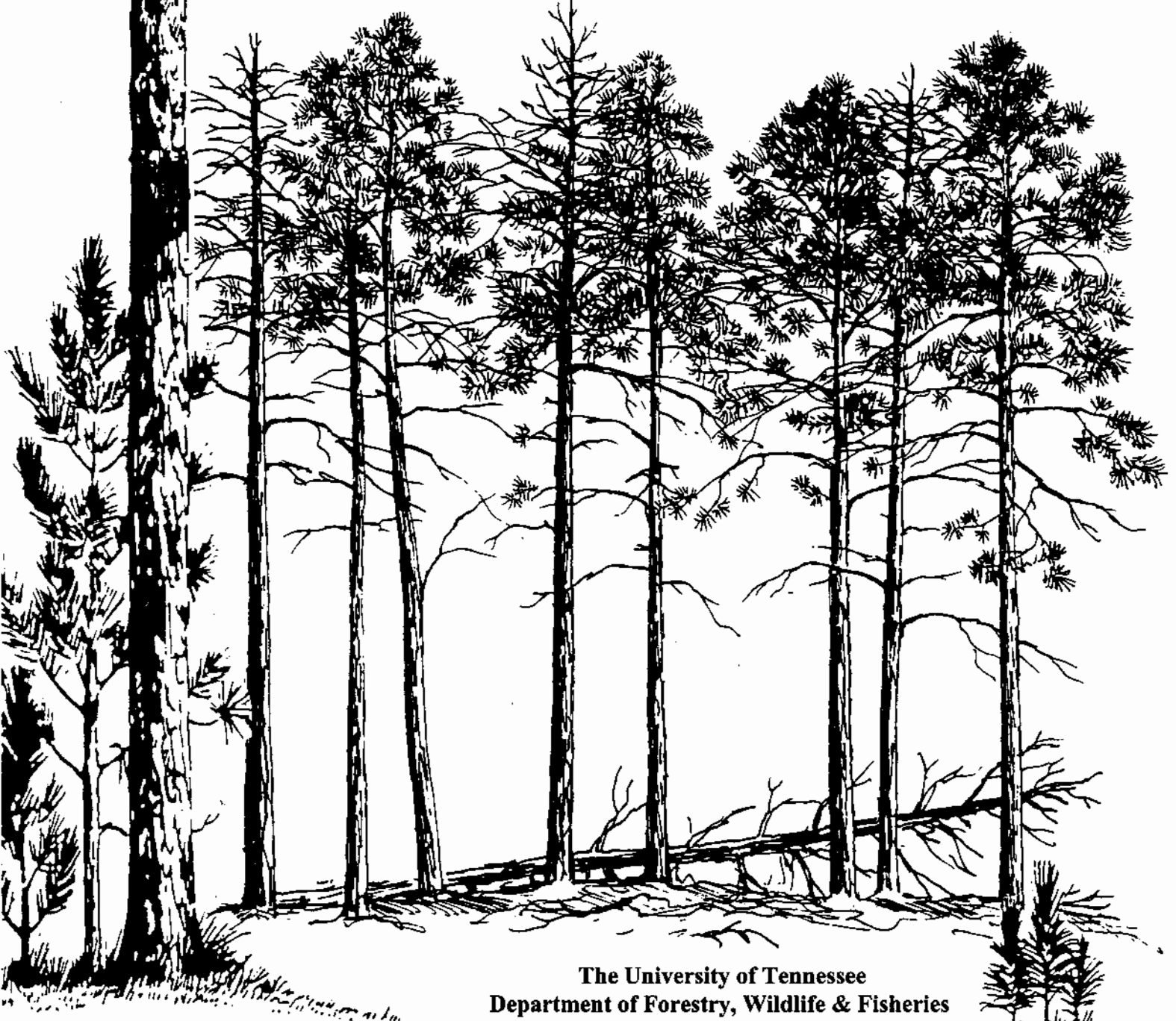
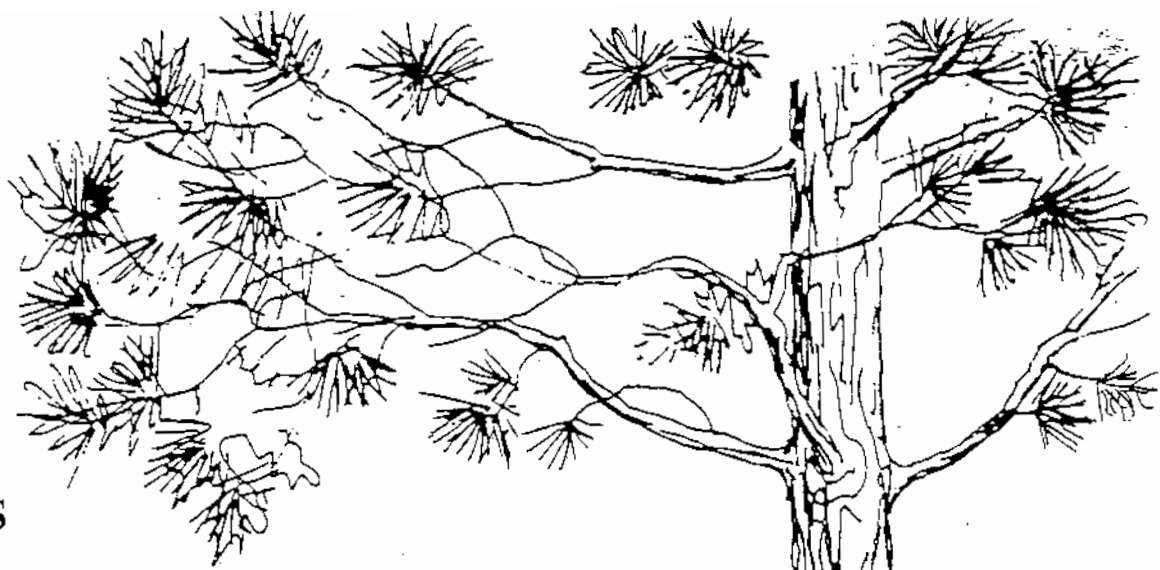




