



Bobwhite Quail



LIFE HISTORY

Bobwhite quail in Indiana typically begin nesting in May. Both the male and female pick a site and build the nest together. Most often, the nest is built in a grassy or weedy site that contains scattered shrubs or briars, and is located within 75 feet from bare or nearly bare ground, such as pastures, crop fields, and paved, gravel or dirt roadways. Using dead grass or weedy vegetation from the previous year's growing season, the nest is built within a saucer-shaped depression. A dome of overhanging vegetation is frequently fashioned over a portion of the nest.

After the nest has been completed, the female begins egg laying, usually laying one a day. A typical clutch contains 12 to 15 small, white eggs. Once the clutch has been completed, the hen begins incubating. Incubation is typically done by the hen, but the male may also perform this task. Twenty-three days later, the eggs hatch within minutes of one another. Most quail eggs hatch by mid-July, but adverse weather during May and June may delay the peak hatch to late July or even early August. If the hen disappears, the male will often raise and care for the brood. It is not uncommon to find quail still nesting in early September.

Nest desertions resulting from predation, drought or heavy rains are common, but quail will often attempt to re-nest. With each subsequent nesting attempt, fewer eggs are produced. Nest success varies from site to site and from year to year, however, only 25% of all nesting attempts are usually successful. Recent research has shown that in good habitat, second broods are more common than once believed.

As soon as the young quail have hatched and dried, they are led away from the nest to begin feeding. Insects are a very important food item at this time. Insects have a high protein content, a necessity for rapid chick growth and development. Between early morning and late afternoon feeding periods, time is spent dusting, preening and resting in areas with protective overhead cover (loafing cover). As nightfall approaches, a roosting area is selected in sparse grassy or weedy vegetation.

With the approach of fall, seeds become an important dietary item, and quail begin seeking areas of heavier cover and higher seed production. At this time, known as the "fall shuffle", quail gather in larger groups, mix and eventually reorganize into smaller groups of 10 to 16 birds. During periods of snow, roosting habits change, and thicker overhead cover

in the form of shrubs, brambles, and thick woody cover is sought.

The covey remains together until spring, then birds begin pairing off in preparation for the nesting season. By spring, the population has reached its lowest level. Up to 80 percent of the fall quail population will have perished, and few hens will live long enough to reproduce. Rarely does a quail in the wild live for more than 14 months.

MANAGEMENT

Since nothing can be done to stop droughts, heavy snowfalls, cold temperatures and heavy rainfalls, the major goal of quail management should be to reduce the detrimental effects of intensive land use and natural plant succession.

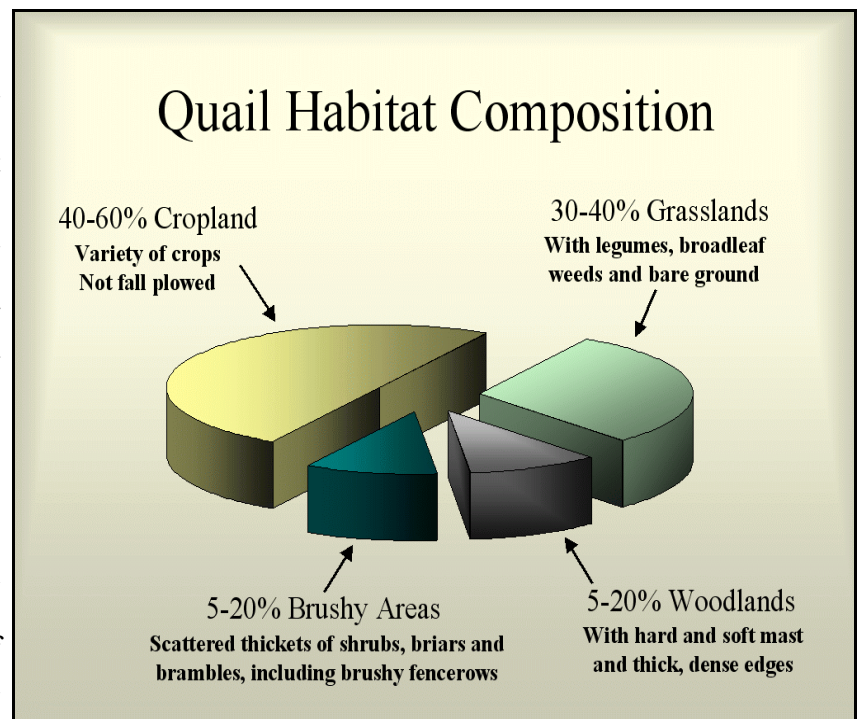
Quail need food, nesting cover and winter cover to maintain a population. At some point during the year, the lack of one or more of these habitats will limit quail populations. By improving the deficient habitat, the population can increase until some other factor becomes limiting. In essence, improving an area for quail becomes a step-by-step process of eliminating those factors which limit production and survival.

