

Small Game Management in Georgia



Georgia Department of Natural Resources
Wildlife Resources Division
Game Management Section

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Preface

Wildlife biologists serving on the Georgia Department of Natural Resources' Small Game Committee prepared this booklet. This is the second revision and third printing of this publication. It is intended to serve as a source of general information for those with a casual interest in small game animals and as a more detailed guide for landowners and managers who want to improve small game populations on their properties. Technical assistance in developing land management plans is available from Private Lands Program (PLP) and WRD biologists. For additional help, contact the Private Lands office or nearest Game Management Office listed below. You can also find your nearest PLP biologist by visiting our map at: <https://georgiawildlife.com/privatelandsprogram>.

Private Lands Program

(229) 420-1183



Game Management Offices

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INTRODUCTION

In the early 1900s, America was in danger of losing many of its wildlife species. Destruction and loss of habitat, industrialization, and overexploitation of certain animals resulted in a major decline of many species including white-tailed deer and eastern wild turkey. Facing this threat, numerous hunters and outdoor enthusiasts joined together in supporting legislation to develop the Wildlife Restoration Program of 1937. This legislation is often referred to as the Pittman-Robertson Act.

The Wildlife Restoration Program or Federal Aid in Wildlife Restoration Act was established in 1937 and funded with money received from excise taxes on the sale of sporting guns and ammunition. In the 1970s, tax receipts from the sale of handguns and archery equipment were added to the program fund. Over 28 billion tax dollars have been invested in conservation and hunter education as well as more than 45 million acres maintained for public access across the U.S.

The Pittman-Robertson Act funds essential research by more than 25,000 professional wildlife biologists nationwide. The program also supports training in firearms and archery safety. In addition, hundreds of public shooting ranges have been built with program dollars. Hunting and target shooting purchases have supported wildlife conservation for over half a century.

The “baby-boomer” generation’s primary hunting opportunities were for small game species, including rabbit, squirrel, and quail. There were few big game hunting opportunities available in Georgia until translocation efforts in the 1960s-1970s resulted in population increases for deer and turkey in the 1980s. With more intensive agricultural practices such as clean farming across larger acreage, industrial forestry, and reduced burning, there was a reduction in shrub-scrubby habitat and weedy fence rows. Hunting leases targeting big game species also shifted management strategies and small game populations declined along with the interest in hunting them.

However, over the last decade, interest in hunting has been on the rise, and with that has come an uptick in the traditions of small game hunting. We now see today’s generation learning to “aim small, miss small” starting with squirrel hunting, and the tradition of opening day dove hunts has grown. Quota hunts set up by the Bobwhite Quail Initiative also allow youth an opportunity to quail hunt and experience the art of setters and pointers stopping on a dime when they have caught the scent of a bird.

Whether you enjoy hunting quail with a fine English setter, treeing a squirrel with a Jack Russell terrier, or listening to a pack of beagles trail a rabbit, small game hunting is special. For most of us, it means quality time spent with family or friends. Hunting is not just recreation. Hunting is an important social and psychological activity. (Wildlife and the American Mind, 1998).

Aldo Leopold stated in his 1949 essay, “Goose Music” that “It is not merely an acquired taste: the instinct that finds delight in the sight and pursuit of game is bred into the very fiber of the race. Golf is sophisticated exercise, but the love of hunting is almost a psychological characteristic. A man may not care for golf and still be human. But the man who does not like to see, hunt, photograph, or otherwise outwit birds or animals is hardly normal. He is supercivilized, and I for one do not know how to deal with him. We are dealing therefore with some thing that lies very deep.”

The Wildlife Restoration success stories for big game, including white-tailed deer, wild turkey, Rocky Mountain elk and pronghorn antelope, have been outstanding. With efforts from both state and federal agencies, landowners are starting to see small game species return to the lands where they were historically decline.

The following chapters on small game species discuss the biology, habitats, and management needed to assist interested landowners and managers in creating good small game habitats on the properties they manage.





BOBWHITE QUAIL

For many years, Georgia was recognized as the “Quail Capital of the World.” This title was justified by the state’s excellent population of bobwhite quail (*Colinus virginianus*). Georgia’s high quail population was the accidental byproduct of low-intensity agriculture and forestry practices commonly applied throughout most of the state during the late 1800s - mid-1900s. However, veteran quail hunters are well aware quail abundance has dropped dramatically since the 1960s, making hunting much less productive. Data from the U.S. Fish and Wildlife Service Breeding Bird Survey indicate that from 1966 to 1998, Georgia’s quail population declined by more than 70 percent. This decline led to a reduction in the number of quail hunters and quail harvested.

In 1962, an estimated 135,000 hunters harvested about four million quail, but by 2022 the number of hunters declined to 12,200 and the reported wild quail harvest was about 74,600. In 2022, 39 percent of quail hunters hunted only pen-raised birds.

Land-use changes are primarily responsible for the quail population decline. More specifically, these changes include: the loss of agricultural land, “clean farming” practices, larger agricultural fields, increased use of pesticides, conversion of farmland and native rangeland to exotic pasture grasses, increased acreage in intensively managed short-rotation pine plantations, decreased use of prescribed fire and increased urbanization.

The good news is that wildlife biologists know more about managing bobwhite quail than any other upland game bird. The first step to improving habitat conditions for quail is developing a management plan that considers the entire life history of the bobwhite relative to the current habitat conditions. For a quail population increase to occur, management practices must address the factor most limiting the population. For example, planting food plots to increase fall foods will not result in more birds if brood habitat is the limiting factor (which often is the case). GA DNR Private Lands wildlife biologists are available to assist landowners in creating a management plan for their property.

LIFE HISTORY

Reproduction

The familiar “bob-bob-white” whistle heralds the beginning of the breeding season for quail. Increases in day length and temperature trigger breeding activity. Pairing begins with covey breakup, usually in March. Coveys often break up during the day and reform just before dark. Remnant coveys may be found until early May.

Quail are generally monogamous, with one male (cock) mating with one female (hen). However, studies reveal that polygamous behavior, having several different mates during a breeding season, is more common than previously thought. Populations consist of about 15 percent more males than females. This uneven sex ratio is primarily a result of hen mortality during the nesting season. Most of the “bob-whiting” in mid and late summer is by unmated cocks in search of hens.

The most important months for nesting are May through August, but some nesting occurs as early as March and as late as October. Bobwhites are ground nesters and preferred nesting areas are where

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ground vegetation contains bunch-type grasses that cover about 30-50 percent of the total ground area. Cover of this type offers optimum nest concealment while providing adequate passageways for quail movement. Both hens and cocks collect materials used in nest construction, primarily grasses and pine needles, from within a few feet of nest sites. Hens continue to re-nest throughout the nesting season if previous attempts are unsuccessful. Hens that are in excellent physical condition may re-nest up to two more times after hatching a brood. Also, some cocks may be left to complete incubation while hens find another mate and begin another nesting attempt. The number of eggs laid per nest (clutch) decreases with each attempt, ranging from an average of 16 eggs in April to only 9 in September. The incubation period is 23-24 days.

Mortality

Quail are a prey species and are near the bottom of the ecological food pyramid. In Georgia, more than 25 different wildlife species have been identified that prey on quail and/or their eggs. Annual mortality rates for quail vary from 60-80 percent depending on habitat quality, weather, predator densities, hunting pressure and other factors.

Studies suggest quail chick mortality is 50 percent or more between hatching and 14 days of age. This loss can be reduced by improving brood habitat, particularly by creating large blocks (2 - 5 acres) of annual weeds such as ragweed and beggarweed that are canopied above but open underneath. During the first few weeks of life, chicks require a high-protein diet provided by animal matter, primarily insects. Management practices, such as winter disking and prescribed burning, produce an abundance of insect life at or near ground level. These management practices also provide chicks with an overhead canopy of annual weeds. This protective canopy of weeds can help increase chick survival by protecting them from the heat of the sun and predators.

In addition to summer losses of chicks, another significant loss of bobwhites occurs during either the hunting season or the breeding season. Even if habitat conditions on an area are good and hunter harvest is low, spring and summer mortality will equal or exceed that of winter. The quality of available habitat controls the size of a quail population. Summer quail production usually exceeds the ability of the habitat to support the young through an entire year. Natural mortality from factors such as predation and disease occur. Studies show that annual losses of 60-80 percent remain constant, whether or not an area is hunted. Therefore, a hunter harvest of 15-20 percent of a fall population may replace part of the natural losses without endangering next year's population.

Weather also can be an important mortality factor for quail. In Georgia, the worst weather scenario is prolonged drought during the spring and summer. Drought negatively impacts quail populations by reducing weed seed production, available cover and insect abundance. These factors ultimately result in decreased quail reproduction, survival and recruitment into the fall population. The best buffer against drought is the continued provision of quality habitat, especially nesting cover, brood habitat and food resources. When rainfall does occur, quail populations can respond quickly.

Food Habits

Food resources utilized by quail vary by season, natural availability of food items, and depend on quail's nutritive needs. Peak fruit consumption, for example, occurs in the late spring and summer while mostly insects are eaten during the summer and fall. The typical annual bobwhite diet consists of 60-65 percent seeds, 15-20 percent fruits, 15 percent animal matter and 5 percent green vegetation. Bobwhites in Georgia can survive without drinking water, provided succulent vegetation and insects are readily available. However, a quail population needs some form of free water (rain, dew, etc.) to thrive, particularly in more arid regions.



Hatching is a major survival accomplishment. Only 2-25 percent of quail nests successfully hatch.

Behavior and Movement Patterns

As summer ends and fall approaches, quail form into groups called coveys. The average covey size is about 12-15 birds and usually consists of birds from two or more broods. Occasionally, two or more coveys may be found together resulting in the “40 bird” covey that quail hunters often talk and dream about hunting. If covey size becomes low during the fall and winter, the remaining birds may join with another covey for the remainder of the winter. For this reason, it is not advisable to use covey size as the determinant factor in deciding whether to harvest additional quail from an area during the hunting season. Birds remain in coveys until spring approaches when they “break up” and disperse to begin the mating season.