TENNESSEE 4-H FORESTRY CONTESTS RULES AND REGULATIONS

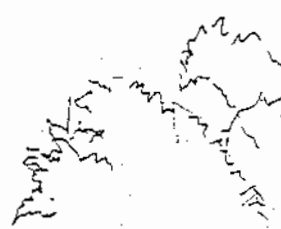


The University of Tennessee
Department of Forestry, Wildlife & Fisheries



CONTENTS

General Rules and Regulations of Tennessee Forestry Contests	2
Tree Identification	3
Official Tree List	4
Tree Identification Score Card	5
Insect and Disease Identification	6
Official List of Insects	7
Official List of Diseases	8
Insects and Diseases Identification Score Sheet	9
Wood Identification	10
Official Wood List	10
Wood Identification Score Sheet	11
Tree Measurement	12
Measurement of Standing Trees Study Guide	13
Volume Table	15
Tree Measurement Score Sheet	16
Compass Traverse	17
Compass Traverse Study Guide	18
Compass and Pacing Score Sheet	20
Junior Pacing Score Sheet	20
Forest Evaluation	21
Forest Evaluation Study Guide	22
Site Evaluation	22
Forest Stand Evaluation	24
Forest Inventory	26
Recommended Practices	27
Forest Evaluation Score Sheet	28-29
Forest Understanding and Facts	30
A Summary of Federal Laws Affecting Forestry	33
Glossary	35
Suggested References	38





GENERAL RULES AND REGULATIONS TENNESSEE FORESTRY CONTESTS

*Larry Tankersley, Extension Specialist I
Forestry, Wildlife & Fisheries
February, 2003*

1. Only contestants and designated officials will be within the perimeter of an event. Once a contestant has started an event, he/she will not be allowed to talk with anyone other than a designated official until completion of that particular event, except in certain team events.
2. A team may be composed of either three or four members. Team scores will be based on the three highest scoring team members in each contest area. Individual contestants with the highest score will also be selected and recognized.
3. Behavior becoming 4-H'ers and citizens of the great state of Tennessee will be expected at all times.
4. All team members should participate in all events to the best of their abilities and talents.
5. The head forestry judge reserves the right to remove any and all contestants or teams at his/her discretion.
6. Ties between senior teams and individuals will be broken based on the high score in the wood identification event. Ties between junior teams and individuals will be based on high scores in the insect and disease event.
7. **The decisions of the judges are final.**



TREE IDENTIFICATION

Objective

Contestants will learn to recognize and identify different tree species. This skill is valuable because tree species have varying requirements for growth, and differ in use and value.

Contestants will identify 10 to 25 trees or leaf specimens. The complete common name should be given (for example, "maple" will be incorrect if the tree is a red maple). One-half point will be given for misspelled names. Trees will be selected only from the following Official Trees List.

Preparation: Number 10 to 25 trees or leaf/branch specimens. These should be from the Official Trees List that all contestants have. Trees or specimens should be typical. Juvenile plants and shade leaves should be avoided, since they are often larger than normal and have a distorted shape. Each contestant should be given a sheet with numbered blanks for each tree's common name. The complete common name should be reproduced as given on the official species list. No credit is given for partially correct names. The judge should give two points for each correct answer and one and one-half points for an identifiable correct, but misspelled answer. The person receiving the highest score will be the individual winner. The team with the highest total for the best three contestants will be the team winner.

Training materials are available from a variety of sources, including video tapes in the Extension district office and publication # PB1145, **Forest Trees of Tennessee**.

Contest Rules:

1. Different species of trees have various requirements for good growth. They also differ in merchantability, ecological function and as human resources. Therefore, you must be able to identify trees of the forest. All trees to be identified will be taken from the "OFFICIAL TREES LIST" below.
2. Contestants will be required to identify species from those listed below. Contestants will be judged on the accuracy of identification and the spelling of common names. **Scientific names will not be required.** Incomplete names will be counted as wrong. Example: Maple instead of red maple, or shortleaf instead of shortleaf pine will be counted wrong. Extra words are not encouraged and may be considered incorrect. **Spelling must be the same as that on the "Official Trees List" in order to be considered correct, and capitalization is only necessary for proper nouns such as Virginia and American.**
3. Contestants will be given a specific time to identify the tree specimens and record the information on the score sheets. An official species list will be available for each contest.
4. Two points will be given for the correct common name. One-half point will be deducted for each name misspelled. The common name must be the one used on the official species list.

