11 Managing for Multiple Use

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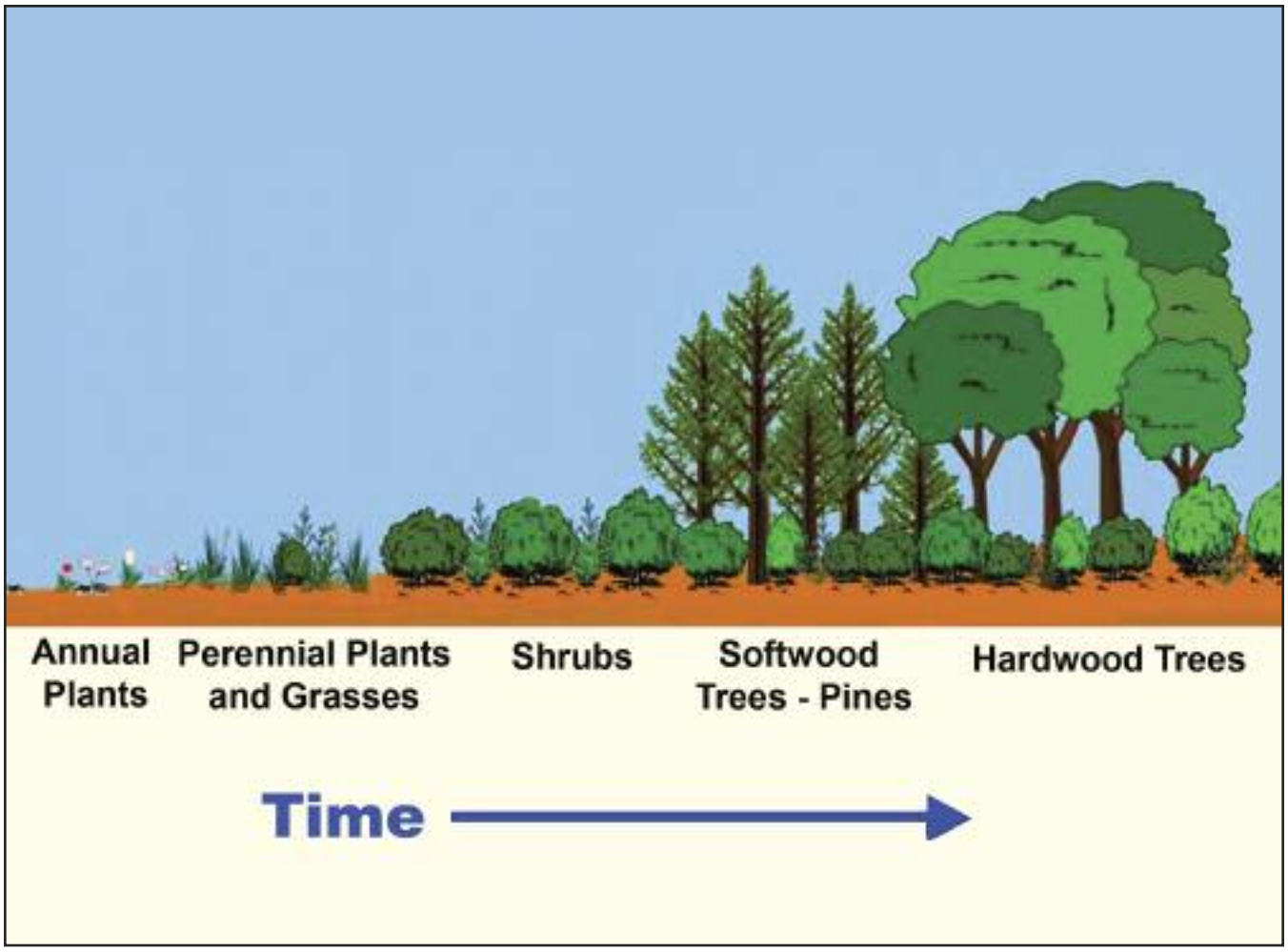
Several surveys indicate that nonindustrial private forest landowners own land for reasons other than timber production. These reasons include aesthetics, recreation, and wildlife management.