Habitat Requirements

Bobwhite quail are an early succession shrub-land species. They need an interspersed cover that is dominated by annual and perennial weeds and legumes, native warm-season bunch grasses, and a mosaic distribution of briar and shrub thickets. Quail densities are highest and respond best to management in areas where there is a contiguous distribution of suitable habitat (perhaps 2,500 acres or more). Fragmented landscapes comprised of small, isolated blocks or “islands” of habitat are not capable of sustaining high densities of quail, and these habitat fragments may limit the potential of quail to respond to management. Soil conditions are also important to consider when managing land for quail. Soils with the greatest quail management potential are well-drained sandy loams and clays. Deep sands and wet soils limit prospects for improving quail populations. Due to site conditions and current land use patterns in Georgia, the Upper Coastal Plain generally offers greater potential for quail management than does the Ridge and Valley, Blue Ridge Mountains, Piedmont, or Lower Coastal Plain physiographic provinces. The Southwestern portion of the Upper Coastal Plain tends to have the best quail potential because of high soil fertility and summer rainfall. This is not to say that quail management is futile in other regions, but expectations must be tempered with the realization of the bird's habitat needs and the condition of the land, as well as surrounding land uses.

Across Georgia's rural landscape, the primary habitat components that are missing for quail populations to rebound, are nesting cover, brood range, and year-round food availability. Most lands have vegetative cover that is either too dense or too sparse at ground level.



MANAGEMENT

Agricultural fields and woodlands can be enhanced for quail through the judicious application of management practices. As previously mentioned, management must address the limiting factor(s) if the quail population is to increase. Additionally, both harvest and habitat management should be conducted in anticipation of the worst weather conditions. This is best accomplished by developing a detailed management plan that is tailored to the property under management consideration. At a minimum, a management plan should include an inventory of current habitat conditions and specific recommendations relative to the type, timing, location and costs of needed management practices.

Croplands

Providing suitable conditions for quail on as little as 2-5 percent of commercial crop fields can result in substantial increases in the population. Croplands can be enhanced for quail through the management of fallow habitats including field borders, hedgerows, field corners, ditch banks, filter strips and fallow fields or patches. Combinations of winter disking, planting and selective application of herbicides can be used on these sites to provide nesting cover and brood habitat during the spring and summer, and food and cover during the fall and winter.

When establishing linear practices like field borders, hedgerows and ditch banks, the best rule to remember is wider is better. They should be at least 15 feet in width, but 30-100 feet is preferred. A

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good approach is to use several disc harrow widths to facilitate strip management. When possible, field borders should be maintained around the entire crop field. However, field borders even on one side of a crop field may provide significant benefits to quail. When feasible, all fallow habitats should be connected to allow for the protected movement of quail throughout the cropland area.

Strip disking during fall/winter can be used to maintain favorable structure and plant species composition for quail in fallow habitats. For example, 1/3-1/2 of the site can be disked each year (November through February) and allowed to remain fallow the following summer. Fall/winter disking encourages the development of ragweed, partridge pea, beggarweeds, and other quail food and cover plants. As a rule, fallow habitats should not be disked, or otherwise disturbed, during spring and summer as this encourages undesirable plants like coffeeweed, Johnson grass and Bermuda grass. Disking in the spring and summer may also destroy nests or disturb birds on nests.

Planting can also be used as an integral part of managing these fallow habitats for quail (see Appendix 1 for specific recommendations). Plant annual grains like corn, Egyptian wheat, brown top millet and grain sorghum in the spring and summer to provide food and cover in the fall and winter. Wheat or oats can be planted during late fall. Plantings should be established in strips and then allowed to remain fallow the following year and rotated across the site. Another option is to plant reseeding annuals like partridge pea and beggarweed, then encourage these to reseed with periodic fall/winter disking. Plant only a small portion of the managed site (generally less than 25 percent) in any given year, maintaining the remainder in desirable weeds and grasses to provide adequate nesting cover and brood habitat.

Periodically, the use of herbicides may be needed to control the invasion of trees and/or exotic grasses and weeds into fallow habitats. Even with frequent soil disturbance, sweetgum and other light-seeded trees may invade fallow areas and shade out desirable food and cover plants. Spot spraying with an approved herbicide can address this problem. Another common problem is the invasion of Bermuda and other exotic grasses into and underneath the weed canopy in fallow habitats. These grasses restrict quail movement and can become so thick as to out-compete desirable vegetation. The best solution is broadcast spraying of an approved herbicide to control exotic grasses within and adjacent to fallow habitats before establishment. Many of the fallow habitats that once provided excellent food and cover for quail have gradually succeeded into trees. These areas can be restored through mechanical and/or chemical treatments to remove the trees and restore the weeds, grasses and briars that quail need. For specific herbicide types and rates, managers should consult their county extension agent or an herbicide company representative.

Grazing Lands and Hayfields

Moderate to heavy grazing by livestock of native rangeland detrimentally affects food and cover conditions for quail. At high stocking densities, livestock may trample and destroy quail nests. Livestock also utilize many of the foods preferred by quail. Heavy grazing reduces the abundance of cover, making quail more vulnerable to predators. On native rangelands where quail management is one of the objectives, low stocking densities and rotational grazing systems are recommended to protect and maintain the quantity and quality of food and cover.

The conversion of native cover to improved pastures and hayfields greatly degrades habitat conditions for quail, songbirds and other early successional wildlife species. Common exotic pasture grasses in Georgia include fescue, Bahia and Bermuda grass. None of these grasses provide suitable food or cover for quail, and they tend to out-compete desirable plants. The best approach for blending quail management with these land uses is to fence out, or set aside, corners, borders, drainage courses and other odd areas. These set-aside areas can be managed with the same techniques previously described for croplands. Additionally, with hayfields or where rotational grazing is a management option, conversion of a portion of the exotic grass fields or pastures to native warm-season grasses can enhance habitat values for quail and other wildlife.

Herbicide treatments are necessary for the successful conversion of exotic grasses to native warm-season grasses. As with the other management practices, landowners should contact their local wildlife biologist for technical assistance before management practices are initiated.

Forested Habitats

In Georgia, longleaf, slash, loblolly, shortleaf and oak/pine forests comprise a substantial proportion

of the bobwhite's geographic range. However, the primary benefit of pine trees for quail management is the provision of pine needles, which serve as a fuel to facilitate prescribed burning. In addition, pine seeds are utilized by quail as a fall food source. However, on many sites, trees occur at densities that shade and out-compete desirable food and cover plants. Within pine forests, the abundance of quail and several high-priority nongame birds is strongly associated with the structure and composition of the ground layer vegetation.

In general, quail favor grass and forb ground cover that develops in open and frequently burned pinewoods. Management for maximum economic return is not consistent with providing optimum habitat for quail. However, through careful planning, timber can be managed for reasonable economic returns while maintaining viable and huntable quail populations.

A variety of silvicultural techniques and habitat management practices can be used to integrate quail habitat with pine forest management. These practices include timber harvest and regeneration, the establishment and management of openings, and prescribed burning.

Forest Management Methods

All-aged and even-aged management are the two primary methods of forest management. All-aged management results from harvesting a portion of a timber stand and selecting individual trees or groups of trees for harvest throughout the life of a stand. The stand then will be comprised of trees of all ages.

Even-aged management is the most used forest management method. It results from the harvest and regeneration of entire stands of trees at a given point in time (called the rotation age) thus creating a new stand of trees of the same age. Regeneration methods for even-aged management include clear-cutting with artificial regeneration, seed tree and shelterwood cuts.

Even-aged management is less complex and less costly to implement on an extensive scale than all-aged management. Quail populations often increase during the first 2-4 years after a stand has been cleared for regeneration. However, even-aged management results in entire stands of trees passing through the sapling stage (age 4-15 years depending on the site) at stocking densities that are not conducive to providing quality habitat or desirable hunting conditions for quail.

Quail habitat can be maintained in pine forests that are managed with even-aged or all-aged methods. The management goal is to keep most of the ground in direct sunlight, control plant succession to maintain a diversity of grasses and forbs in the understory, and control hardwood invasion.



Long-rotation, open understory timber management is more compatible with quail management than short pulpwood rotations.

Pine Species Selection

All pine forest types can be managed to enhance habitat conditions for quail. However, longleaf pine, within its historic range, is better suited for quail management than loblolly, shortleaf, or slash pine because: 1) it has a sparse crown thereby allowing more sunlight to reach the forest floor; 2) it is long-lived thereby providing increased management flexibility and a greater percentage of the total stand life in a suitable habitat condition; 3) it has a seed that is nutrient-rich and highly preferred by

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quail; 4) it is relatively disease and insect resistant; 5) it is normally less prone to wind-throw; and 6) it can be burned while in the grass stage and most other stages as well.

The longleaf pine ecosystem once occupied approximately 21 million acres in Georgia, covering most of the Upper and Lower Coastal Plain and extending into the Ridge and Valley Province. Unfortunately, the longleaf ecosystem has been greatly diminished due to conversion to other forest types and land uses, contributing substantially to the decline in quail populations.

Site Preparation

Sites can be prepared for regeneration in a variety of ways ranging from low intensity, like prescribed burning, to high intensity, like shearing, raking, piling, burning and/or herbicides. The method(s) used affects plant succession. Managers should use whatever method(s) will allow desirable cover to develop on these bare sites in the shortest time possible. Prescribed burning and mechanical methods, especially when applied during winter months, seem to produce the most desirable food and cover conditions for quail in Georgia.

Seedling Spacing

Pine stand re-establishment requires artificial or natural regeneration. Seedling spacing determines the number of years until the tree crowns overlap and shade out the understory. With artificial regeneration, wide tree spacing, such as 8 x 10' or 8 x 12', allows for the establishment and maintenance of grasses, forbs, legumes, soft mast producers and other desirable food and cover plants for a longer period of the stand rotation.

Natural regeneration by seed tree or shelterwood often results in dense seedling stands that quickly out-compete grasses and forbs. These stands should be thinned pre-commercially, or the stem density otherwise reduced by judicious skidding of residual seed or shelterwood trees at the time of their removal.

Thinning

Thinning can be used in pine stands to improve quail habitat, upgrade timber quality and provide revenue to the landowner. Stands should be thinned so that 40-60 percent of the ground is in direct sunlight at noon. This allows for the growth of the understory and creates habitat for quail. Heavier thinning is necessary on infertile soils to produce the desired ground cover.



Pine stands like this should be thinned and prescribed burned to encourage understory vegetation favorable to quail.

Rotation Age

The time to harvest and regenerate pine stands depends on economic, wildlife and aesthetic objectives, pine species present, site fertility and overall stand health. Where quail are part of the management objective, long rotations should be favored. Rotation length can be over 60 years for loblolly, slash and shortleaf pine and over 200 years for longleaf pine. Long rotations allow managers to maintain a greater percentage of the total stand life in a suitable condition for quail.

