

Biology & Management of Eastern Wild Turkey

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Fact Sheet 35

Forestry and Natural Resources

Revised May 2009

Prior to and during early colonial times, the wild turkey (*Meleagris gallopavo*) occurred in large numbers over most of South. As settlement increased, detrimental land-use practices and market hunting resulted in the near extinction of the wild turkey. Because of the aggressive trapping and restocking efforts by state wildlife agencies, wild turkey populations have reached historical high levels in most states, including South Carolina.

Life History - The Mating Season

For any animal, the most complex period of its life is that time surrounding its reproductive cycle. For the wild turkey, this period occurs from about mid-March through June, although some related activities may begin as early as mid-February, and late nesting attempts may take place well into the summer. During this critical period, there are many environmental and behavioral mechanisms acting on the turkey.

Since wild turkeys band together in flocks through the winter, the first events of the reproductive cycle begin while they are still in this loose association. When the weather begins to get milder and spring-like, and as day length increases, internal mechanisms trigger changes in the behavior of both gobblers and hens. These behavioral changes intensify as the reproductive instinct increases.

The first really noticeable behavioral changes occur in the gobblers. Mature toms will begin to gobble several times before leaving their roosts at daylight. They will spend brief periods "strutting" about with tails raised and fanned, body feathers puffed out, and wings dragging the ground. While indulging in this type of display, they will make low "drumming" sounds and will occasionally gobble. Dominance among males is established by challenges to other males which may result in brief fights between closely matched toms. The "boss" gobblers are established through this process, and they will begin to assert their presence toward the hens in the area before the winter flocks have broken up. Although turkeys become sexually mature at about one year of age, the young gobblers are more often spectators than participants in the task of servicing hens.

Gobbling, strutting, drumming and fighting among males increases as spring progresses. The antisocial behavior of gobblers and hens as the instinct to begin nesting increases causes the winter flock to partially disband. Breeding males are often accompanied by a harem of hens numbering as many as 6 or 8, but more often 2 or 3. Several young



gobblers often range together as the various contingents of the winter flock go their separate ways.

About 3 to 4 weeks after gobbling begins, the size of the area used by the combined winter flock increases as individuals and smaller groups disperse over the land. Often a winter flock that may number 20 or more birds uses no more than a 50-acre home range in which to roost, feed and loaf during early March. After the flock breaks up into its breeding range, individuals and small groups may disperse out several miles. Flock break-up usually occurs around the third week in March. The home range of a dominant gobbler during the breeding season averages about 350 acres from mid-March through May.

Egg laying usually begins in late March. While hens are laying their clutches, averaging 1 to 13 eggs, they occasionally visit an available gobbler, even though one mating would probably fertilize the entire clutch. The first egg is laid about one hour after sunrise, and the remainder are laid about an hour later each day until sundown terminates the laying cycle. About two weeks is required for the hen to lay her clutch of eggs. Incubation may begin irregularly when the clutch is nearly completed. After laying an egg in the afternoon, the hen may sit on the nest until dark, then go to roost. She begins continuous incubation within a day or two after laying the final egg, leaving the nest only for brief periods to feed and water.

It requires about 28 days of incubation to bring off the clutch, and all fertile eggs normally hatch within a one-day period. Most hens begin

incubation sometime during the first three weeks in April. Considering early nest failures that lead to renesting, the peak of hatch appears to occur during the last half of May. Occasionally young poults have been observed in early April and as late as early September.

Soon after first nest incubation has peaked, the peak in gobbling intensity occurs, as toms can no longer easily locate a receptive hen. Peak gobbling intensity and duration usually occurs from April 22 to 26, although some sporadic gobbling may continue well into June in some years. Late gobbling is often associated with some unsuccessful hens returning to gobblers for mating before attempting to renest. Gobblers may continue gobbling for several weeks after the last hen has been seen.

The Brood-Rearing Season

The first poults may hatch several hours before the last in the clutch. If these first-hatched poults attempt to leave the nest before the hen is ready, she uses her head and neck to retrieve them and push them back into the nest. Once she leads her brood from the nest she does not return.

With the small poults following close behind, the hen moves slowly and deliberately, no object escaping her incredibly perceptive eyes. Poults are especially vulnerable before becoming large enough to fly. During the first days, the hen and brood use only a few acres. Nights are spent on the ground with the young crouched under her belly feathers and half-spread wings. She "broods" them during rains and on chilly days, as they are susceptible to drowning and exposure to the raw elements. If confronted by an intruder she will try to lure it away from her brood, but if that fails she will pretend to attack. If that warning is unheeded, she may throw caution to the wind and really charge. Communication between the hen and her poults is excellent. Poults obey her vocal commands completely, and if ordered to hide, they stay hidden until her call announces safety.

A poult's growth rate is amazing. Wings feather out first, at a very fast rate. Poults begin flying to roost on low branches when they are about 10 days old. By 18 days of age they are strong fliers.



