HABITAT MANAGEMENT FOR BOBWHITES: A BASIC GUIDE FOR THE LAND MANAGER

Habitat Needs of Bobwhite Quail

In his book "Beef, Brush and Bobwhites – Quail Management in Cattle Country, Fred Guthery has an opening two paragraphs which rather sums up how the quail manager must look at habitat. He says:

> *"Imagine you're 6 inches tall, weigh 6 ounces and would rather walk than fly. Your view of the world would change. A knee-high shrub would become a small tree, a dense stand of bluestem would become an impassible jungle, and a 1-mile jog would telescope into a half marathon.*
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> *You're beginning to see through the eyes of a bobwhite. These are delicate, immobile birds that require a variety of habitats. They're largely concerned with living space from ground level to a height of about 3 feet on areas no larger than 20 city blocks. Therefore, managers must create crazy-quilt patterns of cover on small areas; "patches" in the quilt must fulfill seasonal and annual cover needs."*

The preferred habitat of bobwhites is a mixture of grassland, cropland, brushy areas and woodland interspersed to provide abundant areas of "edge" – those margins where two or more cover types come together. Grasslands are utilized mainly for nesting cover and brooding, cropland for feeding and dusting, and brushy areas, thickets and woodlands for escape cover, loafing and winter protection. The bobwhite is dependent upon "edges" where it can move quickly from nest to feeding areas, from food supply to escape cover; where changing from one activity to another is a but a matter of a quick walk or flight for a few seconds duration. The greater the interspersion of type combinations, the greater the amount of edge and bobwhite quail.

Characteristics of Specific Cover Needs

Nesting Cover

Bobwhites construct their nest on the ground, typically in the protection of a clump of grass that they can walk to and yet provides some overhead protection. The nest bowl is made of dry vegetation from the previous year's growth. The majority of quail nests are found within a few feet of an edge where habitat types change and which serves as a travel lane for the birds. Most nests are built in a grass clump from 6" to 18" tall. Native prairie grasses with their clump-type growth form are ideal nest cover. Prairie grass sites with a clump density of no more than one 12" diameter clump per 4 sq. ft. (2' x 2') are the best. This allows for sufficient nesting clumps (about 10,000 per acre) and is thin enough to allow the birds to walk through the cover. Even much thinner nesting cover allows for plenty of nesting clumps and easier travel. In Texas, biologists consider about 250 nesting clumps per acre (or 1 clump per 13' x 13' size area) to be about the minimum. Nesting cover can be created by proper management of existing native warm season grasses (NWSG) or through planting fields or field borders to NWSG.

Brood Cover

The greatest mortality of quail occurs in the first few weeks after hatch. This is a critical period which often determines whether the fall population will be a bumper crop or less than desired.

Quail chicks have only a few requirements but these are a must! Chicks need freedom of movement at ground level, overhead concealment and a diverse assortment of green plants or plant parts within pecking height – which for a baby quail is only about two to three inches. The ground cover must be very open with only 25% to 50% vegetative coverage. This means that as much as 75% can be bare ground. The low-growing greens attract insects such as beetles, grasshoppers, leafhoppers, ants and other invertebrates, which compose almost the entire diet of quail up to three weeks of age. Recently burned prairie units are ideal as are old-field or previously tilled sites, weedy strips, legume plantings and small grain and legume mixes. The brood cover

must be near (within 100 yards) of midday loafing coverts, which is typically woody cover thickets or stands of taller dense weeds.

Loafing Cover and Winter Protection

Bobwhites require some type of shrubby/woody cover for loafing, headquarters sites, and protection from summer heat plus winter snow and winds. These areas provide a safe, comfortable resting site between morning and evening feeding periods. They will utilize tall grasses and weed patches but prefer woody plants. Many of these sites become what are known as "covey headquarters", which are those select sites around which a covey will center its daily activities. A covey may have several headquarters within its home range that it uses from time to time depending upon the weather and available food. Loafing and headquarters sites may be as small as 100 sq. ft. but ideally are at least 400 sq. ft. or more. Larger, denser sites are required for protection during extremely cold winter weather. No less than 5% or more than 25% of a covey home range should be in woody cover that is 3 feet to 6 feet tall.