Prescribed Burning

Prescribed burning is one of the most cost-effective and efficient tools available for managing quail habitat. Prescribed fire increases insect, legume and soft mast abundance; improves ground-layer vegetation structure to enhance nesting cover, brood range, insect and seed foraging conditions; controls hardwood invasion into the forest midstory; and decreases the abundance of invertebrates that parasitize quail. Prescribed burns should be applied to stands that have recently been thinned and have at least 40 percent of the ground in sunlight. Burning is of little value in forest stands where sunlight cannot reach the forest floor. Prescribed burns should be conducted annually with 40-50 percent of the land left un-burned to provide food, nesting and escape cover. Alternate unburned patches each year so no area goes longer than 2 years without being burned. A way to manage this is to establish permanent firebreaks that divide the site in a checkerboard fashion with 10-50 acre blocks (smaller is better). These blocks can then be burned in a mosaic pattern on a 2-year cycle where one-half of the woodlands are burned each year. A 3-year cycle may be sufficient on infertile soils.

On most sites, prescribed burns should be conducted during winter-early spring. Occasional growing season burns may be needed to control hardwood encroachment into pine stands. More specifically, pine stands established on old agricultural fields have fuel conditions that are best suited to winter-spring burning while longleaf/wiregrass stands are well adapted for growing season fires. Prescribed burning should be initiated in pine stands at the earliest possible age. Longleaf stands can be burned in their second year when seedlings are still in the grass stage. Other pine species can usually be burned for the first time when they are 10-15 feet tall. Timber stands managed under all-aged systems require special consideration for prescribed fire. Before prescribed burning, young pine regeneration areas scattered throughout the stand must be protected by firebreaks. An exception to this is the longleaf pine stand where seedlings in the grass stage can and should be burned to control brown spot disease.

Dense scrub hardwood stands have little value for quail and are difficult to manage. Repeated late spring burning helps open the stand, allowing the growth of beneficial quail plants. However, if the sprouts are more than 1.5 inches in diameter at chest height, mechanical means such as cutting, rotary mowing and bulldozing may be required for control. Herbicide control may also be needed but care should be taken not to destroy desirable vegetation.



Prescribed burning during the proper conditions is a valuable tool for improving wildlife habitat.

Inexperienced persons should not attempt prescribed burning. Important preparations including adequate firebreaks, proper equipment, personnel and burn permits are necessary. A person experienced in fire behavior must evaluate fuel type, timing of the burn with relative humidity, fuel moisture, and wind speed and direction. Smoke-sensitive areas must be identified before burning. The Georgia Forestry Commission and the Department of Natural Resources can make recommendations for prescribed burning and provide training opportunities for landowners and managers.

For specific methods of forest management, contact a wildlife biologist. They can develop a detailed management plan for quail to meet site-specific needs and conditions.

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Forest Openings, Roads and Permanent Firebreaks

Idle openings are critical for providing brood range, food and cover for quail. As previously indicated, 15-40 percent of each forest stand should be maintained in openings that are 2-5 acres in size. Rotational winter disking, planting, and burning should be applied to these openings so that 1/3 - 2/3 of each opening remains fallow each year. Herbicides will be needed if exotic grasses and/or hardwoods invade the site. Roads and firebreaks are necessary components of timber management and can be managed as fallow opening habitat.

PEN-RAISED QUAIL

A common misconception is that pen-raised quail can be used to restore wild quail populations. Several research studies have shown that survival rates are very low for pen-raised quail released into the wild. Pen-raised birds that do survive may pair and mate with wild birds, but so few birds survive that they will not significantly contribute to the establishment or maintenance of a wild population. Also, there may be potential risks to wild quail and wild turkeys from the release of pen-raised quail. These risks are not well-documented scientifically but include disease, increased predation and genetic degradation of wild quail populations.

Summary of Primary Quail Management Recommendations

- Before implementing management practices, determine specific harvest and habitat management objectives.
- Use combinations of winter disking, planting, burning or herbicides to establish and maintain fallow fields, field borders, hedgerows, field corners, ditch banks, forest openings, widened roadsides, thinned pine stands and other habitats in a mixture of erect weeds, cultivated plantings, native bunch grasses, and briars.
- Convert portions of exotic grass pastures and fields to native warm-season grasses and implement rotational haying or grazing.
- Within its original range, plant longleaf pine over other pine species.
- Use wide seedling spacing, such as 8 x 10' or 8 x 12' when regenerating pine stands.
- Thin pine stands regularly to maintain 40-60 percent of the ground in direct sunlight.
- Prescribe burn so that 50-60 percent of the area is burned yearly.
- Manage forest stands on long rotations.
- Establish 15-40 percent of forest stands in openings that are 2-5 acres in size.
- Maintain openings as fallow fields with combinations of winter disking, planting, burning and herbicides.
- Do not disk, mow or disturb field borders, openings or other fallow habitats during April -October nesting and brood rearing season.
- If you have any questions, contact a Bobwhite Quail Initiative biologist (229-420-1183).

HUNTING

Most quail hunting is done behind pointing or flushing dogs. Pointing dogs include breeds such as English Setters, Pointers and German Shorthaired Pointers. These dogs use air and/or ground scent to locate quail and then freeze or lock on point to indicate the covey's location. Flushing breeds include English Cocker Spaniels, Springer Spaniels and Boykin Spaniels. They use scent to locate the quail and then cause them to fly, or flush, into the air. A covey rise is when an entire covey flushes and is one of the best experiences in hunting. Quail season in Georgia runs from mid-November to the end of February. As the season progresses, covey sizes decrease due to natural and hunting mortality. When coveys get small, they may join up with other coveys and form large coveys late in the season. This often gives the false impression that there are more quail on the landscape. Hunters should not use covey size as an indication of population. A good rule is to harvest one bird per covey and do not shoot into coveys of 6 birds or less, especially on public land. Increased additive mortality also occurs later into the harvest season resulting in fewer breeders surviving into the reproductive period. This can reduce bobwhite population size the following fall and, particularly in highly fragmented habitats, may contribute to

or expedite bobwhite sub-population extirpation. In short, extension of the bobwhite hunting season conflicts with science-based management and could negatively impact restoration efforts.

When hunting quail, walking field edges and fence rows are a good way to encounter them. Coveys that are pressured will often leave the area or become hard to point so it is best to hunt an area only once a week. Research has shown that harvesting up to 15% of the fall population does not have a negative impact on the following year's population. This should include adding at least a 20% crippling rate to the bag for birds that are hit but not found.

More quail can be produced through management, but the old saying, “You can’t get something for nothing” is all too true. Effort and money are required. The amount required is based on the habitat development needed and the density of quail desired. Where maximum quail production is the objective, both direct costs and opportunity costs can be great. However, huntable populations can be sustained at reasonable costs to the landowner if there is enough appropriately located land with suitable soils and vegetative cover.





MOURNING DOVE

The mourning dove (*Zenaida macroura*) nests in all 48 contiguous states. In the southern states, the year-round resident dove population is joined each fall by northern migrants. The ever-present dove is Georgia's most popular and numerous game bird. It is hunted by more Georgians than any game species except deer, and the dove harvest is the highest of any species in the state. The 2024-25 season reported approximately 50,000 hunters harvesting approximately 786,000 doves. This bird's popularity does not stop with the hunter, since it also is a favorite of bird watchers and nature photographers.

In contrast to most other game birds, the mourning dove has benefited from most modern agriculture practices. It has adapted to urbanization and remains widespread and abundant while other species, such as bobwhite quail, have decreased significantly or have required intensive management to maintain local populations.

The mourning dove is a member of the pigeon family, Columbidae, characterized by the production of "pigeon milk" in its crop for feeding its young. It is a streamlined bird with a small head and a long, pointed tail. Adults range in total length from 11-13 inches and appear, at a distance, slate gray in coloration with large white spots on the tail. Adult males exhibit a light blue crown and nape with rosy breast feathers blending to a reddish fawn color on their sides. Females normally have a tan or brownish crown, nape and breast feathers. Immature doves are best identified by the whitish or buff-colored edging on their wing coverts and, when very young, appear mottled on the breast, head and neck areas.

LIFE HISTORY

Reproduction

Doves have been known to nest almost year-round in parts of Georgia, but most nesting occurs between late March - August. The hatching peak normally occurs during early June. Usually, two eggs (rarely three) are laid in a flimsy nest that consists of a few twigs on the fork of a limb or shrub. Occasionally, doves use abandoned nests of other birds as a platform on which to construct a nest. Ground nesting can occur but is uncommon. Incubation duties are shared by the breeding pair during the 14-day incubation period. Upon hatching, the nestlings (called "squabs") are fed for the first few days with pigeon milk regurgitated by the adults. The milk is gradually replaced by seeds, and in 12-14 days the young leave the nest. After staying with the adults for a short time, the young begin congregating to form the flocks seen during summer. The adults soon repeat the nesting cycle, usually producing 3-5 broods each season.



Photo credit: Ty Ivey/GNPA

MOURNING DOVE

Mortality

It is estimated that 70 percent of the dove population will die each year. Most of this mortality is from natural causes, and about 10-12 percent is from legal hunting. Nest failures limit dove populations more than any other factor. Only one nest in four successfully fledges young. The flimsy character of dove nests makes them particularly vulnerable to storms and other severe weather and probably accounts for the largest percentage of nesting failures. A variety of nest predators, including blue jays, crows, squirrels, raccoons, and snakes, also destroy dove nests.

Widespread ice and snow sometimes take a heavy toll on wintering dove populations by making food unavailable. Two diseases are important mortality factors in doves. The most prevalent is trichomoniasis, a parasitic disease of the upper digestive tract that can cause serious die-offs. Trichomoniasis is characterized by the formation of a cheese-like substance in the mouth, throat or crop, which interferes with the ingestion of food and usually causes death from starvation. Dove pox, a viral infection, produces symptoms similar to trichomoniasis but is less common and much less devastating to dove populations.

Food Habits

Doves feed on seeds from a variety of cultivated and wild plants. Some favorite cultivated species include wheat, corn, browntop millet, proso millet, grain sorghum, peanuts, oats, rye, peas, sunflower, and benne (sesame). Wild plants that are most important in the diet of Georgia doves include woolly croton (dove weed), pokeweed, ragweed, foxtail grasses, wild millet, morning glory, partridge pea, crabgrass, chickweed, and Johnson grass. Animal foods make up a very small portion of the dove's food intake. Insects are rarely consumed, but snail shells are sometimes found in dove crops, presumably because they provide needed minerals. Small amounts of grit are eaten by doves to aid with grinding food in the gizzard.