The concept of multiple use management was embraced by the U. S. Forest Service in the 1960's after the Multiple Use Sustained Yield Act of 1960 was passed. This act directed the Forest Service to manage forests for a variety of uses, including timber, clean water, wildlife habitat, and recreation.

Private landowners in Mississippi also embrace the multiple use concept on their lands, and many are extremely interested in managing for a sustained yield of timber as well as for enjoyment of their property through recreational use.

Managing for good wildlife habitat is not difficult and can easily be incorporated into the forest-management plan. Landowners should be aware that any actions taken in the forest, including no action, will have an immediate and long-term effect on wildlife habitat.

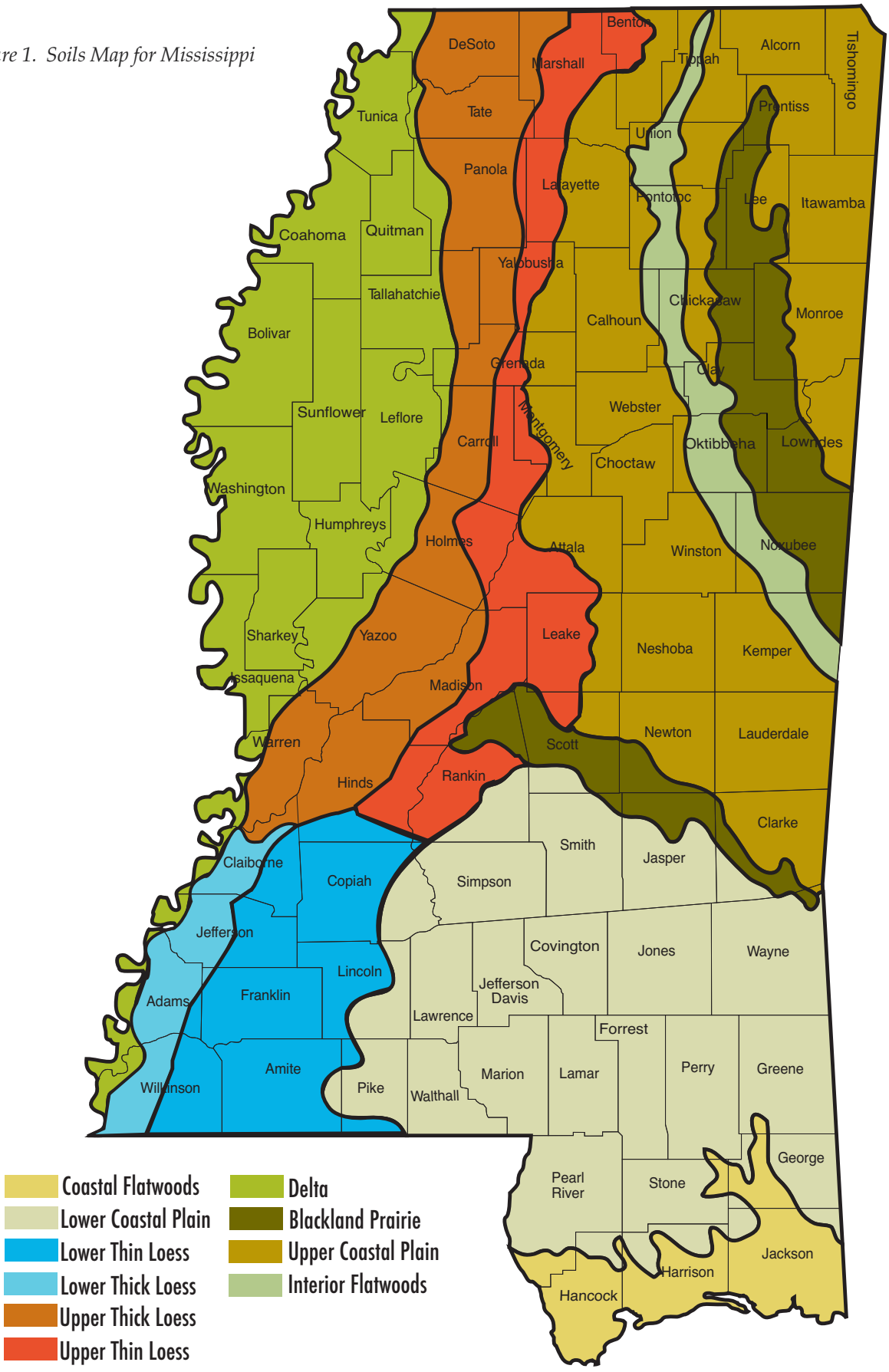
The concept of "plant succession" is important to understanding how different forest management practices alter wildlife habitat. It is also important to understand that not one forest, or forest type, is the ideal habitat for all wildlife species. All disturbances in the forest are followed by a logical and predictable chain of events known as "plant succession." Plant communities do change over time. Disturbances that eliminate all mature trees and greatly disturb the soil and reduce it to bare ground can occur naturally or can be caused by man.