Hen with chicks

Each day the family ranges wider. During spring and summer months, the borders of fields, pastures and new regeneration sites provide the large quantity of both protein-rich insects, tender green vegetation and ripening seed heads needed for rapid growth. By mid-October, hen poults weigh 5 to 7 pounds and males 6 to 10. Growth slows and may halt during winter, but resumes in the spring.

Throughout the poult-rearing period, the mature gobblers range either alone or in small groups. The hens unsuccessful at nesting usually join other hens, with and without poults. By late summer, it is common to see several hens with their broods using an area together.

The Fall and Winter

The flocking behavior of wild turkeys continues through the winter months. Fall flocks usually consist of adult hens and their poults, with old gobblers being segregated into distinct groups or ranging singularly. By the winter, many of the young-of-the-year gobblers have separated from family flocks to form young gobbler flocks.

Through the fall and winter, turkeys spend most of their time in the woodlands in search of acorns, beechnuts, dogwood berries and other types of mast. Where turkeys range through farmland, they will also utilize waste grain in fields, if not too harassed by human activity. Through this period, it is common for several groups of turkeys to flock together on good feeding grounds. Turkey gangs of 30 or more are often seen in good winter range. Old gobblers, young gobblers and hens often feed together, but they roost separately and generally exhibit some degree of segregation on common feeding grounds. On occasion, when a group of gobblers enters the feeding area, the hen group or young gobblers may move off or leave the feeding site.

The total amount of range used by turkey flocks during the fall-winter period varies with the availability of fall-winter habitat and with the abundance of food sources, which varies annually. In poor mast years, more range is required than in good mast years, providing that the turkey population density is relatively unchanged. On a day-to-day basis, a turkey flock may use only a few acres, but they may suddenly move a mile or more to new range. Such sudden movements are often associated with birds' traveling to a particular stand of preferred mast producer, like wild cherry.

Annual Turkey Population Levels

Brood size, or the number of poults comprising a brood, is highly variable, both within and between years, but it generally falls between 4 and 10 poults per brood. The number of broods observed each year varies more than brood size. As a result of these two factors, the fall population is dependent on the number of broods produced and average brood size. Turkey populations in a rather small area have been known to fluctuate as much as 50 percent from one year to the next, as a result of poor nesting success and low brood survival. Couple low production with loss of habitat, and the problems of maintaining a good population of turkeys is magnified.

One year of good production and survival can offset the declines caused by several successive years of poor productivity. All in all, the environment acts as a beneficial check on the turkey population, for if all hens were successful and all poults reached maturity, the population would soon become too dense and would not have enough habitat to support it. Disease, parasites and malnourishment would cause far more damage to the turkey than that invoked by the weather.

Mortality is always high among the very young and very old groups of animals. Among the younger groups, most mortality has occurred by late summer, and when poults have reached 12 weeks of age they have an increasing likelihood of surviving through the first year. In a good production year, the late summer poult to hen ratio is 3:1 or better. This ratio includes all hens and not just those with poults.

Average life span of turkeys is figured by considering mortality of all turkeys from time of hatch forward. By this method, it has been determined that the average life span of gobblers is 1½ years and hens slightly longer. Recently established populations tend to have a higher rate of productivity than the older, established populations.

Limiting Factors

In closing a discussion of the life history of wild turkeys, it is worth identifying the major factors which can interact to limit the success of a turkey population. The single most important factor that can and has completely destroyed turkey populations is manmade habitat destruction. Other factors seldom, if ever, have the long-term catastrophic effects of habitat loss.

Habitat Loss

The main limiting factor of the wild turkey is the lack of abundant quality turkey habitat. Unless the turkey's requirements for food, water and cover are met by a particular area on a year-round basis, the turkey cannot survive. In good quality habitat, it is possible to maintain one flock per 640 acres, but as quality diminishes, the flock's range increases.

Weather

Turkeys, like other animals, are able to survive in certain areas because they are adapted to the normal regional climate and available habitat. Severe deviations from the normal weather patterns cause decreases in population size. In South Carolina, weather is not normally a limiting factor, except during the nesting season if above normal rainfall and/or severe cold occurs. Increased rainfall may be followed by decreased nesting success and fewer poults per brood. Drought, the other extreme, may cause some problems by drying up needed water sources and withering vegetation that feed both the turkey and the insects on which they feed.

Poaching

Turkeys are very susceptible to poaching and need plenty of protection from the thoughtless acts of law-breakers. It is not uncommon for an entire flock to be illegally killed by these enemies of the turkey and sportsmen alike. Wild turkeys, being creatures of habit, possess a few

traits that make them vulnerable to poaching. Most often, shooting into a flock results in one or two outright kills, while crippling several others which eventually die.