Habitat Requirements

Although it is considered an agricultural game species, doves have adapted to many habitat types. However, their basic requirements include food, water, nesting cover, roosting cover and resting sites. Because doves have neither strong beaks nor feet developed for scratching, they feed primarily on grain and other seeds lying free on the ground. Therefore, open grain fields are preferred over areas with thick ground cover.

Most doves nest around fields or clearings that supply food during the nesting season. Nests commonly are found in overgrown fencerows, hedgerows, scrub oak brush, young pine plantations, peach orchards, large hardwoods and pines, and ornamental shrubbery. Roosting and resting cover is provided by various habitat types including pine plantations, mature hardwoods, brushy thickets, dead snags, and powerlines. Cover is seldom a limiting factor of dove populations in Georgia.

Unlike quail, which can obtain adequate water from food and dew, doves must have a daily source of surface water such as lakes, ponds, streams or even mud puddles. Preferred watering sites have bare ground next to the water to provide easy access. Doves may fly considerable distances to favored watering sites, especially during droughts.



Photo credit: Ty Ivey/GNPA

MANAGEMENT

Although the mourning dove is a common game bird on Georgia's farms, the fact that it is migratory and highly mobile, even during the breeding season, limits the effectiveness of localized management practices. The fate of doves in Georgia depends largely upon practices carried out across the eastern U.S. from the Atlantic Ocean to the Mississippi River.

General land management practices that provide for the basic year-round needs of doves can have

a positive impact on local dove populations. While doves are migratory, the early season harvest is made up almost entirely of birds produced in Georgia. Migrants arrive later and make up a significant percentage of the late season bag. To help ensure good dove populations in the early fall, summer feeding fields can be provided. If normal farming practices do not make grains or other seeds available during the summer, food can be provided by leaving strips of unharvested crops or by planting small fields. Strips mowed or disked through these fields can be very attractive to doves; the same treatment is also very effective in fallow fields that are left to grow up in weeds.

Dove fields must be well planned if they are to attract large numbers of doves for hunting. For shooting purposes, a field should be a minimum of 5 acres (larger is better) and if hunters are likely to be shooting from both sides, it should be at least 100 yards wide. A good rule of thumb is to adjust hunter density to fewer than one per acre to provide for a high-quality hunting experience. Dove fields are more effective when they are irregular in shape and have borders of woodland or brushy fencerows to provide good vantage points for hunters. During late summer, disturbance of doves should be kept to a minimum to reduce birds moving to another field.

Fields for dove hunting should be managed so that crops mature at least 10-14 days before the desired period for shooting. Several cultivated grain crops offer attractive food for doves. Those commonly planted for dove fields include browntop millet, proso millet, sunflower, corn, wheat, benne (sesame) and grain sorghum. Crops planted in rows are preferable to those that are broadcast. A summary of planting recommendations is presented in Appendix 1.

For early season shooting, browntop millet has long been the preferred crop since it is a favorite dove food and matures early with minimum attention. Browntop may be planted as a hay crop, a seed crop to be harvested after maturity, or specifically for doves either in rows or by broadcasting. Millet should be planted so that it matures at least two weeks before the first anticipated shoot. However, earlier planting allows the mowing of strips to attract and hold birds during August in the event other food is not available. Millet left standing in rows usually continues to attract doves during the entire early season. Proso millet, which takes longer to mature, is similar in attractiveness and planting requirements to browntop. In addition, wheat can be planted in the fall and then managed to provide food during the summer. When used in combination with strips of browntop millet, food can be made available from early summer through fall. Excellent early shooting opportunities may occur in those areas where corn or grain sorghum has been cut for silage. Harvested peanut fields are prime attractants in South Georgia, often pulling doves away from other food sources. In fact, few crops attract doves in appreciable numbers when harvested peanut fields are nearby.

Below is a calendar year example for dove field management successfully used on many areas:

1. **October – November:** prepare ground by periodic harrowing to condition soil for planting.
2. **November:** plant 1/3 to 1/2 of field in wheat in strips 50 to 150 feet wide. Be sure to fertilize and lime according to soil test for grain production.
3. **April – May:** plant 1/4 to 1/3 of field in browntop millet in strips 50 to 150 feet wide.
4. **June:** Plant 1/4 to 1/3 of field in browntop millet strips 50 to 150 feet wide. Plant cover rows for hunters in corn and/or sunflower and/or grain sorghum. During drought years sunflower may hold up better than corn. However, sunflower is a preferred deer food and is not suited to small fields in areas with high deer densities unless it's fenced off until time to manipulate the field. Cover rows should be at least 50 yards apart for hunter distribution.
5. **July:** Mow, burn and disk wheat and begin mowing early millet as it matures.
6. **August:** Continue to mow disk and burn strips to make feed available
7. **November – February:** Plant wheat strips for following year and mow hunter cover rows to provide fall and winter food.
8. Field borders, hedgerows, and corners can be used to provide habitat for quail, while providing cover for hunters around and across fields being managed for doves.

HUNTING

Overall harvest management of migratory birds, such as doves, falls under the jurisdiction of the U.S. Fish and Wildlife Service. They set bag limits, shooting hours and a hunting season framework

MOURNING DOVE

that currently extends from September 1 - January 31. Depending on the dove population, the hunting season may be liberal, restrictive, or closed. For example, it may be 70 days with a 10-bird daily limit; or it may be 90 days with a 15-bird daily limit. States can choose where to place their hunting season within these framework dates. Georgia's season is a product of several hunter opinion surveys over the last several years.

Hunting regulations are based primarily on the results of annual mourning dove population estimates from banding and recovery data, and harvest estimates. The dove harvest can then be regulated by manipulating bag limits and season lengths according to the Mourning Dove Harvest Strategy, a document approved by the U.S. Fish and Wildlife Service with input from the states and flyways. While breeding populations may vary somewhat from year to year, there has been no significant, long-term change in the number of doves in the Eastern Dove Management Unit since the surveys began in 1966. Consequently, regulations have changed little over the years.

Late season dove shooting is limited mainly to harvested fields of late-maturing crops like grain sorghum and corn. Harvested corn fields can produce excellent dove hunting December -January. Sunflowers and benne also persist into the late season providing good dove shooting opportunities. Under the right conditions, burning weedy fields may be all that is needed to attract birds. Fallow fields containing croton, ragweed, pokeweed, wild grasses or volunteer stands of small grains from the previous year can be mowed, disked or burned to free the seeds and provide an open feeding area. Practices that result in seeds on relatively bare ground are the most attractive to doves.

Normally, a dove field is planted for either the early or late hunting season. However, it is possible to manage a field for both seasons by alternately planting strips 25-30 feet wide of various crops that mature at different times. If well planned, this technique provides dove food for the duration of the hunting season. Interspersing crops with disked strips helps maintain bare soil and increases the attractiveness of the field to doves.

When preparing a field, landowners should be sure that they refrain from any practices that could be considered baiting. Baiting is currently defined as "... the direct or indirect placing, exposing, depositing, distributing or scattering of grain, salt, or other feed that could serve as a lure or attraction for doves to, on or over any area where hunters are attempting to take them." A baited area is any area where bait has been placed. Any baited area is considered baited for 10 days following the complete removal of

the bait. Baiting regulations do not prohibit the taking of doves on or over any land where corn, wheat, peanuts or any other feed has been distributed as a part of "normal" agricultural planting and harvesting, or as a result of manipulation of a crop or other feed on the land where it was grown for wildlife management purposes. Official recommendations of the Cooperative Extension Service of the U.S. Dept. of Agriculture are used to define normal agriculture practices. Crops may be mowed, disked, bush-hogged or knocked down and made more available to doves so long as they are not harvested and then redistributed to the field. Questions regarding baiting issues should be addressed to the DNR Law Enforcement



Division (gadnrle.com).

Locating a dove field near a favored water hole or roosting area can enhance the prospects for good dove hunting. Care should be taken to avoid overshooting an area by limiting hunting to once or twice a week and either in the morning or afternoon but not both.

Doves do not stay in one place indefinitely but do tend to return to the same area each season, with the larger concentration occupying the most attractive places. While good dove management consists primarily of regulating the harvest over a large geographic area, local attention to the basic needs of the birds will greatly increase the chances of successful dove hunting opportunities.



RUFFED GROUSE

The ruffed grouse (*Bonasa umbellus*), often called the “king of the upland game birds,” gets its name from the ruff of dark feathers on its neck, which are commonly displayed by the male. The grouse is a beautiful bird with subtle, mottled coloration and is between the size of a quail and a pheasant.

The range of the ruffed grouse extends from Canada to northern Georgia. The grouse is a bird of the forest. In Georgia, populations are highest in mountainous areas above 1,800 feet in elevation in extreme North Georgia. However, they were historically present as far south as Clarke County and as far west as Floyd County. Georgia is at the edge of the range for grouse and while the state has historically had low densities of ruffed grouse, populations have declined precipitously over the last 50 years. These declines are primarily due to habitat loss, as ruffed grouse prefer young forests with a thick midstory and dense shrub layer. This forest type represents a small fraction of forestland across their range in Georgia.

LIFE HISTORY

Reproduction

The male ruffed grouse is polygamous (mating with more than one female). He attracts females by beating his wings together, known as “drumming,” usually while standing on a fallen log in a dense thicket of mountain laurel or flame azalea. He also uses this sound to defend his territory against other males.

After mating, hens select a nest site at the base of a tree or other obstacle that provides them better protection from the rear while allowing good visibility in front. Nests are often located near a distinct forest edge. Hens usually lay 9-13 eggs with an average clutch size of 9-10 in the southeast. Nesting begins in early April and continues through mid-June.

Incubation of the eggs takes about 24-26 days. If the first nest is destroyed, grouse may re-nest. Renesting rates vary by habitat, with higher rates (50%) in mixed mesophytic forests, and low renesting rates in oak-hickory forests. These differences may be attributed to differences in nutritional conditions due to varying quality of food sources. Hatching peaks in late May. Young grouse chicks are reared entirely by the hen. Studies in Georgia found that grouse preferred dense upland hardwood sapling areas and a variety of herbaceous foods for brood habitat.

In the southern Appalachians, ruffed grouse nest success rates vary, but average about 60%. Because the nest is built on the ground, it is more vulnerable to predation. Common nest predators include raccoons, opossums, bobcats, dogs, cats, bears, and snakes.

