

SECTION 1

WOODLAND MANAGEMENT CONCEPTS

TOPIC 1.1

Objectives

Participants will:

1. understand the basic principles of sustainable forestry;
2. know that SFI[®] is an industry sponsored program to insure that all member companies of the American Forest and Paper Association practice the principles of sustainable forestry

Resources:

Sustainable Forestry: A Guide for Virginia Forest Landowners

Sustainable Forest Management Contact List

WELCOME & OVERVIEW

PRINCIPLES OF SUSTAINABLE FORESTRY

Who is sponsoring this course?

The Virginia Forest Landowner Short Course Series is coordinated by the Virginia Forest Landowner Education Program, which develops and promotes educational opportunities for Virginia's non-industrial private landowners.

What is sustainable forestry?

Sustainable forestry consists of forest practices that meet the present needs without compromising the ability of future generations to meet their own needs. Examples of sustainable forestry include:

- Maintaining riparian buffers to trap sediment and regulate stream temperature
- Planting or naturally regenerating immediately following a timber harvest
- Maintaining key habitat elements for wildlife species
- Reducing exotic species and pests

Sustainable forestry integrates the regeneration, growing, nurturing, and harvesting of trees for useful products with conserving soil, air and water quality, wildlife and fish habitat, and landscape aesthetic quality.

What is the Sustainable Forestry Initiative?

"The Sustainable Forestry Initiative (SFI[®]) program is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists, among others, that combines the perpetual growing and harvesting of trees with the long-term protection of wildlife, plants, soil and water quality. There are currently over 150 million acres of forestland in North America enrolled in the SFI[®] program, making it among the world's largest sustainable forestry programs.

Who can help me implement Sustainable Forestry Practices on my forest land?

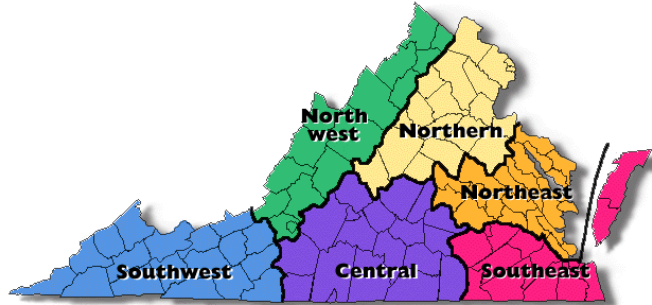
Forest management assistance is available throughout Virginia from many agencies. The next page, which can be pulled out of this manual, lists the first line of contact; Appendix A contains additional resource contact information.

SUSTAINABLE FOREST MANAGEMENT CONTACT LIST

Virginia Cooperative Extension

In addition to the state Landowner Education Program Coordinator, each district (see map below) has a District Forestry & Natural Resource Agent who is responsible for local forestry education programming.

Jennifer Gagnon
State Coordinator
Virginia Forest Landowner Education
Program
540/231-6391; jgagnon@vt.edu



Neil Clark
Southeast District
757/657-6450 Ext 406; southeast@vt.edu

Jason Fisher
Central District
434/476-2147; jasonf@vt.edu

Vacant
Northeast District
Contact State Coordinator

Bill Worrell
Southwest District
276/889-8056; bworrell@vt.edu

Adam Downing
Northern District
540/948-6881; adowning@vt.edu

Matt Yancey
Northwest District
540/564-3080; yancey@vt.edu

Virginia Department of Forestry

Each county in Virginia has an area forester who can assist forest landowners. To find out who your area forester is, contact the Regional Office nearest you or visit: www.dof.virginia.gov

Waverly Regional Office
Ed Zimmer - Regional Forester
804/834-2300; ed.zimmer@dof.virginia.gov

Salem Regional Office
Chuck Hutsell - Regional Forester
540/387-5461; huck.hutsell@dof.virginia.gov

Tappahannock Regional Office
Dave Slack - Regional Forester
804/443-2211; dave.slack@dof.virginia.gov

Charlottesville Regional Forester
Buck Kline - Regional Forester
434/977-5193; buck.kline@dof.virginia.gov

Farmville Regional Office
Greg Winston - Regional Forester
434/392-4159; greg.winston@dof.virginia.gov

Abingdon Regional Office
Ed Stoots - Regional Forester
276/676-5488; ed.stoots@dof.virginia.gov

SECTION 1

WOODLAND MANAGEMENT CONCEPTS

TOPIC 1.2

Objectives

Participants will:

1. learn the importance of locating and marking their property lines correctly;
2. find out how to obtain a legal description/plat sheet for their property;
3. learn how to correctly mark the property boundary.

Resources

Obtaining a Legal Description & Resurveying of Forest Boundaries

Sample Deed and Plat

Maintaining Forest Property Boundaries

GETTING TO KNOW YOUR WOODS: BOUNDARY LINES AND DEEDS

Why is marking my property boundary so important?

- prevents loss of land
- prevents accidental timber theft/gives you legal recourse in the case of intentional timber theft
- minimizes landowner liability
- prevents trespass
- facilitates timber sales and other forest management activities

How do I determine where my property boundaries are?

- obtain a legal description from the Circuit Clerk's office
 - land book
 - grantee/grantor book
 - deed book
 - will book
 - plat sheet
- using the information found in the above documents, try to locate your property boundaries using:
 - monuments
 - agreed upon boundaries
 - deed calls (these can be inaccurate, but it is a place to start)

How do I mark my property boundaries?

- surveyors will cut a swath along the boundaries
- mark trees first by removing 5-6" of bark at eye level
- paint the exposed wood
 - vertical line for trees located on the boundary line
 - one band for trees adjacent to the property line (facing the line)
 - two bands for change in direction (toward direction of change)
 - three bands at property corners (facing corner)

SECTION 1

WOODLAND MANAGEMENT CONCEPTS

TOPIC 1.3

Objectives

Participants will:

1. know where and how to obtain maps, aerial photos and soil surveys;
2. learn to read and use topographic maps, aerial photos and soil surveys;
3. use a dot grid to determine area;
4. be able to locate and use these resources for their own forestland.

Resources

How to Obtain
Topographic Maps,
Aerial Photos, and Soil
Surveys

Topographic Maps,
Aerial Photos and Soil
Surveys

Using Aerial
Photographs - A
Layman's Guide

Dot Grid

GETTING TO KNOW YOUR WOODS: MAPS, PHOTOS AND SOIL SURVEYS

What is a topographic (topo) map?

Topographic maps depict the three-dimensional shape or topography of the land using contour lines. Topo maps help you identify elevation changes, aspect (which way a slope faces), roads, structures, land uses and other human-made features

What is an aerial photograph?

Color infrared or black and white photos taken from a plane. Give a bird's eye view of your property and neighboring property. A comparison of photos taken at different times can be used to identify land use changes. Photos can be used to identify vegetation types (infrared photos can even be used to delineate hardwoods from pines). Aerial photos are a valuable tool in forest management planning.

What is a soil survey?

A collection of information about soil characteristics, composition, and potential uses for a specific area. These are generally conducted at the county level. A survey contains information about the different soil types found in an area, and a map of where those soils are found. This information can be valuable to a land manager trying to decide which species to plant and where.

SECTION 1

WOODLAND MANAGEMENT CONCEPTS

TOPIC 1.4

ASSESSING YOUR RESOURCES

Objectives

Participants will:

1. understand how to identify management units;
3. learn the basics of forest measurements;
4. be able to describe a stand;
5. be familiar with different forest products.

Resources

Resource Evaluation
Reading Your Land
Worksheet

What is a forest stand?

A group of trees sufficiently uniform in species composition, age and condition to be managed as a single unit. The sizes and types of stands can vary. For example, you may have a 100 acre loblolly pine plantation, which is one stand, and a 10 acre wetland, which is another. Each of these management units should be identified in your management plan

Forestry Measurement Units

Certain measurement units are important to the forest evaluation process.

- **Diameter at breast height (DBH)** - diameter of the tree 4.5' above ground level.
- **Height**
 - **Total height** - from ground level to the top of the tree
 - **Merchantable height** - from ground level to the top of the merchantable material in the tree (generally given as a minimum stem diameter). The merchantable height depends on the product. For example, if the tree is going to be used for pulpwood, then the merchantable height is to where the stem diameter inside the bark (dib) is under 4".
- **Logs** - a stem length measurement equivalent to 16'.
- **Cord** - the volume of wood in a pile 4' high by 4' wide by 8' long (128 ft³). Approximately 1.75 to 2.5 tons of wood per cord. Generally used for estimating firewood volumes, occasionally for pulpwood.

- **Log rules and Board Feet** - log rules are used to estimate the amount of lumber in a tree. Generally lumber is estimated in terms of **board feet**. One board foot is 1" thick, by 12" long and 12" wide.
- Commonly used log rules include: **International, Doyle, Scribner**
- The log rule used to estimate your timber will depend on the products, timber type, and the forester. The choice of log rule will affect your volume estimate - no two log rules will give the same volume. Each has pros and cons associated with it.

What is a timber cruise? A forest inventory conducted by a professional forester, to determine the quantity and quality of timber on a property.

Timber Products and Their Values

- **Pulpwood** - wood cut for use as fiber (to produce paper, packaging, etc.). Generally trees between 5" and 9" DBH, or low-quality trees.
- **Firewood** - dead wood or smaller trees removed during harvest operations.
- **OSB** - oriented strand board - a composite product manufactured from wood chips.
- **Chip n' Saw** - logs between 8" and 12" DBH; better quality logs than those used for pulpwood. Lumber and chips are cut from small logs in a single operation; generally a more valuable product than pulpwood.
- **Sawlogs** - come from trees large enough to be cut into lumber, straight-stemmed.
- **Poles** - a high-valued product used for utility poles, billboard, pole buildings. Very high quality standards for straightness, knots, grain, diameter and length. As few as 5 to 10 poles per acre can result in a profitable cut.
- **Piles** - poles or heavy timbers driven into the ground to provide a secure foundation for buildings, etc. on soft wet sites (think bridge foundations). Very high quality standards for straightness, knots, grain, diameter and length. High-value product.
- **Peelers/Veneers** - these are used for plywood, furniture, paneling, cabinets, etc. High-value products

SECTION 2

ASSISTANCE, OBJECTIVES AND PLANNING

TOPIC 2.1

Objectives

Participants will:

1. understand the different roles and assistance available from Virginia's four distinct forestry assistance sources;
2. know how to obtain professional forestry assistance in your area/region.

Resources

Virginia DOF Forest Management Services for Private Landowners

Forest Management Services

Getting Help From a Forestry Consultant

How to Use Extension Forestry Programs and Professionals

The Story of a Timber Sale

OBTAINING PROFESSIONAL ASSISTANCE

Who Provides Forest and Wildlife Management Assistance and What Types of Assistance are Provided?

So you've bought forestland...now what? The first professionals you should contact are the Virginia Cooperative Extension and Virginia Department of Forestry folks listed in the first section of this manual (Sustainable Forest Management Contact List). These professionals can assist you with many forest management issues (mostly free of charge).

Depending on the services you desire, you may need to contact a professional consulting forester. Services which require a consulting forester include: timber sale estimation, contract writing, putting a sale out for bid and stand improvement operations. A list of consulting foresters is available on the Virginia Department of Forestry website

(www.dof.virginia.gov). Included in Appendix A is a more extensive listing of service providers in Virginia, including types of assistance provided and contact information.