In general, quail are most prevalent in areas consisting of 40-60% cropland, 30-40% grassland, 5-20% woodland, and 5-20% brushy areas. However, the extent to which quail are abundant is more dependant on the interspersion (mixing) of these cover types, as well as the condition of each cover type. For example, a large block of cropland, adjacent to other large blocks of grassland, woodland, and shrubland, would not be as favorable as having many small crop fields intermixed with numerous small grasslands, woodlands, and shrubby areas. Additionally, crop fields that have been fall plowed have limited value to quail. Woodlands lacking thick woody perimeters do not provide adequate escape and winter cover, and grasslands composed of thick stands of tall fescue provide little, if any, nesting or brood-rearing cover. Quail become most abundant where cropland, woodland, grassland and brushland are well mixed and each component is maintained in a condition that meets the quail's daily and seasonal needs.

NESTING COVER

Good quail nesting cover can best be described as an area of scattered shrubs and brambles interspersed with moderately dense stands of weeds and grassy vegetation with access to nearby bare or nearly bare ground. Unmown grassy or weedy fencerows, woodland edges, roadsides and the edges of idle fields are good examples of areas that can be good nesting cover because of their proximity to bare ground.

Nesting sites must contain dead grassy materials for nest construction. This means an area that has been disked or burned must remain undisturbed for at least one growing season to provide proper nesting materials. A second undisturbed growing season is necessary to ensure a successful hatch. Ideal nesting sites contain about 20 to 30 percent bare ground distributed evenly throughout the vegetation. Studies have shown that more than half of all quail nests are built at the base of brambles, poison ivy, trumpet creeper or other woody plants such as elm, sassafras, persimmon and sumac.



Many types of course-stemmed grasses such as tall fescue and reed canarygrass are not suitable as nesting habitat due to their dense, sod-forming characteristics. These grasses provide inferior nesting cover and produce little, if any, foods. The best way to provide good quality nesting cover is to eradicate the existing sod grasses, using appropriate herbicides, and allow native forbs and grassy vegetation to



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seed in naturally or plant the site to a light mixture of native grasses, legumes and forbs.

During the first growing season after disturbance and continuing through the third year, the area usually will be invaded by ragweeds, daisy fleabane, annual lespedezas, foxtails, beggarweeds, panic grasses and crab grasses. This early successional stage is most important for seed and insect production and brood-rearing habitat. Over the next six years, perennial forbs (goldenrods, milkweeds, yarrows, asters, plantains and ironweeds), grasses (broomsedge and bluegrass) and woody shrubs and brambles begin to predominate. During this successional stage, nesting cover is at its best. The rate at which these stages progress is dependent on site fertility and will determine how long an area remains in good nesting cover. Once woody vegetation begins shading out the preferred native nesting grasses and forbs, or when ground cover becomes too thick and matted, the area must be rejuvenated by disturbance (prescribed burning, disking, or herbicide treatments).

Preferred nesting conditions are commonly found in idle fields, such as those enrolled in the Conservation Reserve Program. However, most nests will tend to be placed within the perimeter of such fields since the interior portions are typically too far removed from bare or nearly bare ground. By applying strip disking, strip herbicide applications, or prescribed burning at intervals throughout the interior portion of an idle field, both nesting conditions and brood rearing habitat can be improved. Strip disking, strip herbicide spraying, and prescribed burning are approved practices for use on Conservation Reserve Program lands, however, the landowner must first make sure his Conservation Plan has been properly amended and approved by the local USDA offices prior to initiating these practices.

Mowing is extremely detrimental to nesting cover as well as nesting quail. An Illinois study determined that mowing accounted for more than 83 percent of the nest failures attributed to farming practices. Since quail prefer nesting cover between 8 and 20 inches high, mowing potential nesting areas in the spring, prior to nest building, may make these areas less attractive and may actually cause birds to seek nesting cover elsewhere. Mowing during the nesting season causes nest abandonment, nest destruction, mortality of the nesting hen, or mortality of the young. If mowing must be done to control noxious weeds, raise the mower blade as high as possible so that only the seed heads are removed. Use of a flushing bar may also help reduce mortality of nesting hens.

Landowners are encouraged to delay mowing until after August 1. By then, most nesting has been completed and chicks are capable of flight. Where fields must be mowed to control brush, a

rotational system of maintenance ensures that some of the nesting cover will be undisturbed each year. Mow no more than one-third of the area in any one year, and leave a mowed height of at least 8 inches to provide adequate winter cover. Frequent mowing is also detrimental to the maintenance of nesting habitat because it encourages grasses to form a thick sod, thereby reducing the amount of bare ground and the diversity of native forbs and legumes.

