SOME THINGS YOU SHOULD KNOW ABOUT WILDLIFE IN ALABAMA

Photo by Robert Waters

Photo by Dan Brothers

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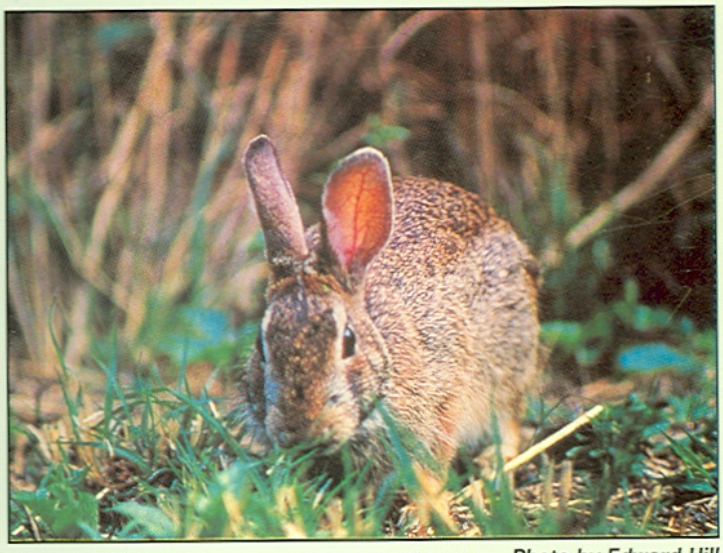

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ALABAMA FORESTRY PLANNING COMMITTEE

TREASURE FOREST

Some Things You Should Know About

WILDLIFE IN ALABAMA

Forest Resources Subcommittee

of the

Alabama Forestry Planning Committee

1996

ACKNOWLEDGMENTS

The attitudes and opinions expressed in this booklet are mine, but they are not exclusively mine. They are based on my forty years of experience in wildlife management, during which time I've been closely associated with some of the most competent wildlife biologists in the country. As you would expect, I've borrowed knowledge and opinions from each of them. This booklet, then, is a composite of what I've learned from experience in Alabama and what I've borrowed from other biologists, mostly from those working in the Southeast.

The conscientious, dedicated help of others made it possible to produce this booklet in a short time--less than three weeks. Among those to whom I'm most grateful are H. Dave Kelly, who read the manuscript and made many suggestions for improvement; Richard C. Zellmer, Chairman of the War Eagle Chapter, SAF, who encouraged me to prepare the manuscript and made arrangements for typing the first draft; and to Marie T. Williamson and Deloris Jones, who deciphered my handwriting and did a commendable job of typing the manuscript in a very short time.

FOREWORD

"Some Things You Should Know About Wildlife in Alabama" was written by Robert (Bob) E. Waters. A friend summed up Mr. Waters' knowledge of this subject by stating: "Bob Waters has forgotten more about wildlife than most people ever learn."

Waters began a career in the wildlife profession in 1950 with the Alabama Department of Conservation. Later he came to work for the Soil Conservation Service (SCS), where he served as the State Staff Wildlife Biologist until his retirement in 1988. During his career of almost forty years, Bob provided wildlife management assistance to land users in every county of the state. He also imparted some of his knowledge to others by training SCS employees, foresters, school teachers, and FFA students. Waters was in the process of completing this publication when he was recognized by the Alabama Wildlife Federation in 1987 with the Governor's Wildlife Conservationist Award. This was one of his last official duties that he completed prior to retirement. "Some Things You Should Know About Wildlife in Alabama" is a description of the life history, habitat needs, and management recommendations for many wildlife species that are found in Alabama.

A special thanks to Mr. Waters for his help in revising this publication; to Chester Billie and Tom Counts for their efforts in getting this booklet published; and to Jerry Johnson, who suggested this project in his capacity as Chairman of the Forest Resources Subcommittee of the Alabama Forestry Planning Committee. Tom Counts is the State Staff Wildlife Biologist for the Natural Resources Conservation Service in Alabama, Chester Billie retired Wildlife Biologist with the Alabama Department of Conservation and Natural Resources, and Jerry Johnson is the State Staff Forester for the Natural Resources Conservation Service in Alabama.

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Tennessee Valley Authority

USDA - Farm Service Agency

USDA - Rural Economic and Community Development

USDA - Forest Service, National Forests in Alabama

USDA - Forest Service, Southeastern Area State and Private

USDA - Natural Resources Conservation Service

PREFACE

This booklet is for everyone interested in wildlife and those who provide technical assistance to landowners in Alabama. As its title implies, it contains information on wildlife, one of the state's truly valuable resources and a resource that is becoming more valuable every day.

The purpose of this booklet is twofold: (1) to provide information that will assist landowners in managing their wildlife resources, and (2) to provide you with answers to some of the questions landowners are asking frequently as their wildlife becomes more and more valuable.

This booklet was originally prepared for the War Eagle Chapter of the Society of American Foresters. For the most part, members of that chapter live and work in east-central Alabama. However, this booklet contains information that is applicable to all of the state. You will, of course, need to adapt the recommendation on habitat management to particular sites and to the desires of individual landowners, but that is not new.

This booklet contains six sections entitled "Introduction," "Values of Wildlife," "More Important Species and Groups of Wildlife," "Nuisance Wildlife," "Important Wildlife Needs in Alabama," and "Appendices." The section entitled "More Important Species and Groups of Wildlife" should be especially helpful. It contains discussions of the life history, habitat needs, habitat management, carrying capacity, and harvesting of the ten more important species and groups of wildlife in Alabama. Until you become familiar with that information, you cannot fully understand the biology behind many of the statements and recommendations in this booklet.

I suggest, therefore, that you review those discussions until you become thoroughly familiar with that information.

The appendices are, of course, to supplement information in the text. I suggest that you glance at the appendices when it is convenient and that you read them carefully when you need more information on a particular subject.

Auburn, Alabama
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Revised 1996

Robert E. Waters

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INTRODUCTION

Because of its geographic location; its high proportion and diversity of forest land; its short but fertile coastline; its abundance and favorable distribution of surface water; its generally productive soils; its mild climate; its diversity of land uses, farm enterprises, and land ownerships; its wide variety and abundance of plants; and other factors, Alabama supports a richness, a variety, and in many places an abundance of valuable wildlife.

Regardless of the scale you use, the sentence (paragraph) above contains a good bit of volume. It may even hold the state record. So help me, you will not find another of that length in this booklet. From here on, it will all seem downhill. O.K.?

The state contains 51,109 square miles, or slightly more than 33 million acres, including 549 square miles or 351,360 acres of inland water. It contains more than 31,250 square miles or about 21 million acres of forest land. In other words, about 66 percent of Alabama's land area is forest land; and according to reports, that acreage has remained fairly constant for several decades.

About 4,317 private landowners in Alabama own at least 500 acres of forest land. These landowners own about 10,771,720 acres. Many of them are already managing habitat for wildlife, and others are expected to do so in the future as the wildlife resource becomes more valuable from an economic standpoint.

The proportion of evergreens in the state's forest lands increases from about 16 percent (mostly red cedar) in the Tennessee Valley of North Alabama to about 90 percent (mostly longleaf and slash pines) near the Gulf Coast. This proportion of evergreens influences the distribution and abundance of many species of wildlife, especially of non-game birds. For example, birds such as the red-cockaded woodpecker, brown-headed nuthatch, and pine warbler are either scarce or absent within 50 miles of the Tennessee state line because pines are also scarce or absent. On the other hand, the increasing number of evergreens near the Gulf Coast seems to limit the breeding range of the wood thrush, red-eyed vireo, American redstart, and other non-game birds that prefer deciduous trees.

The larger, better developed oaks, hickories, yellow poplar, beech, and gums are most abundant in the rich, moist soils of river bottoms and in mountain coves. These hardwoods provide some of the most valuable habitat for wildlife.

Swamps increase in size and number from north to south in the state. They are more common near the Gulf Coast and, of course, along rivers and big creeks.

The biggest swamp in Alabama extends about 50 miles north from Mobile to about the junction of the Alabama and Tombigbee rivers. This swamp contains about 450 square miles or 288,000 acres. Actually, it is not a swamp but a delta. But, it is misshapen due to the high ground which surrounds it.

More than 800 species of vertebrate animals (those with backbones) have been identified in Alabama. Included in the 800 are 300 species of freshwater fishes, 64 species of amphibians (spend part of their lives in water and part on land), 78 species of reptiles (mostly turtles and snakes), 151 species of breeding birds, and 208 species of non-breeding birds, including 19 birds of prey (eat other animals).

More than 25,000 species of invertebrate animals (those without backbones) are found in Alabama, but many of them have not been described. About 400 of these species are considered as "sensitive" to further threats to their existence. Many of them are rare, threatened, or endangered to the extent that their continuous existence in the state is doubtful.

At least 3,400 species of plants are found in Alabama. Most of the state's wild animals depend either directly or indirectly on these plants for food or cover, or both. Because of differences in rainfall, temperature, soils, and other factors, plants well suited for wildlife in one area of the state may be totally unsuited for that purpose in other areas and climatic zones of the state.

VALUES OF WILDLIFE

The state's wildlife resource is valuable, and it is getting more valuable every day. That is why every year more and more landowners are asking what they can do to have more desired wildlife on their property. How long has it been since a landowner asked what he could do to have more blackbirds or stray dogs on his place? See what I mean? They want more desired wildlife because it is a valuable resource. It has many values. We will discuss some of them.

About 35 years ago, Aldo Leopold, the "father of game management in this country," wrote:

> Some have attempted to justify wildlife conservation in terms of meat, others in terms of personal pleasure, others in terms of cash, still others in the interest of science, education, agriculture, art, public health, and even military preparedness. But few have so far clearly realized and expressed the whole truth; namely that all these things are but factors in a broad social value, and that wildlife . . . is a social asset
> (from Round River, Oxford University Press, New York, 1953)

I doubt that truer words were ever written about the value of wildlife.

There is no way that I can express the whole truth about all the values of wildlife in Alabama, so I will not try. I will merely try to tell some of the truth about the values I perceive as having the most bearing in this state. As a landowner and resource manager, you are concerned with the biological, economic, aesthetic, recreational, and scientific values of wildlife. But, you are more concerned with the economic and recreational values. You are also concerned to some extent with the aesthetic value. Let's discuss those three values--aesthetic, recreational, and economic. We will discuss them in that order.

AESTHETIC VALUE

This discussion of wildlife's aesthetic value is an editorial, to be sure. However, it is more than that--it is a plea. It is presented here to help you better understand and appreciate the real beauty of this state's God-given wildlife resource. You probably have that appreciation already; most of us do, thank goodness.

At one time or another, we have all slowed down to watch and admire a proud pair of quail as they escorted their chicks across a road in front of us, and we have all felt better for having done so. Why? You are right. It is because of the quails' aesthetic value.

Seeing only the evidence or sign of wildlife--not necessarily the animals, themselves--is also a pleasure to us. The tracks of a turkey, the shed antlers of a deer, and the well-worn entrance to a fox den are examples.

We enjoy the wild sounds and calls of wildlife: The honking of Canada geese as they fly overhead, the sharp crack of a beaver's tail when it is slapped on the water's surface as a signal to other beaver, and even the raucous caw of the common crow are examples.

Sometimes we are fortunate enough to see the wild animals while they are making the pleasant sounds. But, whether we see them or not, we still feel better for having heard them. Again, it is because of their aesthetic value. So, wildlife in Alabama does, in fact, have aesthetic value, and every day more and more people appreciate that important value. Congratulate yourself for having been born with that appreciation. Some people do not yet have it, you know.

RECREATIONAL VALUE

How about the recreational value of Alabama's wildlife resource? The recreational value may be easier to define than was the aesthetic value. At least we have some figures to support our contentions.

In a recent year, more than 267,000 Alabamians bought hunting licenses to enjoy the excellent hunting in this state. As you know, it is considered to be some of the best in the country, especially for deer and turkey.

In addition to more than 267,000 residents who bought hunting licenses, nearly 20,000 hunters from other states bought trip and non-resident licenses to enjoy the excellent hunting in Alabama. The number of hunting licenses bought every year to hunt in Alabama attests to the recreational value of the state's wildlife resource.

Many people enjoy wildlife from a recreational or hunting standpoint, but are exempt from buying hunting licenses. Hunters less than 16 years old, those 65 and older, and resident landowners who hunt on their own land are examples.

We could mention other activities, such as wildlife photography and bird watching, which attest to either the aesthetic or the recreational value (or both) of wildlife, but that is not necessary. You know that wildlife is valuable from those standpoints.

ECONOMIC VALUE

The economic value of wildlife in Alabama is just as real and is even more important to a fast-growing number of people than are its other values. But the economic value may not be as obvious to many people, including some resource managers, as are the other values.

Fortunately, it is becoming easier every day for landowners in Alabama to see that wildlife is a valuable resource. Many of them are observing their neighbors' success with fee-hunting and, as a result, are beginning to follow their neighbors' examples.

How much do you suppose was spent in 1981-1982 by four groups of hunters in Alabama? A survey by the U.S. Fish and Wildlife Service at the end of the 1981-1982 season

showed that four groups of hunters--deer, small game (dove, quail, rabbits, squirrel), turkey, and waterfowl--spent a whopping $293,128,483 in pursuit of their sport during that season.

The same four groups of hunters will probably spend more than $365 million in pursuit of their sport during the current season. The more than $923 million spent by the four groups of hunters in 1981-1982 does not include money spent by hunters of less popular species such as the common snipe and the American woodcock.

What do hunters spend money for? Sporting arms, ammunition, other hunting equipment and supplies, dog food, gasoline, automobiles, other vehicles, tires, veterinary services, taxidermy services, food, lodging, and many other goods and services too numerous to mention.

How much do you suppose hunters in Alabama have spent during the last ten years for four-wheel-drive vehicles primarily for use in hunting deer? That's right, it has been a potful--a big potful; and four-wheel-drive vehicles are only one item on which deer hunters spend money. Furthermore, deer hunters are only one of several groups of hunters in the state.

Every time a hunter buys a bag of dog food, a cup of coffee, a pair of boots, or any other good or service, someone makes a profit. In fact, every time a hunter goes hunting, nearly everyone connected with his sport makes a profit except, in many instances, the landowner--the person who holds the key to his hunting.

However, thank goodness that is rapidly changing in Alabama. Today, more and more landowners are supplementing their incomes with pay hunting. In fact, many landowners in the state are now making more profit every year from wildlife and pay hunting than from their other activities.

In some of Alabama's heavily forested counties such as Choctaw, Clarke, Coosa, and Washington, wildlife is adding more money to local economies than are row crops. That has been true in those counties for more than a decade. According to one report, wildlife added more money to the economies in Marengo and Sumter Counties in 1987 than did timber and other wood products. Those two counties may be the only ones in which that has been reported, but others will probably follow.

In hundreds of communities in nearly all counties in Alabama, deer hunting alone is adding more money to local economies than are row crops. That is different, of course, from the situation in those communities a few years ago.

If you doubt that deer hunting is adding a great deal of money to local economies, you should park near a well-traveled road almost anywhere in rural Alabama on a Saturday morning during deer season. You should park before sunup and count the passing vehicles loaded with orange-clad deer hunters. You should remember that each of those hunters spends about $25 per hunting trip, and that there are countless thousands of other roads in Alabama on which you could see at least the same number of hunters, if not more. One Saturday morning of such counting will convince you that wildlife is a valuable economic resource in this state--but you already know that.

Every year, more and more landowners in Alabama are supplementing their incomes from wildlife. Here are some examples of how they are doing that.

The owners of a tract of land in west-central Alabama plant corn and browntop millet, and manage the crops to attract doves for hunting. They provide hunters with lodging for one night. They also provide dinner, breakfast, lunch, and one afternoon of dove shooting. For

that, the hunters are charged $200 each. When the landowners started the enterprise, they could accommodate up to twenty hunters at a time. They can now accommodate up to fifty or more. What is fifty times $200? Now multiply that by the number of weeks in dove season. It is not exactly pocket change--at least, for me it is not.

The owner of a fairly large farm in Sumter County plants food plots (mostly winter forage) for deer and turkey. He has built comfortable blinds in or near the food plots. Daily permits to hunt are $150 each, and hunting is by reservation only. The farmer picks up hunters at a nearby motel after they have eaten early breakfast. He takes them to the blinds and delivers them back to the motel after sundown. According to the farmer, he nets more money every year from his pay-hunting enterprise than from his cattle or row crops. Other farmers in the area are following his example.

A farmer in east-central Alabama sold hunting rights on a 22-acre field of browntop millet for one Saturday afternoon. He sold the hunting rights for $2,500 to a group of dove hunters from Birmingham. Yes, it was an exorbitant fee, but he found a group of wealthy hunters who wanted a place to shoot doves and who were willing to pay a good price for quality shooting. There are, of course, hundreds of other wealthy individuals and groups who are just as willing to pay a good price for quality dove shooting as was the group from Birmingham. What did the farmer do with the 22-acre field of browntop after the group from Birmingham hunted it one afternoon? He sold daily permits to 25 hunters for $15 each to shoot doves every Saturday afternoon for the rest of the dove season.

The price of a daily permit to hunt deer and turkey in Alabama is $75 to $300, depending on wildlife populations, location, roads, facilities to accommodate hunters, and other factors. Many landowners who have fee-hunting enterprises cater mostly to out-of-state hunters. They require the hunters to hunt at least three or four days and charge them up to $300 or more per day for the hunting and lodging. Many of these landowners are booked up for the year several months before hunting season starts.

So, the state's wildlife resource is indeed valuable from an economic standpoint. According to a recent survey by the Alabama Cooperative Extension System, hunting adds about $633 million to the state's economy every year. That is not exactly chicken feed, you know. In addition, the state's wildlife resource is getting more valuable every day. Pay hunting, or hunting for a fee, will no doubt become more common in Alabama as the state's human population continues to grow and as more people in urban areas lose their ties with rural people, especially with private landowners on whose land most of the state's wildlife is produced.

We must realize that there is nothing basically or morally wrong with a landowner charging a reasonable fee for hunting on his land. Is a landowner more obligated to produce free wildlife for the hunter's enjoyment than he is to grow free vegetables or a free steer for the hunter's home freezer? The principle is the same--only the products are different.

Fortunately, more and more hunters realize every day that landowners hold the key to their hunting; and they do not object to paying a reasonable fee for hunting on another's land. At least the ethical ones do not object. After all, they are the only ones landowners should have hunting on their lands anyway. In the long run, unethical hunters are far more trouble and expense to landowners than they are worth.

We reached the point in Alabama several decades ago whereby one does not enjoy quality hunting unless he owns land, he is invited to hunt, or he pays for the privilege. Hunters should remember that.

MORE IMPORTANT SPECIES AND GROUPS OF WILDLIFE

As stated earlier, more than 800 species of vertebrate animals are found in Alabama. From a management standpoint, the most important species and groups of these vertebrates are the beaver, birds (non-game), bobwhite quail, cottontail rabbit, gray squirrel, mourning dove, white-tailed deer, wild ducks, wild turkey, and wood duck. They are listed alphabetically--not necessarily in order of importance. They are the species and groups for which Alabamians are most likely to manage habitat. For that reason, they are the species and groups with which you should be most familiar. There are a few places in Alabama where the Canada goose is an important species.

The beaver is included in the state's more important species and groups because historically it has been the state's most valuable fur bearer; it creates excellent habitat for other wildlife; and because in many parts of the state, the animal is a nuisance. It is such a nuisance in places that foresters, landowners, and others are attempting to control the animal.

This section also includes a discussion of the distribution, life history, place in planning, habitat needs, habitat management, carrying capacity, and harvesting of each species and group of wildlife listed in the first paragraph.

You should become familiar with information in the parts entitled "Life History," "Habitat Needs," and "Habitat Management" for each of the species and groups. Until you become familiar with that information, you will not understand the biology behind the statements that follow nor understand the reason for certain recommendations in this booklet.

Again, the species and groups are discussed in alphabetical order--not necessarily in order of importance.

BEAVER *(Castor canadensis)*

The beaver is present in all 67 counties, but its greatest densities are in central Alabama. From an economic standpoint, the beaver is the state's most valuable fur bearer.

Description

The beaver is the largest rodent in Alabama--in fact, the largest in North America. Adults measure 41 to 46 inches from nose tip to tail tip. They may weigh up to 75 or 80 pounds. The largest ever taken in Alabama weighed 65 pounds, but the average weight of an adult in the state is about 33 pounds or about the same as a medium-sized dog.

The beaver is squat and broad. In some ways it resembles a muskrat, but the muskrat is smaller and has a slender tail that is flattened from side to side. The beaver's tail, on the other hand, is flattened from top to bottom and shaped like at paddle.

The beaver's back, tail, and sides are brown to blackish brown. Its underside is somewhat lighter. Its ears are short and black, and they are set far back on a broad, rounded head.

The beaver's tail is broad, flat, and scaly. It is 4 to 6 inches wide and about 16 inches long. The tail is used as a rudder and for signaling to other beaver when danger approaches. The signal is a loud cracking sound that may be heard for up to a mile. It is made by slapping the tail on the water's surface. Contrary to the belief of some, the tail is not used for carrying mud to be used in building dams and lodges.

The beaver has four large, bright orange front teeth--two upper and two lower. These teeth are known as incisors or gnawing teeth. They are about an inch long and a quarter of an inch wide. The four large teeth are used for obtaining food and building materials. Therefore, the incisors or gnawing teeth are very important to the beaver. These four teeth grow very fast. In fact, they would grow 6 to 8 inches in 1 year if not continuously worn down by gnawing. It is necessary, then, for the beaver to do a good bit of gnawing. Otherwise, his front teeth would become too long. That is also true of squirrels, rats, mice, and other rodents whose gnawing teeth continue to grow throughout the animal's life.

The beaver's front feet are strong, but they are small in comparison to the animal's size. In some respects, the front feet resemble hands. The front feet are very important to the beaver. With them, the animal digs burrows, secures mud, moves logs, combs its fur, and handles each piece of wood.

The beaver's hind feet are large and webbed. The second toe on the hind foot possesses a split or double claw which may be used as a comb or lice trap.

Dams, Lodges, and Burrows

To many people, the dam is the beaver's most interesting work. Dams are usually built on slow, meandering streams that pass through flat, moist, wooded valleys. Such locations permit flooding of a relatively large area with a rather low dam. However, the size of the streams on which dams are built varies from small, wet-weather springs to large creeks and small rivers.

The length of the dam varies from a few inches to more than 1,000 feet. The height of dams likewise varies from several inches to ten or more feet. The longest dam ever recorded in Alabama was 1,422 feet long and 6 feet high. The size of ponds formed by dams varies from a few square feet to several hundred or even 1,000 acres. The ponds are usually one-half acre to several acres in size and 3 to 4 feet deep. The greatest depth is usually just in front of the dam (immediately upstream from the dam).

The beaver uses almost any available material in making the dam. Logs, dead limbs, bushes, and trees cut from along streams are placed in position across the stream. Mud, leaves, and other debris are then added to plug holes and give strength. More than one dam may be built along a stream. The number is influenced by stream flow--the greater the flow, the more dams.

The beaver is seen occasionally during daylight, especially in early morning and late afternoon, but it is most active at night. It usually spends the daylight hours either in bank burrows or in stick houses or lodges.

The beaver in Alabama is primarily a stream dweller, and it seems to prefer bank burrows over lodges. In many instances, those living along a stream do not build lodges. They merely dig a den or burrow in the stream bank.

Entrances to bank burrows slant upward and inward, and they are well below the surface of the water. Therefore, a beaver at rest in a bank burrow is well above water level. Bank burrows serve not only as a place to rest and loaf, but also as a place to give birth to young.

Lodges are built in shallow water and usually in an open area of the pond. They may be built on a log, stump, or small island. Lodges usually rise 3 to 5 feet above the water. They are built by the haphazard piling and interlacing of sticks, boughs, and small logs. Entrances to lodges are below water level. A crude platform in the center serves as a place to rest. Active lodges are easily recognized by their fresh cuttings and their fresh mud.

Distribution and Population in Alabama

Historically, the beaver was found throughout nearly all of temperate North America, wherever water and timber were present. It was common to abundant in the area now known as Alabama, except in southernmost Baldwin and Mobile counties.

Early settlements in Alabama were near areas inhabited by the beaver. Pioneers in the state used beaver for food only to a limited extent, and they had little interest in the animal for fur. In addition, early settlers were attracted to the fertile, rather flat uplands. Their clearing and cultivating of uplands had little effect on beaver, which were found mostly in bottom lands.

The trapping and slaughter of beaver were rather severe in Alabama from about 1870 to 1890. About that time, people started using the animal more as a source of food. By 1879, the Hudson Bay Company was trapping beaver in Alabama. Higher prices for pelts caused local residents to intensively trap the animal, and trappers from the North hired Indian guides to trap beaver in the state. This relentless pursuit of the animal for its fur drastically reduced its population, and by 1890 the beaver was scarce in the state.

About 1890, farming in Alabama began on a much larger scale than before the Civil War. Many bottom lands were cleared for cultivation, further reducing the beaver population. This destruction of habitat, in addition to relentless trapping and hunting, reduced the beaver population in Alabama to a few small colonies in the central part of the state where many swamps were either extensive, inaccessible, or impractical to drain.

The state's beaver population increased during the early 1900's, but excessive trapping again in the early and mid-1930's almost eradicated the animal from Alabama. Trapping of beaver was outlawed in the state after the close of the 1938 trapping season. At that time only 500 to 600 beaver were left in Alabama, and for the most part they were present in the central part of the state. By 1940 the population had increased to about 3,500, and they were present in 28 counties.

In 1940, the Alabama Department of Conservation (predecessor of the Alabama Department of Conservation and Natural Resources) started trapping beaver in areas where they were abundant and releasing them where habitat was suitable but where beaver were scarce or absent. From 1940 to 1951, the Department of Conservation trapped about 765 beaver and released them in 48 counties. The department released the beaver only on lands whose owners requested the animals. At that time, nobody could visualize the beaver as anything but a desirable fur bearer. No one dreamed that the animal would ever become the nuisance that it is in parts of the state today.

From a point of near extinction in the mid-1930's, the beaver population has made a remarkable comeback in Alabama. Some authorities believe the state's population has increased tenfold in the last thirty years. According to their estimates, Alabama now has more than 150,000 beaver. They attribute the increase to the following factors: (1) a decline in the number of experienced trappers because of the time when trapping was prohibited by law or fur prices were low; (2) a change in land use, especially to an increase in forest land; and (3) the trapping and releasing of beaver by the Alabama Department of Conservation in the 1940's and early 1950's. Beaver are now present in all 67 counties.

The greatest densities, however, are still in the streams, lakes, and swamps of central Alabama. As might be expected, landowners and others tend to overestimate the number of beaver in a watershed, especially when the animals are causing real damage.

Life History

The beaver reaches sexual maturity at 1.5 to 2.5 years of age. Breeding may start in late October and extend through March; it reaches a peak from November through January. Its gestation period is 115 to 120 days, or about 4 months. Consequently most of the young, or kits as they are commonly called, are born in the spring--usually in March and April. However, they may be born from January through August.

In most of the country, the beaver usually produces one litter per year. However, in Alabama and most of the South, it may produce two litters per year--especially the older females. One to five is the usual number per litter, with the average being about two, but up to eight have been reported in a litter in Alabama. Actually, litter size depends to a large extent on both food supply and the population of beaver. Litter size may be four to six if the beaver population is new, young, healthy, and growing. It may drop to two or even one if the food supply is scarce.

When the young are born, they are covered with fur and their eyes are open. After about a month, the young may accompany their mother around the pond and feeding area. The young usually remain with their parents until they are about two years old. At that time, they are driven from the lodge to fend for themselves.

The beaver usually dwells in colonies. These colonies rarely contain more than six to eight individuals. A typical colony in Alabama contains two parents, two juveniles (less than two years old), and two kits or young of the year. More than one colony may live in a large beaver pond. If so, each colony has its own territory and each defends its territory. Watersheds in Alabama that possess established beaver colonies usually contain ten to eleven beaver per mile.

The life span of an individual is usually six or seven years. Old age is considered to be eleven or twelve years, but few live that long. One female lived 21 years, which seems to be the record for free-living individuals of the species. Actually, the beaver has few natural enemies that can cause mortality. Man has far more impact on beaver populations than does any other animal.

Habitat Needs

The beaver has three basic habitat needs--water, food, and a suitable place for a burrow or lodge. Unlike many other mammals, the beaver does not require vegetative cover except for use in building lodges.

Water. The beaver dens near water, feeds in or near water, and usually travels by water. The beaver has several adaptations which make him very much at home in water. His lungs, liver, and heart are so adapted that the animal can stay submerged for up to fifteen minutes and can travel up to one-half mile under water. Therefore, ponds and other bodies of water furnish ready escape from enemies. The beaver's nose and ears are equipped with valves that close when the animal is under water. His lips form a watertight seal that allows the animal to gnaw under water. The beaver's eyes are protected by transparent eyelids which allow good vision under water. His hind feet are completely webbed, which provides good

propulsion in water and the leverage to push and pull heavy limbs into place in dams. Beavers in captivity usually require drinking water.

Food. According to most authors, the beaver is a strict vegetarian. However, a captive animal in Alabama seemed to prefer crisp fried bacon over other foods.

The beaver's diet in Alabama consists mostly of bark, twigs, leaves, and wood of trees such as sweetgum, cottonwood, willow, alder, maple, yellow poplar, dogwoods, birch, sweetbay, blackgum, and ironwood. Huckleberry, water oak, pines, and many other species are lower in preference, but they may appear in the diet along with bark peeled from branches of species that are used in building dams and lodges. An adult may eat 22 to 23 ounces of bark and twigs every day. Contrary to the belief of some, the beaver does not eat fish.

Trees felled by beaver are usually one to five inches in diameter. Those merely girdled are usually larger. When girdling a tree, the beaver usually gnaws around the tree at the height it can reach and moves on to another tree.

Bark and small twigs are the only part of the tree or branch that is eaten by beaver. When large stems and limbs are cut through, it is either to facilitate their movement or to bring other large stems and limbs into reach.

Occasionally, the beaver feeds on ornamental shrubbery, fruit trees, and pines. The beaver also eats the roots, stems, and leaves of aquatic plants. Sometimes it eats corn, soybeans, sweet potatoes, and other agricultural crops. Other foods in the beaver's diet include wild grasses, switch cane, and acorns. As a rule, it prefers soft aquatic plants in summer and woody plants in winter.

The beaver is often portrayed as an animal in a hurry to get its food supply gathered and stored before winter when ice and snow frequently limit its activities. According to some authors, the beaver in the northern part of the country does just that. It cuts large quantities of branches and twigs and piles them in water, one on top of the other, until the whole mass of green wood sinks to the bottom. That green wood provides the northern beaver with food when winter freezes occur. However, with Alabama's mild winters, there is no need for stockpiling wood--it is there for the taking all year long. Therefore, the beaver in Alabama rarely makes food caches.

Place for a burrow or lodge. As stated earlier, the beaver in Alabama is primarily a stream dweller; and it seems to prefer bank burrows over lodges. However, lodges are fairly common where beaver are plentiful. In sandy soils where burrows often cave in, the beaver may build lodges or it may move to another location.

Beneficial and Harmful Aspects

The beaver modifies water courses to suit its habits and way of life. In doing so, it creates conditions that are both beneficial and harmful to man. Whether the beaver is an asset or a liability to a landowner generally depends on the interests of the landowner and on the beaver's location and numbers. To many landowners, however, the animal has changed from a desirable fur bearer to an economic liability, especially during the past several decades.

Beneficial Aspects

Even though the beaver is frequently detrimental to man's immediate interests, the overall and long-term role of the animal from an ecological standpoint is definitely beneficial.

The beaver is, of course, one of Alabama's most important fur bearers. About 5,000 Alabamians buy trapper's licenses every year. Many of them supplement their income by trapping beaver and other fur bearers in the vicinity of beaver ponds. Here are a few other ways in which the animal is beneficial.

Soil and water conservation. The beaver is a soil and water conservationist, but he is on nobody's payroll as such and he has had no expensive, time-consuming training in the subject. He is a soil and water conservationist by nature and instinct.

According to some authors, rivers in this country carry about a billion tons of sediment every year. For the most part, this sediment gets into the rivers by erosion--primarily erosion caused by water. People who have studied the subject believe that water removes by erosion and leaching 58.5 percent of the nitrogen lost in one year from harvested cropland, 71.7 percent of the potassium, 97.5 percent of the calcium, and 96 percent of the magnesium. Those losses are tremendous, and man tries to replace them from phosphate and other mineral deposits. However, such deposits cannot last forever, especially if the United States and other developed countries continue their efforts toward feeding an ever-increasing human population and extending the use of inorganic fertilizers to undeveloped countries. In addition, sediment in larger river systems of this country results in extensive dredging of navigable channels, shortens the useful life span of reservoirs, and increases the likelihood of damaging floods.

Like other soil and water conservationists, the beaver prevents sediment from reaching larger streams; and he slows the runoff from heavy rains. He does that by trapping silt and by storing water on small tributaries. The effect of one beaver dam on a small stream may be insignificant, but the combined effect of thousands of dams in Alabama and millions in the rest of the country is tremendous. Incidentally, according to one estimate, Alabama had 10,000 beaver dams in the early 1970's. No recent estimate is available. Apparently, no one knows how much silt is trapped by beaver dams in Alabama. However, observations on the amount of sediment in beaver ponds and on the rate at which it is deposited indicate that beaver dams in the state trap an enormous amount of silt.

Wildlife habitat. The beaver creates excellent habitat in Alabama for mink, raccoon, otter, wading birds, songbirds, wood ducks, and many other species of both game and non-game wildlife. In fact, the best brood habitat for wood ducks in Alabama is provided by beaver ponds, especially ponds that: (1) contain buttonbush or other low-growing, brushy vegetation near the edges; and (2) are adjoined by fairly large tracts of bottom land hardwoods. Beaver ponds also provide escape cover for wildlife, especially wildlife that is being pursued by an enemy. Deer being chased by dogs is an example.

Many beaver ponds can be successfully managed to attract ducks. Owners of those ponds can manage their ponds for that purpose. They can then supplement their incomes by leasing duck hunting rights, or they can enjoy more high quality duck hunting themselves. In addition, many beaver ponds contain deep holes which are excellent habitat for fish, both game and non-game. That is particularly true of older, fairly large ponds. Besides, many people enjoy their contacts with beaver and other wildlife in and near beaver ponds, or they enjoy the pleasing sights and sounds near the ponds. The beaver's return from an estimated low of only 500 to 600 in the late 1930's has definitely benefitted wildlife in Alabama.

Water storage. Water stored in beaver ponds is often used for irrigation, watering livestock, and fighting fires, particularly in parts of the arid West. During the extreme

drought of 1954, beaver ponds in parts of Alabama were the only sources of water for livestock. The water table in parts of the state is dropping, particularly in the Coastal Plain where large quantities of ground water have been withdrawn by pumping. Water stored in beaver ponds helps maintain the water table, of course.

Medicine and perfume. Both the male and the female have paired scent glands called castors. These castors secrete castoreum, a substance sometimes used as a base for perfumes and in making medicines.

Human food. Finally, the meat is edible. Because the animal is strictly vegetarian, it is very sanitary in its feeding and living habits, even when compared with some domestic animals. The meat can be broiled, deep-fat fried, baked, roasted, or barbecued, depending on the age of the animal. According to reports, the hams are delicious when sliced, battered, and fried.

Harmful Aspects

Nearly all damage by beaver in Alabama results from: (1) flooding; (2) obtaining food and building materials; (3) damming ditches and stopping up drain pipes and other water-control structures; and (4) burrowing in dams, levees, and road fills.

Flooding. Water impounded by beaver dams may flood homes, farm roads, crop fields, forest land, highways, railroads, bridges, septic tanks, pastures, or anything else on lowlands. In Alabama, the most serious damage from flooding appears to be loss of timber in bottom lands. The initial loss occurs, of course, when the stand dies, and the yearly growth increment is lost as long as the area remains flooded. Generally, timber losses from flooding are greater in the Coastal Plain and other relatively flat areas. Bottom land hardwoods are most likely to be damaged by flooding from beaver dams, but occasionally pines are flooded, especially those planted on lower sites--sites on which the planting of pines is usually not recommended. In some places the beaver does, in fact, cause serious damage to valuable timber. However, in most instances landowners and others exaggerate the damages. Actually, much of the damaged timber in Alabama has little or no market value.

Obtaining food and building materials. As stated earlier, the beaver is a vegetarian. Also, it uses limbs, bushes, and trees cut from along streams in building its dams and lodges. In obtaining its food and building materials, the animal frequently damages trees, row crops, and other vegetation near streams.

The beaver may fell trees (commercial, noncommercial, orchard, or ornamental) up to 6 inches or more in diameter at breast height, especially in winter. As stated earlier, it is only during the winter that the animal feeds on timber and other woody vegetation to any appreciable extent. In the summer it usually relies on lesser vegetation, much of which grows in beaver ponds. Occasionally the animal causes serious damage by felling large, veneer-sized trees, especially sweetgum. Sometimes these large trees fall into small streams, where they interfere with boating and other recreational uses.

On low areas that are being intensively managed for pines, the beaver may damage the trees by either cutting or girdling them. Damage to young pines that are planted adjacent to smaller streams may be severe, especially if the sites were intensively prepared before planting. In such cases, soil disturbance and canopy removal during site preparation encourage the growth of succulent vegetation that is preferred by the beaver. The animal may

move into the intensively prepared areas, feed on the preferred plants while they last, and then feed on the planted pines after the preferred foods are gone.

It should be noted that the beaver does not normally cut on pines, except on recently planted nursery stock that was grown under highly fertile conditions. However, if the animal's preferred foods become scarce, it will feed on pines that are not grown on fertile soils in nurseries. Under those conditions, the adults may produce few young.

Another serious damage caused by beaver is barking and girdling of trees, especially in winter when floods cause the overflow of streams and force the animals onto higher grounds.

Rot and disease may ruin hardwoods from which bark has been removed by the beaver, and pine beetles may quickly infest pine trees with exposed wood. Fairly large trees may be completely girdled from ground level up to about 30 inches. That, of course, reduces their market value for veneer and other purposes.

The beaver frequently damages corn, soybeans, and other row crops planted near streams. Corn planted in bottom land fields is especially susceptible to damage. The animal frequently invades corn fields from July through October. It cuts the entire stalk near the ground and usually moves it to the water's edge.

Almost any available material is used in building dams and lodges. Bushes and tree limbs are two of the frequently used items. The felling of trees in order to obtain limbs for building purposes causes a significant loss in places.

Damming streams and ditches and stopping up drain pipes. In selecting sites for dams, the beaver selects the most advantageous spot from an engineering viewpoint. Engineers locate bridges and culverts to permit runoff of water through narrow outlets. These structures are also located on sites that are advantageous from an engineering viewpoint. Therefore, the beaver frequently chooses a narrow water outlet as the site for his dam. Sometimes that causes the washout of roads. Occasionally, the beaver retards the water flow from green tree reservoirs, fish ponds, irrigation reservoirs, and other such places. That can be a time-consuming and expensive inconvenience.

Burrowing in dams, levees, and road fills. Farm ponds are readily adopted as headquarters for a colony of beaver. These ponds contain a ready-made supply of water. They lack only burrows for denning. The beaver frequently tunnels into the sloping sides of dams and levees around the ponds. Cattle and machinery that cross the dams and levees often break through the excavations. Horses and other livestock may break legs when they step into beaver tunnels or when they stumble after stepping into them. In some instances, beaver tunnels go all the way through dams and levees and deep into road fills. Such tunnels often cause washouts which lower water levels and cause extensive damage to roads.

Control

As stated earlier, the beaver is frequently detrimental; and it often causes economic losses, especially to farmers and owners of forest land. However, because of its beneficial aspects, efforts to control the animal should be concentrated in areas where it is causing a real problem.

Destroying the beaver's dams and lodges rarely drives the animal from an area. Even when a small colony of only one family is present, a dam may be destroyed and may be completely rebuilt before the next day. In such cases, dams may be relocated a short distance either upstream or downstream.

In some instances, the beaver can be forced from ditches and streams by removing its food and building materials. This is especially true where only willows and cottonwoods are available. When these trees are killed or removed, the beaver's basic food and his building materials are eliminated. The beaver is eliminated, also. An effective way, then, of controlling beaver damages in fish ponds and other manmade impoundments is to keep out trees such as willow, cottonwood, and sweetgum.

No toxicant or baiting method has been found that is effective, practical, and lethal only to beaver. At this time, trapping is the best way known of controlling the animal in small watersheds. The landowner should realize, however, that his trapping may come under attack from certain environmental groups, especially those oriented toward humane treatment of animals. On the surface trapping may seem difficult, but actually it is fairly simple if one understands the beaver's behavior and is willing to put forth the necessary effort in the winter.

No. 3 and No. 4 leg-hold traps will take beaver if drowning sets are used. The easiest-to-use and most effective trap is the No. 330 Conibear. It is a humane, quick-killing trap that effectively prevents escape. Other advantages of the 330 Conibear trap are: (1) it is more effective than conventional leg-hold traps; (2) it is more adaptable than conventional traps--it can be set in more places that take advantage of the beaver's natural habits; and (3) fewer traps are required for effective beaver control. However, the No. 330 Conibear trap requires a great deal of caution for its safe use. You must heed the manufacturer's warnings when using the trap; that is, if you want to keep both arms and both legs. Enough said. Here is how to use the No. 330 Conibear trap for controlling beaver in small watersheds. These instructions are from Trapping Beaver and Processing Their Fur, a publication of the Alabama Agricultural Experiment Station, Auburn University, Alabama 36849.

Place the trap in such a way that the beaver has to swim through it to reach his destination. When the animal swims through, it touches the trigger; and the trap snaps shut, which kills the beaver almost instantly.

As a rule, the No. 330 Conibear trap should be placed in a path normally used by beaver. Camouflaging the trap usually improves its success. A good place to set the trap is on the downstream side of a dam at a place where beaver cross over the dam. A set in the path used by beaver as they leave the water for food may be successful, also. Another set that is usually successful involves making a small break in the dam, then guiding the animal to that break from the upstream side by a V-shaped path made with small logs and brush. To reach the break in the dam, the beaver is forced to follow the V-shaped path, which contains a well-camouflaged trap at the downstream end of the V. Check the trap daily to prevent damage to trapped animals and to prevent long, drawn-out suffering by animals that were not killed when the trap snapped shut.

Intensively trap an area in the watershed for two weeks when trapping conditions are good. Use three traps for each colony of beaver. Most of the adults and a few young will be caught during the two weeks. If trapping is continued beyond that time, the catch will contain a higher proportion of young; and there will be longer intervals between catches. After two weeks, move the traps to another productive area in the watershed, trap in that area for two weeks (use three traps for each colony of beaver), and then move on to another productive area in the watershed.

Re-trap the same areas of the watershed during the next trapping season. By doing that, a reasonably good catch per hour of trapping is usually obtained. The beaver population

will be greatly reduced because nearly all of the adult females were removed the first year; consequently, fewer were left to reproduce. The second year of trapping usually removes the juveniles that are reaching maturity and the few adults that were missed in the first year.

Place in Planning

The landowner who has beaver on his property must decide what, if anything, he is going to do with them. In most instances, the landowner has three options: (1) leave the beaver and their dams and ponds alone, and continue receiving the incidental benefits they provide; (2) control the beaver; or (3) change land use in order to maximize the benefits that beaver provide. Sometimes it is necessary to exercise both the second and third options.

The best time for a landowner to make a decision about his beaver and other resources is, of course, while he is either revising or making a plan for his property. Here are some facts about beaver and beaver ponds that the landowner should keep in mind while making that decision.

If beavers are causing little or no economic loss and are not interfering with the landowner's management objectives, it may be best to simply retain the beaver ponds and their immediate areas. By doing that, the landowner will continue receiving the incidental benefits provided by such areas. Retaining them is by far the best option for thousands of landowners in Alabama, especially for those who have only a few acres in beaver ponds. Beaver ponds and their immediate areas are not difficult to retain--merely leave them alone. Do nothing whatsoever to them until they start causing an economic loss or unduly interfering with the planned use of the area. The landowner should realize that the beaver in reasonable numbers can be an asset. In excessive numbers, it can become a definite liability. A few incidental benefits provided by beaver dams and ponds are discussed in the next few paragraphs.

By nature and habit, the beaver is a soil and water conservationist. As such, he provides an invaluable service by helping landowners conserve their soil and water resources. The beaver's help costs little or nothing to the landowner except retaining the beaver and his dams and ponds. That is a bargain that landowners should not overlook.

Beaver ponds and their immediate areas are excellent habitat for fur bearers and many other kinds of wildlife, both game and non-game. As stated earlier, the best brood habitat for wood ducks in Alabama is provided in beaver ponds; and some of the larger beaver ponds provide excellent escape cover for wildlife that is being pursued by an enemy. An example is deer being chased by dogs. The landowner may supplement his income from either trapping or pay hunting, or both, in the vicinity of beaver ponds he has retained.

Many beaver ponds contain deep holes that provide habitat for both game and non-game fish. That is particularly true of older, fairly large ponds. The landowner, his family, and friends may enjoy fishing in beaver ponds that he has retained, or the landowner may supplement his income from fee fishing in the ponds.

Nearly everyone enjoys contacts with beaver and other wildlife in the vicinity of beaver ponds, and nearly everyone enjoys the pleasant sights and natural sounds near the ponds. Those may be ample reasons for some landowners to retain their beaver dams and ponds.

If beaver are causing a definite economic loss, or if they are interfering with the landowner's management objectives, the animals should of course be controlled. They can be controlled by trapping as recommended earlier. The landowner may trap the beaver and sell

their pelts, or he may allow someone else to trap them. As stated earlier, beaver flesh is edible. The landowner may use the trapped beaver for that purpose. He may want to sell the scent glands or castors for medicinal or other purposes.

In addition to controlling the beaver, some landowners may want to change land use in the vicinity of their beaver ponds to take advantage of the animal's beneficial aspects. That is especially true of landowners who have a good bit of land in beaver ponds. Landowners today simply cannot afford large acreages that are yielding less than maximum returns. They must make the beaver an asset--not allow him to be a liability. By doing so, landowners with fairly large acreages in beaver ponds may receive a higher return per acre from their land than they received before the beaver ponds were created. Here are a few ways in which landowners can change land use in order to maximize the beaver's beneficial aspects.

Duck habitat can be successfully managed in beaver ponds that contain: (1) three or more acres of shallow water, two to thirty inches deep; (2) mostly dead trees in the shallow margins; (3) little, if any, buttonbush, alder, or emergent water weeds; and (4) live streams to ensure water for flooding. When developing duck habitat in beaver ponds, follow the instructions in Wood Ducks in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130. In order to develop duck habitat in the ponds, it is necessary to remove the water, of course. The landowner may use the water for irrigating nearby crops, or he may break the dam and allow the water to flow from the pond by gravity. The landowner, his family, and friends may enjoy the high quality duck shooting in beaver ponds that he manages to attract ducks, or he may supplement his income from pay hunting in them, especially in ponds 10 acres or more in size.