Finally, (and since you are enrolled in this course, you already know this) there are numerous educational opportunities available to forest landowners in Virginia. You may not become a professional, but you can become knowledgeable. Educating yourself is very important to sustainable forest management and for protecting your investment in your forestland! The Virginia Forest Landowner Education Program has numerous educational opportunities available throughout the state each year. Please visit www.cnr.vt.edu/forestupdate for dates and locations.

All short course participants are added to the Sustainable Forestry Database. You will receive the quarterly newsletter, "The Virginia Forest Landowner Update", and notification of upcoming natural resource educational opportunities, either by mail or e-mail. If you prefer not to be added to the database, please let your course facilitator know.

SECTION 2

ASSISTANCE, OBJECTIVES AND PLANNING

TOPIC 2.2

Objectives

Participants will:

1. understand the concepts of management, preservation and conservation;
2. learn how to develop forestry objectives that are ecologically and economically sound, and satisfy local, state, and federal legal requirements.

Resources

Management by Objectives: Successful Forest Planning

Advantages of a Written Management Plan

Family Resource Inventory Worksheet/Example

ESTABLISHING OBJECTIVES

What is Forest Management? Forest management or **silviculture** is the art and science of managing a forest to meet specific landowner objectives. Landowners attempt to control conditions such as tree composition, soil productivity, and tree density to meet financial, ecological and aesthetic objectives.

Management Strategies

- **Preservation (passive management)** - a conscious decision to do nothing, a hands-off approach, forest succession continues unabated; generally low or no capital cost to the landowner.
- **Conservation (active management)** - activities which alter or enhance forest succession to sustainably meet management objectives. That is, meeting the needs of today without jeopardizing the ability of future generation to meet their needs.

Management Objectives - which strategy you employ depends on your management objectives, and may change over time. With either strategy, your objectives must be realistic - based on the limitations of your property and resources.

Limiting Factors

- **Biological/Ecological**
 - Soil productivity
 - Site condition
 - Aspect
 - Temperature
 - Rainfall
 - Existing plant and animal species
- **Economic Factors**
 - Proximity to markets
 - Demand for products
 - Time and labor
 - Money
 - Equipment
- **Social Factors**
 - Federal and State laws and regulations
 - Local ordinances (for a listing in your county, see: <http://www.dof.virginia.gov/mgt/law-local-ordinance.shtml>)
 - Neighboring properties

SECTION 2

ASSISTANCE, OBJECTIVES AND PLANNING

TOPIC 2.3

Objectives

Participants will:

1. understand the concepts of management, preservation and conservation;
2. learn how to develop forestry objectives that are ecologically and economically sound, and satisfy local, state, and federal legal requirements.

Resources

Managed Forests for
Healthy Ecosystems

Developing a Woodland
Management Plan

Forest Stewardship:
Planning for Beauty and
Enjoyment

Sample VDOF
Stewardship Plan

VDOF Stewardship
Application

MANAGEMENT PLANS

Multiple Use - forests can be managed for more than one use. For example, a forest can be managed for timber production, wildlife habitat and recreation. National Forests are managed under the multiple use concept.

Sustained Yield - allows for removals of products (such as wildlife through hunting) in a responsible way which never depletes the resource.

Parcelization - the subdivision of larger land holdings into smaller ownerships (parcels); can lead to:

Fragmentation - adjacent parcels with different, often conflicting land uses. For example, an actively managed farm adjacent to an expensive subdivision.

Ecosystem management - an attempt to preserve the health and productivity of large blocks of land, usually with multiple owners, while providing timber, maintaining clean water, biodiversity, and recreation.

What kinds of information do I include in a management plan?

- Management objectives (see section 2.2 - Establishing Objectives)
- Maps/aerial photos/soil surveys with stands delineated (see section 1.3 Getting to Know Your Woods)
- Site and stand descriptions
- Inventory data (species, volumes, quality, etc.) - this information will come from your timber cruise
- Management recommendations
- Schedule of activities

If you are interested in developing a management plan for your property, please contact your county forester (www.dof.virginia.gov) or hire a professional consulting forester (see section 2.1 - Obtaining Professional Assistance).

SECTION 2

ASSISTANCE, OBJECTIVES AND PLANNING

TOPIC 2.5

CONSERVATION STRATEGIES

Objectives

Participants will:

1. understand how to use different conservation programs to conserve their working land, and to reduce taxes;
2. understand the process of applying for land conservation programs;
3. know their local conservation agencies and types of land conservation assistance provided by those agencies.

Resources

List of Localities in Virginia Using Use Value Taxation

New River Land Trust Packet

This segment of the course only covers conservation programs which directly reduce your taxes. However, Virginia has a suite of conservation tools which can be used to maintain a working landscape. For in-depth information on all the tools, please join us for the short course "Forest & Farmland Conservation Strategies". Visit www.cnr.vt.edu/forestupdate to see when this course will be offered in your area.

Use Value Tax Assessment

Definition: Authorized at the State level and implemented at the County level, differential tax assessment programs (aka use value or current use assessment) are generally initiated by grassroots movements within a county. These programs allow local governments to assess farmland at its current use value, which is generally lower than its fair market value, for real property tax purposes. Although Virginia has approved the Use Value Taxation, each county has the right to adopt or reject the program. However, all property belonging to Agricultural and Forestal Districts qualifies for land use taxation, regardless of whether or not the county has adopted the program.

If a county adopts a use value tax program, a property must fall under one of four classifications to qualify:

Agricultural: land must be in *bona fide* crop or livestock production for sale, or be in an approved soil conservation program;

Horticultural: *Bona fide* production of fruits, vegetables, ornamental plants, or ornamental products for sale;

Forested: Productive and nonproductive forest land;

Open Space: Used or preserved for parks, recreation, conservation, flood ways, wetlands, riparian buffers, historic or scenic purposes, or for public interest.

Advantages:

- Lowers property taxes for rural property owners
- Shifts tax burden to those who use more services (urban residents)
- Makes land ownership more affordable for future generations

Disadvantages:

- Locality collects less revenue - must either reduce services or increase taxes on other residents - may not be popular with those whose taxes will increase
- Determining reasonable use values can be difficult

Agricultural & Forestal Districts

Definition: Agricultural & Forestal districts (AFD's) are voluntary rural conservation zones reserved for the production of agricultural products, timber, and the maintenance of open space. Districts are initiated by farm and forest landowner(s) to receive benefits such as use-value property taxation (see section 3.5), protection from nuisance ordinances, limitation of municipal annexation, participation in PDR programs, etc. In return, the district members agree not to convert their land to more intense commercial, industrial, or residential uses for a term of 4 to 10 years. In return, the county and Commonwealth agree not to take action or make infrastructure investments which will increase pressure on landowners to convert land in the district to more intense land uses during the term of the district.

As opposed to agricultural zoning, which can promote low density sprawl, AFD's discourage land uses not in keeping with agricultural, forestal or open-space land uses. Also, AFD's are usually for a minimum of 4-10 years, unlike zoning which can be easily changed at any time.

Virginia has statewide and local AFD programs. As of 2005, 29 Virginia localities have AFD's, which protects approximately 768,000 acres of farm, forest and open space. Somewhere between 60-70% of these protected acres lie in or near rapidly urbanizing areas of Virginia (including Tidewater and Northern Virginia).

To form an AFD, there must be a 200 acre core of land - there can be many owners in this core, but all properties must be adjacent. Once a core is formed, landowners within one mile of the core may also apply to be included. Once the minimum core is established, there is no minimum parcel size and no minimum number of landowners required, and no maximum size limit for a district. A landowner may only include a portion of their property in the AFD.

If this is desired, the parcel should have a separate tax parcel number and be a legally separate parcel of record. Land in an AFD may be sold at any time, but the land remains in the District.

The county review process takes 180 days; during this time, land can be added or withdrawn.

Once the review process is over, land can only be added to the district. Early withdrawal from AFD's is allowed under the following conditions:

- If a landowner dies during the term of an AFD, the heirs have 2 years to withdraw the land
- A written request for withdrawal due to economic hardship may be submitted by the landowner

Landowners interested in forming an AFD need to file an application with the County Board of Supervisors. The application should include the following documents:

- Acreage of each parcel to be included and parcel number
- Name, address and witnessed signature of each landowner joining the district
- Proposed term (4-10 years)
- Location and total acreage of the district
- Type of district (agricultural, forestal or both)
- Proposed name of district
- USGS map (7.5 min. series, available at <http://store.usgs.gov/>) showing district boundaries
- A county real property map (available from the county assessor's office) showing district boundaries
- County road map showing location of district
- \$300 fee

Advantages:

- Ensures use-value taxation (even if local government doesn't have a land-use program in place)
- Provides some protection from eminent domain (VDOT will consider the presence of a District when determining road locations)
- Protection from nuisance ordinances
- Voluntary
- Promotes neighborly cooperation and encourages landscape-level planning/management
- Creates a critical landmass important for maintaining a viable agricultural/forestal landscape.
- Local governments must consider the presence of a district when making administrative and planning decisions
- Keeps land in forestry & farm use for the length of the program (significant penalties for early withdrawal)

Disadvantages:

- Process of forming a district can be timely and complex
- Not effective tool in areas with high development pressure
- Incentives not always enough to get farmers to enroll

Conservation Easements

A conservation (open-space, or preservation) easement is a voluntary legal agreement between a landowner and a public body or conservation group in which the landowner donates or sells

certain ownership rights to conserve the agricultural, environmental and open space value of their land. Depending on the organization granting the easement, certain conservation practices (such as following Best management Practices to protect water quality) may be required, and the landowner relinquishes most of the development rights to the property. Easements provide substantial state and federal tax benefits.

- Conservation easements are generally into perpetuity; occasionally, term easements can be written
- Putting an easement on your property DOES NOT give the public access to your property - you are still the landowner and retain all ownership rights other than those you donate/sell with the easement
- Forestry and agriculture can still be practiced on the property (unless the landowner asks for specific prohibitions to be written into the easement)
- Tracts are generally at least 50 acres
- Landowner retains some development rights (for example, one house site (main house plus one smaller dwelling) per 100 acres; two houses and two smaller dwellings per 250 acres)
- Easement values are typically the difference between the value of the land at its highest and best use (usually development) and the value of the land used for forestry or agriculture
- Tax credits can either be used by the landowner, or sold to other, typically high-income, Virginia tax payers

Advantages:

- Voluntary
- Permanent land protection
- Can be customized
- Generous state and federal tax advantages
- Land under easement can be sold or passed onto children at any time - remember the easement remains with the property forever.

Disadvantages

- Forever is a mighty long time - land under a perpetual easement can never be developed - restricting future options
- Voluntary nature does not ensure protection of critical lands
- Tax benefits may only apply to present generation
- May limit ability to borrow against the land

What is a Land Trust?

(From the Virginia Department of Conservation & Recreation website www.state.va.us/dcr/olc/whereto4.htm)

"Nonprofit organizations in Virginia qualified to accept land for protection are defined as a charitable corporation, charitable association, or charitable trust that has been declared exempt from taxation pursuant to 26 U.S.C.A. § 501 (c) (3) and the primary purposes or powers of which include:

- retaining or protecting the natural or open-space value of real property;
- assuring the availability of real property for agricultural, forestal, recreational, or open-space use;
- protecting natural resources;
- maintaining or enhancing air or water quality; or
- preserving the historic, architectural or archaeological aspects of real property.