In any event, the simplest plant succession model (as shown above) can help us to understand what will occur in the years following a disturbance. Bare ground will quickly change to annual broadleaf weeds and grasses, and then to annuals and perennial weeds and grasses as light-seeded trees invade the site. Later, the tree seedlings mature first into saplings, then into pole-sized trees, and then into mature forests. In most of Mississippi's uplands (outside the major river bottoms and the coastal flat woods), the ultimate or "climax" forest is oak, beech, and magnolia. Climax forests within the major river bottoms will depend upon soil type and the position of the site within the floodplain. In addition, sites within these major bottoms are altered by changes in stream flow and as sediments are deposited within the floodplain.

The species composition of the annual weeds and grasses that germinate and grow on a site depends upon past land use and what is present in the "seed bank." The seed bank consists of seeds that are already on site, or in the soil. These seeds are there as a result of the vegetation growing on that site, as well as wildlife use of a particular area. Plant succession for old-field sites that were once in agriculture will have a different seed bank than areas that have never been farmed. Pastures that are allowed to revert to forests will have a somewhat different pattern of plant succession because of the dense grass sod and its ability to suppress seeds in the seed bank. Generally, the more you disturb the soil, the more diversity you will have in plant species in the early years of plant succession.

Figure 1. Soils Map for Mississippi



Plant succession behaves quite differently on soils with high fertility and a favorable moisture profile as compared to soils with poor fertility and low moisture capacity and/or poor drainage. The land-management plan must consider all of these things when integrating wildlife habitat management concerns. The most fertile soils grow a higher biomass of plant materials, and those plants have a higher nutrient content for white-tailed deer, for example.

Understanding these basic ecological concepts will allow the land manager to predict and plan for the type of plant community that will result from a particular forest management practice.

Plant species' richness and diversity are the major components of wildlife habitat. While all wildlife species share the common need for food, cover, and water, their specific needs can vary greatly. Therefore, the prudent manager will want to manage his or her forest for a diversity of plant communities that will include the required habitat components for the wildlife species preferred.

Wildlife Management Principles

Diversity – Greater diversity will relate directly to greater habitat quality for a broader range of wildlife species. Diversity includes differences in a number of components. More species of plants, different ages of timber stands, and different types of timber stands are included in this definition of diversity.

Also important are the terms *horizontal* and *vertical diversity*. *Vertical diversity* relates to the presence of different layers, or the absence of those layers, in the forest canopy. Mature hardwood forests normally have good vertical diversity because of the presence of an understory, a mid-story, and an upper canopy layer of vegetation.

Horizontal diversity relates to the change in the plant community across the landscape, particularly at ground level. Horizontal diversity is extremely important as the manager considers the relationship of openings in the forest and the relationship of when and where timber-management practices are located to create different ages and types of ground and canopy cover.