Landowners can increase the number of wood ducks in their beaver ponds by erecting and maintaining suitable nest boxes. Such boxes are especially recommended in older, larger beaver ponds 10 acres or more in size, particularly in ponds that: (1) contain at least an acre of open water that ducks can see as they fly overhead in summer; and (2) contain buttonbush or other low-growing brushy vegetation in parts of the shallow water near the edges. When erecting and maintaining nest boxes, follow the instructions in the appendix or in some other reliable publication. After the wood duck population increases, the landowner, his family, and friends may enjoy more high quality duck hunting; or the landowner may supplement his income from pay hunting in ponds.

The landowner may drain his beaver ponds in late summer when forage quality is low because of drought or other reasons and then turn cattle or other livestock into the ponds to graze on the tender vegetation that quickly volunteers on the exposed areas. If the landowner breaks a dam to drain a pond, he should check frequently to see that the dam has not been repaired.

BIRDS (Non-Game)

Since man started keeping records, about 380 species of birds have been seen and recorded in the area now known as Alabama. Some of these birds are now extinct--the Carolina parakeet and the passenger pigeon, for example. Other species, although not extinct, are rarely seen in the state today. The American flamingo, for example, has not been seen in Alabama in about 100 years.

While some species have either disappeared or become scarce, others have increased in numbers and have extended their breeding ranges into Alabama. The barn swallow, brown-headed cowbird, robin, and cattle egret are examples of the latter.

About 355 species of birds may be seen in Alabama today; 46 species are game birds, and the other 309 species are non-game. Many of Alabama's birds are year-round residents. Others are present only during the summer or winter. Still other species merely pass through the state on fall and spring migrations. A few species are seen only on rare occasions.

The information contained herein is intended for the common non-game birds of Alabama farms and forest lands, and for birds that are easily attracted to homes and urban areas.

Life Histories

Life histories vary a great deal, of course. Occasionally, small birds live five to ten years or more, but most of them die within one or two years. In most cases, annual mortality ranges from 50 to 90 percent. Birds in captivity usually live longer than those in the wild.

Place in Planning

Suitable habitat can be retained, created, or maintained on nearly all kinds of land. As a rule, it is easier and less expensive to retain habitat than to create it. Landscape plantings around homes and other buildings provide habitat for many species. Hedge rows, field borders, forest lands, and other areas provide habitat for still other species. Beautification plantings along highways and in other places may provide suitable habitat, also.

Habitat Needs

No two species have identical, year-round habitat needs. All require food, cover, and water. Frequently, many species occupy the same general area. In such cases, each species fits into a different ecological niche. Areas with the most varied and abundant food, cover, and water usually support the most varied and abundant wildlife. Conversely, areas with pure stands of only one species support the fewest birds. Pure stands of even-aged pines are among the state's poorest habitats for nearly all non-game birds except the red-cockaded woodpecker, the brown-headed nuthatch, and the pine warbler.

Food. Some non-game birds eat insects and other small animals, some eat seeds, and others eat berries and fruits. Most birds eat a variety of these and other foods. Insects are fed to the nestlings of most species. Hummingbirds are fond of nectar from flowers, especially red and orange flowers. Often, winter and early spring are times of food shortage.

Cover. All birds require cover for protection from natural enemies and weather. For most birds, vegetation of some kind is a cover requirement. In Alabama, cover is most important during nesting season and during short periods of unfavorable winter weather.

Water. For most species, water is a year-round requirement for either drinking or bathing, or both. Water should be well distributed.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining suitable food, cover, and water.

Retaining Habitat

As a rule, it is much easier and less expensive to retain suitable habitat that is already present than to create new habitat. Retain a variety of trees, shrubs, vines, and other plants on one-eighth of an acre or more. Plants which provide food and trees which contain holes suitable for nests are recommended.

Creating Habitat

Cover. Vegetative cover and nest boxes are usually recommended. Vegetative cover is used the year round by most species. It is especially important during nesting season and during short periods of cold, windy weather. Vegetative cover may be planted, or it may result from natural plant succession. Nest boxes are of most value during nesting season, of course.

On open land, either plant a variety of adapted trees, shrubs, vines, and other plants on one-eighth of an acre or more, or allow the area to become vegetated by natural plant succession.

On forest land, either open the tree canopy or create openings. Opening the tree canopy on one-fourth of an acre or more creates underbrush and makes forest land attractive to a wider variety of birds. Openings in forest land should be one acre or more in size and at least 100 feet wide. A few food-producing trees, shrubs, and vines may be left within the openings. Brush should be piled in small, well-distributed piles. One opening (one acre or more) for every ten acres of forest land supports a variety of birds.

Nest boxes are especially recommended around homes. Nest box requirements for birds that commonly nest around homes are indicated on the next page.

Food can be created as part of the landscape pattern, or it can be grown in food plots. In either case, select plants which ripen their fruits or seeds at different times. That prolongs the food supply for birds. Food can be provided in feeders, also, but feeders are usually recommended for attracting birds to relatively small, local areas.

Part of the landscape pattern. Establish a variety of food-producing trees, shrubs, vines, and other plants on one-eighth of an acre or more. Recommended plants include, but are not limited to, American beautyberry, huckleberries, privet, pyracantha, sumac, and viburnums. For more information, see Invite Birds to Your Home, a publication of the Natural Resources Conservation Service. Blackberry, grapes, Japanese honeysuckle, raspberry, and Virginia creeper are some of the vines recommended. Cannas, cardinal flower, day lilies, gladiolus, hibiscus, jewelweed, mimosa, morning glories, petunia, salvia, and red buckeye are usually recommended for hummingbirds.

Species	Floor Space (Inches)	Depth of Box (Inches)	Entrance		Feet Above Ground	Remarks
			Height (Inches)	Diameter (Inches)		
Barn Owl	10 x 18	15-18	4	6	12-18	High on barn
Screech Owl	8 x 8	12-15	9-12	3	10-30	Orchard, grove
Common Flicker	7 x 7	16-18	14-16	2 1/2	6-20	Cover floor 1" to 2" with wood chips
Red-Headed Woodpecker	6 x 6	12-15	9-12	2	12-20	
Hairy Woodpecker	6 x 6	12-15	9-12	1 1/2	12-20	
Downy Woodpecker	4 x 4	8-10	6-8	1 1/4	6-20	
Great-Crested Flycatcher	6 x 6	8-10	6-8	2	8-20	Rustic, in open woods or orchard
Barn Swallow	6 x 6	6	Open Sides		8-12	On barn, near water or large pasture
Purple Martin	6 x 6	6	1	2 1/2	15-20	White, open spaces, preferably near water
Carolina Chickadee	4 x 4	8-10	6-8	1 1/8	6-15	Rustic, near woods
White-Breasted Nuthatch	4 x 4	8-10	6-8	1 1/4	12-20	
Tufted Titmouse	4 x 4	8-10	6-8	1 1/4	6-15	
House Wren	4 x 4	6-8	1-6	1-1 1/4	6-10	Partly sunny, oblong entrance
Carolina Wren	4 x 4	6-8	1-6	1 1/2	6-10	
Robin	6 x 8	8	Open Sides		6-15	Partially shaded or under leaves
Eastern Bluebird	5 x 5	8	6	1 1/2	5-10	Open place in orchard

Prothonotary Warbler	4 x 4	8	5	1 1/2	4-7	Near water

Food plots. Plant one-eighth of an acre or more in corn, browntop millet, dove proso, grain sorghum, or sunflower. Plots should be well distributed and located near suitable cover. One plot (one-eighth of an acre or more) for every five acres usually supports a variety of birds.

Feeders. Bird feeders are recommended around homes, especially during winter. Feeders bring birds in close where they can be easily seen and enjoyed. Several feeders are usually better than a single one because some birds tend to drive others away from a single source of food. To protect birds from northerly winter winds, place feeders on the southern or southeastern side of a house or evergreen thicket. Place feeders several feet from such shelter. Grains, nuts, fats, and fruits are the main foods that attract birds. Put food into feeders at regular intervals and discard spoiled food.

Water. Provide water if this essential is scarce or absent. Ponds, wildlife watering facilities, and streams are excellent sources, especially if portions of their banks are shallow and free of vegetation in which enemies can hide. Worn tractor and automobile tires may be used if the water is kept clean and fresh.

Birdbaths with maximum depths of two to three inches are recommended for bringing birds in close, especially around homes. Place the birdbath in shade, preferably on a platform or stand, and reasonably close to a shrub or tree. Keep the water clean and fresh.

Maintaining Habitat

Protect from wildfire and heavy grazing. Restrict free-ranging cats and dogs. If possible, avoid the use of chemical pesticides. Replant food plots as needed, and apply lime and fertilizer according to soil test recommendations.

Maintain openings in forest land by disking, mowing, prescribed burning, or by other means. Maintain in early stages of succession. Manage forest land in such a way that an uneven-aged stand of many species of trees, shrubs, vines, and other plants is maintained. An open canopy should be maintained over parts of the forest land.

More Information

More information on non-game birds is available from the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

BOBWHITE QUAIL *(Colinus virginianus)*

The bobwhite quail is common throughout Alabama. Its abundance is determined primarily by land use. Generally, the statewide population has been going downward since the mid-thirties.

Life History

Pairing off usually occurs in April. Pairs remain mated throughout nesting season. Nesting season is May through August, with a rare nest as late as October. Peak of nesting usually occurs in May and early June.

Pairs usually bring off only one brood each year. If the first nest is unsuccessful (no chicks hatched), pairs attempt a second, a third, or perhaps even a fourth nest. Average number of eggs per clutch is about fourteen. Incubation period is 23 days. The hen usually incubates the eggs, but incubation may be performed by the cock. Chicks are capable of short flights at two weeks of age (about the size of a tailless house sparrow). Quail are grown in size at fourteen to sixteen weeks of age.

The young may remain in the covey with their parents, or they may join with quail from other hatchings to form fall and winter coveys. Coveys break up in April when the members pair off for breeding.

Potential life span is about eight to ten years, but few reach that age. Average life expectancy is less than one year. About 80 percent (eight of every 10) of the quail in a fall population are young that were hatched earlier in the same calendar year.

Place in Planning

Suitable habitat can be retained, created, or maintained on cropland, hay land, pasture land, forest land, or wildlife land. Lands that are managed for quail should be protected from erosion and made to produce high quality cover and food, especially winter food. In some instances, quail can provide supplementary income from the lease of hunting rights or the sale of daily permits to hunt.

Habitat Needs

Food. The bobwhite's diet consists mostly of seeds, fruits, insects, and small amounts of green matter. Choice natural foods are acorns, annual lespedezas, blackberry, butterfly peas, common ragweed, dewberry, Florida beggarweed, milkpeas, mulberry, panicgrasses, partridge peas, pines (all species), sweetgum, and tickclover (beggarlice). Choice agricultural foods are browntop millet, corn, cowpeas, grain sorghum, Japanese millet, lespedezas (annual, bicolor, thunbergii), and wheat. Foods must be located near suitable quail cover; if not, they will be of little value.

Cover. The bobwhite thrives best where about equal amounts of cultivated crops, idle fields that have been out of cultivation from three to ten years, and forest land (especially cut-over forest land and areas reverting to forest land) are found in small, well-scattered fields. Cover should provide nesting areas, loafing areas, roosting areas, and concealment from natural enemies. A major portion of the cover should be open enough that quail can walk freely through it. Cover should be located near a year-round supply of quail foods, especially choice winter foods.

Water. The bobwhite drinks when free water is available, but drinking water is usually not essential. Apparently dew, succulent vegetation, insects, and other moist foods provide the necessary moisture.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining suitable food and cover. Lands on which habitat is managed must be protected from wildfire, erosion, and excessive grazing.

Retaining Habitat

In many places, it is much easier and more economical to retain habitat that is already present than to develop new habitat.

Cover. Retain one-half acre or more of thickets, briar patches, Japanese honeysuckle, weeds, grasses, brush, broomsedge, idle crop fields, wooded areas, ditch banks, fence rows, or other natural quail cover. Retain these areas near suitable quail food. Two acres of such cover for every twelve acres usually supports high quail populations.

Food. Retain one-fourth of an acre or more of annual lespedezas, butterfly peas, common ragweed, Florida beggarweed, milkpeas, oaks (old enough to produce acorns), partridge peas, or tickclover (beggarlice). Retain near suitable quail cover. One acre of such food for every twelve acres usually supports high quail populations.

Creating Habitat

Creating habitat can be rather costly. Therefore, do those things that are least costly and that produce long-term benefits. For instance, in creating habitat, select and plant perennials instead of annuals if adapted perennials are also recommended.

Planting cover. Plant sericea, wild plum, Pfitzer juniper, or privet. Plant sericea in strips 15 to 20 feet wide and 330 feet long. A strip of sericea one-ninth of an acre in size (15 feet by 330 feet) is especially recommended adjacent to plots of Amquail, bicolor, and thunbergii. You may know that Amquail (*Lespedeza thunbergii*), DC Nakai, bicolor (*Lespedeza bicolor*), and thunberg lespedeza (*Lespedeza thunbergii*) are all shrub lespedezas. They are similar in appearance and have about the same characteristics, except deer do not browse Amquail nearly as much as they browse bicolor and some other varieties of *L. thunbergii*. See Appendix.

Amquail, an improved variety of *L. thunbergii*, is especially recommended. It produces an abundance of quail food, and it is browsed little by deer. Amquail is available from the Alabama Crop Improvement Association, Inc., South Donahue Drive, Auburn University, Alabama 36849.

Plant wild plum, Pfitzer juniper, and privet in clumps 20 feet or more in diameter. Plant near suitable quail food. Caution: Privet will spread. Under some conditions, it can become a pest.

Create openings in forest land. Openings should be one acre or more in size and at least 200 feet wide. One opening (one acre or more) for every twelve acres of forest land is usually sufficient for quail, especially in rather open, uneven-aged forests.

Creating natural quail cover. On open land, allow natural plant succession to vegetate one-half of an acre or more. Such vegetated areas should be well distributed and located near suitable quail food.

Planting food plots. Plant Amquail, bicolor, browntop millet, common lespedeza, corn, cowpeas (combine and hardseeded varieties are recommended), dove proso millet,

Egyptian wheat (chicken corn), Florida beggarweed, Kobe lespedeza, Korean lespedeza, partridge peas, thunberg lespedeza, vetch, or reseeding soybeans. The Appendix contains planting dates, seeding rates, and other information on these and other crops. The Appendix also contains instructions for planting and maintaining partridge peas.

Plots should be at least 15 feet wide. All except shrub lespedezas (Amquail, bicolor, and thunberg lespedeza) should be one-fourth of an acre or more in size. For ease of hunting, shrub lespedeza plots should be no wider than 15 to 20 feet and no bigger than one-ninth of an acre. When planting shrub lespedezas, it is usually best to plant one-ninth of an acre in shrub lespedeza and an adjoining one-ninth of an acre (total slightly less than one-fourth of an acre) in one of the other recommended quail-food crops. A strip of sericea (one-ninth of an acre in size) adjacent to bicolor and other shrub lespedezas is also recommended, especially if suitable quail cover is scarce. Locate plots near suitable quail cover. One food plot for every twelve acres usually supports high quail populations. The Appendix contains more information on planting Amquail and bicolor. Artificial feeders are not recommended.

Caution: Deer are especially fond of cowpeas and soybeans. If the area contains even a few deer, they will probably destroy small plantings of these two crops. Florida beggarweed is recommended for only South Alabama. It is usually best to plant this beggarweed with a row crop, especially corn. Wild reseeding soybeans should be planted well away from other soybeans because it is difficult to keep the seed separated. Even a few seeds of the reseeding variety drastically reduces the selling price of commercial varieties. After shrub lespedezas have been growing on a site for ten to twelve years, the plants begin to spread. Spreading is especially noticeable where prescribed burning is practiced. Apparently, fire removes the duff and scarifies the hardcoated seed of shrub lespedezas, thereby making conditions favorable for germination. After 20 to 25 years of such management, the tall growing shrub lespedezas can interfere with quail hunting. Therefore, if prescribed burning is going to be practiced on areas under long-term management for quail, annual lespedeza or partridge pea should be planted instead of shrub lespedezas. Both annual lespedeza and partridge pea are low-growing, reseeding annuals that rarely, if ever, become pests. They disappear a few years after prescribed burning is discontinued.

Leaving agricultural crops unharvested. Leave one-fourth of an acre or more of browntop millet, corn, cowpeas, grain sorghum, Japanese millet, annual lespedezas, vetch, wheat, soybeans, or sunflower. Leave these crops unharvested and located near suitable quail cover. One acre or more of such food for every twelve acres usually supports high quail populations.

Maintaining Habitat

Cover. If possible, avoid the use of chemical pesticides. Protect from wildfire and harmful grazing by livestock. Keep most of the cover open enough for quail to walk freely through. Maintain forest land openings in early stages of succession by mowing, disking, prescribed burning, or other means.

Maintaining food plots. Protect from wildfire and harmful grazing. Cultivate the first year if planted in rows. Clip or mow shrub lespedezas near the ground (four to ten inches) in late February following their second growing season and apply 800 pounds of 0-24-24 fertilizer or its equivalent per acre. Clipping causes the stumps and roots of each plant to put forth several upright stems, thereby thickening the stand. Clipping also prevents

sassafras, pine, persimmon, and other unwanted plants from becoming established in bicolor and thunbergii plots. A tractor-drawn rotary mower of the Bush Hog type is excellent for clipping bicolor and thunbergii. Clip in late February every three to five years after the initial clipping and apply 800 pounds of 0-24-24 or its equivalent per acre immediately after each clipping. To reduce the likelihood of serious browsing by dense populations of deer, postpone the application of fertilizer until the beginning of the second growing season after clipping. Warning: A plot that has been clipped with a rotary mower may appear to be damaged, especially for a few weeks, but it is not damaged. It will look very good after new growth appears. For successful reseeding, disk hard-seed cowpeas in May of every year. Prescribe burn Clanton tickclover in late winter of at least every other year. Either disk or prescribe burn annual lespedezas and partridge peas in late winter of every second or third year. Apply lime and fertilizer according to soil test recommendations, and replant food plots as needed.

Maintaining natural foods. Prescribe burn butterfly peas, lespedezas (annual, wild), milkpeas, partridge peas, and tickclover (beggarlice) in late winter. Disk annual lespedezas and partridge peas in late winter and common ragweed in midwinter. Either disk Florida beggarweed lightly but thoroughly in late May or "lay by" row crop by June 1. Fertilizer and lime are usually recommended for natural quail foods.

Carrying Capacity

Quail populations vary somewhat from year to year, depending primarily on reproductive success which is largely determined by spring and summer weather. Normal rainfall and cool temperatures during May through August favor high productivity. Unusually hot, dry spring and summer weather is detrimental. Areas with ideal habitat may support one bird per acre during winter, the least favorable season.

Harvesting

It is difficult, if not impossible, to shoot enough quail during Alabama's legal hunting season to reduce the next year's crop, especially if high quality cover is available. Therefore, harvest every one possible by sport hunting. About eight of every ten (80 percent) in a fall population die before the next fall, whether they are hunted or not. So, go ahead and hunt them heavily during legal hunting season. That is the only way known to make full use of each year's quail crop. The Appendix contains more information on harvesting quail and other wildlife.

More Information

More information is available in The Bobwhite Quail in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

COTTONTAIL RABBIT *(Sylvilagus floridanus)*

The cottontail is the most common rabbit in Alabama. Others are the swamp rabbit, which inhabits lowlands throughout the state, and the marsh rabbit, which inhabits marshes and swamps of extreme South Alabama. The information contained herein is intended primarily for the cottontail, but some of the statements apply to the swamp rabbit.

Life History

February through August is usually the breeding season. An adult male may mate with several females during that time. The gestation period is about 28 to 30 days. Litter size varies from one to eight, with the average being between three and four.

Females are capable of producing twenty or more young during a year. At birth, the young are about the size of a man's thumb; they are blind, thin-furred, and rather helpless. Maternal care covers a period of fifteen to eighteen days, after which the young are able to take care of themselves.

Potential life span is eight to ten years, but few reach that age. A cottontail that lives beyond its first birthday is exceptionally lucky. The average life expectancy is only four to six months. Seventy percent or more (seven or more out of every ten) of a fall population are usually young that were born earlier in the same calendar year.

Place in Planning

Suitable habitat can be retained, created, or maintained on cropland, hay land, pasture land, forest land, or wildlife land. Lands that are managed for rabbits should be protected from erosion and made to produce high quality cover and food. In some instances, rabbits can provide supplementary income from the lease of hunting rights or the sale of daily hunting permits.

Habitat Needs

Food. The cottontail is almost 100 percent vegetarian. Choice fall and winter foods are leaves and stems of succulent forbs (any herb except grass), grasses, legumes, shrubs, and the bark and leaves of young trees and shrubs. Choice spring and summer foods are green shoots, fruits, grasses, branch tips, buds, and bark of various species.

Cover. The cottontail thrives where cropland (including idle fields), hay land, pasture land, and forest land (especially cut-over forest land and areas reverting to forest land) are about equally represented in small, well-scattered fields. Choice natural cover includes bunchgrasses; low-growing, trailing briars; thickets; annual weeds; brush; Japanese honeysuckle; and sericea.

Water. The cottontail drinks when surface water is available, but free water is usually not essential. Apparently dew, succulent vegetation, and other moist foods furnish the required moisture.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining suitable cover and food. As a rule, it is much easier and less expensive to retain existing habitat than to create new habitat.

Retaining Habitat

Retain one-eighth of an acre or more of thickets, briar patches, Japanese honeysuckle, grasses, legumes, weeds, brush, broomsedge, wooded areas, ditch banks, fence rows, and other natural rabbit habitat.

Creating Habitat (not enclosures)

Planting cover. Plant one-eighth of an acre or more of sericea or weeping lovegrass. Plantings should be at least 12 feet wide. Plant near suitable rabbit food, preferably green winter forage. One planting (one-eighth of an acre or more) for every five acres is usually sufficient for high rabbit populations.

Creating openings in forest land. Openings should be one acre or more in size and at least 50 feet wide. One opening (one acre or more) for every ten acres of forest land usually supports rather high rabbit populations.

Creating natural rabbit cover. On open land, allow natural plant succession to vegetate one-half of an acre or more. Such cover should be well distributed and located near suitable rabbit food.

Cover can be created, also, with old rolls of wire, stump piles, and loose brush piles. Three or four stumps piled together with grasses, weeds, and briars growing around the edges is ideal. Loose brush piles should be 12 to 15 feet in diameter and 4 to 5 feet high.

Planting food plots. Plant one-eighth of an acre or more in barley, clovers (arrowleaf, ball, bur, crimson, white), corn, oats, rescuegrass, rye, ryegrass, vetch, or wheat. Plots should be well distributed, and located near suitable rabbit cover. One plot (one-eighth of an acre or more) for every five acres is usually sufficient for high rabbit populations.

Creating natural foods. On open land, allow natural plant succession to vegetate one-half of an acre or more. Such areas should be well distributed and located near suitable rabbit cover.

Creating habitat (enclosures). Establish sericea or weeping lovegrass, green winter forage, and native vegetation in either alternate strips (about 10 feet wide and one-eighth of an acre or more in size) or in checkerboard plots (one-eighth of an acre or more per plot).

Maintaining Habitat

Cover. Protect from wildfire and heavy grazing. Replant sericea and weeping lovegrass as needed. Keep most of the cover open at the rabbit's level and in early stages of succession (three to ten years after cultivation). Control free-ranging cats and dogs, especially during late winter, spring, and summer.

If cover is too thick, it can be thinned by prescribed burning, disking, limited grazing, cutting, mowing, or by other means. Thin in alternate strips that are 15 to 20 feet wide.

Arrange thinning schedule in such a way that the area to be thinned can be covered in three to four years. Such thinning produces cover of different ages which is desirable for rabbits.

Maintaining food plots. Protect from harmful grazing by livestock. Replant food plots as needed.

Maintaining natural rabbit foods. Maintain in early stages of succession by periodic mowing, disking, prescribed burning, or by other means.

Carrying Capacity

Areas with ideal habitat may support as many as two rabbits per acre during winter, the least favorable season. Populations at other seasons may be somewhat higher. Summer and early fall are usually the seasons of greatest abundance. Drought during summer is harmful; it reduces reproductive success.

Harvesting

It is difficult--in fact, almost impossible--to harvest enough rabbits by sport hunting during legal hunting seasons to reduce the next year's population. Therefore, rabbits should be hunted heavily every year. At least 80 percent of a fall population dies before the next fall, whether the rabbits are hunted or not. It is much better to use the resource for recreation and food than to allow annual mortality (sometimes more than 80 percent) to take such a heavy toll. The Appendix contains more information on harvesting rabbits and other wildlife.

GRAY SQUIRREL *(Sciurus carolinensis)*

Both the gray squirrel and the fox squirrel are present throughout the state, but the gray is by far the most abundant. Both species frequently occupy the same forest land. In such cases, the fox squirrel is usually found in the uplands, especially those on which the stand of trees is thin. The gray squirrel is usually found at lower elevations, especially on lower areas with dense stands of mature hardwoods. For the most part, the information herein primarily concerns the gray squirrel, but some of the statements apply to the fox squirrel as well.

Life History

Adults may mate with more than one member of the opposite sex. There are two well-defined breeding periods in Alabama. The first is December to March, with a peak in February. The second is June to August, with a peak in July. The gestation period is about six weeks. Therefore, the two peaks of birth are March and August. Adult females may bear two litters each year. Litter size varies from one to six; the average is between two and three. Maternal care covers a period of about twelve weeks, after which the young are able to take care of themselves. Some semblance of a family relationship may exist for some time thereafter.

The potential life span of a wild gray squirrel is six or seven years, but few reach that age. A gray squirrel in captivity may live up to twelve years or more. About 60 percent (six

out of every 10) of a wild fall population are usually young that were born earlier in the same calendar year.

Place in Planning

Suitable habitat can be retained, created, or maintained on cropland, hay land, forest land, wildlife land, and sometimes on pasture land. Lands that are managed for gray squirrels should be protected from erosion and made to produce high quality food and cover. In some instances, squirrels can provide supplementary income from the lease of hunting rights or the sale of daily permits to hunt.

Habitat Needs

The gray squirrel has three basic habitat needs: food, cover, and water.

Food. The gray squirrel depends primarily upon a variety of natural foods, especially hardwood trees and shrubs. Choice native foods for fall and winter are baldcypress, beechnuts, blackgum, chinkapin, flowering dogwood, hickory nuts, magnolia, oaks (acorns), pecan, pines (all species), and walnut. The Appendix contains information on the value of oaks to squirrels and other wildlife. Choice native foods for spring and summer are blackberry, cottonwood (cambium and buds), black cherry, elm (seed and buds), grape, huckleberry, maple (seed and buds), mulberry, mushrooms, pines, and yellow poplar (seeds and buds). Squirrels also eat a wide variety of less important foods such as herbs, insects, roots, and others.

Cover. The gray squirrel prefers big tracts of mature hardwoods with understories of smaller trees and shrubs. These mature hardwoods should be dense enough that squirrels can travel easily through their crowns. The gray squirrel is rarely found in pure stands of even-aged pines.

The gray squirrel has two distinct homes: long-term tree dens and temporary leaf nests. Tree dens are preferred because they afford more protection from weather, natural enemies, and hunters. Dens with openings three to five inches in diameter and twenty feet or more above the ground are best. Favored dens are six to seven inches wide and one to three feet deep.

Water. The gray squirrel can live without drinking water for several weeks with no apparent ill effects, but free water is an attractive feature of squirrel habitat. In fact, squirrels may leave an area if free water is not available. Squirrels should have to travel no farther than one-fourth of a mile to get water.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining food, cover, and water. Lands on which habitat is managed must be protected from erosion, fire, and excessive grazing.

Retaining habitat

In most instances, it is easier and less expensive to retain the habitat that is already present than to create new habitat. Retain one acre or more of mature hardwoods, primarily oaks and hickories. Retain on hardwood sites if possible. Trees should be dense enough that squirrels can easily travel through their crowns. Retain several different species of oak and hickories. Oaks should be from both the red oak and the white oak groups. Then, if one species fails to produce mast, others will likely succeed. Retain understory species such as dogwood, huckleberry, and others. Retain three or more suitable den trees per acre. If possible, select den trees that also provide food.

Creating Habitat

Plant one-fourth of an acre or more in corn or chufa. Larger plantings (2 acres or more) are recommended on areas with high populations of deer, raccoon, and wild turkey. Plant near suitable squirrel cover. One plot (one-fourth of an acre or more) for every ten acres of forest land is usually sufficient for squirrels. Apply lime and fertilizer according to soil test recommendations.

Five to ten percent hardwood trees planted with pines will eventually produce enough food to maintain at least some squirrels. These hardwoods are especially valuable where large tracts are clearcut and planted in pines. Species to plant are hickories, mulberries, oaks, pecan, and walnut. All except runner oak should be planted in groups rather than scattered throughout the pines. Runner oaks should be planted on the edge of pine plantations.

A few rows of corn, left either unharvested or shocked near forest land, attracts squirrels from long distances. Chufas and peanuts are good for that purpose, also.

Erect nest boxes if tree dens are scarce. Typical nest boxes are about 2 feet deep and 8 inches square, with entrance holes near the top and 3 inches in diameter. When building nest boxes, make provision for removing either the top or bottom for periodic cleaning. Place nest boxes 20 to 30 feet above the ground, preferably in trees that are at least 10 inches in diameter. Entrance holes in nest boxes should be near the trunk for easy entrance. Worn automobile tires make satisfactory nest structures, also, but they may detract somewhat from the appearance of the area.

Create well-distributed water holes (about one-fourth of a mile apart) if free water is scarce or absent.

Maintaining Habitat

Protect from fire at all times. Fire damages habitat for the gray squirrel, but prescribed burning of older pines in late winter is usually recommended for the fox squirrel. Protect squirrel habitat from grazing by hogs and other livestock.

Manage forest land to favor bald cypress, beech, blackgum, chinkapin, flowering dogwood, hickories, magnolia, oaks, pecan, walnut, cottonwood, black cherry, elm, grapes, huckleberry, mulberry, yellow poplar, and other natural squirrel foods. Forest land treatment may include brush control, release cutting, thinning, and other forestry practices, except prescribed burning.

Protect food plots from grazing and replant as needed.

Carrying Capacity

Gray squirrel populations fluctuate a great deal from year to year, depending primarily on food supply. The mast crop of one year, especially on oaks and hickories, determines to a great extent the squirrel population of the following year. During years of gray squirrel abundance, ideal habitat may support one squirrel per acre during winter, the least favorable season. Fall populations may be somewhat higher.

Harvesting

Except in small, isolated wood lots (5 to 75 acres), it is difficult, if not impossible, to over-harvest gray squirrels by sport hunting during Alabama's legal hunting season. Therefore, harvest as many gray squirrels every year as possible. Six out of every ten (60 percent) in a fall population die before the next fall whether they are hunted or not. The Appendix contains more information on harvesting gray squirrels and other wildlife.

More Information

More information is available in Gray Squirrel Management in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

MOURNING DOVE *(Zenaida macroura)*

The mourning dove is common to abundant in Alabama throughout the year. It is migratory, but it breeds in all 48 adjoining states and in southern Canada, Central Mexico, and Cuba. During fall, large numbers usually fly into the state from areas to the north of Alabama. The mourning dove is the state's most popular game bird. Nearly 3.5 million are harvested by state hunters every year.

Life History

Pairing off usually begins in January. Pairs probably remain mated throughout the nesting season, which extends from February through mid-October. The peak of nesting occurs in May and June, but active nests may be found in Alabama during any month.

Doves may attempt to nest seven or eight times during the season. An average of three successful nests per season is typical. The usual number of young per brood is two. Incubation is shared by both parents. Incubation period is fourteen days. Nestlings begin to fly when they are ten to twelve days old. When the young are about four weeks old, they leave the vicinity of the nest to feed and flock with other doves.

The potential life span is about eight years, but few reach that age. Average life expectancy is less than one year. About 70 percent of the doves in a fall population are usually young that were hatched in the same calendar year.

Place in Planning

Suitable habitat can be retained, created, or maintained on cropland, hay land, pasture land, forest land, or wildlife land. Lands that are managed for doves should be protected from erosion and made to produce an abundance of high quality food, especially winter food. In many instances, doves can provide supplementary income from the lease of hunting rights in certain fields or the sale of daily permits to hunt.

Habitat Needs

Food. Doves are almost 100 percent seed-eaters. Nearly all of their food comes from either agricultural crops or from grasses and weeds associated with open land. Choice foods are seeds of barnyard grass, bristlegrass, browntop millet, bull paspalum, common ragweed, corn, Carolina cranesbill, crotons, dove proso millet, sunflower, grain sorghum, Japanese millet, pines (all species), pokeberry, sweetgum, Texas millet, and wheat. Fair foods are barley, benne, buckwheat, cowpeas, Egyptian wheat (chicken corn), lespedezas (Kobe, Korean), oats, rye, and soybeans.

Doves rarely, if ever, scratch for their food. For that reason, foods must be on relatively open land and plainly visible. If not, they will be of little value.

Cover. Doves usually build their nests in trees. Occasionally, they nest on the ground or on stumps, fence posts, and other places. For nesting, doves prefer trees with fairly large horizontal limbs, especially limbs that contain relatively little concealing vegetation. Such trees afford easy entrance and exit.

Trees suitable for nesting are located near farmhouses and along the edges of fields, pastures, and other openings. Nests are rarely, if ever, located in dense forest land.

Doves roost in trees and on the ground. They seem to prefer evergreens for roosting during the winter, but they frequently roost in cotton fields and on other relatively bare ground, even during winter. As a rule, ground cover is not needed. It limits the dove's view of approaching enemies and hinders his flight.

Water. Drinking water is a daily requirement.

Gravel or grit. The mourning dove usually takes gravel or grit every day.

Habitat Management

Habitat for the mourning dove can be successfully managed under more intensive farming than can habitat for any other game species in Alabama.

Retaining Habitat

Retain one acre or more of barnyard grass, bristlegrasses, bull paspalum, common ragweed, cranesbill, crotons, or pokeberry. Foods must fall onto bare ground and be plainly visible.

Creating Habitat

Creating natural foods. Establish two or more acres of common ragweed.

Dove fields. Well-managed dove fields supply an abundance of high quality food. They concentrate doves on small areas, and most of them provide excellent shooting even on areas where hunting for other game has declined because of land use and other reasons. Dove fields are especially recommended where dove shooting is the primary land use.

Dove fields are suited to nearly all areas in Alabama on which good dove shooting is desired. They are of most value, however, on farms and other areas where: (1) the pattern of cropland is not suitable for attracting doves; (2) fields are too small to concentrate doves when planted in the usual crops; or (3) most of the land is in either trees, pasture, quail habitat, or other uses of little value to doves.

Dove fields can provide supplementary income from the sale of shooting rights. Apparently, dove hunters do not object to pay hunting. Maybe it is because pay hunting provides them with high quality shooting at reasonable cost. Many landowners like pay hunting for doves because it provides extra income, and it provides that income with little investment in time, land, and money. In no other kind of hunting can such a small area accommodate so many hunters. Another reason that landowners like pay hunting is that it allows more control of dove shooting on their lands.

For fields to provide supplemental income, they must provide high quality hunting. Generally, quality of hunting is related to number of doves seen, number of hours hunted, number of shells fired, and space between hunters.

Size. Dove fields should be at least two acres in size--smaller ones do not provide enough shooting to be worthwhile. However, five to ten acres or more are usually recommended. A good rule is to plant about an acre for each hunter. Thus, a field expected to accommodate fifteen hunters should contain about fifteen acres, and so forth. That is enough gunners to keep the birds flying but usually not enough to drive them away.

Location. Nearly all dove fields require cultivation. They all require breaking and harrowing before planting. These operations leave the soil bare for at least short times. Therefore, they increase the chance of soil erosion. To reduce the risk of erosion, select sites that are level or nearly level. If possible, locate dove fields away from woods, cities, rivers, and big creeks. Such locations discourage competition from other animals, particularly starlings and blackbirds. Large numbers of the latter may cause doves to leave a field. In addition, doves seem to prefer locations away from woods. Avoid areas with dense deer populations. Deer will literally destroy most of the crops recommended for dove fields.

Lime and fertilizer. A soil test is the best way to determine lime and fertilizer needs. Therefore, apply both according to soil test recommendations. Apply them at the time of land preparation.

Land preparation. Break and harrow dove fields several weeks before planting. That allows rains to settle the soil before planting. The seedbed for all recommended crops should be well prepared but firm.

Kinds of dove fields. Dove fields are of three general kinds, depending on when they are to provide shooting. Those to be shot over from September through November are early season fields, those to be shot over in December and January are late season fields, and those to be shot over from September through January are combination fields. Here is what to plant, how to plant, and how to cultivate crops in the three kinds of dove fields.

This may be a good time to say that the instructions contain a good bit of repetition, and even though we dislike repetition, we believe it is justified in the following instructions for

planting and managing crops in dove fields. If repetition were eliminated, you would have to refer frequently to other sections of this booklet for necessary information. That, of course, would be a time-consuming inconvenience and would make the instructions somewhat difficult to follow. Which is the lesser of the two evils?

Early season fields. Fields to provide early season shooting (September through November) should be planted in either browntop millet, dove proso millet, sunflower, or wheat. More than one of these can be planted in the same field. In fact, we recommend planting browntop millet in the same field with dove proso millet and sunflower. However, we do not recommend planting them on the same tract.

Browntop millet. In Alabama, browntop millet is the crop most frequently planted in early season dove fields. It is a choice food, and it is adapted to a variety of soils. However, it is best adapted to well-drained soils with medium to high fertility. Seed for planting can be bought from nearly all seed stores.

Browntop millet usually grows two to three feet tall. The seed mature sixty to seventy days after the plants emerge. When properly limed, fertilized, and planted in 36-inch rows, browntop produces up to 1,200 pounds of seed per acre.

Plant about one-fifth, but not more than two acres of the field in late April or early May. Plant the rest of the field between June 1 and July 15, depending on when the field is to be hunted.

The small area planted in late April or early May provides food for doves that are nesting in the area and for their offspring. These local doves, particularly the young, congregate in the small planting where they serve as decoys for migrating doves that are flying southward in late summer and early fall. The large planting made in June or July produces most of the food and holds doves in the field during hunting season.

Browntop millet can be planted in Alabama as late as August 19, but seed production is lower on plantings made after July 15. Except for the small area planted in late April or early May, plant on dates that allow the seed to mature about two weeks before hunting is to start in the field. For example, a field in which hunting is to start on September 5 should be planted on or a few days before June 6. That allows one week for the plants to emerge, seventy days after they emerge for the seed to mature, and at least two weeks after the seed mature for doves to become accustomed to feeding in the field. At the end of this section is a table which gives more information on planting dates.

Usually two weeks after the seed mature is enough time for doves to become accustomed to feeding in a field, especially if they are already congregating in the small area planted in late April or early May.

In two weeks few seeds shatter to the ground and deteriorate. During that short time, few seeds are eaten by blackbirds and other competing animals.

Browntop millet may be planted in rows or it may be broadcast. Rows are usually recommended because they permit cultivation which provides bare ground on which the seed can fall. That, of course, is an ideal condition for doves. Rows may be either continuous or skip.

Continuous rows should be 36 to 42 inches apart. A conventional planter--the kind commonly used for planting corn, peanuts, and other row crops--is recommended for planting. Plant eight to 10 pounds of seed per acre in continuous rows. Cover them one inch or less.

If planted in skip rows, plant two rows 36 to 42 inches apart, skip the width of two to four rows, and plant two more rows 36 to 42 inches apart. Repeat the skip row spacing over the area to be planted. About three to 5 pounds of seed will be needed per acre, depending on the width of skips. Cover the seed one inch or less. Many hunters prefer skip rows because downed birds are easier to find in them.

Control weeds in the skips and between the rows. Pesticides may be used to control weeds, but cultivation is usually recommended. Four or five shallow cultivations may be necessary. The seed must fall on bare ground.

Broadcast stands of browntop millet are not as attractive to doves as are plantings made in rows, but broadcast stands can be made attractive. To plant browntop millet in a broadcast stand, broadcast 15 to 20 pounds of seed per acre (preferably on new ground) between June 1 and July 15, depending on when the field is to be hunted. The reason for planting on new ground is that new ground contains fewer seeds of grasses and weeds than do other lands. Broadcast stands cannot be cultivated, of course, and seed production on browntop will be reduced if a dense stand of grasses and weeds volunteers in the planting. Besides, dove cannot find the seed of browntop if they fall into a dense growth of grasses and weeds. Cover the seed one inch or less.

To make a broadcast stand of browntop attractive to doves, mow the entire field after the seed mature and at least two weeks before hunting is to start in the field. The two weeks allow doves to become accustomed to feeding in the field before shooting starts. Allow the mowed plants to dry thoroughly, then rake the plants and bale them. A side delivery rake is recommended. Such management leaves most of the seed on bare ground where doves can easily see them.

<u>Dove proso millet</u>. This plant was developed by the Natural Resources Conservation Service and the University of Georgia, primarily for dove food. In Alabama, it is one of the better crops for planting in dove fields. We usually refer to the plant as simply "dove proso." Seeds for planting are usually available from the large dealers.

Dove proso is suited to a variety of soils and site conditions, but it grows best on well-drained, fertile soils.

In many ways, dove proso resembles browntop millet. However, it is not as leafy as browntop, but is more stemmy. Under similar conditions, dove proso grows a foot or more taller than does browntop. Dove proso produces up to 1,500 pounds of seed per acre, and they mature seventy to eighty days after the plants emerge. Here is how to plant and cultivate dove proso to attract doves.

Actually, both browntop millet and dove proso should be planted in the field, but not on the same tract. Plant browntop millet in about one-fifth, but no more than two, acres, of the field in late April or early May. Plant the rest of the field in dove proso between May 22 and July 15, depending on when the field is to be hunted.

The reason for planting the small area in browntop millet instead of dove proso is that the seed of browntop millet mature sixty to seventy days after the plants emerge. It takes seventy to eighty days after the plants emerge for the seed of dove proso to mature. The purpose of the small planting is to provide food for doves that are nesting in the area and for their offspring, and the sooner the seed mature the better.

Plant the small area of browntop in rows 36 to 42 inches apart. Plant eight to ten pounds of seed per acre, and cover them one inch or less. Cultivate often enough to control weeds and to provide bare middles on which the seed can fall.

Dove proso should be planted at least ninety days before frost, but seed production is lower on plantings made after July 15. Whenever possible, plant on dates that allow the seed to mature at least two weeks before the field is to be hunted. For example, a field in which hunting is to start September 5 should be planted on or a few days before May 28. That allows one week for the seed to germinate, eighty days after the plants emerge for the seed to mature, and at least two weeks after the seed mature for doves to become accustomed to feeding in the field before shooting starts. See the table at the end of this section for more information on planting dates.

Dove proso may be planted in rows, or it may be broadcast. Rows are usually recommended because they permit cultivation which provides bare ground on which the seed can fall. Rows may be either continuous or skip.

Continuous rows should be 36 to 42 inches apart, preferably 42 inches. Plant eight to ten pounds of seed per acre in continuous rows. A conventional planter--the kind widely used for planting row crops--is recommended.

If planted in skip rows, plant two rows 36 to 42 inches apart, skip the width of two to four rows, and plant two more rows. Repeat the skip row spacing over the area to be planted. Many hunters prefer skip rows because downed birds are easier to find in them.

Control grasses and weeds in the skips and between the rows. Pesticides may be used to control grasses and weeds, but cultivation is generally recommended. Four to five shallow cultivations may be needed. The seed must fall on bare ground.

Broadcast stands of dove proso are not attractive to doves, but they can be made attractive. To plant dove proso in a broadcast stand, broadcast 15 to 20 pounds of seed per acre, preferably on new ground, between May 22 and July 15, depending on when the field is to be hunted. Cover the seed one inch or less.

To make a broadcast stand attractive to doves, mow the entire field after the seed mature and at least two weeks before hunting is to start in the field. Allow the mowed plants to dry thoroughly, then rake the plants and bale them. A side delivery rake is recommended. Such management leaves most of the seed on bare ground where doves can easily see them.

Sunflower. The seed of sunflower is a choice dove food. Sunflowers are best suited to fertile, well-drained soils--soils on which corn, grain sorghum, and soybeans are successful. Avoid planting on the same tract during successive years, as that helps prevent wilt and rust.

Any of the oil varieties that produce small to medium-sized seed is probably satisfactory for dove fields. However Peredovik, an open pollinated variety, has been most popular in Alabama. Avoid the large-seeded varieties; their seeds are simply too big for doves to swallow.

The oil varieties usually reach heights of four to six feet and produce more than 1,200 pounds of seed per acre. (A few well-distributed colonies of honey bees around the edges of the fields seem to increase seed production.) Their seed mature 90 to 100 days after the plants emerge. Here is how to plant and cultivate sunflower in a dove field, especially Peredovik and other oil varieties that produce small to medium-sized seed.

Actually, both browntop millet and sunflower should be planted in the field, but not on the same tract. Plant browntop in about one-fifth, but no more than two acres, of the field in

late April or early May. This small planting should be made and cultivated exactly as previously recommended for a small planting of browntop millet in a field of dove proso.

The reason for making the small planting of browntop millet instead of sunflower is that the seed of browntop millet mature sixty to seventy days after the plants emerge. It takes 90 to 100 days after the plants emerge for the seed of sunflower to mature.

The purpose of the small planting is to provide food for doves that are nesting in the area and for their offspring, and the sooner the seed mature the better.

Plant sunflower no later than July 15; and whenever possible, plant on dates that allow the seed to mature at least two weeks before hunting is to start in the field. For example, a field in which hunting is to start September 5 should be planted on or a few days before May 7. That allows about one week for the plants to emerge, 100 days for the seed to mature after the plants emerge, and at least two weeks after the seed mature for doves to become accustomed to feeding in the field before shooting starts. See the table at the end of this section for more information on planting dates.

Plant sunflower in either continuous rows or skip rows. Continuous rows should be 36 to 42 inches apart. Plant at a rate to give one plant for each foot of row or about five to seven pounds of seed per acre. Cover the seed one to two inches, preferably one inch. A conventional planter is satisfactory for planting. Use the large, flat plate.

If planted in skip rows, plant two rows 36 to 42 inches apart. Skip the width of two rows and plant two more rows 36 to 42 inches apart. Repeat the skip-row spacing over the area to be planted. Plant about three pounds of seed per acre in skip rows.

The seed must fall on bare ground and be plainly visible. If not, doves cannot find them. Therefore, control grasses and weeds between the rows and in the skips. Pesticides may be used, but cultivation is usually recommended. Three or more shallow cultivations may be necessary. To reduce the danger of lodging, move soil directly to the base of plants during the last cultivation. Cultivate with care--plants are easily damaged or broken.

It is usually best to leave sunflowers standing to provide cover for hunters and to extend the life of the crop. In nearly all instances, starlings and blackbirds scatter enough seed to attract doves, but check the fields frequently. If enough seed are not on the ground to attract doves, do something that is legal to make the seed available. At this writing, shredding a few strips throughout the field with a rotary mower is legal. Such shredding is usually recommended.