These qualified land conservation organizations are defined as "holders" in the act, essentially meaning they are eligible to acquire and hold a conservation easement by gift, purchase, devise or bequest. These groups must have had a principle office in the Commonwealth for at least five years. Until such a group meets these requirements, it may co-hold a conservation easement with another holder that meets the requirements.

In addition to holding easements, many land trusts and conservancies buy or are given land. And there are many conservation organizations that do not actually hold easements or acquire land. They work instead to educate and promote use of the various land conservation tools."

Virginia's United Land Trusts (VaULT) was formed in 2000 to coordinate private and public land conservation efforts to aid in statewide conservation efforts. There are currently 35 Land Trusts in Virginia. The type of lands a Trust may protect may vary. For example, the 500-Year Forest Foundation grants easements on land owned by folks interested in having old-growth forests. The enclosed booklet titled "Virginia Land Conservation" provides contact information and mission statements for each of these Land Trusts.

In addition to state Land Trusts, there are national and regional land conservation organizations as well. Names and contact information are below:

1. The Nature Conservancy - www.nature.org
2. Land Trust Alliance - www.lta.org
3. Trust for Public Land - www.tpl.org
4. American Farmland Trust - www.farmland.org
5. The Conservation Fund - www.conservationfund.org
6. Civil War Preservation Trust - www.civilwar.org
7. National Park Trust - www.parktrust.org
8. Ducks Unlimited - www.ducks.org/conservation/Projects/

SECTION 3

ECOLOGY AND MANAGEMENT

TOPIC 3.1

Objectives

Participants will:

1. learn about tree identification resources;
2. understand that harvesting is a management tool used to meet biologic and economic objectives;
2. understand basic forest management concepts related to forest product marketing and harvesting.

Resources

Common Forest Trees of Virginia and How to Identify Them
Principles of Regeneration
Silviculture in Virginia

SILVICULTURE

Resources for tree identification

- Virginia Department of Forestry's *Common Forest Trees of Virginia and How to Identify Them* (included with course materials)
- Forest Biology and Dendrology Educational Sites at Virginia Tech <http://www.cnr.vt.edu/dendro/>
- The Silvics of North America USDA Forest Service Agriculture Handbook 654 http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm

Silviculture - the care and tending of trees

Silvicultural Systems include all forest management activities, from harvesting, to site preparation and replanting, and all intermediate operations such as thinning, fertilizing, and crop tree release. Any harvesting operation that does not plan for regenerating the site is NOT a valid silvicultural system and should be avoided.

The silvicultural system you select should be based on the type of forest you have (hardwood or pine, young or mature, overstocked or understocked) and your management objectives.

Regeneration Harvests

Selection - creates an **uneven-aged** forest (at least 3-4 distinct age classes); involves entering the stand every 5-10 years and removing single trees (**single tree selection**) or groups of trees (**group selection**) to create openings in the canopy in which **natural regeneration** can develop. Not to be mistaken with -

Select cuts or **diameter limit cuts** - which are high-grades. In a high-grade, the best trees are taken and only poorly-formed, suppressed or diseased trees are left - the future health and productivity of the stand are NOT taken into consideration.

Seed Tree - uses a series of two partial cuts to gradually remove the overstory and allow natural regeneration to develop into an even-aged forest (one age class).

Shelterwood - similar to a seed tree, except a series of three partial cuts are used. Also results in a naturally regenerated even-aged forest.

Clearcut - used to regenerate shade-intolerant species such as pines. In a **silvicultural clearcut**, ALL trees are removed from the site. This leaves a clean site, with adequate sunlight for new crop of trees to develop - either naturally or artificially. In a **commercial clearcut** only valuable overstory trees are taken. The result is a site many poor-quality trees shading the ground, creating poor conditions for shade intolerant species to regenerate. Silvicultural clearcuts generally result in healthy, productive forests, while commercial clearcuts do not.

Regeneration

Artificial - the future forest is grown from planted seeds or with seedlings grown in a nursery.

Planning - know before the harvest how you are going to regenerate your forest. If you rely on artificial regeneration, know where to purchase seedlings/seeds and how and when to plant. The Virginia Department of Forestry has many native species for sale each year (www.dof.virginia.gov)

Site Preparation - depending on your site, some work may need to be done to improve the site for regeneration. Site prep activities include tilling, disking, mowing, bedding, herbicide application, and burning.

Planting - depending on the species you want and your site, planting can either be by hand or machine. Different species have different planting requirements (depth of planting, time of planting). Planting is a tough job, so be sure to talk to your forester to ensure success the first time around!

Follow-up - a year or so after planting, you will want to conduct a regeneration survey to ensure you are getting adequate survival to meet your management objectives. Supplemental plantings may be needed if there is high mortality. Intense competition from non-desirable species may require a **release operation** (see **intermediate treatments** below).

Natural - seeds from adjacent trees and the soil seed bank or sprouts from stumps develop into the mature forest.

Advanced seedlings - if there are desirable seedlings present on-site during the timber harvest, care should be taken to ensure adequate survival. Or, if there are too many seedlings, the harvest operation can be used to reduce the number of seedlings.

Managing sprouts - most hardwood stumps will produce numerous sprouts. To ensure a vigorous future forest, all but the largest healthiest sprout should be removed by hand (don't apply a herbicide or you will lose all the sprouts on the stump).

Intermediate Treatments

Thinning - a reduction in the number of trees which increases the availability of water, nutrients and light for the remaining trees; generally increases growth. Thinnings are usually conducted in immature stands where the remaining trees will respond well to the increase in resources.

Timber Stand Improvement - chemically or mechanically removing undesirable trees from a forest to improve growth of the remaining trees and species composition

Crop Tree Release - identifying crop trees (ones that will be cut in the final harvest) and mechanically or chemically removing other trees which are competing with them.

Fertilization/Weed Control - like fertilizing your garden, fertilizing your forest can increase growth; weed control (chemical or mechanical) can be used to remove competing vegetation, also increasing growth.

Prescribed Burning - an inexpensive tool which, when used properly, can reduce competing vegetation, prepare a bare mineral soil seedbed for regeneration, and create wildlife habitat.

SECTION 3

ECOLOGY AND MANAGEMENT

TOPIC 3.2

Objectives

Participants will:

1. review the advantages of planting pine;
2. learn the different types of pine common in Virginia;
3. learn the details of pine management.

Resources

How to Identify Virginia's Native Pines

A Southern Pine Management Guide for Tennessee Landowners

Shortleaf Pine: An Option for Virginia Forest Landowners

Facts About Low-Density Plantings of Loblolly Pine

PINE ECOLOGY AND MANAGEMENT

Why should I plant pine instead of hardwoods?

- pine is more productive on marginal sites
- pine seedlings are less expensive and easier to plant
- rotation length is generally shorter
- pines provide winter cover for wildlife

Which pines are commonly found in Virginia and how can I identify them?

- loblolly pine (*Pinus taeda*)
- Virginia pine (*Pinus virginiana*)
- Eastern white pine (*Pinus strobus*)
- shortleaf pine (*Pinus echinata*)
- longleaf pine (*Pinus palustris*)
- Table Mountain pine (*Pinus pungens*)
- pitch pine (*Pinus rigida*)

Please refer to How to Identify Virginia's Native Pines on the following pages for identification information.

Which types of regeneration systems are suitable for pines?

Most pine species are shade-intolerant, meaning they need full sunlight to survive and grow vigorously. For this reason, the clearcut silvicultural system is often used to regenerate pines. However, any of the systems discussed in section 3.1 - Silviculture, can be modified for pine.

SECTION 3

ECOLOGY AND MANAGEMENT

TOPIC 3.3

Objectives

Participants will:

1. review the advantages of growing hardwoods
2. learn some of the different types of hardwoods common in Virginia
3. learn the details of hardwood management

Resources

Hardwood Management
Artificial Establishment
of Hardwoods
Additional information
on hardwood
management can be
found at:
<http://www.cnr.vt.edu/forestupdate/articles/southernhardwoodmanagement.pdf>

HARDWOOD ECOLOGY AND MANAGEMENT

Why should I grow hardwoods?

- hardwood forests can have high biodiversity (both flora and fauna)
- diverse forests can provide multiple benefits
- hardwoods are productive on good sites
- natural regeneration is free

What are some of the common hardwood groups in Virginia?

- oaks (*Quercus* spp.) - northern and southern red, pin, scarlet, black, blackjack, water, willow, white, post, swamp chestnut, chestnut, laurel, turkey, and live
- hickories (*Carya* spp.) - bitternut, shagbark, mockernut and pig nut
- black walnut (*Juglans nigra*)
- birch (*Betula* spp.) - river, black, yellow
- ash (*Fraxinus* spp.) - white and green
- maple (*Acer* spp.) - red, sugar, striped and boxelder
- locust (*Robinia/ Gleditsia* spp.) honey and black (also called yellow)
- elm (*Ulmus* spp.) - American, winged, slippery
- magnolias (*Liriodendron, Magnolia* spp) - yellow-poplar, cucumbertree, mountain and sweet bay

For identification, please see the enclosed guide "Common Forest Trees of Virginia and How to Identify Them".

Which types of regeneration systems are suitable for hardwoods?

Hardwoods vary in their shade tolerance. The silvicultural system you choose will depend on what species you have and what species you'd like to promote, and the current condition of your forest. Any of the systems discussed in section 3.1 - Silviculture, may be appropriate.

SECTION 4

WILDLIFE

TOPIC 4.1

Objectives

Participants will:

1. understand the benefits of forest management to wildlife;
2. learn which practices promote which wildlife species.

Resources

A Landowner's Guide to Wildlife Abundance Through Forestry

What Happens to Wildlife After a Timber Harvest?

Managing Pines for Wildlife

Thinning Timber for Wildlife

FOREST MANAGEMENT FOR WILDLIFE

A common misconception is that forest management practices damage wildlife habitat. In fact, many management practices enhance wildlife habitat for both game and non-game species.

Wildlife habitat includes food, cover, water and space.

Most wildlife management practices will favor one species or a suite of species, while having a negative impact on others.

Wildlife Considerations

Edge patterns and field borders - wildlife use edge - the boundary between two or more land use types - extensively (i.e., food next to cover next to a stream). Creating edge is a good way to increase wildlife sightings.

Wildlife corridors - forested areas which provide cover for animals to travel from one section of the property to another.

Aesthetic values of your property can also be enhanced through forest management. This can include designing trails and roads to provide access to your property.

APPENDIX

SOURCES OF ADDITIONAL INFORMATION & ASSISTANCE

APPENDIX A

Objectives

Participants will:

1. receive a listing of natural resource agencies which provide landowner assistance

American Tree Farm System

C/O American Forest Foundation
1111 Nineteenth Street, NW
Suite 780
Washington, D.C. 20036
(202)463-2462
www.treefarmssystem.org

The American Tree Farm System (ATFS) is a private program of the American Forest Foundation with the mission to promote growth of renewable forest resources on private lands while protecting environmental benefits and increasing public understanding of all benefits of productive forestry. State ATFS Committees bring foresters, consultants and government agency officials together with experienced Tree Farmers to plan and administer each state ATFS program. ATFS is a nationally recognized certification system, and the oldest certification system in the world.

