MARYLAND COOPERATIVE EXTENSION
UNIVERSITY OF MARYLAND
COLLEGE PARK•EASTERN SHORE

Fact Sheet

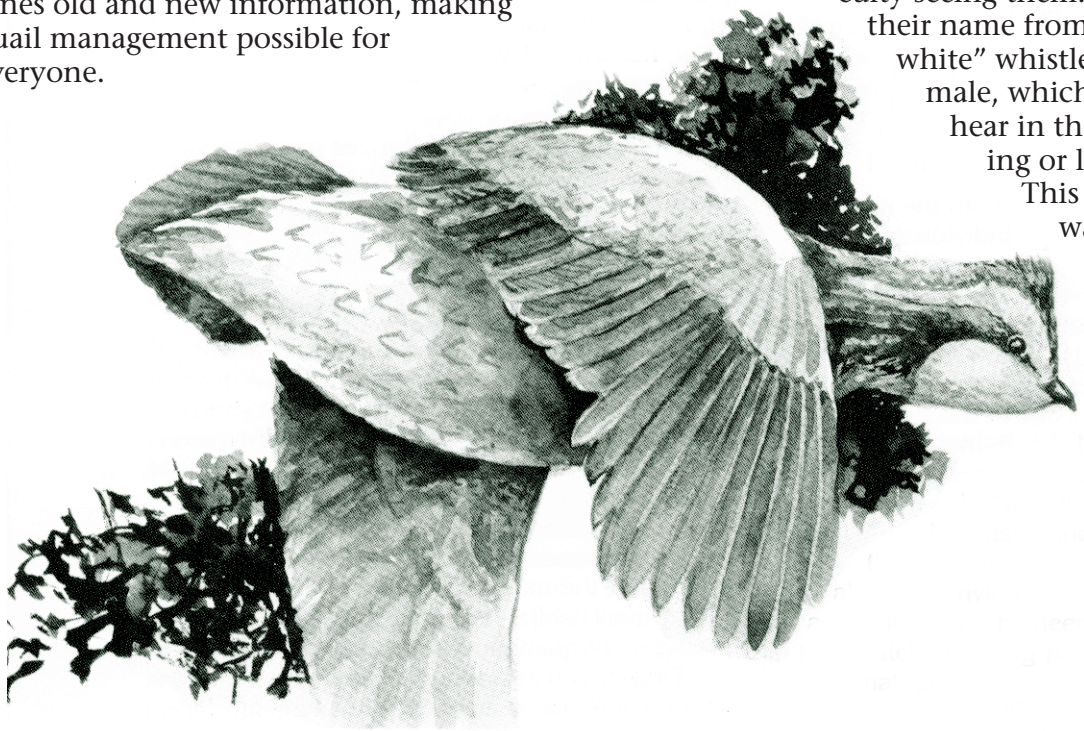
Fact Sheet 602

Wildlife Management: Bobwhite Quail

The wildlife management field is frequently criticized for being more theory than practice, and is not readily understood by the general public. Considering most sporting animals, this may be true. However, for a few species, such as the Bobwhite Quail (*Colinus virginianus*), it is fair to say that progress has been good. Management of the Bobwhite Quail has become a respected art and science, and its habitat requirements are understood by many landowners. This fact sheet combines old and new information, making quail management possible for everyone.

Identifying Physical Characteristics

The Bobwhite Quail is a small, reddish-brown bird that weighs 6 ounces when grown. Males have a white line over their eyes and on their necks. They also have white bibs on their throats. These markings are brownish yellow on females. Because of the quail's coloration, you may have difficulty seeing them. Quail get their name from the "bob-white" whistle made by the male, which you may hear in the early morning or late evening. This whistle is the way one male calls for another to



join him and is also used by males to attract a mate.

Abundance and Distribution in Maryland

The population of Bobwhite Quail, which has long been considered an important game bird, is declining in Maryland. Quail populations have increased and declined as humans and the progress of civilization have continued to alter the environment. Early land-use practices associated with pioneer settlements were typified by a patchy farming pattern, which provided ideal quail habitat.

From the early 1900s to the mid-1940s, quail population densities remained high and quite stable. Since the mid-1940s, however, the number of quail has declined in much of the South. This downward trend is largely associated with deteriorating habitats resulting from the following conditions: a change to cleaner and more mechanized farming methods, the joining of small fields to make large unbroken fields suitable for intensive cultivation, and the development of pastures for cattle, dairy, or hay production. Few wild species, however, are more capable than quail of adapting to human manipulation of the environment.

