragweed, pigweed, foxtail, and wild sunflower). We also did not have habitat-choking tall fescue or smooth brome. Patches of annual weeds with bare ground under a canopy of bunch grasses and forbs are major ingredients in the recipe for quail habitat (Figure 2).



**Figure 2.** Brood cover has a variety of forbs and legumes mixed with grasses (a and b) that form a canopy over bare ground. This canopy allows quail chicks to easily move around to find insects while being protected from avian predators and the elements (c).

Fields should be broken into smaller habitat patches by dividing the field into thirds or quarters. These patches should be disturbed every few years to maintain forb and annual weed abundance as well as to keep the understory open to provide adequate mobility for the chicks. Management techniques to produce good nesting, brood-rearing, and roosting cover include prescribed burning in the fall, fall disking, managed grazing, herbicide application to dense perennial grass stands or monocultures, and field following (Figure 3). These management techniques should be applied every two to three years on one or two of the patches to keep habitat in the desired condition.



**Figure 3.** Fall disking can increase bare ground; reduce grass density to promote forbs; and provide nesting, brood-rearing, and roosting cover in the same area. Photos show a field a) immediately before fall disking and b) in summer following fall disking.

Be mindful that narrower strips may provide easy meals for nest predators. A hungry raccoon, skunk, or opossum is much more likely to find a nest full of eggs in a strip 15-feet wide than in one 100-feet wide.

Can crop fields fill this role? Unmown field borders and filter strips in and around crop fields can provide adequate nesting and roosting cover, especially if these are planted to native grasses. Minimum till or no-till crops can provide enough insects and other invertebrates in the crop residue to provide the energy and protein demands of a brood.

Quail chicks are unlikely to find enough to eat in conventional till systems, especially in corn. This does not imply that broods won't be found in conventionally tilled crop fields. Conventionally tilled fields in soybeans or corn can provide good shade and overhead cover, but may not harbor enough insects to meet the chicks' dietary demands. With conventional-till systems, it is important to have a strip of un-mown borders around the field edge for foraging. Various research on insects and pests indicates that net crop production can be better in the long run in the presence of native forbs and grasses. Furthermore, managing field borders with native forbs and grasses increases beneficial insect communities, such as predator insects and pollinators.

### Woody Cover

Five to 30 percent of the quail's home range should be low-growing woody cover (shrubs, briars, vines, brush piles, etc.). These are often called covey headquarters (HQ) or quail houses, because this is where quail will spend the majority of the day when they are not feeding (Figure 4). When broken down into per-acre density, you might be surprised how much is optimal. While quail may hide under a single shrub or a small brush pile, research shows patches of woody cover up to 1,500 ft<sup>2</sup> are best. Fifteen-hundred square feet is pretty big. A good covey headquarters should be the size of two or three buses parked side by side and consist of shrubs with a dense canopy. We do not want a 1,500-ft<sup>2</sup>, densely compacted brush pile with root wads, which would be attractive to predators known for eating eggs of ground-nesting birds.

Once we realize how big a covey HQ should be, we need to know how many are needed on the average 40-acre quail home range. Here's where it gets surprising, if not overwhelming. Consider the lower threshold of 5% woody cover. An acre is 43,560 ft<sup>2</sup>, and our covey HQ is 1,500 ft<sup>2</sup>. One covey HQ would cover a little over 3% of an acre. Two covey HQ per acre covers almost 7% of the home range, barely enough to surpass the 5% minimum woody cover needed. On 40 acres you would need 58 covey HQ, each 1,500-ft<sup>2</sup>, to reach the 5% minimum. This is the lower

end of the optimal range. Do the math and you'll see that to provide the maximum 30% woody cover on a 40-acre tract, you need 348 covey HQ! Few properties in the Midwest come close to having 30% of their habitat in well-distributed woody cover.

