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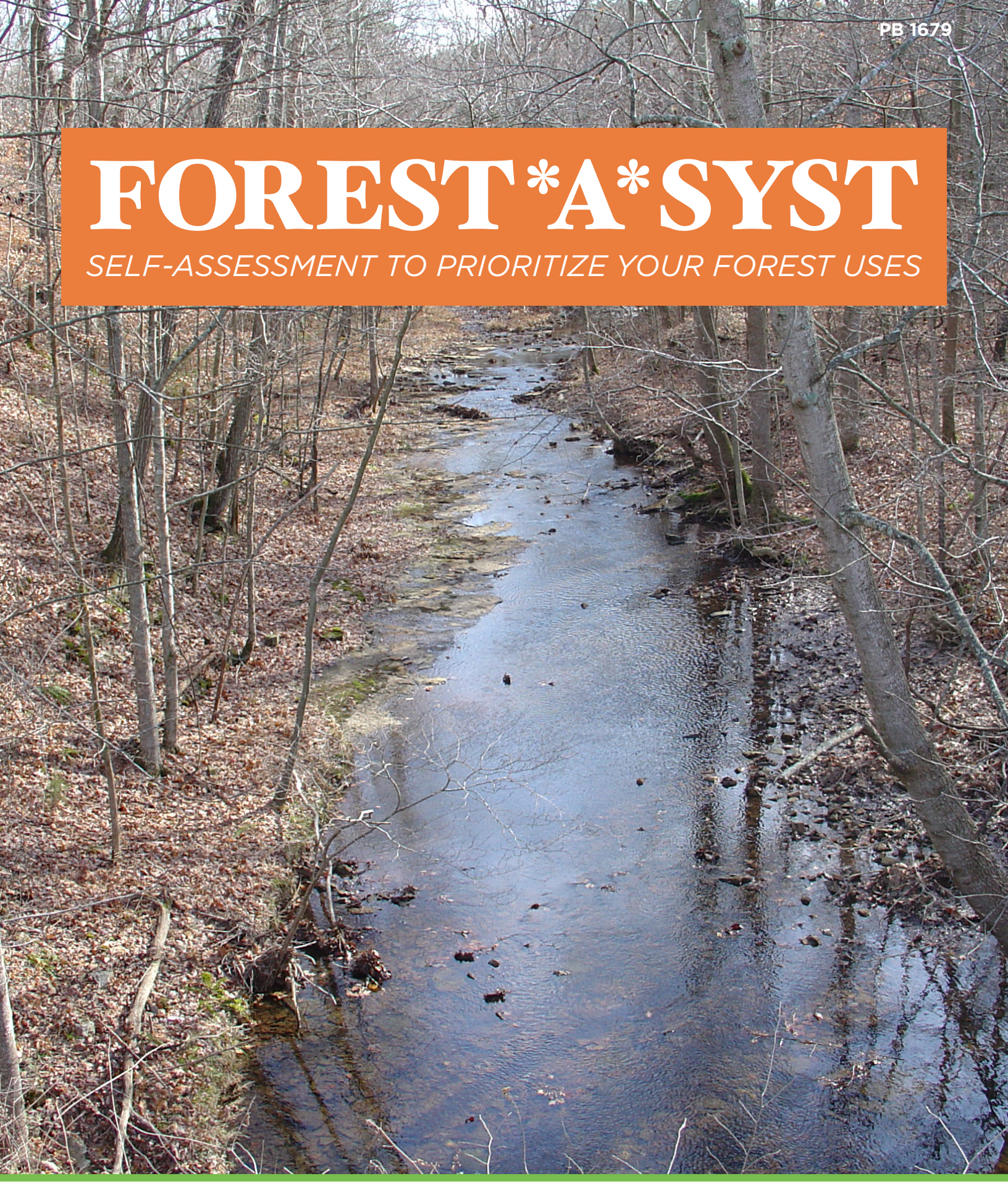
FOREST*A*SYST

SELF-ASSESSMENT TO PRIORITIZE YOUR FOREST USES



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Forest*A*Syst

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The Tennessee Forest*A*Syst Program is a cooperative project of University of Tennessee Extension, the Tennessee Department of Agriculture Forestry Division, the Tennessee Wildlife Resources Agency, the Natural Resources Conservation Service and the Tennessee Department of Agriculture Nonpoint Source Pollution Program.

This publication is adapted from:

Hamilton, Rick A. 1999. Forest*A*Syst: *A self-assessment guide for managing your forest*. North Carolina State University Department of Forestry. 55p.

The original project was funded, in part, under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program and the US Environmental Protection Agency, Assistance Agreement #C9994674-96-1. This reprint is funded in part by the Tennessee Department of Agriculture Forestry Division through the Tennessee Agricultural Enhancement Program (TAEP).

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Preface

You are unique. The title "Forest Landowner" is one not held by many Tennesseans. Your ownership carries with it a sense of treasure, of enjoyment, of wildness. But it's also a privilege, one that imparts responsibility, one that can be observed and one that increasingly can be measured.

If you were to be judged on your forestry practices, how would you score? Would you even know which parameters to assess or what questions to ask? Which of these forest uses aesthetics, recreation, soil, timber, water, wildlife—are more important? Have you ever intelligently, and intentionally, began a planning process for your forest? Are you following a path that someday will allow you to achieve your desired goals?

Our hope is that whatever uses you choose for your forest will include measures to enhance water quality and protect our soil.

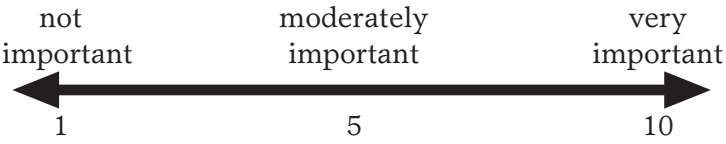
The Forest*A*Syst manual has been prepared to assist you in exploring answers to these and other questions. The manual will take you on a mission that begins with an informal self assessment which, when summarized, will help you evaluate where your interests lie. It will lead you through an unbiased discovery of your personal ownership goals and will give you a better understanding on how to achieve those goals. Our hope is that whatever uses you choose for your forest will include measures to enhance water quality and protect our soil.

Using this manual will satisfy both good forestry and good environmental stewardship. You will realize that environmental protection and timber production can be compatible. Throughout the manual, action steps are stressed. In addition, references for more information and professional assistance are given. Natural resource professionals can help you use this information to fashion your personal forest management plan. A sample management plan is found at the end of this publication. Fill it out in preparation for your professional's visit.

Good luck with your mission!

David Mercker

Self Assessment to Prioritize Your Forest Uses



On a scale of 1 to 10, rate your interest level for each of the following areas as it relates to the objectives for your forest. When completed, total your score for each column, then transfer your scores to the bottom for your evaluation.

Growing timber as an investment _____	Enhancing or diversifying wildlife habitat _____	Well-developed trail system for recreation _____	Fish and other aquatic habitat _____
Periodic income from the sale of timber _____	Increasing wildlife population _____	The appearance or aesthetic value is important _____	Clean water supply for present and future _____
Rapid growth on your trees _____	Having threatened or endangered wild – life on your property _____	Camping and hiking _____	Fertile topsoil to produce the benefits we enjoy _____
Learning about and planting trees as a crop _____	Observing wildlife in natural state _____	Spring flowers and fall color are vital to you _____	Learning about practical ways to protect water quality _____
Total _____	_____	_____	_____

Evaluating Your Assessment

Transfer your scores from the bottom of the above chart to the appropriate category.

			Your Score
Column 1	=	Timber Production	____ (see page 13)
Column 2	=	Wildlife Habitat Management	____ (see page 22)
Column 3	=	Recreation and Aesthetics	____ (see page 26)
Column 4	=	Water and Soil Protection	**40*** (see page 28)

**Column 4 should always total 40.*

Forest benefits for wood, water, wildlife and recreation

Your score indicates where your interests lie. Regardless of your record for the first three columns, all forest landowners should make the fourth column (water and soil protection) a high priority.

A section for each of the four management categories follows. At the end of each section is a brief summary of what steps are most desirable. Be sure to study the one on water and soil protection (page 28). Read on to assess, explore, understand and confirm the reasons why you own forest land. Then when you meet with your resource professional(s), you will be better prepared to assist them in preparing your personalized forest management plan.

Before considering your priorities or developing your plan, you'll benefit from a general understanding of how your forest works. It is a very complex, yet manageable system—much more than might be apparent.

Meet Your Working Forest

As you walk through your forest, it may appear motionless, static, not changing, as though it merely exists. But it's always changing. It is a complicated mix of natural cycles and processes that are all interdependent on each other. With just minor observation, you can see that it is moving in many ways—in many directions.

Cycles in the Forest

The natural environment operates in repeating patterns called cycles. For example, weather can change considerably from day to day, but over a year's time the daily changes fit into a cycle of spring, summer, fall and winter. Just about everything in nature follows some kind of cycle. Cycles may be simple or complicated, fast or slow. Some cycles may take centuries (like rocks weathering and reforming), while some cycles are so subtle and complicated that we don't know how they work—or even that they exist.

The water cycle in the forest

Water evaporates from the ocean, lakes and rivers. Winds carry it over land, where some of it falls as rain. Some water is taken up by plants and released from the leaves into the air, a process called transpiration. Some water returns to the ocean, where it again evaporates.

The forest keeps stream water clean and helps balance streamflow.