Also, quail are well adapted to agricultural regions and are beneficial to people since they eat many harmful insects and weed seeds. Bobwhite Quail can be found throughout Maryland; however, the greatest numbers are found in southern Maryland and the Eastern Shore counties.

The mortality rate for Bobwhite Quail (and most other small game species) is high and is essentially the same in both hunted and unhunted populations. Of every 100 birds alive in the fall, between 75 and 80 will die or be killed within the following 12 months. Hunting only removes surplus birds before they are lost to other causes. For this reason, hunting in years of lower-than-average quail populations will not reduce the prospects for a quick return to normal levels if food, cover, and general habitat conditions are favorable.

Predators have little overall effect on quail populations, but what effects they do have can be greatly reduced by improving habitat. Better habitat increases both the number of species and the quantity of individuals within those species in the area. This concept is called an increased prey base. These species act as buffers, reducing overall predation on quail.

You may be tempted to try to remove predators; however, this has been shown to be a very inefficient approach, partly due to the large number of potential predators and their ability to quickly fill any void created by the removal of others. Instead, combine habitat improvement with in-season fur trapping to keep predators and predation in check.

Life History of Quail

Quail do not like to be alone. During late fall and winter, they gather together to form a "covey." Quail coveys break up as days become warmer in the spring, when the males and females pair off and courtship begins. Quail pair off for the entire nesting season, and both males and females build the nests. Nests are made of dried vegetation and are in areas such as fallow fields, hedgerows, rights-of-way, and hay fields. The nesting period extends from April through September, with most nesting occurring in May, June, and July. Quail renest only when earlier attempts are unsuccessful. Nesting attempts may fail because of wild fires, poor weather conditions, predators, agricultural activity, or other environmental factors. Many nests are destroyed by dogs, cats, foxes, rats, snakes, raccoons, skunks, and other predators. Such destruction, however, is not necessarily bad because it provides more time between hatching dates and thus reduces the potential for mass mortality of the young.

Clutch sizes range from 8 to 25 eggs, with an average of 14. If the female is killed, the male will take over incubation and brooding. After a 23-day incubation period, the number of chicks hatched ranges from 8 to 25 and averages 12. All chicks hatch within a 24-hour period and leave the nest together a few hours after they are dry. Chicks can fly when they are 2 to 3 weeks old. They weigh as much as adults in 8 to 9 weeks and resemble adults in 15 weeks. The adults and brood normally remain together as a covey until fall. The winter covey size averages 14 birds, and most of these birds live about 4 months;

although some may live a year or longer. Approximately 80 percent of the fall quail population consists of birds 3 to 7 months old. These coveys have a home range of 15 to 100 acres. All of their needs, such as food and various types of cover, must be within this home range. Table 1 summarizes the life history of quail.

Managing Quail

The following general quail management recommendations should provide you with some ideas about what may be done on land you own, manage, or hunt. Specific management recommendations can be made only after you investigate an area and prepare a management plan.

As previously mentioned, the only way to permanently increase quail populations on any land is through the maintenance and development of quality quail habitat. The procedure involved in producing more quail, however, is relatively simple.

First, if you are a landowner or hunter, think about where you consistently found quail during the past few winters. The locations all will contain essentially the same elements: adequate cover within a short distance of a food supply containing several important food plants, either cultivated or native. Next, look over your land, decide where you would like to develop your land for birds, and try to determine why birds are not using these areas already. Be sure to identify the limiting factor(s), and use management techniques to alleviate these factors. If adequate cover exists, grow food; if cover is scarce, develop it before you grow food.

Some of the more common management techniques used to improve quail habitat include disking, burning, and planting for food and cover. Remember to design your management plan so food and cover are adequately interspersed.

Use caution when planting food plots for quail. Seeds of cultivated plants are not always a reliable source of late-winter nutrition for the birds because they have a tendency to rot more quickly than native plants. The easiest way to encourage native plant species growth is by disking and subsequent fallowing of areas along field edges. If possible, avoid late-summer or fall plowing of crop residue unless an unplowed strip of residue can be left around field edges.