The future of turkey hunting, for many hunters, will depend on complete cooperation with enforcement agents in order to effectively stop those few that give all hunters a bad name. Severe punishment of violators will help some think twice about breaking laws. Above all, those who hunt must develop the proper perspective for regulated harvest rather than wanton killing.

Diseases and Parasites

Under wild conditions, diseases and parasites usually make their presence felt when populations become too dense for the habitat to support. In such cases, they usually act to put the population back within the capacity of its habitat.

Occasionally, periodic declines in populations are blamed on diseases and parasites. It is believed by many that the diseases and parasites most detrimental to wild turkey populations are those introduced with the release of the "pen-reared wild turkey" which, like domestic poultry, can be immune to but carriers of infectious organisms. Blackhead and coccidiosis are as examples of diseases spread by both domestic poultry and pen-reared birds that affect wild turkeys.

It is good management to prevent contact between pen-raised or domestic stock and wild turkeys. Today, considerable effort is being expended to learn more about the role of disease and parasites in limiting wild populations. Wild turkey declines in some sections of the state may have been partly due to contacts between wild and domesticated flocks.

Needs and General Considerations

To have and keep wild turkeys on a given area, the land must provide suitable turkey habitat. Habitat implies a place in which an animal finds all its life-supporting and life-renewing requirements. The wild turkey requires many factors that a deer or squirrel requires, but it also requires some specific needs of the land that the other species do not. An absence of any needed factor may mean the difference in having or not having turkeys.

Wild turkeys are flocking animals and spend most of the year in close association with other turkeys. The key is providing enough habitat to support a flock on a year-round basis.

Generally speaking, suitable turkey habitat includes a scattering of mature mast-producing hardwoods, mainly oaks, with smaller hardwoods coming on to replace those becoming over-mature. Also needed is a mixture of understory plants, like dogwood and wild cherry, that provide food and cover. Turkeys make good use of green plants and seed heads found in pastures, fields, roadsides, some regeneration sites and elsewhere. These areas also provide the insects needed by poults to obtain the high quantity of protein necessary for their first few weeks of growth. Turkeys need water almost daily and must have easy access to

permanent water sources. In good quality turkey habitat, the area will support one bird per 30 acres or one flock to about 640 to 800 acres.

When management efforts are successful and turkeys set up residence and begin to reproduce, they can increase their numbers at a fantastic rate. Often it appears that the area will support one bird per 5 or 10 acres. After they become too dense, natural population mechanisms will begin to reduce the numbers to a lower density.

A population may exceed carrying capacity for brief periods, especially during the summer and fall of a good hatching year, but if this level is not reduced by turkeys spreading to adjoining range and/or by hunting, then disease and parasite problems will often combine with other factors, like food shortages, to cause excessive die-offs that may nearly wipe out the turkey flock.

Foods and Feeding

Turkeys consume a wide variety of foods. They feed by several methods, depending on the food source. Turkeys feed by picking, scratching, clipping, stripping or ingesting food material whole. Often a combination of these methods is used. During the spring, green grasses and leaves are ingested in large quantities. During the summer and early fall, picking and stripping methods are used to get at ripened seed heads. Scratching in the leaves for acorns and berries is the principal feeding method used from late fall through early spring.

Some principal wild foods of turkeys include acorns, beechnuts, fruits of dogwood, grape, black gum, wild cherry, blackberry and huckleberry, vegetative and/or seed heads of grasses, sedges, ferns, greenbriar, beggar's tick and honeysuckle. Acorns are considered to be the most important, because they are available during the fall and winter when most other foods are scarce. Acorns are very nourishing and provide the high energy content needed by turkeys to brave periods of extreme cold, when the body's energy requirements are highest.

Young poults, particularly during the first 2 weeks of life, require a high protein diet. This protein requirement is largely furnished by insects. Grasshoppers, crickets, stink bugs, beetles, flies wasps, ants, moths, millipedes, snails and spiders include the bulk of the animal matter consumed. In addition, grit is an important material needed in the gizzard to aid in grinding the food to a digestible stage.

Wild turkeys respond well to food plots. Chufa makes an excellent supplementary winter food source. However, in some areas a commercial seed source is difficult to find. Several clovers, as well as wheat, ryegrass, oats, corn, soybeans, cowpeas, vetch and bahiagrass make excellent plantings.

Water

Water is an almost daily requirement of turkeys, especially for turkey broods, which are almost never more than a quarter mile from water. Permanent streams, springs and ponds provide the water sources needed. About 4 sources per square mile are necessary; however, where a stream meanders through an area, the one source should suffice.

Cover

Cover requirements of wild turkeys vary with the season of the year and relate to the events of the turkey's year. Nesting cover is perhaps the most important cover category. Mature timber for roosting is important. Several suitable roosting sites scattered over a flock's range are needed, as turkeys seldom roost in the same place on successive nights. Aside from the many varied vegetative cover types found in turkey range, natural land contours that allow turkeys to avoid intruders can also be considered a form of cover. Rolling pasture land is a good example of contour cover, as turkeys feel safer when they can retreat over a hill and get out of sight of whatever spooked them.