Mortality

Appalachian grouse studies indicate that chick survival is very low in the southeast, particularly during the first few weeks after hatching with less than 10% of chicks surviving to 35 days old. Half of this mortality is the result of predation, while the other half died from exposure. Once the birds reach adult size, they rarely die from disease, exposure or malnutrition. Predation by mammalian and avian predators eliminates 50-60 percent of the adult population each year.

RUFFED GROUSE

In the northern part of their range, grouse populations cycle up and down during a ten-year period. Most researchers agree that the cycle involves changes in the rates of movement, reproduction or mortality. There is little evidence that the cycle occurs in the southern part of their range.

On a landscape-scale, hunting does not seem to impact grouse populations. In Georgia, statewide harvest is minimal and likely does not affect grouse at a statewide population level but may affect local populations of grouse if localized hunting pressure is high.

Food Habits

Ruffed grouse eat both plants and animals, but feed primarily on plants. In the Southern Appalachians, they eat more green leaves than fruits or buds. Fall and winter food studies in Georgia found leaves from a variety of plants in 97 percent of the grouse collected. Leafy material made up 93 percent of the ingested food volume. Georgia grouse eat a wide variety of plants but mountain laurel, Christmas fern, and greenbriar are the most important. Mountain laurel makes up one-third of the grouse's diet during the fall and winter. Other important foods include cinquefoil, goldenrod, foam flower, trailing arbutus and clover.

Previous studies have indicated that some of the important winter foods in the Southern Appalachians, such as mountain laurel, are low in nutrition when compared to aspen buds, which are important winter foods in the Great Lake states. Foods found in the southeast are typically lower in protein, which may result in smaller clutch sizes, poorer hatching rates, and lower survival rates.

Behavior and Movement Patterns

The adult male ruffed grouse does not typically associate with other grouse outside the breeding season. Radio telemetry studies show that the male's home range is about 50 acres. The home range of males is considerably smaller than females. Males spend a lot of time near their drumming logs, particularly during the spring and fall.

The home range for a hen is small during the incubation period. After hatching, hens with broods become very mobile as they search for good food and cover for their young chicks. Home ranges are larger for hens with broods than those without broods. Winter home ranges for hens may be as large as 100 acres.

Young grouse become more independent as they mature. By fall, broods break up and disperse into new habitats. During the winter, younger birds typically move more than adults as they search for food or territory.

Habitat Requirements

Grouse require cover for escape, nesting, brooding and protection from the weather in winter. Recent studies in the Appalachians found that grouse preferred habitat with high densities of saplings associated with 10-year-old hardwood clearcuts. They frequent more densely forested areas during the winter and the spring nesting seasons for cover and protection for broods. Open, brushy habitats are used during summer and fall because of greater food availability and higher insect populations. In north Georgia, evergreen shrub (such as rhododendron and mountain laurel) thickets and forest regeneration areas provide quality habitat for adult birds in the summer.

Drumming logs are very important to a male bird because much of an adult male's life is spent in the vicinity of chosen logs. Most males use more than one drumming log but usually have one primary log. Drumming logs typically are in dense thickets on sloping hillsides, permitting a maximum field of view. Critical drumming site habitat includes a well-dispersed shrub thicket understory.



MANAGEMENT

Ruffed grouse are a species that prefer young forests with a brushy midstory. Forest management practices such as clearcutting (even-aged silviculture) have a positive effect on grouse populations in oak-hickory forests. Research has shown that grouse use of clearcuts for summer adult/brood habitat, fall and winter cover and drumming habitat is greatest 6-15 years following timber harvests. Therefore, any impediments to timber harvest will likewise impede the management efforts to increase this species.

Horizontal structure, like logging slash, blow-down trees or other forest debris, provides good cover in open areas. However, too much horizontal cover can be detrimental to grouse because it conceals predators, reduces the grouse's ability to see and impedes grouse movements on the forest floor.

Small clearcuts in mountain hardwoods are an effective forest management practice for improving grouse habitat. This technique requires the removal of all trees except oak seedlings or saplings and small clumps of food-producing trees beneficial to grouse. Cuts of 5-20 acres are most desirable but cuts up to 40 acres are acceptable if arranged in irregularly shaped strips or blocks. The highest grouse populations occur on areas where hardwood regeneration (6-15 years old) makes up more than 14 percent of the total area.

Therefore, habitat management should include regeneration areas that maintain a good balance between partial canopy closure and high basal areas to enhance grouse habitat. Oak stands are most productive for grouse in the sapling stage when they provide dense understory and overhead cover. Many researchers agree that winter cover, not brood habitat, ultimately determines grouse population densities in many areas.

Seeded roads or linear forest openings are preferred over fields because they reduce grouse' susceptibility to predation. Cleanly mowed openings are less desirable than strip-mowed fields that leave some weed and brush cover remaining. Wildlife openings with a brushy edge can be created by leaving the outer few feet of openings un-mowed for one or two years. Brushy edges can be created to improve grouse habitat by "daylighting," or cutting down mature trees in 50-foot strips around fields or along roads.

HUNTING

When hunting grouse in the Southern Appalachians, focus on areas with early-successional cover such as clear cuts or areas with regenerating trees or shrubs such as rhododendron. Many hunters use a dog to help locate and flush the birds but a hunter without a dog can still be successful by walking slowly down closed forest roads and firebreaks. Larger gauge shotguns are often preferred due to the dense cover and longer range shots.

Ruffed grouse are truly a challenge for upland game hunters in Georgia because they are found only in mountainous areas with rough terrain and thick brushy cover. The management of our north Georgia forests, particularly oaks, is critical in providing the cover and food necessary to support future ruffed grouse populations.





RABBITS

Rabbits became abundant when early settlers cleared the forests, providing a valuable food source. They are still considered to be an important small game animal in the United States today. In Georgia, they rank fourth (behind ducks, doves, and squirrels) in small game hunting popularity.

Four species of rabbits live in Georgia:

The most common is the eastern cottontail (*Sylvilagus floridanus*). This rabbit has dense brown to gray fur on its back with a white underside and tail. There is sometimes a white spot on the forehead. The sexes are similar in appearance for all rabbit species. Cottontails are found throughout the state. Their habitat includes upland areas associated with agricultural fields, pine woodlands, clearcuts, and brushy areas.

The swamp rabbit (*Sylvilagus aquaticus*), often called a “cane cutter,” is the largest rabbit in Georgia. It has black to rusty-brown fur with a white underside. Swamp rabbits are found in bottomland hardwood and beaver pond habitats along rivers and creeks in the Piedmont.

The marsh rabbit (*Sylvilagus palustris*) is the smallest rabbit found in Georgia. It has a blackish to reddish-brown back with a brownish-gray underside – not white as in the other three species. Its ears and tail also are smaller. Marsh rabbits usually are found in open marsh areas associated with the Coastal Plain and coastal river systems.

The Appalachian cottontail (*Sylvilagus obscurus*) is similar in size and appearance to the Eastern cottontail. However, instead of a white spot on the forehead, they often have a black spot between the ears. Appalachian cottontails are confined to high mountain elevations. Georgia is at the southern end of the Appalachian cottontail range and sightings of this rabbit are rare. The Appalachian cottontail is included on Georgia’s Protected Wildlife list.

Crossbreeding between rabbit species, which is found among rabbits in New England, may also occur in Georgia. However, how common it may be is unknown.

LIFE HISTORY

Reproduction

In Georgia, rabbits begin breeding after the first warm days in February and typically continue until early November. Gestation averages 28 days for cottontails, 33 days for marsh rabbits, and 37 days for swamp rabbits. Before giving birth, the female selects a dry location to build a nest. Early spring nesting habitat for cottontails is characterized by grassy areas with vegetation less than eight inches high. Later nests are commonly located in hay fields and areas of native grass. The female cottontail digs a nest cavity in the ground and lines it with grass and fur. Swamp rabbit fur-lined nests are built on top of the ground under low-growing bushes or in plant debris, such as fallen limbs, using dried weed stalks.



Young rabbits are completely on their own after two weeks of age.

RABBITS

Rabbits in Georgia are usually one year old before they breed; some very early born rabbits may breed the same year they were born. They can have 3-7 litters per year and typically select different nest locations for each litter. A female rabbit will breed on the same day that she gives birth. Litter sizes range from 3-5 young. They are born blind and helpless but develop quickly. Their eyes open in about one week, and they leave the nest about two weeks after birth. The mother returns to the nest to nurse the young at dawn and dusk, but once the young leave the nest they are on their own. Female rabbits produce an average of 20 young per year. More males are born than females, and males remain more numerous in the adult population.

Mortality

Approximately 80 percent of the rabbit population dies each year. A major cause of this mortality is predation. Rabbits rank high on the list of preferred foods for many predators. Predation is normal for most wildlife populations, and rabbit reproduction makes up for these losses if adequate escape cover is available.

Rabbits are host to several species of ticks, mites, fleas, warbles, and chiggers. These parasites seldom cause death in rabbits. However, they can infest rabbits to such a degree that they increase susceptibility to predation or diminish the rabbits' reproductive condition.

Warbles, or "wolves," are the larvae of botflies that lay eggs around holes and burrow entrances. The eggs become attached to the rabbit's fur and are ingested when the rabbit cleans itself. They hatch inside the rabbit and the larvae migrate through the rabbit's body to the skin, often in the neck area. The larvae often exceed one inch in length as they grow under the skin, feeding on body fluids. When mature, the larvae emerge and drop to the ground, pupating to become a fly. The presence of warbles may cause a hunter to discard the carcass, even though the meat is unaffected and quite edible.

Many kinds of roundworms and tapeworms also infect rabbits. The species most important to hunters is the canine tapeworm. Some rabbits ingest tapeworm eggs while feeding. The eggs hatch in the intestines and the larvae travel into the body cavity where they form a clear, bladder-like structure with a white center. This formation, called a cysticercus, rarely harms the rabbit. The larvae mature into adult worms after they are ingested by mammalian predators, like coyotes or foxes, which have eaten an infected rabbit. Some hunters allow their dogs to eat the innards, or viscera, from harvested rabbits. If the rabbit is infected with canine tapeworm larvae, the hunter may be promoting infection in their dog. Therefore, it is not recommended for hunters to feed the innards to their dogs.

Fleas and ticks may carry the bacteria that cause tularemia (rabbit fever). Infected rabbits are sluggish and usually die within 10 days of getting the disease. Humans can become infected when they handle sick rabbits or eat undercooked meat. The disease can be life-threatening to humans, and people should not handle sick rabbits. Hunters should wear rubber gloves when cleaning rabbits, apply iodine to cuts and scratches incurred during the cleaning process, and thoroughly cook rabbit meat.