Cover

In general, quail like a diversity of cover types, including forests, brush, sparse grass, and cultivated lands. When all or a combination of these conditions exist, populations present usually depend largely on a distribution of these four types. Bobwhites prefer areas where all types may be found within their normal 40-acre range.

Bobwhite Quail are a low to intermediate successional wildlife species, which means they like a diversity of habitats dominated by brushy areas, grassland, and cropland. Provide a mixture of 30 to 40 percent sparse

Table 1. Life History of Quail.

Breeding season	April to October
Brood size	Average: 12 chicks Range: 8 to 25 chicks
Clutch size	Average: 14 (in most instances a pair of quail will hatch one brood per year) Range: 8 to 25 eggs
Covey size	Average: 14 birds
Fly	2 to 3 weeks of age
Hatching season	May to August
Home range	Average: 40 acres Range: 15 to 100 acres
Incubation period	23 days (both male and female share in the incubation)
Markings	Male: White line over its eye and down its neck and a white bib Female: Markings are brownish yellow
Maturity	15 to 16 weeks of age
Weight	Adult: 6 ounces

grassland, 40 to 60 percent cropland, 5 to 20 percent brushy cover, and 5 to 40 percent woodland. Quail are relatively sedentary animals, with daily movements usually restricted to 20 to 40 acres. Thus, a mixture of habitats providing adequate food, cover, and water should be well interspersed within the quail's range of 1/8 to 1/4 of a mile.

Large fields of fescue are not good quail habitats. The best cover for quail should not be too dense. Remember, a quail looks at the world from a height of about 4 inches and requires space to escape predators easily. Optimum cover provides a thick overhead canopy while maintaining openings within 1 foot of the ground. For quail cover, think diversity or variety. Cover requirements for quail can be broken into nesting cover, roosting cover, loafing cover, screening cover, escape cover, and winter cover.

Nesting cover. Nesting cover is critical for successful reproduction. Optimum nesting cover is usually a grass or grass and weed mixture that is not too old or thick; therefore, fescue is not good nesting cover. Ideally, prime nesting cover is typified by scattered shrubs and briars interspersed with a moderately sparse stand of herbaceous and grassy vegetation, such as goldenrod, panic grass, broom sedge, bluegrass, and orchardgrass. Most nests are located within 50 feet of an edge.

Roosting and loafing cover. Roosting cover is characterized by sparse, low-growing vegetation with an open canopy. This cover provides warmth for the birds at ground level at night. In addition, should flight be necessary, the chance of a collision is reduced. Quail use loafing cover for dusting, resting, and loafing during midday inactive periods. This cover should occur in clumps (30 to 50 feet across) where the ground is relatively bare, but with a canopy several feet above ground. Shrubby areas are excellent loafing cover. Dusting is important for quail to control external parasites and mites. Thin stands of weeds, grasses, and shrubs, such as aster, ragweed, horseweed, broom sedge, plum bushes, and sumac bushes, fit this need.

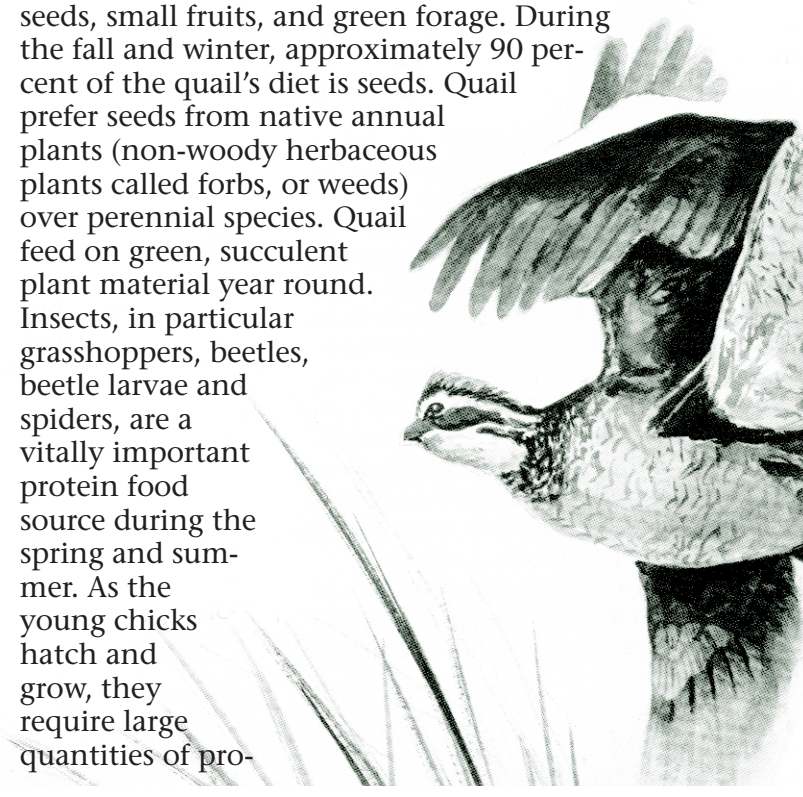
Screening and escape cover. Quail use screening cover for protection from predators while traveling or feeding. Low shrubs or tall grass and weed mixtures provide excellent screening cover. Often, this type of cover can be provided by maintaining unmowed areas. Escape cover is required for eluding predators such as hawks, owls, foxes, and house cats. Usually dense grass, coarse weeds, or dense brush provides excellent escape cover. Dense woody plants, such as blackberry, grapevine, and vine honeysuckle; dense, low-growing thickets; brush piles; and felled treetops are also used.