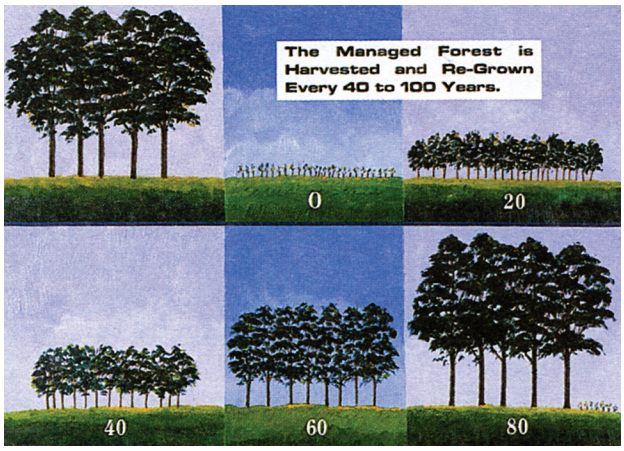
The forest keeps streamwater clean and helps balance streamflow. Dead leaves protect forest soil from raindrops, and thick mats of tree roots bind it together—like reinforcing bars. Forest soil is spongy and absorbent. Rain soaks into the soil and through the subsoil and cracks in the bedrock, where it is filtered and stored. From there it seeps slowly and steadily into streams and springs. Evaporation from tree leaves cools and humidifies the air. Trees are such powerful water removers that soil in the forest sometimes gets drier than soil in open fields. During dry summers, streams in the forest often have less water than streams in open areas!

Concern is increasing over the damage of water bodies due to nonpoint source water pollution. **Nonpoint source water pollution** occurs when water bodies are polluted by sources not easily traced to a single source of discharge. Forest management operations are presently considered nonpoint source, so care must be taken to practice responsible forestry and protect soil and water. Refer to page 28 for forestry Best Management Practices.

The plant cycle in the forest

Plants within a forest community go through cycles called succession. Succession is the replacement of one plant community by another. The forest will retain certain species of trees until favorable conditions are reached for the establishment of the next stage. Distinct stages in the natural development of a forest stand include: stand initiation (the beginning), stem exclusion (period of competition), understory re-initiation (new seedlings establishment) and old growth.

An example of succession could begin with an abandoned field. Cottonwood tree seeds carried by the wind might be the first to inhabit the field. As they grow, trees compete with each other for sunlight, nutrients and water. Some will be "starved" and will die. Then in time, more shade tolerant ash or maple seedlings might become established beneath (in the "understory" of) the cottonwoods. As the cottonwoods eventually mature and die (or are harvested), the ash and maple seedlings will grow to fill the gaps created by the mortality.



The carbon cycle in the forest

Trees take carbon out of the air and turn it into leaves, roots and wood. As these rot, most carbon goes back into the air, some dissolves in stream water that flows into the ocean, and what is left becomes humus, a dark brown substance that enriches the soil. Humus decomposes slowly, releasing carbon dioxide back into the air to complete the cycle.

Soil humus is a great storehouse of food (energy) for microbes, which are a source of food for other creatures. Roots are an especially important source of humus. Small, fine-textured roots, called rootlets, are short-lived, and trees constantly renew rootlets as they die and decompose.

The nutrient cycle in the forest

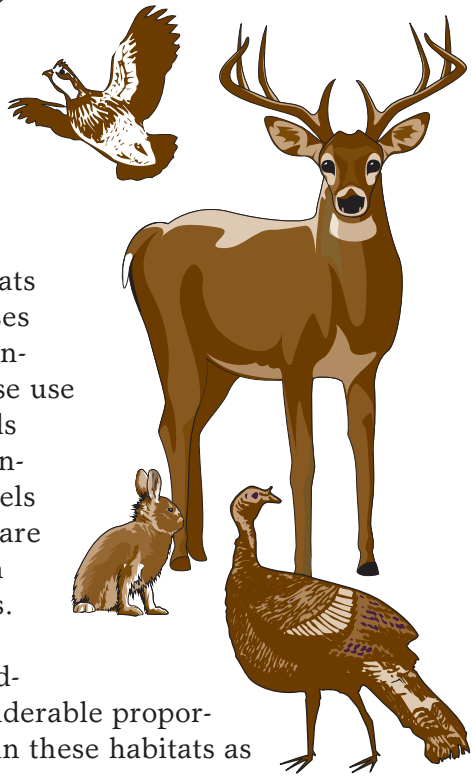
Nutrients are simple chemicals found in the soil. The most important are nitrogen, potassium and phosphorous. Potassium and phosphorous come from the bedrock—the solid rock that lies underneath the soil. There are usually huge quantities of these elements in the soil, but they are mostly "locked up" in the soil particles. These particles release their stored nutrient molecules slowly into the water present within the soil. Roots pick up these "loose" nutrients.

Nitrogen comes from the air. Before nitrogen can be used by plants, it must be changed from a gas to a salt called nitrate. That process is accomplished by lightning and by micro-organisms. Lightning "zaps" nitrogen and oxygen gas molecules together in the air to make nitrate: microbes ease them together in slower chemical reactions in the soil. Clover, locust, redbud and certain other plants enrich the soil by adding large amounts of nitrogen, using microbes that live in their roots. Nitrogen is usually the nutrient that is in shortest supply.

When plants decompose, their nutrients are released back into the soil. Leaves and small roots are rich in nutrients; wood is not. Most loose nutrients either stick to soil particles or are picked up again by roots. Only tiny amounts are washed out of the soil into streams. New nutrients are constantly being added from soil particles, bedrock, lightning and microbes.

The wildlife cycle in the forest

Forest animals are continually in cycle too. Most wildlife species prefer one or two successional stages for various life requirements. For example, wild turkeys prefer to nest in brushy cover, yet spend most of their time in open mature woodlands where acorns and other mast (nuts and berries) are available during fall and winter. Quail and rabbits are found in early successional habitats where forbs, grasses and brush are abundant. Ruffed grouse use young forest stands with high stem density (thick). Squirrels and woodpeckers are found primarily in mature woodlands. Predators of these species understandably spend a considerable proportion of their time in these habitats as well.



Not only do species of wildlife cycle within the forest, but so do their populations. This is influenced by many factors, including weather, availability of food crops, predation, disease and recruitment. For example, an extended drought could lead to a poor acorn crop. This, coupled with extended winter snow and ice cover, could make winter feeding difficult for wildlife and then lead to increased mortality and decreased reproductive success.

This gives you a general understanding of the processes of the forest, which leads to the next important part of Forest*A*Syst - your forest management plan.

Preparing a Management Plan

Planning is not a single event, but a series of continuous steps leading to a desired goal. Forest management plans are, by necessity, long-term. The plan guides activities over time, is implemented in phases and provides a record of activity. The plan can be as detailed (short-term recommendations) or as general (long-term recommendations) as you desire. The first step is to determine your priorities, set goals and identify the management activities to reach those goals.

Forest management plans traditionally follow a common format. They should be in writing, and then revisited periodically for updates or changes. The assistance of professional foresters, wildlife biologists, soil and water specialists, recreational specialists and others is recommended as you develop your plan.

Seek professional assistance when preparing your management plan.

Statement of Landowner Goals and Objectives

A well-written plan should begin with a statement of the landowners' goals for ownership. Long-term goals (more than 10 years) are usually general. Short-term goals (called objectives) are then established to help achieve the long-term goals. Objectives are more targeted, with specific practices and timetables. For instance, a long term goal might be to grow quality sawtimber for future timber income. Two objectives to help achieve this goal might be to (1) conduct an inventory of the timber and to (2) implement timber stand improvement killing culls, vines and unacceptable tree species.

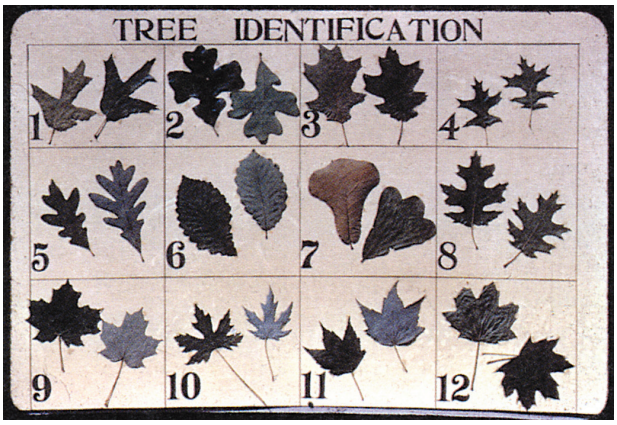
Location

Your plan should have a map and/or aerial photograph showing the location of the property and how the property can be accessed. Photographs (copies) with general property shapes can be obtained from your local Farm Services Agency, the Tennessee Department of Agriculture Division of Forestry or through Web sites. The land should be surveyed with boundaries clearly marked and described. A legal description taken from the deed is beneficial.

Stand Description and Inventory Data

A forest stand is a group of uniform trees that can be clearly differentiated from surrounding stands by tree age, composition, site quality or geography. Stands are the basic management units of the forest and can vary in size.

From aerial photos, soil maps and study of the historical uses of your land, distinct stands of trees can be identified. For example, on an aerial photo, an abandoned field or pasture that has since regrown to a young forest will contrast considerably from a stand of pine or mature hardwoods.



Know the species of trees in your forest.

Each stand should be accurately marked on your photos and described separately. Do you have hardwood or pine? Are the trees mature or are they young and still developing? When was it last harvested? The description should include such things as: soil types, number of acres, tree species and their condition, stand age, stocking, diameters and height, the amount of timber volume, water quality/ streams/ or drainage information, and history (timber harvesting, fires, farming or pasturing activities). In addition, notes on wildlife, trail systems, unique physical features, scenery and other observations within each stand should be made.