Rabbit hemorrhagic disease (RHD) is a new disease on the horizon. It does not affect humans but can decimate rabbit populations. In Georgia currently (2025), RHD has only been found in domestic rabbits, but it infects wild rabbit populations west of the Mississippi River. It is very important that hunters do not use domestic rabbits, including San Juan rabbits, to train dogs where they may encounter wild rabbits.

While there is evidence that wild rabbits can be infected with COVID-19, it cannot transfer back to humans and has little effect on rabbits.

Weather also can impact rabbit populations. Heavy rains during the nesting season can drown young rabbits. Extended drought, which decreases the availability of young and tender vegetation, can reduce pregnancy rates. Drought also forces rabbits to search longer and in less protected areas for food, making them more vulnerable to predation.

Thousands of rabbits are killed each year by vehicles. Peak roadside use coincides with springtime breeding activity and an increase in herbaceous food found along these roadsides.

Food Habits

Rabbits eat parts of over 100 species of plants. They prefer herbaceous plants whenever available. Woody plants are used mainly during the winter months when more palatable food is scarce. However, marsh rabbits make more year-round use of woody vegetation than do other rabbit species.

Winter foods include honeysuckle, lespedeza, blackberry, greenbrier, and a variety of grasses

and dried vegetation. Bark, twigs, and buds from sumac, black cherry, willow, holly, and dogwood also are eaten. Agricultural crops consumed during the winter include rye, wheat, alfalfa, clover, corn, peanuts, and ryegrass. Cottontails may damage fruit orchards by eating the bark of fruit trees. Buds of seedlings in pine plantations also may be eaten during the winter.

Foods during warmer months include a variety of sedges, grasses, and other herbaceous plants. Important species include paspalum, panic grass, plantain, dandelion, crabgrass, ragweed, croton, clover and lespedeza. Agricultural crops eaten during the summer include clover, alfalfa, soybeans, peanuts, and garden vegetables.

Rabbits pass two types of pellets from their digestive system. Hard, brown fecal pellets are undigested plant material. Soft, green, food pellets containing vitamin B and other nutrients are reingested by the rabbit. Eating fecal material, called “coprophagy,” allows rabbits to more efficiently absorb nutrients from their diet.

Rabbits do not require surface water for drinking. They obtain moisture from rainfall, dew, and the herbaceous vegetation in their diets but may utilize standing water when available.

Behavior and Movement Patterns

Home ranges of cottontails are usually less than 11 acres. Males have larger home ranges than females, and adults have larger home ranges than young cottontails. Also, a cottontail's home range is greater during the breeding season than the non-breeding season. Home ranges overlap when preferred food is less abundant in late fall and winter. Adult female home ranges usually do not overlap during the breeding season. Dispersal into areas of suitable habitat is usually by younger rabbits that have not bred. Cottontails are mostly active during nocturnal and crepuscular (dawn/dusk) time periods. Research has shown that cottontails that move the most also experience greater predation, thus why as a cryptic species it's best not to move a lot unless there is no choice. Movements vary with habitats also, with cottontails having greater movements in more open habitats with fewer species of vegetation than thicker habitats with greater species of vegetation. Therefore, managing for thicker rabbit cover with a greater variety of vegetation should in theory reduce cottontail movements and decrease predation.

During spring and summer, cottontails use herbaceous vegetation for feeding and resting. Open areas with shorter vegetation are used at night. They use thicker vegetation containing tangles of vines and low-growing, thorny bushes for resting during the day. Cottontails use woody vegetation more for resting sites during the fall and winter when herbaceous vegetation is dead. Fall populations in good habitat range between 1-2 rabbits per acre.

Home ranges of swamp rabbits vary from 4-17 acres. Densities range from 1 rabbit per 1.5 to 18 acres. Home ranges for marsh rabbits are reported as less than one acre and their densities may exceed two rabbits per acre.

Rabbit tracks follow a characteristic pattern. The two front feet are offset, while the back feet land together ahead of the forefeet. The offset front feet distinguish the rabbit from squirrels, whose front feet generally land together.

Habitat Requirements

Areas with a mixture of grassy and brushy vegetation provide excellent habitat for cottontails. Because rabbits rate high on the menu of many predators, quality escape cover located close to a food source is the key ingredient to maintaining a high rabbit population. Old fields, utility rights-of-ways, shrubby areas between fields and woods, hedgerows, shelter belts, and young pine plantations provide good habitat.

Swamp and marsh rabbits, as their names imply, are always found close to water. Swamp rabbits



RABBITS

inhabit wooded swamps and marshy areas along rivers and streams. Suitable swamp rabbit habitat has thickets of cane, privet, blackberry, honeysuckle, or greenbrier for escape cover. Logs, fallen trees, and downed limbs provide shelter. Small forest openings and the edges of beaver ponds provide additional food and cover.

Marsh rabbits inhabit open marshy areas containing scattered shrub thickets. They often are the major occupants of land next to open marsh along Georgia's coast. Brackish marshes containing cord grass, *Juncus*, *Spartina*, and *Panicums* are heavily used. As with cottontails, maintenance of quality escape cover and abundant food sources are essential for high populations of both marsh and swamp rabbits.

MANAGEMENT

Croplands for Cottontails

Agricultural fields are improved for rabbits by allowing edges and corners to grow into thickets of blackberry, honeysuckle, plum, or other dense, low-growing vegetation. Similar vegetation, grown as hedgerows across fields, provides cover strips that break up large fields. Plum, blackberry, and honeysuckle thickets should be encouraged in these strips. Hedgerows and cover strips provide travel lanes that allow rabbits access to more of the field.

Nesting cover and food production are improved by creating field borders. These field borders are areas 30-60 feet wide where natural vegetation is allowed to develop. Annual weeds and grasses grow during the first summer, followed by perennial and woody plants in the following years. Mowing or disking part of this field border every 2-3 years keeps vegetation at the desired stage and prevents woody plants, like sweetgum and pine, from becoming too large.

Preferred foods also may be planted in or adjacent to field borders (Appendix 1). Disking provides similar benefits to mowing and promotes the growth of additional food plants like ragweed and crabgrass. Brier thickets with narrow strips of land (12-20 feet wide) planted in clover or similar forage are excellent places to hunt rabbits, as they allow rabbits to feed close to cover, resulting in less exposure to predators; hunters, on the other hand, can use the strips as shooting lanes and travel lanes. The quality and quantity of food for cottontails improve if these managed areas are fertilized.

Natural vegetation around fields, overgrown fence rows, ditch banks, and wet areas provide food and cover for cottontails. When protective cover becomes too thick, strips should be mowed or disked through overgrown vegetation to stimulate new growth.

Cottontails often use brush piles for cover, especially during the winter when the availability of protective herbaceous vegetation has declined. Brush piles should be 5-8 feet high and 10-16 feet wide, placing larger logs and debris at the bottom. If equipment is used, keep from pushing dirt into the pile to allow rabbits easier access. Brush piles should be located near a preferred food source and within 300 feet of other cover. A brush pile only lasts a few years and should be replaced before its value for rabbits is lost. Brush piles can quickly provide protective cover for rabbits where it is lacking. However, they cannot replace the value of more permanent, live vegetative cover.

Pastures grazed by livestock are poorly suited for rabbits. Livestock compete with rabbits for preferred food plants, especially legumes, and they trample and graze vegetation until it is too sparse to provide protective cover. Pastures can be improved for rabbits by fencing livestock out of adjacent woodlands and allowing fencerows and field corners to develop protective cover.

Fescue's dense growth competes with more desirable plants and restricts the movements of young rabbits. A fungus that grows on fescue causes reproductive problems in cattle and may affect other animals that eat it. Although rabbits seldom eat fescue, they may resort to this grass if other foods are



Dense thickets provide critical protective cover for rabbits.

not available. Fescue fields that remain idle for several years and succeed into blackberry, broomsedge, vetch, and other preferred plants can provide good habitat for rabbits. In areas where fescue occurs, serious rabbit management includes an aggressive program to convert pasture from fescue to native vegetation.

Forested Habitats for Cottontails

Cottontails are found in a variety of woodland habitats. Pine or mixed pine-hardwood forests have the most potential for rabbit habitat improvement.

Young clear-cuts with native blackberry thickets are highly sought after by rabbit hunters. Mature timber stands should be maintained at densities that allow food and protective cover to grow in the understory. Thinning pine stands to a basal area of 50-65 square feet per acre allows enough sunlight for the understory to develop. If higher timber densities are desired, rabbit habitat can still be improved by creating small, scattered openings that can develop into shrub-thicket areas.

Pine stands reach their maximum potential for wildlife when thinned and prescribed burned. Burning helps control hardwood competition, releases nutrients back into the soil, and stimulates the growth of food and cover plants for rabbits. The best time for burning is between January and early March, before spring green-up. Later burns may endanger nestling rabbits. Burning scattered, 20-30 acre blocks within larger pine stands provides better habitat diversity than burning the entire stand the same year. Rotate burned areas each year to create a three to four-year burning cycle. Protect several 0.5 acre areas within each burned block with a firebreak. These areas should contain blackberry, honeysuckle, or other thicket-forming vegetation to provide escape cover while the burned areas regenerate. Young mast-producing trees within and next to burn areas should be protected from fire.

Only persons experienced with fire behavior should conduct control burns. A burn plan that describes suitable conditions for burning, smoke management, and safety precautions helps ensure the desired results. A permit is required from the Georgia Forestry Commission before burning. Additional information on controlled burning is available from the Georgia Forestry Commission and the Wildlife Resources Division.

Firebreaks are important parts of timber and wildlife management. A permanent firebreak system should be developed and maintained on an annual basis by mowing or disking. Permanent firebreaks improve fire control and provide additional access to hunting areas. Periodic soil disturbance from firebreak maintenance increases plant diversity, which provides more food for rabbits.

Creating scattered 0.25 to 0.5 acre openings provide additional food and cover for rabbits. These openings can be managed for native vegetation or planted in clover, wheat, or other suitable crops. Loading docks, skid trails, firebreaks, and roads also can be maintained in rabbit plantings.

Clearcuts and pine regeneration areas less than seven years old provide good rabbit habitat. These areas usually contain a mixture of herbaceous plants, thickets, and brush piles until the trees begin to shade out the understory. Planting pine seedlings on an 8' by 12' or wider spacing will delay crown closure and lengthen the period of good rabbit habitat.