OFFICIAL TREE LIST¹

Common Name

*arborvitae or northern white-cedar
eastern cottonwood
green ash
American beech
river birch
*sweet birch
buckeye
eastern redcedar
black cherry
baldcypress
flowering dogwood
American Elm
black tupelo or blackgum
sweetgum
*American basswood
hackberry
eastern hemlock
pignut hickory
shagbark hickory
mockernut hickory
pecan
American holly
black locust
red maple
silver maple
sugar maple
boxelder
red mulberry
black oak
chestnut oak
northern red oak
post oak
scarlet oak
southern red oak
white oak
*water oak
common persimmon
*red spruce
*balsam fir
eastern white pine
*pitch pine
loblolly pine
shortleaf pine
Virginia pine
yellow-poplar or tuliptree or tulip-poplar
*cucumbertree
sassafras
sourwood
sycamore
black walnut
butternut or white walnut
willow

Scientific Name

Thuja occidentalis L.
Populus deltoides Bartr.
Fraxinus pennsylvanica Marsh.
Fagus grandifolia Ehrh.
Betula nigra L.
Betula lenta L.
Aesculus sp.
Juniperus virginiana L.
Prunus serotina Ehrh.
Taxodium distichum Rich.
Cornus florida L.
Ulmus americana L.
Nyssa sylvatica Marsh.
Liquidambar styraciflua L.
Tilia americana L.
Celtis occidentalis L.
Tsuga canadensis Carr.
Carya glabra Sweet
Carya ovata K. Koch.
Carya tomentosa Nutt.
Carya illinoensis K. Koch.
Ilex opaca Ait.
Robinia pseudoacacia L.
Acer rubrum L.
Acer saccharinum L.
Acer saccharum L.
Acer negundo L.
Morus rubra L.
Quercus velutina Lam.
Quercus prinus L.
Quercus rubra L.
Quercus stellata Wangenh.
Quercus coccinea Muenchh.
Quercus falcata Michx.
Quercus alba L.
Quercus nigra L.
Diospyros virginiana L.
Picea rubens Sarg.
Abies balsamea Mill.
Pinus strobus L.
Pinus ridiga Mill
Pinus taeda L.
Pinus echinata Mill.
Pinus virginiana Mill.
Liriodendron tulipifera L.
Magnolia acuminata L.
Sassafras albidum Nees.
Oxydendrum arboreum DC.
Platanus occidentalis L.
Juglans nigra L.
Juglans cinerea L.
Salix sp./¹*Required at state contest only

¹/*Required at state contest only

TREE IDENTIFICATION SCORE SHEET

No.	Kind of Leaf	Score
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		
25.		

Contestant's No. _____

Total _____

INSECT and DISEASE IDENTIFICATION

Objective

Contestants will learn to recognize and identify forest insects and diseases or evidence of their damage. This is a valuable skill because most insects and diseases that damage trees affect only certain tree species or groups of related species. Insect and disease outbreaks can cause high dollar value damage in the forests. Insects and diseases also play important roles in forest succession and the cycling of essential elements.

Contestants will identify insect and disease specimens, or their symptoms or signs, which will be displayed. Displays may include any stage of the pest's life cycle, leaves, twigs or bark samples that would indicate a certain insect or disease. All contest specimens will be from the official lists below. Judging will be done on accuracy of identification. Only common names will be required, however, the names must be complete and spelled correctly. For example, caterpillar would receive no credit if the correct identification is eastern tent caterpillar. Misspelled names will receive only partial credit. Information on these pests should be gathered from local foresters. Each county has been provided at least one copy of "*Insects and Diseases of the South*" booklet as a 4-H reference. A set of slides and a CD are available in each Extension district office.

Preparation: Five to 15 specimens or symptoms of the listed insects and diseases should be numbered and displayed. Each contestant should be given a sheet with numbered blanks. Full credit will be given only to the correctly spelled, full name of each correctly identified specimen displayed. The person receiving the highest score will be the individual winner. The team with the highest total for the best three contestants will be the team winner.

Contest Rules

1. Contestants will be required to identify five to 15 insects, diseases or examples of their damage. Specimens will be selected from those on the "*Official List of Insects*" and "*Official List of Diseases.*"
2. Contestants will be judged on the accuracy of identification and the spelling of the common names. **Scientific names will not be required.** Incomplete names such as caterpillar instead of eastern tent caterpillar or rust instead of fusiform rust will be considered incorrect. Extra words are not encouraged. Spelling must be the same as that on the "*Official List of Insects*" or "*Official List of Diseases*" to be counted correct. Capitalization is required only for proper names, such as American, Nantucket, European, Asian, etc.
3. Contestants will be given a specific time to identify the specimens.
4. Two points will be given for each correct common name. One-half point will be deducted for each name misspelled. The common name must be the one used in the "*Official List of Insects*" or "*Official List of Diseases.*"

OFFICIAL LIST OF INSECTS



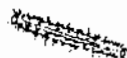
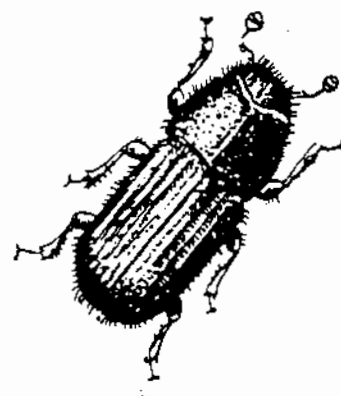
Common Name