Edge Effect - Edges are the transition between one type of plant community and another. Edges are important since two types of plant communities are present in close proximity to each other, and animals can use both communities quite easily. Increased edge equals greater plant diversity. For example, the edges of a mature hardwood stand and an old field that is growing up in shrubs and grasses provide food for deer in the form of hard and soft mast in the hardwood stand. The old field provides bedding cover and forages such as broadleaf weeds, vines, and soft mast as well.

Edges can be abrupt or feathered. Feathered edges are preferred as there will be greater diversity in plants across the edge rather than a definite boundary such as a fence with an agricultural field on one side and a pine plantation on the other side. A feathered edge would include an area in between the agricultural field and the pine stand that could be managed for early succession plant communities, valuable to quail and rabbits and to many other species. Strip disking is a common way to create a feathered edge where none presently exists. Strip disking is especially valuable to ground-nesting birds such as bobwhite quail and wild turkey. For instance, the newly hatched quail chicks can forage for insects among the one-year-old broadleaf weeds and can easily travel through them on the almost bare ground. Two- and three-year old areas that have been disked also provide benefits to turkey and various other species as the area gradually produces a greater variety of plants and insects that are a required food for turkey poults (turkey young).

Openings – Openings are important for several reasons. Every opening will have an edge, and these edges are valuable to many wildlife species. Openings are used extensively by many species for food and for social interaction. These openings also serve as hunting areas and can be managed in a variety of ways. Annual and perennial wildlife food plantings, strip disking, clipping, fertilization of native plants, and herbicide use are all management practices that will produce good results in managing an opening. Several small openings should be located throughout the property as opposed to one large opening.

Landowners with smaller parcels of land will face limitations on how they can manage for a broad diversity of wildlife species. Quite often, the choices are limited, and a decision is made to favor a certain species. For example, a landowner with 80 acres of pine timber planted under the Conservation Reserve Program (CRP) cannot

really manage for squirrels in the short term. The landowner could, however, manage for white-tailed deer and for greater diversity. He could do this by conducting his management practices, such as thinning and burning, on various portions of the 80 acres in different years to produce a broader range of plant communities across the entire 80-acre forest.

The following section addresses habitat needs for several wildlife species and management practices that will favor those species.

Wildlife Habitat Management for Selected Key Species

White-Tailed Deer

White-tailed deer thrive in a variety of habitat types. They are present in all soil resource regions of Mississippi. Usually, deer are larger and population densities are greater on the most fertile soils. Deer in Mississippi use all habitat types but are more dependent on forage than on hard mast. While hard mast in the form of acorns is an important energy food consumed in fall and winter, excellent populations of deer do exist in areas with very little hard mast.

Because deer are most dependent on forages in the form of annual and perennial broadleaf weeds, vines, and twigs of hardwood seedlings and shrubs, they make great use of plant communities in the early stages of plant succession. These areas also serve as good bedding cover for the deer while they make trips into more open timber areas to forage on hard and soft mast as well as to browse on available plants in the understory.

Deer eat a wide variety of plant materials throughout the year. A good way to categorize plants for deer use is to classify them as preferred, staple, and delicacy. While managers will want to provide as much preferred food plant material as possible, they should make certain that "staple" foods are present in large amounts as well. Preferred foods are those either high in protein and or energy. Staple foods are those that offer basic nutrition but have relatively less protein and energy. They are considered to be maintenance foods that prevent starvation until the preferred foods become available again.

Since deer require 13 – 16 percent crude protein in the diet for optimum growth and development, preferred foods are those that can provide a level of protein near or exceeding that requirement. While there are a number of plants growing on delta soils that can provide high protein levels, the same plants on soils with low natural fertility will have far lower crude protein content. Therefore, preferred plants are those with the highest protein available in a particular region. In addition, protein content will vary and will generally be higher in spring and early summer and will decline as fall approaches.

Preferred foods for spring and summer have a relatively high protein content and high digestibility. Broadleaf weeds such as common ragweed and other herbaceous plants are preferred because of their high protein content and palatability. Some of the invasive plants that are not native are also preferred in most locations and include kudzu, Japanese honeysuckle, and Chinese privet hedge.