Winter cover. Winter cover can be a critical factor and is necessary to escape harsh, adverse weather conditions. Woodlands and dense brush are examples of excellent winter cover.

The key to successful quail management is to provide all kinds of cover in a small area in the proper arrangement. Also, remember to keep some areas free of vegetation for scratching, dusting, and feeding. Most farms in Maryland lack adequate nesting cover, winter cover, or winter food. If you follow the previously listed requirements, the other habitat needs will also be met.

Food

Quail need all of their food and cover requirements close together because they live primarily on the ground and travel mostly by walking. Primarily feeders of fields and open forests the diet of quail is composed largely of seeds, small fruits, and green forage. During the fall and winter, approximately 90 percent of the quail's diet is seeds. Quail prefer seeds from native annual plants (non-woody herbaceous plants called forbs, or weeds) over perennial species. Quail feed on green, succulent plant material year round. Insects, in particular grasshoppers, beetles, beetle larvae and spiders, are a vitally important protein food source during the spring and summer. As the young chicks hatch and grow, they require large quantities of pro-



tein. This protein requirement is met by consuming large numbers of protein-rich insects. A single quail consumes 56,430 insects and 5,379,168 weed seeds in a year, and it can eat 560 mosquitoes or 168 grasshoppers in a single feeding. Artificial feeding is not recommended because it is usually expensive and yields questionable results.

Bobwhite Quail eat some of these important plant species: pigweeds, ragweeds, wild beans and peas (legumes), sunflowers, beggar's lice, tick trefoils, and crotons. Quail also eat grasses, such as panic grasses, foxtail grasses, orchardgrass, barnyardgrass, and smartweeds. They also eat hard and soft mast, including the seeds of oaks, ashes, blackberries, and sumac, as well as a variety of cultivated crops, including sorghum, milo, corn, and wheat. Seeds of legumes are probably the most important native quail foods, with grasses and sedges second in importance.

Although quail are commonly seen near open water and are occasionally observed drinking surface water, it is not essential because birds normally receive their water requirements from dew, insects, and succulent green vegetation.

Once the cover requirements have been satisfied, examine the food base and determine if adequate nutritious late-winter food is available, because late winter is usually the period of greatest stress for the birds. Winter food must be present in February and March and must be available above any snow cover. Soybeans, grain sorghum, and shrub lespedezas all represent excellent examples of winter food species.

Some of these food requirements can be provided through the proper manipulation or harvest of the more important row crops planted in Maryland. Soybeans are probably the best all-round cultivated food source for quail, because they help to provide year-round quail needs. Corn, smaller grains, and dwarf sorghum are also good food sources. Integrated pest management or minimal pesticide use will help the bobwhite to thrive.

The current practice of planting corn in thick stands, especially for silage, has reduced the overall value of these fields for quail because dense stands and herbicide applications seriously reduce the volunteer growth of annual weeds and other plants preferred by quail. If possible, leave a couple of rows of corn standing around the field edge after harvest is complete. Mow portions at intervals during the winter months to supply food for coveys during this period. Soybeans and the grain sorghums are more valuable to birds when a few rows are left standing on field edges. The vegetative part of these plants offers some cover and, in most cases, seeds will scatter out gradually, thus providing a continual source of food. All of these food supplies should, when possible, be left close to available escape cover.