Scientific Name

Asian long-horned beetle
 balsam woolly adelgid
 beech scale
 birch leafminer
 bronze birch borer
 eastern tent caterpillar
 European pine sawfly
 fall webworm
 forest tent caterpillar
 gypsy moth
 hemlock woolly adelgid
 Ips engraver beetle
 Japanese beetle
 locust borer
 locust leafminer
 Nantucket pine tip moth
 pales weevil
 periodical cicada
 pine needle scale
 red oak borer
 redheaded pine sawfly
 slug oak sawfly
 smaller European elm bark beetle
 southern pine beetle
 spruce budworm
 two-lined chestnut borer
 variable oakleaf caterpillar
 white pine weevil
 white-marked tussock moth

Anoplophora glabripennis (Motschulsky)
Adelges piceae (Ratzeburg)
Cryptococcus fagisuga (Lindinger)
Fenusa pusilla (Lepeletier)
Agrilus anxius (Gory)
Malacosoma americanum (Fabricius)
Neodiprion sertifer (Geoffroy)
Hyphantria cunea (Drury)
Malacosoma disstria (Hubner)
Lymantria dispar (Linnaeus)
Adelges tsugae (Annand)
Ips. spp
Popillia japonica (Newman)
Megacyllene robiniae (Forester)
Odontota dorsalis (Thunberg)
Rhyacionia frustrana (Comstock)
Hylobius pales (Herbst)
Magicicada septendecim (Linnaeus)
Chionaspis pinifoliae (Fitch)
Enaphalodes rufulus (Halderman)
Neodiprion lecontei (Fitch)
Caliroa lineata (MacGillivray)
Scolytus multistriatus (Marsham)
Dendroctonus frontalis (Zimmerman)
Choristoneura fumiferana (Clemens)
Agrilus bilineatus (Weber)
Heterocampa manteo (Dblady)
Pissodes strobi (Peck)
Orgyia leucostigma (J.E. Smith)



OFFICIAL LIST OF DISEASES

Common Name

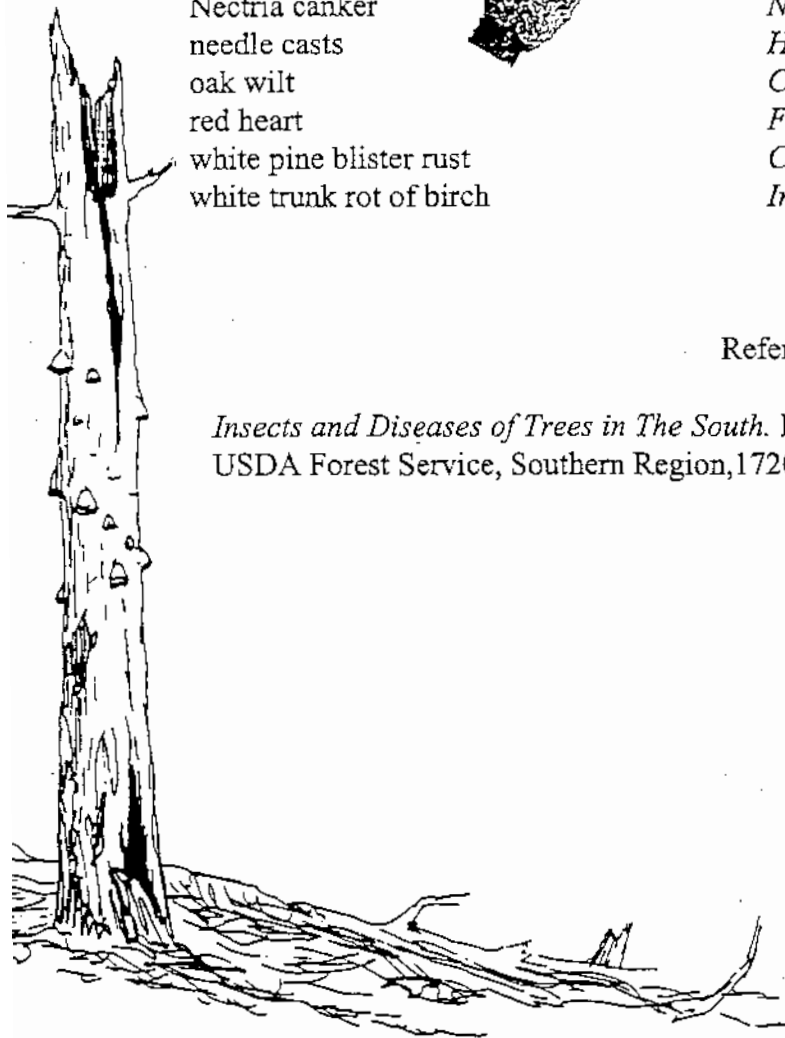
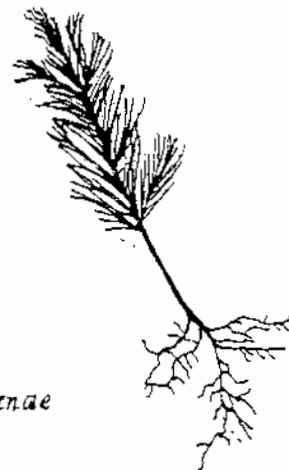
artist conk
 annosus root rot
 beech bark disease
 black knot
 brown spot needle blight
 cedar-apple rust
 chestnut blight
 dogwood anthracnose
 Dutch elm disease
 dwarf mistletoe
 fusiform rust
 Hypoxylon canker
 lichens
 Nectria canker
 needle casts
 oak wilt
 red heart
 white pine blister rust
 white trunk rot of birch