Forest Management Prescription

A critical part of your forest management plan is the recommendations (or prescriptions). These are made to satisfy your goals. Prescriptions are the actual activities that you or your resource professional will follow to activate your plan. They could be included in the previous section, stand description and inventory data, or can be in a separate section at the end of the plan. Prescribed activities could include:

- Timber stand improvement (TSI)
- Planting or regenerating a stand, including site preparation
- Timber harvesting
- Measures for water protection - called Best Management Practices (BMPs—refer to page 28)
- Establishing or enhancing wildlife habitat
- Thinning overstocked stands
- Improving the forest aesthetics, recreational use, diversity of plants, etc.
- Protecting unique or historical areas

An inventory of your forest will reveal what you own.

Protection and Maintenance

Along with recommended prescriptions, your plan should also address activities for you and your forests' protection: marking and maintaining property boundaries; road, trail and access control; fire protection practices; and insect and disease inspection.

Action Steps for Preparing a Management Plan

1. Seek the assistance of a professional resource manager when preparing your plan;
2. Have your plan in writing, and make it comprehensive but flexible;
3. Review the plan regularly and update it as needed (5 - 10 years);
4. Be sure to include measures to protect water and soil resources;
5. And most importantly, implement it.

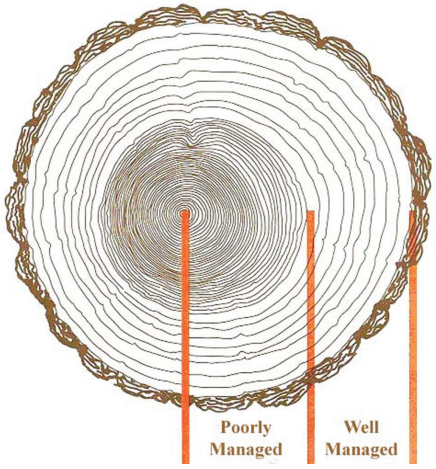
Principles of Timber Production

One objective of many landowners is timber production. Lands managed primarily for wildlife, recreation or water protection can produce timber. Timber management will improve wildlife management and profitability. Timber management often provides the financial resources to implement wildlife and recreation practices.

Your forest is capable of producing a renewable supply of wood products.

Forests managed properly for timber generally have several common features:

- Healthy crop trees that have adequate room to grow,
- Best Management Practices (BMPs) to prevent soil erosion (soil movement) and protect water quality—avoiding sedimentation in water bodies,
- Minimal numbers of damaged, diseased or insect-infested trees,
- Protection from unwanted fire and destructive grazing,
- Good access,
- Clearly marked boundaries,
- A written forest management plan that recommends activities.

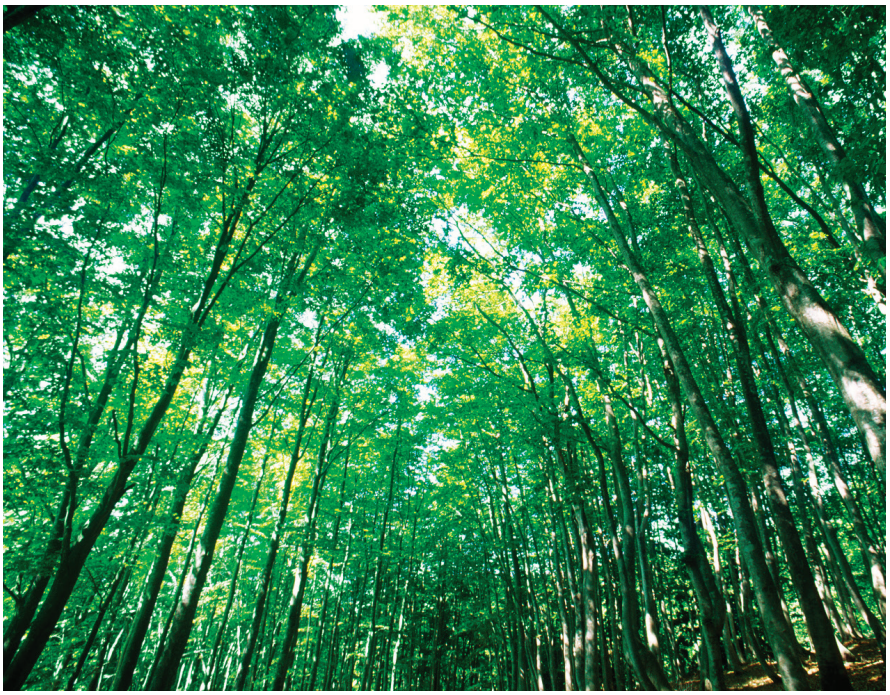


An indication of a well-managed forest is healthy, rapidly growing crop trees.

First, determine if your forest has even-aged, two-aged or uneven-aged stands (perhaps a combination of all of these).

Even-aged Stands

Even-aged stands are forest units in which the majority of the trees are the same age (within 10 to 20 years of each other). Even-aged stand management is designed to harvest all trees over a short period of time. Then, following the harvest, they will produce another stand also composed of trees of similar age. In other words, trees begin their growth together, develop together and eventually



A young, even-aged sapling stand where trees compete for sunlight and other elements.

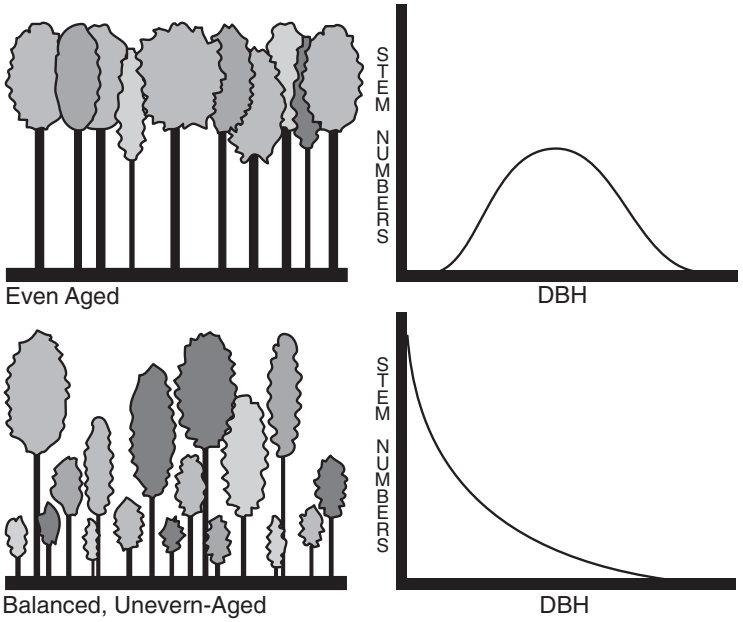
are harvested together. During the stand's development, weak trees may die or are thinned for the benefit of the remaining trees. Normally, even-aged stands are harvested by clearcutting (removing all trees), which allows maximum sunlight to reach the forest floor for the next crop of trees. The size of the clearcut can be adjusted to suit your objectives.

Two-aged Stands

Two-aged stands are composed of two distinct age classes, both growing on the same site within the forest. Usually they form after one of two conditions. The first could be after a pastured woodlot (not a recommended practice) is abandoned, and the overstory, *shade trees* (which protected the livestock) remained. Then, a second story of younger trees develops under the shade trees, which becomes a second distinct stand of growing trees, hence two-aged. A two-aged stand also could form following a heavy timber harvest that removes most of the marketable trees, but leaves scattered trees. These scattered trees continue to grow, while concurrently a second story of seedlings and saplings originates under the scattered residuals.

Uneven-aged Stands

Uneven-aged stands contain trees with considerable differences in age. Trees of three or more age classes are present in uneven-aged stands. There is

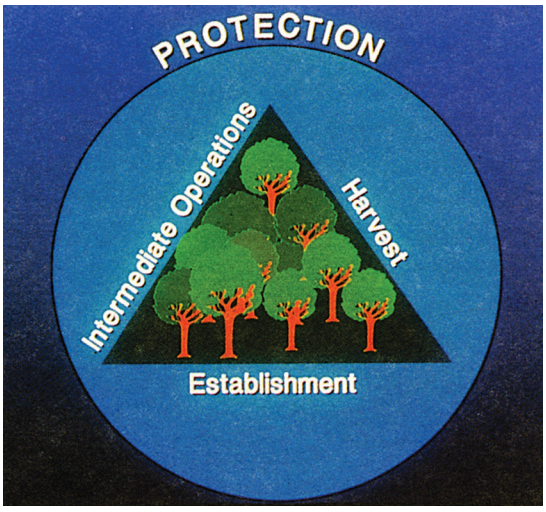


Number of trees and diameter at breast height (DBH) of trees grown in even-age and uneven-age stands.

a greater number of trees in each smaller age class than in the next older class. With each timber harvest, uneven-aged stands maintain lasting forest cover by harvesting only a few dispersed but relatively evenly spaced trees. This leads to followup harvests on periodic intervals. Because the forest canopy is never opened up enough to allow in a great amount of sunlight, uneven-aged stands eventually result in a forest composed primarily of *shade tolerant* trees such as maple, beech or dogwood (shade tolerance is the ability of a tree to develop in the shade of other trees). Due to lower market value and less wildlife mast production, shade tolerant trees are often less desirable than shade intolerant trees. (For further information, see Hopper, George M. 1995. ***Forest Practices Guidelines for Tennessee.)***

The Forest Management Triangle

Forest management practices designed to satisfy timber production goals fall into one of three phases. Each phase could be likened to the legs of a triangle. They are: (1) establishment (2) intermediate operations, and (3) final harvest. The range of practices used over the life of a forest is called the "silvicultural system," where silviculture means "controlling the growth of forest trees." It is linking the three phases together into a logical sequence to meet your goals.



Phases of forest management practices.

During each of these phases, forestry "Best Management Practices" (BMPs) should be followed. BMPs are practical methods to lessen the environmental impact from forest management practices. The goal of forestry BMPs is to protect water quality by preventing soil erosion, disturbance and damage during forest management operations. A separate section describing BMPs is included on page 28.