In areas where disking, burning, or available row crops will not produce the desired foods, you may plant a variety of high-quality quail food plants. Plantings for quail may be divided into two general types: fall plantings and late-winter plantings. Fall plantings concentrate birds for hunting and late-winter plantings are used during periods of low food availability. A combination of the two is probably best. Late-winter food helps to make an area attractive to the birds year round. Fall plantings help to attract birds during the hunting season and may draw some birds from adjoining unmanaged land.

Some of the better fall plantings include the annual lespedezas (common, Korean, and Kobe), browntop millet, and Florida beggarweed. Low-maintenance, late-winter foods normally planted in this part of the country include bicolor lespedeza, soybeans, and dwarf sorghum. All of these plants require good seedbed preparation and fertilization, and some require cultivation.

The size of the plantings should be at least 1/16 of an acre and normally does not need to be larger than 1/4 of an acre. Establish the plantings in large, narrow strips about 15 to 20 feet wide, parallel to field borders, forest edges, roadways, grown-up ditches, or other areas adjacent to suitable escape cover.

Remember, the best quail cover is relatively thick above and open at ground level to allow easy movement.

Disking

Disking your land, except where it is practical to burn, is probably the cheapest method of producing desirable quail food plants. Disk anytime following the first full frost until the following May.

Nearly all fields will provide an abundance of native food plants through light disking of strips around the edge of these fields, allowing for a transition zone if needed. Transition zones are simply a third habitat type developed between two existing and different habitat types. In most instances, transition zones will be developed along an adjoining edge between hedgerows, roads, ditch banks, timbered areas, and cultivated fields. You may disk new ground the second year, as an established strip will continue to produce food for several years. You should always establish strips close to adequate cover. Transition zones between forest and field are extremely important because the bobwhite is an "edge species," and the amount and quality of edge present usually dictates the abundance of quail on a particular area. Properly managed and maintained, these areas will provide much of a quail's needs year round. Transition zones may be established in the agriculturally unproductive field corners, edges, or borders. These zones may be located where woodlands meet crop fields or exposed pastures and along fence lines and roadways. These transition strips may cover all the unproductive field edge but should never be less than 15 feet wide.

Brush Piles

You may build brush piles in woods adjacent to fields where winter cover, such as greenbriers or honeysuckle vines, is lacking. Brush piles are one of the quickest methods of improving quail cover. They may be constructed with readily available materials. (See Fact Sheet 599, "Brush Piles for Wildlife," for more information.) Brush piles should be loosely built and grass and weeds allowed to grow in them. You will need one or two average-sized treetops to build a brush pile (15 feet wide by 5 feet high by as much as 40 feet long). Establishing hedgerows and planting shrubs around field edges or in clumps in corners of fields will improve winter cover. Evergreen trees should also be incorporated in the hedgerows and clumps.

When establishing plantings in fields adjacent to woods, leave 50-foot-wide, 100-yard-long alternately mowed and unmowed strips around the fields. Areas mowed and unmowed need to be reversed each year or two. They should be mowed after July 31. Disking a quarter of these mowed strips after the main nesting season will benefit quail in their nesting efforts.

Hedgerows

Hedgerows should be developed and maintained. They provide the foundation for quail management on many farms. Minimum width should be 12 feet. Hedgerows next to crops should not be more than 7 feet high to prevent shading of the crop. Encourage woody plants, such as wild plum, sumac, greenbrier, wild grape, honeysuckle, blackberries, dogwood, sassafras, osage orange, and other low-growing shrubs. Do not allow tall trees to dominate (not more than one tall tree per 150 feet of hedgerow should be allowed to stand), because large trees shade valuable undergrowth. Cut tall trees and allow them to fall in hedgerows. Let tops and limbs lie where they fall, and permit a narrow strip of grass or weeds to grow next to the hedgerow. Leaving a strip fallow to grow into a suitable hedgerow may require 3 to 15 years depending on the soil and what has previously been growing there. A well-developed hedgerow around a 20-acre grain field may support one or two coveys.