Scientific Name

Fomes applanatus
Heterobasidion annosum
Nectria coccinea var. *faginata*
Apiosporina morbosa
Scirrhia acicola
Gymnosporangium juniperi-virginianae
Endothia parasitica
Discula sp
Ceratocystis ulmi
Arceuthobium pusillum
Cronartium quercuum f.sp. *fusiforme*
Hypoxylon sp
 numerous species
Nectria galligena and *N. magnoliae*
Hypoderma sp. and *Lophodermium* sp.
Ceratocystis fagacerarum
Fomes pini
Cronartium ribicola
Inonotus obliquus

References

Insects and Diseases of Trees in The South. Protection Report R8-PR, 16. June 1989.
 USDA Forest Service, Southern Region, 1720 Peachtree St. NW, Atlanta, GA 30367-9102.



INSECTS AND DISEASE IDENTIFICATION SCORE SHEET

No.	Kind of Insect or Disease	Score
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Contestant's No. _____

Total _____

WOOD IDENTIFICATION ^{1/}

Objective

Contestants will learn to recognize and identify wood from different tree species. This skill is valuable because woods from different tree species have varying uses and value.

Contest Rules

1. Each contestant will have the opportunity to identify five to 10 wood samples displayed at the contest site. Samples may or may not display bark. Contestants are encouraged to learn to distinguish between woods based on cell structure and arrangement. All woods to be identified will be taken from the "**Official Wood List**" below.
2. Contestants will be judged on the accuracy of identification and the spelling of common names. Incomplete names, such as locust instead of black locust will be considered incorrect. Note that maple, gum, oak and walnut are correct regardless of species presented. Spelling must be the same as that on the "**Official Wood List**" to be considered correct. Extra words are not encouraged and may be counted incorrect. Capitalization is not required except for Southern, as it is a proper noun.
3. Contestants will be given a specific time to identify the tree specimens and record the information on the score sheets.
4. Two points will be given for the correct common name. One-half point will be deducted for each name misspelled. Common names must be those used in the "**Official Wood List.**"

OFFICIAL WOOD LIST

Common Name

Southern yellow pine	Cottonwood
Redcedar	Walnut
Oak	Beech
Ash	Birch
Elm	Gum
Hickory	Maple
Black locust	Yellow-poplar
Cherry	Sycamore

¹ Senior 4-Her's Only

WOOD IDENTIFICATION SCORE SHEET

No.	Kind of Wood	Score
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Contestant's No. _____

Total _____

TREE MEASUREMENT

Objective

Contestants will learn to measure standing trees in order to estimate the volume of forest products that may be obtained from the trees. Since most timber is bought and sold on a volume basis (usually by board foot volume), it is a good idea to have some estimate of total tree volume, volume per acre and volume by product before selling timber.

Contestants will estimate the sawtimber volume in designated trees. Senior 4-H'ers will measure five (5) trees and Juniors will measure three (3). They may use an official cruise or scale stick with no modifications. **Diameter tapes, calipers, and other instruments will not be allowed.** The person obtaining the total volume closest to that calculated by the judges will be the individual winner. The amount that each team member missed the correct volume will be determined. Points are awarded for correct measurement of each tree's diameter and merchantable length, depending on how close contestants are to the judge's volume.

Preparation: Select and number five(5) sawtimber-sized trees. If possible, measure each with a diameter tape and altimeter or clinometer. Careful "stick" measurements are acceptable. Avoid borderline trees; that is, those trees with a diameter or height that might easily be thrown one inch larger or smaller or one-half log higher or shorter. Give each contestant a scale stick and a sheet numbered with spaces for DBH, height, and volume.

Allow only one contestant at each tree at the same time. When all have calculated the total volume in all trees, an appropriate expansion factor should be applied to yield a per acre estimate of sawtimber volume. Then ask the 4-H'er to circle this figure and turn in their sheets.

Contest Rules

1. Contestants must determine diameter to the nearest inch.
2. Tree heights will be taken to the nearest full half-log for sawtimber. A half-log is defined as being 8 feet long. The minimum tree size will be 10 inch DBH, one log merchantable length, and have a minimum top diameter of 8 inches.
3. A standard International 1/4-inch (rule) tree scale volume table will be provided by the contest judge.
4. Record sawlog volumes as found in the volume table (International ¼ inch Rule is the official rule of all contests).
5. Contestants will be required to give the total volume of all the trees.
6. Contestants must be able to compute volumes on a per acre basis from 1/10, 1/5, or 1/4 acre sample plots. Foresters seldom measure every tree when estimating volumes per acre. The concept of an expansion factor should be emphasized during contestant training.
7. Two points will be awarded for each correct DBH and merchantable length. Twenty points will be awarded for the correct volume per acre. Point allocation will be 20 for $\pm 5\%$ of the official volume, 15 points for $\pm 10\%$, 5 points for $\pm 15\%$, and no points over $\pm 15\%$,