The Young Stand

Establishing a forest can be achieved by either planting trees (called artificial regeneration) or by natural regeneration. Natural methods can occur in many ways. For example, wind and animals transport seeds into woodland openings which may sprout and grow. Also, young seedlings sometimes originate by resprouting from cut tree stumps. Another method, advanced reproduction, is when seedlings are already present on the forest floor prior to a timber harvest, and are then *released* to grow after the harvest. Often, most young stands may originate from all of these methods. Some of the activities that occur in the establishment of a young stand include:

Site preparation

Site preparation is preparing the land for forest establishment. Methods used may include clearing, chemical vegetation control, burning, fertilization or mechanical cultivation. BMPs to protect water and soil quality should be followed during site preparation (see page 34).

Natural regeneration

Natural regeneration is the cheapest method to reproduce a stand. Success of natural regeneration depends on whether there is adequate seed, seedling or sprout

supply; ample soil moisture; a well-prepared seedbed (in the case of pines); adequate sunlight on forest floor; and control of competing vegetation. Careful planning is required to ensure success.

Artificial seeding

Seed can be sown by either spreading from ground-level or by broadcasting from the air over the site or in spots. This is most common with cone-bearing trees (pines, etc.) For hardwoods, direct seeding of nuts or acorns in rows has been successful. Success is determined by many of the same factors that affect natural regeneration. Rodents and birds can consume large quantities of seed, leading to poor survival.

Tree planting

The planting of tree seedlings, either by hand or machine, is a common method of establishing a young stand. Tree planting lets you pick the type of trees (species) and their spacing. You may choose pine or hardwoods. Examples might include: (1) loblolly, shortleaf or Virginia pines or (2) hardwoods such as red oak, white oak or walnut. Tree plantings will be more successful if the selected species are well adapted to the site, of good quality, healthy and carefully handled and planted. It is best to plant on the contour of the land, when using a machine, to reduce soil loss and sedimentation.

Example of machine tree planting to restore bottomland hardwoods.

Weed control

Weed and grass control is considered essential to the survival and initial growth of young seedlings. Weeds and grasses compete with seedlings for vital moisture and sunlight. Control can be manual, mechanical or through herbicide application. The latter is the most common and generally the most cost effective. Following herbicide label instructions will provide the best results and help you avoid any environmental problems. See page 34 on pesticide use procedure.

Fertilization

Fertilizer is sometimes applied if a soil test indicates a critical shortage of one or more nutrients. The best time to adjust fertility is at the time of the stand's establishment. Best management practices dictate that only the needed amount of fertilizer be applied, and that care is taken to prevent water pollution from fertilizer. Soil analysis is available by contacting your local county Extension office.

The Middle-aged Stand

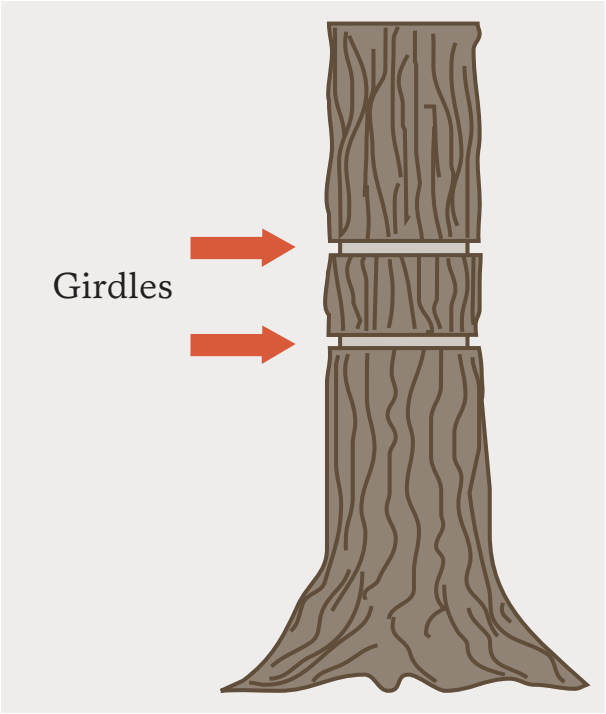
Middle-aged stands of timber occur between the time of establishment and maturity. Often thought of as the *waiting period*, middle-aged stands can be actively managed to more rapidly achieve your goals. Tending the stand while it develops will assure a healthier and more productive forest. Management in this phase includes controlling density (number of trees per acre), species composition, competition and growth rate. Trees or weeds that do not contribute to your objectives can be eliminated. The following activities are collectively called timber stand improvement (TSI).

Weeding

Weeding, sometimes called cleaning, is a precommercial practice of freeing seedlings or saplings from competition with shrubs, vines or other ground

Low-forked "weed" trees can be felled or deadened to create free growing space around young crop trees.

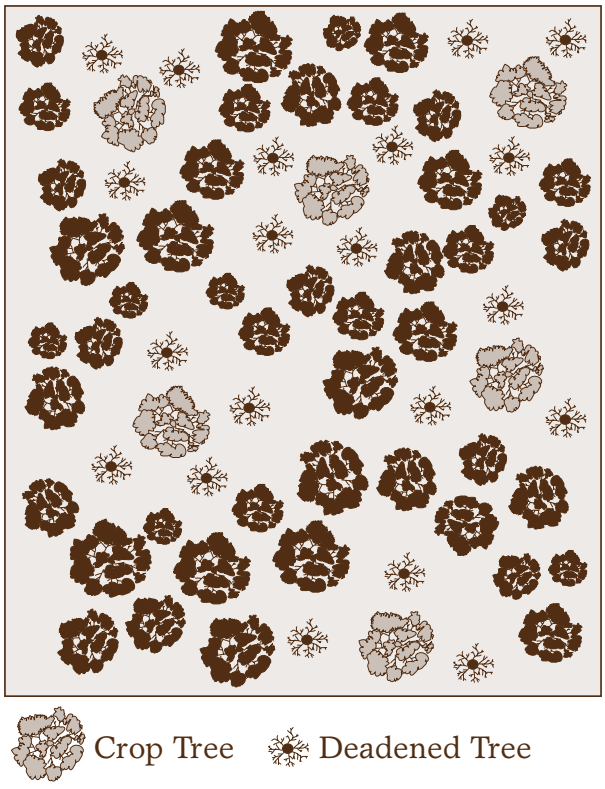
vegetation. In young pine stands, it could include an aerial application of herbicides to control/deaden vines, briars or unwanted hardwood trees. Weedings in hardwoods stands could mean cutting out unacceptable cottonwood sprouts that are invading an oak plantation. Weeding encourages the survival of desired species.



Girdles on a hardwood tree.

Crop tree release

Crop tree release (CTR) is also a form of weeding. Normally, it is applied to hardwood stands that have not reached commercial size classes. It is the practice of deadening selected trees in younger forests for the benefit of releasing desirable crop trees. CTR can be used to alter species composition within a forest, and to concentrate diameter growth on desirable, potentially valuable crop trees. CTR allows you to guide your forest, leaving it with well-spaced trees whose crowns are capable of rapidly responding to increased growing space. The result is to shorten the rotation length, allowing desirable trees to survive and mature sooner. A variety of tools such as chainsaws, hatchets, axes, hypo-hatchets and tree stump injectors have been used to conduct CTR, sometimes in combination with a herbicide applied to the cut surface.



Aerial view of released crop trees.

Commercial thinning

Thinning is tree removal in a forest stand that reduces tree density and tree-to-tree competition. Thinning is very similar to CTR, except it is normally a commercial venture producing moderate income. It can be more systematic, removing straight rows of trees (as with pine). Thinning seeks to control stocking and crown competition. It is usually done in even-aged stands when the tree crowns become so dense, they shade each other and suppress growth. Thinning enhances forest health. Often unthinned stands are more vulnerable to disease and insect infestations, and take longer to mature.

Commercial thinning benefits the future forest. Slow-growing, unhealthy trees are removed and converted to wood chips used to make paper products.

Pruning

Removing persistent low branches improves wood quality and increases the percentage of valuable, clear (knot free) wood production. Pruning is best done when branches are less than 2 inches in diameter. Pruning is labor intensive, and normally limited to trees which have potential for high monetary value.

Controlled or prescribed burning

These are intentional fires set to accomplish a management objective, such as silvicultural, wildlife or fire-hazard reduction. A prescribed burn could be used to remove debris and create a seedbed, or to retard the understory growth of woody species to favor herbs for wildlife. Conditions such as weather, soil moisture and wind must be favorable prior to ignition.

Prescribed burns can satisfy many forest management objectives.

Harvesting the Forest

Trees are harvested at various sizes and ages, depending upon their intended use. There are several ways to harvest timber. Each involves felling, moving and loading the logs. Saws or felling machines cut the trees. Skidders, tractors or livestock drag the logs to a log landing or *deck*. Then loaders stack the logs on trailers to be hauled to the sawmill. These operations are potential sources for erosion, soil degradation and sedimentation. Refer to the BMP section on page 28. With the assistance of a professional forester, you should make a pre-harvest plan that will result in a good timber sale and harvest contract, and adequate oversight of the process to minimize environmental impacts. The harvest plan allows you to accomplish your desired goals.

Harvesting a timber crop makes room for new seedlings to continue the forest cycle.

Clearcutting

Silvicultural clearcuts remove the entire marketable portion of the stand in one cutting. It is the most efficient, easiest and cost effective way to harvest timber. Clearcutting is most appropriate when a stand has matured; is of poor quality; has an overabundance of unacceptable tree species; or has been threatened or taken by insects, storm, disease or fire. A new, even-aged stand results following a clearcut.