Covey headquarters and loafing sites are easily made by protecting existing thickets from fire and grazing, felling a tree covered with grape or greenbrier vines or by planting small thickets to low growing shrubby species such as American plum, blackberry, fragrant sumac, Bessy cherry, Nanking cherry, or dogwood.

Winter Food

Bobwhites will utilize numerous kinds of seeds, grains and berries to satisfy their food requirements. Studies have shown that over 1,000 different plants are included in the diet. However, there are relatively few that are of the most importance.

To the manager wanting to maximize quail populations knowing which seeds provide the most energy to quail is of the utmost importance. Raising or encouraging those plants for winter food supply which provide a low calorie food source is not only wasteful but can actually be detrimental to the quail. Quail food habits are almost as much a matter of availability as they are selectivity. Therefore, if a low quality seed is in abundance the birds will utilize it. On poor feed, quail will not be as fat and not able to withstand severe winter weather, hens will enter the breeding season in poorer condition, lay fewer eggs and experience more physiological stress.

Some seeds that contain 80% or more of the energy required to maintain a quail in winter are (in decreasing order of importance):

Food Item	***% of Requirement***
Giant ragweed	*99.2*
Western ragweed	*89.1*
Corn	*88.7*
Soybean	*86.7*
Sorghum	*85.1*
Sunflower	*83.8*
Osage orange	*81.6*
Dogwood	*81.2*

Having several of the above seeds available to quail within their home range would offer some degree of insurance against crop failure.

In most plans, we try to maintain one food plot (or feeder station where plots are not feasible) per 20-40 acres at the maximum density to one per 160 acres at the minimum density. The plots need not be more than 2-3 acres and in fact several well-distributed smaller plots would be better. The exception would be those fields managed for quail and doves where larger fields are needed to attract doves.

Description of Selected Habitat Management Techniques

A few management techniques will be of the most importance in developing quail habitat. These include prescribed burning, disking, mowing, planting of food plots, legume seeding, shrub

and shelterbelt planting, and _ cutting. A short discussion of each of these is presented here to better understand each.

Prescribed Burning

Fire is one of the most important quail habitat management tools. Burning performs several vital functions including removing accumulated litter, stimulating new growth and controlling excessive woody invasion. Native rangelands that are burned periodically have a wider diversity of plants beneficial to quail than unburned prairies. Also, quail utilization of burned prairies will be greater than on unburned prairies for four reasons: 1) The litter has been removed from the ground level which aids in bird movement, 2) Burned units attract a greater density and diversity of insects which are critical to quail chicks, 3) Seed production is greater on burned prairies and 4) The ability of birds to feed on those seeds is improved.

Before conducting a prescribed burn be sure you are knowledgeable of state and local laws and regulations concerning burning. Prepare a burn plan which would include the purpose of the burn, target dates of the burn, area to be burned, permissible weather conditions for the burn, emergency numbers, equipment and manpower needs, etc.

Timing your burn is important. Burn when the perennial forbs have just started their spring growth. Normally this is from February to late March from the southern most areas of the quail range to the northern, respectively. Burn when there is a 5-15 mph wind, preferably in the stable atmosphere after a storm front has moved through and when the humidity is above 40%. Remember that the winds tend to increase in speed throughout the day and generally decrease toward evening.

For best wildlife response, burn in small units. On any area of 40-60 acres or larger, burn only 1/2 to 1/3 of the unit annually. Use firebreaks that are maintained by disking or fall mowing. Burning only 1/2 to 1/3 of the unit annually allows a portion of the area to be in ideal nesting cover, a portion that is good nesting and fair brooding and an area that regrows to ideal brooding sites.

If control of excessive woody plants is the objective of the burn then a "hot" fire is best. This is one, which, after the backfires are secure, is set to travel with the wind and generate a lot of heat as it consumes litter. Wildlife managers most often use "cool" fires. These are generally fires set to back into the wind or where the line of fire is parallel with the wind. Cool fires are easier to control and do a good job of leaving some woody cover intact. Cool late afternoon and nighttime burns are very good. The purpose is not generally to completely sweep the entire are black with fire but rather to enhance the "crazy quilt" pattern. Nighttime fires set when the wind is decreasing and humidity is rising tend to go out in some spots and burn through the heavier cover creating a patchwork design.

Disking and Mowing

The disk is another relatively inexpensive and effective tool available to the quail manager. Too often quail populations are perennially low in an area simply because birds are not able to move from one habitat to another. Quail must be able to walk between their food, cover and water needs and if the vegetation is too thick to allow this or there are inadequate travel lanes then the potential population density of quail will be reduced.