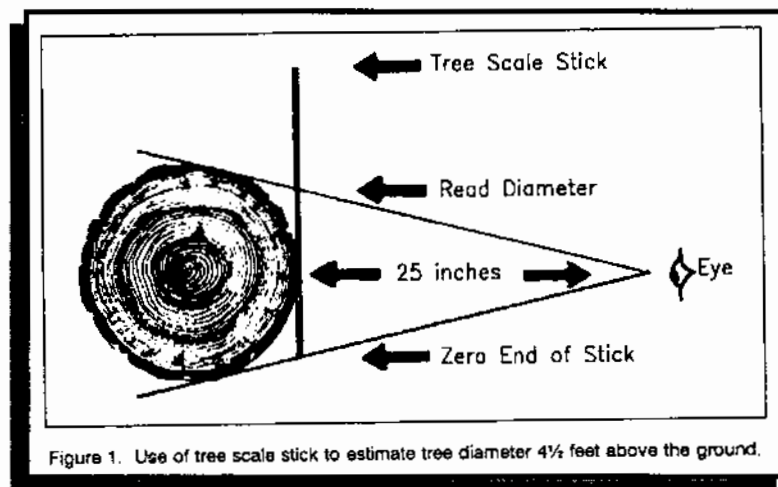
Example: if 4,000 board feet is the official volume per acre, then an answer between 3800 bd. ft. and 4200 receives 20 points; 3600 to 3799 and 4201 to 4400 receives 15 points; 3400 to 3599 and 4401 to 4600 receives 10 points and less than 3400 and more than 4600 receives no points.

MEASUREMENT OF STANDING TREES STUDY GUIDE

Since a tree is similar in shape to a cylinder, its volume may be determined by measuring its diameter and height. Diameter of standing trees is measured by time-honored custom, at 4 ½ feet above ground on the uphill side of the tree. This is abbreviated as **DBH** (diameter breast height.) The way to determine diameter will be explained in detail later. **Height** of a standing tree might be measured as **total** (the entire height from ground line to the top) or **merchantable**. Merchantable height varies, depending on the product which might be cut. The top diameter is sized by certain specifications. If a tree is to be cut into logs, the height is usually measured in 16 foot logs to the nearest **full** half-log.

To measure diameter, you may use a caliper, diameter tape, or tree scale stick. Since the tree scale stick is to be used in the contest, the method of using it will be explained.

Figure 1 shows how the tree scale stick is used to find tree diameter. Use the flat side of the stick, which reads, "Diameter of Tree (in inches)." The instrument of this side of the tree scale stick is called a **Biltmore Stick**. Hold the stick level at 25 inches from the eye¹, against the tree, at a height of 4-1/2 feet above the ground. (Practice is needed to find both the 4-1/2 foot point in relation to your height, and the distance from your eye.) When the stick is placed against a tree, close one eye, and sight at the left or zero end. This and the tree bark should be in the same line. Now, **DO NOT MOVE YOUR HEAD**. Just move your eye across the stick to the right-hand edge of the tree, and read the tree diameter to the nearest inch. Be sure to hold the stick perpendicular to the tree.