Clearcutting creates a dramatic landscape change. However, the full sunlight it provides to the forest floor favors the regeneration of many of the valuable and preferred tree species. Examples include oaks, pine and poplar. In addition, this system offers diversity in wildlife food sources and habitat in a landscape that is often

A regenerated forest (clearcut) creates young growth and diversifies wildlife habitat.

absent in dense forests. For proper BMPs, clearcutting should not be done immediately adjacent to streams or other water bodies without leaving an appropriate buffer zone (a lightly disturbed area near water bodies). Buffer zones near water bodies are called stream side management zones (SMZs). For recommended width of SMZs, refer to page 28.

Seed tree

A seed tree harvest is used almost exclusively with conifer (pine) species and, like clearcutting, produces an even-aged forest. Scattered, high-quality, seed-producing trees are left to naturally re-seed the site after harvest (four to 20 per acre). It is crucial to plan the timing of the harvest to assure adequate seed fall. Planning is also required to remove the seed trees after regeneration.

Problems with a seed tree harvest include risk in either overstocking or understocking of seedlings following regeneration, difficulty in logging logistics (making up to three trips to complete the logging on the same site) and exposure of the best and most valuable trees (the seed trees) to wind and lightning damage.

Shelterwood

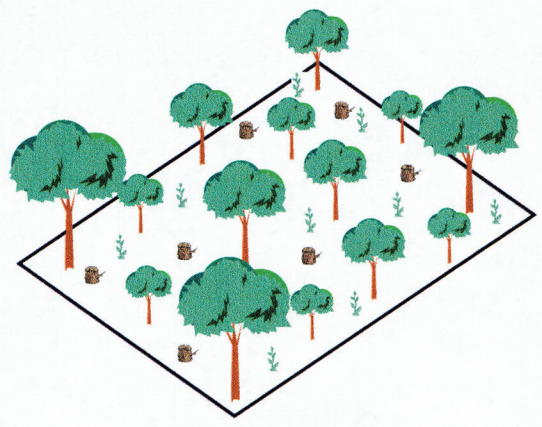
The shelterwood harvest is similar to the seed tree approach, but it leaves more trees following the initial harvest (21 to 60 per acre). It is a preferred even-aged natural regeneration system for non-prolific, seed-producing species, and is visually appealing for both hardwood and conifer species. A shelterwood harvest is actually a **two-staged** clearcut. The purpose is to allow enough sunlight to reach the forest floor so that desirable seedlings become established. Once established, the overstory (or shelter trees) are removed (which then makes it resemble a clearcut).

It provides an abundance of seed and shelter for seedlings, as well as residual shade to control weeds. Since there is a greater number of trees left (than with the seed tree approach), loggers are more willing to return and remove the shelter trees after regeneration is established, usually within three to five years.

Selection

A selection harvest regenerates uneven-aged stands of slow-growing, mostly shade tolerant trees. Either individual trees or small groups of trees are selected

and harvested. It doesn't work with valuable shade intolerant or moderately shade tolerant species unless harvests are made frequently enough (every 5 - 10 years). Rarely does sufficient sunlight reach the forest floor to support desirable trees. Selection harvesting can lead to a badly degraded forest with little timber value—particularly when repeated harvests remove only the best trees. Another disadvantage is difficulty in logging without damaging residual trees, particularly in high density stands.



Single tree selection allows for permanent forest cover but can lead to a degraded forest if done improperly.

Harvests of slightly larger groups of trees (sometimes called group selections or regeneration *openings*) in both hardwood and pine stands are common on private lands in the South. These openings average from one to 10 acres in size. Stand entries to harvest additional groups are made on approximately 15-year intervals. This produces a series of smaller, even-aged groups within an uneven-aged stand. In time, this approach allows for diversity in wildlife habitat by creating various age classes of trees. It lends well with owners whose land objectives include more than just timber production (recreation, aesthetics, wildlife, etc.).

The benefits of a selection harvest are that it generally allows for frequent income and keeps a permanent forest cover. Selection harvesting is more common on small forest ownerships, where alternative forest uses are higher priority.

Aerial view of a group selection harvest.

Examples of Tree Species and Their Shade Tolerance

Shade Intolerant	Moderately Shade Tolerant	Shade Tolerant
Yellow poplar	White oak	Sugar maple
Cottonwood	Red oak	American beech
Southern pines	Black oak	Flowering dogwood
Red cedar	White ash	Eastern hop-hornbeam
Black walnut	Green ash	Sourwood
Wild black cherry	American elm	Basswood
Butternut	Hackberry	Persimmon
Willows	Pecan	Buckeyes
Black locust	Hickories	American holly
Blackgum		Red maple
		Mulberry
		Hemlock

Other Considerations

Wildfire, insects, diseases and overgrazing are destructive to your forest. Frequent visits by you and a professional forester are recommended to evaluate your forest's health and vigor, and to protect your investment. Also, forest roads are an important consideration in timber production. Roads are addressed in the BMP section (page 29).

Action Steps for Timber Production

1. Address and follow BMPs in all timber management activities to protect soil and water.

2. Maintain proper tree stocking throughout the rotation to control species composition, competition and health.

3. Select and manage for tree species that will meet your goals for timber, wildlife, water quality, recreation and aesthetics.

4. Implement well-planned timber harvesting with the assistance of a forester; with concern for the future.

Managing for Wildlife Habitat

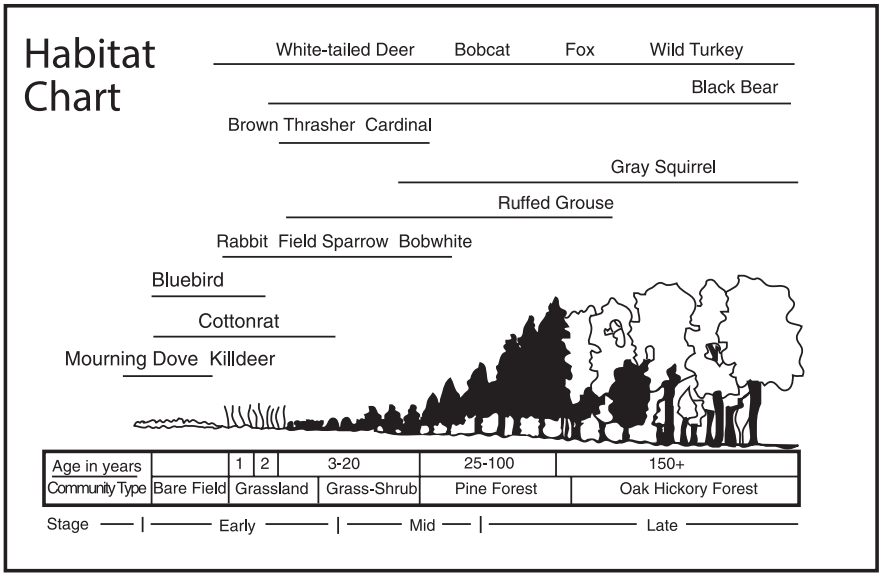
Wildlife and timber management are not only compatible, but interrelated. Developing a management plan with wildlife in mind allows you to improve habitat for many species of wildlife, both game and nongame. You can concurrently manage forests for wildlife and improve forest productivity, while increasing the diversity of your stand(s) and add to your personal enjoyment.

Examples of game and nongame wildlife.

Linking the Forest and Wildlife

Wildlife have four basic survival requirements: food, cover, water and space. The proportion and diversity of each of these determines which wildlife species are present and their abundance. Different wildlife species require different stages of forest growth to meet their needs. For example, quail and rabbits feed on seeds and foliage of annual and perennial weeds and grasses that occur within early successional, young-growth stands; ruffed grouse prefer dense 8- to 25-year-old stands; squirrels and tanagers prefer the structure and resources found in mature forests; deer and wild turkeys use all stages of habitat succession. Vegetation age/type/size, harvest operations, water resources and topography all influence wildlife diversity and abundance.

Your forest may have streams, swamps, rivers, ponds and some sections of your woodland might adjoin fields, pastures, roads and other openings. Managing the *edges* of your forest is crucial to abundant populations of many wildlife species. The relationship between vegetation management and wildlife habitat is well-established. Understanding these relationships is the first step in determining how your forest can be managed to promote the wildlife species you want to attract.



Impacts of Management Practices on Wildlife

Even-aged Forests

Young, even-aged forests benefit early successional wildlife species by encouraging forbs, grasses and shrubs. As even-aged forests develop, this desirable ground cover disappears. Ground cover can be established through periodic timber harvesting, which allows sunlight to again reach the forest floor, stimulating new growth. To improve wildlife habitat in even-aged forests, consider:

1. Harvesting small units (< 40 acres) scattered over the landscape to provide more edge and habitat diversity;
2. Irregularly shaping harvest areas, which creates more edge than square areas;
3. Separating harvest areas with 100-foot or wider areas of uncut timber to provide travel corridors between fragmented habitats;
4. Leaving > 100 - foot wide buffer strips (areas lightly or not harvested) along both sides of streams to create wildlife corridors and protect water quality;
5. Leaving islands of uncut timber within harvest areas to increase diversity in the stand. This is best accomplished by leaving islands of hard and soft mast producers (e.g. oaks, hickories, beech, persimmon and serviceberry).
6. Maintaining some permanent "closed canopy" within your forest, especially along north-facing slopes and riparian zones. This shade will cool the forest soil and within the rotting leaves, encourage worms, salamanders, snails and more. These are important sources of protein for turkeys, small birds, reptiles and mammals.

Uneven-aged Forests

An uneven-aged forest simulates minor natural disturbances such as windthrow, ice damage, scattered insect and disease mortality, or spot fires. Mid-and late-successional habitat types are maintained with single tree selection. Group selection harvests provide short-lived pockets of early-successional vegetation interspersed within the mid- and late-successional habitat. These can temporarily benefit wildlife, but must be periodically recreated.