Swamp and Marsh Rabbits

Swamp and marsh rabbits are dependent on bottomland hardwood or marsh wetland habitats. Protection of these critical habitats is the most important aspect of managing these species. Timber management practices that reduce bottomland hardwood stands to narrow bands along creeks or rivers can eliminate swamp rabbit populations. Stream channelization, wetland drainage, and conversion of bottomland hardwoods to pines or agricultural crops destroys valuable habitat. Grasslands of cane were once common around rivers, creeks, and streams and were heavily utilized by swamp rabbits (thus, why its nickname is cane cutter). Cane needs less than 70% canopy cover to achieve sufficient stem density to become a canebrake. Selective timber harvests, mechanical clearing, or herbicide may be used to reduce canopy cover and understory competition. The role of fire in maintaining and establishing canebrakes has been speculative at best. Limited concrete research has documented a beneficial role of fire in maintaining canebrakes.

Selectively thinning bottomland hardwoods allows sunlight to reach the forest floor and increases herbaceous growth, thus improving habitat for swamp and marsh rabbits. In closed-canopy stands, the creation of 1/4-1 acre clearings will improve habitat for these rabbits. Where clear-cuts must be conducted in bottomland areas, they should be limited to 10 acres or less. No more than 20 percent of a

RABBITS

stand should be regenerated in a 10-year period. Both swamp rabbits and marsh rabbits readily respond to increased food production associated with winter burning of marsh grass areas.

HUNTING

While there are several methods of hunting rabbits, chasing rabbits with a pack of beagles is the most common; in fact, beagling and rabbit hunting have become almost synonymous. What is less well recognized is that much of and maybe most, beagling is nonconsumptive (in other words, rabbits are never shot). It is called training, pleasure packing, and field trailing, and is largely a year-round sport. Rabbits are rarely caught by the dogs in this scenario, as the excitement lies in the chase rather than the kill. The hunt continues until the dogs lose the rabbit's trail, after which the hunters move them to another location. Even when rabbit season is open, many hunters will not shoot their quarry unless it is being run by the little hounds. Rabbits tend to remain in their home range when chased and follow a wide loop through the dense cover they know well. Hunters station themselves in spots where they can see the quarry between thickets.

Beagle clubs have been around for more than a century and were originally formed to help rabbit hunters select the best dogs to breed through judged competition. Clubs are found throughout the U.S. but especially in the eastern half, including Georgia. These beagle clubs are sponsored or licensed by organizations like the American Kennel Club, National Kennel Club, and others. Most clubs have fenced running grounds for their competitions.

Today, many landowners build rabbit enclosures for training and "pleasure packing" but they never shoot rabbits in them. Most only allow friends to run their packs in them, but a few charge fees to the public for the privilege. Places to run beagles without them getting onto neighboring properties are difficult to find because of the explosion of land development in recent years, and these pens may be a good solution for the future.

These enclosures range from an acre for training puppies to 20+ acres for running older dogs. Well-built enclosures have low fences (3 feet or so) with electric wire on top. They are constructed with rabbit wire and aprons on the ground to prevent predators from digging in or rabbits from digging out. The low fence allows deer to easily move in and out but prevents beagles from leaving. The habitat in enclosures is managed for excellent rabbit cover and food. The rabbits usually reproduce and thrive in them even though beagles may run daily.

Although most rabbit hunting involves a pack of beagles, other methods are sometimes used. Some falconers hunt rabbits with hawks and they will sometimes use dogs to flush the prey into the open. A few hunters hunt rabbits without assistance, walking through the undergrowth until they jump a rabbit. Hunters without dogs are more likely to take occasional rabbits while hunting other game species.

Rabbit hunting was very popular in Georgia during the early 1960s when about 117,000 hunters harvested 1.27 million rabbits annually. Wildlife Harvest Surveys show a steady decline in rabbit hunting since the 1960s with just over 13,000 hunters harvesting over 58,000 rabbits during the 2024-

25 hunting season. This decline resulted from several factors, including loss of rabbit habitat because of "clean" farming practices that remove protective cover, and urban expansion that eliminates cover and limits hunter access. Deer hunting has become increasingly popular and competes with small-game hunting. The leasing of hunting rights for other primary uses also limits access to many acres of good rabbit habitat. Some rabbit hunters now are



RABBITS

sub-leasing rabbit hunting rights from deer clubs; these usually cost half or less of the full price. Unfortunately, most deer clubs do not allow rabbit hunters on the property until after the deer season. This is despite research that shows hounds—especially small beagles—do not disturb deer if they are used to seeing them and the dogs don't chase them. State Wildlife Management Areas (WMAs) with many clear-cuts have become important to rabbit and other small game hunters, especially where hunts are scheduled on different days from deer hunts.





GRAY & FOX SQUIRRELS

The gray squirrel (*Sciurus carolinensis*) and the fox squirrel (*Sciurus niger*) are found throughout Georgia. The generic name, *Sciurus*, means “squirrel” in Latin and was derived from two Greek words, “skia” (shadow) and “oura” (tail). Taken literally, the name means “an animal that sits in the shadow of its tail,” which both species can do.

The tail is a squirrel’s most distinctive physical feature. It provides balance while running, jumping and climbing, and acts as a parachute to break an unexpected fall. It supplies warmth in cold weather and shade on sunny days. When rapidly flicked back and forth, the tail acts as a warning signal, or a decoy to distract enemies.

The gray squirrel is predominantly gray with white underparts. The fox squirrel has several color phases varying from silver-gray with a predominantly black head, to solid black, to a light buff or brown color tinged with reddish-yellow. Fox squirrels have more color phases than any other North American mammal. Fox squirrels are larger than gray squirrels with some adults exceeding three pounds. Gray squirrels appear more slender-bodied with adults weighing around one pound.

It is hard to imagine any type of hunting more linked with American history and tradition than squirrel hunting. The famous Kentucky long rifle, developed in the early 1700s by German gunsmiths in Pennsylvania, was often referred to by many early pioneers as their “squirrel rifle.” Superbly hand-made and extremely functional, the rifles were amazingly accurate in the hands of these early hunters.

Evidence of exactly how capable these master riflemen were was seen later that century when Pennsylvania placed a bounty of three pence each on the common bushytails. Many men simply quit work and went squirrel hunting, and within one year the Pennsylvania treasury was drained of eight thousand pounds sterling.

Until logging caused their eventual demise in the early 1900s, the virgin forests of the east supported tremendous squirrel populations. Historical records state that as recently as 1901, market hunters were accounting for 50 or more squirrels in a single morning’s hunt. Although the combination of cleared land and thinner woodlands drastically reduced squirrel numbers over the next half-century, the adaptable bushytail continued to be the most popular game animal across rural eastern America.

Starting in the 1960s, successful wildlife restoration efforts for white-tailed deer and wild turkeys led to huntable populations of those species and dropped squirrel hunting from its top ranking in most states. By the late 1970s, more Georgia hunters were pursuing deer instead of squirrels. During the 2024-25 season, approximately 31,000 squirrel hunters harvested 357,000 squirrels, with 92%



Fox squirrel (Sciurus niger)

GRAY & FOX SQUIRRELS

harvesting grays, 7% mixed bag, and 1% only fox squirrels. Nevertheless, each fall as mornings turn cooler and hickory trees begin to yellow, many hunters across the Peach State return to their roots. For many Georgians, especially those raised in rural counties, squirrels provided their very first hunting experience, and it is hard to break with tradition.

LIFE HISTORY

Reproduction

Squirrels normally have two distinct breeding periods in Georgia. The first occurs in December and early January followed by a second in June and early July. Females usually produce their first litter at one year of age. When food is scarce, they may wait until their second year to breed. After an exceptional mast crop, four-month-old gray squirrels may breed successfully and after a severe mast failure, squirrel breeding may be scarce or nonexistent. Twenty to forty percent of adults produce two litters per year. The gestation period for both species is approximately 45 days and litter sizes range from 1-8, with an average of three.

Gray and fox squirrels have two types of homes: dens and leaf nests. Dens are in tree cavities and usually are filled with leaves and bark. Den trees are usually large, mature hardwoods having cavities formed from weather or insect damage. Leaf nests can be found in the forks of limbs or built around several intertwining branches. They consist of a rough twig framework, approximately 15-25 inches across, interlaced with layers of leaves. The inside cavity is 10-12 inches in diameter and accessed through a hole in the side of the nest. Squirrels gather nest material from the tree in which the nest is located. Leaf nests can be constructed in less than 12 hours and last for several months. One squirrel may build many different nests during the year.



Den trees are more secure than leaf nests for raising young and are preferred by gray squirrels. Fox squirrels, on the other hand, frequently raise their young in leaf nests. Most nests are in the upper 40 percent of the tree with adult females usually occupying the highest nests.

Young squirrels are born hairless with their eyes closed. At three weeks of age their bodies are covered with short hair, and their eyes open a week or two later. The young begin to venture out of the nest or den at six weeks and are half-grown at eight weeks. Mother squirrels raise their young alone and aggressively defend the nest tree. Good parental care results in high survival rates for the young compared to other small game species.

Mortality

The life expectancy of squirrels in the wild is 1-2 years with about 50 percent of the population lost to predation, accidents and disease. Sometimes environmental factors can push mortality rates even higher, for example when extensive, long-term winter flooding in bottomlands exposes squirrels to additional predation pressure. Hunting has little impact on squirrel populations, except on small woodlots that are heavily hunted. Annual harvest rates are normally 10-20 percent of the population.

Many predators including hawks, owls, bobcats, coyotes, and snakes eat squirrels. These losses are normal and usually are offset by reproduction each year. Squirrels have few serious parasites or diseases. Mites, ticks, fleas, roundworms and tapeworms sometimes infest squirrels but seldom cause serious problems. Occasionally, an outbreak of mange or scabies (a severe skin condition caused by mites) results in mortality.

During September and October, squirrels are often infested with botfly larvae, sometimes called warbles or "wolves." These larvae develop under the squirrel's skin, similar to the warbles described in the chapter on rabbits. Although these warbles are not fatal to the squirrel or harmful to the hunter,

the ugly lesions prompt many hunters to discard infested squirrels. The discarding of warble-infested squirrels is unnecessary. Even though these lesions are unsightly, the squirrel's meat is quite edible. By late October, most warbles have left their host.