Forest Legacy

Forest Legacy Program Manager
USDA Forest Service;
NA State and Private Forestry
271 Mast Road
Durham, NC 03824
(603)868-7695
www.fs.fed.us/spf/coop/programs/loa/flp

The Forest Legacy Program is a partnership between States and the USDA Forest Service developed to identify and protect environmentally important forests from conversion to non-forest uses. The main tool used for protecting these important forests is conservation easements. The Federal government may fund up to 75 percent of program costs with at least 25 percent coming from private, State or local sources.

U.S.D.A. Forest Service

1400 Independence Avenue, SW
Washington, D.C. 20250
(202)205-8333
www.fs.fed.us

The mission of the Forest Service, a federal agency of the United States Department of Agriculture, is "to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations". For over a century, the Forest Service has managed public land in national forests and grasslands, currently totaling over 193 million acres.

U.S. Fish & Wildlife Service

1849 C Street NW
Washington, D.C. 20240
(800)344-WILD
www.fws.gov

The Mission of the U.S. Fish & Wildlife Service (USFWS) is to work with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The USFWS is committed to a collaborative approach to conservation. Their strategy is to empower Americans to become citizen conservationists.

Virginia Cooperative Extension & Virginia Tech Department of Forestry

313 Cheatham Hall (0324)

Blacksburg, VA 24061

(540)231-5483

www.cnr.vt.edu/forestupdate

www.sharplogger.vt.edu/

These state agencies administer the *Virginia Forest Landowner Education Program* and *SHARP Logger Training*, and provide basic forestry, wildlife, and natural resource management information to forest landowners, farmers, and the general public. Forest resource extension personnel conduct educational tours, meetings, and short courses on a variety of forestry and wildlife topics. They publish numerous natural resource extension bulletins including the *Virginia Forest Landowner Update*, a quarterly newsletter. All Virginia counties have local Cooperative Extension offices; see the blue pages in your phone book under State Government.

Virginia Department of Conservation & Recreation

203 Governor Street Suite 213

Richmond, VA 23219

(804)786-1712

www.dcr.virginia.gov

www.invasivespecies.org

The Department of Conservation and Recreation (DCR) is a state agency that works with Virginians to conserve, protect, and enhance their lands and improve the quality of the Chesapeake Bay and rivers and streams. DCR promotes the stewardship and enjoyment of natural, cultural and outdoor recreational resources (e.g. State Parks), coordinates statewide non-point source pollution control, insures the safety of Virginia's dams, and, via the Land Conservation Office, provides statewide land conservation information. The Natural Heritage Program, which protects land for conservation of biodiversity, manages the habitats of rare, threatened, and endangered species, protects significant natural communities, geologic sites, and other natural features, and provides information on invasive species, is administered by DCR.

Virginia Department of Forestry

Fontaine Research Park

900 Natural Resources Dr.

Suite 800

Charlottesville, VA 22903

(434)977-6555

www.dof.virginia.gov

The Virginia Department of Forestry (DOF) is a state agency that provides basic forest management planning and forestry information, seedlings and seed mixes for reforestation and wildlife, BMP guidance, and enforces water quality, seed tree, and burning laws. The DOF administers cost share programs, and maintains lists of private forestry consultants, contractors and timber buyers by county. The DOF cooperates closely with other state and private resource agencies and companies in conducting education programs for loggers and landowners. Most counties have local offices; see the blue pages in your phone book under State Government.

Virginia Department of Game and Inland Fisheries

4010 W. Broad St.

P.O. Box 11104

Richmond, VA 23230-1104

(804)367-9369

www.dgif.virginia.gov

The Department of Game & Inland Fisheries (DGIF) is a state agency that provides information, education, and technical assistance on wildlife management to forest landowners. The DGIF monitors wildlife populations, enforces hunting and fishing regulations, and provides technical assistance to federal agencies on cost share programs for wildlife management practices on private lands. The agency is currently developing a comprehensive strategy for managing wildlife, including threatened and endangered species.

Virginia Forestry Association

3808 Augusta Ave.
Richmond, VA 23230-8733
(804)278-8733
www.vaforestry.org

This private non-profit membership organization represents Virginia's broad forestry community. The Virginia Forestry Association (VFA) is active in legislative and regulatory issues affecting forestry and forest management, works with the media on forestry issues, sponsors forestry and environmental camps for school-aged youth, provides general forestry and forest industry information, and assists member landowners and others in interpreting regulatory requirements relative to forestry. *Virginia Forests*, a quarterly magazine on forest management and issues, is published by the VFA.


Virginia Outdoors Foundation

101 N. 14th Street 17th Floor
Richmond, VA 23219
www.virginiaoutdoorsfoundation.org

The Virginia Outdoors Foundation (VOF) is a state agency charged with the preservation of cultural and heritage lands in Virginia. VOF works with private landowners to establish voluntary conservation easements to protect farm and forest land. The VOF easement program has grown to over 1,700 properties (289,000 acres).

Professional Foresters

Professional foresters are employed by government organizations, forest industry, and private consulting companies. Professional foresters offer a full range of services to private landowners including management planning, timber appraisals, timber sale preparation and administration, site preparation and reforestation. Landowners are advised to check references and professional affiliations before choosing a forester. These references include membership in organizations such as the Association of Consulting Foresters (ACF, www.acf-foresters.org) and the Society of American Foresters (SAF, www.safnet.org). Lists of professional foresters are available from your local VDOP office (www.dof.virginia.gov), ACF and SAF.



APPENDIX

GLOSSARY OF FOREST TERMS

APPENDIX B

Objectives

Participants will:

1. review commonly used forestry terms

Abiotic - The non-living components of the environment, such as air, rocks, soil, water, coal, peat, plant litter, etc.

Acid Soil - A soil having a preponderance of hydrogen ions over hydroxylions in the soil solution; thus a soil giving an acid reaction (precisely below pH 7.0; practically, below pH 6.6).

Acre - An area of land containing 43,560 square feet, roughly the size of a football field, or a square that is 208 feet on a side.

Adventitious Bud - A bud which develops at the base of a needle cluster, or on woody tissue on a branch or leader, when the end of the branch or leader is injured or cut off.

Afforestation - Establishing a forest on an area which has not previously had trees growing on it.

Algae - Simple rootless plants that grow in bodies of water in relative proportion to the amount of nutrients available. Algal blooms, or sudden growth spurts, can affect water quality adversely.

Alkaline Soil - Any soil that is alkaline in reaction (precisely, above pH 7.0; practically, above pH 7.3).

All-Age Forest - A forest stand in which trees of all ages and usually all sizes are present. This is in contrast to an "even-aged" forest.

Altimeter - An instrument used to determine the height of a tree.

Annual Ring - The growth layer of one year, as viewed on the cross section of a stem, branch, or root.

Annuals - Plants that live less than 12 months.

Anthraco nose - A disease usually characterized by ulcer-like leaf or fruit spots and caused by fungi that produce asexual spores in the type of fruiting body called an acervulus.

Aquifer - A sand, gravel, or rock formation capable of storing or conveying water below the surface of the land.

Aspect - The compass direction towards which a slope faces.

Association - An assemblage of plants having ecologically similar requirements and including one or more dominant species from which it derives a definite character.

Azimuth - Direction from a point, measured in degrees clockwise from true north.

Backfill - Excavated material used to build up a road higher than the original level.

Backfire - 1) Fire set along the inner edge of a fire control line to stop a spreading wildfire by reducing the fuel or changing the direction of force of the fire's convection column. The term applies best where skill techniques are required for successful execution. Using such fire to consume unburned fuel inside the fireline to speed up line holding and mopup is usually distinguished as "burning out" or "clean burning." 2) A prescribed fire set to burn against the wind. Also called back-burn. 3) To set a backfire.

Bare Root Seedling - Seedling stock shipped without their roots being in soil.

Basal Area - 1) Of a tree - the cross-sectional area (in square feet) of the trunk at breast height (4-1/2 feet above ground). For example, the basal area of a tree 14 inches DBH is approximately 1 square foot. 2) Of an acre of forest - the sum of basal areas of the individual trees on the acre. For example, a well stocked northern hardwood stand might contain 80-100 square feet of basal area.

Bedrock - Unbroken solid rock, overlain in most places by soil or rock fragments.

Berm - A low earth fill constructed in the path of flowing water to divert its direction, or constructed to act as a counter-weight beside the road fill to reduce the risk of foundation failure.

Best Management Practices (BMPs) - Implies a practice or combination of practices, that is determined by a state or designated areawide planning agency to be the most effective means of preventing or reducing the amount of pollution.

Biennials - Plants that live for two growing seasons.

Biltmore Stick - A tool resembling a yardstick, calibrated to measure the diameter of a tree at breast height. Sticks are calibrated with different scales depending upon the reach (arm length) of the person using it.

Biological Control - The use of organisms or viruses to control parasites, weeds, or other pests.

Biological Diversity - The variety of life forms in a given area. Diversity can be categorized in terms of the number of species, the variety in the area's plant and animal communities, the genetic variability of the animals, or a combination of these elements. Also called biodiversity.

Blaze - To mark a tree, usually by painting and/or cutting the bark. Boundaries of forest properties frequently are delineated by blazing trees along the boundary line.

Blowdown - A tree pushed over by the wind, also called windthrow .

Board Foot - A unit measuring wood volumes equalling 144 cubic inches which is commonly used to measure and express the amount of wood in a tree, sawlog, veneer log or individual piece of lumber. For example, a piece of wood 1 foot x 1 foot x 1 inch or one measuring 1 foot x 3 inches x 4 inches both contain 1 board foot of wood.

Bole - The main trunk of a tree.

Bolt - A short log or a square timber cut from a log, commonly eight-feet long.

Borrowpit - That area from which soil is removed to build up the road bed, sometimes directly adjacent and parallel to a road.

Breast Height - The standard height, 4-1/2 feet above average ground level, at which the diameter of a standing tree is measured. Abbr. D.B.H.

Broad-Based Dip - This is a surface drainage structure specifically designed to tip water out of a dirt road while vehicles maintain normal haul speeds.

Broadcast Burning - Burning over a considerable area and permitting fire to spread freely with or without the use of firebreaks.

Brood-Rearing Habitat - Commonly referred to as "bugging areas", this habitat provides an abundance of insects for young turkeys and quail as well as many nongame species of birds.

Browse - Portions of woody plants including twigs, shoots, and leaves used as food by such animals as deer.

Browseline - The uppermost limit on trees and tall shrubs to which livestock and big game animals browse. Syn. Grazing line.

Buck - To cut trees into shorter lengths, such as logs or cordwood.

Burn - An area over which fire recently has run.

Butt Log - This is the first log above the stump and is generally the most valuable log in a tree.

Cache, Fire-Tool - A supply of fire tools and equipment assembled in planned quantities or standard units at a strategic point for exclusive use in fire suppression.

Caliper (or Calipers), Tree - An instrument to measure diameters of trees or logs.

Cambium - The layer of cells between the inner bark and wood of a tree. This is where growth takes place.

Candle - The new bright green and tender growth of all conifers grow in the spring.

Canopy - The upper level of a forest, consisting of branches and leaves of taller trees.

Carnivore - A flesh eating animal.

Carrying Capacity - The maximum number of animals possible in an area without inducing damage to vegetation or related resources; may vary from year to year because of fluctuating forage production.