Acorns are a preferred food in fall, but are preferred for a different reason. As winter approaches, deer instinctively prefer foods high in energy. While acorns are relatively low in protein, they are high in fat and energy and are, therefore, "preferred" because deer instinctively recognize their need to build fat reserves for the winter. Pecans are also used to build fat reserves for winter, particularly in the Mississippi delta region.

Staple foods are those present throughout much of the year. Native vines and the twigs of shrubs and trees provide basic sustenance for deer in winter when preferred foods become limited. Browse plants include blackberry and dewberry, greenbrier (smilax species), poison ivy, trumpet creeper, American beauty berry (French mulberry) and yellow jasmine. Plants that are not native include Japanese honeysuckle and Chinese privet hedge, and these plants are very important as staple browse plants in many areas. Tree twigs browsed by deer include

black gum, dogwood, willow, maple, cottonwood, and many others. Stump sprouts of many hardwood species are a staple food for deer.

Common Ragweed frequently contains crude protein levels in excess of 20 percent and flourishes on disturbed soil sites during summer months.

Delicacies are also important to deer and to deer hunters. The native persimmon is highly preferred along with honey locust pods, muscadine grapes and vines, crabapples, and other seasonal fruits. Mushrooms are also heavily used by deer as a delicacy food.

Deer also make use of the forage and crop residues available in adjoining agricultural fields, and this food supply should be considered in any management plan. In summer, the deer prefer soybeans and peanuts and winter wheat and ryegrass pastures in the winter, if available. They also use grain residues such as those from corn and soybeans.

Wildlife food plots are also valuable, especially in the regions of the state with poor soil fertility. A well-limed and fertilized food plot can grow up to 10 times more digestible protein per acre than is present in adjacent woodlands. On rich delta soils, the difference is not as great, but supplemental food plots can be managed to provide additional nutrition.

The two stress periods for deer in Mississippi are late summer and late winter. A supplemental food plot program should attempt to produce forages that will be available to increase nutrition for deer during those stress periods. Legumes are preferred, and the best warm-season plants that can withstand at least some browse pressure in summer are cowpeas and alycee clover (a white clover). Cool-season plantings should include small grains such as oats and wheat. The addition of clover is also very beneficial. In areas that have no significant hard mast production, deer can benefit from corn planted to provide a diet high in energy.

While cool-season food plots are relatively easy to grow, the production of high quality warm-season plantings requires more effort and skill. Soil pH is more important, and both pre-emergent and post-emergent herbicide applications may be required to control competing vegetation.

For optimum growth and yield, plant food plots on a smooth, firm seedbed that is well limed and fertilized according to soil tests. Consult your local County Extension Office for assistance. Another very valuable source for information on planting wildlife food plots is the Quality Deer Management Association (QDMA). This organization can be found on line at www.qdma.com. They offer a wide range of resources for the deer manager, including a very good book on the establishment and management of wildlife food plots.

Because deer thrive in early to middle succession plant communities, land managers who want to create and maintain good deer habitat should use frequent timber sales and other land-management activities that will allow sunlight to reach the forest floor. Streamside Management Zones (SMZ) should be managed with selective harvest practices to favor both hard and soft mast species.

When possible, pine forests should contain a number of different age classes and should be managed for a variety of ground covers of different ages. Pine stands should be burned on 3- to 5-year intervals with some burning done each year to produce horizontal diversity for forage production and for bedding cover.

Many pine stands in Mississippi have dense mid-story layers of sweet gum and other shade-tolerant species. These trees compete with pines and reduce growth rates. They also shade out ground-level plants that provide deer browse and cover. Visibility is also greatly reduced,

and hunting success can be decreased. Quality Vegetation Management (QVM) is a relatively new concept in pine management. Herbicides are used to kill this mid-story vegetation, and fire is reintroduced to manage for increased plant biomass at the ground level where it is beneficial to most animals. Managers interested in implementing Quality Vegetation Management should consult with a registered forester or a certified wildlife biologist with experience in QVM.