Nesting cover is a must, and although hens may attempt nesting almost anywhere, woodland margins, old fields, unmowed pastures and brush lands provide the best areas. Because hens may nest in fields subject to early mowing, an important protective measure, if hens have been seen in the area, would be to delay mowing until mid-June. On any opening to be mowed from late March through June, it would be wise to drive over the mowing route with just a tractor and look closely for nesting hens. At least take time to drive the area within 50 to 60 yards of woodland borders. By locating the nest before mowing, enough cover can be left around the nest site to afford some protection if mowing cannot be delayed until nest completion. On lands subject to early cultivation, it would be wise to mow the area in late fall, after the growing season, or keep the soil turned, so that cover would be too sparse for a hen to attempt nesting.

Habitat Improvements

Developing a Turkey Management Plan

It would be impractical to develop small areas for turkeys unless a flock is already in the vicinity. Also, if turkeys are already using the area to be managed, careful consideration should be given as to why they are present. Further development of the area may cost more than it's worth in terms of increasing or maintaining the present population, especially if their presence is already satisfying one's desire to have turkeys on the area.

Habitat Survey

Whether the area considered for turkey management is 330 or 33,000 acres, habitat considerations are the same. First, make a survey of what is already available to turkeys and get some idea of the quality and quantity of available habitat. To accomplish this, a map of the area should be constructed and should include all property intended for habitat management as well as adjacent property which may be used by the turkey flock. Consideration of the habitat adjacent to the land being managed is important, as a well-designed management plan should make use of all property intended for habitat management as well as adjacent property which may be used by the turkey flock. Consideration of the habitat adjacent to the land being managed is important, as a well-designed management plan should make use of all available habitat that adds needed ingredients which improve the overall range.

Making use of good habitat components on adjacent property is especially important to the small landowner, who could not think of holding a flock of turkeys year round, even if his was the best available habitat. Turkeys know no property boundaries and will roam wherever their needs for food, water, cover and protection can be provided.

The best habitat map can be developed from aerial photographic coverage of the property. The local Farm Services Agency (FSA) has aerial photo coverage of all lands in each county of South Carolina, and will help landowners interpret basic habitat features as they appear on the photograph (such as stream drainage, hardwood areas, ridges, valleys, etc.).

The FSA office will assist in ordering aerial photographs. Coverage should include the land to be managed and some of the adjacent property. To recognize the various habitat features, coverage in the scale of 1" = 330' or 1" = 660' provides good detail. The latter scale is probably the most practical for tracts of 1,500 acres or larger. With photos in hand, it may take several days or weeks to plan the operation, depending on the amount of acreage and work involved.

Probably the best time to begin pre-management planning is in June. This will allow plenty of time before fall planting or the spring growing season to decide on initial development activities, purchase seed for planting, make new openings and have a professional biologist or forester review the management plan and make further recommendations. These efforts may sound like a lot of trouble and not completely necessary, but jumping into something on the spur of the moment, without thorough planning, will far more often than not result in a waste of time and money.

Constructing a Habitat Map

Learn to recognize the various habitats by comparing areas that you know with those which appear similar on the photographs. Use photographs to accomplish the following:

1. As nearly as possible, draw in the property boundaries.
2. Learn what highways, secondary roads, dirt roads and trails look like on photos.
3. Identify all types of openings — pastures, old fields, croplands, regeneration sites, logging decks, etc.
4. Find the power lines and gas lines.
5. Identify the various drainages on the property.
6. Note pine plantations, hardwood areas and mixed pine-hardwood.
7. Identify all water sources.
8. Identify all dwellings and consider whether the occupants will be a help or potential threat to your management plan.
9. Note acreages that are going to be materially changed during the coming years for other land uses.

After constructing the basic map, figure how many acres are in the various habitat types — hardwood acreage, mixed pine-hardwood, pine plantation, fields, pastures, and cropland.

Study the habitat distribution on the aerial photographs. It may first appear to be a patchwork quilt, but look closer and consider what each habitat type offers turkeys under its present condition and in combination with adjacent habitat components. Remember that during the critical reproductive period (from early spring through summer), hens, poults and gobblers like the areas where spring's first green plants reappear. During fall and winter, they use the woodlands in search of acorns and other mast crops. They seldom use areas over ¼ to ½ mile from water. With these and other things in mind, like possible sources of human disturbance and planned future timber cutting, a plan of habitat development should begin to take shape in your mind.

Compatibility of the Management Plan

Perhaps the biggest consideration in developing a habitat management plan is how compatible it will be with present and/or planned land use: how much of the commercial value is presently being wasted and how much one is willing to forego on behalf of turkey management. You will never find the ideal distribution and combinations of habitat types for turkeys on any given tract of land. There is no universal turkey management plan that can be employed from the coast to the mountains, because the distribution, abundance and quality of the many habitat types varies greatly from place to place. It should be emphasized that developing turkey habitat and maintaining it through the years is a long-term proposition.