Cell - The basic structural unit of all living organisms. An organism may be composed of a single cell (example: bacteria) or many cells (all "higher" organisms, including man).

Chain - A distance of 66 feet. Five chains makes a tally.

Chlorophyll - The green photosynthetic substance in plants which allows them to capture solar energy.

Choker - A length of wire rope or chain with a loop or noose at one end used to secure trees or sections of trees for skidding.

Clearcut - A harvesting technique which removes all the trees (regardless of size) in an area in one operation. Clearcutting is most often used with species which require full sunlight to reproduce and grow well. Produces an even-aged forest stand.

Clinometer - An instrument used to determine the height of a tree.

Clone - A plant group derived from a single individual through vegetative reproduction. For example, a clone of many aspen trees may sprout from the roots of a single aspen tree, after it is cut.

Co-Dominant - A tree receiving full light from above, but comparatively little from the sides. Such trees usually have medium sized crowns.

Commercial Forestland - Any forested area capable of producing 20 cubic feet of timber per acre per year which has not been withdrawn from such use by law or statute.

Commercial Treatments - Forestry operations, such as thinning or other TSI work, which generate income from sale of the trees that are removed.

Community - A collection of living organisms functioning together in an organized system through which energy, nutrients, and water cycle.

Conifer - A tree belonging to the order coniferales which is usually evergreen, cone-bearing and with needle, awl or scalelike leaves such as pine, spruce, fir and cedar; often referred to as a "softwood".

Conservation - The protection, improvement, and use of natural resources according to principles that will assure their highest economic and social service.

Consulting Forester - A self-employed professional forester.

Consumer - The company or individual who purchases rough wood products with the intent of remanufacturing or reprocessing them into a usable form.

Consumer Scale - Wood is hauled off the land and is measured at the mill (where the logger sells his wood). The logger reports this mill scale to the landowner. Payment to the landowner is based on this scale at the mill.

Contact Herbicide - A herbicide that kills primarily by contact with plant tissue rather than as a result of translocation; only the portions of the plant which actually come in contact with the chemical are affected.

Controlled Burning - The planned application of fire with intent to confine it to a predetermined area.

Cool Season Forage - Plants that mainly provide a winter or early spring food source for wildlife (examples: clover, winter wheat, rye, ryegrass).

Cooperage - Containers consisting of two round heads and a body composed of stave held together with hoops.

Coppice Forest - A forest consisting wholly or mainly of sprouts.

Cord - A pile of wood 4 feet high, 4 feet wide, and 8 feet long, measuring 128 cubic feet. Actual volume of solid wood in a cord will vary from 60 to 100 cubic feet, depending on size of individual pieces and orderliness of stacking. In the Lake States, pulpwood cords are usually 4' x 4' x 100" and contain 133 cubic feet.

Cordwood - Small diameter and/or low quality wood suitable for firewood, pulp, or chips, but not for sawlogs.

Cover - Physical habitat structure that allows resting places or protection for wildlife.

Cover Type - Classification of lands according to predominating vegetative cover.

Crook - A defect of a tree characterized by a sharp bend in the main stem.

Crop Tree - A tree identified to be grown to maturity and which is not removed from the forest before the final harvest cut. Usually selected on the basis of its location with respect to other trees and its quality.

Crown - The branches and foliage of a tree; the upper portion of a tree.

Crown Classification - Individual trees in a stand may be classified according to the relative size and height of their crowns compared to other trees in the stand. In descending order of crown height and size the classes are: dominant, co-dominant, intermediate, suppressed.

Crown Cover - The canopy of green leaves and branches formed by the crowns of all trees in a forest. Syn. Leaf Canopy.

Crown Fire - A fire which runs through the tops of living trees, brush or chaparral.

Crown Ratio or Live-Crown Ratio - The ratio of the portion of a tree height with leaves to the total tree height.

Cruise - A survey of forest land to locate timber and estimate its quantity by species, products, size, quality, or other characteristics. Also refers to an estimate derived from such a survey.

Cruiser - One who cruises timber. Syn. Estimator; Land looker; Valuer.

Cubic Foot - A wood volume measurement containing 1,728 cubic inches, such as a piece of wood measuring 1 foot on a side. A cubic foot of wood contains approximately 6 to 10 usable board feet of wood.

Cull - 1) A tree or log of merchantable size rendered unmerchantable because of poor form, limbiness, rot or other defect. 2) The deduction from gross volume made to adjust for defect. 3) To cut a small portion of a stand by selecting one or a few of the best trees. 4) To reject a tree, log, or board in scaling or grading. 5) Any item of production which does not meet specifications.

Culvert - A conduit through which surface water can flow under roads.

Cunit - A unit of measure in cube scaling equal to 100 cubic feet of wood.

Cut-and-Fill - Process of earth moving by excavating part of an area and using the excavated material for adjacent embankments or fill areas.

Cutting Cycle - The planned time interval between major harvesting operations in the same stand. The term is usually applied to uneven-aged stands. For example, a cutting cycle of 10 years means that every 10 years a harvest would be carried out in the stand.

Damping-Off - The killing of young seedlings by certain fungi that cause decay of the stem or roots.

Debark - The action of removing bark from trees or sections of trees. Debark generally denotes mechanical means as opposed to manual peeling. Syn. Bark; Barking.

Deciduous Tree - A tree which loses all of its leaves during the winter season.

Defect - Any irregularity or imperfection in a tree, log, piece product, or lumber that reduces the volume of sound wood or lowers its durability, strength, or utility value. Defects in lumber may result from such factors as insect or fungus attack, growth conditions and abnormalities, manufacturing or seasonal practices, etc.

Defoliation - The loss of leaves or foliage on a plant or tree.

Dendrology - The study of the identification, habits and distribution of trees.

Den Tree - A hollow tree used as a home by a mammal.

Diameter - Tree diameter is usually measured 4-1/2 feet above ground level (see DBH).

Diameter, Breast High (DBH) - The diameter of a tree at 4.5 feet above average ground level, except that in National Forest practice it is measured from the highest ground level.

Diameter-Limit Sale - A timber sale in which all trees over a specified dbh may be cut. Diameter-limit sales often result in high grading.

Diameter Tape - A tape measure, calibrated to determine the diameter of a tree by measuring its circumference.

DIB (d.i.b.). Diameter inside bark, usually measured at the small end of a log.

Dieback - The progressive dying, from the tip downward, of twigs, branches or tops.

Dimension Lumber - Hardwood dimension lumber processed so it can be used virtually in the sizes provided, in the manufacture of furniture or other products. Softwood dimension lumber consists of boards more than 2 inches thick but less than 5 inches thick. Such wood is used in construction and is sold by units such as 2x4s, 4x8s, or 2x10s.

Discing - A site preparation system where a heavy harrow with large disks is pulled over a site in order to eliminate competing vegetation.

Diurnal - Active during the day.

Diversion Ditch - A channel with a supporting ridge on the lower side constructed across a slope for the purpose of intercepting surface runoff.

Diversity - The variety of plants and animals on an area.

Dominant - The tallest, fastest growing trees in a plantation or natural stand.

Dominant Trees - Those trees within a forest stand which extend their crowns above surrounding trees and capture sunlight from above and around the crown.

Dormant Seedlings - Seedlings that have temporarily ceased visible growth (sometimes called a resting stage) because of high or low temperature, moisture or other external causes.

Doyle Rule - One of several log rules designed to estimate the board-foot volume of lumber which can be sawn from logs of a given length and diameter. See log rule.

Duff - Forest litter and other organic debris in various stages of decomposition, on top of the mineral soil, typical of conifer forests in cool climates where rate of decomposition is slow, and where litter accumulation exceeds decay.

Ecological Niche - The role a particular organism plays in the environment.

Ecology - The study of interactions between living organisms and their environment.

Ecosystem - An interacting system of living organisms (plants and/or animals), soil and climatic factors. Foresters consider a forest an ecosystem.

Ecotone - A transition between two distinct communities.

Edge - The boundary between open land and woodland or two other ecological communities. This transition area between environments provides valuable wildlife habitat. Consideration of edge can reduce visual impact of a timber harvest.

Edge Effect - The increased richness of plants and animals resulting from the mixing of two communities where they join.

Endangered Species - A species designated as being in danger of becoming extinct.

Endemic - Native or confined to a certain area.

Entomology, Forest - The science that deals with insects in their relation to forests and forest products.

Environment - The prevailing conditions which reflect the combined influence of climate, soil, topography and biology (other plants and animals) factors present in an area.

Epicormic Branching - Branches which grow out of the main stem of a tree, arising from buds under the bark. Severe epicormic branching increases knottiness, thereby reducing the quality of lumber sawn.

Epidemic - A temporary widespread outbreak of disease.

Erosion - The process by which soil particles are detached and transported by water, wind and gravity to some downslope or downstream point.

Eutrophication - The natural or artificial process of nutrient enrichment whereby a water body becomes filled with aquatic plants and low in oxygen content.

Eutrophic Lake - A lake that has a high level of plant nutrients, a high level of biological productivity, and low oxygen content.

Even-aged Forest - A forest in which all of the trees present are essentially the same age (within 10 to 20 years).

Evergreen - Trees which retain green foliage throughout the year. Not all conifers are evergreens. An example is tamarack.

Extinct - Being no longer found anywhere in the world (example: passenger pigeon).

Face Cord - Stove length wood with a "face" of 32 square feet (a stack four feet high and eight feet wide). The volume of a face cord depends on its length.

Fauna - Animals.

Fell - The process of severing a tree from the stump so that it drops to the ground.

Final Cut - In even-aged management, the amount or volume of material removed in harvesting the main crop at the end of the rotation.

Firebreak - A natural or constructed barrier utilized to stop or check fires that may occur or to provide a control line from which to work. Sometimes called a fire lane.

Fire Plow - A heavy duty, usually specialized machine; either of the share or disk type, designed solely for abusive work in the woods and used with either horses or tractors to construct firebreaks and fire lines.

Flora - Plants.

Foaming Agent - A material, designed to reduce drift, which causes a pesticide mixture to form a thick foam.

Foliage - Growth of leaves on a tree or other plant.

Food Chain - A group of plants, animals, and/or microorganisms linked together as sources and consumers of food.

Forest - A plant community in which the dominant vegetation is trees and other woody plants.

Forest Fire - Any fire on forest land which is not being used as a tool in forest protection or management in accordance with an authorized plan.

Forest Floor - All dead vegetable matter on the mineral soil surface in the forest, including litter and unincorporated humus.

Forest Land - Land at least 10 percent stocked by trees of any size or formerly having had such tree cover and not currently built-up or developed for agricultural use. Forestland may include Grassland, Shrubland, Treeland, Wetland, and/or Barren land. Examples of forest land use are grazing, recreation, and timber production. See Forest Land Class for further breakdowns. Virginia Fire Law defines forestland as 80 woody stems per acre.

Forest Management - Giving the forest the proper care so that it remains healthy and vigorous and provides the products and amenities the landowner desires. (Technical Definition: The application of technical forestry principles and practices and business techniques (such as accounting, benefit-cost analysis, etc.) to the management of a forest.)

Forest Sanitation - The destruction, removal, or treatment of infected or infested material for the purpose of reducing disease and insect incidence in the forest. See also Cutting, methods of.

Forest Survey - An inventory of forest land to determine area, condition, timber volume, and species for specific purposes such as timber purchase, forest management or as a basis for forest policies and programs.