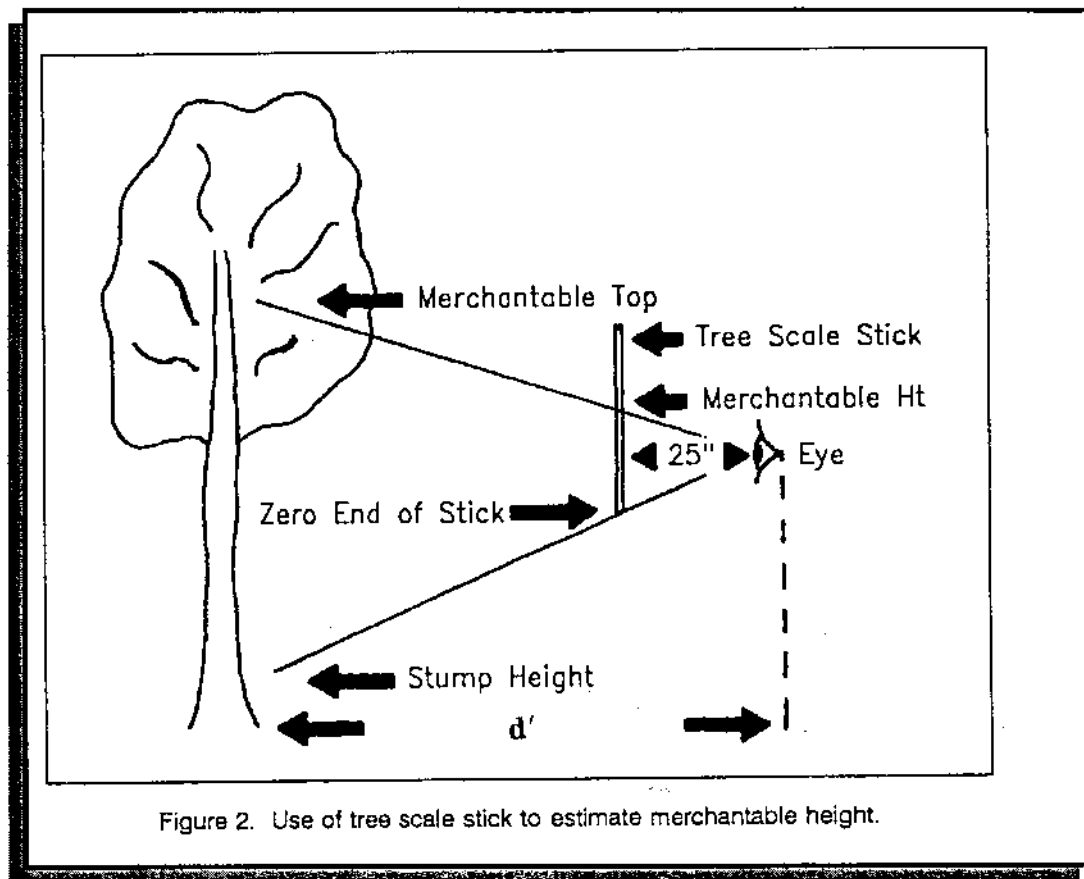


1/see figure 2 on page 11.

To measure the merchantable height of a tree, pace away from the tree the distance required by your Biltmore stick¹, to a point where the entire tree can be seen. It is a good idea to continue on the same contour as the tree rather than up or down hill from it. Hold the tree scale stick so that the edge of the stick that reads "Number of 16 foot logs" faces you. The instrument on this edge of the tree scale stick is called a **Merritt Hypsometer**. The zero end should point toward the ground. Plumb the stick, at 25 inches from the eye.² Sight the zero end to appear to rest at stump height. (12 inches above ground line). **DO NOT MOVE YOUR HEAD OR THE STICK.** Look up the stick to a point where the top of the last merchantable cut would be made in the tree (eight inch diameter or at the first major fork or other major defect). Read the merchantable height to the nearest full half-log. If the merchantable height is slightly less than 2 ½ logs, you must record it as 2 logs.

Practice pacing is needed to find the distance from the tree. (Appropriate . . . this will vary according to the graduations on the stick). The 25-inch distance from your eye to the stick is still the same as in measuring tree diameter.

Note: Agents are advised and strongly urged to bring sticks used in practice to the contest so the 4-H'er will have consistency in measuring sticks for the contest. A "limited" number of sticks will be available at the contest.



¹ Contestant should note the appropriate distance for a given measuring stick.

² Some sticks are graduated for varying reach.

Volume Table

The volumes in the table are composites of actual volumes, on an average basis, for the product indicated. Once the tree measurements are determined, read down the left-hand column until you come to the column containing the tree diameter at breast height (DBH). Move across from left to right until you come to the column containing the tree merchantable height at the top. At the intersection of that row and column, you will find the merchantable volume of the tree. Read and record each tree volume directly and separately. **FOR CONTEST PURPOSES, DO NOT USE THE VOLUME TABLE ON THE TREE SCALE STICK.** *Ask the Judge for a volume table.*

International 1/4 Inch Long Rule -- Form Class 78
VOLUME (board feet) BY NUMBER OF USABLE 16-FOOT LOGS

Tree Diameter	Number of useable 16-foot logs								
	1	1 ½	2	2 ½	3	3 ½	4	4½	5
10	36	48	59	66	73	---	---	---	---
11	46	61	76	86	96	---	---	---	---
12	56	74	92	106	120	128	137	---	---
13	67	90	112	130	147	158	168	---	---
14	78	105	132	153	174	187	200	---	---
15	92	124	156	182	208	225	242	---	---
16	106	143	180	210	241	263	285	---	---
17	121	164	206	242	278	304	330	---	---
18	136	184	233	274	314	344	374	---	---
19	154	209	264	311	358	392	427	---	---
20	171	234	296	348	401	440	480	511	542
21	191	262	332	391	450	496	542	579	616
22	211	290	368	434	500	552	603	647	691
23	231	318	404	478	552	608	663	714	766
24	251	346	441	523	605	664	723	782	840
25	275	380	484	574	665	732	800	865	930
26	299	414	528	626	725	801	877	949	1021
27	323	448	572	680	788	870	952	1032	1111
28	347	482	616	733	850	938	1027	1114	1201
29	375	521	667	794	920	1016	1112	1210	1308
30	403	560	718	854	991	1094	1198	1306	1415
31	432	602	772	921	1070	1184	1299	1412	1526
32	462	644	826	988	1149	1274	1400	1518	1637
33	492	686	880	1053	1226	1360	1495	1622	1750
34	521	728	934	1119	1304	1447	1590	1727	1864
35	555	776	998	1196	1394	1548	1702	1851	2000
36	589	826	1063	1274	1485	1650	1814	1974	2135
37	622	873	1124	1351	1578	1752	1926	2099	2272
38	656	921	1186	1428	1670	1854	2038	2224	2410
39	694	976	1258	1514	1769	1968	2166	2359	2552
40	731	1030	1329	1598	1868	2081	2294	2494	2693

TREE MEASUREMENT SCORE SHEET

Contestants Name _____

No.	DBH	# 16 ft Logs	Board Feet*
1.			
2.			
3.			
4.			
5.			
Totals			

Plot Size _____

Total board foot volume per acre _____

*** Do not use Volume table on your stick! Ask the Judge for a volume table.**

COMPASS TRAVERSE

Objective

Contestants will learn to estimate ground distances by the pacing method and to determine direction of travel using a compass.¹

Senior contestants will be given three (3) compass bearings and distances. From a designated starting point, they will follow these bearings and distances. Only a hand compass will be allowed. The end of each participant's course will be designated by a letter or number. The end point must then be recorded. A course longer than 200 yards will be desirable. The person ending the course nearest the correct point will be the individual winner. The distance each individual misses the termination point will be measured. Points will be awarded based on the distance from the correct termination point. A perfect score is 50 points with one-half point deducted for each foot from the correct termination point. Juniors will pace between given points and estimate the distance. A perfect score is 50 points with ½ point deducted from the correct distance.