The basic consideration for the future is the timber management plan. A timber rotation cycle should be commercially profitable, while being good for turkeys. Eventually hardwoods become over-mature and should be removed, but there should be younger, more vigorous mast-producers ready to replace those harvested.

Considerations for the Small Landowner

For those landowners who have small tracts, not totally capable of supporting a year-round flock, this information should be reviewed with the idea of comparing what the existing habitat offers in combination with adjacent habitat and then manipulate the land to provide what the adjacent area lacks. An example of this might be that the adjacent tract is mostly forested with no open areas within ½ mile or more of the property boundary. Then perhaps the best habitat feature to develop would be a scattering of openings, planted for late winter and spring use by turkeys. Planting openings adjacent to heavily used hardwood stands will help attract turkeys to regularly use the area during the spring gobbler season.

Hardwood Management

It should, by now, be clear that oaks are vitally important to wild turkeys. As much acreage as possible should be left in hardwoods that offer a variety of different oak species. Most oak species begin to bear

acorns between 20 to 25 years of age, but, for most, the best mast-producing years are from age 50 to 100 years when the trees are 14 to 24 inches in diameter at breast height (dbh).

Because many wildlife species utilize acorns as a primary food source, it is essential to provide a continuous crop of mast-producing trees. Before a given percentage of the available hardwoods is harvested for timber value, an equal percentage should be entering the best period of mast production (50 years or older). An alternative to this would be to have a higher percentage entering the 30- to 40-year old class, so that the collective production of acorns would about equal the production of acorns of the harvested acreage of mature oaks. Any timber cutting rotation for oaks for wild turkey should not be shorter than 70 years nor exceed about 100 years.

Other mast-producing species like hickory and beech should receive similar treatment, since these mast-producing components can relieve some of the pressure put on the oak by squirrels and other forest animals. Presence of a good variety of mast-producing species is especially important during years when the acorn crop is poor. If feasible, hickory and beech stands should be managed on a slightly longer timber rotation than oak, as their years of best mast production come later. A good rotation cycle for these species would range from 80 to 150 years.

Swamps, river bottoms, creek bottoms and drains should be managed for mast production. Often, good mast producers are found on upland ridges and slopes above bottomland and around old abandoned house sites. Such sites should be maintained as key mast-producing areas, even if there are only a few mature trees in the stand. These key areas scattered over the land provide more mast availability. Often, the swamps, river bottoms, and creek bottoms contain high volume of poplar, elm, gum, cypress and other less valuable mast species. These species should be removed in favor of oaks, hickories and beech; however, on many wetter sites it will be impractical to convert the forest stand to better species.

It is a well-known fact that turkeys prefer open woodland. Dense stands of young hardwoods will eventually mean thin-crowned mature trees that do not produce as well as will full-crowned trees. Good hardwood management should include some thinning to remove stunted, thin-crowned, poorly-formed, low vigor and damaged trees (except den trees that provide shelter for other wildlife). Poor mast producers should be removed, as they use just as much of the available soil nutrients as good producers. When superior mast producers are located, they should be protected as possible sources of superior seed stock. A good stand of mature mast producers should have the appearance of a broad-crowned overstory and a mixture of shade-tolerant understory species with mixed age groups of young mast producers ready to shoot skyward when over-mature trees are harvested.

In small stands (less than 50 acres), the best harvest method is selective cutting of those over-mature or poor mast producers to allow the younger vigorous trees to reach the crown. A given stand should

be harvested or thinned no less than every 5 years to minimize the disturbance factor imposed on turkeys. Where large stands occur or where clearcutting is a must, the size of the clearcut should not exceed 50 acres and preferably not more than 25 acres. A good first step toward getting a hardwood regeneration area back into mast production is thinning the young thick stand in about 20 to 35 years, which will facilitate full crown development of the remaining trees.

Also important is the development and management of lower-growing understory vegetation. Wild turkeys need the soft mast produced by dogwood, grape, wild cherry, huckleberry, blackberry and dewberry and wild strawberry. These species help provide the needed variety in year-round turkey range that assures an ample food source will always be available. Dogwood is probably the most important, as it provides a fall food source that can help offset the effects of a poor acorn crop. During thinning and/or selective cutting, care should be taken not to remove or damage dogwood and wild cherry trees. Other understory species can fend for themselves.

In managing the overstory components, guard against developing too dense a crown coverage that completely shades out the understory. Overstory trees should develop a full crown, but some spacing between trees helps assure that sufficient sunlight reaches the forest floor, allowing some understory to develop. At the turkey's eye level, the forest floor should be fairly open. Their fantastic vision is their key defense and, as long as they have a view of about 50 feet or more, they feel safer.