Wheat. Wheat is one of the best crops for planting to attract doves during September and October. Wheat grows best on medium to heavy textured, well-drained, fertile soils. Wheat usually grows about 3 feet tall and produces about 25 bushels or 1,500 pounds of seed per acre. The seed mature in May and June, depending on variety.

There are many varieties from which to choose. Select a variety that is recommended for grain production in your area and that stands up well after the seed mature. The Alabama Cooperative Extension System has information on varieties suited to particular areas. Here is how to plant and manage wheat in a dove field.

The best time to plant is September 1 to November 15. Plant 90 pounds or 1.5 bushels of seed per acre. Either broadcast the seed or plant them in drills about 10 inches apart. Cover the seed about 1 inch. When planted according to these instructions, wheat needs the following management before September 1.

Mow about one-third, but no more than two acres, of the field in June after the seed are fully mature. Allow the mowed plants to dry thoroughly, then rake the plants and bale them. A side delivery rake is recommended. In late July or early August, mow another one-third of the field. Again, rake the plants and bale them. About two weeks before hunting is to start in the field, mow the remaining standing plants. Again, rake the plants and bale them.

Late season fields. Fields that are to provide shooting during late season (December and January) should be planted in either corn or grain sorghum. Corn is usually recommended.

Corn. There are many varieties from which to choose. Select a high-yielding, hard-seeded hybrid that is recommended for your area. If possible, select a hybrid that is not susceptible to viruses which can seriously reduce yields. The Alabama Cooperative Extension System has information on varieties suited to particular areas.

Corn grows best on medium to heavy-textured, well-drained, fertile soils. Yields of 100 bushels or 5,600 pounds of seed per acre may be obtained. Depending on variety, the seed mature 80 to 130 days after the plants emerge. Generally, the late maturing hybrids are recommended. Here is how to plant and cultivate corn to attract doves for late season shooting.

Plant on dates that allow the seed to mature before frost. Plant in rows 30 to 40 inches apart. Space the seed 10 to 12 inches apart in the rows and cover them 1 to 2 inches. A conventional planter is recommended for planting. About 7 to 10 pounds of seed are needed to plant an acre.

Control grasses and weeds. Pesticides may be used, but shallow cultivations are usually recommended. The kernels must fall on bare ground and be plainly visible. If not, they will be of little value to doves.

Grain sorghum. Although corn is usually recommended for late season dove fields, there are conditions under which grain sorghum is the better choice. Compared with corn, it takes less time for the seed of grain sorghum to mature; grain sorghum is more resistant to drought, and grain sorghum can be planted in broadcast stands.

On the other hand, grain sorghum is more susceptible to damage by insects, diseases, and non-game birds--especially blackbirds, sparrows, and starlings. The seed are susceptible to mildew, particularly during autumns with heavy rainfall. The seed of grain sorghum deteriorate rapidly after exposure to damp soils, frosts, and wet weather.

Grain sorghum usually grows 2 to 4 feet high. Yields of up to 2,500 pounds or 50 bushels per acre are common. The seed mature 80 to 140 days after the plants emerge, depending on variety. Grain sorghum is adapted to a wide range of soils, but is best suited to deep, well-drained soils with high fertility and a pH between 5.5 and 8.5.

There are many varieties from which to choose. Select a variety that produces loose heads. If possible, select one that is resistant to common parasites, insects, and diseases of grain sorghum. The Alabama Cooperative Extension System has information on varieties suited to particular areas.

Grain sorghum may be planted in rows, or it may be broadcast. Plant on dates that allow the seed to mature before frost. Rows are usually recommended because they permit cultivation, thereby providing bare ground on which the seed can fall. Rows may be either continuous or skip. Many hunters prefer skip rows because downed birds are easier to find in them.

Continuous rows should be 30 to 40 inches apart. About 5 to 8 pounds of seed are required to plant an acre in continuous rows. Cover the seed 1 to 2 inches. A conventional planter is recommended for planting. Use the sorghum plate and plant 7 to 8 seed per foot of row.

If planted in skip rows, plant two rows 30 to 40 inches apart, skip the width of two rows, and plant two more rows 30 to 40 inches apart. Repeat the skip row spacing over the entire field. Plant about 3 to 4 pounds of seed per acre in skip rows or about eight seed per foot of row. Cover the seed 1 to 2 inches. Again, a conventional planter with the sorghum plate is recommended.

Control grasses and weeds between the rows and in the skips. Pesticides may be used, but cultivation is usually recommended. Four or more shallow cultivations may be necessary. The seed must fall onto bare ground.

As a rule, broadcast stands of grain sorghum are not as attractive to doves as are plantings made in rows, but broadcast stands can be made attractive. To plant grain sorghum in a broadcast stand, broadcast 12 to 15 pounds of seed per acre, preferably on new ground. Cover the seed 1 to 2 inches.

Here is how to manage a broadcast stand to attract doves: As soon as the seed are fully mature shred a few strips throughout the field, preferably with a rotary mower. Doves usually start congregating and feeding on seed in the shredded strips. Then, two weeks before hunting is to start in the field, partly combine the entire field or mow it with a rotary mower. If partly combined, remove no more than one-third of the grain crop--leave the rest on the ground for doves. The residue from either partly combining or mowing with a rotary mower should be raked and removed from the field. These operations expose the seed on relatively bare ground, where they are readily available to doves.

Combination fields. Fields to provide shooting during open season from September through January should be planted in three crops.

Two of the crops should be selected from those previously recommended for early season fields. One of these crops should be planted on a date that allows the seed to mature about two weeks before the opening of dove season. Since dove season usually opens in most of Alabama about September 7, this crop should usually be planted on a date that allows it to mature about August 24. The other crop should be planted on a date that allows the seed to mature about October 15. These recommended planting dates help prolong the food supply. All other instructions for planting and cultivating the two crops are exactly the same as previously recommended for planting and cultivating them in early season fields.

The third crop in a combination field should be either corn or grain sorghum. It should be planted and cultivated according to previous instructions for planting and cultivating the crop in late season fields.

Browntop millet, dove proso millet, and late-maturing hybrid corn are especially recommended for combination fields. When planted in combination fields, browntop millet should mature about two weeks before the start of dove season, dove proso should mature about October 15, and corn should mature before frost. Here is how to plant and cultivate the three crops in fields to provide hunting from the opening of season in September until it closes in January.

Plant browntop millet in about 1/5 of the field, but no more than 2 acres, in late April or early May. Plant the small area in continuous rows 36 to 42 inches apart at the rate of 8 to 10

pounds of seed per acre. Cover the seed one inch or less. Control grasses and weeds between the rows. Four or more shallow cultivations may be required.

The small area planted in late April or early May provides food for doves that are nesting nearby and for their offspring. These local doves, especially the young, congregate in the small planting where they serve as decoys for doves flying southward in late summer and early fall. The rest of the field provides most of the food and holds doves in the field during hunting season.

Plant the rest of the field in alternate strips of browntop millet, dove proso, and late maturing hybrid corn. Strips should be 30 to 50 feet wide, and should contain ten to fourteen rows 36 to 42 inches apart. Plant the alternate strips of browntop millet on or a few days before May 28 if hunting is to start in the field on September 5. That allows one week for the seed to germinate, 70 days after germination for it to mature, and at least two weeks after it matures for doves to become accustomed to feeding in the field before shooting starts. The alternate strips of browntop should be planted in continuous rows 36 to 42 inches apart at the rate of 8 to 10 pounds of seed per acre. Cover the seed 1 inch or less. Control grasses and weeds between the rows, preferably by shallow cultivations.

Plant sunflower in alternate strips if seed of dove proso are not available for planting. Plant on dates that allow the sunflower seed to mature on or a few days before October 15.

Plant the alternate strips of hybrid corn between March 1 and July 31, depending on variety. Plant on dates that allow the seed to mature before frost. Yields may be higher if the variety selected is silking and tasselling when summer rains are normally expected. Plant in continuous rows 30 to 40 inches apart at the rate of 7 to 10 pounds of seed per acre or one stalk for each 9 inches or row. Control grasses and weeds in the rows and between them.

Planting dates for crops in dove fields. Planting dates in the table below are to be used as a guide. Dates for planting specific crops are indicated in the text. To obtain planting date from the table: (1) Decide the date on which shooting is to start in the field; (2) select the crop to be planted; (3) determine the number of days for the seed of that crop to mature after the plants emerge; and (4) read the planting date from the table. For example, if shooting is to start in the field on November 1 and it takes 100 days after the plants emerge for seed of the selected crop to mature, the planting date is July 3. Unless otherwise noted, planting dates in the table allow seven days after planting for the plants to emerge and fourteen days after seed mature for doves to become accustomed to feeding in the field before shooting starts.

Managing Habitat

Managing natural foods. Disk common ragweed during winter of every year. Heavily graze pasture areas which contain good stands of wooly croton. Livestock do not graze the croton. They feed on plants that compete with croton, thereby leaving relatively bare areas on which croton seed can fall.

Managing dove fields. Manage dove fields according to instructions under "Dove Fields" in the "Creating Habitat" section. Protect from harmful grazing. Replant every year and apply lime and fertilizer according to soil test recommendations.

Shooting to Start in Field	Days Required for Seed to Mature After Plants Emerge						
	60	70	80	90	100	110	120
Sept 1	June 12	June 2	May 23	May 13	May 3	April 23	April 13 1/
Sept 15	June 26	June 16	June 6	May 27	May 17	May 7	April 27
Oct 1	July 12	July 2	June 22	June 12	June 2	May 23	May 13
Oct 15	July 26	July 16	July 6	June 26	June 16	June 6	May 27
Nov 1	Aug 12	Aug 8	July 23	July 13	July 3	June 23	June 13
Nov 15	Aug 26	Aug 16	Aug 6	July 27	July 27	July 17	June 27
Dec 1	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 12	Aug 2	July 23	July 13
Dec 15	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 6	July 27
Jan 1	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 19 2/	Aug 13

1/ Plant on this early date in only South Alabama. Corn and sunflower are the only crops recommended for dove fields that can be planted this early in North Alabama. Others might be damaged by frost.

2/ Plant no later than this date. Frost will prevent seed from maturing if planted later.

For More Information

We have tried to give you the information you need for planting and cultivating crops in dove fields, and we have tried to present it in a logical, easy-to-understand way. However, in all probability, we have not succeeded in every instance. If you need additional information or on-site technical assistance, contact your local office of the Natural Resources Conservation Service.

Managing Crop Residues

Frequently doves congregate in fields after corn, peanuts, soybeans, and other crops are harvested. These crop residues provide excellent shooting--in fact, some of the best in Alabama. Crop residues are especially recommended where dove shooting is the secondary use of the land and where the residues will not interfere with the primary land use.

The next few paragraphs contain instructions for managing some of the common agricultural crops in ways that their residues will attract doves during hunting season. The instructions do not violate state and federal regulations in effect at this writing.

Corn. Harvest by mechanical means or by livestock between September 1 and December 31, depending on the variety planted and on when the field is to be hunted. If harvested by mechanical means, harvest at least two weeks before shooting is to start in the field. If harvested by livestock, turn livestock into the field at least two weeks before shooting is to start. Two weeks after harvest is usually enough time for doves to congregate in the field. Remember that kernels must be off the cobs. If not, corn is of little value to doves.

Millets. Doves relish the seeds of nearly all millets. They are especially fond of browntop millet and dove proso. If possible, harvest millets after the seed mature and about two weeks before hunting is to start in the field. If millets are to be used for hay or mulch, allow the seed to mature; mow the plants and allow them to dry thoroughly. Then rake the plants and bale them. A side delivery rake is recommended. These operations expose the seed on relatively bare ground where they are available to doves.

Peanuts. Either harvest by mechanical means or start harvesting by hogs after the seed mature and at least two weeks before the field is to be hunted. Peanuts must be on top of the ground and their hulls must be removed. If not, they will be of little value to doves.

Grain sorghum. Either harvest by mechanical means or start harvesting by livestock at least two weeks before hunting is to start in the field.

Soybeans. Harvest at least two weeks before hunting is to start in the field.

Harvesting Doves

Some fields can be shot rather heavily without driving doves away. Other fields, sometimes even with a greater abundance of choice food, will not tolerate nearly as much shooting without driving the birds away. Some of this dove movement may be caused by gun pressure, but part of it is probably normal migration. Because of these facts, it is impossible to make a recommendation regarding frequency of shooting and expect it to be the best recommendation for all fields under all conditions.

For best results, a particular field should be shot no more than once a week. This is especially true of fields expected to provide many weeks of shooting--combination fields, for example. Occasionally, a field will provide good shooting twice a week for several weeks if three or four days are allowed between shoots. Crowd hunters no closer than one per acre. That is enough to keep the birds flying but usually not enough to drive them completely away.

Confine shooting to three or four hours per day. Avoid shooting the last hour or two before sunset. That allows doves to feed undisturbed before nightfall and helps ensure their coming back to feed the next day. Avoid shooting a field on several successive days. Such shooting drives most of the birds away, thereby drastically reducing the number killed per hour of hunting.

The dove's color blends well with vegetation in and near dove fields, especially during late summer and fall. For that reason, some birds are downed but are not found by hunters. True sportsmen deplore this loss, of course, and effort should be made to prevent it. Besides, state and federal regulations require hunters to make a serious effort to retrieve downed birds and include them in daily bags. A well-trained retriever prevents losing many of the downed birds, but hunters who do not have retrievers can greatly improve their recovery rate by marking the birds down well, keeping their eyes on spots where birds fall, and walking directly to the spots.

Shooting must be carefully supervised in pay-hunting fields. In such fields, it is especially important that adequate publicity be given to dove shoots, that directional signs be placed on major roads leading to the farm or tract of land, that entrance signs be erected, and that a gate station be established either to sell or check hunting permits and to hand out instructions to shooters.

It is important in all fields, but especially in pay-hunting fields, that daily bag limits be observed. Doves shot in excess of the daily limit by unscrupulous hunters can mean fewer days of pay hunting later in the season. Besides, hunters who exceed the daily limit are violating both state and federal regulations.

What effect does sport hunting (legal shooting during hunting season) have on the mourning dove? Here are a few things that have been learned by careful research during the last few decades.

Game animals cannot be stockpiled, and a majority of each species dies before it is a year old, whether hunted or not. These deaths are called "annual mortality," or the yearly rate at which wild animals normally die. Annual mortality is Nature's way of harvesting surplus animals from the yearly crop of wildlife.

Annual mortality in a population of mourning doves is 70 percent, which means that 7 out of every 10 doves in a fall population die before the next fall, whether they are hunted or not. An interesting thing about dove mortality is that 50 percent of the young die within ninety days of their learning to fly. This 50 percent dies whether the birds are hunted or not.

It is almost impossible to harvest more doves by sport hunting than the 70 percent Nature is going to harvest through annual mortality. (Actually, hunters take only 10 to 15 percent of the population each year.) Besides, if hunters take a certain percentage of the dove population every year by sport hunting, annual mortality takes an additional toll until total mortality for the year equals, but does not exceed, the 70 percent.

For instance, if hunters take 50 percent of the doves in a fall population, mortality from all other causes for that year will be 20 percent. However, if hunters take only 20 percent,

mortality from all other causes will be 50 percent. Furthermore, if hunters do not fire a single shot at doves, annual mortality will still be a whopping 70 percent. So, mortality from all causes--sport hunting and all others--will be 70 percent for the year. In other words, if one thing does not get a majority of the doves in a fall population, something else will. Wise use of the resource dictates that sport hunters get them, not bugs, opossums, and buzzards.

The above facts mean that landowners who are not hunters themselves can either lease hunting rights or charge a daily fee for dove hunting without fear of harm to their dove resource. Furthermore, the above facts mean that dove hunters can continue their wholesome recreation without endangering in any way the welfare of the mourning dove, not only for themselves but also for future generations.

More Information

More information on the mourning dove is available in Management for Mourning Doves in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

WHITE-TAILED DEER *(Odocoileus virginianus)*

White-tailed deer are present in all 67 counties of the state. The Alabama Game and Fish Division estimates that the state's population now exceeds one million. In addition, there is a small herd of imported fallow deer mostly in Wilcox and Dallas counties. This small herd furnishes little hunting.

Whitetails vary from one area of the state to another in such things as height, weight, antler size, food habits, and even color. Yet, they are all white-tailed deer.

Life History

Both bucks and does normally breed for the first time during their second winter. Breeding season is usually from November to March. A dominant buck may breed with seven or more does during breeding season. Gestation period is 190 to 200 days. Most of the fawns are born in June, July, and August, but a few are born as late as November. Many does have two fawns, but does bearing young for the first time usually have only one. Occasionally three are born, and there are a few records of four. In good habitat, the average is about one and one-half fawns per breeding doe each year.

The young are weaned at 3 to 4 months of age, but they remain with their mother until the following year. They leave her a few weeks before she drops fawn again.

Young bucks start growing antlers during their first spring when they are 5 to 7 months old. They grow a new set of antlers every spring thereafter. Antler development is usually best when bucks are 5 to 8 years of age. In late winter or early spring, cells at the base of the antlers die, and the antlers fall off. Rodents and other animals, including deer, soon eat the antlers--probably for their calcium content.

Contrary to popular belief, a buck's age cannot be determined by the number of points on his antlers. The best known way of aging deer is by checking their teeth--about the same as

a veterinarian ages a horse. Potential life span of a white-tailed deer is about twenty years, but few live to be more than six years old.

Place in Planning

Suitable habitat can be retained, created, or maintained on cropland, hay land, pasture land, forest land, or wildlife land. Lands that are managed for deer should be protected from erosion and made to produce high quality food and cover. In many instances, deer can provide supplementary income from the lease of hunting rights or the sale of daily permits to hunt.

Habitat Needs

Food. Deer require a varied diet. At one time, they were thought to feed almost entirely on browse or the leaves and twigs of woody plants. Recent studies show, however, that many grasses, weeds, fruits, mushrooms and other fungi, agricultural crops, flowers, and other foods are also important in their diet. Apparently, deer select foods because of their palatability, succulence, availability, and nutritional value.

During spring, summer, and early fall, deer eat succulent grasses, legumes, weeds, fruits, various agricultural crops, and the tender growth of shrubs, trees, and vines. During late fall and winter, they feed on acorns; grasses; evergreen leaves; fruits; forage in improved pastures; various agricultural crops; green stems of dogwood, greenbrier, blueberry, and sassafras; and even on dried leaves. Acorns are especially important; they help condition deer for the relatively lean winter months. The Appendix contains more information on the value of acorns to deer and other wildlife.

Deer use salt when it is available, especially during spring and early summer. However, supplemental salt is not considered a necessity on most areas in Alabama. Fortified salt may be better for deer than the standard, unfortified salt blocks used by many cattle producers.

Cover. Ideal cover consists of about equal parts of mature hardwood forest, cropland, brush land, and pasture land. The best woodland cover is a mixed forest stand, especially bottom land hardwoods with scattered openings and an abundance of tender growth within 4.5 feet of the ground.

Water. Deer require free water for drinking, especially during warm weather. It should be well-distributed throughout the area.

An important decision must be made in deer management. That decision is whether to: (1) Control the herd so that the number of deer will not exceed carrying capacity; or (2) increase carrying capacity so that more deer can be supported. The first of these is by far the better choice in most areas of Alabama.

Herd Management

Throughout most of the state and during most of the hunting season, it is legal to hunt only bucks with antlers visible above the hairline. When only bucks are harvested, less than 10 percent of the fall population can be taken each year. Such low harvest is satisfactory on areas

with good habitat and few deer, but it can be disastrous where deer populations are about to reach carrying capacity or have already done so. On the latter areas, about one-third of the fall population, including about equal numbers of both sexes, should be harvested each year. If not, deer frequently become overpopulated. They become overpopulated because today there are few large predators such as the mountain lion to help keep deer herds in Alabama under control. An overpopulated area has the following undesirable characteristics:

1. Choice deer foods are eliminated.
2. The fawn crop is smaller.
3. Mortality is higher, especially among fawns and the older deer.
4. Average weight in various age classes decreases.
5. Bucks have smaller antlers.
6. Harvestable bucks make up a smaller percentage of the herd.
7. In farming areas, crop damage is more serious.
8. Parasites and diseases of deer are more prevalent.
9. Forest reproduction is heavily browsed.
10. Young planted pines, especially those grown under fertile conditions in nurseries, are heavily browsed.

Harvesting One-Third of the Fall Population

The best known way of harvesting one-third of a deer herd every year and thus preventing overpopulation or a higher degree of overpopulation is to have a well-regulated either-sex or hunter's choice hunting season. Alabama law now permits such seasons in most of the state.

Why harvest one-third of the fall population? Because research has shown that slightly more than one-third of the fall population can be harvested each year with no apparent effect on the next year's population.

How does a landowner know that he is harvesting one-third of his herd every year? He can be reasonably sure that he is harvesting that many, but it is not an easy task because there is no known way of making an accurate count of deer on a tract of forest land, especially on a tract of dense forest land such as is found in many parts of Alabama.

A landowner can count his cattle by herding them into a small area and counting them one at a time, but he cannot herd his deer into a small area and make an accurate count of them. Therefore, he has to estimate the population.

Fortunately, trained people are available who can help make the estimate. Biologists who work with federal and state agencies and with industry can be of real help in making the estimate, especially those who work in the local area. Some of these biologists have a good bit of experience in estimating wildlife populations. In most instances, they should be asked to help make the estimate.

After the size of the deer herd has been estimated, one-third of the estimated fall population should be harvested every year for three years. Harvesting should be by sport hunting during legal hunting seasons, of course. About equal numbers of both sexes should be harvested.

Weigh all deer killed during the three-year period. Determine their ages by checking the development, replacement, and wear of teeth in the lower jaw. Instructions for aging deer by that method are contained in The White-Tailed Deer in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130. Biologists employed by state and federal agencies, especially those working in the local area, can provide detailed instructions for aging deer by checking teeth in their lower jaw.

Accurate records of live weights (nothing removed from body cavity) must be kept. Convert field-dressed weight (body cavity completely empty) to live weight by using the chart at the end of this section.

During the three years, average live weights of both sexes in the various age classes (1.5 years, 2.5 years, 3.5 years, and so forth) will either remain the same, increase, or decrease. If they have increased, continue harvesting the same number of deer each year for the next three to five years. Again harvest about equal numbers of both sexes.

If the average live weights of both sexes in various age classes has either remained the same or decreased, increase yearly harvest by 10 percent for the next three to five years. Again, keep accurate records of ages and live weights of both sexes as was done during the initial three-year period.

If average live weight in the various age classes increases during the three to five years, continue harvesting the same number of both sexes every year for the next three to five years. If average live weights have remained the same or have decreased, increase the yearly harvest of both sexes by 10 percent for the next three to five years. Continue this process until the average live weight of 1.5 year old bucks is 115 to 135 pounds and that of 1.5 year old does is 95 to 110 pounds.

Harvesting one-third of the herd every year by sport hunting is the best use of the deer resource. It ensures maximum harvest of desirable deer for the greatest number of hunters and prevents the devastations of overpopulation. The Appendix contains more information on harvesting deer and other wildlife.

Producing Trophy Bucks

Every year, more and more landowners and hunters in Alabama are becoming interested in producing trophy bucks--large animals with massive antlers. According to information that is available, here is how to do it.

Severely restrict both the total deer population and various segments and age classes within the population. In most of Alabama, that means harvesting far more than one-third of

the fall population--maybe up to 50 percent or more of the herd every year. Such heavy harvesting allows maximum physical development of individual deer that remain in the herd.

In order to produce trophy bucks, at least three things must happen: (1) Many does must be harvested; (2) many spike bucks must be harvested; and (3) many prong-antlered bucks must be harvested. The few prong-antlered bucks that survive will develop into trophy animals.

As stated earlier, a buck's antlers are usually best when he is five to eight years old. As a rule, his antlers get bigger and frequently contain more points every year until he is four to five years old. So, he has to survive at least four or five years before he becomes a trophy buck. A few will survive that long.

Alabama's Deer Management Program

The Alabama Game and Fish Division provides technical assistance to landowners and hunting clubs who request assistance in managing their deer herds. The division provides that assistance through the Alabama Cooperative Deer Management Program, or deer management program as it's commonly called.

Landowners and hunting clubs who participate in the program are required to keep accurate harvest records and to collect a lower jawbone from each deer harvested during hunting season. The harvest records contain information such as date harvested, antler development, weight (with nothing removed), and sex of each deer harvested.

Both the harvest records and the lower jawbones are numbered consecutively (1, 2, 3, and so forth). The number placed on a jawbone must be the same as the number on the harvest record of the deer from which the jawbone was taken. For example, the jawbone from the deer described in the harvest record number 18 must also be numbered 18, and so forth.

Landowners and members of hunting clubs must remember that a jawbone without a corresponding accurate harvest record is of little value. Likewise, a harvest record without a lower jawbone is of even less value.

After hunting season, the Game and Fish Division determines the age of each deer by examining the jawbones. The age of each deer is then recorded on the harvest record for that particular deer. Harvest records of deer in the various age classes (1.5, 2.5, 3.5, and so forth) are then analyzed. Bucks are analyzed separately from does, of course. After analyzing the harvest records in the various age classes, the division makes specific recommendations to the landowners and hunting clubs regarding management of deer herds on their particular lands.

The division's recommendations are based on specific objectives of the individual landowner or hunting club. For example, a landowner who wants to produce trophy bucks gets an entirely different set of recommendations from a landowner who merely wants to prevent his land from becoming overpopulated with deer. He gets a different set of recommendations, even though deer densities and habitat conditions on the two tracts of land may be almost identical.

The state's deer management program has been in operation for several years, and it is getting more popular every year. It is getting more popular because it is providing a valuable service to people who are sincerely interested in managing their deer herds to achieve specific objectives. Landowners and hunting clubs who are interested in proper management of their deer herds should consider cooperating with the program. More information on the program

is available from the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining suitable food, cover, and water.

Retaining Habitat

From a practical standpoint, the most that can be done on many Alabama areas is to retain the excellent habitat that is already present--merely retain it in its present condition.

Cover. Retain forest land, especially forest land with an abundance of tender undergrowth within 4.5 feet of the ground.

Food. Retain trees (mostly hardwoods), vines, grasses, legumes, and weeds. On each acre of woodland, retain five or more mast-bearing oaks, preferably with diameters of 16 inches or more. Retain trees on hardwood sites if possible. Retain several different species of oaks from both the white oak and the red oak groups. If one species fails to produce mast, others are likely to succeed.

Creating Habitat

Creating natural foods on forest land. Open up the tree canopy and allow sunshine to hit the forest floor. Any forestry practice, including prescribed burning, which opens up the tree canopy and either creates or maintains desirable undergrowth within 4.5 feet of the ground is satisfactory.

Creating openings on forest land. Create openings by cutting trees from the site and marketing them. Openings should be 1 to 5 acres in size and at least 200 feet wide. They should be well-distributed. One opening for every 25 acres of woodland is usually enough for high deer populations.

Planting food plots. On most areas in Alabama, food plots appear to have little value in increasing carrying capacity for deer. Maybe it is because landowners, as a rule, do not plant enough acreage in food plots. Maybe it is because winter food does not limit deer populations in most areas of Alabama. Frankly, we do not know why. However, in a study in another state, it was found that 4 to 5 percent of a forest land area had to be planted in winter forage crops before carrying capacity for deer could be increased. That is 4 to 5 acres in winter forage for every 100 acres of forest land. As a rule, landowners in Alabama do not plant that many acres in food plots.

Food plots do, however, aid in harvesting deer, especially in areas where still hunting is practiced--where hunters merely take a stand or enter a blind near a food plot and wait for deer to appear. On the other hand, food plots seem to be of little aid in harvesting deer when dogs are used in hunting.

Plant food plots in American jointvetch, barley, clovers (arrowleaf, ball, bur, crimson, subterranean, white), corn, Japanese honeysuckle, oats, rescuegrass, rye, ryegrass, vetch, wheat, or fescue (fungus-free). Several Appendices at the end of this booklet contain

instructions for planting and managing food plots for deer. Plots should be at least one acre in size. Whenever possible, plant on sites that are either level or more nearly level. That reduces the likelihood of soil erosion. When planting oats, select a variety that is winter hardy.

Fescue is not a choice food of deer, but it is a perennial. Therefore, it does not require replanting every year. It should be planted on steep slopes and on other areas where choice foods would likely be overgrazed, thereby allowing serious erosion.

Plots should be well-distributed and located on or near forest land. They should be large enough that deer will not overgraze them. One food plot for every 25 acres usually provides enough supplementary food for deer.

Leaving farm crops unharvested. Leave one acre or more of such crops as corn, grain sorghum, and soybeans. Leave these crops unharvested and located near forest land. One acre or more of such crops for every 25 acres of forest land usually supports high deer populations. Feeding hay or grain during cold weather is not recommended.

Plant outlying fields in winter forage. Plant outlying agricultural fields in the same crops as recommended for food plots. The production of deer food is not the primary reason for such planting, of course, but the fields provide a good bit of deer food without interfering with the normal farming operation.

Water. Construct well-distributed water holes if water is scarce or absent. Deer should have to travel no farther than one-half mile for water.

Maintaining Habitat

Keep free-ranging dogs from the area, especially during spring, summer, and early fall.

Cover. Protect from wildfire and overgrazing by livestock.

Food. Manage forest land in such a way that an uneven-aged stand of many kinds of trees are present, including five or more mast-bearing oaks per acre. An abundance of tender undergrowth over at least half of the forest land is desirable.

Maintain low-growing vegetation in forest land openings by mowing, disking, burning, or by other means.

Protect food plots from heavy grazing by livestock. Mow fescue plots every fall and apply nitrogen fertilizer. Replant food plots as needed.

Carrying Capacity

The number of deer that an area can support is usually determined by the quality and quantity of winter food available within 4.5 feet of the ground. In general, upland areas may support one deer on every 25 acres during winter, the least favorable season. Lowlands may support one on every eight to twelve acres. It appears that these numbers can be supported year after year without damaging deer habitat.

Deer populations should be maintained at densities somewhat below carrying capacity. The best known way of doing that is to have a well-regulated either-sex hunting season. Such a season results in high sustained annual yields of desirable deer for both recreation and food, and it prevents overpopulation. Two Appendices at the end of this booklet contain more information on proper harvesting of deer in Alabama.

More Information

More information is available in The White-Tailed Deer in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

If either the live weight (nothing removed) or the field-dressed weight (body cavity completely empty) of a deer is known, the other can be determined from the above chart.

Find the dressed weight at the bottom of the chart. Then, follow upward to the diagonal line. From the intersection, follow direct line to the scale at left and read live weight. Reverse the procedure to find dressed weight when live weight is known.

WILD DUCKS

Twenty-six species of wild ducks have been observed in Alabama and in coastal waters off the state. Only one of them--the wood duck--breeds in appreciable numbers in Alabama.

All ducks are similar in many ways. They all have webbed feet, more or less wide, flat bills, short legs and tails, and rather long necks. All live in or near water.

Ducks are usually classified into two broad groups according to certain body structures and habits. These broad groups are the dabblers and the divers.

The dabblers are surface-feeding ducks. Frequently, they are called "puddle ducks". They prefer small, shallow, inland lakes, ponds, marshes, and creeks. Dabbling ducks obtain their food by tipping up, rather than by diving. When frightened, they spring directly into flight instead of pattering on the water while getting airborne. The legs of the dabblers are set farther apart than are the legs of other ducks. This enables them to walk fairly well on land.

Their ability to feed on land and in shallow water and to dive fairly well makes dabblers the most versatile feeders of all ducks.

The more common dabbling ducks in Alabama are the mallard, black duck, gadwall, green-winged teal, blue-winged teal, baldpate (American widgeon), pintail, shoveler, and wood duck.

The divers are sometimes called "sea ducks" or "bay ducks". They are ducks of more open bodies of water. Some are common on lakes and rivers of the interior. Diving ducks dive for their food and feed underwater. When taking flight, they patter on the surface until becoming airborne. The divers have larger feet and shorter legs, which are located farther to the rear than are the legs of dabbling ducks. These features make diving ducks awkward on land. As a result, they rarely visit crop fields.

The more common diving ducks in Alabama are the redhead, ring-necked duck, canvasback, greater scaup, lesser scaup, common goldeneye, and bufflehead.

Life Histories

Life histories vary a great deal. They are too varied to list here. Each species has its unique habits and adaptations of nesting sites, migration routes, and local habitat. Each species has traits which overlap those of others, but each species has its particular combination of traits.

Place in Planning

Duck habitat can be retained, created, or maintained on cropland, pasture land, hay land, forest land, or wildlife land. Habitat management may or may not involve a change in land use. In many instances, ducks can provide supplementary income from the lease of hunting rights or the sale of daily permits to hunt.

Habitat Needs

Ducks use nearly every available water habitat from ocean surf to inland pothole; from arctic sea to semi-tropical lagoon. Each species has habitat needs which overlap those of others, but no two species have identical needs. Each species fits into a different ecological niche. All ducks require food, cover, and water.

Food. As a group, the dabblers feed upon a variety of water plants: forest mast such as oaks, ash, and sweetgum; many water and land animals from insects to clams; and the seeds of many farm crops, grasses, and weeds.

Diving ducks feed mainly on aquatic foods, but there is a great diversity among species. For the most part, redheads and canvasbacks eat plants. Scaup eat both plants and animals. Maritime divers feed mostly on animals.

Cover. The quality, quantity, and pattern of vegetative cover needed by ducks varies from season to season and among species of ducks. Except for the wood duck, vegetative cover appears to be of little importance in Alabama. It is of utmost importance on the breeding grounds.

Water. Water determines to a great extent how many ducks hatch, grow, and reproduce. Water is essential for marshes, swamps, and other wetlands. Water influences and maintains the growth of food and cover for ducks.

Water requirements vary from season to season and from species to species of ducks. Water must be of the quality, quantity, and distribution required by the desired species.

Both water management and water requirements are discussed to some extent in the following sections.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining suitable food, cover, and water. In Alabama, the production of food that is suitable from early fall to late winter is especially important. This usually involves either flooding or the manipulation of water levels.

Retaining Habitat

In some instances, it is much easier and less expensive to retain habitat that is already present than to create new habitat. Retain at least one acre of wetlands such as beaver ponds; borrow pits; abandoned gravel, sand, and clay pits; abandoned strip mines; boggy swamps; woody swamps; marshes; coastal flats; and natural ponds.

Creating Habitat

Beaver ponds. Duck habitat can be created in beaver ponds that: (1) Contain at least one acre of shallow water, 2 to 30 inches deep; (2) contain mostly dead trees in the shallow margins; (3) contain little, if any, alder, buttonbush, and emergent water weeds; and(4) contain live streams to ensure water for flooding during early fall.

Break beaver dam at the existing channel in June or July. The break should be in the form of a deep, narrow "V". When the flow of water becomes slow enough that one can work with ease, construct and install a three-log drain. Wood Ducks in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130, contains instructions for building and installing a three-log drain.

Broadcast 20 pounds of Japanese millet seed per acre immediately after draining, while the exposed mud flats are still wet. No ground preparation is necessary. The planting should be at least one acre in size, but five to ten acres or more give better results.

Remove log drain after the seed mature in the fall. In most cases, beavers will plug the hole and the resulting impounded water will flood the millet to proper depths.

Shallow edges of ponds and lakes. The shallow edges of ponds and lakes are excellent places to grow winter food for ducks. Food production in these shallow edges requires the drawdown of water levels and the exposure of at least two acres that are suited to the growth of duck foods. It also requires raising the water level in the fall after the duck food matures.

Lower the water level in the spring or summer, depending on the crops to be grown. On the exposed area, plant or establish at least two acres of corn, browntop millet, barnyard grass, buckwheat, dove proso millet, foxtail millet, grain sorghum (bird resistant varieties are

recommended), smartweed, Japanese millet (on wetter sites), pearl millet, or soybeans. As a rule, ducks prefer grain to soybeans and other legumes.

Corn should be planted in rows. It should be well-fertilized and cultivated. For best results, soybeans should be cultivated, also. The other recommended crops may be broadcast.

Crops should be planted in time for the seed to mature in the fall just before the ducks arrive. Seed that mature too early may be eaten by non-game birds and other animals, or they may deteriorate before ducks arrive. More information on planting agricultural crops for ducks can be found in Farming for Waterfowl, a publication of the U.S. Fish and Wildlife Service, 1875 Century Boulevard, Atlanta, Georgia 30345.

Drawdowns encourage the growth of natural duck foods such as barnyard grass and smartweeds. However, intensively-managed agricultural crops are recommended for producing large quantities of duck food on relatively small areas.

Raise water level in the fall after the seed mature and just before hunting season. Raise water progressively to prevent flooding duck food more than 24 inches. It is usually best to flood in stages of 1 to 2 feet every 4 to 8 weeks. If blackbirds or other animals are seriously competing for the food, it may be best to flood the entire crop at one time. Then, gradually lower the water level during late fall and winter.

Duck fields. If they are to be flooded, duck fields should: (1) Contain at least two acres that are suited to the growth of duck foods; (2) be level or nearly level; (3) have high water-holding capacities; and (4) be located near a dependable water supply, especially during early fall.

Construct dikes as needed. Install a water-control structure that is large enough to prevent flooding for more than two days after heavy summer rains.

Plant at least two acres of the agricultural crops previously recommended in the subsection Shallow edges of ponds and lakes.

Flood in the fall after the seed mature and just before hunting season. Flood to depths of 15 inches or less. Flooding can be done in several ways. Gravity flow is simple and economical. Low-head turbine pumps are practical, also. Rainfall cannot be depended upon for early fall flooding--frequently Octobers and Novembers are too dry.

When located near open water, upland fields that are planted in soybeans, corn, and other crops often attract large numbers of ducks without flooding. Corn is especially attractive and nutritious. It fattens ducks even when exceptionally cold winters exert heavy demands on their energy reserves. Corn is a choice food, especially for mallards, pintails, black ducks, and wood ducks. Mallards are most often associated with corn fields, however.

Ducks prefer corn fields that are clean and open, and which contain an abundance of grain and mostly broken or flattened stalks. (Caution: It is illegal to shoot ducks over corn or any other crop that is deliberately broken down or flattened. This is considered as baiting. At this time, it is legal to shoot over crops that are left standing or are broken down or flattened by normal agricultural planting or harvesting.) Ducks easily find the kernels of corn on the ground between rows. Ducks eat corn even when it is partly frozen to the ground. They often snuffle through light snow to find buried corn. Ducks are surprisingly adept at extracting kernels from ears of standing corn.

In some areas, ducks are reluctant to feed on agricultural crops in upland fields. In such cases, "train" the ducks by leaving small amounts of legal food in choice locations at first. Then, expand the program as they become accustomed to feeding in the fields.

Green tree reservoirs (woodland duck ponds). Green tree reservoirs are areas of bottom land hardwoods (mostly mast-bearing oaks) around which low dikes have been built. The hardwoods are flooded from early fall to late winter. They are not flooded at other times. Acorns fall into the shallow water where they are available to ducks, particularly to puddle ducks.

Green tree reservoirs should: (1) Have a good stand of acorn-bearing oaks, preferably water oak, willow oak, nuttall oak, cherrybark oak, and shumard oak; (2) be level or nearly level so that at least three acres can be impounded at reasonable cost; (3) have soils with high water-holding capacities; and (4) be located near a dependable source of water--either a spring, a permanent stream, an overflowing well, a storage reservoir, or some other source.

Construct dikes as needed. Install a water-control structure that is large enough to pass the normal summer flow through the area. The structure should be large enough that it will drain the area within one week. Permits such as those required under Section 404 of the Clean Water Act will usually be needed to construct a dike. Sites which involve one to ten acres of wetland will require a Pre-Discharge Notification. Sites which involve greater than ten acres of wetland will require a 404 permit. Check with the Corps of Engineers or the Natural Resources Conservation Service prior to any clearing or construction in wetlands.

Open areas in green tree reservoirs may be planted in the same crops as recommended in the subsection entitled Shallow edges of ponds and lakes. Flood from early October to not later than March 1. Such flooding does not kill hardwoods. In fact, it increases the hardwood growth by as much as 10 percent. Flood most of the reservoir to depths of 15 inches or less.

Harvested grain fields or crop residues. Few things are more attractive to puddle ducks, especially to mallards and pintails, than is a harvested grain field. Often, waste grain is available after corn, cowpeas, grain sorghum, millet, soybeans, and other crops are harvested by mechanical means or by livestock. Cattle make corn fields especially attractive to ducks because cows pick up the ears and leave individual kernels for ducks.

These harvested grain fields are good ways of providing winter food for puddle ducks without interfering with the normal farming operation. This is particularly true if fall seeding, plowing, and disking are not done.

Water. To some extent, ducks use nearly all ponds, lakes, reservoirs, and other water areas in Alabama. However, areas with controlled water levels are more easily managed for ducks. Many unwanted plants are eliminated by raising water levels. Desirable plants are encouraged by lowering water levels. Or, as noted earlier, areas can be drained and planted in agricultural crops that produce food for ducks.

Some factors which influence the use of water areas:

1. Geography - There is more use when water areas are located near a concentration of ducks, such as in the Tennessee Valley, Mobile Bay, and in the vicinity of National Wildlife Refuges and state waterfowl management areas.

2. Soils - Nearly all Alabama soils are suited for ducks.

3. Size and depth - Water areas that are ten acres or more in size are preferred. Areas with shallow water, some aquatic vegetation, and deep water are most desired.

4. Location - Areas should be located away from human disturbance. Those isolated from other water areas are least desired.

5. Water characteristics - Usually, stable water levels are least desired. Turbidity, oil, pesticides, and other pollutants discourage ducks.

6. Vegetation in and near the water - Plants that provide duck food are desired. These include sago pondweed, naiad, watershield, widgeongrass (brackish water), and others. Heavy growths of emergent plants such as cattail and other non-food plants around the entire shore reduce its use by ducks.

7. Management - Nest structures (for wood ducks), islands, and artificial loafing areas are attractive to ducks. The Appendix contains instructions for building, erecting, and maintaining nest boxes for wood ducks.

Water areas can be created in many ways. One successful way is to blast potholes, especially in coastal marshes which contain solid stands of black needlerush or other undesirable plants. As previously mentioned, certain activities in wetlands are regulated. Check with the Corps of Engineers and the Natural Resources Conservation Service prior to any work in wet areas.

Maintaining Habitat

Protect from wildfire and grazing by livestock. Avoid unnecessary disturbances. Provide ample protection from the time ducks arrive in early fall until they leave for their breeding grounds. This protection helps to ensure that ducks will return the following fall. Protect trees which contain cavities suitable for wood duck nests.

Avoid contaminants from industrial, agricultural, and domestic sources. These contaminants reduce the production of duck food and frequently reduce cover.

Lower water levels, plant, and flood every year as needed. Remove undesirable brush, logs, stumps, and other debris from areas on which duck habitat is created. Prescribe burn coastal marshes as needed to produce suitable foods and to create favorable feeding conditions. Clean and service nesting boxes for wood ducks at least once a year, preferably in January.

In green tree reservoirs, remove undesirable trees and thin the stand of desirable trees. Allow plenty of space for the crowns of desirable trees. This helps ensure high production of acorns.

Whenever possible, avoid fall plowing of agricultural fields that contain crop residues suitable for duck food.

Harvesting

Excessive shooting causes ducks to abandon an area. If the area is large enough, set aside a part as an inviolate sanctuary. This sanctuary provides protection and helps to ensure that ducks will be present over the portion to be hunted.

As a rule, confine shooting to the early morning. This allows ducks to return and feed undisturbed before nightfall. Ducks may abandon an area if it is hunted more than once a week, especially if the area is small. Migrating ducks may leave areas with even less hunting activity.

Manipulation of standing crops--other than by flooding--is considered as baiting. It is illegal to hunt ducks over crops that have been dragged, mowed, or otherwise deliberately knocked down for the sole purpose of making the food available to ducks.

At this time, it is legal to deliberately flood a mature standing crop or to harvest the crop in the usual agricultural manner, flood the field, and shoot ducks that are attracted to the area.

Federal regulations on managing agricultural crops must be observed where hunting occurs. These regulations are subject to change from year to year. Obtain information on these regulations from the local Alabama Conservation Enforcement Officer or from a U.S. Fish and Wildlife Service Speical Agent.

Carrying Capacity

The number of ducks that migrate into Alabama varies from year to year and from decade to decade, depending largely upon conditions in the breeding grounds. The trend in peak populations is generally downward.

Areas with ideal winter habitat may support relatively few ducks one year and a good many more during other years. It is difficult, therefore, to predict the number of ducks that

will congregate on any Alabama area. Areas with abundant winter food and ample protection are most attractive, however.

More Information

More information on wild ducks is available in Farmer's Bulletin 2218, Wild Ducks on Farmland in the South, U.S. Government Printing Office, Washington, D.C. 20402; and in Wood Ducks in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

WILD TURKEY *(Meleagris gallopavo silvestris)*

The wild turkey is found throughout most of the state. The Alabama Game and Fish Division estimates that the state now has about 500,000 of these magnificent game birds.

Life History

Flocks begin to break up in late winter. At that time the old, mature gobblers set up poorly defined breeding territories. These old toms mate with a number of hens, usually four or five.

Breeding season extends from late winter to about May 15, with a peak in March and April. The average number of eggs per clutch is about ten. The hen incubates the eggs. The incubation period is 28 days. Nests are usually abandoned at the slightest disturbance. If her first nest is destroyed or abandoned, a hen usually does not attempt to re-nest that year.

The hen and her brood remain on the ground at night during the first few weeks. The young gradually become able to fly when they are between 4 and 8 weeks old. The young can fly fairly well at 6 weeks of age.

The young usually remain in a flock with their mother until the following spring. In late summer, a hen and her brood may join other groups; or they may be joined by hens which were unsuccessful in bringing off broods.

After breeding season, the old, mature gobblers may retreat to lives of solitude; or they may join flocks made up entirely of old gobblers. Occasionally these old toms join with hens and their offspring. Younger gobblers frequently live and travel together. Such relationships may exist until flocks break up in late winter for the next breeding season.

The potential life span is 12 to 15 years, but few reach that age. Adults 2.5 years or older make up a small part of the population.

Place in Planning

Suitable habitat can be retained, created, or maintained on cropland, hay land, pasture land, forest land, or wildlife land. Lands that are managed for wild turkeys should be protected from erosion and made to produce high quality food and cover. In many instances, turkeys can provide supplementary income from the lease of hunting rights or the sale of daily hunting permits, especially in parts of southern and western Alabama.

Habitat Needs

Food. Choice foods for late fall, winter, and spring are acorns, beechnuts, chufa, corn, flowering dogwood, berries, wild grapes, pine seed, and agricultural crops that provide green winter forage such as small grains and winter clovers. Two Appendices at the end of this booklet contain information on planting winter forage crops for turkeys. Choice foods for summer and early fall are blackberries, bahiagrass, mulberries, browntop millet, cowpeas, corn, peanuts, grain sorghum, soybeans, wheat, insects, and the seeds of many grasses and weeds.

Young turkeys depend almost entirely on insects and grass seeds for food during their first few months. Insects furnish protein that is needed for rapid growth of the poults.