Thinning

Thinning stands allows more sunlight to reach the forest floor, resulting in more vigorous understory growth. This practice creates short-lived ground-level vegetation, yet leaves some mid-and late-successional trees in the overstory. Stands can be thinned specifically for wildlife. By removing those trees that provide very little benefit (e.g., maples, elms, sweetgum, yellow poplar), more space is provided for the crowns of mast producers to expand and produce more food. In mature stands, all stems in the under-and mid-story may be removed (or killed) to allow increased sunlight to the forest floor. Thinning the overstory will encourage more herbaceous growth.

Controlled or Prescribed Burning

Prescribed burning controls undesirable woody growth in the understory, releases nutrients and increases seed germination—including legumes and grasses. Prescribed fire is now being used in hardwood forests, particularly to favor oaks that produce important hard mast. Controlled burning sets back succession just as a raging wildfire would do, but without the damage to potential timber crop trees. Note that burning cannot be used in many regions, at certain times of the year (such as high fire danger), or in certain forest types. Before conducting any burn, consult with a professional.

Den Trees

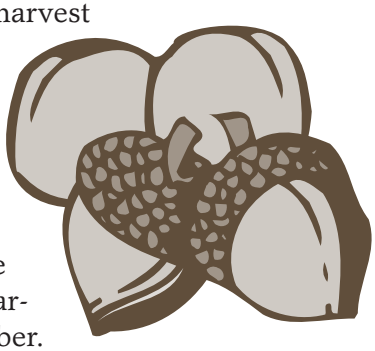
Den trees and snags are critically important for wildlife shelter. Den trees are living trees with one or more cavities used by birds and mammals for

Birds and mammals alike depend on den trees.

roosting or nesting. Snags are standing, dead trees that also provide cavities for many species. Birds and mammals alike depend on den trees and snags, including woodpeckers, owls, chickadees, wrens, wood ducks, squirrels, raccoons and black bears. As a rule, at least five den trees or snags per acre should be left in any thinned or harvested area.

Mast Trees

Mast trees produce nuts and fruits eaten by wildlife. Trees producing hard mast relished by wildlife include hickory, oaks and beech. Soft mast producers include persimmon, serviceberry, blackgum, hollies, hawthorns, dogwoods, as well as grapevines. It is beneficial to leave mast-producing trees during thinning operations and any time possible during other harvest operations. The ideal time to select and mark den and mast trees is before you thin or harvest your timber.



Protection from Livestock

Grazing of forested areas by livestock negatively impacts both forest and wildlife values. Livestock will severely limit or eliminate the presence of grassy cover, forbs and shrubs that provide both food and cover for a wide variety of wildlife species. Long-term grazing in woodlots can cause soil compaction and tree root damage. Livestock in forested riparian areas (adjacent to streams) can develop paths along the streambank that contribute to erosion, degrade water quality through excrement and disturb aquatic habitat from distruction of the streambank and streambed.

Establishing Wildlife Food Plots

Food plots are a relatively easy means of attracting wildlife to your property. Food plots can be established along roads, forest edges, logging decks, or in

Food plots should provide quality forage. An exclusion cage (on left) demonstrates the extent of browsing.

artificially created openings. Food plots serve secondary purposes of controlling erosion and improving water quality.

Although useful in attracting wildlife for viewing or hunting, keep in mind that for many wildlife species, other habitat factors such as nesting, roosting and protective cover are often more limiting to their presence than food. Make sure these factors are addressed in your management plan.

Seeding and establishment recommendations vary widely depending on geographic region, soil type, moisture availability and fertility. Successful plantings require soil testing with the appropriate lime and fertilizer application, adequate seedbed preparation, and

planting at the appropriate time. Most ground covers require maintenance by fertilization or liming, burning, discing or mowing.

Recommended mixtures with seeding rate/acre for forage and grain plots are provided below (Harper 2000). For additional information, refer to ***A Guide to Successful Wildlife Food Plots***, (PB1769), available at your county Extension office.

Seeding logging roads to "wildlife friendly" plants provides additional forage and helps prevent soil erosion.

Warm-season forage plots (plant late April thru May)

50# Iron-clay cowpea
10# Lablab
5# Peredovic sunflower

Cool-season forage plots (plant in September)

Annual mixture:

10# Crimson clover
5# Arrowleaf clover
20# Austrian winter pea
40# Wheat or oats

Perennial mixture:

4# Ladino clover
5# Red clover
2# Chicory
1# Dwarf essex rape
40# Oats

Warm-season grain plots (planted in April)

6# Corn
5# Grain sorghum
5# Peredovic sunflowers

Seeded logging roads

6# Ladino clover
5# Crimson clover
50# Wheat

Note: Do **not** substitute fescue or orchard grass in mix because they will choke out clover within 18 months and fewer invertebrates will be present for wild turkeys, ruffed grouse and bobwhite quail.

Action Steps for Management of Wildlife

1. Provide diversity in food and cover.
2. Forest stands should be scattered, irregularly shaped, separated by uncut areas and bordered by stream buffer strips where needed.
3. Improve intermediate and older stands for habitat by thinning, controlled burning and protection for den and mast trees.
4. Widen or re-open roads and trails to sunlight, and then seed them to vegetation agreeable to wildlife.
5. Maintain some permanent closed canopy within your forest for habitat diversity.

Managing for Recreation and Aesthetics

Forests can simultaneously be managed for profit, recreation and beauty. Properly planned forestry activities can actually enhance visual appearance and improve recreational opportunities.

Enhancing Visual Appearance

Integrating forest management for scenic beauty and diversity can be viewed as landscaping on a grand scale. It is the arrangement of sizes, colors, textures and form across your forest.

A forest has many uses.

Protecting, shaping and creating open areas

Large tracts of timber with similar age or species can be made more diverse by creating openings. They can enhance views, improve wildlife habitat and increase plant diversity. It is preferable to utilize and maintain existing forest openings rather than to create new ones.

Managing the forest edge

Minimizing the contrast between the opening and the forest is the primary goal in managing aesthetics on the forest edge. A soft transition from the low vegetation of the opening to medium size shrubs and then to taller trees at the forest is desired. Considerations include:

- Create or maintain wavy edges with indentations to improve visual diversity
- Establish or maintain irregular outlying clumps of trees to create a natural appearance of the forest edge
- Favor a mixture of hardwood and conifer species to vary the edge
- Retain or establish trees and shrubs of varied shape, form, flower or foliage color
- Periodic discing, mowing or prescribed burning is required to maintain the "soft edge" from developing into a forest.

Reforestation

These activities set the direction, shape and appearance of the ensuing stand. Reforestation is an opportunity to establish attractive, diverse forests. Alignment and spacing of planted trees, and the intensity of site preparation and competition control, create different looks.

Managing visual impacts of clearcutting

Clearcuts can be made less obtrusive to the viewer. Practices include limiting the size of the clearcut, maintaining irregular edges, leaving buffers (areas not cut or lightly cut) along high-visibility areas and along water bodies, leaving clumps of trees within the clearcut, and felling *snags* (scattered trees often with

Leaving trees as a buffer from clearcuts located along high-visibility areas will improve aesthetics.

broken tops that were left within the clearcut). Collectively these will simulate a more natural and less tattered appearance after the harvest.

Improved Recreational Opportunities

Many people enjoy hiking, bird watching, hunting, camping, picnicking, picking berries and just being outdoors. Most of the land suitable for outdoor recreation is privately owned. Some owners open their lands up to the public, while others restrict the use of their land.

Access to your forest is important for visual enjoyment and recreation.

Controlling public access

Open public use—requires no effort. Preferably, you should require verbal or written permission from the recreationist, but this is difficult to enforce. Uncontrolled public use often decreases the quality of recreational opportunities available to you or your friends, plus it could expose you to liability claims.

Restricted access—to family, friends, neighbors and responsible recreationists who ask permission. This requires that the land be posted and/or that you issue guest permits. The obvious advantages of posting and granting written permission are better control of activities on your land and reduced abuse of your property.

Lease your land—for recreational access. Landowners who lease recreational rights usually charge enough to pay their property taxes. Often the lessee posts the land; polices trespassers; maintains roads, trails and gates; and picks up litter.

Permit daily use—for a fee. Daily written permits are issued by the owner. This is often used by owners of hunting and fishing preserves, campgrounds and waterfowl impoundments.

Form a cooperative—with neighbors. Landowner cooperatives build a sense of community among neighbors with similar recreational goals. The acres entered into the cooperative can be for personal enjoyment or made available to the public through one of the methods above.

Constructing trails

Proper construction of trails can enhance scenic beauty and recreation. Trails should be built with proper drainage and adequate slope and grade to minimize erosion and maintenance. They should be posted and gated to deter trespassing.

Trails provide access for monitoring the growth and health of your forest, exercising, recreation use, educational activities and observing nature. If well planned, they will provide low-cost access and require minimal maintenance.

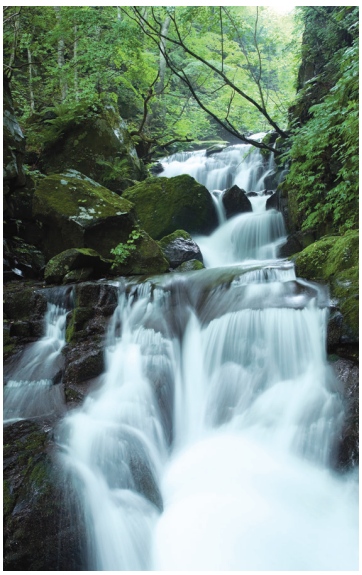
For proper road construction, first preplan the road or trail using aerial photographs, topographic maps, field maps, and personal knowledge of the property. Try to avoid areas with wet soils; frequent flooding; unstable or highly erosive soils; steep slopes; hazards such as cliffs and ledges; locations requiring expensive bridges and culverts; environmentally sensitive areas; and high-maintenance areas, such as those requiring constant mowing or pruning.