Another technique that can be used, especially in pine plantation stands, is soil disturbance by "light" disking or by the use of a "Herschel drag." The Herschel drag is a tool bar that has bulldozer tracks attached to it. The drag can be pulled by a small bulldozer or a high horsepower tractor. The ground disturbance simulates a timber sale by exposing bare soil, allowing a variety of broadleaf weeds to germinate and grow on the site. Two years after the first thinning is a good time to use this technique in a pine plantation.

Hardwood stands can be managed with a variety of harvest strategies. Small clear-cuts and group-selection harvests can be used regularly to maintain a diversity of relatively open ground cover as well as thick areas for both forage and bedding cover.

Deer harvest is a key component of good deer management, and antlerless deer harvest should be used as appropriate. Deer can degrade their own habitat over time if deer numbers exceed the land's ability to support them at a healthy level.

Because habitat conditions and deer productivity vary so greatly, recommended harvest rates vary also. Harvest in good habitat in the better soil regions of Mississippi can be as high as one deer harvested per 30 acres of habitat on an annual basis. Antlerless deer should comprise 50 to 65 percent of the harvest. Harvest rates in the poorest regions of the state can be as low as one deer per 150 – 200 acres with 40 to 50 percent of the harvest in antlerless deer. Consequently, all regions in between those two extremes would have harvest rates somewhere in between and should be designed to keep the population stable. A good average in many areas of Mississippi is a harvest of one deer per 50 to 60 acres with 50 percent of the harvest as antlerless deer.

For more information, a qualified deer management professional can determine what is best for your situation.

Wild Turkey

Wildlife biologists once believed that wild turkeys could not survive apart from huge expanses of mature hardwood and mixed pine hardwood forests. The current knowledge now demonstrates that turkeys do quite well in a variety of landscapes, as long as they are given adequate protection from illegal hunting. Even pine plantations provide good turkey habitat when they are managed by frequent harvest cuts and with fire on a regular basis. Streamside Management Zones (SMZ) adjacent to the pine stands provide adequate diversity by furnishing hard and soft mast, leaf litter for invertebrate insects, water, and other critical elements for turkey survival.

Pine stands that have been thinned and burned offer good brood habitat, and logging decks are often managed as openings in the years following a harvest cut. Soil disturbances associated with harvest cuts grow early succession vegetation that hens and poults use as "bugging" areas as they forage for insects. Brood habitat can be a limiting factor since young turkeys need a diet comprised almost entirely of insects for the first several weeks of their lives. As the weeks progress, they begin to eat more seeds and tender plants. Pine stands can also furnish a number of other foods such as pine seeds, grape and huckleberry fruits, blackberry and dewberry, dogwood fruits, and a variety of others such as smilax and poison ivy.

Turkeys spend a lot of time in and near openings; therefore, managers who want to manage for turkeys should have a good open-area management program in place.

Use a variety of techniques to provide several different stages of plant succession from 1 to 5 years old. Strip disking, food-plot planting, and maintenance of perennial food plots such as clover can pay big dividends. Wild turkeys also make extensive use of agricultural fields to forage for a variety of crop residues, germinating weeds, grasses, and insects.

Hardwoods should be managed to provide good supplies of hard and soft mast. Also present in hardwood forests are a number of vines that furnish food such as several species of grapes, smilax, and even poison ivy berries.

In regions where acorns may be scarce, food plots can provide high-energy foods such as corn and grain sorghum. Clovers are also very beneficial because they furnish forage directly, and they also provide insects. Managing perennial clover fields by a combination of clipping and herbicide use can provide turkeys with a very valuable year-round opening.