Cover. Ideal cover is a well-protected area of at least several hundred acres. Ninety percent of the area may be forest land, with a variety of timber types, one-half of which should be mature hardwoods--predominately oaks. The forest understory should be open. At least 10 percent of the area should be in well-distributed grassy openings. As much as 50 percent of the area may be in openings if the openings are not heavily used by people.

Openings provide insects, which are especially important in the diet of young turkeys. Adults use openings for resting and feeding. Frequently, nests are located near openings.

The wild turkey prefers to roost in trees that are 70 feet tall or taller. Pines and magnolia are often used during winter. No preference of tree species is noted during spring or summer. Turkeys frequently roost in trees over water.

Water. Adult wild turkeys require drinking water every day. They should have to travel no farther than one-half mile to get water.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining suitable food, cover, and water.

Retaining Habitat

In many instances, it is much easier and more economical to retain habitat that is already present than to develop new habitat. Retain one acre or more of forest land with a variety of timber types, one-half of which should be mature hardwoods--predominantly oaks. Retain several different species of oaks and pines. Oaks should be from both the red oak and the white oak groups. If one species fails to produce mast, others are likely to succeed.

Creating Habitat

Planting food plots. Plant one acre or more in barley, bahiagrass, browntop millet, chufa, clovers (arrowleaf, ball, bur, crimson, white), corn, dove proso millet, fescue (fungus-free), oats, rescuegrass, rye, ryegrass, soybeans, vetch, or wheat. Larger plantings (two acres or more) are recommended for chufa and for planting on areas with dense deer populations (one or more per twelve acres). Bahiagrass produces seed which turkeys eat during summer and early fall, and insects are abundant in bahiagrass throughout the warm season. However, bahiagrass is not recommended as a food during winter and early spring. Fescue is not a choice turkey food. It should be planted on steep slopes where choice turkey foods would likely be overgrazed by deer and other animals, thereby allowing serious erosion. When planting oats, select a variety that is winter hardy. Several Appendices at the end of this booklet contain seeding rates, planting dates, and other information on these and other crops.

Plots should be well-distributed and located near suitable turkey cover. One plot (one acre or more) for every 25 acres of forest land is usually enough for high turkey populations. Several Appendices at the end of this booklet contain more information on planting and managing food plots for turkey.

Feeding of grain during cold weather is not recommended. Artificial feeders appear to be of little real value.

Planting outlying fields in turkey foods. Plant outlying agricultural fields in the same crops as recommended for food plots. This is a good way of providing turkey food as part of the normal farming operation.

Creating openings in forest land. Create openings by cutting trees from the proposed site and marketing them. Openings should be one acre or more in size and at least 200 feet wide. Wide openings allow maximum sunshine to reach the ground, thereby ensuring high production of low-growing vegetation and insects.

Openings should be well-distributed. One opening (one acre or more) for every 25 acres of forest land is usually sufficient for high turkey populations.

Creating water holes. Construct water holes if drinking water is scarce or absent. Locate water holes about one-half mile from creeks, ponds, or other dependable year-round water supplies.

Maintaining Habitat

Cover. Protect from wildfire and free-ranging poultry and livestock, especially hogs. Such livestock may compete with turkeys for food. Keep disturbances to a minimum, especially from March through June. Some things that will reduce disturbances are:

1. Restrict timber cutting to small areas. Extensive cutting causes turkeys to change their range.

2. Restrict human activity, especially from March through June.

3. Keep livestock and stray dogs from the area.

4. Prevent wildfires.

5. Prevent all fires during nesting season.

Maintain an open understory in forest land. Prescribed burning provides open understories which enable the best use of the wild turkey's keen eyesight and his running and flying abilities. Prescribed burning increases the stands of annual grasses, wild legumes, and other desirable foods of the wild turkey, especially in pine forest land. January and February are the best months to burn.

Food

Maintaining turkey foods in forest land. Manage forest land in such a way that up to 90 percent of the area is covered by trees, one-half of which should be hardwoods, predominantly mast-bearing oaks. Other plants to favor are beech, blackgum, flowering dogwood, mulberry, pines, blackberry, wild grapes, and numerous grasses and weeds. Prescribed burning, brush control, release cutting, thinning, and other practices may be used in maintaining turkey foods in forest land.

Maintaining food plots. Protect from grazing by livestock. Clip fescue in early fall and apply nitrogen fertilizer. Replant food plots as needed.

Maintaining openings in forest land. Maintain in early stages of succession by periodic mowing, disking, prescribed burning, or by other means. Vegetation in openings should be no higher than 1 foot, especially during most of the growing season.

Carrying Capacity

Populations vary a good bit from year to year, depending primarily on reproductive success. Areas with ideal habitat may support one wild turkey on each 25 acres during winter, the least favorable season.

Harvesting

There is both a fall and a spring hunting season on gobblers in many parts of Alabama where populations are dense enough to warrant such hunting. In other parts of the state, there is only a spring season. The population is so low in some places that no hunting is permitted.

If legal methods are used, it is difficult, if not impossible, to shoot enough wild turkeys during Alabama's legal hunting season to affect the next year's population. The Appendix contains more information on harvesting turkey and other wildlife.

More Information

More information is available in Management for Alabama Wild Turkeys, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

WOOD DUCK *(Aix sponsa)*

Twenty-six species of wild ducks are found in the coastal and inland waters of Alabama, but only one of them--the wood duck--breeds in appreciable numbers in the state.

The wood duck is fairly common the year round in most of the state. Based on the number harvested each year by Alabama hunters, the wood duck is the state's number two duck--the mallard is number one. Sometimes the wood duck is called woodie, summer duck, squealer, swamp duck, or acorn duck.

Wood duck is a fitting name for the species because it is indeed a duck of forest land, especially of bottom land hardwoods. It obtains a great deal of its food by foraging on the ground in woody swamps. During breeding season, it spends a good bit of time perched in trees. For the most part, it nests in hollow trees--a trait not typical of most ducks. In short, the wood duck is more dependent on forest land than is any other waterfowl in America.

Life History

The wood duck, like nearly all other wild ducks, is migratory. Every fall, large numbers fly into Alabama to spend part of the winter. They come in from many states, particularly those north of Alabama and east of the Mississippi River. In the fall, a few woodies fly out of Alabama to spend the winter in other states--states in all directions from Alabama.

Therefore, during late fall and most of the winter, a swamp in Alabama usually contains woodies that were hatched and raised in the state as well as some that have flown into Alabama, mostly from states to the north.

Life History

Courtship and pairing off take place during late fall and winter. After pairing off, the female leads the way and the male follows as the pair travels from place to place. When they leave the wintering grounds, usually in February, to seek a nest site, the female returns to her previous nest site or to the general area of where she was hatched, and the male follows her. Thus, a male hatched in another state and paired with a female from Alabama follows her to a nest site in Alabama. On the other hand, a drake hatched in Alabama follows his mate to her previous nest site or to the general area of where she was hatched--either in the state or out. The female's tendency to return to her former nest site or to the general area of where she was hatched makes it easier to increase the breeding population in an area, especially if suitable nest boxes are erected and maintained.

The wood duck usually nests in tree cavities or in man-made nest boxes. It prefers tree cavities near water. Occasionally, it nests in barns and other little-used buildings, under overhanging stream banks, in rocky cliffs, in chimneys, and in other unusual places.

The male accompanies the female as the pair searches for a nest site. However, the hen selects the site while the drake waits nearby, frequently perched in a tree. The female forms a shallow depression in the litter on the bottom of the selected tree cavity or nest box. Actually, she may make depressions in several before deciding which to use. Neither of the pair brings leaves or other nest material to the site.

In Alabama, egg-laying may start in mid-January, but it usually starts about the first of February. The eggs resemble those of a domestic chicken, but they are smaller and darker. Two or more hens may lay in the same nest. Such nests may contain up to 40 or more eggs, but they are often deserted by the females. In nests where eggs are laid by only one hen, the average is about 10 to 12 eggs per nest.

As a rule, one egg is laid every day, usually early in the morning. If the hen is not frightened, she covers the eggs with decaying wood, leaves, or other loose material before leaving the nest. After laying the first few eggs, the hen starts collecting down from her breast by preening. She uses the down to cover the eggs. No longer does she bury them in litter. She continues adding down as the rest of the eggs are laid.

Nesting season in Alabama is usually from mid-February to May, sometimes as late as July. The peak is in March and April. The hen incubates the eggs, usually starting the day after the last one is laid. Incubation takes about thirty days, which is longer than for most ducks. (The mallard, for example, has a normal incubation period of 22 to 24 days.) During incubation, the hen usually leaves the nest twice a day--early in the morning and late in the afternoon--to feed and rest with her mate.

The wood duck nests again and again until it is successful or until the end of the nesting season. If her nest is destroyed, the hen usually moves to a different location before starting another nest. She may have two successful nests during one season.

Ducklings usually leave the nest during early morning of the day after they are hatched. Their down is dry and they can swim at that time. When it appears that the brood can safely leave the nest, the hen calls from the ground, water, or a nearby limb. As she calls, the ducklings jump toward the entrance; and their sharp claws catch on the side of the tree cavity or nest box. They rest a moment, then jump upward to gain another hold. Three or more successful jumps may be required before they reach the entrance. They pause a moment at the

entrance before jumping with feet outstretched and wings beating--apparently unafraid of the fall. Sometimes they jump from as high as 70 feet. Occasionally, some of the weaker ducklings are unable to reach the entrance and die of exhaustion in the nest.

If the nest is over land, the hen leads the brood to the nearest suitable body of water. If the nest is over water, the hen and her brood swim to the nearest suitable brood habitat. The hen usually remains with her brood until the young are able to fly or about 8 to 10 weeks.

The drake, having left his mate at hatching time or just before, joins other males on secluded woodland ponds or in dense swamps. Here the males lose their flight feathers and are unable to fly for a short time. The drake is free of family ties until he again takes a mate during the following winter.

Maximum life span of the wood duck is about 15 years, but few live to be more than 3 or 4 years old. About 70 percent of a fall population are usually young that were hatched earlier in the same calendar year.

Place in Planning

Suitable habitat can be retained, created, or maintained in cropland, pasture land, forest land, and wildlife land. Lands that are managed for wood ducks should be protected from erosion and made to produce high-quality food and cover, especially winter food. In some instances, wood ducks can provide supplementary income from the lease of hunting rights or the sale of daily hunting permits.

Habitat Needs

As stated earlier, the wood duck is more dependent on forest land than is any other American waterfowl. Hardwood forests, especially bottom land hardwoods that contain permanent freshwater ponds with at least some brushy borders and swampy areas, usually provide suitable food, cover, and water. In Alabama, beaver ponds probably come closest to meeting all the habitat needs of the woodie, not only during breeding and rearing seasons but also during fall and early winter.

Food. The wood duck is a dabbler, and like other dabbling ducks it obtains most of its food by tipping up and by dabbling in shallow water. It also obtains a good bit of its food by foraging on the ground in woody swamps. As a rule, adults eat acorns and other plant foods; the young eat insects and other small animals.

Preferred plant foods are duck weeds, cone scales, and gall from cypress, tubers of many kinds, and the seeds of sedges, rushes, and grasses. Seeds of wild rice, smartweeds, pondweeds, and water lillies are especially preferred. Other preferred plant foods are the fruits of many trees, shrubs, and vines. These include water elm, wild grape, swamp privet, buttonbush, oaks, beech, tupelo gum, and hickories.

The wood duck is especially fond of small acorns, particularly those of water oak, willow oak, nuttall oak, cherrybark oak, and shumard oak. In years of high production, these small acorns are the wood duck's most important winter food in Alabama. Woodies search for small acorns on the forest floor and even in trees before acorns drop, but they prefer acorns that fall into shallow water--15 inches and less.

Preferred agricultural crops are browntop millet, buckwheat, corn, dove proso, foxtail millet, grain sorghum, Japanese millet, pearl millet, and soybeans. Preferred animal foods are spiders, large insects, and crustaceans. The wood duck is especially fond of spiders--sometimes spiders make up to 80 percent of the woodie's stomach content.

Cover. Ideal year-round cover is bottom land hardwoods that border streams, especially hardwoods that contain permanent freshwater ponds or lakes. The hardwoods should contain suitable nest cavities, and the ponds or lakes should contain brushy borders for rearing the young and swampy areas for roosting. Most beaver ponds provide excellent brood habitat, especially those with good stands of buttonbush and other plants under which the ducklings can hide.

The wood duck nests in cavities of many sizes and shapes. Usually, a cavity is suitable for a nest if: (1) The hen can enter; (2) its base will hold a clutch of eggs; (3) it is free of water; and (4) it contains enough leaves, decaying wood, or other loose material to form a base for the nest and to cover the first few eggs.

The entrance to cavities should be at least 3 x 4 inches. Interior size should be at least 5 x 5 inches. Cavities should be no deeper than 50 inches--about 24 inches is ideal. Generally, the higher the cavity, the greater its use; but the woodie will use cavities as low as six feet. The closer the cavity is to a body of water, the better because the hen and her brood have fewer hazards to face on their journey to water. Cavities within one-half mile of isolated woodland ponds, lakes, and streams are preferred.

Water. The wood duck spends most of its time on or near water. It prefers either still or slow-moving water and water that is protected from wind. It feeds to some extent on dry land, but it prefers to feed in shallow water--15 inches and less.

Habitat Management

There is great potential in Alabama for increasing the number of wood ducks by habitat management. With increased numbers, the woodie can provide hunting where other ducks are either scarce or absent. Habitat management consists mostly of retaining, creating, and maintaining suitable food, cover, and water.

Retaining Habitat

It is much easier and less expensive to retain suitable habitat that is already present than to create new habitat. Retain wetlands and bottom land hardwoods near wetlands. Streams, natural ponds, oxbow lakes, wooded sloughs, wooded islands, beaver ponds, seasonally flooded hardwoods that contain suitable nest cavities, and oaks that overhang shallow water are especially recommended. Retain at least one suitable nest cavity in each five acres of forest land, especially in hardwoods within one-half mile of water.

Creating Habitat

The production of high-quality winter food and the erection and maintenance of suitable nest boxes are especially recommended. Trees and other woody plants are essential,

of course, but they should be retained, not planted. When planted, it takes too long for them to become effective.

Food. The production of winter food often involves flooding of either bottom land hardwoods or agricultural crops, or both. Occasionally, wood ducks feed in dry upland fields, especially in corn and soybean fields, almost as freely as do mallards. However, wood ducks are rarely found far from water and woodland cover. Beaver ponds, green tree reservoirs, and the shallow edges of ponds and lakes are recommended for producing winter food.

Beaver ponds. Winter food can be produced in beaver ponds that contain: (1) At least one acre of water 2 to 30 inches deep; (2) mostly dead trees in the shallow margins; (3) little, if any, buttonbush, alder, or emergent water weeds; and (4) live streams to ensure water for flooding.

Break the beaver dam at the existing stream channel in June or July. Late July is recommended where dense stands of sesbania volunteer on the exposed area. Such stands reduce the production of duck food. The break should be in the form of a deep, narrow "V". When water flow becomes slow enough that one can work with ease, install a three-log drain. Instructions for building and installing a three-log drain are contained in Wood Ducks in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

Broadcast 20 pounds of Japanese millet seed per acre immediately after draining, while the exposed mud flats are still wet. Ground preparation is not necessary. The planting should be at least one acre in size, but five to ten acres or more give better results.

Remove the log drain in the fall after the millet seed mature. In most cases, beavers will plug the hole and the resulting impounded water will flood the millet to proper depths.

Green tree reservoirs (woodland ponds). Green tree reservoirs are areas of bottom land hardwoods (mostly mast-bearing oaks) around which low dikes have been built. The hardwoods are flooded from early fall to late winter; they are not flooded during growing season. Acorns fall into the shallow water where they are available to woodies and other ducks, particularly to mallards and black ducks.

Green tree reservoirs should: (1) Have a good stand of acorn-bearing oaks, preferably water oak, willow oak, nuttall oak, cherrybark oak, and shumard oak; (2) be level or nearly level so that at least three acres can be impounded at reasonable cost; (3) have soils with high water-holding capacities; and (4) be located near a dependable source of water--either a spring, a permanent stream, an overflowing well, a storage reservoir, or some other source.

Build dikes as needed. Install a water-control structure that is large enough to pass the normal summer flow through the area. It should permit draining the area within one week. Permits such as those required under Section 404 of the Clean Water Act will usually be needed to construct a dike. Sites which involve one to ten acres of wetland will require a Pre-Discharge Notification. Sites which involve greater than ten acres of wetland will require a 404 permit. Check with the Corps of Engineers and the Natural Resources Conservation Service prior to any clearing or construction in wetlands.

Open areas in green tree reservoirs should be planted in crops that produce winter food, especially if the openings are one acre or more in size. Actually, understory species and trees that do not produce duck food should be removed in order to create openings.

The benefits from creating openings in green tree reservoirs and planting them in crops that produce duck food are two-fold: (1) Loss of a mast crop, particularly in oaks, does not

eliminate all winter food from the green tree reservoir; and (2) trees that are left, especially on the edges of openings, have more crown space; therefore, they are more likely to produce an abundance of mast.

Crops recommended for planting in the openings are browntop millet, buckwheat, corn, dove proso, foxtail millet, grain sorghum (bird resistant varieties), Japanese millet (on wetter sites), pearl millet, and soybeans.

As a rule, the woodie and other ducks prefer grain to soybeans and other legumes. Corn and soybeans should be planted in rows and cultivated. Other recommended crops may be broadcast. All plantings should be fertilized. Crops should be planted in time for the seed to mature by September 20 or shortly thereafter.

Remove undesirable trees from green tree reservoirs and thin slow-growing stands of desirable trees, especially oaks. Trees to favor are cherrybark oak, water oak, willow oak, nuttall oak, shumard oak, southern red oak, and laurel oak. Allow plenty of space for the crowns of desirable trees. This helps ensure high production of acorns.

Actually, the objectives in improving stands of desirable trees for wood ducks and for timber production are about the same. The objectives are vigorous, large-crowned, mast-producing trees that are free of defects.

Flood from early October to March 1. Such flooding does not kill hardwoods. On the contrary, it increases their growth by as much as 10 percent. However, prolonged flooding after March 1 may either kill or weaken hardwoods.

Flooding can be done in several ways. Gravity flow is simple and economical. Low-head turbine pumps are practical also. Rainfall cannot be depended upon--Octobers and Novembers are too dry. Flood most of the reservoir to depths of 15 inches or less.

Beaver ponds that contain good stands of acorn-bearing oaks can be managed as green tree reservoirs. For the most part, these ponds will be less than two years old. Merely install a three-log drain every year. Instructions for building and installing a three-log drain are contained in Wood Ducks of Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130. Remove the drain in late September and allow beavers to rebuild the dam.

Shallow edges of ponds and lakes. The shallow edges of ponds and lakes are excellent places to produce winter food for the woodie and other dabbling ducks. Food production in these shallow edges requires the drawdown of water levels and the exposure of at least two acres that are suited to the growth of duck foods. It also requires raising the water level in the fall after the duck food matures.

Lower the water level in the spring or summer, depending on the crops to be grown. On the exposed area, plant the same crops as recommended earlier for openings in green tree reservoirs. Make plantings immediately after the exposed area dries enough for land preparation. If not planted immediately, troublesome weeds may become established. Crops should be planted in time for the seed to mature by September 20 or shortly thereafter.

Drawdowns encourage the growth of wild foods such as barnyard grass and smartweeds. However, intensively-managed agricultural crops are recommended for producing large quantities of high-quality winter food in small areas.

Raise the water level about November 1. Pumping may be necessary, but gravity flow is more economical whenever the area can be flooded that way. Raise water level progressively to prevent flooding duck food more than 24 inches. It is usually best to flood in

stages of 1 or 2 feet every four to eight weeks. If blackbirds and other animals are competing for the food, it may be best to flood the entire crop at one time. Then, gradually lower the water level during late fall and winter.

Nest boxes. Nest sites are only one of the wood duck's requirements, but tree cavities suitable for nests are so scarce in Alabama--and they are getting more scarce every day--that nest boxes are usually recommended, especially in areas with suitable brood habitat. Nest boxes that are properly built, erected, and maintained are effective--they increase the number of wood ducks. However, if nest boxes are not properly built, erected, and maintained, they do more harm than good--they are nothing more than death traps for the hen and sometimes for her brood.

Nest boxes provide safer nests than do tree cavities because they: (1) Are more likely to be weatherproof; (2) can be more favorably located; and (3) can be made proof against most predators. Nest boxes can be made of wood, metal, composition paper, and other materials. Those made of wood and metal are most popular. However, boxes made of other materials, especially composition paper, have desirable characteristics. Also, they give excellent results when properly built, erected, and maintained. The Appendix contains instructions for building, erecting, and maintaining nest boxes.

Maintaining Habitat

Protect habitat from fire and harmful grazing by livestock. Avoid unnecessary disturbances. Protect trees that contain cavities suitable for nests.

Selectively thin bottom land hardwoods, especially oaks, so that each tree becomes either dominant or co-dominant. Remove trees that have poor form, poor growth characteristics, and a history of low mast production. The result of selective thinning should be an uneven-aged stand of fast-growing, large-crowned, short-boled trees that are ideally suited for mast production.

Avoid pollution from industrial, agricultural, domestic, and other sources. Pollutants may reduce the production of food and cover, and they may be harmful on contact to wood ducks and other wildlife.

Draw water levels down, plant duck foods, and flood every year as needed. Remove undesirable brush, logs, stumps, and other debris from areas on which habitat is created. Clean and service nesting boxes at least once a year, preferably in late December or early January.

Carrying Capacity

The number of wood ducks that migrate into Alabama and the number raised in the state varies from year to year. Areas with ideal habitat may have a few one year and a good many during other years. It is difficult, therefore, to predict the number that will be present. The most attractive areas, however, are those with an abundance of high quality winter food, suitable roosting places, and nest boxes that are properly built, erected, and maintained.

Harvesting

Excessive shooting causes ducks to leave an area. If the area is large enough, set aside a portion as an inviolate sanctuary. This sanctuary provides protection and helps ensure that woodies and other ducks will be present on at least part of the area.

As a rule, confine shooting to the early morning. This allows ducks to return and feed undisturbed before nightfall. Woodies and other ducks may leave small areas that are hunted more than once a week.

Federal regulations on duck hunting must be observed. These regulations, especially on shooting over planted crops, are subject to change--and frequently do change--from year to year. Current information on hunting regulations can be obtained from the local Alabama Conservation Enforcement Officer or from a Federal Game Management Agent.

More Information

More information on the wood duck is contained in Wood Ducks in Alabama, a publication of the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130.

NUISANCE WILDLIFE

A few species and groups of wildlife have become nuisances in the state. Among them are alligators, armadillos, beavers, blackbirds, blue jays, cattle egrets, coyotes, crows, gopher tortoises, gray squirrels, pocket gophers, pigeons, sparrows, starlings, and woodpeckers.

Nearly everywhere in the state, deer are becoming more of a nuisance every year, particularly in crop fields. During the past 35 to 40 years, the armadillo has spread from the Gulf Coast upward to at least the central part of the state. The coyote was either introduced into the state several decades ago or its range has naturally expanded into the state. It has become a nuisance in many places, and is becoming more so every day.

Except for the beaver and white-tailed deer, this booklet contains no instructions for controlling nuisance wildlife. Actually, it is against state and federal regulations to take, capture, or kill some of the species considered to be nuisances in Alabama. For that reason, you should obtain instructions for controlling nuisance wildlife from the Alabama Game and Fish Division, 64 North Union Street, Montgomery, Alabama 36130; or USDA-APHIS, Animal Damage Control Office, Room 118 Extension Hall, Auburn University, Alabama 36849; or the local office of the Cooperative Extension Service.

IMPORTANT WILDLIFE NEEDS IN ALABAMA

By far, the most important wildlife need in Alabama is to help landowners and others, including some resource managers, realize that wildlife is indeed a valuable resource. Other wildlife needs in the state are secondary. Actually, other recognizable needs are symptoms of the need to realize that wildlife is truly a valuable resource.

The secondary needs are numerous. Some of the more important are listed here. Except for the first, the needs are listed in no particular order--surely not in order of importance.

A well-directed educational effort is needed. Such effort should be directed toward: (1) Helping landowners and others realize that wildlife is truly a valuable resource; (2) informing landowners and others of economical, effective techniques of retaining, developing, and maintaining suitable wildlife habitat in areas managed primarily for either wood products, row crops, or cattle; (3) informing landowners and others of the need to liberalize laws and regulations pertaining to harvesting of deer, especially of does; (4) informing hunters of the nuisance that dogs can create when allowed to trespass on another's property; and (5) convincing hunters that landowners cannot afford to dedicate their time, land, labor, money, and equipment to production of wildlife unless it is profitable to do so. Hunters must realize that landowners are under no obligation whatsoever to produce free crops of wildlife for the hunter's enjoyment. Other secondary needs include:

- To help more landowners find an effective incentive for producing wildlife, especially on privately-owned lands in the state. Every year, monetary return is

becoming an incentive for more and more landowners, and it is expected to become an incentive for even more in the future.

- To inform landowners, hunters, resource managers, and others that wildlife is an annual crop of the land, a crop whose production can be increased by making food, cover, and water more favorable for wildlife production. That, of course, includes improving the quality, quantity, and pattern or distribution of food, cover, and water or the three essential components of wildlife habitat. You may know that food, cover, and water determine carrying capacity and that carrying capacity usually determines the wildlife population on lands in Alabama.

- To further liberalize the regulations pertaining to harvest of deer, especially of does. Much of the state is already overpopulated with deer. That is why more liberal regulations are needed. The undesirable characteristics of an area overpopulated with deer are listed under Herd Management in the preceding section on deer.

  The best known way of correcting an overpopulation of deer is to harvest about one-third of the herd every year, preferably by sport hunting. This one-third should contain about equal numbers of both sexes. That is the best way of preventing an overpopulation, also. Such harvesting should start several years before overpopulation occurs.

  The reason deer have become overpopulated in much of the state is that the mountain lion and other large natural enemies of deer have been eliminated. Consequently, there is no large, effective predator to help keep deer densities in balance with the land's ability to support them; and hunters have not taken enough by sport hunting to control the herds. As a result, there is an overpopulation in much of the state. It is that simple.

  The landowner's role in preventing and correcting an overpopulation is important. Why? Because he ultimately decides how many deer are harvested on his land and whether or not both sexes are harvested in about equal numbers.

- To find effective ways of economically controlling nuisance wildlife, thereby preventing crop depredation and reducing other losses. This is especially true of deer in many parts of Alabama, and of beaver on small streams in flat forest land.

- To produce an adequate supply of seed and seedlings for planting food plots and making them available to landowners at reasonable prices.

- To develop among hunters an improved attitude and respect for landowners, law enforcement officers, and game laws.

- To develop an appreciation of non-game wildlife, especially of birds, by more residents of the state.

- To find ways of preventing competition for food between non-game wildlife and game species. For example, how to prevent blackbirds and starlings from competing with doves for food in a dove field.

- To determine specifically what effect, if any, pesticides are having on desired wildlife.

- To continuously seek better ways of cooperating with individuals, groups, and both state and federal agencies in meeting mutual wildlife objectives. Another example is the unique TREASURE Forest Program of the Alabama Forestry Planning Committee. That program is one of the very best, period; it should be wholeheartedly supported by all resource managers and landowners.

If an effective, satisfactory job can be done for $5.00, we are doing the landowner a disservice if we recommend something that costs him $100.00 to do a job that is no more effective. For example, if Kobe lespedeza will do an effective job for quail on a particular site, why recommend the planting of thunberg lespedeza seedlings on the site? You may know that enough Kobe lespedeza seed to plant a plot for quail costs about $5.00, and that enough thunberg lespedeza seedlings to plant the same plot cost about $60.00 plus shipping. See what I mean? The landowner is depending on you and me to help manage his resources and at least some of his money. Let's not forget that.

MORE INFORMATION ON WILDLIFE

You may need more information on wildlife than is contained in this booklet and its appendices. For that reason, we are listing several sources of additional information. We are listing them according to the likelihood of their having the information you need.

Alabama Department of Conservation
and Natural Resources
Game and Fish Division
64 North Union Street
Montgomery, AL 36130

Alabama Forestry Commission
513 Madison Avenue
Montgomery, AL 36130

Department of Zoology and
Wildlife Science
331 Funchess Hall
Auburn University, AL 36849

Alabama Cooperative Extension System
111 Duncan Hall
Auburn University, AL 36849

U.S. Fish and Wildlife Service
P.O. Drawer 1190
Daphne, AL 36526

U.S. Forest Service
2946 Chestnut Street
Montgomery, AL 36107-3010

Natural Resources Conservation Service
P.O. Box 311
Auburn, AL 36830

USDA Animal and Plant
Health Inspection Service
Animal Damage Control
Room 118 Extension Hall
Auburn University, AL 36849

WOOD DUCK NEST BOXES
(NRCS Guide Sheet on Wood Duck Nesting Boxes)

by Robert Waters
Biologist, USDA Soil Conservation Service

Twenty-six species of wild ducks have been reported in Alabama and in coastal waters of the state, but only one of them--the wood duck--breeds in appreciable numbers. The wood duck is fairly common year-round in most of Alabama. Sometimes it is called "woodie," "summer duck," or "native duck." Wood duck is a fitting name for the species because it is more dependent on woodland, especially bottomland hardwoods, than any other waterfowl in the country. It obtains a good bit of food by foraging on the ground in woody swamps. During breeding season, it spends a good bit of time perched in trees. For the most part, it nests in hollow trees--a trait not typical of most ducks.

This article contains instructions for building, erecting, and maintaining a certain kind of wooden nest box for wood ducks. The box discussed here is inexpensive and fairly easy to build. All that is needed are a few easy-to-obtain building materials, common tools used by most carpenters, a little spare time, and a sincere desire to be of real help to the wood duck. This article also contains information on the wood duck's nesting habits in Alabama to help you understand why certain recommendations are made regarding nest boxes.

If nest boxes are properly built, erected, and maintained, they increase the number of wood ducks on an area. With increased numbers, the wood duck can provide hunting where other ducks are either scarce or absent. Often, these increased numbers can provide income from the lease of hunting rights or the sale of hunting permits.

NESTING HABITS

The wood duck, like nearly all other wild ducks, is migratory. Every fall, large numbers fly into Alabama to spend part of the winter. They come in from many states, particularly those north of Alabama and east of the Mississippi River. In the fall, a few wood ducks fly out of Alabama to spend the winter in other states--states in all directions from Alabama. Therefore, in late fall and most of winter, swamps in Alabama usually contain "woodies" that were hatched and raised in the state, as well as those that have flown in from states mostly to the north.

Courtship and pairing off take place in late fall and in winter. After pairing off, the female leads the way and the male follows as the pair travels from place to place. When they leave the wintering ground to seek a nest site, usually in February, the female returns to her previous nest site or to the general area where she was hatched. The male follows her. Thus, a male hatched in another state and paired with a female from Alabama follows his mate to her previous nest site whether in-state or out-of-state. The female's tendency to return to her former nest site or to the general area where she was hatched makes it easier to increase the breeding population on beaver ponds, oxbow lakes, natural ponds, and other such places, especially if suitable nest boxes are erected and maintained.

In Alabama, egg-laying may start in mid-January, but it usually starts about the first of February. The eggs resemble those of a domestic chicken, but are smaller and darker. Two or more hens may lay in the same nest. Such nests may contain up to 40 or more eggs, but they are often deserted by the females. In nests where eggs are laid by only one hen, the average is about ten to twelve eggs per nest.

As a rule, one egg is laid every day, usually early in the morning. If the hen is not frightened, she covers the egg with decaying wood or other loose material such as leaves. These loose materials must be available within the tree cavity or nest box because neither the male nor the female brings nest material to the site. After laying the first few eggs, the hen starts collecting down from her breast by preening. She uses the down to cover the eggs. No longer does she bury them in litter. She continues adding down as the rest of the eggs are laid.

Nesting season in Alabama is usually from mid-February to May, sometimes as late as July. The peak is in March and April. The hen incubates the eggs, usually starting the day after the last one is laid. Incubation takes about thirty days, which is longer than for most ducks. (The mallard, for example, has a normal incubation period of 22 to 24 days.) During incubation, the hen usually leaves the nest twice a day--early in the morning and late in the afternoon--to feed and rest with her mate.

The wood duck nests again and again until it is successful or until the end of nesting season. If her nest is destroyed, the hen usually moves to a different location before starting another nest. She may have two successful nests during one season.

RAISING THE FAMILY

Ducklings usually leave the nest during early morning of the day after they are hatched. Their down is dry and they can swim at that time. When it appears that the brood can safely leave the nest, the hen calls from the ground, the water, or a nearby limb. As she calls, the ducklings jump toward the entrance, and their sharp claws catch on the side of the tree cavity or nest box. They rest a moment, then jump upward to gain another hold. Three or more successful jumps may be required before they reach the entrance. They pause a moment at the entrance before jumping with feet outstretched and wings beating, apparently unafraid of the fall. Sometimes they jump from as high as 70 feet. Occasionally, some of the weaker ducklings are unable to reach the entrance and die of exhaustion in the nest.

If the nest is over land, the hen leads the brood to the nearest suitable body of water. If the nest is over water, the hen and brood swim to the nearest suitable brood habitat. The hen usually remains with her brood until the young are able to fly, or about eight to ten weeks.

The drake, having left his mate at hatching time or just before, joins other males on secluded woodland ponds or in dense swamps. Here the males lose their flight feathers and are unable to fly for a short time. The drake is free of family ties until he again takes a mate during the following winter.

BUILDING THE NEST

As stated earlier, the wood duck prefers to nest in tree cavities near water, but such cavities suitable for nests are so scarce in Alabama that nest boxes are usually recommended. Properly constructed and maintained nest boxes are effective and increase the number of wood ducks, but if improperly built, erected, and maintained, they may do more harm than good. They may be little more than death traps for the hen and sometimes for her brood. Therefore, when building and erecting nest boxes, closely follow the instructions in this article or obtain instructions from some other reliable source.

Nest boxes can be made of many materials. Those made of wood and metal are the most popular; however, boxes made of other materials are being used a good bit in some places. Here are instructions for building and erecting one of the common wooden nest boxes.

Use well-seasoned 1 x 12 inch boards. Ten linear feet is enough for one box **(Figure 1).** Boards may be either rough sawed or dressed. Rough-sawed cypress boards are recommended, but pine and other less durable boards may be used if they are treated with a relatively clear preservative such as one containing pentachlorophenol. Creosote and other dark preservatives are not suited.

The back of the box should be 24 inches high; the front should be 23 inches. Other outside measurements should conform to the following specifications: width of front and back = 12 inches; width of sides = 14 inches; roof = 12 x 16 inches; bottom = 12 x 14 inches; and the door = 6 x 12 inches. The roof should overhang the front about 2 inches. It should be flush with the rest of the box **(Figure 2).**

Cut an oval entrance hole in the front. It should be four inches wide and three inches high. The top of the hole should be about three inches below the roof.

Tack a four-inch strip of hardware cloth on the inside of the front, from the bottom to the entrance **(Figure 3).** The hardware cloth makes it easier for ducklings to get from the nest to the entrance, especially in boxes made of dressed boards.

The mesh of the hardware cloth should be one-fourth of an inch. Sharp ends should be bent under.

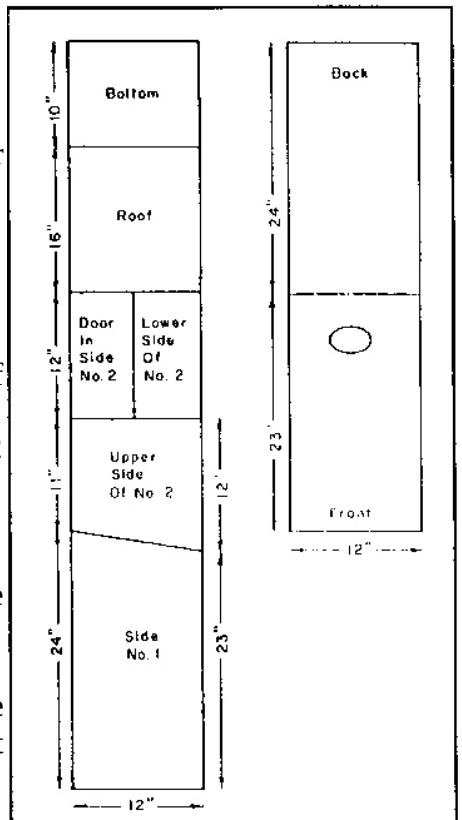


FIGURE 1 - 10 Linear feet of 1"x12" board is enough for one nest box.

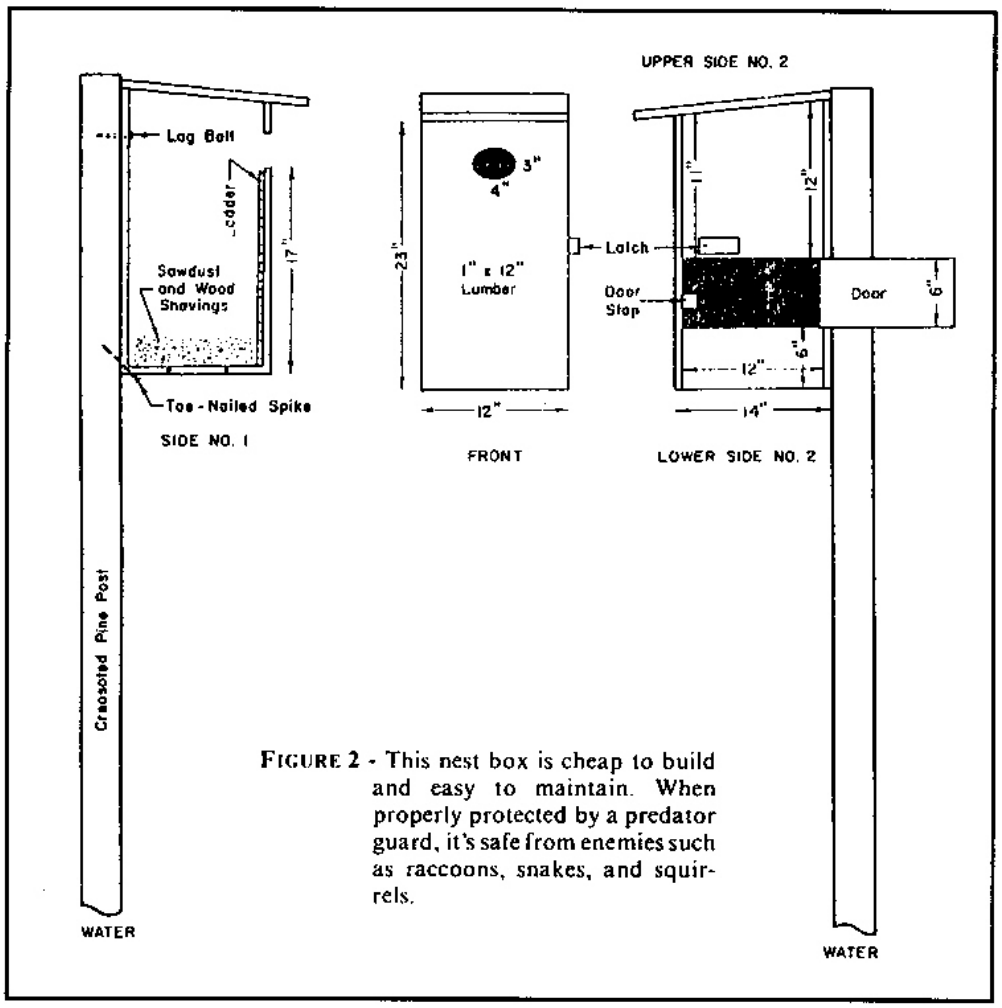


FIGURE 2 - This nest box is cheap to build and easy to maintain. When properly protected by a predator guard, it's safe from enemies such as raccoons, snakes, and squirrels.

Drill a small hole in the back and opposite the entrance. It should be one-fourth of an inch in diameter and about six inches below the top of the back. The hole is needed for attaching the box to the post.

Drill four small holes in the bottom to allow for drainage **(Figure 3).** They should be one-fourth of an inch in diameter. The small door on the side makes it easier to clean the box every year and to add nest materials as needed **(Figure 2).** Use a three-inch cabinet hinge for swinging the door. The hinge and its screws should be rustproof. The edges of the door may need trimming to ensure smooth operation. The homemade door stop on the inside of the front and the homemade latch **(Figure 2)** are for fastening the door, which must be fastened tightly at all times. If the door is not fastened tightly, "woodies" will not use the box.

Boxes must be tightly constructed. Use box nails that are large enough to hold securely in spite of weathering and rough handling. Eight-penny, zinc-coated nails are recommended. Seal all cracks and knot holes, preferably with galvanized sheet metal.

Boxes made of dressed boards should be painted with an outside, flat, light-colored paint. Paint makes them last longer, improves their appearance, and makes them cooler during summer.

Erect nest boxes during early winter, preferably before January 1. Erect them in areas known to be used by wood ducks. Erect nest boxes over water or on the edge of water. Over water is recommended. Beaver ponds, oxbow lakes, natural ponds, and other small bodies of water surrounded by bottomland hardwoods are ideal places to erect nest boxes. Avoid large bodies of water and areas where wave action is heavy.

Erect nest boxes on treated posts. Creosoted pine posts are recommended. Posts should be at least four inches in diameter. Erect boxes at least five feet above flood level. Those erected over land should be out of easy reach of people. Boxes at such heights are readily used by wood ducks and are fairly easy to service and maintain.

Drill a pilot hole about six inches below the top of the post. It is needed for attaching the box. The hole should be one-fourth of an inch in diameter and at least two inches deep.

Erect boxes in places where they can be easily seen by wood ducks. To increase visibility, it may be necessary to cut away small limbs and brush. The entrance should face open waters, and if possible it should face either northward or southward. Such placement reduces the amount of light that can enter.

Erect nest boxes either vertically or with a slight forward tilt. A backward tilt may hinder ducklings on their exit from the nest and may allow water to enter.

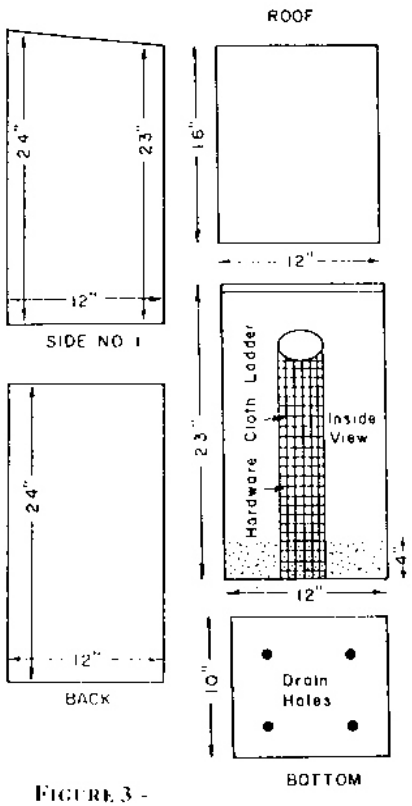


FIGURE 3 - Nest box should be constructed of well-seasoned 1x12 inch boards. They may be either rough sawed or dressed. Rough-sawed cypress boards are recommended. The entrance should be oval -- 4 inches wide and 3 inches high. The ladder of hardware on the inside of the front should be 4 inches wide. It should extend from bottom of the box to the entrance. The ladder provides ducklings a means of escaping the box.

Use lag bolts for attaching boxes to posts **(Figure 2).** Lag bolts should be three-eighths of an inch in diameter and at least four inches long. Place a flat washer on the lag bolt. Insert the bolt through the hole in the back of the box and into the pilot hole in the port. Tighten the bolt until the box is drawn firmly against the post.

Fill the bottom four inches of the box with wood shavings and sawdust **Figure 2).** These are needed for covering the eggs. You will recall that neither the male nor the female brings nest material to the boxes. Wood shavings keep the sawdust from packing.

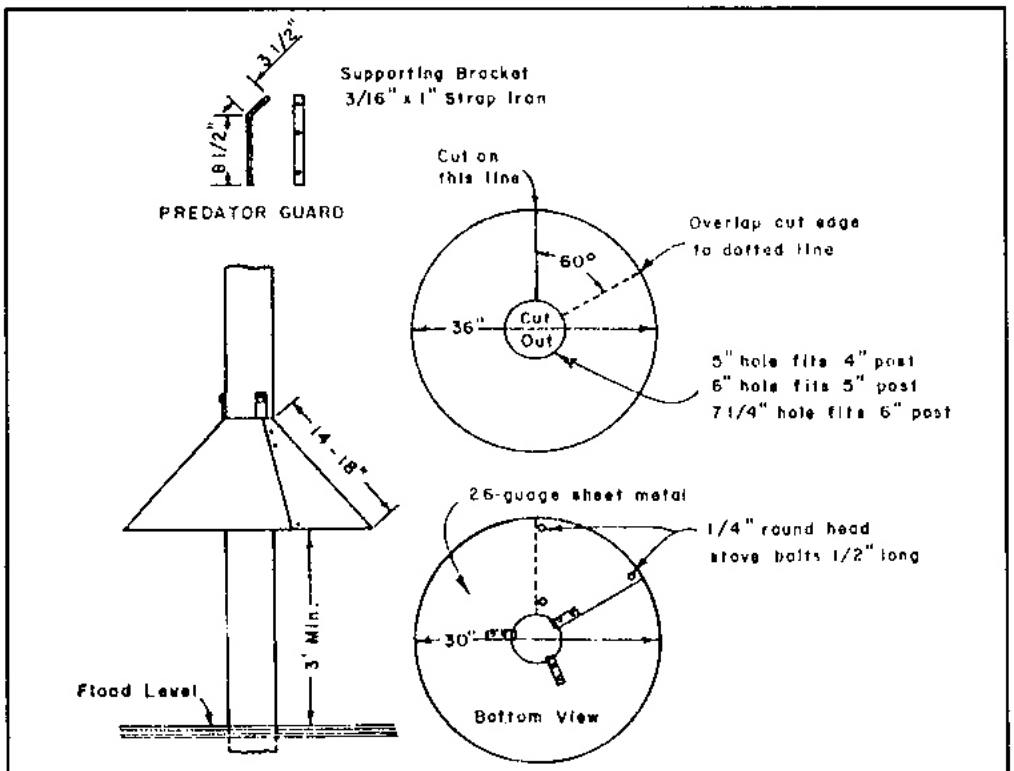


FIGURE 4 - Predator guard and brackets.

Protect boxes with a predator guard **(Figure 4).** Such guards protect nests from climbing enemies, especially the raccoon--one of the worst nest predators in Alabama. The guard should be at least three feet above flood level, and it should fit the post tightly enough that snakes can't squeeze through.

Make predator guards from 26-gauge galvanized sheet metal. **Figure 5** is a layout for cutting three guards from a 3 x 8 foot sheet. When installing the guard, overlap the cut edge to the dotted line. Cut on solid lines and follow the sequence of numbers. Make circular cuts in a counter-clockwise direction. To make the initial cut on line **AB,** make a slot **A** with a cold chisel. Use tin snips and wear leather work gloves.

As indicated in **Figure 4,** drill two small holes near the outer edge of the guard. They are needed for forming the guard into a cone. Holes should be one-fourth of an inch in diameter.