Pine Management

Managing strictly for short rotation pine pulp on vast acreages in contiguous blocks leaves little prospect for wild turkeys. Dense stands of even-age pines do not allow hardwoods to develop, even in the understory, where dogwood, wild cherry and other soft mast species could provide turkey foods. In addition, thick stands also provide habitat for many predators that prey upon the eggs, poults and adult turkeys. Managing for pine saw timber does allow a fair degree of potential for turkey management if done with wildlife values in mind.

Perhaps the most detrimental timber management practice is the conversion of large stands (200 acres and up) of hardwood and mixed forest types to pine plantations. In some cases, clearcuts over 1,000 acres may destroy enough range to support a large year-round flock of turkeys. Many such regeneration sites are commonly treated with herbicides to kill the hardwood saplings when the site is about 7 years old. This practice releases the pine saplings by reducing root and canopy competition with hardwoods. After a young stand is sprayed, the value to many wildlife species rapidly diminishes through the remainder of the rotation cycle. As many pine plantations planted in the 1950s are now being cut and regenerated again, the competition from hardwoods will be less than in its first planting because the source of hardwood stock has diminished under the pure pine canopy.

Pine management should always be confined to those sites suited best for pine and least for hardwoods. The slopes or zones between

bottomland and upland will grow good mast producers and should not be converted to pine. While trying to grow mast trees on every site will result in many areas with very low-grade hardwood, it is also poor wildlife management to convert a good hardwood site to pine.

Clearcutting of pine stands and regenerating areas into pine should be confined to areas of not more than 200 acres and preferably less than 100 acres in a block. The scattering of oaks, hickories, dogwoods and other mast-bearing trees that sometimes occur in natural pine stands should be maintained, especially where mast trees are scarce over a several hundred acre area.

Hardwood drains and stream bottoms should be left uncut and as wide as possible. Leaving only a narrow belt of hardwoods in the bottoms (less than 50' wide) usually results in a dense growth of understory and ground cover species, which is the result of too much sunlight reaching ground level. By leaving hardwoods well up the slopes, the overstory canopy should be sufficient to prevent too much undergrowth from covering the ground. Drains composed of hardwoods under 50 years old should be left uncut, as these sites will eventually be needed to replace older hardwood sites that need harvesting.

As a general rule of thumb, some of the upper slope sites in narrow drains are good pine sites, but they should only be converted to pine if 20 percent of the total acreage is in hardwood timber of good mast bearing potential (about 50 years old). Also, don't forget to leave enough acreage of younger mast producers for future use.

Clearcuts should be made in irregular shapes. This is easily accomplished if the drains are left uncut. Irregularly shaped clearings increase edge effect, a practice good for wild turkey and other wildlife species. In some areas, a "new" regeneration area may provide fair short-term nesting and brood range, before the ground cover becomes too dense. Gobblers will frequent the edges of these areas usually following the hens.

Areas managed on a saw timber rotation of 70 years usually increase in value for turkey management from about 30 years of age. To speed the developing value of these areas, thinning cuts should begin at the sapling stage and continue on 5 to 10 year intervals until the stand is about 30 to 40 years old. This practice will allow a mixed understory to develop fairly early in the rotation. Dogwoods, cherries and some oaks can reach mast-producing age by the time the stand is 40 to 50 years old. Thinned properly, the stand will then provide the open-wooded aspect that turkeys like, as well as some needed soft and hard mast producers.

One aspect of pine plantation management that is particularly detrimental to turkeys is the patchwork-quilt effect that some areas develop when adjacent stands are converted to pines every few years. Within a 7 to 10 year period, it is easy for several thousand acres of adjacent sites to be converted to pines from age zero to ten. Care should be taken to maintain enough stands of sawtimber-size trees to prevent elimination of turkey range over a several thousand-acre block. A minimum of 50 percent of the timber should be pole size or larger and such stands should not be isolated as islands in vast young pine stands.

The saw timber stands should connect to other fairly large timber to avoid creating a natural barrier that turkeys will not pass through. Such a management approach may cause a turkey flock to use more acreage to satisfy annual needs, but at least they will not be eliminated over several square miles.

Controlled Burning

Longleaf, shortleaf, loblolly and slash pine, or mixtures of these species have survived wildfires through the Coastal Plain for many thousands of years and are fairly fire resistant, except in the early seedling and sapling stages. The use of prescribed burning by skilled managers for the purpose of controlling understory growth in pine habitat can be an excellent turkey management practice. Under more limited conditions, prescribed burns can be effectively used in pine stands in the Piedmont.

In Coastal Plain and Piedmont regions, fire should be excluded from hardwood components of the forest. It is imperative to exclude fire from oak and mixed hardwood transition zones between pine upland and gun swamps. Repeated burning of transition zones will convert them to pine. Fire should be limited where scrub oaks occur as a sub-type in longleaf pine stands. The mast produced by these oaks may be very important during some years.