Forest Type - A group of tree species which, because of their environmental requirements and tolerance for shade and moisture, are repeatedly found growing together. Examples are the jack pine type and the aspen-paper birch type.

Forestation - The establishment of forest naturally or artificially upon areas where it is at present absent or insufficient. See Afforestation; Reforestation.

Forested Wetland - An area characterized by woody vegetation over 20 feet tall where soil is at least periodically saturated with or covered by water.

Forestry - The scientific management of forests for the continuous production of goods and services.

Fork - A defect characterized by division of the main stem or bole of a tree into two or more stems.

Frilling - A method of killing trees by inflicting a series of cuts around the bole (stem) and applying an herbicide to the wounds. Frilling or girdling of trees may be used to reduce the density of a stand or to kill individual undesirable trees.

Frost Crack - A vertical split in the wood of a tree, generally near the base of the bole, from internal stresses and low temperatures.

Fullstocked Stand - A forest stand in which all growing space is effectively occupied but having ample room for development of the crop trees. Syn. Normal stand.

Gall - A pronounced swelling or outgrowth on a plant.

Girdle - To encircle the stem of a living tree with cuts that completely sever bark and cambium and often are carried well into the outer sapwood, for the purpose of killing the tree by preventing passage of nutrients or by introducing toxic materials. Besides girdling proper, or removal of bark and cambium in a band of appreciable width girdling may take several forms, viz: 1) Hacking or frilling - A single line of overlapping downward axe cuts, leaving a frill into which toxic materials may be poured. 2) Double hacking - Girdling by means of a double frill cut around the tree and the removal of the chips between them. 3) Notching - Ringing the tree with notches cut well into the sapwood. 4) Stripping - Peeling off a band of bark completely around the tree.

Grade - (see slope) The slope of a surface such as a roadway. Also, the elevation of a real or planned surface or structure.

Grading - Evaluating and sorting trees or logs according to quality.

Greentree Reservoir - A forested, wetland area inundated during the dormant period of tree growth to temporarily provide aquatic habitat, usually for waterfowl, without damaging tree survival.

Ground water - The subsurface water supply in the saturated zone below the level of the water table.

Group Selection - A process of harvesting patches of selected trees to create openings in the forest canopy and to encourage reproduction of uneven-aged stands.

Growth Rate - With reference to wood, the rate at which the wood substance has been added to the tree at any particular point; usually expressed in terms of number of rings per inch. Growth rate bears an inverse relationship to number of rings per inch. Also applies to volume, value, or other types of increase in trees or stands.

Growth Rings - The layers of wood laid down each growing season, also called annual rings. These rings frequently are visible when a tree is cut and may be used to estimate the age of the tree, as well as to determine the rate of its growth.

Gully - A channel resulting from erosion and caused by the concentrated flow of water during or immediately following heavy rains. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage. (A rill is of less depth and can be smoothed by ordinary tillage.)

Guyline - A line used to stay or support spar trees, booms, etc.

Habitat - The local environment in which a plant or animal lives.

Hard Mast - Fruits of oaks, hickories, pines, and beech trees that are important foods of many species of wildlife in the fall and winter.

Hardwood - A term used to describe broadleaf, usually deciduous, trees such as oaks, maples, ashes, elms, etc. It does not necessarily refer to the hardness of the wood.

Harvest - A general term for the removal of trees.

Heartwood - The inner core of a woody stem, wholly composed of nonliving cells and usually differentiated from the outer enveloping layer (sapwood) by its darker color.

Heel-In - To store young trees prior to planting by placing them in a trench and covering the roots or rooting portions with soil.

Height, Merchantable - The height of a tree (or length of its trunk) up to which a particular product may be obtained. For example, if the minimum usable diameter of pulpwood sticks is 4 inches, the merchantable height of a straight pine tree would be its height up to a trunk diameter of 4 inches. Note, one must know the product being cut to estimate merchantable height.

Height, Total - The height of a tree from the ground level to the top of its crown.

Herbaceous Vegetation - The low-growing, non-woody plants in a forest understory, including wildflowers and ferns.

Herbicide - A chemical which kills herbaceous (non-woody) plants - In common usage, however, often used interchangeably with the words phytocide (plant killer) and silvicide (tree killer).

Herbivore - A plant eating animal.

Hibernation - A condition where an animal's metabolism is purposely slowed to endure prolonged periods of adverse environmental conditions, normally several months at a time.

High Grading - Removing the mature, high quality trees from a stand and leaving inferior species and defective trees. "Take the best and leave the rest." Generally regarded as a poor forestry practice.

Home Range - The area which an animal uses during its normal activities, not to be confused with territory.

Horizon, Soil - A layer of soil approximately parallel to the land surface with more or less well-defined characteristics that have been produced through the operation of soilbuilding processes. 1) A-horizon - The upper horizon of the mineral soil, from which material has been removed by percolating waters. The horizon of eluviation. Commonly divided into a dark colored A1 horizon containing a relatively high content of organic matter, and light-colored A2 horizon of maximum leaching. 2) B-Horizon - The horizon of deposition, to which materials have been added by percolating waters, the horizon of illuviation. 3) C-Horizon - The weathered parent material.

Humus Layer - The top portion of the soil which owes its characteristic features to its content of humus. The humus may be incorporated or unincorporated in the mineral soil.

Hypsometer - Any of several tools or instruments designed to measure the height of trees. The altimeter is such a tool.

Imprinting - A short-term rapid learning process early in life which is generally irreversible. More prevalent in precocial young.

Improvement Cut - A cutting made in a stand past the sapling stage for the purpose of improving its composition and character, by removing trees of less desirable species, form and condition in the main crown canopy.

Increment Borer - An auger-like instrument with a hollow bit, used to extract cores from trees for growth and age determination.

Industry Forester - A professional forester working for a wood consuming industry.

Infiltration - The downward entry of water into the soil. This is distinct from percolation, which is movement of water through soil layers or material.

Insecticide - Any chemical used to destroy insects and other small invertebrates.

Insectivore - An animal that eats insects.

Instar - A stage in the development of an insect between two successive molts.

Integrated Pest Management (IPM) - An ecological approach to pest management in which all available necessary techniques are consolidated into a unified program so that pest populations can be managed in such a manner that economic damage is avoided and adverse side effects are minimized.

Intensive Forestry - The practice of forestry with the objective of obtaining the maximum in volume and quality of products per unit of area through the application of the best techniques of silviculture and management.

Intermediate Crown Class - Trees with crowns extending into the canopy with dominant and co-dominant trees. These trees receive little direct sunlight from above and none from the sides. Crowns generally are small and crowded on all sides.

Intermediate Cut - The removal of immature trees from the forest sometime between establishment and major harvest with the primary objective of improving the quality of the remaining forest stand. Contrast with harvest cut. An intermediate cut may generate income (commercial cutting) or, in some cases, may actually cost the forest landowner (a non-commercial cutting).

Intermediate Cuttings - Cuttings made in a stand between the time of its formation and its major harvest. Included are cleaning, liberation, weeding, release, thinning, improvement, salvage, and sanitation cuttings.

International Rule - One of several log rules designed to estimate the volume of lumber which may be sawn from a given log. See log rule.

Interplant - To set young trees among existing forest growth of similar age and/or size, planted or natural, to bring the stand to a fully stocked condition.

Interspersion - The irregular occurrence or intermixing of plant species, communities and habitat types which provide cover for animals within a limited area.

Intolerance - The characteristic of certain tree species which does not permit them to survive in the shade of other trees. For example, oak and loblolly pine are intolerant; sugar maple and balsam fir are tolerant.

J-Root - Seedling roots planted in a manner that forms a J-shaped configuration in the planting slit. Such seedlings may grow poorly or die.

KG Blade - A sharp blade on a bulldozer blade to shear off brush and trees.

L-Root - Seedling roots planted with roots forming an L-shaped configuration. Such seedlings may grow poorly or die.

Landing - An area where wood is concentrated in a harvest operation prior to hauling to the mill. Yard is synonymous.

Layering - Process of regenerating a tree by covering a lower branch with soil after which the branch develops roots and can stand alone as a new tree.

Leaching - Downward movement of a pesticide or other soluble material through the soil as a result of water movement.

Leader - A terminal leader is the uppermost branch or vertical tip of the tree. It eventually becomes the tree stem or trunk.

Litter - The uppermost layer of the organic debris, composed of freshly fallen or slightly decomposed organic materials.

Lodged Tree - A tree that has not fallen to the ground after being partly or wholly separated from its slump or otherwise displaced from its natural position.

Log - A piece of the woody stem of a tree. The trunk portion of a tree used for sawlogs.

Log Deck - Also called log landing, log yard, brow or bunching area - A place where logs or tree-length material is assembled for loading and transporting.

Logger - An individual whose profession is cutting timber.

Logging Debris (Slash) - That unwanted, unutilized, and generally unmarketable accumulation of woody material in the forest such as limbs, tops, cull logs, and stumps, that remain as forest residue after timber harvesting.

Log Rule - A device, usually presented in tabular form, which expresses log volume content based on log diameter (inside bark of the small end) and length. A log rule expresses the volume of cut logs. A tree rule expresses the volume of standing trees.

Lop - 1) To chop branches, tops, or small trees after felling so that the slash will lie close to the ground. 2) To cut the limbs from a felled tree. Syn. Toplop; Limb.

Lump-Sum Sale - A timber sale in which payment is based on the Appraised value of the tract, distinguished from a sale in which payment is based on the volume Harvested and Scaled.

MBF - Thousand board feet - unit for measuring wood volume. One board foot is 1 foot x 1 foot x 1 inch or .144 cubic inches.

Machine, Planting - Mechanical equipment which opens a hole or furrow and closes it again and firms the soil about a tree seedling which is usually inserted by hand.

Main Stem - The portion of a tree between ground level and the division into major branches, usually referred to as the bole.

Management Plan - A written plan for the operation of a forest property using forestry principles. It usually records data and prescribes measures designed to provide for optimum use of all forest resources.

Marking Timber - The process of indicating what trees are to be cut or otherwise treated. Prior to timber sales it is advisable to mark with paint each tree to be harvested. One spot of paint at eye level and one on the stump portion will help determine whether unmarked trees have been cut.

Mast - Nutlike fruits of trees, such as acorns, beech, and chestnuts. Mast is valuable as a source of food for many wildlife species.

Mature Tree - A tree that has reached the desired size or age for its intended use. Size or age will vary considerably depending on the species and intended use.

Mensuration, Forest - A science dealing with the measurement of volume, growth and development of individual trees and stands and the determination of various products obtainable from them.

Merchantable Height - The point on a tree stem at which diameter limit requirements for a certain product are not met. Limits are: the point at which a sawlog tree is less than 8 inches in diameter, measure inside the bark (dib); a pulpwood tree less than 4 inches dib; or the point on any tree at which a defect is found that cannot be processed out.

Merchantable Timber - A tree or stand of trees which may be disposed of at a profit through conversion to salable products.

Milacre - A sample plot of 1/1000 acre (usually 1/10 chain square) used in reproduction or vegetation surveys.

Mixed Stand - A stand in which less than 80 percent of the trees in the main crown canopy are of a single species.

Molt - To shed the hair, outer skin, or feathers at certain intervals, to be soon replaced by a new growth.

Mortality - Death or destruction of forest trees as a result of competition, disease, insect damage, drought, wind, fire, and other factors.