Form the guard into a cone by overlapping the cut edge to the dotted line. Insert a round-headed stove bolt through the holes near the outer edge of the guard and tighten. Stove bolts should be one-fourth of an inch in diameter and one-half inch long.

Bend the brackets to conform to the underside of the guard and to the upright post. For attaching brackets to the guard, use six stove bolts of the kind described above.

Brackets can be attached to the post by No. 8 screws. They should be one-fourth of an inch in diameter and at least one inch long. Pilot holes are recommended.

Erect only a few nest boxes on an area during the first year--no more than two per acre and spaced 50 to 100 yards apart. Add more as needed. Boxes that have been in the same place for two nesting seasons and have not been used by wood ducks should be moved to a better location.

Clean and service nest boxes at least once a year, preferably in December or early January. At that time, make needed repairs, add nest material if needed, and loosen the sawdust and wood shavings. Spray the inside with Lysol or other disinfectant to discourage bees and wasps. Your boxes are now ready for wood ducks to set up housekeeping!

You can obtain more information on building, erecting, and maintaining nest boxes from the Natural Resources Conservation Service, your county Extension office, the Alabama Department of Conservation and Natural Resources, the Alabama Forestry Commission, and the U.S. Fish and Wildlife Service. Technical assistance in managing habitat for wood duck and for all other valuable wildlife is available from these agencies also.

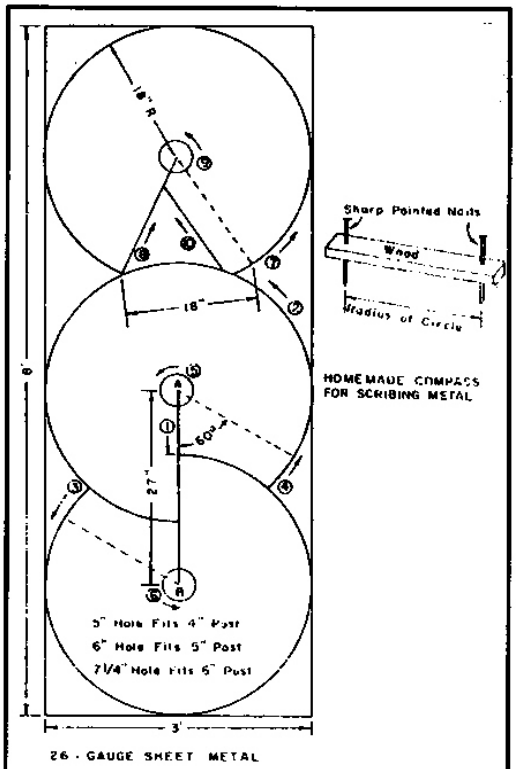


FIGURE 5 - Layout for cutting three predator guards from a 3x8 foot sheet of 26-gauge galvanized sheet metal. Cut on solid lines and follow the sequence of numbers. Make circular cuts in a counter clockwise direction. To make initial cut on line **AB**, make a slot at **A** with a cold chisel. Use tinsnips and wear leather work gloves. When installing a guard, overlap the cut edge to the dotted line.

Building Materials	
Nails	(25) 8-penny, zinc coated
Spike	(1) at least 4 inches long
Lag bolt	(1) 3/8-inch at least 4 inches long and flat washer
Hinge	(1) 3-inch cabinet hinge and screws. These should be rustproof.
Hardware cloth	(1) 17-inch strip, 4 inches wide (all sharp ends should be bent under)
Post	(1) treated post (creosote is not recommended) at least 4 inches in diameter. Length depends on depth of water and flood stage level.
Sawdust and wood shavings	Enough to fill the bottom 4 inches of the nest box
Predator guard	(1) 26-gauge galvanized sheet metal as shown in **Figures 4 and 5**

Planting Guide for Wildlife

Crop	Use*	Growth Habit	Seeding Rate/Acre**	Planting Depth (Inches)	Plant Dates and Adapted Area			Remarks
					North	Central	South	
Alfalfa	d,f	Warm-season perennial legume	30 lbs.	0 - 1/4	Aug 15 to Oct 1	Sep 1 to Oct 1	Oct 1 to Nov 15	Requires deep, fertile, well-drained soils with pH 6.0-7.0.
Austrian winter peas	g,k	Cool-season annual legume	35 lbs.	1-2	Sep 1 to Oct 15	Sep 1 to Oct 15	Sep 15 to Oct 31	Best adapted to well-drained soils.
Bahiagrass	b,d,e	Warm-season perennial grass	20 lbs.	1/4 - 1/2	***	Mar 1 to Jul 15	Feb 1 to Nov 1	Adapted to moist sandy bottoms to droughty uplands
Barley	a,c,j,k	Cool-season annual grass	Grain 75-100 lbs. Grazing 100-120 lbs.	1-2	Sep 1 to Oct 15	Sep 1 to Oct 31	Sep 15 to Nov 15	Best adapted to drained productive soils. Matures earlier than other small grain.
Bermuda grass, Coastal and other hybrids	d,e	Warm-season perennial grass	Rows 15 bu BC-3000 lbs. ***	3-6 2-4	Apr 1 to Jul 15	Mar 15 to Jul 15	Mar 1 to Aug 15	Well-drained, light sand to clay loam. pH 5.5-7.0
Bermuda grass, common and seed propagated varieties	b,d,e	Warm-season perennial grass	5 lbs.	1/4 - 1/2	Apr 1 to Jul 15	Mar 15 to Jul 15	Mar 1 to Jul 15	Highly susceptible to leaf spot.
Birdsfoot Trefoil	d,e	Warm-season perennial legume	10 lbs.	0 - 1/4	Sep 1 to Oct 31	Sep 1 to Oct 31	_	Best on well-drained productive soils in North Alabama.

Bluegrass, Kentucky	e	Cool-season perennial grass	10 lbs.	0 - 1/4	Sep 1 to Oct 31	-	-	Requires fertile soils with pH 5.6-7.0. Somewhat shade tolerant.

Caley peas	a,d,g,k	Cool-season annual legume	50 lbs.	1/2 - 1	Aug 25 to Oct 15	Sep 1 to Oct 15	-	Adapted to alkaline and moderately acid clay and wet soils. Seed are toxic.
Chufa	j	Warm-season perennial sedge	40 lbs.	1	May 15 to Jun 30	May 15 to Jun 15	May 15 to Jun 15	Productive upland soils with sandy topsoils. New ground is recommended. Avoid alkaline soils and soils with clayey topsoils.
Clover, Arrowleaf	a,d,g,j	Cool-season annual legume	6 lbs.	0 - 1/2	Aug 25 to Oct 1	Sep 1 to Oct 15	Sep 1 to Nov 1	Best on well-drained soils. Avoid alkaline soils.
Clover, Ball	a,g	Cool-season annual legume	4 lbs.	0 - 1/4	Sep 1 to Nov 1	Sep 1 to Nov 1	Sep 1 to Nov 1	Adapted to most soils. Tolerates wet soils and flooding.
Clover, Crimson	a,d,g,j, k	Cool-season annual legume	25 lbs.	0 - 1/2	Aug 25 to Oct 1	Sep 1 to Oct 15	Sep 15 to Nov 15	Best on well-drained soils. Avoid high pH soils.
Clover, Red	a,d,g,j	Cool-season biennial	15 lbs.	1/4 - 1/2	Feb/Sep 1 to Apr/Nov 1	Feb/Sep 1 to Apr/Nov 1	Sep 15 to Nov 15	Best adapted to well-drained, fertile soils.
Clover, Subterranean	a,d,g,j, k	Cool-season annual legume	10 lbs.	0 - 1/2	Aug 25 to Oct 1	Sep 1 to Oct 15	Sep 15 to Nov 15	Best on well-drained, productive soils. Tolerates lower pH's than other clovers.

Clover, White and Ladino	e,j	Cool-season perennial legume	3 lbs.	0 - 1/4	Feb/Sep 1 to Apr/Nov 1	Feb/Sep 1 to Apr/Nov 1	Aug 15 to Nov 15	Best adapted to moist bottoms and productive upland soils.
Corn, Field	c,f,j	Warm-season annual grass	Rows: 7 - 10 lbs.	1-2	Apr 1 to May 10	Mar 20 to Apr 20	Mar 1 to Apr 10	Fertile, moist bottoms, and productive uplands.
Cowpeas	d,g	Warm-season annual legume	Rows: 30 - 40 lbs. BC: 120 lbs.	2-3	May 1 to Jun 15	May 1 to Jul 1	May 1 to Aug 1	Best adapted to well-drained soils.
Dallisgrass	d,e	Warm-season perennial grass	10 lbs. PLS	1/4 - 1/2	Mar 15 to Jul 1	Mar 1 to Jul 1	Feb 1 to Jul 1	Low seed germination. Adjust rate accordingly. Best on moist bottom soils.
Egyptian Wheat	j	Warm-season annual grass	10-20 lbs.	1/2 - 1	May 15 to Jun 1	May 15 to Jun 15	May 1 to Jun 15	Adapted to well-drained soils with medium to high fertility
Fescue, Tall	a,b,d,e	Cool-season perennial grass	20 lbs. - D 25 lbs. - BC	1/4 - 1/2	Sep 1 to Nov 1	Sep 1 to Nov 1	Sep 15***** to Nov 15	Best on moist fertile bottom and productive uplands.
Florida Beggardweed	j	Warm-season annual legume	10-12 lbs.	0 - 1/4	-	Apr 15 to Jun 15	Apr 15 to Jul 1	Best on sandy soils.
Johnson grass	d,h	Warm-season perennial grass	15 lbs. - D 30 lbs. - BC	1/2 - 1	Apr 1 to Jul 31	Apr 1 to Jul 31	Apr 1 to Jul 31	Adapted to medium to heavy clay soils. Cannot be continuously grazed.
Lespedeza, Bicolor (seed)	j	Warm-season perennial legume	10 - 12 lbs. 30" rows - 5 lbs.	1/4 - 1/2	Mar 1 to Apr 15	Mar 1 to Apr 1	Feb 15 to Apr 1	Best on well-drained, productive soils. Avoid deep sands and lime soils.

Lespedeza, Bicolor (plants)	j	Warm-season perennial legume	1000 plts/plot (15' x 330') or 12,000/ac	2 - 4 in. above root collar	Dec 1 to Mar 1	Dec 1 to Mar 1	Dec 1 to Mar 1	Best on well-drained, productive soils. Avoid deep sands and lime soils.
Lespedeza, Kobe	d,g,j	Warm-season annual legume	30 lbs.	1/4 - 1/2	Feb 15 to Apr 1	Feb 15 to Apr 1	Feb 1 to Mar 15	Best on moist bottoms. Tolerates wet soils. Plant on productive uplands for wildlife food. Avoid deep, fine sands and alkaline soils.
Lespedeza, Korean	d,g,j	Warm-season annual legume	25 lbs.	1/4 - 1/2	Feb 15 to Apr 1	Feb 15 to Apr 1	-	Best on moist bottoms. Tolerates wet soils. Recommended for wildlife food only on upland soils of North Alabama.
Lespedeza, Sericea	b,d,e, g,i	Warm-season perennial legume	20 lbs. - D 30 lbs. - BC	1/4	Mar 15/Jun 15 to May 15/Jul 15	Mar 1/Jun 15 to May 1/Jul 15	Feb 15/Jun 15 to May 1/Jul 15	Does well on moist, well-drained soils. Avoid lime soils of the Black Belt.
Lespedeza thunbergii "Amquail" seed	j	Warm-season perennial legume	10-12 lbs.	0 - 1/4	Mar 1 to Apr 15	Mar 1 to Apr 1	Feb 15 to Apr 1	Adapted best to well-drained productive soils. Avoid deep sands and lime soils.
Lespedeza thunbergii "Amquail" plants	j	Warm-season perennial legume	1000 plts/plot (15' x 330') or 12,000/ac	2-4 in. above root collar	Dec 1 to Mar 1	Dec 1 to Mar 1	Dec 1 to Mar 1	Adapted best to well-drained, productive soils. Avoid deep sands and lime soils.
Lovegrass, weeping	b,i	Warm-season perennial grass	3 lbs.	0 - 1/4	Mar 15 to Aug 1	Mar 15 to Aug 1	Mar 1 to Aug 15	Adapted to dry, infertile, sandy soils.
Lupine, Blue	a,c,d,g, k	Cool-season annual legume	70-100 lbs.	1 1/2	-	-	Sep 15 to Nov 1	Does well on sandy soils if fertilized.

Millet, Browntop	d,h,j	Warm-season annual grass	25 lbs. - BC 10 lbs. in rows	1/2 - 1 1/2	May 1 to Aug 1	Apr 1 to Aug 15	Apr 1 to Aug 15	Best adapted to well-drained, productive soils.
Millet, Dove Proso	j	Warm-season annual grass	25 lbs. - BC 10 lbs. in rows	1/4 - 1/2	May 1 to Aug 1	Apr 1 to Aug 15	Apr 1 to Aug 15	Does best on well-drained, productive soils.
Millet, Foxtail	d,h	Warm-season annual grass	25 lbs.	1/2 - 1 1/2	May 1 to Aug 1	Apr 1 to Aug 15	Apr 1 to Aug 15	Best adapted to well-drained, productive soils.
Millet, Japanese	j	Warm-season annual grass	25 lbs. 8 lbs. in rows	1/4 - 1/2	May 1 to Aug 1	May 1 to Aug 1	May 1 to Aug 1	Adapted to wet, poorly-drained soils.
Millet, Pearl	d,f,h	Warm-season annual grass	25 lbs.	1/2 - 1 1/2	Apr 20 to Jul 1	Apr 15 to Jul 1	Apr 1 to Jul 15	Best adapted to well-drained, fertile soils. Avoid alkaline soils.
Oats	a,c,d,j, k	Cool-season annual grass	Grain 60-90 lbs. Grazing 90-120 lbs.	1-2	Aug 25 to Oct 1	Sap 1 to Oct 15	Sep 15 to Nov 1	Does best on clay loam to sandy loam soils. Some varieties subject to winter kill.
Old World Bluestems	b,e	Warm-season perennial grass	5 lbs. PLS	0 - 1/4	-	Mar 15 to Jun 15	-	Does well on chalky Black Belt soils. King Ranch or Plains Bluestem are recommended varieties.
Orchard grass	a,d,e	Cool-season perennial grass	15 lbs.	1/4	Aug 15 to Nov 1	-	-	Will not tolerate poor drainage or overgrazing.

Partridge Pea	j	Warm-season annual legume	16 lbs.	1/4 - 1/2	Feb 15 to May 15	Feb 15 to May 15	Feb 15 to May 15	Does best on moist bottoms and productive uplands. Will grow on alkaline soils.
Rye	a,c,g,j	Cool-season annual legume	Grain 60-90 lbs. Grazing 90-120 lbs.	1-2	Aug 25 to Oct 1	Sep 1 to Oct 15	Sep 15 to Nov 1	Best adapted to well-drained sandy to clay loam soils.
Ryegrass	a,g,j,k	Cool-season annual legume	25 lbs.	0 - 1/2	Aug 25 to Oct 1	Sep 1 to Oct 15	Sep 15 to Nov 1	Does best on clay loam soil.
Sorghum, Forage and Sweet	f	Warm-season annual grass	5 lbs. - D 20 lbs. - BC	3/4 - 1	Apr 25 to May 15	Apr 15 to Jun 15	Apr 1 to Jul 1	Best adapted to well-drained, productive soils with pH 5.8 -6.5.
Sorghum, Grain	c,f,j	Warm-season annual grass	Wide rows 4-8 lbs. Narrow rows 15-20 lbs.	3/4 - 1	May 1 to Aug 1	Apr 15 to Aug 1	Apr 1 to Aug 15	Well-drained, productive soil with pH 5.8-6.5
Sorghum-Sudan Hybrids	d,f,g,h	Warm-season annual grass	30 lbs.	1/2 - 1	May 1 to Aug 1	Apr 15 to Aug 1	Apr 1 to Aug 15	Best adapted to well-drained, productive soils with pH 5.8 - 6.5.
Soybeans	d,h,j	Warm-season annual legume	Rows 40 lbs. Drill 75 lbs.	1-3	May 1 to Jun 1	May 1 to Jun 15	May 1 to Jul 1	Does well on deep loam bottomland soils.
Sudangrass	d,f,h	Warm-season annual grass	D - 20 lbs. B - 35 lbs.	1/2 - 1	May 1 to Aug 1	Apr 15 to Aug 1	Apr 15 to Aug 1	Adapted to light sandy to heavy clay soils.
Sunflower	j	Warm-season annual forb	Rows 8 - 10 lbs.	1 - 2	Apr 1 to Jul 15	Apr 1 to Jul 15	Apr 1 to Jul 15	Well-drained, productive soils.

Sweetclover	a,d,g	Cool-season annual or biennial legume	12 - 15 lbs.	1/4 - 1/2	Sep 1 to Oct 15	Sep 1 to Oct 30	-	Adapted only to lime soils with high pH.
Timothy	d,e	Cool-season perennial grass	8 lbs.	1/4 - 1/2	Aug 15 to Sep 15	-	-	Well-drained productive soils with pH 6.0 - 6.5.
Vetch, common	a,g,j,k	Cool-season annual legume	20 lbs.	1 - 2	-	Sep 1 to Oct 15	Sep 15 to Nov 1	Best adapted to well-drained soils. Varieties: Cahaba white, Nova II, Vanguard, and Vantage
Vetch, Hairy	a,g,j,k	Cool-season annual legume	20 lbs.	1 - 2	Sep 1 to Oct 15	Sep 1 to Oct 15	Sep 15 to Nov 1	Best adapted to well-drained soils.
Wheat	a,c,f,j,k	Cool-season annual grass	Grain 60 - 90 lbs. Grazing 90 - 120	1 - 2	Aug 25 to Oct 1	Sep 1 to Oct 15	Sep 15 to Nov 1	Best adapted to medium to heavy soils.

Uses

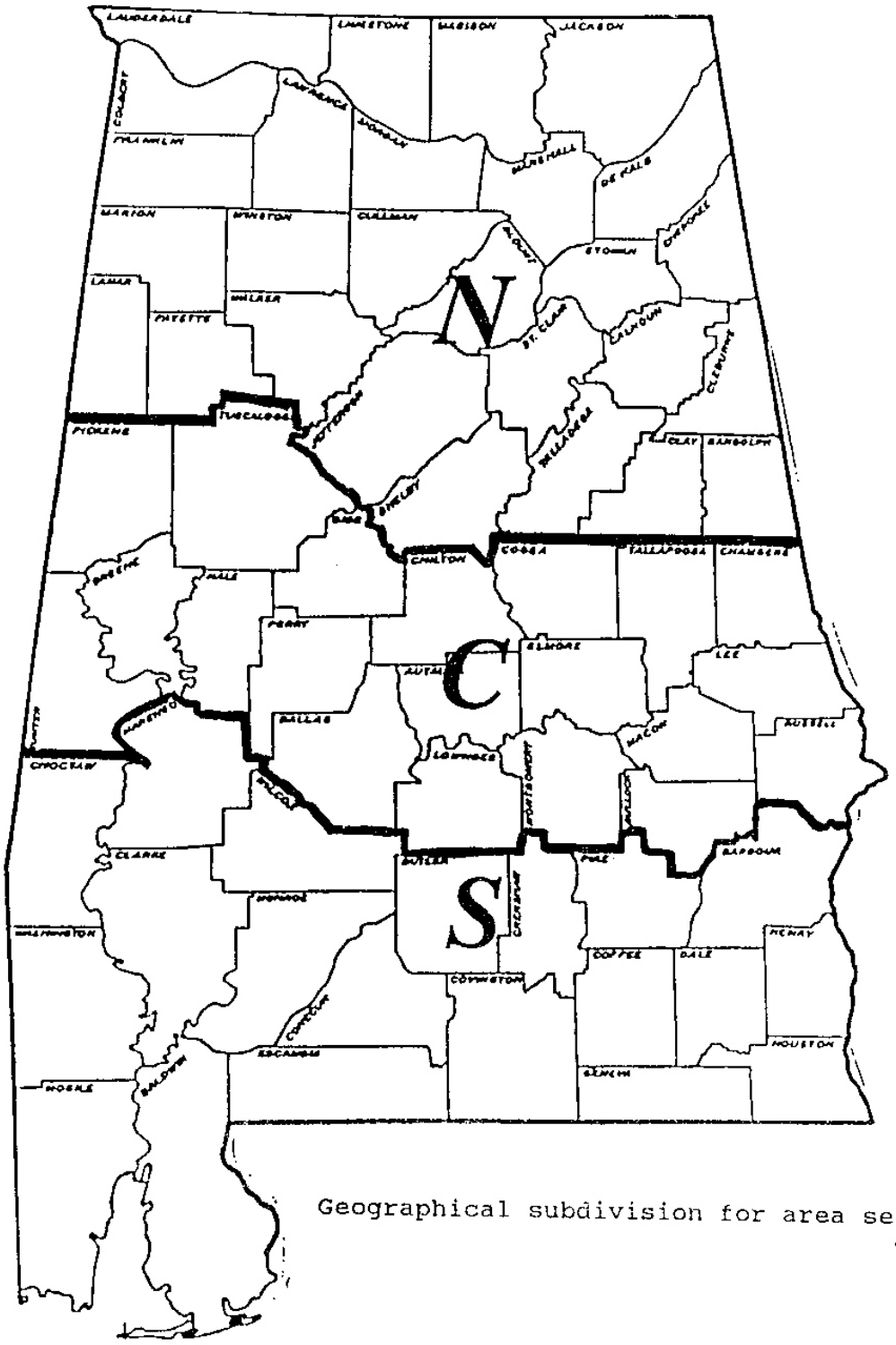
a - Cool-season grazing
b - Erosion control
c - Grain
d - Hay
e - Permanent pasture
f - Silage
g - Soil improvement
h - Temporary summer grazing
i - Wildlife cover
j - Wildlife food
k - Mulch crop for conservation tillage

** Seeding rates should be increased at least 30 percent when aerially seeded. When two grasses are used in a mixture, reduce seeding rate of each by one-third. Do not reduce seeding rates of legumes when used in mixtures.

*** D - Drilled and BC - Broadcast

**** Bahiagrass plantings in North Alabama are limited to Pensacola bahia planted in counties contiguous to Central Alabama plus St. Clair, Calhoun, and Cleburne Counties.

***** Fescue plantings in South Alabama are limited to subclass with soils except in MLRA 135.



Geographical subdivision for area seeding dates.

AMQUAIL: A NEW QUAIL FOOD THAT'S RESISTANT TO DEER BROWSE

Amquail is an improved variety of thunbergii (*Lespedeza thunbergii*). It produces an abundance of winter food for quail, yet it is browsed little by deer. Like other shrub lespedezas, Amquail is a perennial, warm-season legume that usually grows 6 to 8 feet high. It is especially recommended for areas in the Southeast on which the deer population is one or more per 15 to 20 acres.

Until about the mid-1960's, bicolor (*Lespedeza bicolor*), another shrub lespedeza that produces an abundance of winter food for quail, could be planted almost anywhere in the Southeast without fear of destruction by deer. Until then, deer densities in most of the Southeast were much lower than they are today, and deer were of little threat to bicolor. However, that is not true today. According to the Alabama Game and Fish Division, the state now has about 1,500,000 deer. Georgia has about that many, other states in the Southeast have similarly high populations, and their numbers are increasing every year.

In order for deer to survive, they require food every day; and it does not matter to them that bicolor was planted to provide quail food. So, the hordes of hungry deer help themselves to the bicolor in the small, highly fertilized plots until seed production is drastically reduced and, in many instances, until the bicolor plants are destroyed. However, dense populations of deer are less likely to prevent Amquail and a few other varieties of thunbergii from producing enough seed to feed quail. This has been proven in Alabama, Georgia, South Carolina, and other southeastern states since the 1970's. Nobody seems to know why deer destroy bicolor and usually do little browsing on Amquail and a few other varieties of thunbergii. It could be that bicolor contains less tannic acid than the thunbergiis. A dreadful thought to quail hunters, managers of quail preserves, and dog trainers is that the deer population will probably continue to increase for at least several more decades, thereby further aggravating the deer-bicolor problem and making Amquail and other deer-resistant varieties of thunbergii more desirable as a producer of winter foods for quail.

The official name of the plant is "Amquail" (*Lespedeza thunbergii* (DC) Nakai). It is a much improved variety of thunbergii--it produces more seed, the seed are better filled out, and the plant is more resistant to deer browse than nearly all other varieties of thunbergii. The "Am" in its name comes from the fact that the improved variety was developed by the Natural Resources Conservation Service at its Plant Materials Center near Americus, Georgia. The "quail" is from the fact that the variety produces an abundance of hard-coated seed that are readily eaten by quail from late December to mid-March.

Prepared by Robert E. Waters, Wildlife Consultant/Free-Lance Writer, 318 Bowden Drive, Auburn, Alabama 36830, (334) 887-9460, April 1991.

As stated earlier, Amquail is a perennial, warm-season legume. It is a shrub that usually grows 6 to 8 feet high. It is related to bicolor and, of course, to regular thunbergii, two other shrub lespedezas commonly planted to produce winter food for quail in the Southeast. The three shrub lespedezas (Amquail, bicolor, and regular thunbergii) are much alike. In fact, from a distance, it is difficult to distinguish one from another, especially in winter. All three produce an abundance of winter food for quail, but Amquail is more resistant to deer browse than are most of them. Individual plants of Amquail may contain up to eight or more stems which rise from a crown-like stump near the ground. The young stems are purplish. Amquail usually blooms from mid-August to early September. For the most part, the flowers are rose-purple, but a few are white. Most of the seed are black, but a few are reddish-brown. The seed ripen in October and early November. Some fall to the ground soon after they ripen. Others remain on the plant and are shed gradually throughout winter. Incidentally, the number of seed per pound is 45 to 67 thousand.

The seed are most valuable to quail from late December to mid-March, when other foods are most likely to be absent. At that time, some coveys feed almost exclusively on Amquail when the seed are available. That, of course, makes hunting and bird-dog work more enjoyable. All the hunter or dog trainer needs to do then is take his dogs from one small plot of Amquail (1/9 of an acre) to another; and by doing that, he can find nearly every covey on a tract of land, especially in late December and in January and February. In other words, properly located small plots of Amquail decrease the time a hunter is required to spend hunting quail and increase the time he can spend in shooting quail and training dogs. You bird hunters and dog handlers will like that.

Here is the bottom line: If your soil is suited, if your deer population is more than one per 15 to 20 acres, if you can leave the site in production of quail food for many years, and if you are going to exclude fire and livestock, Amquail and other deer-resistant varieties of thunbergii are the best crops you can plant today to produce winter food for quail in the Southeast. Furthermore, if the deer population continues to increase in the Southeast as predicted, Amquail and other deer-resistant varieties of thunbergii will probably become even more valuable as winter food for quail.

As we will note later, fire in late fall and winter does not damage Amquail. Instead it encourages spreading, which may cause the plant to become a pest after 20 to 25 years.

LIMITATIONS

Like all other plants used in managing habitat for quail, Amquail has limitations. Its limitations are the same as those of bicolor and nearly all other shrub lespedezas. However, as noted earlier, Amquail is resistant to deer browse; and most of them are not. That one characteristic far outweighs the plant's limitations. Here are the limitations of Amquail and a few suggestions for overcoming them.

Like bicolor and other shrub lespedezas, Amquail is easily destroyed by livestock. For that reason, it should be planted in areas not grazed by livestock.

Amquail does not thrive in wet, poorly-drained soils. Two years are usually required for it to become a dependable producer of seed. It does not grow well in deep, fine sands, but it grows better on sandier soils than does bicolor. It does not grow well in the moderately alkaline soils of the Blackland Prairie. Like bicolor and other shrub lespedezas, Amquail

begins to spread after 10 to 12 years, especially in heavier soils that are prescribe burned occasionally in late fall and winter.

Nobody seems to know why fire causes Amquail and the other shrub lespedezas to spread, especially in heavier soils. However, fire breaks the hard coat of numerous Amquail seed on the ground. That breakage allows both oxygen and moisture to enter, which favors germination. Fire also removes a good bit of organic matter (leaves, stems, and so forth) from the ground. That allows more of the Amquail seed to be in contact with bare soil, which also favors germination. It appears, therefore, that those two factors could be primarily responsible for the spread of Amquail and other shrub lespedezas after several years of prescribed burning in late fall and winter.

No one seems to know why spreading is more noticeable in heavier soils. It may be that more of the four to six week old seedlings survive in the heavier soils, which usually contain more moisture near the surface than do sandier soils. It is known that seedlings require a good bit of moisture to survive during their first few months, and sandier soils simply may not contain that required moisture.

Even though Amquail and other shrub lespedezas tend to spread after 10 to 12 years, they usually do not become pests. They don't spread into cropland and pasture land. It is usually on areas under long-term management for quail that they become pests, and they do not become pests on those areas until after 20 to 25 years. Their spread can be controlled by grazing in spring, summer, and fall. Grazing by livestock at that time eliminates shrub lespedezas. No ifs, ands, or buts.

If you desire to provide winter food for quail in an area that will be prescribe burned occasionally in fall and winter, and if you are concerned about the spread of Amquail and other shrub lespedezas, you should consider planting either showy partridge pea or Kobe lespedeza, or both. Those two plants are well-suited to most of the Southeast. Partridge pea grows well on both sandy and clay soils. Kobe lespedeza should be planted only in heavier soils. Neither is browsed by deer to any appreciable extent. Both are reseeding annuals; and they reseed well if prescribe burned or disked lightly, but thoroughly, in February every 2 or 3 years. Actually, they reseed better if prescribe burned or disked lightly every February. Neither Kobe lespedeza nor showy partridge pea grow nearly as tall as do Amquail and other shrub lespedezas. Both are easy to control. Merely stop prescribe burning or light disking in February and, after a few years, the two plants will disappear.

ESTABLISHMENT

Amquail can be established by planting scarified seed or by transplanting one-year-old seedlings. Both give excellent results when planted and maintained according to instructions contained herein. Here are a few facts to consider when deciding which to plant.

Enough seed to plant an area usually costs less than do enough seedlings to plant the same-sized area. As a rule, seed can be planted in less time than can seedlings. Seed should be planted in late winter or early spring when weather in the Southeast is more favorable for outside work. Seedlings, on the other hand, must be planted in late fall, winter, and early spring when weather is likely to be less favorable for outside work. Seed require a more thorough job of soil preparation than do seedlings, and more care must be taken at planting time to prevent covering the seed too deeply.

Seedlings usually produce a good many seed the first year, especially if properly limed and fertilized, and by the second year they are in significant production. Plots in which seed are planted usually produce few seed until the second year. It is usually the third year before they get into significant production. Also, more of the one-year-old seedlings survive the first summer, especially if the weather is dry, than do the first-year plants from seed.

If you are in doubt about which to plant, choose seedlings even though they may be more expensive and are usually more difficult to plant. Most people are better pleased with seedlings; and you will probably be, also.

Size of Plots

Regardless of whether you plant scarified seed or transplant one-year-old seedlings, your plots should be 15 to 20 feet wide and about one-ninth of an acre in size. From the standpoint of bird-dog work, hunting, and producing ample winter food for quail, the ideal dimensions of a plot are 15 feet wide and 330 feet long. Unless noted otherwise, hereafter when I mention a plot, I am thinking of one with those dimensions (15 feet wide and 330 feet long).

Width of Plots

From the standpoint of producing quail food, width and shape of Amquail plots make little difference. However, from a quail-shooting and dog-training standpoint, width is very important. Shooting and dog work are difficult in plots more than 20 feet wide. Here is why.

A dog that is pointing in a plot wider than 20 feet may be difficult to locate unless you walk into the plot. If you walk into the plot, it is difficult to swing your gun while standing in the Amquail. Remember, it usually grows 6 to 8 feet high. On the other hand, if plots are no wider than 20 feet, you can usually see a dog that is pointing in the Amquail, and you can usually flush the birds without walking into the plots. Therefore, if you are going to harvest some of your birds by sport hunting--and there's no biological reason for not doing so--your plots should be no wider than 20 feet. The ideal width, however, is 15 feet.

Why is there no biological reason for not harvesting at least some of your quail by sport hunting every year? Because, according to research in the Southeast, about 80 percent of the quail in a fall population (8 out of every 10) die before the next fall, whether they are hunted or not--whether or not a single shot is fired at them. Here is how it works.

If you harvest 20 percent of your fall population by sport hunting, 60 percent of that population will die of other causes before the next fall. That is a mortality of 80 percent for the year. Collectively, the "other causes" are called "annual mortality", or the yearly rate at which a population of wildlife normally dies. If you harvest 50 percent of your fall population, annual mortality (other causes of death) will be 30 percent or a total mortality of 80 percent for the year. If you don't harvest a single quail by sport hunting, mortality for the year will still be a whopping 80 percent.

What it amounts to is this: If one thing does not get 80 percent of the quail in your fall population every year, something else will--something else such as bugs, buzzards, and opossums. Isn't it just as well, then, that you harvest at least some of them every year by sport hunting?

Where to Plant

Amquail is best adapted to upland Coastal Plain soils of the Southeast. It produces more seed when planted on fertile sites, but it grows well in infertile sites if it is properly limed and fertilized.

Plant near thickets, briar patches, woods, or other natural quail cover. Plant where there is a shortage of winter food for quail or where you want to find quail consistently for ease of hunting or training of dogs. In most instances, plots can be located where they will interfere little, if any, with other activities on the area.

Good locations are field and woodland borders, idle crop fields, utility rights-of-way, openings in thin woodland, along ditch banks and hedge rows, land in set-aside government programs, and nearly anywhere else near natural quail cover if your soil and other conditions are suitable. Your local agricultural agencies can tell you whether or not your soils are suited.

An ideal location, if the soil is suited, is the edge of crop fields, especially the sloping edges near woods or other natural quail cover. If Amquail is properly limed, fertilized, and cared for, it produces an abundance of seed in the partly-shaded, unproductive areas on the edge of many crop fields.

If the soil is suited, I also recommend planting a 15-foot strip of sericea between the Amquail and the crop field which makes a total width of 30 feet (15 feet of Amquail and 15 feet of sericea) and a total length of 330 feet for the planting. Sericea is a warm-season, perennial legume that usually grows 2 to 3 feet high. It produces an abundance of seed, but usually quail do not eat them unless other foods are scarce. However, sericea produces excellent nesting cover and the winter roosting cover that is essential for quail. Plant sericea between March 1 and August 15 at the rate of 25 pounds of scarified seed per acre or about 2 3/4 pounds per plot (15 feet wide and 330 feet long).

Avoid higher seeding rates than those recommended here. The stand must be thin enough that quail can walk freely through it. Your local agricultural agencies can give you detailed instructions for planting and maintaining sericea. They can also recommend varieties for your area.

Some quail hunters, managers of quail preserves, and dog trainers may want to extend the 30-foot planting of Amquail and sericea (15 feet of Amquail and 15 feet of sericea) around the entire edge of smaller crop fields, especially those on sloping land. Such plots will be longer, of course, than the usually recommended 330 feet. Besides providing permanent food and cover for quail, the extended plots will help control erosion, provide turn rows and travel lanes for farm machinery, and generally improve the appearance of crop fields.

Another option on the edge of larger crop fields is to plant nothing in the 1,320-foot intervals between the 30-foot plots of Amquail and sericea (15 feet of Amquail and 15 feet of sericea). In a few years, grasses and weeds will become established in the 1,320-foot intervals. Those grasses and weeds will provide the nesting cover and winter roosting cover that is essential for quail.

Either disk or burn the grasses and weeds in February every 3 to 5 years, but avoid disking or burning all grasses and weeds on the edge of a field during any one February. Leave some untreated to provide cover for quail. They can be treated later.

If possible, locate plots several hundred feet from thriving stands of kudzu and Japanese honeysuckle. After a few years, those pesky vines can overtop a plot of Amquail and ruin its value to quail. Avoid planting in highly alkaline soils; in deep, fine sands; in heavily-shaded areas; and in areas grazed by livestock.

From the standpoint of providing ample winter food for quail, there is no reason for planting more than one plot per 12 acres.

When to Plant

Planting dates vary a good bit depending on whether you plant scarified seed or transplant one-year-old seedlings.

Scarified seed. The best dates for planting scarified seed are March 1 to April 15. Avoid planting after May 15.

Plant soon after the danger of killing frost in order to have enough moisture for the seed to germinate and to have spring rains to ensure survival of the one- to six-week-old plants.

Seedlings. The best dates for transplanting one-year-old seedlings are December 1 to March 1. Acceptable dates are November 15 to March 15. Avoid planting after April 1.

Soil Preparation

Break and harrow your plots several weeks before planting. That will allow rains to settle the soil before planting. The soil should be well prepared but firm. For success with seed, it is essential that the seedbed be free of Bermuda grass, Johnson grass, Japanese honeysuckle, and other persistent plants that can ruin a plot.

Lime and Fertilizer

Apply lime and fertilizer according to soil test recommendations. Apply both at the time of soil preparation or a few days before. Your local agricultural agencies have instructions for collecting soil samples. They may have small containers in which to mail the samples to an approved laboratory for analysis. In the absence of a soil test, apply lime and fertilizer according to instructions from the Natural Resources Conservation Service, your county Extension office, or other reliable source.

Because Amquail plots are small and frequently located in remote places, dealers may be reluctant--and may even refuse--to apply the lime and fertilizer that is necessary for success. Sometimes the dealers simply cannot drive their loaded trucks over the rough roads to reach your plots. In such cases it may be necessary to apply the lime and fertilizer by hand, but use whatever means are necessary in order to apply the correct amounts. Otherwise, you will probably be disappointed.

As a rule, avoid using fertilizer that contains nitrogen because added nitrogen is of little value to Amquail. However, nitrogen encourages Bermuda grass, Johnson grass, and other persistent plants that can damage a plot, especially one in which seed were planted.

How to Plant

Both scarified seed and one-year-old seedlings give excellent results when planted properly, especially if there is normal rainfall in the first spring and summer, and if grasses and weeds are controlled the first year. Here is how to plant them.

Scarified seed. Plant soon after the danger of killing frost. By planting at that time, you will probably have enough moisture in the soil for seed to germinate. Spring rains that follow will probably provide the moisture that is necessary for the one- to six-week-old seedlings to survive.

The seed may be planted in rows, or they may be broadcast. Broadcasting takes less time and usually results in a thicker stand. Broadcasting is usually recommended on new ground where there are few weeds. Rows, on the other hand, permit cultivation the first year, which is desirable if weeds are a problem.

For best results, inoculate the seed with a lespedeza inoculant. Your seed dealer can order it for you.

Broadcasting. Lightly freshen the seedbed with a disk harrow between March 1 and April 15. Broadcast 2 pounds of scarified seed evenly over the entire plot. Use a shoulder-supported, Cyclone-type seeder or broadcast the seed by hand. Cover them no more than one-half inch with a cultipacker or other roller. That is deep enough to prevent the seed from drifting during moderately heavy rains. Avoid traveling up and down slopes with a cultipacker or other roller. That will reduce the likelihood of serious erosion.

Rows. Plots should contain six rows 330 feet long and spaced 3 feet apart. Plant 1 pound of scarified seed per plot. Open a shallow furrow, place 20 to 30 seed per foot into that furrow, and cover them about one-half inch. The seed can be planted by hand or by using a single-row, push-type garden planter. Control weeds between the rows, especially during the first year.

The reason for six rows spaced 3 feet apart and for planting 20 to 30 seed per foot is that such planting gives good ground coverage over the entire plot, and good ground coverage is important. It provides enough Amquail plants for ample seed production, and it forms an umbrella covering over the ground.

The "umbrella" shades grasses and weeds from under the inside four rows and affords overhead cover for quail, especially overhead concealment from hawks. The two outside rows usually have at least some grasses and weeds growing under them at all ages. But, if there is an excessive growth of grasses and weeds under the inside four rows after 2 or 3 years, the plot is probably providing less than maximum benefit to quail. It may be producing an abundance of seed, but the seed are falling into the grasses and weeds where they are difficult for quail to find. On the other hand, quail usually "hold" better when pointed in plots that contain a good bit of low-growing, grassy-type vegetation--probably because the birds feel more secure in that kind of vegetation.

Seedlings

Ease and method of planting are determined to some extent by size of the seedlings. Seedlings are considered as small if their diameter about 1 inch above the root collar (enlargement on the stem at depth seedling grew in the nursery) is less than 1/8 of an inch, medium if between 1/8 and 1/4 inch, and large if more than 1/4 inch.

Larger seedlings are usually more difficult to plant. However, they seem to withstand rough treatment better than do smaller seedlings, and a higher percentage of the larger seedlings produce seed the first year.

Freshly dug seedlings give better results. Therefore, have your soil prepared and plant your seedlings immediately after receiving them. If you can plant them within a few days, merely store them in a barn, basement, or other cool, dry place until they can be planted. If planting will be delayed more than a week, the seedlings should be "heeled-in". Here is how to heel them in.

Remove seedlings from the shipping wrapper or container, remove twine from around the seedlings, spread the seedlings somewhat, place them upright in a trench 12 to 18 inches deep, and cover the roots with soil to about 3 or 4 inches above the root crown. Leave the stems uncovered.

The three common methods of transplanting seedlings are furrow, dibble, and mechanical tree planter. All three methods give good results when the seedlings are planted properly and weeds are controlled the first year. One thousand seedlings are required to plant a plot. Here is how to plant Amquail seedlings by the three common methods.

Furrow. The furrow method increases the likelihood of serious erosion on sloping land. For that reason, the method should be used on land that is more nearly level. Larger seedlings can be satisfactorily planted by this method.

Plow a rather deep furrow, preferably with a turn plow or a moldboard plow. The depth of the furrow will depend to some extent on the root length of the seedlings. Place the seedlings 2 feet apart against one side of that furrow--the side that is more nearly vertical. The roots may be trimmed somewhat to make them better fit the furrow.

Cover the roots with a second furrow. Cover them deep enough for the soil after it settles to be 2 or 3 inches above the root crown. Leave the stems uncovered. Repeat until all six rows are planted. About 4 man-hours are required to plant a plot by this method.

Dibble. A dibble is a metal planting bar--the kind commonly used in planting pine seedlings. Use a dibble on slopes where there is danger of erosion. Small and medium-sized seedlings are recommended when planting by this method. At least two men are needed--one to use the dibble and the other to handle the seedlings. About 12 to 14 man-hours are needed to plant a plot by this method.

Insert the dibble 8 to 10 inches into the soil. Apply pressure with your foot as you insert the dibble. Work the handle back and forth to make a "V"-shaped hole; then remove the dibble. Place a seedling as far downward into the hole as possible, then pull it upward until the root crown is 1 or 2 inches below ground level. If necessary, the roots may be trimmed somewhat to make them fit the hole. Place the dibble about 4 inches behind the seedling (between the seedling and the man who is using the dibble), and again work it 8 to 10 inches into the soil. As you do so, apply pressure with your foot. Pull backward on the handle of the dibble to pack soil around the roots. Push forward on the handle to pack soil around the root crown. Firm the soil around the seedling with your heel. Repeat at two-foot intervals until all six rows are planted.

Mechanical tree planter. A tractor-drawn tree planter is recommended if you are planting a good many plots on land that is more nearly level. Medium-sized seedlings are recommended when planting by this method. Avoid using a tree planter on sloping land because it leaves furrows which increase the likelihood of serious erosion. At least two men

are needed--one to drive the tractor and the other to place the seedlings. Actually, it is better if the planter will accommodate two men. About 3 or 4 man-hours are needed to plant a plot by this method.

Place the seedling well forward in the open trench. Set the seedling so that it will be covered 1 to 2 inches above the root crown. Hold the seedling straight upward until the soil closes around the roots and is packed by the wheels. Repeat at two-foot intervals until all six rows are planted.

When using a tree planter, there is danger of driving the tractor too fast for proper placement of seedlings in the ground. There is also danger of spacing the seedlings farther apart than the recommended 2 feet and rows farther apart than the recommended 3 feet. So, be careful when using a tree planter. Incidentally, seedlings that are run over by a tractor tire during planting may appear to be damaged, but usually they are not.

HOW TO MAINTAIN

Like other shrub lespedezas, Amquail puts forth new growth every spring from the roots, stumps, and stems of the previous year. There seems to be more new growth from the roots and stumps after winters with weather colder than usual. With proper care, your plots should last 50 years or more. Here is how to make them last that long.

Protect from grazing by livestock. Grazing in spring, summer, and early fall either kills the plant or reduces seed production. Grazing at other times reduces the plant's value as overhead cover for quail.

If fencing is necessary, construct: (1) At least one gate that is wide enough for farm tractors, mowers, disk harrows, and other farm equipment to enter; and (2) several "V"-shaped stiles--the kind that allows people to enter but excludes livestock. Fences equipped with such stiles are much safer to cross, and they may prevent snagging and ripping of expensive trousers.

Clip or mow your plots 4 to 8 inches above the ground in late February after their second growing season and apply fertilizer according to soil test recommendations. For example, a plot planted in seed during the spring of 2000 should be clipped or mowed in late February 2002--the February following its second growing season. A plot planted in seedlings during the winter of 1999-2000 should be clipped or mowed in late February 2001. That is the second growing season for the seedlings (one season in the nursery and one in the plot).

If grazing by excessively dense populations of deer (more than one per 15 acres) is likely, postpone the application of fertilizer until the beginning of the second growing season after clipping. In most instances, that postponement discourages browsing by deer.

Clipping causes the stumps and roots of each plant to put forth several upright stems, thereby thickening the stand. Clipping also prevents sassafras, plum, persimmon, pine, and other unwanted plants from becoming established in the plots. A tractor-drawn rotary mower of the Bush Hog type is excellent for clipping Amquail. A plot that has been clipped with a rotary mower may appear damaged for a few weeks, especially if mowed with a dull blade, but it is not damaged. It will look good after new growth appears.

Clip in late February every 3 to 5 years after the initial clipping; and immediately after each clipping, apply fertilizer according to soil test recommendations. Again, if there is

likelihood of browsing by dense populations of deer, postpone the fertilizer until the beginning of the second growing season.