Other types of vegetative cover are also important under certain conditions. Large fields and pasture, for example, contain areas within the center that are not utilized by quail. Generally, quail will not venture more than 50 feet into the open from the nearest adequate cover type. To provide access routes into these areas, divide large fields into small tracts by providing travel lanes across or into these fields. This may be accomplished by leaving undisturbed strips in native vegetation. These strips should be at least 60 feet wide or wider if practical. You can set up the strips by connecting adjacent timbered or cul-

tivated areas or areas providing adequate cover. These strips should be maintained by mowing, disking, or burning one side of each strip every 2 or 3 years in the early spring. To receive some economic return from cropland removed from production by fallow strips, these areas may be established in pine seedlings on a spacing of 8 feet by 10 feet. These plantings will provide a permanent cover for the future as well as some fiscal return.

Cropland Management Practices to Benefit Quail

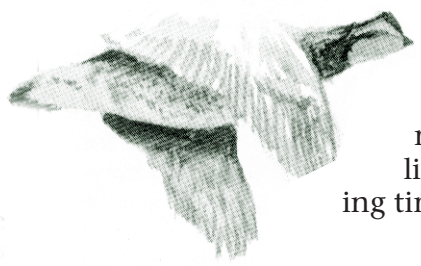
Quail management practices for cropland can be summarized with the following suggestions:

- Avoid tillage or mowing within 50 feet of field edges during May, June, and July, if possible. Portions of the field edges should be disked when more than 75 percent of the soil is covered with a layer of dead vegetation to provide for new weedy growth and ideal nesting cover.
- Leave turn rows and roadsides unsprayed and untilled.
- Do not burn roadsides, hedgerows, or crop residues. If burning is needed for management, burn between February 15 and April 1.
- Do not disk or plow crop residues in the fall.
- Mow ditch berms only often enough to control unneeded woody growth, and mow only in midsummer (July 31 to August 30). Mow one side of a ditch in a given year.
- Disk around suitable patches of nesting cover to protect them from controlled burning.

Woodland Management Practices to Benefit Quail

Quail management practices for woodland can be summarized in the following suggestions:

- Keep at least five good mast-producing trees per acre when thinning hardwoods.
- Divide extensive open areas with plantings of conifers and shrubs. Where conifers and shrubs are to be used in the strips, plant the conifers in the center flanked by the higher shrubs, with the lower shrubs on the outside. When planting coniferous species for game purposes, use an 8-foot by 8-foot or 12-foot by 12-foot square. Where shrubs are to be used alone, a spot planting of 6 to 10 shrubs should be made or a hedgerow of plants using a close spacing.
- For optimum quail production in pine and pine hardwood woodlands, limit sawlog production to one-half the normal expected production for the site and maintain an open canopy so that at least 60 percent of the forest floor is exposed to direct sunlight at noon during the summer.
- Use uneven-aged stands and long rotations in woodlands of pine or hardwoods. A rotation for loblolly pine of about 50 years is satisfactory.
- Plant rectangular strips 200 feet wide at 10-foot by 10-foot square spacings at 10-year intervals when converting open lands to pine for timber production. Thin the first strip after the third strip is planted, and winter control burn the limited strip 1 year following thinning.
- Use timber harvest and regeneration methods if maximum quail management on timbered land is desired and to develop permanent 1- to 2-acre forest openings, which may be planted to a variety of the quail food crops previously discussed. Permanent openings should average one per 15 to 20 acres. If permanent openings take too much land from timber production, food patches may be established in existing timber stands.



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This Wildlife Management series was published by Maryland Cooperative Extension with joint expertise and funding from the U.S. Fish and Wildlife Service and the Department of Natural Resources. Marylanders interested in wildlife management can refer to this series for basic wildlife management concepts, species' needs, management recommendations, habitat requirements, food and cover plants, and other general considerations. Contact your county Extension office for more information on wildlife management. Fact sheet titles in the full series are:

Fact Sheet 597 Introduction to Wildlife Management
Fact Sheet 598 Planting Crops for Wildlife
Fact Sheet 599 Brush Piles for Wildlife
Fact Sheet 600 Field Border Management
Fact Sheet 601 Eastern Cottontail Rabbits
Fact Sheet 602 Bobwhite Quail
Fact Sheet 603 Ring-necked Pheasants
Fact Sheet 604 Ruffed Grouse
Fact Sheet 605 Mourning Doves
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Fact Sheet 610 Dabbling Ducks
Fact Sheet 611 Diving Ducks
Fact Sheet 612 Canada Geese
Fact Sheet 613 Songbirds

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