Mulching - Providing any loose covering for exposed forest soil, using organic residues, such as grass, straw or wood fibers to protect exposed soil and help control erosion.

Multiple Use - Using and managing a forested area to provide more than one benefit simultaneously. Common uses may include, wildlife, timber, recreation, and water.

Natural Regeneration - Regenerating a stand of trees using seed from trees either on-site or nearby, or sprout growth for some species of hardwoods.

Non-Commercial Cutting - A cutting which does not yield a net income, usually because the trees cut are too small, poor quality or not marketable.

Nonindustrial Private Forestland (NIPF) - Forest land owned by a private individual, group, or corporation not involved in wood processing.

Nonpoint Source Pollution - Pollution arising from all ill-defined and diffuse source, such as runoff from cultivated fields, grazing land, or urban areas.

Nonselective Herbicide - An herbicide which will kill or harm all or most plant species.

No Till; Zero Till - Planting a crop without prior seedbed preparation into sod, crop residue, or an existing cover crop and eliminating subsequent tillage operations.

Noxious Weed - A plant defined by law as being especially undesirable, troublesome, and difficult to control.

Old Growth Forest - A forest dominated by long lived species that has escaped catastrophic disturbance for at least 120 years. It usually has large old dying trees, large snags and down logs.

Omnivore - An animal that eats both plants and animals.

Ornithology -The study of birds.

Overbrowsing - Excessive use of browse usually found where there is an over-population of game. Similar to overgrazing, except that overgrazing refers to grasses and forbs, while overbrowsing refers to shrubs and trees.

Overmature Forest - A forest in which, as the result of age, growth has almost entirely ceased, and decay and deterioration has accelerated.

Overstocked - The situation in which trees are so closely spaced that they are competing for resources, resulting in less than full-growth potential for individual trees.

Overstory - The canopy in a stand of trees. In contrast to the understory which is low growing woody or herbaceous vegetation forming a layer beneath the overstory.

Overtopped Crown Class - Trees with crowns entirely below the general level of the crown cover receiving no direct light either from above or from the sides. Syn. Suppressed.

Pair Bond - The attachment that either of the mated pair has for the other.

Partial Cut - A cutting by which only a part of the stand is removed. It usually implies a series of such cuttings.

Pathogen - A living organism capable of causing disease in a particular species or range of species.

Pathology, Forest - The science that deals with diseases of forest trees or stands, and to the deterioration of forest products by organisms.

Peeler - A log from which veneer stock will be cut.

Percolation - Movement of water through soil layers of material.

Perennials - Plants that form annual above ground vegetation and seed structures from underground roots that persist for many years.

Persistence Time - The time required for a pesticide to become inert. Arbitrarily assumed to equal four half-lives when measured persistence time is not available.

Pesticides - Chemical compounds or biological agents used for the control of undesirable plants, animals, insects or diseases.

Phloem - The tissue in higher plants which transports organic nutrients manufactured in the leaves to other portions of the plant, such as the branches, trunk and roots.

Phytotoxicity - Injury to plants due to exposure to a chemical.

Pickaroon - A device with a head similar to an axe but with a point rather than a blade mounted on the end of a handle which is used to assist in the lifting and placement of bolts of wood.

Piling - Round timbers to be driven into the ground to support other structures.

Plantation - An artificially reforested area established by planting or direct seeding. Contrast with a natural forest stand which is established naturally.

Planting Bar - A hand tool used in making a slit-hole in which trees are planted.

Plant Pathology - The science that deals with the nature and causes of plant disease.

Plot - An area of land usually less than one acre on which trees and sometimes other vegetation are measured during a cruise (or inventory).

Point Source Pollution - Pollution arising from a well-defined origin, such as a discharge from an industrial plant.

Pole - A young tree 4 inches or more in diameter breast high. The maximum size of poles is usually though not invariably taken to be some diameter breast high between 8 and 12 inches.

Post - A short timber up to 16 feet in length used in an upright position to support other structures for fencing.

Pre-Commercial Operations - Cutting conducted in forest stands which removes wood of a size too small to be marketed. Such operations usually are designed to improve species composition and increase quality, growth, and vigor of the remaining trees.

Predator - Any animal that kills and feeds on other animals.

Prescribed Burning - Skillful application of fire to natural fuels that will allow confinement of the fire to a predetermined area and at the same time will produce certain planned benefits.

Presuppression, Fire - Activities in advance of fire occurrence to insure effective suppression action. Includes recruiting and training, planning the organization, maintaining fire equipment and fire control improvements, and procuring equipment and supplies.

Prevention, Fire - Activities directed at reducing the number of fires that start, including public education, law enforcement, personal contact and reduction of fuel hazards.

Pruning - The removal of live or dead branches from standing trees. With forest trees, pruning is generally done along the trunk to remove the side branches (which cause knots in the wood) to produce a higher quality wood (knot-free).

Pulpwood - Wood cut or prepared primarily for manufacture into wood pulp, for subsequent manufacture into paper, fiber board, or other products, depending largely on the species cut and the pulping process. Generally trees 5" to 9" DBH.

Range - The geographic area in which a tree species grows. Natural range is the entire geographic area where a species is known to occur under natural conditions; commercial range is the geographic area in which a species is harvested for commercial purposes.

Raptor - The birds of prey; including falcons, hawks, owls, eagles, and ospreys.

Reforestation - The natural or artificial restocking of an area with forest trees; most commonly used in reference to the latter.

Regeneration - The act of replacing a forest stand that has been harvested, either naturally or artificially.

Regeneration Cut - A timber harvest designed to promote and enhance natural establishment of trees. Even-aged stands are perpetuated by seed tree, shelterwood, and clearcuts. Uneven-aged stands are perpetuated by selection of individual or small groups of trees.

Release - To free trees from competition by cutting or otherwise removing or killing nearby vegetation and branches. Usually applied to young stands.

Reproduction - The process by which the forest is replaced or renewed. This may be: Artificial Reproduction, by means of seeding or planting. Natural Reproduction, from natural seeding or sprouting.

Residual Stand - Trees remaining uncut following any cutting operation.

Restricted-Use Pesticide - A pesticide which is designated as such by the Environmental Protection Agency because it is felt that it may generally cause, without additional regulatory restrictions, unreasonable adverse effects on the environment, including injury to the applicator. A "restricted-use" pesticide may be used only by, or under the direct supervision of, a certified applicator.

Rick - One-third of a standard cord. 37 cubic feet unsplit, 40 cubic feet split.

Riprap - A layer of boulders or shot rock fragments placed over a soil to protect it from the erosive forces of flowing water.

Rolling Drum Chopper - A large cylinder with blades around it, pulled by a large bulldozer, used to chop and press down brush and slash.

Root Collar - The stem of a seedling at the ground line at the time of removal from the nursery.

Roots - That portion of the tree which is generally underground and which functions in nutrient absorption, anchorage and storage of food and waste products.

Rot - A defect characterized by decay of wood in a standing tree or log.

Rotation - The planned time interval between regeneration cuts in a forest stand.

Rotation Age - The age at which the stand is considered ready for harvesting under the adopted plan of management.

Runoff - That portion of precipitation or irrigation water that flows off a field and enters surface stream or water bodies. The water that flows off the surface of the land without sinking into the soil is called surface runoff.

Salvage Cut - A harvest made to remove trees killed or damaged by fire, insects, fungi, or other harmful agents, to utilize available wood fiber before further deterioration occurs.

Sanitation Cut - A cutting made to remove trees killed or injured by fire, insects, fungi, or other harmful agencies (and sometimes trees susceptible to such injuries), for the purpose of preventing the spread of insects or disease.

Sap - The moisture in unseasoned wood and all that it holds in solution.

Sapling - A tree at least 4.5 feet tall and up to 4 inches diameter.

Sapwood - The tissue in higher plants which transports water, dissolved salts, and other materials (e.g. pesticides) from the roots to aerial portions of the plant. Also known as xylem.

Sawlog - A log large enough to produce lumber or other products that can be sawed. Its size and quality vary with the utilization practices of the region.

Sawmill - A plant at which logs are sawed into salable products. It includes all the machinery and buildings necessary for the operation of the plant.

Sawtimber - Trees that yield logs suitable in size and quality for the production of lumber.

Scaling - Process of measuring wood products, usually pulpwood and sawlogs, after the trees are felled.

Scale Stick - A flat stick, similar to a yardstick, which is calibrated so log volumes can be read directly when the stick is placed on the small end of the log of known length.

Scalping - Removing a patch or strip of sod in preparation for planting trees.

Scarify - 1) To break up the forest floor and top soil preparatory to natural regeneration or direct seeding. 2) As applied to seed, to wear down by abrasion or by acid treatment an outer more or less impervious seed coat to facilitate or hasten germination.

Sealed Bid Sale - Sale of timber where several timber buyers are invited to submit a secret bid stating what each would pay for the timber offered.

Second Growth - Forests that originate naturally after removal of a previous stand as by cutting, fire, or other cause. A loosely used term for young stands.

Sediment - Solid material that is in suspension, is being transported, or has been moved from its original location by air, water, gravity, or ice.

Seedbed - 1) In natural regeneration, the soil or forest floor on which seed falls. 2) In nursery practice a prepared area in which seed is sown.

Seeding - A method of establishing a forest artificially by sowing seed. In broadcast seeding seed is sown over the entire area. Partial seeding may be done in strips, furrows or trenches, plots or spots.

Seed Tree - Any tree which bears seed; specifically, a tree left to provide the seed for natural reproduction. Syn. Mother tree.

Seepage - Percolation of water through the soil from unlined canals, ditches, laterals, watercourses, or water storage facilities.

Selection Cut - A regeneration cut designed to create and perpetuate an uneven-aged stand. Trees may be removed singly or in small groups. A well designed selection cut removes trees of lesser quality and trees in all diameter classes along with merchantable and mature high quality sawlog trees.

Selective Herbicide - An herbicide which is effective only against certain species and is able to control unwanted plants without serious injury to desirable species.

Shade Tolerance - Relative ability of a tree species to reproduce and grow under shade. Tree species are usually classified in descending order of shade tolerance as: very tolerant, tolerant, intermediate, intolerant, and very intolerant.

Shearing - The operation of cutting off trees and brush at ground level by pushing a bulldozer blade along the surface. The stems and trunks are sheared off at ground level.

Sheet Erosion - The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterbelt - A wind barrier of living trees and shrubs maintained for the purpose of protecting farm fields. As applied to individual farmsteads, termed "Windbreak". Syn. Belt.

Shelterwood Harvest Cutting - A harvest cutting in which trees on the harvest area are removed in a series of two or more cuttings to allow the establishment and early growth of new seedlings under partial shade and protection of older trees. Produces an even-aged forest.

Shrub - A low-growing perennial plant with a persistent woody stem and low branching habit.

Silviculture - The art of producing and tending a forest; the application of the knowledge of silvics in the treatment of a forest; the theory and practice of controlling forest establishment, composition, and growth.

Sinkhole - A depression in the landscape where limestone has been dissolved.

Site - An area evaluated as to its capacity to produce a particular forest or other vegetation based on the combination of biological, climatic and soil factors present.

Site Index - An expression of forest site quality based on the expected height of dominant trees at a specified age (usually 50 years in the eastern United States).

Site Preparation - Treatment of a site with mechanical clearing, burning, or herbicides, to prepare a site for planting.