While ground-nest predators can have an effect on turkey populations, you can minimize their effect by creating forest conditions that furnish a wide range of good nesting habitat scattered across the landscape. Research on predators of bobwhite quail has demonstrated that quail populations can be improved in areas of extensive predator control, and the same is thought to be true for wild turkeys. However, the predators quickly return within 2 years. Therefore, a predator-control program designed to improve quail and turkey populations should be very aggressive and should be maintained from year to year. A better alternative may be to provide ideal habitat to mitigate the effect of the predators.

While controlled burning is very valuable to produce new growth at ground level, it should not be so extensively practiced that all good nesting and escape cover is eliminated. Annual burns will gradually convert the ground level vegetation to grasses and will eliminate many broadleaf weeds, vines, and shrub components. A good controlled burning program in pine forests should include a 3-year rotation. Landowners should maintain a number of areas that are not burned across the property. These areas should be reasonably thick at ground level to provide escape cover and low-roosting cover. They should also be larger than one acre in size and should be irregular in shape with a feathered edge if possible. Leave plum thickets, switch cane thickets, and other areas of dense shrubs intact for escape and nesting cover.

Other good vegetation management practices for turkeys include strip disking to produce nesting and escape cover. Areas set aside for strip disking should be several acres in size. Disk one third to one fifth of the area each year to control and maintain the area in the bare-ground stage and other areas up to the shrub and small tree stages. QVM is also a good practice to use to gradually reclaim pine stands that have extensive mid-story layers of sweet gum so effective controlled burning can resume.

Harvest rates for wild turkey also vary widely because of differences in population levels. Long-term harvest rates of one to two adult gobblers per square mile will serve as a guide for most regions of Mississippi.

Bobwhite Quail

Bobwhite quail numbers depend heavily on land use. The largest numbers of quail in recent history occurred in Mississippi from 1940 to 1970. This is because small-scale agriculture, extensive use of fire, and other land-use patterns created early plant- succession habitats that are ideal for bobwhite quail. Quail numbers have declined by 70 percent since the 1970's, however, because of several factors, including predators and parasites. While these factors are certainly important, the most significant reason for the decline was a loss of quail habitat.

Ideal quail habitat depends upon early plant succession habitats that provide bare ground, native clump grasses, woody cover, and seeds and insects for food. Clean farming practices, the increased use of sod-forming grasses that are not native, dense tree stands, and other land-management practices do not provide the ideal habitat for quail.

While many landowners will be content to enjoy the quail that naturally occur on their property, many will want to manage for more quail. Great quail habitat and great quail hunting are possible if you use a variety of techniques to intensively manage your land for early succession plant communities.

Pine stands should be managed with frequent fire and should be thinned frequently to maintain an open canopy. Soil disturbances such as strip disking, the use of a Herschel drag (as mentioned above in the section on white-tailed deer) and other practices that will produce bare ground on an annual basis are important for good brood habitat.

Numerous small food plots that mimic small scale agriculture should be interspersed near thick woody cover, such as plum thickets and overgrown fencerows. Plant a wide variety of crops such as grain sorghum and corn to small grains and clovers. Encourage native clump grasses, and control or eliminate grasses that are not native, such as Bahia grass, Bermuda grass and other sod-forming grasses. Encourage native leguminous plants such as partridge pea and beggar lice with fire and soil disturbance.

Intensive predator control and supplemental food-plot management can increase quail populations. However, control must be intense and continuous because predators will return to high numbers one to two years after control is terminated.

For more information on bobwhite quail management, please visit the Mississippi State University Extension Service Web Site at http://msucares.com/wildfish/wildlife/quail.html.

Small Game Animals

Small game animal populations vary greatly with habitat quality. Rabbits are abundant in early plant-succession plant communities, while squirrels depend more on mid- to late-succession forests of hardwood and mixed pine hardwood stands.

Squirrels. Squirrels eat a variety of plant materials such as tree buds, seasonal fruits, and soft mast. However, they depend most on soft and hard mast. Soft mast species consumed by squirrels include black gum and tupelo gum, dogwood berries, and the berries of several woody vines. Hard mast includes pine and cypress seeds, acorns, hickory nuts, and pecans.