Disking also does a couple other beneficial things for quail. If a disked area is allowed to regrow into the annual weeds and grasses that normally invade disturbed soil then there will be additional areas for chicks to catch insects and a winter food supply in the weed seeds. Also, the bare soil areas are needed by quail for dusting sites so the birds can rid themselves of external parasites.

Normally, the strips are disked only deep enough to thoroughly disturb the soil and kill existing vegetation. About 3" to 4" depth is enough. The strips can be in various widths depending upon the equipment used, however, about 10' to 15' is about the minimum. Strips up to 10 yards wide are fine as long as they are allowed to revegetate to annual weeds and grasses.

In some places, disking will be impossible due to the erosion that might occur on the strip or because of shallow, rocky soils. In either of these instances mowing can be used as the alternative.

Areas mowed as travel lanes should be cut as short as possible and preferably in the fall. With successive years of fall mowing a carpet of Kentucky bluegrass tends to invade these strips,

which offers green winter browse for quail, rabbits and other animals. Also, a mowed strip covered with bluegrass is a more effective firebreak. Mowed strips should also be at least 15" wide. Mowing should be considered only as a substitute for disking where disking is not possible since a mowed strip does not possess many of the beneficial attributes described above for the disked strip.

Food Plots

Food plots can vary greatly in size from _ acre to 2 acres or more. On areas where there may be severe competition with other animals, especially deer, the larger food plots will be needed. Where no deer problems are likely to occur then the smaller plots are sufficient. On larger food plots or even portions of crop fields managers can plant only 1/2 to 1/3 of the plot annually and allow the remaining portion to grow into summer annuals in the idle years.

Care must be taken that quail are always able to walk through the food plot to gather seeds. If the plot is planted too thick or becomes choked with weedy grasses then quail use and food plot effectiveness will be reduced. Use the following seeding rates for the various food plot crops:

Crop	***Lbs. per acre***
Milo (with planter)	*4 to 5*
Milo (broadcast)	*6 to 8*
Soybeans (with planter)	*30 to 40*
Soybeans (broadcast)	*50 to 80*
Corn (with planter)	*12 to 15*
Corn (broadcast)	*15 to 20*
Sunflowers (with planter)	*3 to 4*
Sunflowers (broadcast)	*4 to 8*
Egyptian wheat (planted)	*4 to 5*
Egyptian wheat (broadcast)	*6 to 10*
Proso millet	*20 to 30*

Some additional food plot crops that have worked well for quail are: buckwheat, sorghum Sudan grass, hybrid forage sorghum, Rox orange cane, peredovic sunflower, WGF sorghum, bobwhite soybeans (a reseeding variety of field soybeans), sesame, various peas and cowpeas. All of these should provide high-energy winter foods.

Soil samples should be taken for any quail food plot area to determine the fertility and recommended fertilizer rates. Follow the recommended rates for producing a medium milo or corn crop.

Allowing some "weeds" to grow in the food lot is not necessarily bad, however a thick mat of annual grasses such as crabgrass or foxtail will hinder the quail's ability to forage for seed. At least one cultivation is usually needed to get the grain plants off to a good start ahead of the weeds and grasses.

Legume Seeding

The seeding of disked strips with wheat or oats and a legume crop is recommended. Legumes are important to the hen in the spring when she is gaining physiological condition for nesting. Green legumes also attract a diverse array of insects beneficial to quail chicks.

The legumes most often used by the quail manager are: Korean lespedeza, ladino clover, white clover, red clover, and subterranean clover and alfalfa. All of these can be broadcast seeded in late winter onto bare soil or drilled.

Any strips disked as a firebreak or disked as a travel lane for quail or even portions of some of the larger food plots can and should be planted to a legume crop or a small grain and legume mixture.

Half Cutting and Shrub Planting

In many areas the amount of woody cover at "quail level" is deficient or essentially non-existent. Where there are trees that can be used, half cuttings can be very effective.

Half cutting trees means cutting a tree 1/2 to 2/3 of the way through leaving a hinge of bark attached so that the tree falls over yet remains alive. This creates a living brush pile. This is particularly useful in making covey headquarters. The effect is enhanced if trees can be found which have a vine such as river grape or greenbrier attached which will then proceed to cover the entire brush pile. Cut several trees in one site half cutting so that they fall onto each other making a brush pile of from 20 to 50 feet across is particularly effective.