For best results with roads, refer to guidelines on road construction in the BMP section that follows.

Using BMPs to Protect Water Quality

Best Management Practices (BMPs) are practical guidelines that can be used to protect water quality in forest management activities. When a forest is disturbed, the potential for soil erosion and degrading water quality increases. The criteria used to measure water quality includes sediment levels, nutrient and dissolved oxygen levels, water temperature and streamflow.

Each of the management practices previously discussed in this manual requires using various BMPs. As they relate to the forest, BMPs generally fall into one of the following categories:



A goal of all forest management practices is to maintain good water quality.

1. Streamside management zones (SMZs)
2. Forest roads and skid trails
3. Log landings
4. Stream crossings
5. Fertilizer and pesticide applications

All of these categories will be addressed after this brief introduction on the importance of planning your BMPs. **You should understand that some BMP recommendations can be difficult to implement due to obstacles such as property lines or topography, and therefore must occasionally be modified to accomplish suitable protection of water and soil.**

Planning Phase

A variety of BMPs should be incorporated into the management of your property. Along with your resource professional, you should first assess your property condition and identify potentially sensitive or unique areas: water bodies, soils, areas with steep terrain, wildlife habitats, areas receiving heavy recreational use, and even consider adjacent land uses (fields, pastures, neighbors), etc.

Then consider how your desired management activities might impact each of these features. How can you minimize the movement and reduce the overflow velocity of water across your land? What can be done to assure the soil stays in place? How would you want your neighbor's property upstream to be managed to minimize the disturbance to your property? Let's look at each of the BMP categories in more detail to answer these and other questions.

Protecting Water through Streamside Management Zones

Streamside management zones (SMZs) include the land and vegetation adjacent to water bodies such as streams, rivers, lakes and wetlands. These buffer areas are critical for filtering sediment

SMZs are critical forest buffers near water bodies.

and pollutants, preventing them from entering water bodies. They slow, filter and spread surface water, cleansing it and allowing more water to be absorbed and made available for terrestrial life.

The shade in SMZs also cools soil and adjacent waters, preventing rising water temperatures. Some aquatic species have a very limited temperature range (i.e., trout). High water temperatures lower dissolved oxygen levels, which harms aquatic life. Further, trees within SMZs contribute leaf litter, sticks and organic matter, all necessary for supporting the food chain. And too, SMZs are important traveling and feeding corridors for wildlife.

BMPs for Forest Roads and Skid Trails

A road system, temporary or permanent, provides access for timber harvesting and management activities, recreation or wildlife enjoyment. Improper road construction and maintenance can cause erosion and sediment from forestry activities. Proper road construction not only protects the water, but will last longer, and will minimize aggravation from ponding and rut development. The goal should be to prevent water from entering roads and skid trails and to drain water off the roads as soon as possible within practical and economical limits.

Streamside Management Zone Widths

Slope of land between disturbed area and stream or other water body* (percent)	Recommended SMZ width (each side) (feet)
0	25
10	45
20	65
30	85
40	105
50	125

(Tennessee Department of Agriculture, Forestry Division, 1998.)

$$*\%\ \text{slope} = \frac{\text{rise in vertical feet}}{\text{horizontal run in feet}}$$

Action Steps for Streamside Management Zones

1. The width of SMZs should range from 25 to 125 feet on each side of water bodies, depending on the steepness of the surrounding terrain (wider for steep terrain).
2. Minimize harvesting trees in SMZs, being careful not to remove more than 25 to 50 percent of the crown canopy.
3. Clearly mark the outside boundaries of your SMZ before harvesting timber.
4. Avoid operating equipment in SMZs.
5. Never use stream beds (wet or dry) as a skid trail or haul road.
6. Locate log landings completely out of the SMZ.
7. Keep logging debris out of water bodies.

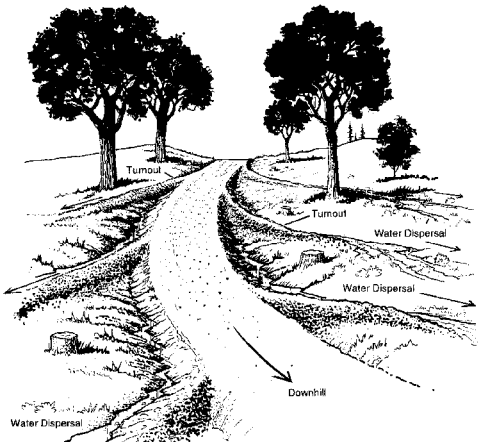
(Tennessee Department of Agriculture, Forestry Division, 1998.)

Skid trails are used to drag or haul logs out of the forest. After logging, they provide access for other uses.

Special road and skid trail BMPs include:

Water turnouts

Water turnouts are ditches, trenches or waterways that divert water away from the road surface. They carry water into an undisturbed area where the flow slows and sediments are filtered and trapped before reaching water bodies.



Design and installation of turnouts.

Source: Cooperative Extension Service Division of Agricultural Sciences and Natural Resources, Oklahoma State University

Culverts transfer water under a road, reducing soil erosion.

Cross-road drainage by culvert

Cross-road drainage is the transfer of water across or under the road, usually by a culvert. It is used on any road or trail where storm water runoff, ditch-to-ditch transfer, slope or overland seepage might cause erosion. Pipe culverts 14 inches or larger are normally installed on permanent roads and trails. Culverts should be properly installed to ensure passage of any aquatic life.

Broad-based drainage dip

Broad-based dips create a reverse uphill slope in a road surface, effec-

Broad-based dip road.

Source: Georgia Forestry Commission.

Recommended Spacing For Broad-Based Dips

Road Grade *(Percent)*	Distance Between Dips *(Feet)*
2	300
4	200
6	167
8	159
10	140

From the formula:
spacing (feet) = 400/slope + 100 feet

(Tennessee Department of Agriculture, Forestry Division, 1998.)

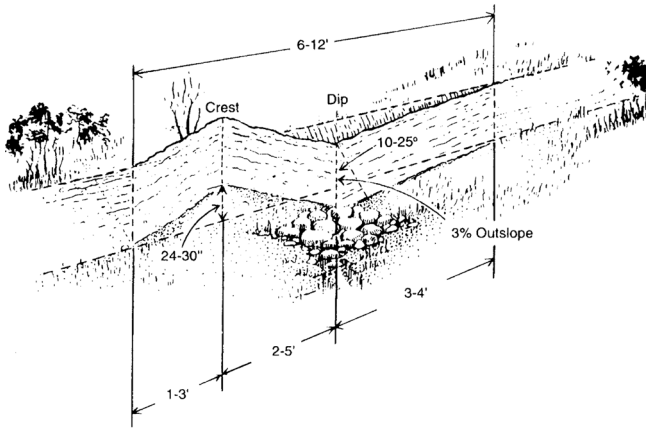
tively slowing and then moving water off the road surface into an undisturbed adjacent area.

Rolling dip

Rolling dips are a rounded hump that create a reverse slope and turnout—essentially bringing the moving water to a stop, then casting it off the trail. They are often used in skid trails where logs are skidded (dragged) to a log landing area. The rolling dip provides cross drainage, slows water flow and holds up better under heavy traffic.

Water bars

Water bars are a combination mound/trench built into a road or trail and angled slightly downslope to move water off the road surface into an undisturbed, adjacent area. Construct them with an angle 30 degrees downhill, and extending 3-4 feet beyond the trail. This



Profile of retired temporary access road showing water bars.

Source: Cooperative Extension Service Division of Agricultural Sciences and Natural Resources, Oklahoma State University

will divert water off the skid trail. Water bars are usually installed after the road is no longer used.

BMPs in Log Landings

The area within a logging operation that receives the greatest impact to the soil is the log landing. Log landings are areas to which trees are skidded, processed into logs and loaded onto trucks for transport to the sawmill. Prior to use, landings must be cleared of vegetation. During use, heavy logging and transport equipment converges at the landing—compacting, churning and "ponding" the soil. Because landings are often located near the edge of the property and adjacent to public roads, they can invite attention.

Action Steps for Forest Roads and Skid Trails

1. Use topographic and soils maps to layout roads and trails prior to harvesting.
2. Construct roads carefully, minimizing their number, limiting the grade (slope), and avoiding cut and fill (digging up the dirt and moving it elsewhere).
3. Build roads and trails to drain off the water—create broad-base dips, gentle slopes, reverse grades, turnouts, culverts and water bars and crown the center.
4. Never operate skidders up or down a stream.
5. Cross streams only at right angle to the stream flow.
6. Revegetate skid trails and construct water bars soon after the timber harvest.

Action Steps for Log Landings

1. Choose sites with soils that are capable of holding up under heavy use—sandy or gravelly soils are best.
2. Minimize the number of landings and re-use old landings when possible.
3. Locate landings on higher ground, well away from water bodies.
4. The landing should have a slight slope and face south if possible (to aid in drying the soil). Don't exceed a 5 percent slope.
5. Grade and revegetate landings with a wildlife seed mix as soon after the logging as possible to stabilize the soil and provide cover (refer to wildlife section for food plot recommendations).
6. Consider access safety and aesthetics near public roads. A screen of uncut trees between the landing and the road can sometimes be left.

Water quality problems arise in landings that are improperly planned, located, *finished off* and maintained. If properly created and maintained, landings can be a benefit to wildlife and can be re-used in future logging operations.

Reseeded log landings provide wildlife food sources as well as recreational opportunities.