Skidding - The act of moving trees from the site of felling to a loading area or landing. Skidding may be accomplished by tractors, horses, or specialized logging equipment. The method of skidding can greatly affect the impact of logging on soil and the residual stand.

Skid Road - A road or trail leading from the stump to the skidway or landing.

Slab - The exterior portion of a log removed during the sawing process.

Slash - Debris left after logging, pruning, thinning, or brush cutting; also, large accumulation of debris after wind or fire. It includes logs, chunks, bark, branches, stumps and broken understory trees or brush.

Slash Disposal - Treatment of slash to reduce the fire hazard or for other purposes.

Slope - A term of measurement in percent and means the increase in height over the distance measure. An increase of 1 foot over a distance of 5 feet is expressed as a 20 percent slope. Syn. Grade.

Snag - A standing dead tree used by many species of birds and mammals for feeding and nesting.

Soft Mast - Soft fleshy fruits eaten by wildlife (examples: persimmon, wild grapes, blackberries, blueberries, huckleberries, mulberries, plums, and crabapples).

Softwood - Generally, one of the botanical groups of trees that in most cases have needle or scale-like leaves; the conifers; also, the wood produced by such trees.

Soil - The top layer of the earth's surface, composed of finely divided disintegrated rock containing more or less organic material, which is penetrated by the roots of plants. It includes the surface soil (horizon A), the subsoil (horizon B) and the upper portion of the substratum (horizon C) to the extent that it is penetrated by plant and tree roots. The average soil is composed of 45% mineral, 25% air, 25% water and 5% vegetation.

Soil Reaction - The degree of acidity or alkalinity of the soil mass expressed in pH values or in words as follows: extremely acid, below 4.5; very strongly acid, 4.5-5.0; strongly acid, 5.1-5.5; medium acid, 5.6-6.0; slightly acid, 6.1-6.5; neutral, 6.6-7.3 (strictly 7.0); mildly alkaline, 7.4-8.0; strongly alkaline, 8.1-9.0; very strongly alkaline, over 9.1.

Soil Texture - The feel or composition of a soil based on the proportion of sand, silt, and clay in the soil.

Sold Appraised Sales - Wood is sold "on the stump" and the sale price is based on the appraised volume determined by the forester. This volume is only an estimate.

Species Composition - The mix of tree species occurring together in the same stand.

Spot Fire - Fire set outside the perimeter of the main fire by flying sparks or embers.

Sprout - A tree that grows from the stump or sucker root of a parent tree: it is not of seed origin. Basswood is frequently of sprout origin.

Stand - A group of trees occupying a given area and sufficiently uniform in species composition, age and condition so as to be distinguishable from the forest on adjoining areas. A forest stand is said to be "pure" if 80 percent or more of the trees present are of the same species. If less than 80 percent of all trees present are of the same species, the stand is said to be "mixed".

Stand Density - The quantity of trees per unit area. Density usually is evaluated in terms of basal area or percent-crown cover. See basal area, crown cover, stocking.

Stem - The portion of a tree that supports the branches; also called the bole.

Stick, Biltmore - A rule graduated in such a way that the diameter of standing tree may be estimated when the stick is held tangent to the surface at right angles to the main axis of the tree, and at a distance from the eye for which the stick is graduated.

Stick, Scale - A graduated stick for measuring the diameters and contents of logs; both measures are stamped on the stick.

Stocking - An indication of the number of trees in a stand as compared to the desirable number for best growth and management, such as well-stocked, overstocked, partially stocked.

Stomata - Minute openings on the surfaces of leaves and stems through which gases (e.g. oxygen, carbon dioxide, water vapor) and some dissolved materials pass into and out of plants.

Stratified Seed - Seed that has been stored in a cool, moist condition before use. This storage practice hastens the germination of some species.

Stream, Perennial - A watercourse that flows in a well-defined channel throughout most of the year under normal climatic conditions. Includes small creeks up to large rivers.

Streamside Management Zone (SMZ) - An area of natural timber or vegetation protected and maintained on each side of a stream or drainage to provide habitat diversity, wildlife travel corridors and protect water quality.

Stumpage - Uncut trees standing in the forest. Sometimes used to mean the commercial value of standing trees.

Stumpage Price - The price a logger is willing to pay for wood as it is in the woodland or "on the stump".

Succession - The progression of vegetation types after site disturbance which begins with herbaceous plants and ultimately reaches a mature forest. The gradual replacement of one plant community by another.

Sucker - Synonymous with sprout.

Sugar Bush - A stand mostly of sugar maple which is currently used for gathering sap for the production of maple syrup.

Summer Annual Grasses - Grasses that must be replanted each spring. These plantings provide summer feeding areas for many kinds of wildlife, especially young turkeys and quail which utilize green forage and insects. Plants that mature and produce seed in late summer-early fall such as millets and sorghums are also used by seed eating birds.

Summer Perennial Grasses - Grasses that do not need to be replanted each spring. These plantings also provide green forage, seeds and produce insects for many kinds of wildlife.

Suppressed - The condition of a tree characterized by low growth rate and low vigor due to competition with overtopping trees. Syn. Overtopped.

Suppression, Fire - All the work of extinguishing or confining a fire beginning with its discovery.

Sustained Yield - An ideal forest management objective at which point the volume of wood removed is equal to growth within the total forest.

Sweep - Tree defect resulting from a gradual curve in the main stem of the tree.

Tally - A system of recording trees counted during a timber cruise.

Taproot - The main root of a tree which strikes downward with or without heavy branching until it either reaches an impenetrable layer or one so lacking in oxygen or moisture that further downward growth is impossible.

Territory - The area which an animal defends, usually during breeding season, against intruders of its own species. Territories are smaller and are normally located within the animal's home range.

Thinning - Removal of trees in an overstocked stand to give the remaining trees adequate room for growth.

Threatened Species - Species that could become endangered in the foreseeable future.

Timber - Standing trees, usually of commercial size.

Timber Inventory - A collection of information about a timber stand made by measuring tree and stand characteristics such as tree volume and grade and stand density.

TSI (Timber Stand Improvement) - A practice in which the quality of a residual forest stand is improved by removing less desirable trees, vines and, occasionally, large shrubs to achieve the desired stocking of the best quality trees.

Tolerance - The capacity of a tree to develop and grow in the shade of and in competition with other trees. Trees able grow in full or partial shade are considered "tolerant". Trees requiring full sunlight for survival are considered "intolerant".

Transplant - A tree which has been removed from its original seedbed and replanted one or more times in a nursery.

Tree - A woody plant having a well-defined stem, more or less definitely formed crown and usually attaining a height of at least 10 feet.

Tree Cavities - Hollow cavities in trees that provide resting or nesting places for wildlife.

Tree Farm - A privately owned forest (woodland) dedicated to the production of timber crops. Additionally, it may be recognized as a "Tree Farm" by the Tree Farm Program, an organization sponsored by the American Forest Industries.

Tree Injector - Equipment specially designed to inject chemicals, usually phytocides, into the trunk of a tree.

Tree Shelter - A plastic tube that can be wrapped around the stem of hardwood seedlings to increase survival and growth.

Trim Allowance - Excess length of a log to allow for square trimming the lumber to an exact length.

Turnout - A widened space in a road to allow vehicles to pass one another and which slopes away (downhill) from the road. Also, a drainage ditch which drains water away from roads.

Undercut - 1) In logging, the notch cut in a tree to govern the direction in which the tree is to fall and to prevent splitting. 2) In forest management, the harvesting of a quantity of timber less than the budgeted cut.

Underplant - To set out young trees or sow seed under an existing stand.

Understocked - A stand of trees so widely spaced that, even with full growth potential realized, crown closure will not occur. Understocking indicates a waste of resources, as the site is not fully occupied.

Understory - The lesser vegetation (shrubs, seedlings, saplings, small trees) within a forest stand which forms a layer between the overstory and the herbaceous plants of the forest floor.

Uneven-Aged Stand - A group of trees of a variety of ages and sizes growing together on a uniform site.

Veneer - Thin sheets of wood (usually less than 1/4" thick) produced by slicing or peeling a log.

Veneer Log - A log of high quality and desirable species suitable for conversion to veneer. Logs must be large, straight, of minimum taper, and free from defects.

Virgin Forest - A wooded area with old-growth trees which never has been harvested or altered by humans.

Volume - The amount of wood in a tree or stand according to some unit of measurement, (board feet, cubic feet, etc.) or some standard of use (pulpwood, sawtimber, etc.)

Volume Table - A table of figures used to estimate the volume of wood contained in a standing tree, based on dbh and merchantable height.

Water Bar - A diversion ditch and/or hump across a trail or road tied into the uphill side for the purpose of carrying water runoff into the vegetation, duff, ditch, or dispersion area so that it does not gain the volume and velocity which causes soil movement and erosion.

Watershed - The surrounding land area that drains into a lake, river or river system.

Water Table - The highest point in a soil profile where water saturates the soil on a seasonal or permanent basis.

Weed - An unwanted plant.

Well Stocked - The situation in which a forest stand contains trees spaced widely enough to prevent competition yet closely enough to utilize the entire site.

Wetlands - Lands sometimes or always covered by shallow water or which have saturated soils where plants adapted for life in wet conditions usually grow.

Whorl - Two to ten or more branches growing in a ring at a node, surrounding the central leader or stem.

Wildfire - 1) An unplanned fire requiring suppression action, as contrasted with a prescribed fire burning within prepared lines enclosing a designated area, under prescribed conditions. 2) A free-burning fire unaffected by fire suppression measures.

Wildlife Habitat - The native environment of an animal, ideally providing all elements required for life and growth: food, water, cover, and space.

Wildlife Plantings - Agricultural crops specifically planted for wildlife in fields or small forest openings and are sometimes referred to as food plots.

Wildlife Travel Corridor - Forested areas or other established vegetation used as travel lanes or buffer zones to connect larger stands of suitable wildlife habitat or prevent isolation of important foraging and nesting areas.

Windbreak - A wind barrier of living trees and shrubs maintained for the purpose of protecting the farm home, other buildings, garden, orchard or feedlots.

Windrow - Slash, residue and debris raked together into piles or rows.

Windthrow - A tree pushed over by wind. Windthrows (blowdowns) are more common among shallow-rooted species and in areas where cutting has reduced the density of a stand so that individual trees remain unprotected from the force of the wind.

Winter Annual Grasses - Grasses that must be replanted each fall or winter. These plantings mainly provide winter forage for deer, turkeys, rabbits, and geese while they are growing but can provide seeds for birds when they mature (examples: wheat, rye).

Winter Perennial Grasses - Grasses that do not need to be replanted each fall or winter. These plantings also provide winter forage for wildlife (examples: perennial ryegrass and orchard grass).

Wolf Tree - A tree which occupies more space in the forest than its value justifies. Usually a tree which is older, larger or more branchy than other trees in the stand.

Woodland - See Forest Land.

Woody Plants - Plants which live longer than two years and have a thick, tough stem or trunk covered with a layer of cork.

Woody Pulp - Mechanically ground or chemically digested wood (composed primarily of wood fiber) which is used in the manufacture of paper, fiberboard, etc.

Xylem - The tissue in higher plants which transports water, dissolved salts, and other materials (e.g. pesticides) from the roots to aerial portions of the plant. Also known as sapwood.

Zoology - The study and classification of animals and animal life.

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