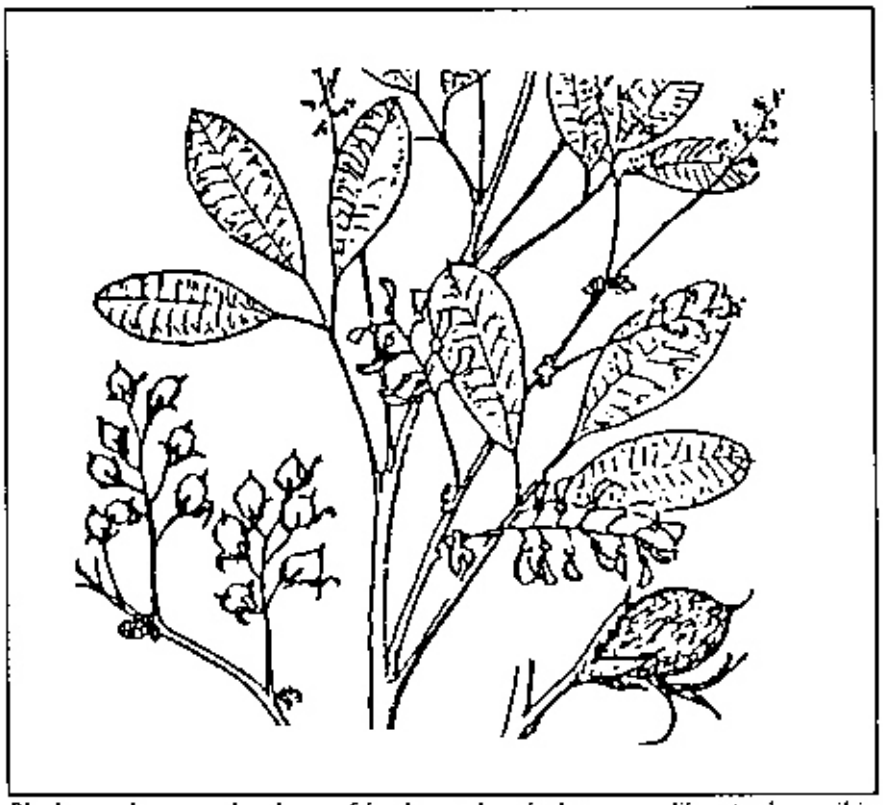
Plots can be prescribe burned every year in late February with no apparent damage to Amquail, but fire at other times either damages the plants or makes hunting and bird-dog work less enjoyable. As stated earlier, after 10 to 12 years of occasional burning in late fall and winter, Amquail and other shrub lespedezas begin to spread, especially in heavier soils. In such soils, fire causes any shrub lespedeza to become a pest after 20 to 25 years.

Have your soil tested every 5 to 7 years, and apply lime and fertilizer according to the latest soil test recommendations.

BICOLOR FOR QUAIL IN THE SOUTHEAST

INTRODUCTION

Bicolor (*Lespedeza bicolor*) is one of the shrub lespedezas. It is a warm-season perennial legume that usually grows six to eight feet high. It is called "bicolor" because its flowers are mostly two-colored, white and purple.

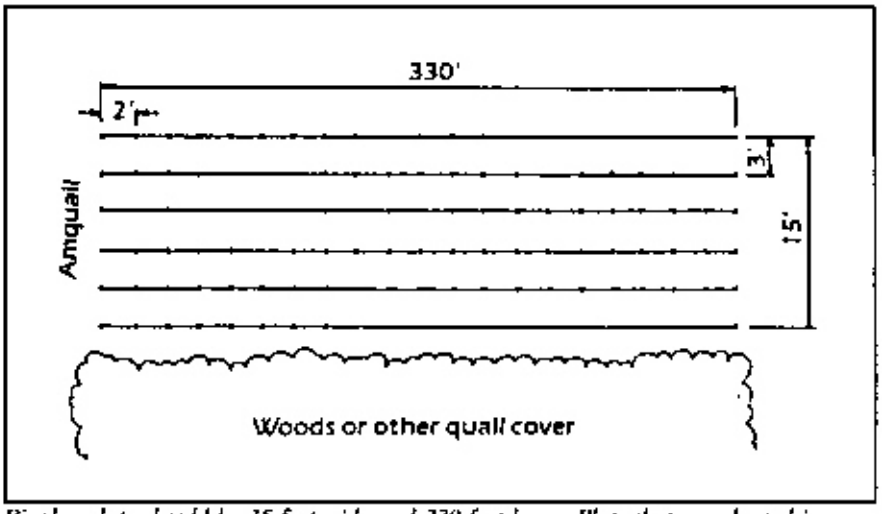


Bicolor produces an abundance of hard-coated seeds that are readily eaten by quail in late December and in January and February. It is especially recommended for upland areas in the Southeast that have no more deer than 1 per 20 to 25 acres.

Bicolor produces an abundance of hard-coated seed which are readily eaten by quail from about Christmas until early March. Frequently that is a time of food shortage for quail in the Southeast. By that time, many other quail foods have either rotted, sprouted, or otherwise become unavailable.

Prepared by Robert E. Waters, Wildlife Consultant/Free-Lance Writer, 318 Bowden Drive, Auburn, Alabama 36830, (334) 887-9460, October 1994.

The seed ripen in October and early November. Some fall to the ground soon after they ripen. Others remain on the plant and are shed gradually during fall and winter. However, the seed are most valuable to quail in late December and in January and February. In fact, some coveys feed almost exclusively on bicolor seed at that time. That, of course, makes hunting and training of bird dogs more enjoyable. A hunter can then take his dogs from one bicolor plot to another. By doing that, he can find nearly every covey of quail on a tract of land, especially in January and February.



Bicolor plots should be 15 feet wide and 330 feet long. Plots that are planted in rows should contain 6 rows spaced 3 feet apart. One thousand seedlings are required to plant a plot; 1 pound of seed is required for planting a plot in rows; and 1.5 pounds of seed are required per plot when broadcasting the seed. Plant near briar patches, brush, or other natural quail cover. In most instances, plots can be located where they will interfere little, if any, with other activities in the area.

Bicolor was brought into this country from Asia. The exact date of introduction is unknown, but it was listed in nursery catalogs as early as 1888. In 1935, the Soil Conservation Service started planting it for erosion control and wildlife food. Since the early 1940's, it has been planted more extensively in the Southeast to produce quail food than has any other crop. However, bicolor has lost some of its popularity during the last few decades because of dense populations of deer. Deer populations of more than 1 per 20 to 25 acres are common in the region today, and those high populations of deer have made it impossible to grow bicolor in many areas of the Southeast. Why? Because the deer literally eat it up.

In addition to being destroyed by dense populations of deer, bicolor has a few other limitations. We will discuss those limitations later. However, (1) if your soil is suited, (2) if you can leave the area in production of quail food for a decade or more, (3) if you will exclude fire, and (4) if your area contains no more than 1 deer per 20 to 25 acres, bicolor is still the best crop you can plant to produce quail food in most of the Southeast, period. Here are the outstanding limitations of bicolor.

It is easily destroyed by grazing. For that reason, bicolor should be planted where livestock and dense populations of deer will not have access to it. Bicolor does not thrive on wet, poorly drained soils. Two years are usually required for it to become a dependable producer of seed, especially when established by planting seed. It is susceptible to damage by dry weather, especially during its first two growing seasons. In parts of the Southeast, pocket gophers (or "salamanders" as they are sometimes called) may damage it. Bicolor does not grow well on deep, sandy soils or on moderately alkaline soils of the Blackland Prairie or "Black Belt" as its commonly called.

Field border planted in bicolor and sericea. Bicolor is near the woods, and sericea is between the bicolor and crop field. A good way to provide quail habitat on cropland.

Like nearly all other shrub lespedezas, bicolor begins to spread after ten or twelve years, especially on heavier soils that are prescribe burned occasionally in late fall and winter. No one seems to know why fire causes shrub lespedezas to spread on heavier soils, but fire breaks the hard coat of numerous seed on the ground. Those breaks allow oxygen and moisture to enter, which favors germination. Fire also removes a good bit of organic matter (leaves, stems, and so forth) from the ground. That allows more of the lespedeza seed to be in contact with bare soil, which also favors germination. It appears, therefore, that those two factors may be responsible for the spreading of bicolor and other shrub lespedezas after several years of prescribe burning in late fall and early winter. Also, no one seems to know why

spreading is more noticeable on heavier soils. It may be that more of the one to six week old seedlings survive on the heavier soils which contain more moisture near the surface than do sandier soils. It is known that the seedlings require a good bit of moisture to survive during their first few months, and sandier soils simply may not contain that required moisture.

If you desire to produce winter food for quail on an area that will be prescribe burned periodically and are concerned about the spreading of bicolor and other shrub lespedezas, you should consider planting either showy partridge pea (*Cassia fasciculata*) or Kobe lespedeza (*Lespedeza striata*), or both. Those crops reseed every year, especially if they are prescribe burned or disked lightly, but thoroughly, in February every two or three years. Actually, they reseed better if prescribe burned or disked lightly in February of every year.

Neither partridge pea nor Kobe lespedeza grows nearly as tall as does bicolor, and neither becomes a pest. Both are easy to control. Merely stop prescribe burning or light disking in February and, after a few years, the two plants will disappear.

Partridge pea grows well on both sandy and clay soils. Kobe lespedeza should be planted on only heavier soils. Neither is browsed to any appreciable extent by deer.

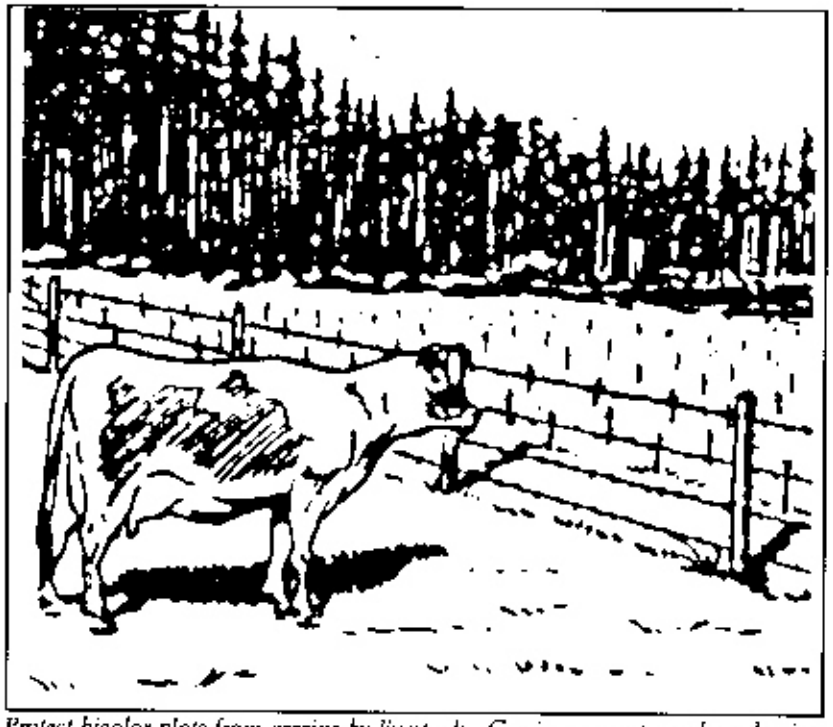
ESTABLISHMENT

Bicolor plots can be established by transplanting one-year-old seedlings or planting scarified seed. Both give excellent results when planted and maintained according to instructions on the next few pages. Besides, the limitations of bicolor that I have already mentioned, here are a few other facts you should consider when deciding whether to plant seed or transplant seedlings.

Enough seed to plant an area usually costs less than do enough seedlings to plant the area. As a rule, seed can be planted in less time than can seedlings. Seed should be planted in late winter or early spring when weather in the Southeast is more favorable for outside work. Seedlings, on the other hand, must be planted in late fall and winter when weather is likely to be less favorable for outside work. Seed require a more thorough job of land preparation before planting than do seedlings, and more care must be taken at planting time to prevent covering the seed too deep.

Seedlings usually produce a good many seed the first year, especially if properly limed and fertilized; and, by the second year, they are in significant production. Plots in which seed are planted usually produce few seed until the second year. It is usually the third year before they get into significant production. Also, more of the one-year-old seedlings survive the first summer, especially if the weather is dry, than do the first-year plants from seed. As a rule, seed for planting plots can be bought from local seed dealers. Seedlings, on the other hand, usually have to be ordered from distant nurseries.

Even though seedlings are more expensive and are usually more difficult to plant than are seed, most people are better satisfied with seedlings than with seed. You probably will be, too.



Protect bicolor plots from grazing by livestock. Grazing prevents seed production and reduces the plant's value as overhead cover.

Size of Plots

Regardless of whether your plant scarified seed or transplant one-year-old seedlings, your plots should be fifteen to twenty feet wide and about one-ninth of an acre in size. From the standpoints of bird-dog work, hunting, and producing enough winter food for quail, the ideal dimensions of a plot are 15 feet wide and 330 feet long. Unless otherwise noted, hereafter when I mention a plot, I am thinking of one with these dimensions--15 feet wide and 330 feet long.

From the standpoint of producing quail food, the width and shape of plots makes little difference. However, from a quail-shooting and dog-training standpoint, width is very important. Shooting and dog work are difficult in plots more than 20 feet wide. Here's why. A dog that is pointing in a plot wider than twenty feet may be difficult to locate unless you walk into the plot; and, if you walk into the plot, it will be difficult to swing your gun. Remember that bicolor usually grows six to eight feet high. On the other hand, if plots are no wider than twenty feet, you can usually see a dog on point in the bicolor without walking into the plot. Also, you can usually flush the birds without walking into the plot. Therefore, if you are going to harvest some of your birds by sport hunting--and there is no biological reason for not doing so--your plots should be no wider than twenty feet. However, as stated earlier, the ideal width is fifteen feet.

Why is there no biological reason for not harvesting at least some of your quail by sport hunting every year? Because according to research in the Southeast, about 80 percent (eight out of every ten) of the quail in a fall population dies before the next fall, whether they are hunted not--whether or not a single shot is fired at them. Here's how it works. If you harvest

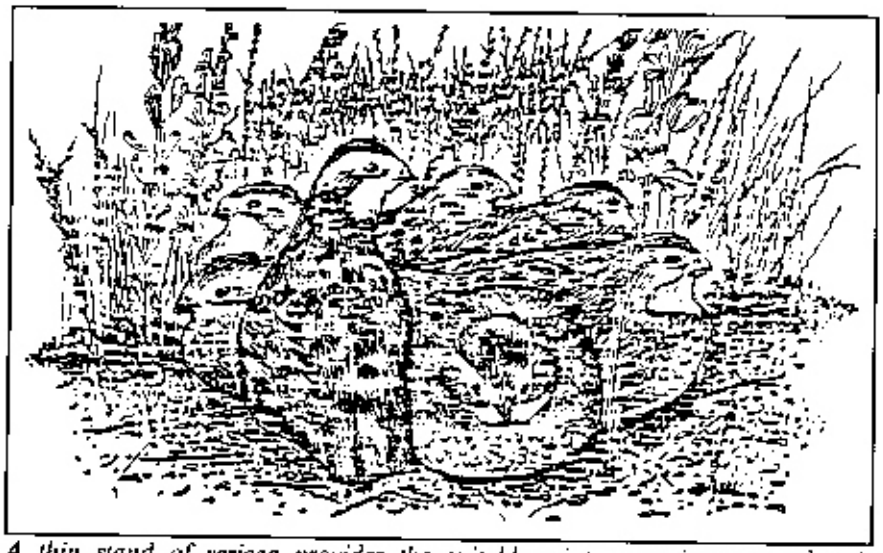
20 percent of your fall population by sport hunting, 60 percent of that population will die of other causes before the next fall. That is a total mortality of 80 percent for the year. Collectively, the other causes are called "annual mortality," or the yearly rate at which a population of wildlife normally dies. If you harvest 50 percent of your fall population, annual mortality (other causes of death) will be 30 percent, or a total mortality of 80 percent for the year. If you don't harvest a single quail by sport hunting, mortality for the year will still be a whopping 80 percent.

What it amounts to is this: If one thing does not get 80 percent of the quail in your fall population every year, something else will--something else such as bugs, buzzards, and opossums. Isn't it just as well, then, that you harvest at least some of them by sport hunting every year?

Where to Plant

Bicolor produces more seed when planted on fertile soils, but it grows well on infertile soils, especially if it is properly limed and fertilized. Avoid planting on moderately alkaline soils of the Blackland Prairie; on deep, sandy soils; on wet, poorly drained soils; on heavily shaded areas; and on areas grazed by livestock or dense populations of deer (more than one for every 20 to 25 acres).

Plant near thickets, briar patches, woods, or other natural quail cover. Plant where there is a shortage of winter food for quail or where you want to find quail consistently for ease of hunting or training of dogs. In most instances, plots can be located where they will interfere little, if any, with other activities on the area.



A thin stand of sericea provides the suitable winter roosting cover that is essential for quail.

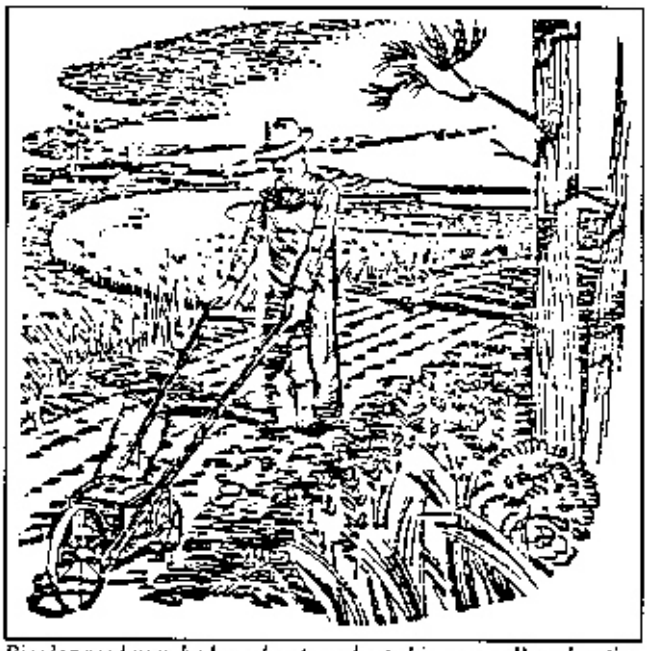
Good locations are field and forestland borders, idle crop fields, utility rights-of-way, openings in thin woodland, along ditch banks and hedgerows, land in set-aside government programs, and nearly anywhere else near woodland if your soil and other conditions are suitable. Your local agricultural agencies, wildlife consultants, and other trained professionals can tell you whether or not they are suited.

An ideal location, if the soil is suited, is the edge of crop fields, especially the sloping edges near woods or other natural quail cover. If bicolor is properly limed, fertilized, and cared for, it produces an abundance of seed in the partly shaded, unproductive areas on the edge of those fields. If the soil is suited, I also recommend planting a fifteen-foot strip of sericea (*Lespedeza cuneata*) between the bicolor and the crop field, which makes a total width of 30 feet (15 feet of bicolor and 15 feet of sericea) and a total length of 330 feet.

Sericea is a warm-season, perennial legume that usually grows 2 to 3 feet high. It produces an abundance of seed, but usually quail do not eat them unless other foods are scarce. However, sericea produces excellent nesting cover and the winter roosting cover that is essential for quail. Yes, the winter roosting cover that is essential for quail. Apparently, many wildlife biologists and authors overlook the fact that suitable winter roosting cover is essential for quail. If I have learned anything about quail in nearly fifty years of working with them, it is this: If suitable winter roosting cover is absent during hunting season, quail will be absent too--no ifs, ands, or buts.

Plant sericea between March 1 and August 15 at the rate of 18 pounds of scarified seed per acre or about 2 pounds of seed per plot (15 feet wide and 330 feet long). Avoid higher seeding rates than recommended here. The stand must be thin enough that quail can walk freely through it.

The seed should be inoculated before planting. The correct inoculant is available from your local seed and fertilizer dealer, but he many have to order it. Dodder-free seed are recommended. Your local agricultural agencies can give you detailed instructions for planting and maintaining sericea.



Bicolor seed may be broadcast or planted in rows. Broadcasting is recommended on new ground. A push-type garden planter is excellent for planting the seed in rows.

Some quail hunters, managers of quail preserves, and dog trainers may want to extend the thirty-foot planting of bicolor and sericea (15 feet of bicolor and 15 feet of sericea) around the entire edge of smaller crop fields, especially those on sloping land. Such plots will, of course, be longer than the usually recommended 330 feet. Besides providing permanent food and cover for quail, the extended plots will help control erosion, provide turn rows and travel lanes for farm machinery, and generally improve the appearance of crop fields.

Another option on the edge of larger crop fields is to plant a thirty-feet-wide plot of bicolor and sericea (15 feet of bicolor and 15 feet of sericea). Then skip one-quarter mile or 1,320 feet around the edge of the field and plant another thirty-feet-wide strip of bicolor and sericea. Plant nothing in the 1,320 feet intervals between the bicolor and sericea. In a few years, grasses and weeds will become established in the 1,320 feet intervals. Those grasses and weeds will provide nesting cover and the winter roosting cover that is essential for quail.

In February of every three to five years, either disk or burn the grasses and weeds in the 1,320 feet intervals. However, avoid disking or burning all grasses and weeds on the edge of a particular field during any one February. Leave some untreated to provide cover for quail. They can be treated in later Februarys.

If possible, locate plots several hundred feet from thriving stands of kudzu and Japanese honeysuckle. After a few years, those pesky vines can overtop a plot of bicolor and reduce its value to quail.

Number of Plots

From the standpoint of providing ample winter food for quail, there is no reason for planting more than one plot per twelve acres.

When to Plant

Planting dates vary a good bit, depending on whether you plant scarified seed or transplant one-year-old seedlings.

Scarified seed. The best dates for planting scarified seed are March 1 to April 15. By planting at that time, there will probably be enough moisture in the soil for the seed to germinate. Also, the spring rains that follow will probably provide the moisture that is necessary for the one- to six-week-old seedlings to survive. Avoid planting after May 15.

Seedlings. The best dates for transplanting one-year-old seedlings are December 1 to March 1. Acceptable dates are November 15 to March 15. Avoid planting after April 1.

Land Preparation

Break and harrow your plots several weeks before planting. That allows rains to settle the soil before planting. The seedbed for both seed and seedlings should be well prepared but firm. For success with seed, it is essential for the seedbed to be free of Bermuda grass, Johnson grass, Japanese honeysuckle, and other persistent plants that can ruin a plot.

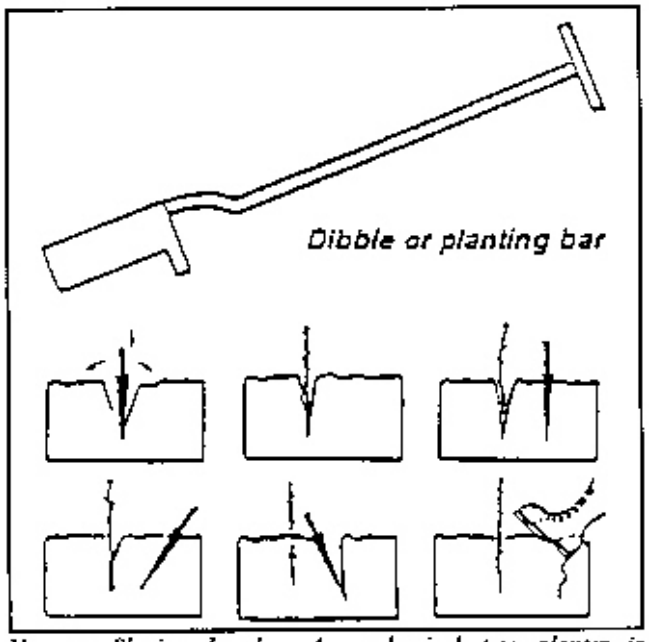
Lime and Fertilizer

Apply lime and fertilizer according to soil test recommendations. Apply both at the time of land preparation or a few days before. Your local agricultural agencies, especially your county Extension agent, have instructions for collecting soil samples. They may also have small containers in which to mail the samples to an approved laboratory for analysis.

In the absence of a soil test, apply lime and fertilizer according to instructions from the Natural Resources Conservation Service, your county Extension agent, a wildlife consultant, or other reliable source.

Because bicolor plots are small and frequently located in remote places, dealers may be reluctant--and may even refuse--to apply the lime and fertilizer that is necessary for success. Sometimes, the dealers simply cannot drive their loaded trucks over the rough roads to reach your plots. In such instances, it may be necessary to apply the needed lime and fertilizer by hand, but use whatever means are necessary in order to apply the recommended amounts. Otherwise, you will probably be disappointed with the results.

As a rule, avoid using fertilizer that contains nitrogen because added nitrogen is of little value to bicolor. However, nitrogen encourages Bermuda grass, Johnson grass, and other persistent plants that can damage bicolor plots, especially those in which seed are planted.



Use on Sloping Land. A mechanical tree planter is recommended when planting a good many plots on land that is more nearly level. Avoid using a mechanical tree planter on sloping land. The planter creates furrows which increase the likelihood of soil erosion.

HOW TO PLANT

As stated earlier, bicolor plots can be established by planting scarified seed or transplanting one-year-old seedlings. Both give excellent results when properly planted, especially if there is normal rainfall the first spring and summer and if grasses and weeds are controlled the first year. Here is how to plant seed and transplant one-year-old seedlings.

Scarified Seed

The seed may be planted in rows, or they may be broadcast. Broadcasting takes less time and usually results in a thicker stand. Broadcasting is usually recommended on new ground where the soil contains fewer seed of grasses and weeds. Rows, on the other hand, permit cultivation the first year which is desirable, especially if weeds are a problem.

For best results, inoculate the seed before planting. The correct inoculant is available from your local seed dealer, but he may have to order it.

Broadcasting. Lightly scarify the seedbed between March 1 and April 15 when there is enough moisture in the soil for the seed to germinate. A disk harrow with a slight angle is recommended for that scarification. Broadcast 1.5 pounds of seed evenly over the entire plot. That may be somewhat difficult because the seed are so small. In order to obtain more nearly even distribution, the seed may be mixed with granular fertilizer before broadcasting. Use a shoulder-supported, Cyclone-type seeder; or broadcast the seed by hand. Cover the seed with a cultipacker or other roller. Cover them no deeper than one-half inch. That is deep enough to prevent drifting during moderately heavy rains. Avoid traveling up and down slopes with a cultipacker or other roller, as that will reduce the likelihood of soil erosion.

Rows. Plots should contain six rows 330 feet long and spaced three feet apart. Plant one pound of scarified seed per plot between March 1 and April 15, and when there is enough moisture in the soil for the seed to germinate. Open a shallow furrow, place twenty to thirty seed per linear foot into that furrow, and cover them about one-half inch. Plant by hand or use a single-row, push-type garden planter. Control weeds between the rows, especially during the first year.

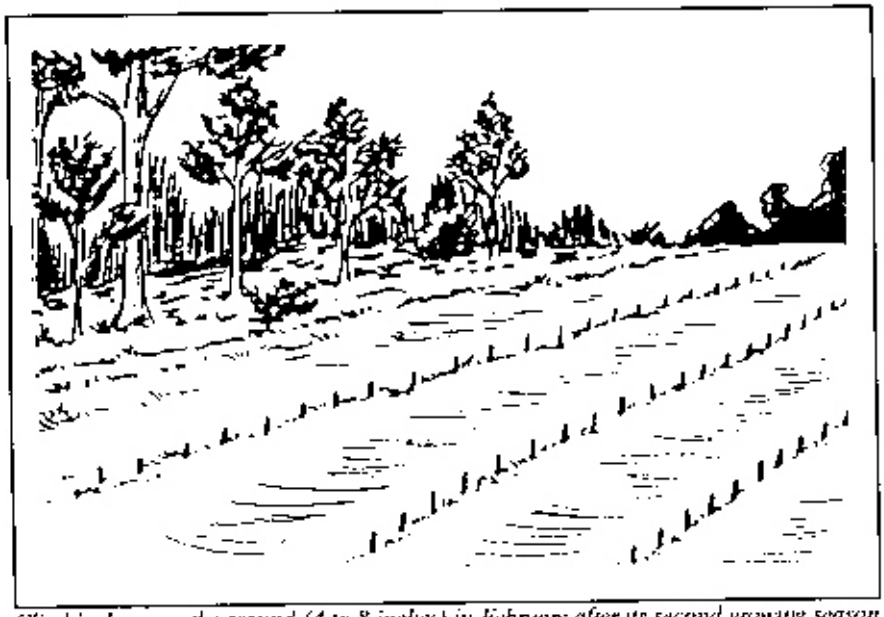
The reason for six rows spaced three feet apart and planting twenty to thirty seed per linear foot of row is that such a planting gives good ground coverage over the entire plot; and good ground coverage is important. It provides enough bicolor plants for ample seed production, and it results in an "umbrella" covering over the ground.

The umbrella shades grasses and weeds from under the inside four rows and affords overhead cover for quail, especially overhead concealment from hawks. The two outside rows usually have at least some grasses and weeds growing under them at all ages. However, after a few years, if there is an excessive growth of grasses and weeds under the inside four rows, the plot is providing less than maximum benefit to quail. It may be producing an abundance of seed, but they are falling into the grasses and weeds where it is difficult for quail to find them. On the other hand, quail usually "hold" better when pointed in plots that contain a good bit of low-growing, grassy-type vegetation, probably because the birds feel more secure in that kind of vegetation.

Seedlings

Ease and method of planting are determined to some extent by the size of the seedlings. Seedlings are considered small if their diameter about one inch above the root collar (enlargement on the stem at the depth that the seedling grew in the nursery) is less than one-eighth of an inch, medium if between one-eighth and one-fourth of an inch, large if more than one-fourth of an inch.

Larger seedlings are usually more difficult to plant. However, they seem to withstand rough treatment better than do smaller seedlings, and a higher percentage of the larger seedlings produce seed the first year.



Clip bicolor near the ground (4 to 8 inches) in February after its second growing season and in February every three to five years thereafter.

Freshly dug seedlings give better results. For that reason, have your land prepared and plant your seedlings immediately after receiving them. If you can plant the seedlings within a week or two, merely store them in a barn, basement, or other cool, dry place until they can be planted. If planting will be delayed more than several weeks, the seedlings should be "heeled in". Here is how to heel them in.

Remove the seedlings from the shipping wrapper or container, remove twine from around seedlings, spread the seedlings somewhat, place them upright in a trench 12 to 18 inches deep, and cover the roots with soil to about 3 or 4 inches above the root crown. Leave the stems uncovered.

The three common methods of transplanting seedlings are furrow, dibble, and mechanical tree planter. All three methods give good results when the seedlings are planted properly and weeds are controlled the first year. Regardless of the method you use, 1,000 seedlings are required to plant a plot. Here is how to transplant bicolor seedlings by the three common methods.

Furrow. The furrow method increases the likelihood of serious erosion on sloping land. For that reason, the method should be used on land that is more nearly level. Larger seedlings can be satisfactorily planted by this method. About four man-hours are required to plant a plot by this method.

Plow a rather deep furrow, preferably with a turn plow or a moldboard plow. The depth of the furrow will depend to some extent on the root length of the seedlings. Place the seedlings two feet apart against one side of that furrow--the side that is more nearly vertical. The roots may be trimmed somewhat to make them better fit the burrow.

Cover the roots with a second furrow. Cover them deep enough for the soil after it settles to be two or three inches above the root crown. Leave the stems uncovered. Repeat a two-foot intervals until all six rows are planted.

Dibble. A dibble is a metal planting bar--the kind commonly used in planting pine seedlings. Use a dibble on slopes where there is danger of erosion. Small and medium-sized seedlings are recommended when planting by this method. At least two men are needed--one to use the dibble and the other to handle the seedlings. About twelve to fourteen man-hours are needed to plant a plot by this method.

Insert the dibble eight to ten inches into the soil. Apply pressure with your foot as you insert the dibble. Work the handle back and forth to make a v-shaped hole, then remove the dibble. Place a seedling as far downward into the hole as possible, then pull it upward until the root crown is one or two inches below ground level. If necessary, the roots may be trimmed somewhat to make them fit the hole. Place the dibble about four inches behind the seedling (between the seedling and the man who is using the dibble), and again work the dibble eight to ten inches into the soil. As you do so, apply pressure with your foot. Pull backward on the handle of the dibble to pack soil around the roots. Push forward on the handle to pack soil around the root crown. Firm the soil around the seedling with your heel. Repeat at two-foot intervals until all six rows are planted.

Mechanical Tree Planter. A tractor-drawn tree planter is recommended if you are planting a good many plots on land that is more nearly level. Medium-sized seedlings are recommended when planting by this method. Avoid using a tree planter on sloping land because it leaves furrows which increase the likelihood of soil erosion. At least two men are needed--one to drive the tractor and the other to place the seedlings. Actually, it is better if the planter will accommodate two men. About three or four man hours are needed to plant a plot by this method.

Place the seedlings well forward in the open trench. Set the seedling so that it will be covered about two inches above the root crown. Hold the seedling straight upward until the soil closes around the roots and is packed by the wheels. Repeat at two-foot intervals until all six rows are planted.

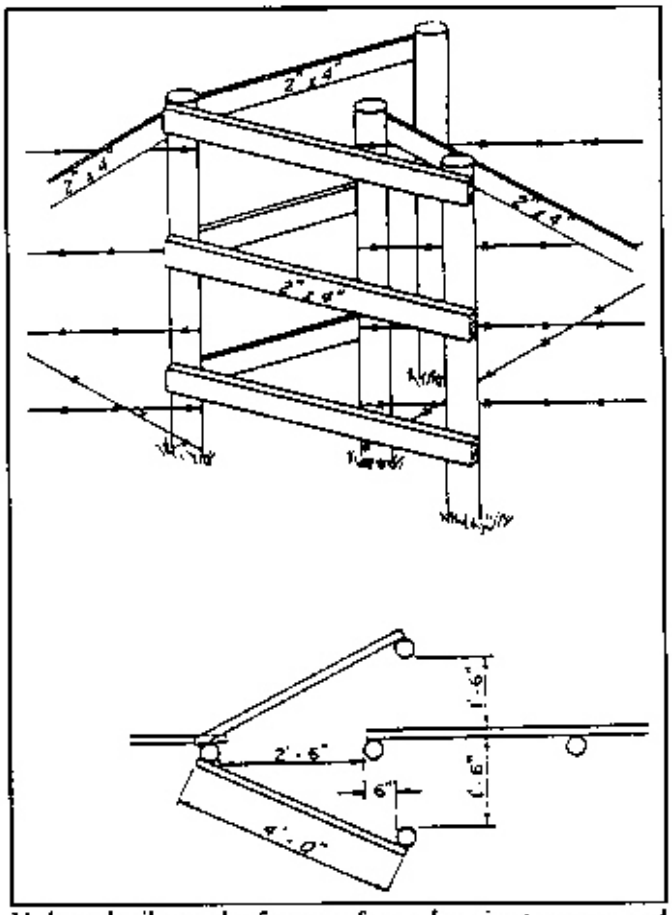
When using a tree planter, there is danger of driving the tractor too fast for proper placement of seedlings in the ground. There is also danger of spacing the seedlings farther apart than the recommended two feet and the rows farther apart than the recommended three feet. So, be careful when using a tree planter. Incidentally, seedlings that are run over by a tractor during planting may appear to be damaged, but usually they are not.

HOW TO MAINTAIN

Like other shrub lespedezas, bicolor puts forth new growth every spring from the roots, stumps, and stems of the previous year. Most of the new growth seems to come from the roots and stumps after winters that are colder than normal. With proper care, your plots should last 50 years or more. Here is how to make them last that long.

Protect from grazing by livestock. Grazing in spring, summer, and early fall either kills the plants or reduces seed production. Grazing at other times reduces a plot's value as overhead cover for quail.

If fencing of individual plots is necessary, construct (1) at least one gate that is wide enough for farm tractors, mowers, disk harrows, and other farm equipment to enter and (2) at least two v-shaped stiles--the kind that allows people to enter but excludes livestock. Fences equipped with such stiles are much safer to cross, and they may prevent snagging and ripping of expensive trousers.



V-shaped stiles make fences safer and easier to cross, and they prevent ripping of expensive clothing.

Clip or mow your plots four to eight inches above the ground in late February after their second growing season and apply fertilizer according to soil test recommendations. For example, a plot planted in seed during the spring of the year 2000 should be clipped or mowed in late February of 2002, or the February following its second growing season. A plot planted in seedlings during the winter of 1999-2000 should be clipped or mowed in late February of 2001. That is the second growing season for the seedlings (one year in the nursery and one in the plot).

If grazing by excessively dense populations of deer (more than one per 20 to 25 acres) is likely, postpone the application of fertilizer until the beginning of the second growing season after clipping. In most instances, that postponement discourages browsing by deer.

Clipping causes the stumps and roots of each plant to put forth several upright stems, thereby thickening the stand. Clipping also prevents pine, plum, sassafras, persimmon, and other unwanted plants from becoming established in the plots. A tractor-drawn rotary mower of the Bush Hog type is excellent for clipping bicolor. A plot that has been clipped with a rotary mower may appear damaged for a few weeks, if mowed with a dull blade, but it is not damaged. It will look good after new growth appears.

Clip in late February every 3 to 5 years after the initial clipping; and immediately after each clipping, apply fertilizer according to soil test recommendations. Again, if there is the likelihood of browsing by dense populations of deer, postpone the fertilizer until the beginning of the second growing season.

Plots can be prescribe burned every year in late February with no apparent damage to bicolor, but fire at other times either damages the plants or makes hunting and bird-dog work less enjoyable. As stated earlier, after 10 to 12 years of occasional burning in late fall and winter, bicolor and other shrub lespedezas begin to spread, especially in heavier soils. In such soils, fire causes any shrub lespedeza to become a pest after 20 to 25 years.

Have your soil tested every 5 to 7 years, and apply lime and fertilizer according to the latest soil test recommendations.

EFFECT OF SPORT HUNTING ON GAME IN THE SOUTHEAST

INTRODUCTION

What effect is sport hunting having on wildlife in the Southeast? Are we reducing next year's crop by harvesting too heavily during hunting seasons? Should we restrict harvest by reducing bag limits, length of seasons, or both? Should we prohibit sport hunting as advocated by anti-hunting groups and individuals? Should we liberalize hunting regulations to permit the harvest of more game? Are there biological reasons for changing our current hunting regulations? These questions are among those being asked by landowners, hunters, lawmakers, and others interested in wildlife.

Let's discuss the effect of sport hunting on game in the Southeast. In doing so, we will answer the above questions and provide the information you need in order to make better decisions regarding hunting and wildlife.

In our discussion, we will steer clear of emotionalism. That's the realm of those opposed to sport hunting--the kind of hunting that is as much a part of our heritage as the Fourth of July.

Hereafter, I will refer to those opposed to sport hunting as "anti-hunters" or "antis." In addition to emotionalism, the anti-hunters commonly use part truths, innuendoes, and other ploys of propaganda in their war against sport hunting. Such tactics may have temporary value, especially for fund raising purposes. However, their lasting value is questionable. So, we will stick with facts as revealed by research and leave the questionable tactics to them.

Should sport hunting be banned as advocated by anti-hunting groups and individuals? Of course not! Sport hunting is about the same to game production as harvesting peanuts is to peanut production. Both crops (game and peanuts) soon go to waste if not harvested every fall and early winter.

Prepared by Robert E. Waters, Wildlife Consultant/Free-Lance Writer, 318 Bowden Drive, Auburn, Alabama 36830, (334) 887-9460, October 1994.

In fairness to the antis I must admit, however, that sometimes they use whole truths in their war against sport hunting. Furthermore, they use those truths to remind the public of the widespread, inexcusable conduct of the outlaws in our midst who are masquerading as sport hunters.

We will start by defining game and sport hunting. Then, we will discuss the definitions. That may sound confusing, but it is not. Read on.

Game

Game animals are those for which there is a hunting season somewhere in their ranges. The ruffed grouse, for example, is an important game bird in parts of its range. It is present in small numbers in Alabama, my home state, but there is no hunting season for the bird in the state. Yet, for our purposes, the ruffed grouse is a game species--there is a hunting season for it in parts of its range.

The terms "game" and "wildlife" may be confusing. If so, this will clarify the confusion: Game is wildlife because it is wild, but wildlife is not necessarily game. The pileated woodpecker, for example, is wildlife--it is not domesticated. However, it is not game because there is no hunting season for the big woodpecker anywhere in its range. When I use the term "wildlife" herein, I am usually thinking of game.

Sport Hunting

For the most part, sport hunting is the harvesting of wild game by lawful means during hunting seasons. Some call it "recreational hunting." I refer to it sometimes as simply "hunting."

Killing deer by spotlighting or "shining" their eyes at night during hunting season is not sport hunting because it is not legal. For the taking of game to be sport hunting, it must be done by lawful means during hunting seasons.

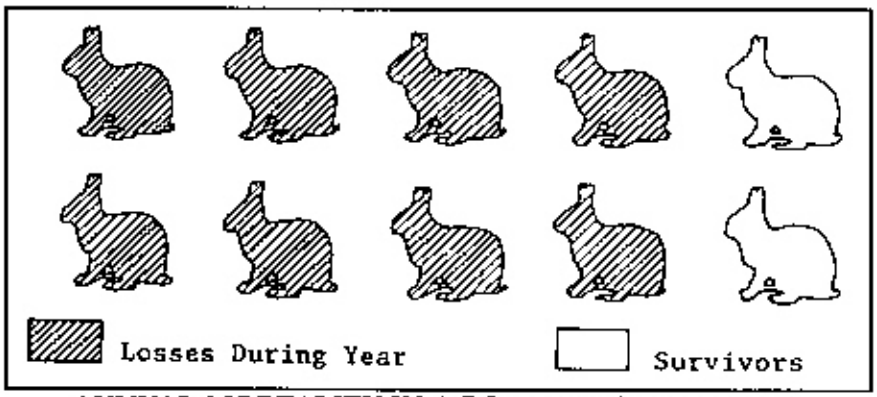
There are, however, a few instances in which the taking of game is not the objective of sport hunting. The chasing of foxes by hounds is an example. You probably know that fox hunters are among the most avid sport hunters in the Southeast. Their objective is to chase foxes, not harvest them. Also, about the same is true of hunters who are devotees of field trials for hunting dogs.

Outlaw Hunters

Only hardened, consistent violators and outlaws who are masquerading as sport hunters approve the illegal taking of game. At least, their actions indicate their approval.

Hardened, consistent violators are outlaws who are known in their communities and among law enforcement personnel as having no regard for game laws. They take game illegally during hunting seasons and throughout the year. We sport hunters can do little about hardened violators except promptly report them to our state wildlife agency; and we must do that.

Outlaws masquerading as sport hunters are the hunters about whom the antis are telling the truth. That truth is threatening sport hunting because the antis are informing the public of the large number of outlaws in the fields and woods with us sport hunters.



ANNUAL MORTALITY IN A POPULATION OF GAME

Eighty percent or more of the rabbits in a fall population dies from one fall to the next, whether they are hunted or not. Nearly all other game animals have similarly high yearly death rates. That is why game cannot be stockpiled and why banning sport hunting as advocated by anti-hunters would result in no increase in populations of most species.

You are probably on a first-name basis with several of these outlaws. The prominent businessman who is active in civic and church affairs but who shoots more than the daily limit of doves is an example. He could be the one who hands out programs at your church every Sunday morning.

These outlaws buy hunting licenses every year. They dress like sport hunters. They are in the fields, marshes, and woods with sport hunters. In addition, because of their appearance and association with sport hunters, many people assume they are sport hunters; but they are not. They are thieves, and like bank robbers, shoplifters, and other thieves, they must stop their stealing or pay the penalty.

We sport hunters need these thieves in our midst about like a rooster needs dental floss, not because their stealing is always detrimental to wildlife, but because the outlaws are portraying a bad image of hunters. In the long run, that bad image can be disastrous to sport hunting. Why? Because the public frequently judges all hunters by the inexcusable conduct of the pseudo sport hunters in our midst.

Most people in the Southeast, including millions of non-hunters, are not opposed to sport hunting and may never be. However, like other law-abiding people, they are opposed to the illegal taking of game by outlaws. Because of that opposition, they may support the banning of sport hunting in the hope that it will curtail the illegal taking of game by outlaws who are in the fields and woods with sport hunters. That is why we must convince the outlaws in our midst that we can tolerate no more of their illegal activities.

Here is what we should do when attempting to convince an outlaw in our midst to stop taking game illegally: Remind him in a friendly manner of his illegal taking of game (mention times and places) and explain how his conduct is providing the antis with

ammunition for their war against sport hunting. This friendly reminder and warning should be a private matter between you and him. It is other people's business, of course, but at this stage only you and the outlaw should be involved.

If the outlaw fails to heed your friendly warning and continues to take game illegally, you and one or two other sport hunters should warn him a second time of his inexcusable conduct and assure him that sport hunters can tolerate no more of his illegal shooting of game.

In most instances, one of those warnings will be effective. However, occasionally they are no more effective than pouring perfume on a skunk. If neither is effective, treat the outlaw exactly as you would a hardened violator--promptly report him to your state wildlife agency.

Wildlife agencies in some southeastern states maintain toll-free telephone numbers for reporting game law violators. Check to see if your state maintains such a number. If so, post it near your telephone for immediate use in reporting violations. Also, do not hesitate about testifying in court to help convict the thieves you have observed breaking game laws.

WHAT WILDLIFE BIOLOGISTS SAY ABOUT IT

When we need the most reliable information on a subject, we turn to those best informed on that subject. When we need the most reliable information on the effect of sport hunting on game in the Southeast, we must turn, then, to authorities on that subject. That is, we must turn to wildlife biologists and to university personnel at wildlife research stations in the Southeast.

Collectively, wildlife biologists have spent thousands of man-years in research on sport hunting and its effect on game. Their statements and opinions are based on conclusions from that research. These highly trained professionals are neither for nor against anything related to wildlife until they know what effect that thing is having, or will have, on wildlife. Here is what wildlife biologists say about the effect of sport hunting on game in the Southeast and some reasons for their statements.

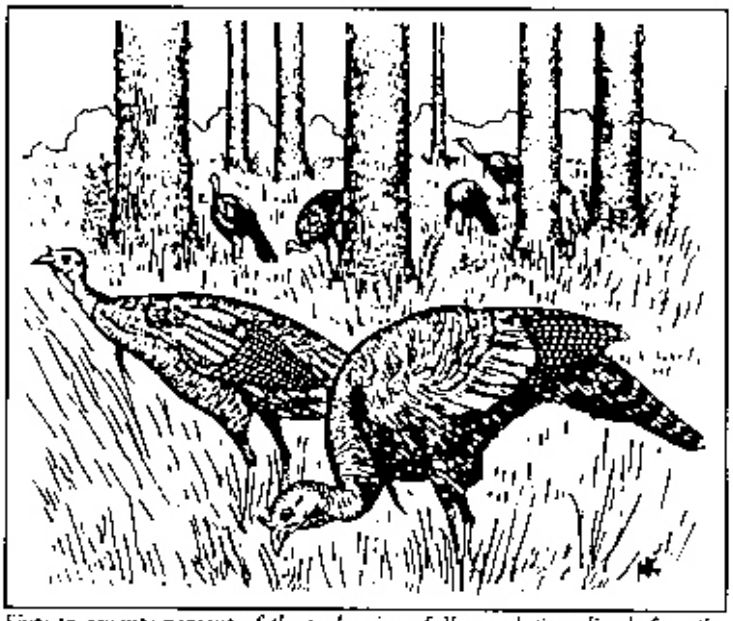
Game Animals Cannot Be Stockpiled

Game animals cannot be stockpiled because a majority of each species dies before it is a year old, whether hunted or not. These deaths are called "annual mortality," or the yearly rate at which wild animals usually die. Annual mortality is Nature's way of removing animals that are not needed for breeding stock. We will say more about annual mortality later.

Game is somewhat like a yearly agricultural crop. Game is somewhat like corn, cotton, soybeans, and other agricultural crops that are grown in spring and summer and harvested in fall and winter. Wildlife produces its young during breeding season, which is usually spring and summer. The populations of resident, non-migratory species are highest for a short time after the peak of breeding season. The wild turkey is an example. The populations of migratory species, on the other hand, are usually highest in winter. Ducks, woodcock, and others that fly into the Southeast are examples.