Landowners who want to manage for squirrels should maintain good streamside management zones (SMZ) in their pine stands and should practice good hardwood management in the SMZ and in hardwood stands. Oaks and other mast-bearing trees generally produce greater mast crops when their crowns are full and they are not overcrowded. Good hardwood-management practices that are designed to keep the hardwood stand healthy and actively growing will also be the best management techniques for squirrels.

Rabbits. Management practices that favor and produce an abundance of low-growing plants and thickets favor rabbits. Rabbits are generally most abundant during the third through the seventh year of a pine plantation because of abundant food and cover. Landowners interested in rabbit hunting should make certain they have frequent site disturbances such as timber sales, strip disking, etc. Any management practice that produces or maintains plant communities with abundant ground cover will benefit rabbits and will make for great rabbit hunting.

Economic Considerations of Wildlife Management

As a general rule, good timber management is good wildlife management. Actively growing timber stands are healthy and will produce the most food for most wildlife species. Because diversity across the landscape is very important to good wildlife populations, frequent timber sales will help to produce that diversity.

Timber management and wildlife habitat management are linked together, and the timber management plan will affect the wildlife habitat management plan. Healthy wildlife populations produce a quality outdoor experience for the landowner, family, and guests, or for the persons who lease the property for hunting and fishing. Fees paid for hunting leases vary greatly across Mississippi and are tied directly to the abundance and quality of the white-tailed deer herd on the property and in the region in general. Good hunting lands with high deer populations often command $10 or more per acre. The Delta, Loess Hills, Brown Loam, and Black Belt Prairie Regions generally command the highest per acre lease prices. The Coastal Plains and Coastal Flatwoods regions have the lowest lease prices.

Landowners who are leasing, or who want to lease their lands, should have a good open-area management philosophy. Hunters want to see wildlife as well as harvest it, and wildlife viewing is enhanced with good visibility provided by food plots and other open areas such as those managed by strip disking, etc. Any areas left open and not growing timber will be a sacrifice because the timber growth that is worth about $75 or more per acre per year will be lost. However, this revenue can be recovered easily by a slight increase in the per acre lease price to compensate for it. For example, if a 1,000-acre property has 2 percent in openings, 20 acres will be left open and not growing timber. If timber growth is valued at $75 per acre per year, this would be $1,500 per year. If 40 acres are left open, then $3,000 per year would be sacrificed to lost timber growth.

Knowing that hunters will pay more per acre for a hunting lease with open areas for planting food plots and for good hunting visibility, a simple increase in the lease price will recover the costs. For the 20 open acres mentioned above, an increase of $1.50 per acre will cover the loss and is actually better because the financial return is received in the present instead of in the future at the sale of the timber. If the value of the increase in hunting lease is invested, foregoing the future timber sale revenue for the present, income of the increased hunting lease revenue is equal to or better than keeping that 20 acres in timber.

Food-plot planting and management are extremely popular. Hunters will pay more for a property that will allow them to plant a sizeable number of good sized food plots. Landowners can easily compensate for the timber growth loss by charging more for the lease.

Hunting leases should be executed through use of a formal contract that spells out the expectations of the lessor and the lessee. The landowner should also require hunting club liability insurance. A number of vendors can supply hunting club insurance. The Mississippi Forestry Association and the Quality Deer Management Association can be helpful in finding a good policy for a hunting club.

Food plots managed for Osceola Ladino (a white Ladino clover) do well on sandy loam soils in Mississippi. During a mild summer with average rainfall, good growth may persist into August, as seen in this photo.-

References

Natural Resources Economic Enterprises. http://www.naturalresources.msstate.edu/research/index.html

Traugott, T. A. 1995. Forestry myths and misconceptions. MSU Extension Service Publication 1612. http://msucares.com/pubs/publications/p1612.pdf

Traugott, T. A. 2000. Prescribed burning in southern forests: Fire ecology, techniques and uses for wildlife management. MSU Extension Service Publication 2283. http://msucares.com/pubs/publications/p2283.pdf