In places where there is no woody cover existing that can be half-cut or protected with disking, the manager may have to replant some small shrub thickets. The best shrubs for our area are: American plum, fragrant sumac, red cedar, dogwood, blackberry, granjeno (spiny hackberry), lote bush (chaparral), black brush, Texas persimmon, and lime prickly ash. Where no native shrubs exist at a site where a thicket is needed then we have little choice but to plant. Any planting will have to be protected from fire and grazing for at least several years until it is well established. All of the shrubs we plant for these purposes are bare root seedlings. Plantings are made at any time from mid-March to mid-May; however, the earlier the better. Site preparation is very important to the survival of seedlings. Any vegetation that will compete with the seedling's moisture or nutrients should be killed. If the planting site is currently in cultivation, disking once or twice may be adequate to kill existing competition and prepare mellow soil. If it is in grass sod then you must plow the area to be planted. Allow the plowed site to mellow over winter and disk again in the spring to prepare the soil.

Spacing of plants is important. Between row spacing can be dictated by the equipment used to cultivate (or disk) between the rows, however the rows should be no closer than 8' or no more than 12'. Spacing within the rows should be 10' for red cedar and 5' for shrubs.

Care after planting is also very important. The thickets must be protected from livestock. They must also be kept weed and grass free at least for the first year or two by cultivation and/or hoeing or mulching.

If a source of existing plum thickets can be found, some managers use a large tree spade to transplant plugs of existing plums to new locations. Place at least three plugs per new location to create a new thicket. The distance between the new thickets should be no more than 150 feet.

Conclusion

As mentioned earlier, the key to bobwhite habitat management is to provide as many of the annual habitat needs of the species within the average covey home range. The arrangement is not necessarily critical if birds are able to move between cover types without being exposed to predation. Remember Fred Guthery's "crazy quilt" description of quail habitat where each "patch" of the quilt fulfills some seasonal or annual cover need.

In order to maximize quail populations, biologist apply a principle developed by Dr. Fred Guthery called the "usable space hypothesis", which, in short, states that bobwhite management can be viewed as providing the maximum number of usable acres containing those habitat components required for quail survival and increase within the species' home range for the greatest length of time. Think of it this way. A 100-acre tract of land has the potential of 36,500 quail acre-use days per year (100 acres X 365 days) if every acre was usable to quail for every day of the year. Any activity that reduces the number of quail acre-use days reduces the carrying capacity of the land for quail.

Val W. Lehmann, noted Texas quail biologist, put it another way in 1984: "To supply most of the needs of high populations of quail, they must be assured continuous use of virtually every square foot of ground". If you think about it, that's quail management in a nutshell.

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Revised 12/05

Where To Find Out More About Bobwhite/Wildlife Management:

State web sites

Alabama – www.dcnr.state.al.us/agfd
Arkansas – www.agfc.state.ar.us
Colorado – www.dnr.state.co.us
Delaware – www.dnrec.state.de.us
Florida – www.state.fl.us/gfc
Georgia – - www.state.ga.us/dnr/wild/
Illinois – www.dnr.state.il.us
Indiana – www.wildlife.IN.gov
Iowa – www.state.ia.us/government/dnr
Kansas – www.kdwp.state.ks.us
Kentucky – www.kdfwr.state.ky.us/smallgam.htm
Louisiana – www.wlf.state.la.us
Maryland – www.dnr.state.md.us
Massachusetts – www.state.ma.us/dfwele
Michigan – www.dnr.state.mi.us
Mississippi – http://msucares.com/pubs/pub2179.htm
Missouri – www.conservation.state.mo.us/landown/wild
Nebraska – www.ngpc.state.ne.us
New Jersey – www.state.nj.us/dep/fgw/
New Mexico – www.gmfsh.state.nm.us
North Carolina – www.state.nc.us/wildlife
Ohio – www.dnr.state.oh.us
Oklahoma – www.wildlifedepartment.com/
Oregon – www.dfw.state.or.us
Pennsylvania – www.dcnr.state.pa.us
Rhode Island – www.state.ri.us/dem
South Carolina – www.dnr.state.sc.us
Tennessee – www.state.tn.us/twra
Texas – www.tpwd.state.tx.us
Virginia – www.dgif.state.va.us/wildlife/habitat_part/farm_habitat.html
West Virginia – www.wvwildlife.com
Wisconsin – www.dnr.state.wi.us