Annual mortality takes a good bit of its toll on adults during breeding season, especially on females of ground-nesting birds, and it continues taking its toll on adults and young after breeding season. Mortality increases in late fall and continues to late winter when populations of resident, non-migratory species decline to the number the land can support during that unfavorable season.

That low population in late winter is the carrying capacity of the area. It is the breeding stock needed to produce the next year's crop. Also, because the land cannot support more animals, late winter populations remain essentially the same from year to year, whether hunted or not. That is why game cannot be stockpiled, and why sport hunting has no long-term effect on game populations. We will say more about carrying capacity later.



Sixty to seventy percent of the turkey in a fall population dies before the next fall, whether they are hunted or not. The resource is simply too valuable to let that many go to waste without harvesting at least some of them by sport hunting every year.

All southeastern states have a spring hunting season for gobblers, and most of them also have a short fall season. As a rule, the spring season is the more popular with hunters. However, in many areas of the Southeast, there is no biological reason for not having a short fall season for hens and gobblers. Such a season allows sport hunters to harvest more of the yearly crop before annual mortality has time to take its customary heavy toll.

Here is another way in which game and some of our common agricultural crops are alike. A landowner cannot grow soybeans in a field for five consecutive years and, at the end of the fifth growing season, harvest the soybeans he has grown all five years. He can harvest only those grown in the fifth year. Those produced in the other four years have gone to waste before the fifth year. However, each year's crop could have been, and really should have been, harvested every year.

Likewise, a landowner cannot produce game on a tract of land for five consecutive years and, at the end of the fifth year, harvest the game produced all five years. He can harvest a good many of the animals produced the fifth year and only a few of those produced the other four years. Like the soybeans, game crops of the other four years, for the most part, have gone to waste; and late winter populations have remained essentially the same from year to year. That is a good reason for harvesting part of the annual crop of game every year by sport hunting.

Annual mortality. Here are the high yearly rates at which Nature harvests some of the common game animals in the Southeast. Nearly all other game animals in the Southeast have similarly high yearly death rates. Those percentages mean that eight of every ten quail in a fall population die before the next fall, whether they are hunted or not. They also mean that eight or more of every ten rabbits in a fall population die before the next fall, whether or not anybody fires a shot at them. Finally, these numbers mean that seven of every ten doves in a fall population die before the next fall, whether they are hunted or not. According to a study in Florida in the early 1950's, 50 percent of the young doves died within ninety days after they learned to fly and left the nest. If that is happening throughout the Southeast, it is another biological reason for opening dove season in early September before annual mortality has time to take its customary toll.

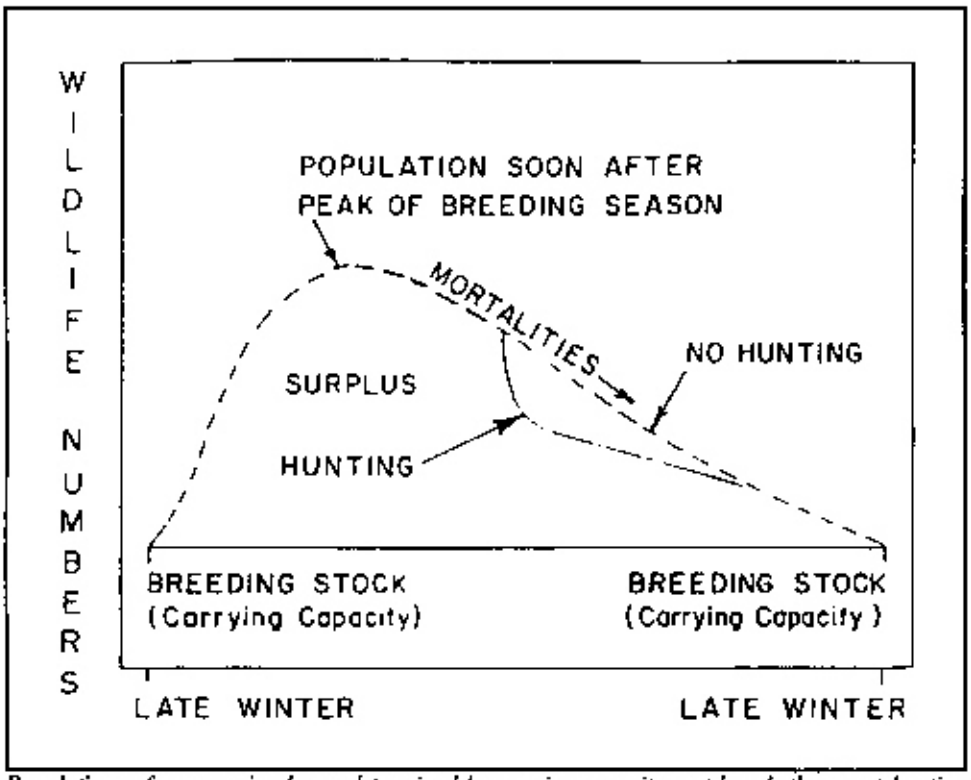
Cottontail Rabbit	80 percent or more
Gray Squirrel	60 percent
Mourning Dove	70 percent
Wild Turkey	60 to 70 percent
Wood Duck	70 percent

One of my jobs as a wildlife biologist several decades ago was to age and weigh deer killed in a wildlife management area in north Alabama. We opened the area to hunting in 1957. It had been closed since the mid-1920's when 105 white-tailed deer were brought from Michigan and released in the area. There had been some illegal hunting in the area, of course, but not a great deal. There had been two major die-offs of deer--one in 1949 and the other in 1950. There had also been several minor die-offs, usually in late summer. We aged and weighed every deer killed in the area in 1957, the first year of hunting. The average age of those harvested that year was between 2.5 and 3.5 years.

You may know that white-tailed deer will live twenty years, but few on that management area had reached their fifth birthdays even with no hunting allowed. What had been happening to them since their re-establishment in the mid-1920's? Nature had been harvesting them every year and had harvested them exceptionally heavy in 1949 and 1950. For practical purposes, thousands of deer in the area had gone to waste. From a biological standpoint, the area provided a classical example of mismanagement of deer and other game. Similar waste and mismanagement would occur in millions of areas of the Southeast if sport hunting were banned, as advocated by anti-hunters.

If hunters don't get them, something else will. That does not sound right, but it is; and here is how it works. When hunters take a certain percentage of a game population during hunting seasons, annual mortality takes an additional toll until total mortality for the year--sport hunting and all other mortality--equals, but does not exceed, the high yearly death rates indicated earlier for some of our common game species. That fact should be remembered by sport hunters, landowners, lawmakers, and others interested in the best use of our wildlife resource.

What it amounts to is this: If man does not harvest a majority of the animals in fall populations of game every year by sport hunting, that majority will die of natural causes and become food for predators and scavengers such as bugs, buzzards, and opossums. Yes, predators and scavengers are desirable in the natural scheme of things. However, do the scavengers have to gorge on our valuable game resource?



Populations of game animals are determined by carrying capacity--not by whether sport hunting is permitted. Because of that, there is no biological reason for banning or further restricting sport hunting of most species, especially of species that have never been eliminated from extensive areas in the Southeast. Their populations reached carrying capacity many decades ago, and their late-winter numbers have remained essentially the same from year to year, whether hunted or not.

Wise use of the game resource dictates that some of the surplus (animals not needed to produce the next crop) be used for sport hunting, and that all of the surplus not become food for predators and for scavengers such as bugs, buzzards, and opossums. That would be their fate if sport hunting were banned as advocated by anti-hunters.

This will help explain how sport hunting and annual mortality are related and why sport hunting has no lasting effect on game populations: If hunters take 50 percent of the quail in a fall population, mortality from all other causes during the year will be 30 percent of that population, or a total mortality of 80 percent for the year. If hunters take 10 percent of the fall population, mortality from all other causes will be 70 percent, or a total mortality of 80 percent for the year. If hunters don't fire a shot at quail, mortality for the year will still be a whopping 80 percent of the fall population. So, if one thing does not get 80 percent of the quail in a fall population, something else will.

It works the same way with other game animals. Only total mortality for the year differs. For the mourning dove, total mortality would be 70 percent; for the wild turkey, it would be 60 to 70 percent; and so forth.

Wise use of the game resource dictates that hunters get a high percentage of the surplus animals every year and that they not become food for predators and scavengers. When harvested by sport hunters, game furnishes human food and wholesome recreation. Also, for many landowners, game provides supplemental income from the lease of hunting rights or the

sale of daily permits to hunt. However, when game is harvested by Nature, predators and scavengers receive most of the benefit. Does one need to be a Phi Beta Kappa to know which is the better use of the resource?

The end result, then, is the same, whether the animals are hunted or not. Again, that is why game cannot be stockpiled and why late winter populations of most species do not increase when sport hunting is banned and nothing else done. Are the anti-hunters not aware of that, or do they deliberately overlook those facts in their propaganda against sport hunting?

Carrying capacity. Something else apparently not understood by anti-hunters is that land has a definite carrying capacity for game and other wildlife. Carrying capacity is the maximum number or weight of a particular kind of wildlife an area can support during the least favorable season, usually late winter in the Southeast.

If a non-migratory species is present and has never been eliminated from an area, the only known way of significantly increasing its population is to increase the area's carrying capacity for that species. In nearly all instances, that involves improving the quality, quantity, or distribution of either food, cover, or water for the desired species.

Reproductive Potential

How do we know that statements in the preceding paragraph are true? Because each species has a high reproductive potential, or the ability to produce offspring. Some refer to that ability as "biotic potential," others as "breeding rate." I prefer "reproductive potential," probably because I have used the term for more than forty years. We will use the bobwhite quail as an example of the high reproductive potential of game animals.

After the female and male bobwhite pair off in the spring, they remain mated throughout the breeding season unless a disaster befalls one of them. The female usually lays only one clutch of 14 eggs during each breeding season. That simplifies the arithmetic involved in illustrating the bird's reproductive potential. Yet, it may be difficult to follow my explanation and assumptions under the table below.

REPRODUCTIVE POTENTIAL OF THE BOBWHITE QUAIL				
At End Of:	**Young**		**+ Adults**	**= Total**
First Year		14	2	16
Second Year	(16 ÷ 2)14 =	112	16	128
Third Year	(128 ÷ 2)14 =	896	128	1,024
Fourth Year	(1,024 ÷ 2)14 =	7,168	1,024	8,192
Fifth Year	(8,192 ÷ 2)14 =	57,344	8,192	65,536
Sixth Year	(65,536 ÷ 2)14 =	458,752	65,536	524,288
Seventh Year	(524,288 ÷ 2)14 =	3,670,016	524,288	4,194,304
Eighth Year	(4,194,304 ÷ 2)14 =	29,360,128	4,194,304	33,554,432
Ninth Year	(33,554,432 ÷ 2)14 =	234,881,024	33,554,432	268,435,456
Tenth Year	(268,435,456 ÷ 2)14 =	1,879,048,192	268,435,456	2,147,483,648

If one starts in the spring with a pair of adult quail (one male and one female), if they accept each other as mates and the female lays 14 eggs (the average number laid by the female bobwhite in the Southeast), if all the eggs hatch, and if all the chicks and the 2 adults survive until the following spring, there will be a total of 16 quail. (Sex ratios in the bobwhite are about equal.) If those 16 pair off (male and female), there will be 8 pairs. If each of the 8 females lays 14 eggs, if all the eggs hatch, and if all the chicks and the 16 adults survive until the following spring, there will be 128 quail from only a pair two years before. The potential life span of the bobwhite is 10 years, and if we continued the arithmetic and the assumptions until the tenth year, there would be an astounding 2,147,483,648 quail from only a pair ten years before. That is the bird's reproductive potential.

Nearly all other game animals in the Southeast have high reproductive potentials similar to that of the bobwhite. However, those potentials are never expressed in wild populations because of decimating factors such as quality, quantity, and pattern or distribution of food, cover, and water; and because each animal has definite space requirements. We should be pleased that they are never expressed in wild populations. If so, we would be up to our drawers in wildlife.

Prohibiting Sport Hunting

Prohibiting sport hunting as advocated by anti-hunters would result in no increase in populations of resident, non-migratory species that have never been eliminated from extensive areas in the Southeast. Why? Because, with their high reproductive potentials, their populations have already reach carrying capacity. Because they have done so, there will be no further population increase unless there is an improvement in either quality, quantity, or pattern (distribution) of food, cover, or water for wildlife.

Contrary to the propaganda of anti-hunters, prohibiting sport hunting would have no effect whatsoever on late winter populations of most resident, non-migratory species. Their late winter populations have already reached carrying capacity, and their numbers will remain essentially the same from year to year, whether the animals are hunted or not. Is there any biological reason, then, for not harvesting at least some of them by sport hunting every year?

However, that is not always true of deer and turkey in the Southeast. Unrestricted hunting and changes in land use eliminated those two species from most of the Southeast about the turn of the century. They have been re-established in millions of areas since World War II. For that reason, many areas in the Southeast can support more deer and turkey than they are now supporting. On some of those areas, sport hunting should be restricted for a few years, not prohibited.

If remnant populations of deer and turkey are present and habitat is suitable, there is no biological reason for not allowing at least a few days of hunting for antlered deer in the fall and a similar season for gobblers in the spring. Under those conditions (remnant populations and suitable habitat), such seasons have no noticeable effect on populations. In fact, under those conditions, populations will continue to increase, and after a few years there will be enough deer and turkey for liberal hunting seasons. We have seen that happen in thousands of areas in the Southeast since World War II.

I will use deer in my home county, Tallapoosa County, Alabama, as an example. Like deer in most of the Southeast, they were eliminated from the county about the turn of the century. According to the 1908 annual report of the Alabama Department of Game and Fish (later known as the Alabama Department of Conservation, and now as the Alabama Department of Conservation and Natural Resources), there were "few" deer in the county.

In the late 1930's, the Alabama Department of Conservation and Alabama Polytechnic Institute (now known as Auburn University) made a survey of game resources in the state. The results of that survey were published in 1939 as The Status of Game Birds and Mammals in Alabama. According to that publication, the presence of deer in the county was "doubtful." I believe they were absent at that time.

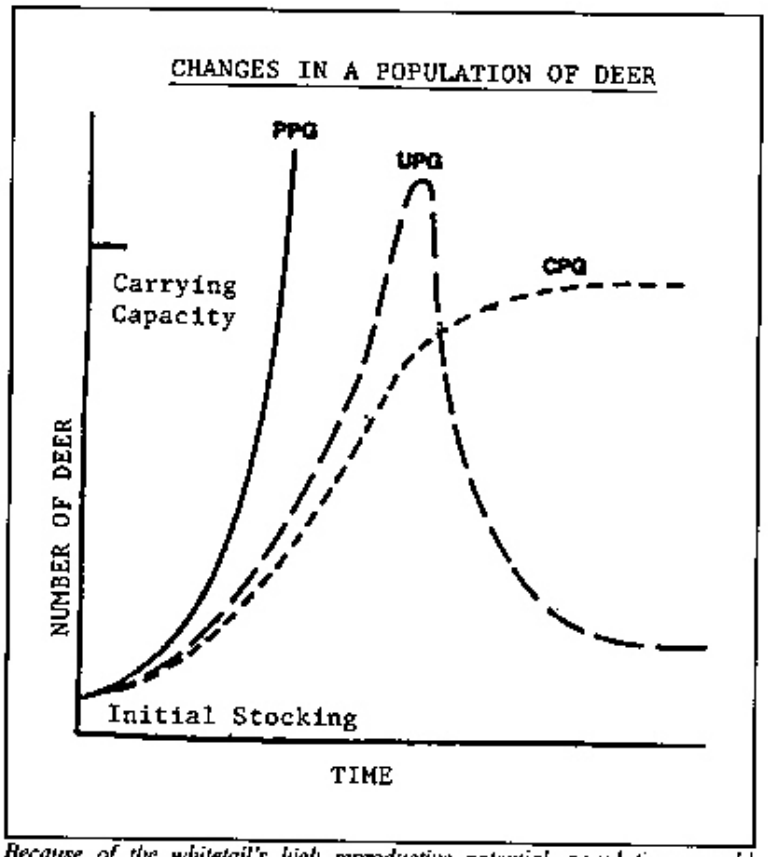
The state stocked deer in the southern part of the county in 1955-1956. Between then and 1964, the state stocked deer at two other places in Tallapoosa County. One hundred and nine deer were released at the three locations. From those releases, the county's deer population has grown to more than 15,000, and it is still growing.

In 1963, a few days of deer hunting were permitted in the area where deer were released in 1955-1956. Since then, hunting seasons and regulations have been liberalized from time to time. Every year, more and more deer are being harvested in the county. For the last ten or twelve years, there has been a deer season in all of the county. That season opens in November and closes in January. Furthermore, for the past few years, there has been a hunter's choice or either-sex season in most of the county. That season permits the harvest of more doe deer. For the most part, landowners and hunters are using the season for that purpose.

Still, more deer must be harvested in the county. If not, the population will soon outgrow the land's ability to support them. It is already doing so in most of the county. When a population of deer outgrows the land's ability to support them, many of the younger and older deer die and become food for bugs, buzzards, and other scavengers. The county's deer resource is too valuable to let that happen.

Contrary to the propaganda of anti-hunters, the best known way of preventing a higher degree of overpopulation in the county and on similar areas in the Southeast is to harvest more and more deer of both sexes every year by sport hunting. Prohibiting sport hunting and doing nothing else improves neither the quality, the quantity, nor the distribution of food, cover, and water for wildlife. In other words, it does not increase carrying capacity. Because it does not increase carrying capacity, it does not increase populations of resident, non-migratory species that have never been eliminated from the area. The bobwhite, cottontail rabbit, and gray squirrel are examples.

The next time you are challenged by an aggressive anti-hunter, ask him or her the following questions: How long has it been since you have killed the daily limit of cardinals? How long has it been since you have known of an adult who has even shot at a cardinal? After the anti-hunter has answered "never" or "many years" to your questions, ask if he or she has noticed an increase in the summer population of cardinals during the last ten, twenty, or thirty years.



Because of the whitetail's high reproductive potential, populations would increase at a rapid rate if there were no deaths except from old age. That rapid increase is represented by line PPG, potential population growth. That potential is never expressed in wild populations because there are deaths from accidents, diseases, and many other causes besides old age.

If a population of deer in the Southeast is not controlled by sport hunting, the population soon increases beyond carrying capacity. When that occurs, the deer's food supplies are exhausted, which results in massive die-offs (especially of the older and younger deer). Such population increases and subsequent drastic decreases are indicated by line UPG, uncontrolled population growth.

Controlled population growth, represented by line CPG, is the best known way of managing deer populations in most areas of the Southeast. Such control maintains deer populations somewhat below carrying capacity, prevents massive die-offs, and ensures high sustained annual yields of top quality deer.

In order to control population growth, it is usually necessary to harvest at least one-third of the fall population every year and to harvest equal numbers of both sexes.

The anti-hunter may have seen a dozen or more cardinals feeding on the seed of giant ragweed or some other choice winter food, especially at a feeder or on the edge of a country road. However, there has been no significant population increase because the population

reached carrying capacity many years ago. Even with no hunting, the population has not increased. It would work the same way with game animals if sport hunting were banned, especially with species that have never been eliminated from extensive areas in the Southeast.

If game populations in late winter do not increase beyond carrying capacity (which they do not), and if annual mortality takes a majority of each species every year whether the animals are hunted or not (which it does), why not harvest at least some of them by sport hunting every year? There is no biological reason for not doing so.

Actually, carrying capacity for white-tailed deer may be reduced if a large portion of the animals on an area is not harvested every year by hunting. Here is why: For the most part, the panther (cougar) and nearly all other large natural enemies of deer have been eliminated from the Southeast. So, today we have few predators that are capable of keeping deer numbers in balance with their food supplies. In time the coyote, with its increasing numbers, may become effective. However, today, if man does not harvest the surplus deer every year by sport hunting, areas soon become overpopulated and soon display the following undesirable characteristics:

1. Choice deer foods are eliminated.

2. The fawn crop is smaller.

3. Mortality is higher, especially among fawns and the older deer.

4. Average weight of deer in the various age classes decreases.

5. Bucks have smaller antlers.

6. Harvestable bucks make up a smaller percentage of the population.

7. In farming areas, crop damage is more serious.

8. Parasites and diseases of deer are more prevalent.

9. Forest reproduction is heavily browsed.

10. Young planted pines, especially those grown on fertile soils in nurseries, are heavily browsed.

The best known way of preventing an overpopulation of deer or a higher degree of overpopulation in most areas of the Southeast is to harvest at least one-third of the fall population every year by sport hunting. That harvest should consist of equal numbers of both sexes. For example, if the estimated fall population in an area is sixty deer, at least twenty of them should be harvested during hunting season. That harvest should consist of ten bucks and ten does. However, if you are managing your deer to produce trophy bucks or to attain some other specific objective, you should harvest according to recommendations of a wildlife

biologist or a qualified consultant who is aware of your management objectives and who has made a thorough inspection of your area.

ANTIS USE PART-TRUTHS

IN THEIR WAR AGAINST SPORT HUNTING

As stated earlier, among other ploys of propaganda, the antis use part-truths in their war against hunting. We sport hunters should admit that some of what they are saying is true. To do otherwise would damage our credibility. However, we should counter their part-truths with "the rest of the story." Here are a few of those part-truths and the rest of their stories.

Game Animals Killed by Hunters Feel Pain Before Their Deaths

That is usually true. The rest of the story is that game animals killed by predators, those that die from diseases after being weakened by lack of food or exposure to unfavorable weather, and those that die from numerous other natural causes, also feel pain before their deaths. However, those that die from natural causes frequently have drawn-out, merciless deaths; whereas, those killed by sport hunters usually have quicker, more merciful deaths. Does one need the smarts of a rocket scientist to know which is better from the standpoint of pain to the animals?

Hunters Wound Animals and Leave Them to Die Slow, Painful Deaths

According to the antis, hunters wound animals, which results in long, lingering deaths. That is a part-truth. The whole truth is that hunters *occasionally* wound animals, which results in slow, painful deaths. The rest of the story is that there is no acceptable way of preventing hunters from wounding at least a few animals. Every sport hunter I have ever known would rather miss cleanly than to wound an animal and leave it in the field for a long, painful death. That is why hunters equip their rifles and sometimes other firearms with expensive telescopic sights to ensure quick, merciful kills. That is also the reason many hunters use guns and ammunition far more powerful than needed, or required by law, for the game they are hunting.

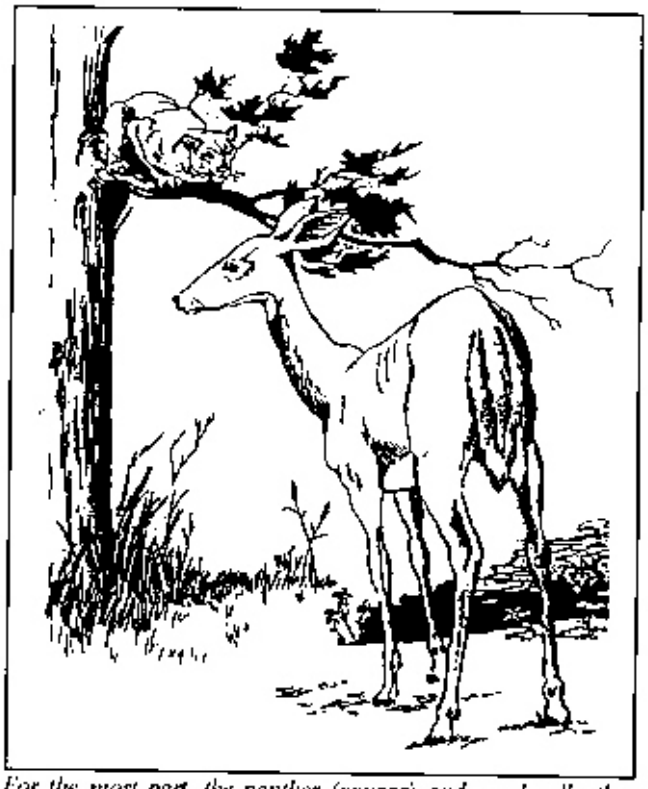
Hunters Kill Females With Eggs in Nest or Young Unable to Care for Themselves

That, too, is a part-truth. The whole truth is that hunters *occasionally* kill females with eggs in the nest or young not old enough to care for themselves. The rest of the story is that some game animals in the Southeast have such long breeding seasons that it is impossible to set biologically sound hunting seasons that will prevent the harvest of at least a few such females.

The U.S. Fish and Wildlife Service and wildlife agencies in southeastern states have been criticized for permitting dove hunting when a few nests contain eggs and when some of

the young are unable to care for themselves. For that reason, we will use the mourning dove as an example and discuss the pros and cons of setting dove seasons at various times.

In most of the Southeast, nesting season for the mourning dove extends from February through mid-October. The peak of nesting is in May and June, but active nests may be found during any month. As mentioned earlier, annual mortality takes 70 percent of the yearly crop of doves, whether they are hunted or not. Annual mortality starts taking its toll as soon as the young are hatched. In the Florida study mentioned earlier, 50 percent of the young died within ninety days after they learned to fly and left the nest. In view of those facts, it seems that we have three options regarding dove seasons in the Southeast. Let's discuss them.



For the most part, the panther (cougar) and nearly all other large natural enemies of deer have been eliminated from the Southeast. Because of that, we have few predators today that are capable of keeping deer numbers in balance with their food supplies. If man does not harvest the surplus every year by taking equal numbers of both sexes, preferably by sport hunting, areas may become overpopulated, which results in massive die-offs (especially of the older and younger deer).

Permit no dove hunting whatsoever and, for practical purposes, let 70 percent of the yearly crop go to waste. That would prevent hunters from taking an occasional female with eggs in the nest or with young not old enough to care for themselves. However, that is not an acceptable option. The dove resource is too valuable to let 70 percent of the yearly crop go to waste without harvesting a large portion of them by sport hunting every year.

Permit no dove hunting until after mid-October, when there are few active nests. That would allow annual mortality to take a heavy toll of the yearly crop before hunters were permitted to go afield after doves. However, an occasional female with eggs in the nest or young not old enough to care for themselves would still be harvested. That is a better option than the first.

Leave dove seasons in the Southeast about as they are until a significant change in population warrants a change in seasons. That will allow hunters to continue taking a high percentage of the yearly crop of doves before annual mortality has time to take its customary heavy toll. Still, an occasional female with eggs in the nest or young not old enough to care for themselves will be harvested. Of the three options, this is by far the best from the standpoint of wisely using the resource.

SUMMARY

Anti-hunters are a threat to sport hunting in the Southeast--in fact, all over the country. They are well financed and can afford to print and distribute tons of propaganda against sport hunting. Some anti-hunting organizations have excellent lawyers on their payrolls, and they can afford long, expensive court cases. However, they do not have biological evidence to support their objective of banning sport hunting. Neither is public sentiment in favor of banning it.

On the other hand, biological evidence is available to support the continuation of sport hunting, and public sentiment in the Southeast favors its continuation. However, it is imperative that we sport hunters help law enforcement officers stop the illegal killing of game by the outlaws in our midst who are masquerading as sport hunters. Whether we realize it or not, their despicable conduct is a bigger long-term threat to sport hunting in the Southeast than are the anti-hunters.

The facts mentioned herein mean that most of the information being distributed by well financed anti-hunters is pure malarkey. In other words, they mean that we sport hunters can continue our hunting without fear of long-term harm to wildlife. They mean, too, that landowners can lease hunting rights or sell daily permits to hunt without endangering in any way the welfare of wildlife--not only for themselves, but also for future generations. Furthermore, they mean that we sport hunters must use whole truths in countering the part-truths of the antis. If we sport hunters do not inform the people about sport hunting by telling the whole truth, who will? That is right, no one will. Furthermore, the public will continue to be misinformed by the part-truths, innuendoes, and falsehoods of anti-hunters and the liberal media, many of whom would rather inflame public sentiment against hunting than tell the whole truth.

Another thing we sport hunters must do is always respect the rights of others, especially of landowners, and we must insist that our fellow hunters do likewise. Respecting the rights of others is not difficult. All we need to do is treat them as we would like to be treated, ourselves. Enough said.

Finally, we must support the organizations, lawmakers, and others who are working tirelessly to maintain sport hunting--the kind that is so much a part of our heritage. We must support them with our money, our time, and our vote. There are a good many such organizations in the country. Two that readily come to mind are: (1) National Rifle Association of America, 1600 Rhode Island Avenue, N.W., Washington, D.C. 20036-3240; and (2) Wildlife Legislative Fund of America, 801 Kingsmill Parkway, Columbus, OH 43229-1137.

Do yourself and sport hunting a favor by sharing this information with your hunting companions and others interested in wildlife.

OAKS, ACORNS, AND WILDLIFE

by ROBERT WATERS
Wildlife Biologist USDA Soil Conservation Service

More than 20 species of oaks are native to Alabama. Some are common throughout the state. Others are found in only a few places. Some are valuable for lumber, others are of little or no value for that purpose, but the seed (acorn) of all oaks native to Alabama are valuable to wildlife.

Nutritionally, acorns are a good food concentrate for wildlife. They are high in fat and carbohydrates and they contain protein, vitamins, calcium, and phosphorus. At least 96 species of wildlife are known to feed on acorns. Among them are deer, squirrels, quail, turkey, ducks (especially mallards and wood ducks), many non-game birds, raccoons, flying squirrels, and rodents such as rats and mice.

The oaks are divided into two broad groups--the white oaks and the red oaks. The latter are sometimes called black oaks. The seed of the white oaks mature in one year; those of the red oaks require two years. Common white oaks in most of Alabama are the post oak, overcup oak, chestnut oak, swamp chestnut oak, and white oak. Common red oaks in most of the state are water oak, willow oak, laurel oak, black jack oak, northern red oak, scarlet oak, black oak, and southern red oak. The white oaks are more valuable for timber production and their acorns are generally preferred by wildlife. Some believe that wildlife prefer the acorns of white oaks because they contain less tannic acid than do acorns of the red oak group.

The following statements are based on results of research by many people in various parts of the South. They are generally true in Alabama, but there are probably exceptions in the state to each of them.

Oaks that usually grow on bottomland (water, laurel, willow, overcup, swamp chestnut, and white) usually produce more acorns than do oaks that usually grow on upland (post, black jack, southern red, black, scarlet, and northern red). Oaks that grow on bottomlands are more likely to produce a merchantable tree, also a tree that can be sold for lumber at some future time.

Acorn production varies from year to year and from species to species. For example, white oak may produce a bumper crop of acorns one year; and black jack may produce practically none. The next year black jack may have a bumper crop and white oak may produce none. However, generally an individual oak, regardless of species, that produces a good crop of acorns one year also produces a good crop every year that is productive for that species. In other words, some individual trees are better producers of acorns than are other trees of that species.

Oaks that grow on bottomland are generally larger than oaks that grow on upland. This helps account for higher acorn yields on bottomland oaks.

Acorns vary a good bit in size--even acorns from trees of the same species. Individual trees of a species may produce small acorns, other trees of that species may produce acorns twice as large. Therefore, a tree that produces only a few larger acorns may bear as many pounds of seed as another tree of that species that yields more, but smaller acorns.

Many factors influence the minimum ages at which acorn production begins. One is competition. Apparently crowded trees start producing at a later age than do trees with plenty of crown space. It usually takes about 25 years for Alabama's native oaks to get into significant acorn production.

Even during years of bumper acorn production for a species, all trees of acorn-bearing size do not produce. About 60 percent of the trees in the white oak group are productive in good years. About 90 percent of the red oaks are productive in the better years. The two most dependable acorn producers in Alabama are the water oak and the willow oak--two species that are found throughout the state. Water oak is the most consistent acorn producer; it rarely fails to produce a crop of acorns. The best seed production comes from healthy, vigorous trees with larger diameters (at least 12 inches) and well developed crowns.

Acorns are subject to heavy damage by weevils. Such damage is worse during some years than during others. As a rule, about 25 percent of the acorns that reach maturity are unsound because of damage by weevils.

None of Alabama's native oaks produce a crop of acorns every year. Numerous weather factors influence acorn production. Late spring freezes are not uncommon in Alabama. When that happens, white oaks yield few or no acorns and red oaks produce none or few the second fall after the late spring freeze.

Just how important are acorns in the diets of wildlife? Let's look at a few of our common game species.

Deer. Acorns usually become available in quantity in September, and they are the preferred food of deer in fall, winter, and even into spring when available. A Missouri study showed that in the total volume of food eaten by deer, acorns range from 0 percent in June to 62.4 percent in October. The Missouri study lasted five years. During the five years, the percentages of acorns in the total volume of food eaten by deer in late fall and early winter were 80, 7.3, 32.6, 44.3, and 53.9. These percentages also reflect acorn production during each of the five years because consumption of acorns by deer is in proportion to acorn abundance. Researchers in Alabama and throughout the range of deer have found that acorns, when available, are the principal fall and winter food of this important game animal.

A researcher in Arizona had this to say about acorns and deer: "During a fall of acorns, deer may eat little else; and because they respond so quickly to changes in diet, deer have been recorded which have gone from thin, dry-haired condition to sleekness and good flesh in 15 days when there was a plentiful supply of acorns."

In Alabama, deer consume large quantities of forage and browse from smilax, Japanese honeysuckle, and numerous other plants, but eagerly seek and readily consume acorns when they are available. Browsing usually falls off when acorns are available in quantity. This is important in deer management because the amount of browse available on any given area usually determines that area's ability to support deer. If acorns are available in quantity, they supplement the browse and usually produce enough high quality food for good populations of deer.

Squirrel. Hunters, foresters, wildlife biologists, and others interested in squirrels know that acorns are important to both the gray squirrel and the fox squirrel. An adult of either species requires about 1.5 pounds of feed per week. Their main diet consists of nuts and acorns.

Oaks in a timber stand are essential for maintaining a population of squirrels. The best gray squirrel habitat is found along streams. That's also the best place to grow merchantable hardwoods. So, the landowner who desires a crop of squirrels each year should consider leaving hardwoods, especially oaks and hickories, along streams.

It is interesting to note that the mast (seed) crop on oaks and hickories affects the reproduction of squirrels. There is usually poor squirrel reproduction in the year that immediately follows poor mast crops.

Wild Turkey. Acorns are the preferred food of the wild turkey, also. Much of what we have already said about acorns, deer, and squirrels is also true about acorns and the wild turkey. This magnificent game bird prefers acorns as food in fall and winter. Therefore, oaks are essential in good habitat for the wild turkey, especially the oaks that produce smaller acorns.

Other Game. Many other species of game feed extensively on acorns. Quail eat them readily. Ducks, especially the mallard and wood duck, seek them out when they are available. Acorns are important for many non-game species as well.

The bottom line is this: If you desire a crop of game animals, leave on each acre of upland at least five mast-bearing oaks. These oaks should be from both the white oak and red oak groups. Then if one species fails to produce mast, the others are likely to succeed. From the standpoint of both forestry and wildlife, it is frequently good management to favor hardwoods on bottomland.

GRAY SQUIRRELS

by Robert Waters, Wildlife Biologist, U.S.D.A. Soil Conservation Service

Both the gray squirrel and the fox squirrel are present throughout Alabama. The gray squirrel is by far the most abundant. Both species frequently occupy the same tract of forest land. In such cases, the fox squirrel is usually found in upland and the gray in bottomland hardwoods.

Until a few years ago, squirrel hunting was the most popular hunting sport in Alabama. It is now second in popularity--deer hunting is number one. In 1983-1984, the state had about 113,208 squirrel hunters. They harvested about 1,420,510 squirrels, most of which were grays. So, the gray squirrel is indeed an important game animal in the state.

Information in this article is primarily about the gray squirrel, but some statements also apply to the fox squirrel. Basically, the two species are much alike. They are closely related, and their habits and life needs are similar. Except for size and color, the main difference between the two is habitat preference. The gray squirrel prefers large tracts of dense, mature hardwoods, especially oaks and hickories with an understory of smaller trees and shrubs. These hardwoods may be on either upland or bottomland, preferably bottomland. The fox squirrel, on the other hand, prefers groves and open, cut over stands of mixed pines and hardwoods, especially upland.

Life History

As a rule, the gray squirrel pairs off for only a day or two at a time--until the female's fertile period is over. The male generally rests before seeking another female. There are two well-defined breeding periods in Alabama. The first is December to March, with a peak in February. The second is June to August, with a peak in July. Gestation period is about six weeks. Therefore, the two peaks of birth are March and August. Adult females may bear two litters each year. Litter size varies from one to six, with the average between two and three. Actually, litter size and number of litters per year depend on food supply. Litter size is smaller during years of food scarcity; and during those years, adult females may produce only one litter per year. Maternal care covers a period of about twelve weeks, after which the young are able to take care of themselves. Some semblance of a family may exist for several weeks thereafter.

The maximum life span of a wild gray squirrel is eight to nine years, but few reach that age. In captivity, an individual may live up to twelve years or more. About 60 percent (six out of every ten) of a wild fall population were born earlier in the same calendar year.

Habitat Needs

The gray squirrel depends primarily upon a variety of native foods, especially hardwood trees and shrubs. Choice native foods for fall and winter are bald cypress, beechnuts, blackgum, chinkapin, flowering dogwood, hickory nuts, magnolia, oaks, pecan, pines, and walnut. Choice native foods for spring and summer are blackberry, cottonwood, black cherry, elm, grape, huckleberry, apple, mulberry, mushrooms, pines, red maple, and

yellow poplar. Squirrels also eat a wide variety of less important foods such as herbs and insects. Choice foods for feeding stations are cantaloupe seed, corn, hickory nuts, pecans, grain sorghum, sunflower seed, cracked walnut, and wheat.

For cover, the gray squirrel prefers big tracts of mature hardwoods with understories of smaller trees and shrubs. These mature hardwoods should be dense enough that squirrels can travel easily through their crowns.

The gray squirrel has two distinct homes: long-term tree dens and temporary leaf nests. Tree dens are preferred because they afford more protection from weather, natural enemies, and hunters. Dens with openings three to five inches in diameter and twenty feet or more above ground are best. Favored dens are six to seven inches wide and one to three feet deep.

The gray squirrel can live without drinking water for several weeks with no apparent ill effects. However, free water is an attractive feature of squirrel habitat. In fact, squirrels may leave an area if free water is not available.

Habitat Management

Habitat management consists mostly of retaining, creating, and maintaining habitat or a suitable place for squirrels to live and rear their young. Well-managed habitat should be protected from erosion.

Retain hardwoods, primarily oaks and hickories. If possible, retain these hardwoods on sites that will produce marketable trees. For the most part, the sites will be along creeks and other streams. Trees should be dense enough that squirrels can easily travel through their crowns. Retain several different species of oaks and hickories. Oaks should be from both the white oak and the red or black oak groups. Then, if one species fails to produce mast (fruit or nut-bearing trees), others will likely succeed. Retain understory species such as dogwood and huckleberry. Retain three or more suitable den trees per acre. If possible, select den trees that also provide food.

Plant one-fourth of an acre or more in corn or chufa. Larger plantings (two acres or more) are recommended on areas with high populations of either deer, raccoon, or wild turkey. These plantings should adjoin mature hardwoods, especially oaks and hickories. One plot (one-fourth of an acre or more) for every ten acres of hardwoods is usually sufficient for squirrels.

Five to ten percent hardwood trees planted with pines will eventually (25 years or more) produce enough food to maintain squirrels. These hardwoods are especially valuable where large tracts are clearcut and planted in pines. Species to plant are hickories, mulberries, oaks from both the white and red oak groups, pecan, and walnut. These hardwoods should be planted in groups rather than scattered throughout the pines. A few rows of corn left either unharvested or in shocks and adjoined by hardwoods attract squirrels from long distances. Chufas and peanuts are good for this purpose, also. Maintain feeding stations around homes.

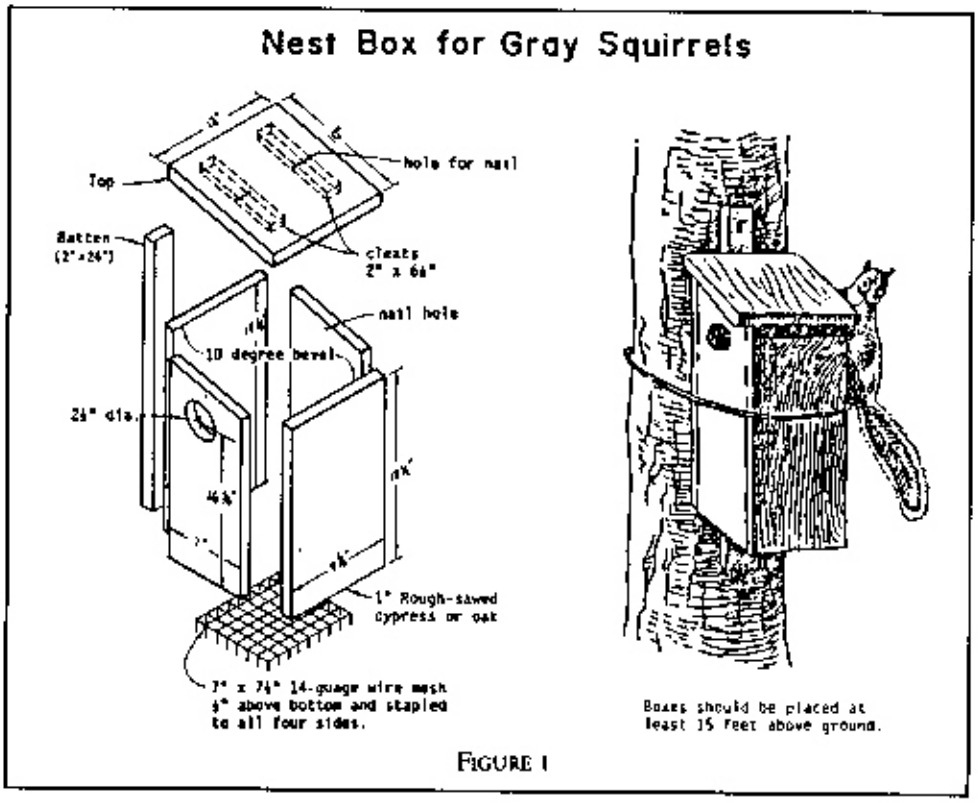


FIGURE 1

Erect nest boxes if den trees are scarce. A typical nest box is shown in **Figure 1.** When building nest boxes, make provisions for removing either the top or bottom for periodic cleaning. Place nest boxes fifteen to thirty feet above ground, preferably in trees at least ten inches in diameter. Entrance holes in nest boxes should be near the trunk for easy entrance. Worn automobile tires **(Figure 2)** make satisfactory nest structures, also, but they may detract somewhat from the appearance of an area. One or two nest boxes per acre may be needed. Create well-distributed water holes (about one-fourth of a mile apart) if free water is scarce or absent. Water holes can be created by improving springs, damming small streams, or digging small ponds.

Protect the habitat from fire at all times. Protect from grazing by hogs and other livestock. Manage woodland to favor the choice foods listed earlier in the paragraph entitled "Food." Woodland treatment may include release cutting, thinning, and many other practices, except prescribed burning, which is detrimental to gray squirrel habitat. Inspect nest boxes at least once a year, preferably in December or early January. Make needed repairs and remove bees and other unwanted occupants from boxes.

Carry Capacity

Gray squirrel populations fluctuate a good bit from year to year, depending primarily upon food supply. The fall mast (nuts or fruit) crop of one year, especially on oaks and hickories, determines to a great extent the squirrel population of the following year. During

years of gray squirrel abundance, ideal habitat may support one squirrel per acre during winter, the least favorable season. Fall populations may be somewhat higher.

Harvesting

Except in small, isolated woodlots (5 to 75 acres), it is difficult, if not impossible, to over-harvest gray squirrels by sport hunting during Alabama's legal hunting season. Research has shown that at least six out of every ten squirrels in a fall population die before the next fall, regardless of whether they are hunted. Wildlife biologists call these deaths "annual mortality" or the yearly rate at which wild animals normally die. Yearly mortality rates are rather high for game animals, especially the smaller ones. For the gray squirrel, annual mortality is 60 percent. Annual mortality is nothing more than Nature's way of harvesting surplus animals from the yearly crop of wildlife.

It is almost impossible to harvest more animals of a particular species by sport hunting each year than Nature is going to harvest through annual mortality. This is especially true of small game such as the gray squirrel. Besides, if hunters take a small percentage of the game population every year by sport hunting, annual mortality takes an additional toll until mortality for the year equals--but does not exceed--the number that Nature would have taken from the various species without any hunting whatsoever. Here is how it works.

If hunters take 50 percent of the squirrels in a fall population, mortality for the year from all other causes will be 10 percent. However, if hunters take only 20 percent, mortality from other causes will be 40 percent. Furthermore, if hunters do not fire a single shot at squirrels, mortality from other causes will be a whopping 60 percent! So, mortality from all causes--sport hunting and all others--will be 60 percent for the year. In other words, if one thing does not get 60 percent of the squirrels in a fall population, something else will. Wise use of the squirrel crop dictates that hunters harvest a large portion of the annual surplus, thereby ensuring that the resource will be used for wholesome recreation and, in most instances, for human food also. When Nature is allowed to harvest the annual surplus, only bugs, opossums, and buzzards benefit from the squirrel crop. Obviously, that is not good use of the resource.

More Information

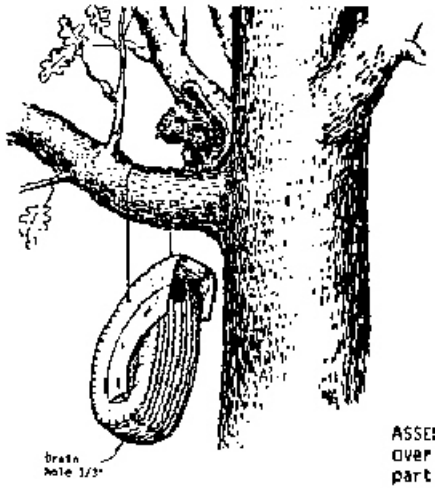
More information on the gray squirrel is available from the Natural Resources Conservation Service, your County Agent Coordinator, the Alabama Department of Conservation and Natural Resources, the Alabama Forestry Commission, the U.S. Fish and Wildlife Service, and the U.S. Forest Service. Technical assistance in managing habitat for the gray squirrel and for other valuable wildlife is available from the same sources.

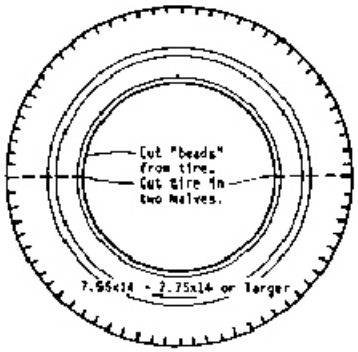
FIGURE 2

Squirrel Nest from Old Tire

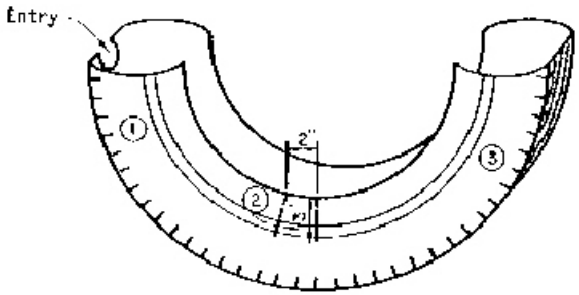
Erect one or two nests per acre. Place them 15 to 20 feet above ground. Opening of nest should face trunk of tree. Place wire bail around limb. Check at least once a year for maintenance and remove bees and other unwanted guests.