The turkey's need for a relatively open forest understory has already been emphasized. The proper use of fire to maintain this open aspect is an important management practice in pine types. In addition to maintaining an open understory, prescribed burns enhance the availability of some desirable food sources. Wild turkeys eagerly consume the new tender growth of forbs, grasses and legumes stimulated by the burn. Insects are often abundant on recently burned areas, as they are attracted to the newly abundant flowering legumes. Hens and poults make excellent use of such areas for insect and plant materials.

Prescribed burning should be accomplished during January and February and no later than March 15. Some variation in opinion exists on how often to burn as well as how much area to burn. Two primary theories on burning will be described so that the one best suited to a given situation can be employed.

One type of burning technique employs "spot burns" over $\frac{1}{3}$ to $\frac{1}{2}$ the entire pine woodland each year. Spot burns range from about 1 to 5 acres and are well distributed over the terrain. Spot burning should be accomplished with a light fire. Effects of such burns are to give a maximum food supply each year that is well distributed over the turkey range. Burning the same site should be done every 2 to 3 years, except for those sites which must be controlled annually.

The second type of burning technique is a "compartment burn," which is accomplished with a slightly hotter fire than spot fires. The compartments may range in size up to several thousand acres and comprise about $\frac{1}{4}$ to $\frac{1}{3}$ of the total land area. Such burns should be done on a 2- to 4-year rotation, depending on the rate at which a given compartment again develops dense ground vegetation. Compartment

burning seems to be the most widely used technique. Care should be taken to protect cover during prescribed burns.

Managing the Openings

Wild turkeys need open areas in which to feed on green vegetation, seeds and insects. The insect population is highest in open grassy areas and therefore easiest to find. Openings may include pastures, fields, crop land, orchards, logging decks, roadsides, powerlines, gas lines, new regeneration areas and other areas that provide a break from continuous woodland.

Studies have shown that turkeys use open areas of almost any size, but prefer openings from 5 to 20 acres. Apparently, such openings produce more forage, seed and insects, and the turkey flock is not able to eat them out as readily as they are the smaller ones.

From a development standpoint, it may be too costly or difficult to bulldoze out large openings of over 5 acres. Unless developed for commercial purposes, with turkey use as a secondary objective, the large openings may not be practical. Several closely spaced smaller openings may be the best investment, and they add to the edge effect. In order to decide which size openings are best suited to your operation and budget, contact someone who knows development costs and tell them what you are trying to achieve. This will probably save you money.

About 10 percent of the overall acreage should be maintained in some type of open land. Turkeys will prosper more if a slightly higher percentage is left in openings that are well distributed among the wooded tracts. A given tract of land may be as high as 40 to 50 percent open land (pasture, cropland, orchard), yet still be an excellent place for turkeys. Perhaps the key factors that make such open areas good turkey habitat are the presence of several year-round food sources and a high percentage of mast-producing oaks in the surrounding woodlands. Increased amounts of open land attract hens to nest nearby and use the area during the brood rearing period.

Before incurring the expense of developing new openings, it would be wise to inventory what is already available, but unused. Electrical and gas line rights-of-way are relatively open and may cost very little to develop. Bush-hogging will remove brush from areas that can be planted and maintained. Leaving the unworkable sites in brush will provide good nesting cover. It may be relatively easy to develop several ¼ to 2 acre patches along the rights-of-way with just a tractor, bushhog and disc harrow. Request that power companies do not spray or mow during the nesting season, as this may disturb nesting. Financial assistance may be available through some power companies to those willing to maintain a section of right-of-way.

Logging decks, logging roads and private roads have good promise for developing openings at a low cost. Old logging decks and logging roads may contain stumps that should be removed before planting. Stump removal on these sites will cost less than developing an opening from scratch. Where timber sale contracts are involved, the timber operator could be required to remove stumps and leave the decks and roads

workable. Removal of stumps is not completely necessary if they are not too numerous and are left at nearly ground level. A light harrow can then be used without too much trouble or risk to equipment.

Privately controlled roads may be excellent for roadside plantings. Roughs along the edge of roads also serve as possible nesting cover. The problem in planting along roads is drawing turkeys to them in areas where uncontrolled access makes these areas a poacher's paradise.

Closely grazed pasture land is well suited to turkey use. Grazing sometimes keeps pasture grasses, such as fescue, in a tender growing condition that is more palatable to turkeys.

Turkeys use corn fields, bean fields and the like for fall and winter food sources. For wild turkeys and other animals, clean borders around cropland is wasted space that should be converted into winter grazing or cover. Planting the 10- to 20-foot-wide fringe around cultivated openings and orchards is a practice beneficial to wildlife.

Supplemental Planting

As pointed out earlier, the wild turkey is one wildlife species that supplemental planting really helps. Almost any non-wooded area can serve as a potential wildlife opening.