Stream-Crossing BMPs

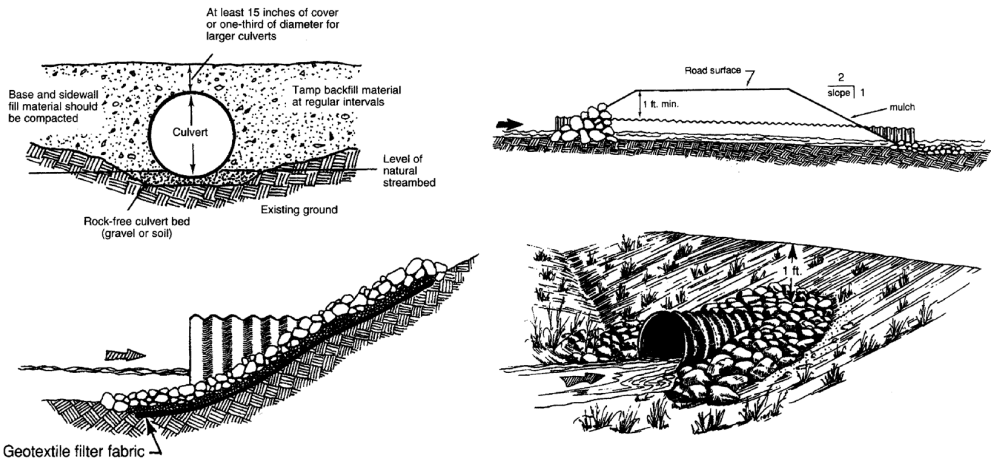
Forest management activities, including recreation, often require crossing streams for access. Streams are usually classified as **perennial** or **intermittent**. Perennial streams contain water within a well-defined channel year- around and are capable of supporting fish life. Intermittent streams contain water within a well-defined channel only temporarily following a major rainstorm or when ground water is abundant. Both stream types need attention when crossings are necessary.

There are several acceptable ways of crossing steams:

Pipe culverts

Considered expensive, pipe culverts are usually used on permanent roads. However, following use on temporary roads and trails, they can be carefully removed (to minimize soil disturbance) and then used again. Culverts should be of adequate diameter to handle above-normal water flows and long enough (to extend slightly upstream and downstream from the crossing). A single larger-diameter culvert, sized to handle the water flow, is less likely to clog than several smaller, stacked culverts. Backfill material (preferably with gravel) should

Intermittent streams contain water only temporarily following major rainstorms.



Source: Bureau of Forestry Wisconsin, Department of Natural Resources.

Stream culvert installation with specifics of slope, placement, fill, etc.

be free of debris and the culvert should be covered with fill to a depth of one-half the diameter of the culvert, or a minimum of 1 foot.

Culvert placement (elevation) is important for aquatic habitat. If placed too high (above normal water flow), culverts can create a barrier for aquatic movement.

Bridges

Temporary or permanent, there are numerous styles of bridges used to cross streams where culverts won't handle the stream flow. Bridges should be of proper size to handle heavy loads. Professionals can help design your bridge. Stream channels and stream banks should be protected from erosion during construction by continual mulching or using a ground cover. Abutments and headwalls may be needed to handle flood conditions and to stabilize the approaches of the crossing area. Use vegetation or ground cover to stabilize road approaches and road banks.

Fords

A ford is a low spot in a stream where equipment can more easily cross. Fords are temporary or minimum-use crossings that are improved with various materials, including riprap stone, portable bridges, wood/metal/rubber mats or sometimes logs. These materials protect the stream bank and its channel during use, and except for the stone, are normally removed afterwards.

Bridge constructed with on-the-farm materials.

Action Steps for Crossing Streams

1. Avoid crossing streams if possible.
2. Choose crossings at narrow portions of the stream, preferably with gently sloped banks.
3. Cross streams at perpendicular angle to the stream flow.
4. When constructing the crossing, minimize excavating the soil and do not push the soil into the stream.
5. Choose stable crossing sites.

Action Steps for Pesticide and Fertilizer Application

1. Apply pesticides and fertilizer according to label directions, minimizing the rate to accomplish the goal. Note areas of non-application addressing intermittent and perennial streams, wetlands, sinkholes and other sensitive areas on the pesticide label under "Environmental Hazards."
2. Comply with all federal and state regulations around water bodies, roads, schools, residences and for disposal of containers.
3. Mix chemicals and clean tanks only where spills will not enter water bodies.
4. If a spill occurs, immediately contain it, and notify the appropriate authorities.
5. If hiring a custom applicator, require a written contract and proof of appropriate licenses, insurance and bonding of the contractor.
6. The label directions will indicate at what wind speeds and temperatures aerial application must cease.

BMPs for Pesticide and Fertilizer Application

The application of pesticides and fertilizer to forests is a management tool increasing in popularity. Pesticides include two categories: herbicides to control unwanted weeds, and insecticides to control unwanted and detrimental insects. They are applied via hand applicators, mechanized ground equipment or aerial application. To minimize water quality impact and for optimum effectiveness, they should deliver the right **amount**, to the right **place**, at the right **time**.

Cost-Share Assistance

Responsible management of your forest and adjoining lands will provide direct benefits to you, the landowner. However, the public derives both direct and indirect benefits from you as a result of good land stewardship. Soil and water protection, abundant wildlife, landscape aesthetics and limited access for recreation all contribute positively to quality living.

Thus, many public agencies, conservation organizations and forest industries provide cost-share assistance for the specific practices outlined in this manual. These could include free or low-cost tree and shrub seedlings, grains for wildlife food plots and native grass seed, all to assist the landowner in implementing beneficial land use practices.

Parting Advice on Forest*A*Syst

You are encouraged to begin your forestry activities by filling out page 36 and seeking the assistance of professionals who can assist in preparing a forest management plan. Sources of assistance and Websites are included. Share the completed self-assessment (found at the beginning of this manual) with your professionals. In your planning, study this manual and strongly consider the recommendations denoted as **action steps**. Be patient, yet confident in implementing your steps. Follow BMPs, and **make protection of the soil and water resources paramount as you proceed.**

Professionals stand ready to assist in your forest management program.

Sources of Assistance

Tennessee Department of Agriculture
Division of Forestry
Ellington Agricultural Center
440 Hogan Road
Nashville, TN 37220

Mailing Address:
P.O. Box 40627
Nashville, TN 37204

tn.gov/agriculture
615-837-5411

Tennessee Forestry Association
2605 Elm Hill Pike, Suite G
Nashville, TN 37214
615-883-3832
tnforestry.com

UT Department of Forestry, Wildlife and Fisheries
274 Ellington Plant Sciences
Knoxville, TN 37996-4563
UT Extension contact: 865-974-7346
extension.tennessee.edu
Departmental contact: 865-974-7126
fwf.ag.utk.edu

Natural Resource Conservation Service
675 U.S. Courthouse
801 Broadway
Nashville, TN 37203
615-277-2531
www.tn.nrcs.usda.gov

Farm Service Agency
579 U.S. Courthouse
801 Broadway
Nashville, TN 37203
615-277-2603
fsa.usda.gov

Tennessee Wildlife Resources Agency
Ellington Agricultural Center
P.O. Box 40747
Nashville, TN 37204
615-781-6500
tn.gov/twra

Also, professional consultants and industry representatives are available for assistance. Your county Extension office or area forester will maintain a list for your area.

Websites

The following websites are available to assist you in gaining more knowledge on forest management.

- **Southern Region Extension Forestry** — http://forestryindex.net
- **Forest Landowners Association** — forestlandowners.com
- **Tennessee Department of Agriculture Division of Forestry** — tn.gov/agriculture
- **Tennessee Forestry Association** — tnforestry.com
- **University of Tennessee Extension** — extension.tennessee.edu
- **American Forest and Paper Association** — afandpa.org
- **Association of Consulting Foresters** — acf-foresters.org
- **National Timber Tax** — timbertax.org
- **USDA Forest Service Southern Research Station** — srs.fs.fed.us
- **Tennessee Wildlife Resources Agency** — tn.gov/twra
- **American Tree Farm System** — treefarmsystem.org
- **Natural Resource Conservation Service** — tn.nrcs.usda.gov

Sample Forest Management Plan Outline

(Portions to be filled out by landowner in advance of meeting with natural resource professional.

Date: _____

Owner(s): _____ Phone: _____

_____

_____

Location and Directions to Property:_____

_____

Statement of Purpose for the Plan:_____

_____

Ownership Goals:_____

_____

Land Description:_____

Total number of forested acres_____

History of the Forest _____

_____

Habitat or Timber Types_____

_____

Soils_____

Water Bodies_____

Access to Property_____

Property Boundaries_____

Terrain _____

_____

Individual Stand Analysis and Prescription

Stand #_____ Stand Name _____# of Acres _____

Analysis

Species present by diameter size class:

Regeneration (seedlings)_____

Saplings (1-3″)_____

Post (4 - 7″)_____

Pole (8 - 11″)_____

Small Sawtimber (12 - 18″)_____

Large Sawtimber (19 - 24″)_____

Overmature (25″ +)_____

Condition of Stand _____

_____

_____

_____

Biometrics (measurement of the forest - completed by professional)

Basal Area_____

Number of Trees Per Acre (Sapling size and larger)_____

Board Feet_____

Wildlife Observations and Patterns_____

_____

Site Limitations_____

_____

History _____

_____

Stand Prescription (recommendations)

_____

_____

_____

_____

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THIS REPRINT IS FUNDED IN PART BY THE TENNESSEE DEPARTMENT OF AGRICULTURE FORESTRY DIVISION THROUGH THE TENNESSEE AGRICULTURAL ENHANCEMENT PROGRAM (TAEP).

EPA PUBLICATION NUMBER 904-B02001

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EXTENSION.TENNESSEE.EDU

17-0066 10M 12/16(Rev) R12-4910-231