Hanger wire should be placed to allow top portion of part 3 to overhang sufficiently to keep out rain.





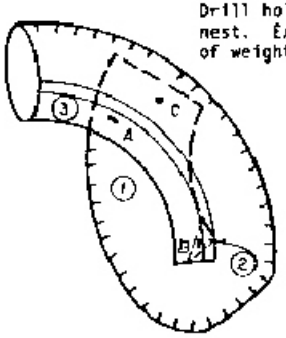
ASSEMBLY: Fold part 1 over part 2, fold part 3 over parts 1 and 2. Part 3 is folded over part 1 about 2" to form a canopy.



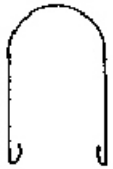
Before assembling, cut entry hole in part 1. Diameter of hole should be 2½" for gray squirrels and 3" for fox squirrels.

Make cuts on dotted lines on both sides to allow tire to bend.

Drill holes on both sides at point C to hang nest. Exact location of holes vary because of weight and size of tire.



Drill holes through parts 1, 2 and 3 at point B on both sides and secure with bolts or fasteners.



Insert wire bail in hole C on both sides of nest.

Wire keys made from #9 wire to fasten parts together. Bolts, rivets and so forth can be used.

FOOD PLOTS FOR DEER AND TURKEY (ALABAMA)

INTRODUCTION

According to the Alabama Game and Fish Division, nearly 300,000 deer and about 50,000 turkey are harvested by hunters in Alabama every year. By anyone's standard, that is a lot of deer and turkey; but how many are you and your companions harvesting every year? Are you getting your share? Are the hunters to whom you lease hunting rights or sell daily permits to hunt getting their share?

One way of increasing your harvest, especially of deer, is by planting winter forage in small plots and waiting for deer to come into the plots to feed. It is that simple. The more successful deer hunters in Alabama have been doing that for decades.

Food plots planted in winter forage will increase your chances of harvesting deer.

Food plots for deer and turkey may be dual purpose (provide food for both deer and turkey), or they may be single purpose (provide food for only turkey). Regardless of their purpose, food plots must be located where they can attract the desired game. Furthermore, they must be properly limed, fertilized, planted, and maintained. If not, they will be of little value.

The next five sections contain general information that applies to all food plots for deer and turkey. In the remaining sections, we will discuss plots to provide food for both deer and turkey, as well as plots to provide food for only turkey. We will also discuss the harvesting of both deer and turkey, especially deer.

Prepared by Robert E. Waters, Wildlife Consultant/Free-Lance Writer, 318 Bowden Drive, Auburn, Alabama 36830, (334) 887-9460, October 1994.

Where to Plant

Food plots for either deer or turkey or both should be planted in or near forestland. Good locations are openings in forestland, utility rights-of-way, "log landings" or "loading decks," idle crop fields, land in set-aside government programs, and nearly anywhere else near forestland if the soil is suited. Your local agricultural agencies can tell you whether or not it is suited. As a rule, select sites that are more nearly level. That will help prevent soil erosion. Also, avoid sites that can be seen from public roads and adjoining property. That will help prevent poaching.

Good roads to food plots are essential, especially to plots in forestland. Such roads are necessary for hauling lime, fertilizer, and seed, and for moving farm tractors and other equipment.

As a rule, the main road on an area should not lead directly from one food plot to another. It is better, by far, if a short road (at least 100 yards in forestland, longer in open land) leads from the main road to only one plot. A road arrangement of that kind allows vehicles and other traffic to move through an area without interfering with hunting in the plots. That is especially important if you are leasing hunting rights or selling daily permits to hunt. You might be shocked at how quickly an otherwise good-natured, gentlemanly hunter can lose his sense of humor when someone on a farm tractor or other equipment spooks deer from a plot over which he is paying to hunt. Under those circumstances, his reaction is usually about the same as yours and mine would be under like circumstances.

Size of Plots

As a rule, food plots should be one to five acres in size. The ideal size seems to be 1.0 to 1.5 acres if you are planting to attract deer for increasing harvest. Plots may be up to five acres or more in size if you are planting ladino clover or some other perennial to provide food for both deer and turkey, or if you are making a planting to provide food for only turkey.

Number of Plots

If your plots are to provide food for both deer and turkey, plant a few more plots than the maximum number of deer hunters you expect to accommodate on any day during hunting season. If you expect to accommodate no more than three hunters, plant about four plots. If you expect to accommodate no more than ten hunters, plant twelve or thirteen plots; and so forth. What might happen if you plant fifteen plots and have only five hunters to accommodate? That is right--deer might feed in the ten plots without hunters. If so, you and your hunting companions would harvest few deer--maybe none.

For turkey, 50 percent of the area may be in food plots and other openings, especially if the openings contain low-growing, grassy-type vegetation (about twelve inches high) and the openings are not used extensively by people. Usually, two plots (1.5 to 3.0 acres or more) for each 25 acres of forestland is enough for rather high turkey populations.

Land Preparation

Break and harrow food plots several weeks before planting. That allows rains to settle the soil before planting. Food plots that are located in old log landings or loading decks must be broken to a depth of about eighteen inches during land preparation. Why? Because soils in those plots were compacted by trucks and the heavier equipment used in harvesting timber. If that compacted layer is not broken during land preparation, the roots of planted crops will not penetrate the soil as they should. That, of course, will result in stunted, yellowish plants, especially in years of low rainfall. The seedbed for all recommended crops must be well prepared, but firm. Also, it must be free of briars, kudzu, Japanese honeysuckle, bushes, and other persistent plants.

Lime and Fertilizer

Deer prefer forage that has been properly limed and fertilized, and they eat it first when it is available. Such forage may be more nutritious, palatable, or both; but it is definitely preferred by deer. Therefore, in plots to provide food for both deer and turkey, apply lime and fertilizer according to soil test recommendations. Apply both at the time of land preparation or a few days before. Your local agricultural agencies, especially your county Extension agent, have instructions for collecting soil samples and for mailing them to Auburn University for analysis.

Because food plots are small and frequently located in remote places, fertilizer dealers may be reluctant, and may even refuse, to apply the needed lime and fertilizer. Sometimes, dealers simply cannot drive their loaded trucks over the rough roads to reach your plots. In such instances, it may be necessary to apply the lime and fertilizer by hand. However, use whatever means are necessary in order to apply the correct amounts. Otherwise, you will probably be disappointed.

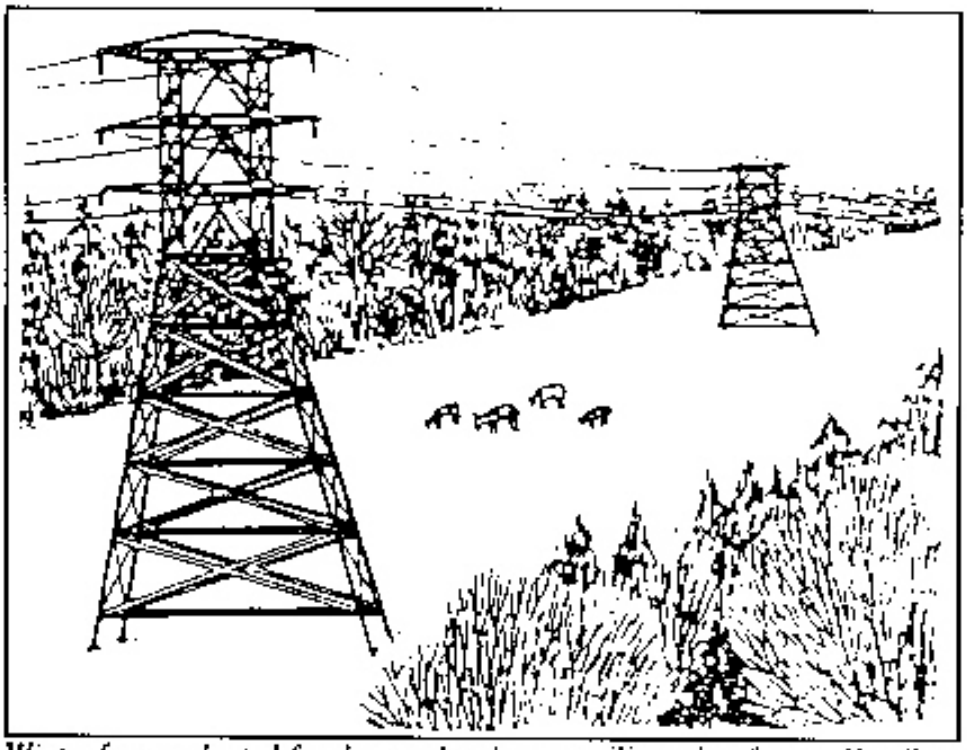
Do you know of any reason for wildlife, especially deer, to feed in your food plots that have not been properly limed and fertilized when they can as easily feed on Japanese honeysuckle or some other choice food in an idle crop field that has been properly limed and fertilized for decades? Deer know of no reason, either.

As stated earlier, food plots for deer and turkey may be dual purpose (provide food for both deer and turkey) or they may be single purpose (provide food for only turkey). Here is what to plant, when to plant, and how to plant and maintain the two kinds of food plots. Follow the instructions very closely until you get several years of experience in planting and maintaining food plots.

PLOTS FOR BOTH DEER AND TURKEY

Plots to provide food for both deer and turkey should be planted in small grains (barley, oats, rye, wheat), and other cool-season grasses or in adapted cool-season legumes. Some of the crops may be planted alone, but it is usually better to plant two or more in a plot. There are many crops from which to choose. Your local agricultural agencies, the Alabama Game and Fish Division, wildlife consultants, and other trained professionals can help you make the right choices. Here are a few things to keep in mind, however, when deciding what to plant.

As a rule, avoid planting an annual and a perennial on the same piece of ground. Annual ryegrass can be persistent. Once established, it may be difficult to prevent reseeding. It is usually best to plant ryegrass in little-used roads and in firebreaks. If you plant oats, select a variety that is winter hardy. Otherwise, the crop may be killed by cold weather of the kind we occasionally have in Alabama. As a rule, avoid the nationally advertised crops of which fantastic claims are being made. The promoters of those crops seem to be more interested in separating you from your money than in selling you seed of a high quality crop that is adapted to your area. In some instances, separating you from that folding green stuff seems to be their only interest. Enough said.



Winter forage planted for deer and turkey on utility right-of-way. Excellent location for food plots. Select sites that are more nearly level.

Fescue is not a choice food for wildlife, but deer occasionally eat it and maybe turkey too, especially if it is clipped in early fall and a generous amount of nitrogen fertilizer is applied. If you plant fescue, select a variety that is fungus-free (no more than 5 percent of the seed infected). Plant the fescue on firebreaks or on steep slopes where choice foods would likely be overgrazed, thereby allowing serious erosion. According to research, fungus-infected fescue kills rabbits, and it may also be harmful to other wildlife.

You should remember, too, that deer and turkey prefer small to medium-sized acorns over any forage crop you can plant in a food plot. For that reason, deer and turkey usually use food plots very little in fall and early winter until after most of the smaller acorns are gone.

Many hunters and landowners prefer wheat, Redland II clover, and crimson clover for deer and turkey on uplands in north and central Alabama. They prefer wheat and crimson clover for deer and turkey on uplands in south Alabama, and Regal ladino clover for deer and turkey on bottom lands throughout the state. My experience (more than forty years) is that those crops are among the very best you can plant to provide food for both deer and turkey in Alabama. Here is how to plant and maintain the crops recommended for deer and turkey.

Wheat, Redland II Clover, and Crimson Clover

This combination is especially recommended on upland soils of medium to high fertility in central and north Alabama. Wheat is a cool-season annual grass, Redland II clover is a cool-season, short-lived perennial legume (usually two years in Alabama), and crimson clover is a cool-season annual legume. Some landowners and hunters like to add cold-tolerant oats to this combination. Oats is a cool-season annual grass, and adds variety to the combination. In parts of the state, deer seem to prefer oats over wheat. However, according to research in another southeastern state, wheat is more nutritious for deer.

When to plant. The best time to plant wheat, Redland II, and crimson clover is between September 15 and September 30, and when there is enough moisture in the soil for the seed to germinate. Avoid planting before September 1 and after October 15.

How to plant. Scarify the seedbed lightly--two to three inches. A disk harrow with a slight angle is recommended for making that scarification. Broadcast 1.5 bushels or 90 pounds of wheat seed per acre on the scarified seedbed. If you want to add cold-tolerant oats to the combination, plant 90 pounds of oat and wheat seed per acre (45 pounds of wheat and 45 pounds of cold-tolerant oats). Neither wheat nor oat seed requires inoculation. Broadcast the seed evenly over the entire plot. They may be broadcast by hand; with a shoulder-supported, Cyclone-type seeder; or by other means. Cover the seed about one inch, preferably with a disk harrow. Firm the soil over the covered seed with a cultipacker or other roller. When firming the soil, go up and down slopes with the cultipacker or other roller.

Then, immediately broadcast 15 pounds of Redland II and 30 pounds of crimson clover seed per acre on the covered wheat (and oat) seed. Broadcast the seed evenly over the entire plot. That may be somewhat difficult because the seed are so small. They may be mixed with granular fertilizer in order to obtain more nearly even distribution. The seed may be broadcast by hand; with a shoulder-supported, Cyclone-type seeder; or by other means.

Redland II and crimson clover seed require inoculation before planting. The correct inoculants are available from seed and fertilizer dealers, but they may have to order them.

Cover the seed of Redland II and crimson clover about one-quarter inch--just enough to prevent drifting during moderate rains. Cover them with a cultipacker or other roller. When covering the seed, go at right angles to the slope. That will reduce the likelihood of soil erosion.

How to maintain. Protect from grazing by livestock. If fencing of individual plots is necessary, install at least one gate at each plot. That gate should be wide enough for farm tractors, disk harrows, fertilizer trucks, and other equipment to enter.

Replant every year between September 15 and September 30 when there is enough moisture in the soil for seed to germinate. Replant according to instructions in the section entitled "How to Plant." The seed of Redland II and crimson clover do not need inoculation when replanted in plots where the two clovers have previously grown.

Have the soil tested every three years, and apply lime and fertilizer according to the latest soil test recommendations. Keep hardwood sprouts, pine seedlings, briars, kudzu, tall-growing weeds, and other plants clipped from above the wheat (and oats), Redland II, and crimson clover. A rotary mower of the Bush Hog type is recommended for that clipping.

Wheat and Crimson Clover

The wheat and crimson clover combination is recommended for providing fall, winter, and early spring food for both deer and turkey on upland soils of medium to high fertility, especially in south Alabama.

Wheat and crimson clover should be planted in exactly the same way and at the same time as previously recommended for the wheat, Redland II, and crimson clover combination. Furthermore, wheat and crimson clover should be maintained in the same way as wheat, Redland II, and crimson clover. The only difference is that Redland II clover is omitted.

Cold-tolerant oats may be added to this combination, also. To make that addition, reduce the seeding rate of wheat to 45 pounds of seed per acre; and replace the wheat seed with 45 pounds of cold-tolerant oat seed per acre. In other words, plant a total of 90 pounds of wheat and oat seed per acre--45 pounds of wheat and 45 pounds of oats.

Regal Ladino Clover

Like other ladino clovers, Regal is a cool-season perennial legume. Hereafter, I may refer to it as "ladino clover" or simply "ladino." When doing so, I am referring to the Regal variety that was developed by Auburn University and that is well suited to bottom land soils in most of Alabama.

Ladino clover is recommended for providing high quality, year-round forage for both deer and turkey on bottom lands throughout the state. It is especially recommended for providing high quality food for deer between May and September, when antlers are developing and when there may be a scarcity of high quality, natural foods for deer in many areas of Alabama. Landowners and hunters who are managing for trophy bucks are especially fond of ladino clover. The high quality food provided by ladino between May and September is believed to increase antler size and development.

Land preparation. As stated earlier, ladino clover is a perennial. Once established, it should last about five years without replanting. Competition from persistent plants (briars,

Japanese honeysuckle, Johnson grass, hardwood sprouts, bushes, and so forth) is the major reason that ladino needs replanting about every five years.

You can prevent a good bit of that competition by eliminating persistent plants during land preparation. Deep disking with a bush and bog harrow will eliminate many of those plants.

When to plant. Ladino clover may be planted between August 15 and November 1. I recommend planting between September 15 and October 15, and when there is enough moisture in the soil for the seed to germinate. Avoid planting after November 1.

How to plant. Lightly scarify the seedbed. A disk harrow with a slight angle is recommended for that scarification. Then, firm the seedbed with a cultipacker or other roller. When firming the seedbed, go up and down slopes with the cultipacker or other roller.

Broadcast five pounds of ladino seed per acre on the firmed seedbed. The seed must be inoculated before planting. The proper inoculant is available from seed and fertilizer dealers, but they may have to order it. Broadcast the seed evenly over the entire plot. That may be difficult because the seed are so small. They may be broadcast by hand; with a shoulder-supported, Cyclone-type seeder; or by other means. To obtain more nearly even distribution, thoroughly mix the seed with granular fertilizer before broadcasting. Cover the seed about one-quarter inch with a second trip over the plot with a cultipacker or other roller. When covering the seed, go at right angles to the slope. That will reduce the likelihood of soil erosion.

How to Maintain. Protect from grazing by livestock. If it is necessary to fence individual plots, install at least one gate that is wide enough for farm tractors, disk harrows, fertilizer trucks, and other equipment to enter.

Keep taller weeds and other plants clipped from above ladino clover. Do not allow seed of those taller weeds to mature. That may require clipping two or three times a month in July, August, and September, especially if rainfall is heavier than normal. A rotary mower of the Bush Hog type is recommended for clipping the taller plants. Have the soil tested every three years, and apply lime and fertilizer according to the latest soil test recommendations.

As stated earlier, ladino needs replanting about every five years. Replant according to instructions in the section entitled "How to Plant." The seed do not need inoculation when replanting in a plot where ladino has grown during the past several years.

Salt

Deer use salt when it is available, especially in late spring and early summer. It is illegal in Alabama to shoot deer over fortified salt blocks (additional nutrients and minerals added). However, fortified salt blocks are probably better for deer than are the standard, unfortified blocks used by many cattle growers. It is probably better if deer have to travel no farther than one-half mile to obtain salt. Place salt on the ground and well away from food plots, roads, agricultural fields, and other places where it can easily be seen by people.

Blinds

Erect at least one elevated blind (at least ten or twelve feet above ground) on the edge of each plot. The blind must provide protection from unfavorable weather, and it must be comfortable.

Actually, it is better to erect two blinds on the edge of each plot. If you erect two blinds, locate one so that the sun will be to your back in the morning and the other so that it will be to your back in the afternoon. Such locations make shooting more pleasant, especially with scope-sighted rifles. Besides, two blinds per plot allow the hunter to use the blind that is more nearly downwind from deer that are feeding in the plot.

PLOTS FOR ONLY TURKEY

Plots to provide food for only turkey should be planted in either: (1) chufa, especially on sandy soils throughout the state; (2) browntop millet on more nearly level upland sites in the state; or (3) Pensacola bahia grass in central and southern parts of the state, especially on steeper sites. Here is how to plant, when to plant, and how to maintain each of the recommended crops.

Chufa

Chufa is a warm-season sedge. It is related to nutgrass but, unlike nutgrass, it does not become a pest.

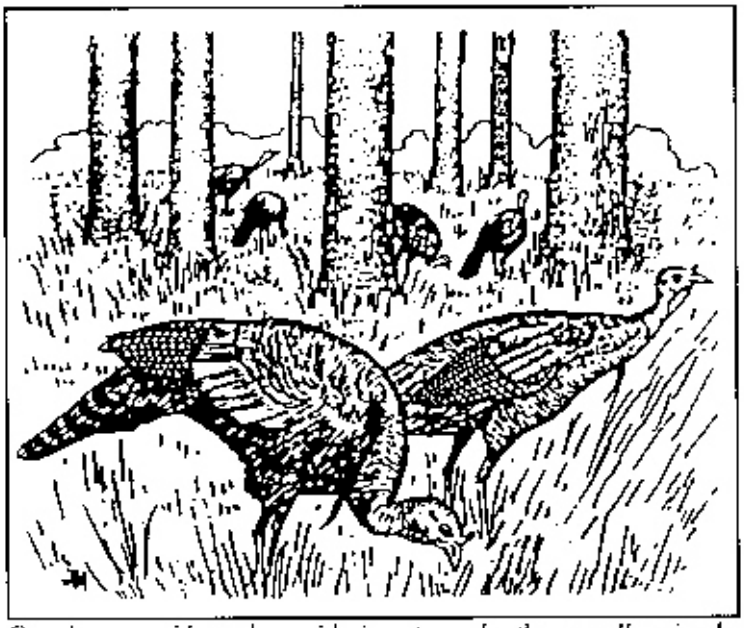
Chufa produces underground nutlets that taste somewhat like coconut. The nutlets are relished by turkey and nearly all other wildlife, especially raccoons. For that reason, chufa plots should be three to five acres or more in size; and they should be located away from streams and other wetlands.

Larger plots (three to five acres or more) are recommended because they are more likely to produce enough nutlets to feed turkey and other wildlife that relish them. The reason for locating chufa plots away from streams and other wetlands is that wetlands are the preferred habitat of the raccoon. Therefore, the farther chufa plots are located from wetlands, the less likely are the nutlets to be devoured by raccoons.

Turkey do not eat the leaves of chufa, but they obtain insects and other small animals from the low-growing chufa plants (usually about eighteen inches high). Chufa is especially recommended for turkey on sandy and loamy soil throughout the state. Plant on new ground if it is available. Why new ground? Because new ground contains fewer seed of grasses and weeds; and, on new ground, the nutlets are less likely to be damaged by weevils, especially during the first two or three years. Here is when to plant, how to plant, and how to maintain the crop for turkey.

When to plant. Chufa may be planted between May 15 and June 30. The best planting dates, however, are between June 15 and June 30, when there is enough moisture in the soil for the seed to germinate. Avoid planting after July 10.

If planted before June 15, the nutlets mature about the time acorns drop in the fall. As stated earlier, deer and turkey prefer small to medium-sized acorns over any crop you can grow in a food plot. If both chufa and acorns are available at the same time, turkey and deer almost invariably feed on the acorns while raccoons and other wildlife are feeding on the chufa nutlets. Turkey and deer continue feeding on the acorns until they are gone; and, by that time raccoons and other wildlife have eaten most of the chufa. Therefore, the acorns and chufa disappear about the same time. However, if chufa is planted after June 15, chances are good that most of the nutlets will be available to turkey after the small to medium-sized acorns are gone. That is why it is recommended that chufa be planted between June 15 and June 30 in Alabama.



Openings provide turkey with insects and other small animals. Those animals are high in protein, which is essential for rapid growth of the poults during the first few months of their lives. Turkey seem to prefer openings that contain low-growing, grassy-type vegetation (about twelve inches high). That vegetation does not hinder the adults' view of approaching enemies.

How to Maintain. Protect plots from grazing by livestock. If it is necessary to fence individual plots, install at least one gate per plot. That gate should be wide enough for farm tractors, disk harrows, fertilizer trucks, and other equipment to enter.

When the nutlets mature in the fall, either pull a few plants by hand at several places in the plot or make a few trips through the plot with a disk harrow. Either treatment exposes some of the nutlets and makes them easier to find by turkey. Such exposure is especially recommended during the first one or two years that a plot is located on a particular site.

Replant every year between June 15 and June 30. When replanting, follow instructions in the section entitled "How to Plant." It is usually best to relocate plots at least every three years. Frequent relocations help control some of the insects that feed on the nutlets. Relocated plots should be planted on new ground if it is available. Have the soil tested every three years, and apply lime and fertilizer according to soil test recommendations. A good time to have the soil tested is when the plot is relocated.

Browntop Millet

Browntop millet is a warm-season, annual grass. Hereafter, I may refer to it simply as "browntop." It is adapted to a variety of soils, but it is best adapted to well-drained upland soils of medium to high fertility.

Browntop millet usually grows two to three feet high. The seed mature sixty to seventy days after the plants emerge. When properly limed and fertilized, browntop may

produce up to 1,200 pounds or more of seed per acre. The seed are relished by turkey, doves, quail, and many non-game birds. Browntop millet also produces low-growing vegetation from which turkey can obtain insects and other small animals. As a rule, deer do not browse the plants of browntop millet to any appreciable extent. Plots of three to five acres or more are recommended.

Plant on new ground if it is available. New ground contains fewer seed of grasses and weeds. Seed production will be reduced if a dense stand of grasses and weeds volunteers in the browntop. Besides, turkey cannot find the seed of browntop if they fall into a dense mat of grasses and weeds.

When to plant. Browntop millet may be planted from May 1 to August 15, but seed production is lower when it is planted after July 15. As a rule, the best time to plant browntop millet when only one planting is made in a general area is between July 1 and July 15, when there is enough moisture in the soil for the seed to germinate. In plots five acres or more in size, it is usually best to plant one-half of the plot between May 1 and May 15 and the other half between July 1 and July 15. Those planting dates ensure a food supply (insects and other small animals and the seed of browntop) from about June 1 to late December.

How to plant. Scarify the seedbed lightly--one or two inches. Again, a disk harrow with a slight angle is recommended for that scarification. Broadcast twenty pounds of seed per acre. Broadcast them evenly over the entire plot. Broadcast the seed by hand; with a shoulder-supported, Cyclone-type seeder; or other means. The seed do not need inoculation. Cover the seed one inch or less with a cultipacker or other roller. When covering the seed with a roller, go at right angles to the slope. That will reduce the likelihood of soil erosion.

How to maintain. Protect from grazing by livestock. If it is necessary to fence individual plots, install at least one gate per plot. That gate should be wide enough for farm tractors, disk harrows, fertilizer trucks, and other equipment to enter.

Replant every year according to instructions in the previous paragraphs, "When to Plant" and "How to Plant." In plots five acres or more in size, replant one-half of the plot every year between May 1 and May 15 and the other half between July 1 and July 15. Have the soil tested every three years, and apply lime and fertilizer according to soil test recommendations.

Pensacola Bahia Grass

Pensacola bahia grass is a warm-season perennial. I may refer to it as either "bahia grass" or simply as "bahia." When doing so, I am thinking of Pensacola bahia grass that is well suited to upland soils in central and south Alabama.

Bahia provides low-growing vegetation (twelve to eighteen inches high) in which both poults and adult turkey can catch grasshoppers, crickets, and other small animals from April through September. Those small animals contain a good bit of protein which is essential for rapid growth of poults during the first few months of their lives. Besides, the seed of bahia grass are relished by both young and adult turkey in late summer and early fall.

Bahia spreads by rhizomes (root-like stems) and by seed. Under poor management, it can become a pest, especially in ladino clover and other low-growing perennials. You can reduce its chances of becoming a pest by keeping it clipped or mowed from above the crops in which you don't want bahia to become a pest. In those crops, bahia may have to be clipped or mowed several times a month, especially in July, August, September, and early October. A rotary mower of the Bush Hog type is recommended for clipping bahia from above ladino and other low-growing perennials.

When to plant. Bahia may be planted in Alabama from March 1 to July 15. The best planting dates, however, are between April 1 and April 15, and when there is enough moisture in the soil for the seed to germinate.

How to plant. Lightly scarify the seedbed with a disk harrow. Firm the seedbed with a cultipacker or other roller. When firming the seedbed, go up and down slopes with the cultipacker or other roller. Then, broadcast 25 pounds of Pensacola bahia grass seed per acre. The seed do not need inoculation. Broadcast the seed evenly over the entire plot. They may be mixed with granular fertilizer in order to obtain more nearly even distribution. Broadcast the seed by hand; by using a shoulder-supported, Cyclone-type seeder; or by other means.

Cover the seed one-fourth to one-half inch by a second trip over the plot with a cultipacker or other roller. When covering the seed, go at right angles to the slope. That will reduce the likelihood of soil erosion.

How to maintain. Protect from grazing by livestock. If it is necessary to fence individual plots, install at least one gate per plot. That gate should be wide enough for farm tractors, disk harrows, fertilizer trucks, and other equipment to enter.

Keep tall weeds and low-growing woody vegetation clipped from above bahia. A rotary mower of the Bush Hog type is recommended for that clipping. Poults and adult turkey seem to prefer catching insects and other small animals in vegetation no taller than twelve inches. Vegetation of that height allows the birds, especially the adults, to see approaching enemies. For that reason, when clipping tall weeds and woody vegetation from above bahia, it is usually best to clip at a height of twelve inches.

Have the soil tested every three years, and apply lime and fertilizer according to soil test recommendations. Bahia is not likely to need replanting. However, if it does, replant according to instructions in the paragraph entitled "How to Plant."

HARVESTING DEER AND TURKEY

The harvesting of corn, peanuts, soybeans, and other agricultural crops every year is an essential part of crop management. Likewise, the yearly harvest of game, preferably by sport hunting, is an important part of game management. Actually, it is an essential part of management if the valuable game resource is to be wisely used--no ifs, ands, or buts. Let's discuss the harvesting of deer and turkey.

Deer

If you are cooperating in the state's deer management program and are managing your deer for a specific objective such as producing trophy bucks, follow very closely the recommendations of the Alabama Game and Fish Division, especially their recommendations regarding number, sex, and antler development of deer to be harvested every year.

Likewise, if you are managing your deer according to a plan prepared by a wildlife consultant, follow his harvest recommendations very closely. However, if you are not managing your deer for a specific purpose, it is best to harvest one-third of your estimated fall population every year. That harvest (one-third of the estimated fall population) should consist of equal numbers of both sexes. For example, if your estimated fall population is 120 deer, you should harvest 40 of them during hunting season. That harvest should consist of 20 bucks and 20 does. When estimating fall populations, remember that there is a tendency, even among wildlife biologists, to underestimate deer populations, especially during falls with an abundance of acorns.

Why harvest one-third of the fall population every year? Because research has shown that slightly more than one-third of the fall population can be harvested every year with no apparent reduction in the next year's population. Such harvesting ensures a sustained annual yield of high quality deer for recreation and food, and prevents the devastating effects of overpopulation.

You may know that an area overpopulated with deer has the following undesirable characteristics:

1. Choice deer foods are eliminated.

2. The fawn crop is smaller.

3. Mortality is higher, especially among fawns and the older deer.

4. Average weight of deer in the various age classes decreases.

5. Bucks have smaller antlers.

6. Harvestable bucks make up a smaller percentage of the population.

7. In farming areas, crop damage is more serious.

8. Parasites and diseases of deer are more prevalent.

9. Forest reproduction is heavily browsed.

10. Young planted pines, especially those grown on fertile soils in nurseries, are heavily browsed.

Turkey

There is both a fall and a spring hunting season on gobblers in parts of Alabama where the population is dense enough to warrant such hunting. In other parts of the state, there is only a spring season. The population is so low in still other parts of the state that no hunting is permitted. If legal methods are used, it is difficult to harvest enough wild turkey to affect the next year's population.

PARTRIDGE PEA FOR QUAIL IN THE SOUTHEAST

INTRODUCTION

More than twenty species of partridge pea are found in the United States, and most of them occur in the central and southeastern parts of the country. The two most important species in the Southeast are the showy partridge pea (*Cassia fasciculata*) and the sensitive partridge pea (*Cassia nictitans*). Both species provide winter food for quail.

The showy partridge pea is sometimes called large or large-flowered partridge pea. The sensitive partridge pea is also known as the small partridge pea. Both species are fairly common in most of the Southeast.

The sensitive partridge pea is susceptible to wilt which may strike in late summer and kill the whole plant. Seed of the sensitive partridge pea are not available from commercial sources. For those reasons, the sensitive partridge pea is not recommended for planting in small plots to produce winter food for quail. If the plant is present (at least 1/4 acre), it should be maintained according to instructions in the section entitled "How to Maintain" later in this Appendix.

The showy partridge pea, on the other hand, is more resistant to wilt. It produces more seed than does the sensitive partridge pea. Seed of the showy partridge pea are available from commercial sources, and it provides a good bit of overhead cover that is essential for quail. For those reasons and others, the showy partridge pea is recommended for planting in small plots to provide winter food for quail.

For the most part, the information in this guide concerns the showy partridge pea and the Comanche variety of that species. However, some of the statements apply to the sensitive partridge pea also.

The Comanche variety was developed by the Soil Conservation Service (now the Natural Resources Conservation Service) at its Plant Materials Center near Knox City, Texas. Even though it was introduced from Texas, the Comanche variety is well-suited to most of the Southeast. Seed of that variety are being produced for commercial purposes in Alabama, Georgia, and several other southeastern states.

The showy partridge pea is an annual, warm-season legume that usually grows 2 to 3 feet high, but individual plants vary from about 6 inches to 4 feet or more in height and from narrow with few branches to wide with many branches, depending mostly on soil conditions and stand densities. Like nearly all other legumes, the partridge pea adds nitrogen to the soil through bacterial action on the roots.

Prepared by Robert E. Waters, Wildlife Consultant/Free-Lance Writer, 318 Bowden Drive, Auburn, Alabama 36830, (334) 887-9460, May 1991.

The partridge pea frequently volunteers on disturbed areas along ditch banks, fence rows, roadsides, field edges, and similar places, especially in the Blackland Prairie and in moist soils throughout the Southeast. Except in years with little rainfall in August and September, partridge pea usually produces an abundance of hard-coated seed that are readily eaten by quail from late December to mid-March, especially if other foods are scarce.

The leaf of the partridge pea resembles the leaf of sensitive briar, but it is much larger; and like the sensitive briar, the leaf of partridge pea folds when touched. The leaf usually contains 10 to 15 pairs of leaflets. There is a reddish-brown nectary or honey gland on the petiole and slightly below the lowest pair of leaflets. The plant's bright yellow flowers are especially noticeable in August and September.

The seed pods are 2 to 3 inches long, flattened, and straight or nearly so. They usually contain 10 to 14 or more seed. The seed are black (those of the Comanche variety are brownish black), flat, and somewhat square. The seed contain diagonal rows of circular depressions that can be seen under magnification.

The seed mature in September and early October, after which the seed pods split with a good bit of force that may throw the seed several feet. Some of the seed sprout in February and March to re-establish the stand. Others remain on the ground, where they are available to quail throughout the year and for several years thereafter.

However, it is in late December and in January, February, and March that the seed are most valuable to quail. From about Christmas to the end of bird season, some hunters and dog trainers take their dogs from one small planting of partridge pea to another. By doing that, they can find nearly every covey on a tract of land, especially if other quail foods are scarce. That, of course, makes hunting and dog training more enjoyable.

Besides providing an abundance of winter food, partridge pea is valuable to quail for other reasons. Among those reasons are:

- In late spring, summer, and early fall, partridge pea provides overhead cover from hawks and other predators. Also at that time, the plant provides shade in which adults and broods can catch insects and other small animals. In late fall and winter, when quail are feeding on the seed of partridge pea, that overhead cover conceals the birds from hawks and other enemies. You may know that a good many hawks have migrated into the Southeast by that time.

- Partridge pea provides winter roosting cover, especially if the stand is beginning to thin (no more than one plant per square foot). Winter roosting cover or a suitable place to spend the nights during winter is essential for quail, even though some authors apparently overlook its importance. If I have learned anything about quail in more than forty years of working with them, it is this: If winter roosting cover is unsuitable, quail will be absent during hunting season. No ifs, ands, or buts.

- Partridge pea provides nesting cover during years when it is not disked or prescribe burned in late January or early February to encourage reseeding. That is, it provides nesting cover at least every second year and sometimes two out of every three years.

LIMITATIONS

Like all other plants used in managing habitat for quail, partridge pea has limitations you should be aware of. Hunters, managers of quail preserves, dog handlers, and others who have used partridge pea successfully for decades use it in ways that minimize its limitations and maximize its advantages. You should do likewise. Instructions for doing that are contained in the next few paragraphs and in the section entitled "How to Maintain" later in this Appendix. Here are the plant's limitations:

- Partridge pea must be protected from livestock throughout the year.
- Partridge pea is susceptible to drought, especially in August and September. Dry weather at that time drastically reduces, and sometimes prevents, seed production.
- The showy partridge pea is a reseeding annual, but prescribed burning or light disking in January or early February every two or three years is required to make it reseed.
- Partridge pea may be damaged by rodents and occasionally by rabbits. The cotton rat is especially destructive, but it can be controlled by the deep disking of nearby stands of grasses and weeds, especially the dense stands.
- In some instances, sparrows and other non-game birds compete with quail for the seed.

ESTABLISHMENT

The best way to establish partridge pea is to plant scarified seed in February or early March.

Size of Plots

Plots should be 30 to 45 feet wide and at least one-fourth of an acre in size. From the standpoint of hunting and dog training, width makes little difference because a dog that is pointing in the 2- to 3-feet-high plants is usually easy to see. (Because of their height and sometimes their color, Brittanies may be difficult to see.). Also, you can usually swing your gun while standing in a plot. However, the ideal dimensions of a one-fourth acre plot seem to be 30 feet wide and 360 feet long. Unless stated otherwise, hereafter when I refer to a plot, I am thinking of one with those dimensions--30 feet wide and 360 feet long. It is usually better to plant several one-fourth acre plots than to make one larger planting.

Where to Plant

Partridge pea grows well in most of the Southeast, but it grows best in moist, sandy bottom land soils with a pH of 6.0 to 6.5. It grows satisfactorily on many soils that will not grow other plants that produce winter food for quail.

It can be grown in areas with high populations of deer because deer browse the plant very little. Partridge pea grows fairly well on eroded upland sites, especially if the proper inoculant is used and if lime and fertilizer are applied according to soil test recommendations. Partridge pea grows well on the moderately alkaline soils of the Blackland Prairie. It produces more seed when grown on sites covered by shade about 30 percent of the time.

Plant near woods or other natural quail cover. Plant where there is a shortage of winter food for quail or where you want to consistently locate quail for ease of hunting or training of dogs. In most instances, plots can be located where they will not interfere with other activities. Good locations are field and woodland borders, idle fields, utility rights-of-way, openings in thin woodland, along ditch banks and hedge rows, level stretches of little-used roads in open woodland, and land in set-aside government programs.

If the soil is suited, an ideal location is the more nearly level edges of crop fields, especially those near woods or other natural quail cover. Partridge pea grows well and usually produces an abundance of seed in those partly shaded field edges. When planted on the edge of crop fields, plots should be 30 feet wide and 360 feet long, except as noted in the next few paragraphs. Plots on the edge of crop fields should be on land that is more nearly level because light disking in January or early February is one of the treatments recommended to encourage reseeding. Disking at that time increases the chances of erosion, especially on sloping land.

Some landowners, hunters, and dog trainers may want to extend the 30-foot planting of partridge pea around the entire edge of smaller fields on more nearly level land. Plots planted on those edges will be longer, of course, than the usually recommended 360 feet. Besides providing winter food and overhead cover for quail, such plantings enrich the soil, help control erosion, and generally improve the appearance of crop fields.

If the land is more nearly level and the soil is suited, I recommend the planting of partridge pea and sericea on the edge of larger crop fields. Here is how to plant them.

Plant a 30-foot plot of partridge pea 360 feet long, skip 1320 feet or 1/4 of a mile, and plant another plot of partridge pea. Continue the planting of partridge pea plots and skipping 1320 feet around the entire edge of the field. Then plant sericea in the 1320-foot intervals between the partridge pea plots.

Sericea is a warm-season legume that usually grows 2 to 3 feet high. It produces an abundance of seed, but quail usually do not eat them unless other foods are absent. However, sericea produces excellent roosting and nesting cover for quail. It should be planted between March 1 and August 15 at the rate of 25 pounds of scarified seed per acre or 27 pounds per 1320-foot interval between the partridge pea plots. Your local agricultural agencies can give you detailed instructions for planting sericea and can recommend varieties for your area.

Another option on the edge of larger crop fields is to plant nothing in the 1320-foot intervals between the partridge pea plots. That is especially recommended on soils not suited for sericea. In a few years, grasses and weeds will become established in the 1320-foot intervals and will provide excellent nesting cover and the winter roosting cover that is essential for quail. Keep the grasses and weeds thin and in early stages of succession by disking or burning in early February every three to five years. However, avoid disking or burning all grasses and weeds on the edge of a field during any one February. Leave some untreated to provide cover for quail. They can be treated in later years.

Avoid planting partridge pea on areas grazed by livestock. As stated earlier, livestock will destroy it. If fencing is necessary, construct at least one gate wide enough for farm tractors, disk harrows, mowers, and other farm equipment to enter. Construct several "V"-shaped stiles--the kind that allows people to enter but excludes livestock. Fences equipped with such stiles seem to be safer to cross, and they prevent snagging and ripping of expensive trousers.

Avoid planting on sites that contain Johnson grass, Bermuda grass, Japanese honeysuckle, or other persistent plants. In a few years, such plants can ruin a plot's value to quail. Avoid planting in dense shade and, if possible, avoid planting in full sunshine and in highly acidic soils.

One plot per 12 acres provides enough winter food for quail. However, two plots per 12 acres allows one plot to be disked or burned in January or early February to encourage reseeding and the other to remain untreated to provide: (1) Food for quail until mid-March; and (2) cover in which quail can nest the following spring and summer. The second plot can be disked or burned in January or early February of later years. Landowners, quail hunters, and serious dog trainers who are planting two plots per 12 acres like the idea, and so will you.

When to Plant

The best dates are February 15 to March 15. Acceptable dates are February 1 to March 31. Avoid planting after April 15.

Soil Preparation

Break and harrow your plots several weeks before planting. That will allow rains to settle the soil before planting. The seedbed should be firm but thoroughly prepared, and it should be free of Johnson grass, Bermuda grass, kudzu, Japanese honeysuckle, and other persistent plants that can ruin a plot in a few years.

Lime and Fertilizer

At the time of soil preparation or a few days before, apply lime and fertilizer according to soil test recommendations. Your local agricultural agencies have instructions for collecting soil samples. They may have small containers in which to mail the samples to an approved laboratory for analysis. If a soil test is not made, obtain instructions for applying lime and fertilizer from the Natural Resources Conservation Service, your county Extension office, or some other reliable source.

Because food plots are small and frequently located in remote places, dealers may be reluctant--and may even refuse--to apply the lime and fertilizer that is necessary for high production of seed. Sometimes they simply cannot drive their loaded trucks over the rough roads to reach your plots. In such instances, it may be necessary to apply the needed lime and fertilizer by hand. Use whatever means are necessary to get the correct amounts on your plots. Otherwise, you will probably be disappointed.

As a rule, avoid using fertilizer that contains nitrogen because added nitrogen is of little value to partridge pea. In addition, it encourages Johnson grass, Bermuda grass, and other persistent plants that can ruin a plot. A fertilizer widely used on partridge pea in the Southeast is 0-24-24.

How to Plant

Freshen the seedbed lightly. A disk harrow with a slight angle is satisfactory for that. Broadcast 16 pounds of scarified seed per acre or 4 pounds per 1/4 acre plot (30 feet by 360 feet).

Yes, you may reduce the seeding rate by up to one-half. However, if you do so, it will take at least two years to get a good stand. Furthermore, you will get a good stand then only if you disk lightly or prescribe burn in late January or early February following the plant's first growing season.

It is better to plant seed that were produced in your state or in an adjoining state because, as a rule, they are more likely to be suited to your conditions. As stated earlier, seed of the Comanche partridge pea, a variety introduced from Texas, are being produced in Alabama, Georgia, and several other southeastern states. That variety is well-suited to most of the Southeast.

As a rule, the seed do not need inoculation. However, they may need it if you are planting: (1) Several hundred yards from the edge of a big field that has been in continuous crop production for many years; (2) on an area that has been continuously grazed by livestock for many years; (3) on an area that has been strip mined within the last year or two; (4) on new ground that was covered by a dense stand of mature hardwoods; or (5) on an extensive area

from which the topsoil has been removed by erosion or other means. Your local seed dealer may have the correct inoculant. If not, he can order it for you.

Broadcast the seed evenly over the entire plot. Broadcast them by hand or use a shoulder-supported, Cyclone-type seeder. Cover the seed with a cultipacker or other roller. Cover them 1/4 to 1/2 inch--just enough to prevent drifting in case of moderately heavy rain. Avoid going up and down slopes with a cultipacker or other roller. That will reduce the likelihood of serious erosion.

HOW TO MAINTAIN

Even though the showy partridge pea is an annual, it reseeds very well when planted on suitable sites and managed properly. I know of plots that were planted in Alabama more than 40 years ago, and they are still thriving. Here is how to make your plots last indefinitely.

Protect from grazing by livestock. Grazing in spring, summer, and early fall either kills the plant or prevents seed production. Grazing at other times damages the partridge pea's value as overhead cover for quail.

In order for partridge pea to reseed, it must be prescribe burned or disked lightly, but thoroughly, every 2 or 3 years. Besides removing the leaves and stems of partridge pea, prescribed burning scarifies many of the seed on the ground and allows more of the seed to be in contact with bare soil. That condition favors germination. Light, but thorough, disking also removes the leaves and stems of partridge pea and allows more of the seed to be in contact with bare soil. Therefore, light disking also encourages germination.

Either treatment, prescribed burning or light disking, must be applied in January or early February before most of the seed germinate. Disking or burning at other times either damages the next stand of partridge pea, or it results in fewer days of enjoyable hunting and bird-dog work.

As one would expect, the seed germinate much earlier if there has been several weeks of unseasonably warm, spring-like weather. For that reason, you must learn to identify the one- to two-week-old seedlings of partridge pea. Otherwise, you will probably damage your plots by occasionally burning or disking after most of the seed have germinated. There is more danger of burning too late than of disking too late, especially if the plots are at least three years old.

To encourage quail to roost in your plots, clip a strip at least ten feet wide and 10 to 12 inches above the ground in mid-October. These 10-foot strips should extend the entire length of your plots. They should be located well away from trees and preferably on eastern, southeastern, or southern slopes.

In some instances, partridge pea enriches the soil to such an extent that only a lush growth of leaves and stems--but few seed--are produced. That is especially true on moderately fertile sites that have been disked lightly for many years in January or February to encourage reseeding. Some of that soil enrichment comes from nitrogen fixation by bacteria on the roots of the partridge pea, and some of it comes from incorporation of leaves and stems of partridge pea into the soil by disking. In such instances, prescribed burning in January or early February for a few years usually increases seed production.

In other instances, stands that result from light disking or prescribed burning in January or early February are simply too thick for high production of seed (more than three plants per

square foot). Such stands should be thinned soon after the seed germinate. Either a disk harrow with a slight angle or a rotary hoe is satisfactory for thinning such stands.

Keep vines, persimmon, sassafras, pine, plum, and other unwanted plants cut and removed from plots. Have your soil tested every 3 to 5 years and apply lime and fertilizer according to the latest soil test recommendations.