The question arises as to how much food planting is necessary to help supplement what is already naturally available. When time, money, labor and equipment are involved, this is certainly a question that should be asked. From the habitat inventory (which should be completed before you reach the point of developing and planting wildlife openings), you should know something about what is already available as well as when it is available for turkey use. From this point, it is only necessary to fill in the gaps, making the natural situation even better.

If it appears that some development of wildlife openings and/or supplemental planting are necessary, start with a fairly minimal program. Make use of all that is available before further development is initiated. Supplemental plantings of ¼ acre are not too small to consider; however, it is cheaper to work larger openings up to about 10 acres. For the first 2 years it is wise to limit the amount of artificial planting to only 5 or 10 acres on small ownerships, and 20 to 50 acres on large tracts, and evaluate how much use turkeys make of your offerings. During these early stages of development, keep a close watch on the use of naturally available food sources and at least mentally compare the use with the supplemental plantings. This effort may lend insight to how much more or less management is necessary to achieve landowner goals.

Supplemental Foods

Supplemental plantings should be compatible with the primary land use, like planting ryegrass and winter wheat for cattle grazing or grain harvest and soybeans and peanuts for their commercial value. Such plantings result in commercial profits as well as benefiting the wild turkey. By starting with an economically feasible management plan, the

dollars invested will stretch farther and show a higher rate of all-around return.

Of all supplemental foods, chufa is perhaps the best. Chufa does best on "new" ground can be planted in plots from $\frac{1}{10}$ acre to about 2 acres. Raccoons and hogs can be a problem in eating out small chufa patches, but where they are not a major problem, the best patch size to plant is about $\frac{1}{2}$ acre, with several such patches spread around the area on sandy soils.

Newly regenerated clearcuts are good areas to plant several acres of chufa around the border during the first year of regeneration. Five acres of chufa per section of land (640 acres) can produce tons of chufa, which may effectively offset an acorn mast failure. In wildlife plots of 2 acres or larger, sow chufa on part of the opening and plant other turkey food on the remainder. Turkeys that have never scratched for chufa may need your help in finding them. Pull up and scatter several clumps from the patch from about November until the turkeys discover them. Chufas also volunteer well several years after the initial planting if disked 2-5 times periodically during early spring and throughout the growing season. In many cases it seems the more chufa plots are disked, the better they respond. Caution should be taken, however, since hunting over disked chufas is considered baiting in South Carolina and is illegal.

Clovers may be second in importance to chufa for turkey plantings. Ladino clover holds up well and lasts longer into spring and summer than does crimson or white clover. Ladino is best suited to fertile clay and silt loams, while crimson and white clover are more widely adapted. The Tillman variety is a hardy clover and does well in places where others might fail, especially near the coast. All clovers do best when planted alone, and can be maintained for several years with annual liming to maintain the proper soil pH. Combination plantings of clover and wheat, ryegrass or bahiagrass do well together. Plant clover on roadsides, powerlines and gaslines, and around edges and between rows in some croplands and orchards.

In incorporating clover in a pasture program, clovers should be seeded around pasture edges which turkeys frequent most. Clovers should be planted in the fall; however, clover can be planted together with a pasture grass in early spring. This combination will provide a year-round food source and requires almost no maintenance for several years.

While bahiagrass is a good food source in pastures, it is considered a pest plant in some areas because songbirds spread the seed to unwanted sites.

Field corn is an excellent fall-winter food source. Only part of the crop should be made available at one time. By periodically knocking down several rows of stalks it will last much longer. Deer, squirrels, quail, raccoons and other wildlife use corn during the winter; therefore, plantings should be no smaller than one acre per opening. Where corn is planted in large acreages for silage or other purposes, leave several scattered patches standing near woodland margins for winter use. Corn left on the ground in harvested fields will serve to feed many animals as long as it lasts.

Winter wheat is a good choice to plant in wildlife patches. If the patch is one acre or less, plant the entire opening in wheat, but on larger patches combine wheat with other crops. If the variety "Blue Boy" is suited, it is the best choice, because it is a low growing wheat. This makes it easier for young poults to get around, and they can get to ripening seed heads with more ease. Recommendations for winter wheat also hold for oats and ryegrass. However, oats is a poor choice on low sites that have periods of standing water. Ryegrass is preferred over rye because of its lower growth form that makes it more available to use.

Grain sorghum can be planted in strips, because a dense stand may be difficult for turkeys to travel through. The planted strips should be 3 to 4 feet wide, leaving about 2 feet between rows to allow easy traveling. Quail, doves and other birds also use sorghum. If planning to shoot doves, be sure that federal regulations for migratory birds are followed. If sorghum is planted for silage or other uses, leave unharvested strips around field borders for fall and winter food. Patches planted strictly for turkeys should range from about 1 acre up to 10 acres, depending on expected use of all wildlife species.