FOOD

Although quail eat a variety of foods, almost 80 percent of their diet consists of seeds from annual plants. High on the list of annuals are common weeds such as ragweeds and foxtails, and some of our most common grain crops: corn, soybeans, wheat and sorghum. Various legumes including annual lespedezas, beggarweeds (sticktight), and partridge pea are especially attractive. Another 15 percent of the quail's diet consists of seeds from woody plants. The remainder of the diet is a mixture of green vegetation and insects including beetles, weevils, aphids, crickets and grasshoppers. Insects are eaten in small quantities by adult bobwhites, but comprise the bulk of food items consumed by growing chicks. During late winter and early spring, green vegetation becomes a key food item and improves the overall physical condition of the birds, resulting in improved nesting success.

Quail are ground-feeding birds. Seeds of annual plants must be readily visible on the bare ground or be in a light ground litter that can easily be moved about by scratching. Quail feeding areas are often in semi-bare soils beneath a canopy of standing vegetation such as weeds, small grains, or sparse grass and legume mixtures. Once feeding areas become overrun with perennial weeds, usually in four or five years, the amount and variety of quality quail foods decrease. Grass and perennial weeds tend to become too thickly matted and inhibit quail movement. If such areas are to continue to provide high-quality foods, they must be disked, burned, treated with appropriate herbicides, or replanted to encourage a new crop of annuals.



Naturally occurring woody or herbaceous plants that hold their fruits or seeds until early spring should be encouraged along field borders, fencerows and woodlots.

Snowfall that remains on the ground for extended periods of time can lead to starvation because most quail foods are seeds and waste grains that have fallen to the ground prior to snow accumulation. Food plots that stand above the snow can be extremely important, especially in northern Indiana. Sorghum, corn, wheat or soybean food plots, one-eighth to one-quarter acre in size should be planted adjacent to good winter cover. The plots will be best utilized if they are long and narrow (20 to 50 feet wide). As with any crop, proper applications of fertilizer and lime will improve plant growth and seed production. During periods of heavy snowfall, knock down some of the standing plants to provide additional feeding opportunities.

Naturally occurring woody or herbaceous plants that hold their fruits or seeds until early spring should be encouraged along field borders, fencerows and woodlots. They serve as emergency food sources during periods of deep or enduring snows. Black locust, redbud, sumac, native roses (Pasture, Prairie, Swamp, or Virginia rose), blackhaw, nannyberry, maple-leaved viburnum, poison ivy and Virginia creeper are good sources of emergency food and are common throughout most of Indiana. Other woody plants that provide important seasonal foods include sassafras, dogwoods, wild plum, blackberries, raspberries, grapes, ashes and oaks.

WINTER COVER

Quail are primarily a warm climate bird, and populations in the northern half of Indiana often fluctuate wildly in response to the duration of snow cover and freezing temperatures. During years with mild winters and favorable nesting conditions, populations increase, but when faced with several lasting snowfalls and cold temperatures, populations drop rapidly. Snowfalls of more than three inches that remain for at least 60 days can seriously reduce quail numbers.

The main goal of winter cover management should be to maintain thick, brushy cover capable of providing emergency food items close to other traditional food resources. Thick woodland edges, shrubby fencerows, thickets, tall herbaceous weedy growth and clumps of evergreens provide good winter cover. These areas are even better if they contain a low ground cover of trumpet creeper, Virginia creeper, poison ivy, native roses, or wild grapes.

Winter cover is often in the form of woody stems that will eventually grow into large trees. As trees grow, they shade out the underlying thickets and shrubs and no longer provide winter cover. Larger saplings that shade out underlying dense cover should be cleared. Tree and sapling stems should be collected and piled loosely to form brushpiles for additional winter cover. Emphasis should be placed on piling brush loosely so that grasses, forbs, and vines grow up through and around the dead branches.

Where winter cover is lacking, shrubby or young woody growth should be encouraged. Native trees and shrubs resulting from natural succession are usually the best cover because they offer familiar foods as well as cover. Establish winter cover and adjoining food plots where the chances of drifting snow are reduced. In areas where drifting snow is a problem, establish a windbreak of evergreens 20 feet to the windward side of food and cover plots.



Maintain woodland edges in dense shrubby growth

Woodland edges can be good winter habitat if the perimeter contains areas of dense shrubby growth. Woodland edges that abruptly change from tall mature trees to open ground lack the brushy edge needed for winter cover. By selectively removing or girdling large trees within the perimeter of the woodland, thick brushy growth, plus blackberry and raspberry brambles, are encouraged. Trees that are removed through this process can be sold as firewood or saw timber and the tops made into brushpiles.

Tree-lined fencerows can also serve as winter habitat, if areas of thick brushy cover are maintained. Where fencerows have grown into tall mature trees, quail habitat can be rejuvenated by alternately felling or girdling groups

of trees along the length of the fence line. This will result in portions of the fencerow developing into young brushy growth, immediately adjacent to sections having mature trees (providing soft and hard mast) in an alternating fashion. To maintain this condition, periodical removal of the maturer trees of the fencerow will be necessary. Again, trees that are removed through this process can be sold as firewood or saw timber and the tops made into brushpiles.