Federal web sites

United States Fish & Wildlife Service – www.fws.gov
Plant Materials Centers –
Wildlife Habitat Management Institute - www.ms.nrcs.usda.gov/whmi
www.ms.nrcs.usda.gov/whmi/pdf/quail.pdf
Natural Resource Conservation Service – www.nrcs.usda.gov/

Other web sites

Auburn University – Albany Area Quail Management Project – www.quailmanagement.com
Caesar Kleberg Wildlife Research Institute, Kingsville, TX – www.ckwri.tamuk.edu/
Quail Unlimited – www.qu.org
Southeast Quail Study Group (SEQSG) – www.seqsg.qu.org
Tall Timbers Research Station, Tallahassee, FL – www.ttrs.org
Texas Cooperative Extension – http://texnat.tamu.edu and http://teamquail.tamu.edu
The Longleaf Alliance – www.longleafalliance.org

Books

- Bobwhites on the Rio Grande Plain of Texas by Val W. Lehmann. 1984 Texas A&M University Press, College Station, TX. 371 pp.

- The Bobwhite Quail – Its Life and Management by Walter Rosene. 1969. Rutgers University Press, New Brunswick, NJ. 418 pp.

- The Bobwhite Quail – Its Habits, Preservations, Increase by Herbert L. Stoddard. 1931. Charles Scribner's Sons, New York, NY, 559 pp.

Booklets on Bobwhites –

- Managing For Quail by Progressive Farmer, Inc. 2001. 37 pp.
Send check or money order for $9.95 per copy, plus $3.95 s&h charges to "Managing for Quail," Progressive Farmer Books, P.O. Box 830069, Birmingham, AL 35283-0069, or call 800-425-0374 for credit card orders. 10 copies or more, $5.90 per copy and a one-time s&h fee of $3.95.

- Bobwhite Quail In Georgia – History, Biology, and Management by Reggie Thackston and Mark Whitney. 2001. Georgia Department of Natural Resources. 48 pp.

- New handbook and fact sheets on bobwhite management available September 2002 from Tall Timbers Research Station. Check www.ttrs.org for order information.

- Various websites listed above have reference to additional information that can be ordered.

Videos

Quail Country – 20 minutes – VHS, $10.00
Three landowners describe their interest in bobwhites and what they've done on their farms to improve habitat for these appealing upland game birds. Missouri Department of Conservation, MDC Media Library, P.O. Box 180, Jefferson City, MO 65102-0180, (314) 751-4115.

Prince of Game Birds: The Bobwhite Quail – 28 minutes - $10.00
This video traces the life cycle of quail throughout the year and shares the excitement of quail hunting. Quail Unlimited, P.O. Box 610, Edgefield, SC 29824-0610.

Thirty Coveys a Day – 28 minutes - $15.00
Shows how man and nature cooperate in South Texas to provide some of the fastest quail gunning in North America. Quail Unlimited, P.O. Box 610, Edgefield, SC 29824-0610.

Bobwhite Habitat Management in Mississippi – 35 minutes – VHS $10.00
This video will equip the landowner, manager, or sportsman with information and techniques needed to improve and restore wild quail populations. Includes companion publication: Ecology & Management of the Northern Bobwhite. MSU Extension Service, Bobwhite Video, Box 9690, Mississippi State, MS 39762. Visit http://msucares.com/pubs/pub2179.htm

Farms, Grasslands & Wildlife – 30 minutes – Free
Bobwhite quail and many other grassland species have been on a long-term decline over the past 30 years. By using the practices shown in this video you can provide better habitat for quail, conserve soil and water and improve livestock production. Available through the Kentucky Department of Fish & Wildlife Resources, Attn: Wildlife Annex, Upland Game Program, #1 Game Farm Rd., Frankfort, KY 40601.

Managing CRP Lands for Wildlife – 15 minutes – VHS, Free
This video shows you how to implement approved management practices, such as prescribed burning, strip disking, shrub plantings and food plots to improve CRP lands for wildlife. Provided by the Missouri Department of Conservation. NE Regional Office, 2500 S. Halliburton, Kirksville, MO 63501.