Food Habits

An adult squirrel consumes about two pounds of food each week. Food preferences are similar for both gray and fox squirrels. However, types of food are extremely variable depending on locale, abundance and availability. Major fall foods include "mast" or nut crops (acorns, hickory nuts, beech nuts, pecans and walnuts), pine seed and the fleshy fruits of dogwood and blackgum. Spring and summer foods include buds, seeds, flowers of elm, maple, poplar, hop-hornbeam and other trees and shrubs. Squirrels also eat mushrooms and a variety of fruits including mulberries, wild cherries, blackberries and wild grapes. Animal foods, mainly insect larvae and bird eggs, occasionally are eaten. Squirrels are quick to take advantage of agricultural crops when available, especially corn, peanuts and sunflowers. Pecan orchards are favorite places for squirrels in late summer and early fall. Squirrels do not require open water but obtain the moisture they need from their diet, dew and rain.

Squirrel populations vary between years and depend on food availability. Populations are influenced strongly by the fall mast crop. When there is good mast production, squirrels enter the following spring and summer breeding seasons in excellent condition and produce more and healthier young. Following a poor mast year some females only have one litter, and many one-year-old females will not produce young.

Behavior and Movement Patterns

Fox squirrels have larger home ranges than gray squirrels and males of both species have larger home ranges than females, especially during the breeding season. Although fox squirrels can move over one mile in a day, both species typically use less than five acres surrounding the den tree.

Habitat use is influenced by food availability and changes in behavior during the breeding season. The total area used during the year is usually less than 30 acres.

Besides mast production, gray squirrel densities are influenced by the availability of tree cavities for dens. Seasonal changes occur as squirrels respond to the availability of preferred foods. Pecan orchards attract many squirrels from the surrounding woods. When hardwood mast is scarce, squirrels spend more time in adjacent pine woodlands eating pine seed. These movements give the appearance of abundance in some areas and scarcity in adjacent habitats.

Neither species of squirrel hibernates. However, during high winds, heavy rains or extreme cold, they seldom leave their den or nest. Both gray and fox squirrels have major activity peaks during the morning and afternoon hours. Gray squirrels are generally more active early and late, while fox squirrels often move during the middle of the day.

Although fox and gray squirrels are considered tree dwellers, both spend a considerable amount of time on the ground foraging for food. Fox squirrels readily venture into open agricultural fields and pastures. Grays seldom travel through large open areas, preferring to stay along the woods borders near the protection of trees.

Habitat Requirements

Although fox and gray squirrel habitats overlap, better gray squirrel habitat is found in mature hardwoods having a well-developed hardwood midstory with associated vines. This type of habitat is typical of hardwood forests where fire has been excluded. Gray squirrels also use pine-hardwood forests, but only the borders of pine plantations. Tree cavities for dens are essential for good gray squirrel habitat.

Fox squirrels prefer open forests without a hardwood midstory.



GRAY & FOX SQUIRRELS

Fox squirrel habitat includes mature upland pine and pine-hardwood forests that have been burned frequently. They use edges of forests and open lands and will feed in large pastures or fields hundreds of yards from the nearest tree. Another favorite habitat of fox squirrels is mature longleaf pines with an open wiregrass understory.

MANAGEMENT

Squirrel management often conflicts with modern timber management practices. Squirrel populations are extremely low in large tracts of even-aged pines managed on a short rotation. Squirrels need mast-producing hardwoods for food and cavity trees for den sites, and pine plantations lack these habitat components. Although short-rotation pine plantations are not desirable for squirrels, modifications to this management can improve squirrel habitat. To enhance pine stands for squirrels, landowners should:

- Leave hardwood corridors along streambanks and in drainages unsuitable for pines.
- Leave strips of hardwoods between pine stands.
- Clearcuts should be 50 acres or less.
- Protect large mast producing hardwoods and den trees within pine regeneration areas.
- Combine prescribed burning with thinning in pine stands to create and maintain an open understory. The resulting habitat is desirable for fox squirrels.
- During controlled burns, protect adjacent hardwood trees and shrubs, including food producers such as dogwood, blackgum, oak, hickory, beech and other mast trees.

Within hardwood stands, landowners should:

- When harvesting hardwoods, leave at least one den tree (cavity tree) and five mast trees per acre. These are minimum requirements. Not every mast tree will produce each year, so the more nut producing trees that are left, the better.
- Thin young hardwood stands to favor mast trees and promote faster growth and crown development.
- Protect understory trees, shrubs, and vines. Many of these understory plants produce important food for squirrels.

Supplemental feeding is not practical for squirrels. However, both species will use small strips or patches of corn when they are planted along woods borders. Squirrels often are unwanted guests at backyard bird feeders. An inverted metal, cone-shaped collar placed 4-5 feet from the base of the feeder or adjacent trees can prevent squirrels from climbing onto feeders.

HUNTING

Still-hunting, slow stalk hunting and the use of squirrel dogs are all popular techniques for hunting squirrels. A squirrel dog is a dog, either purebred or crossbred, that works with its human handler to tree squirrels. Today, the most popular squirrel dogs are the cur and feist breeds, which were specifically developed to be treeing dogs. Squirrel dogs can display various hunting styles, some of which may be attributed to the specific breed, but most are dependent on the personal preferences of the handler. Generally, the dogs range out on their own to hunt but stay close enough to check back with their handlers at regular intervals. In this regard, they are much easier to control than trail dogs involved with hunting other game species. Additionally, most squirrel dogs are silent while working a scent trail and bark only when a squirrel is treed.

While it is possible to squirrel hunt any time during the season, it is much more enjoyable, not to mention successful, to wait until late fall and winter when the leaves have fallen. Otherwise, the bushytails hide in dense foliage and are nearly impossible to locate.

Another important reason to wait is that most of Georgia's private woodlands are leased to deer hunting clubs, and it is difficult to gain access. In January, after deer season closes, many of these same clubs will allow squirrel hunters permission to hunt the land.

Many hunters do not have access to private lands but are very fortunate that Georgia's WMAs provide over 1.1 million acres of hunting opportunities. Squirrel hunting is allowed on these WMAs at specific times during the statewide small game season. Hunters should check the hunting regulations

for specific WMA regulations and dates.

Today, the resurgence of the popularity of squirrel hunting, with its strong traditional ties and association with a way of life that unfortunately has nearly disappeared, is one of the brighter developments in the future outlook for small game hunting. Hopefully, this positive trend will continue.

The most important habitat components to provide for gray squirrels are mature, mast-producing hardwoods and large cavity-producing trees. Fox squirrel habitat includes mature, open pine forests having a variety of mast-producing trees. Most oaks and hickories require over 40 years to reach optimum mast production and cavity development. Forest management decisions once carried out, are not quickly changed and have long-term impacts on squirrels. It is important for landowners to wisely manage their forests if the continued benefit of squirrels and other hardwood dependent wildlife is among their objectives.



HUNTING IN GEORGIA

If you don't already, we hope you make small game hunting a part of your life.

License: If you are not hunting on property owned by you or an immediate family member, you will need a hunting license. You can purchase one online (GoOutdoorsGeorgia.com), by phone (800-366-2661), or in person at a license vendor.

Hunter Education: Hunter Education is not required to hunt on one's own land or land of a parent or guardian. However, if you hunt elsewhere residents and non-residents born on or after January 1, 1961, must successfully complete a hunter education course prior to purchasing a season hunting license. Find out more at GeorgiaWildlife.com/hunting/huntereducation.

Wildlife Management Areas: Find out more about public hunting land available to you at GeorgiaWildlife.com/allWMAs.

Hunting Regulations: Find Georgia Hunting Regulations at GeorgiaWildlife.com.

Appendix 1: Planting Guide for Small Game

Crop	Planting Rates Per Acre	Planting Dates	Days to Maturity	Species Utilization/ Comments
Millet, Browntop	Broadcast 20 lbs Drill 15 lbs	April-June	60-70	Good dove food and early fall food for quail/Apply 40-60 lbs/ac nitrogen at planting
Millet, Proso	Broadcast 20 lbs Drill 15 lbs	April-June	75-110	A preferred food for doves/Apply 40-60 lbs/ac nitrogen at planting
Partridge Pea	Broadcast 15 lbs	March-April	150	Excellent quail food/Maintain pH above 6.0
Oats, Wheat, Rye	Broadcast or Drill 2 bushels	Mid-Sept. to Mid-Dec.	180	Apply 40-60 lbs/ac nitrogen at planting and again in early spring. Plant seed varieties of wheat to hold through the summer for doves.
Sesame	Broadcast 10 lbs 36" rows 5 lbs	Soil Temp. 75 degrees	85-100	Doves/Deer Resistant
Grain Sorghum	Broadcast 8-10 lbs or 36" rows 4-6 lbs	April-June	95-130	Doves and quail/Apply 8-100 lbs/ac nitrogen at planting, split application on sandy soils. Some varieties may suffer damage from black birds.
Sunflower	Broadcast 5 lbs 36" rows 5 lbs	May-July	100	Excellent food for doves and quail/Deer may feed on young plants
Corn	Rows 7 lbs	March-May	80-100	Doves and quail/Apply 80-100 lbs/ac nitrogen at planting, split application on sandy soils
White Clover	Broadcast 8 lbs	Sept.-Oct.	-----	Rabbits/Innoculate seed, maintain pH above 6.5, mow in late summer if weedy
Crimson Clover	Broadcast 20 lbs	Sept.-Oct.	-----	Rabbits/Innoculate seed, maintain pH above 6.0, mow in late summer if weedy
Red Clover	Broadcast 10 lbs	Sept.-Oct.	-----	Rabbits/Innoculate seed, maintain pH above 6.0, mow in late summer if weedy
Egyptian Wheat	36" rows 10 lbs	April-June	90-105	Provides food and cover for quail/Apply 80-100 lbs/ac nitrogen at planting, split application on sandy soils
Cowpeas	Broadcast or rows	April-July	60-70	Good quail food
Fla. Beggarweed	Broadcast 10 lbs	April-May	150-180	Excellent quail food/Use scarified seed, maintain pH above 6.0

*Apply fertilizer per soil test recommendations for best results.

*Consult your local county extension agent for variety and cultural recommendations specific to your area.

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For more information about the Bobwhite Quail Initiative, Private Lands Program and Landowner Resources at GEORGIAWILDLIFE.COM



DRIVE WITH PURPOSE!

The purchase of a Go Hunt License Plate, featuring bobwhite quail, white-tailed deer and wild turkeys contributes directly to the Bobwhite Quail Initiative, through which critical habitat for quail nesting, feeding and cover has been created. No state appropriations are allocated for the initiative's work involving quail. This program has positively affected more than 20,000 acres for quail, songbirds and other native animals and plants that depend on this habitat.