ARRANGEMENT

The secret to successful quail management is the proper arrangement and maintenance of all habitat components. Quail become most abundant where cropland, woodland, grassland and brushland are well mixed and each component is maintained in the proper condition. The more these habitats are mixed together, the more “edge” is created and the greater the possibility for higher quail numbers.

BENEFICIAL MANAGEMENT PRACTICES FOR BOBWHITE QUAIL

1. **Create grassy or weedy field borders around crop fields.** Leaving a border of native herbaceous cover around fields will increase nesting and brood rearing cover with minimal impact on crop production. As little as 10 feet will benefit quail, but where possible, 20 to 50 feet is a better field border width. To develop field borders simply leave a strip of fallow ground around each field. Annual plants will soon begin to appear, followed quickly by native grasses, such as bluegrass, crabgrass, and broomsedge. If erosion is a concern, seed the area lightly with winter wheat, spring oats, or a mix of clovers. Field borders will need to be disturbed on a regular basis to prevent woody encroachment. Instead of disturbing the entire field border every three or four years, disk one-fourth to one-third of the border every year on a rotational basis.



Grassy and weedy field borders provide nesting and brood rearing habitat for quail

- This practice can be incorporated with routine ground preparation work in the Spring or Fall. Fall disking tends to encourage hard-seeded weeds such as ragweed and partridge pea and help control Johnsongrass. Spring disking will encourage annual grasses such as foxtails.
2. **Maintain idle areas in beneficial grasses, legumes and forbs.** High quality nesting cover is very important in maintaining abundant quail populations. If idle areas currently contain good nesting cover, then maintain the stand in good condition. If not, plant idle areas to a light seeding mixture of native (warm season) grasses or thin-stemmed cool season grasses such as timothy, redtop, bluegrass, or Virginia wild rye.
 3. **Convert areas planted to tall fescue to more beneficial grasses, legumes and forbs.** Tall fescue is a very aggressive sod-forming grass. It will reduce plant stand diversity and cover bare soil areas in a very short time span. Plant stand diversity and associated bare ground are important to quail. Treating fescue with herbicide is your best bet for creating better quail habitat.
 4. **Create brushy areas for escape, loafing, and winter cover.** Create brushy cover along woodland edges using woodland edge enhancement practices. Maintain fencerows in a combination of brushy and weedy growth, with scattered mature trees to provide emergency winter foods. Plant tree and shrub corridors or coverts where brushy cover is lacking, or set aside areas and allow natural succession to run its course.
 5. **Routinely apply strip disking, strip spraying, or prescribed burning to idle grasslands.** Over time, grassland habitats become too thick. The amount of bare ground interspersed within the stand disappears, and the litter layer (the accumulation of dead vegetation laying on top of the ground) becomes too thick for quail to scratch for fallen seeds.
 6. **Reduce and delay mowing.** Mowing of idle areas such as field borders, ditch banks, roadsides,

and grass waterways prior to or during the nesting season is very detrimental. Delay mowing until after August 1st. Where mowing is necessary, use it judiciously. Spot mow only those areas that are a problem, or use rotational mowing to leave undisturbed nesting and roosting areas. Mow no more than one-third of the area in any one year, and mow no shorter than 8 inches to allow adequate regrowth prior to winter. When mowing large areas or cutting hay, mow from the inside and work toward the outside. This will push quail broods to the safety of the field edge instead of trapping them in the center of a shrinking patch of cover.

7. **Place grain food plots adjacent to good winter cover.** Energy conservation is very critical for quail during winter months. The farther quail must move to secure food, the greater amount of energy they have to expend. If food plots are to be established on the eastward or southward sides of winter cover, leave 10 to 20 feet between the food plots and winter cover. This will serve as a snow trap and allow blowing snowfall to accumulate prior to reaching the food plots.



Place grain food plots adjacent to good winter cover

Related *Habitat Management Fact Sheets*:

Fescue Eradication
Warm Season Grass Establishment
Cool Season Grass Establishment
Woodland Edge Enhancement
Tree and Shrub Corridors
Tree and Shrub Coverts
Strip Disking
Strip Spraying

Natural Revegetation
Prescribed Burning
Warm Season Grass Maintenance
Brush Pile Construction
Legume Food Plots
Grain Food Plots
Legume Interseeding

Prepared by the Indiana Department of Natural Resources, Division of Fish and Wildlife. For up-to-date information concerning the Indiana Division of Fish and Wildlife, or for information on the location of your District Wildlife Biologist, visit our website at www.state.in.us/dnr/fishwild/index2.htm

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