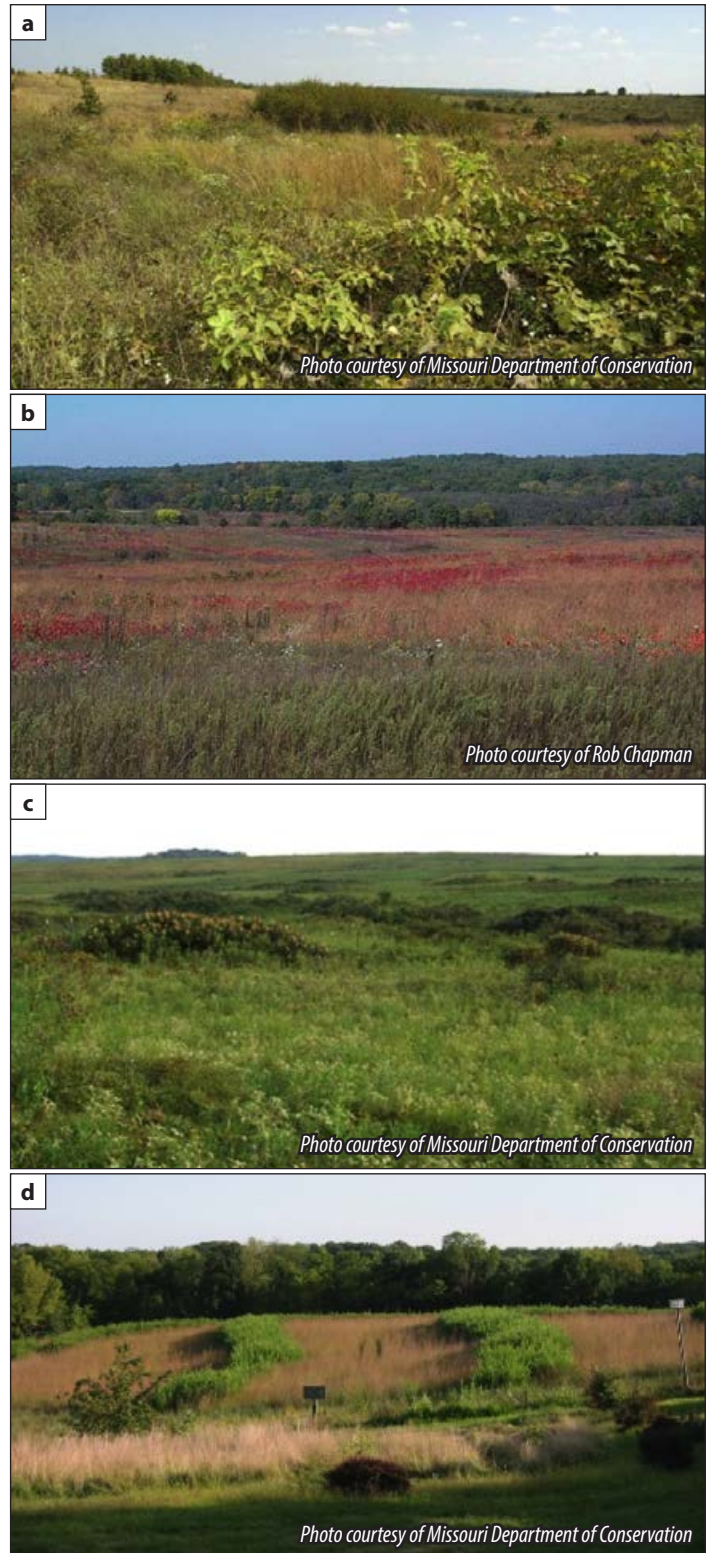


**Figure 4.** Woody cover should consist of shrubs with tight canopies of interlacing branches and an open understory. Shrubs that provide excellent woody cover as well as an additional food source include American plum, gray dogwood, and blackberry (a). Smaller shrubs such as coralberry, poison ivy, and aromatic sumac offer limited cover, but provide much-needed food resources in late winter (b).

While the ideal size of a covey HQ is 1,500 ft<sup>2</sup>, the size isn't as important distribution. You should have patches of covey HQ throughout the property for quail to thrive. The softball test is a good way to determine if your covey HQ are evenly distributed throughout the property. Covey HQ should be distributed so that a quail is never more than the throw of a softball in any direction from woody cover. No matter where you are in a field, if you can't throw a softball and hit a covey HQ, then you don't have enough woody cover (Figure 5).

Breaking down these cover requirements for quail, a property can be evaluated on its ability to provide sufficient amounts of nesting, brood-rearing, roosting, and protective cover. Providing as much of these as possible on the property increases the amount of the land that can be used by quail, and should ultimately increase quail abundance. For more information or assistance on your project, contact your local wildlife biologist or private land biologist.

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**Figure 5.** Covey HQ that are distributed throughout a field within nesting, brood-rearing, and roosting cover maximize the amount of the area quail can use (a). Fall is a great time to determine shrub distribution in a field (b). Shrubs can be planted into draws (c) or planted in strips (d) to increase the amount of woody cover in the field.

**Additional Information:**

Quail Friendly Plants of the Midwest <http://extension.missouri.edu/publications/DisplayPub.aspx?P=MP903>

On The Edge: A Guide to Managing Land for Bobwhite Quail [http://bringbackbobwhites.org/newsroom/our-stand-on-issues/doc\\_view/62-guide-to-managing-lands-for-bobwhites](http://bringbackbobwhites.org/newsroom/our-stand-on-issues/doc_view/62-guide-to-managing-lands-for-bobwhites)

Missouri Bobwhite Quail Appraisal Guide <http://extension.missouri.edu/publications/DisplayPub.aspx?P=MP902>

Bobwhite Quail Habitat Evaluation and Management Guide <http://www.okrangelandswest.okstate.edu/files/wildlife%20pdfs/E-904.pdf>

Habitat Suitability Index Models: Northern Bobwhite <http://www.nwrc.usgs.gov/wdb/pub/hsi/hsi-104.pdf>

Ecology and Management of the Northern Bobwhite <http://msucares.com/pubs/publications/p2179.pdf>

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