Preparation: After selecting the event site, the distance of the course can be determined. Starting stakes should be placed and several bearing and distances determined. The length of each course should be approximately the same. Each course should contain three bearings. Compasses may be provided, or each contestant may bring his/her own. The judge's compass will be the standard. Each contestant is responsible for comparing his compass with the judge's compass. A 100-foot distance may be marked off so contestants may check their pace. Tell each contestant where they should start from and give them a card or sheet with the three bearings and distances. The termination point should be marked so that the judge can check it for accuracy. The judge will record the distance the termination point is from the point where it should have been.

Materials and equipment:

Silva Ranger-type compass
Score sheet
Flags

¹ Juniors are only required to estimate ground distances by pacing.

Contest Rules

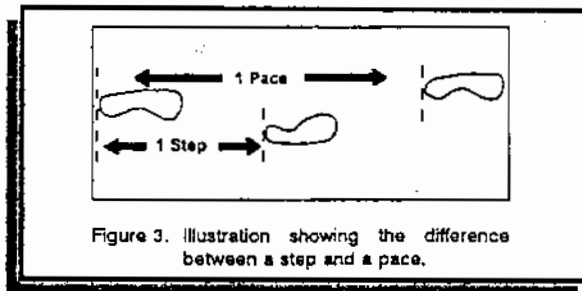
1. Determine your number of paces per 100 feet on a practice course prior to the contest.
2. Instructions will be given to the contestants prior to beginning the course. Contestants will:
 - Complete line measurements (distance and bearing)
 - Record measurements on a score sheet
 - Return course sheets to the official
3. Contestants can use only the following equipment:
 - Silva Ranger-type compass
 - Pencil and clip board
 - Score sheet
 - Electronic calculators
4. The course layout will consist of three lines. Contestants will pace the lines using a compass for directions. Bearings and distances will be followed and the ending point identified. Junior contestants will pace the three lines and report the total distance.
5. The time limit for this event is at the judge's discretion.

COMPASS TRAVERSE STUDY GUIDE

Foresters are often required to estimate horizontal distances by the pacing method, and to determine direction of travel by using a compass. These methods are very useful in cruising timber and finding property boundaries.

Pacing

Pacing is an expedient, but crude, method of determining ground distances. To measure distance by pacing, you need to know how much distance your walking pace covers. One stride is a step; a pace is two steps (Figure 3).



To determine your pace, you need to walk a measured distance and count your steps or paces between the two end points. You should do this several times to establish an average number of paces required to cover the known distance. Once you know how many paces it takes to go the known distance you can calculate your "**pace factor**" by dividing the known distance by the number of steps. For example, if it takes 17 paces to cover 100 feet your pacing factor is 100 divided by 17, or 5.88 feet/pace. Thus if you were asked to measure the distance between two points, you would walk between the two points counting your paces. When you reach the end point, you multiply the number of paces by your pacing factor. For example, "It took me 25 paces between two flags at the 4-H Forestry Contest. 25 times my pacing factor (5.88 feet/pace), means the distance should be 147 feet." To be good at pacing requires a fair amount of practice. Have fun!

Using a Compass

A compass is used to tell the direction of travel by estimating the angle of deflection from magnetic north. The floating compass needle always points in the direction known as Magnetic north. The end painted red is toward magnetic north. The circular part of the compass is divided into 360 equal parts known as degrees indicated by the superscript "o." On many compasses, the rim of the compass has large and small marks. The large marks often indicate 10 degrees while the smaller marks are two (2) degrees.

Most compasses are designed to measure direction in either **azimuths** or **bearings**. Azimuths range from 0° to 360° (Figure 5), and bearings range from 0° to 90° in each of four quadrants (Figure 6).

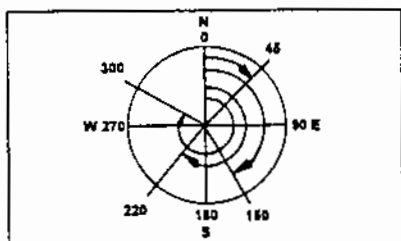


Figure 5. Azimuths are read from an azimuth compass.

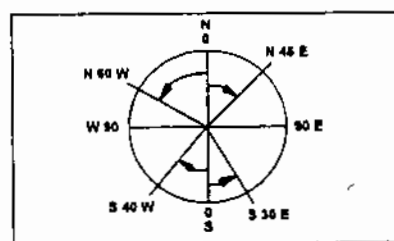


Figure 6. Bearings are read from a quadrant compass.

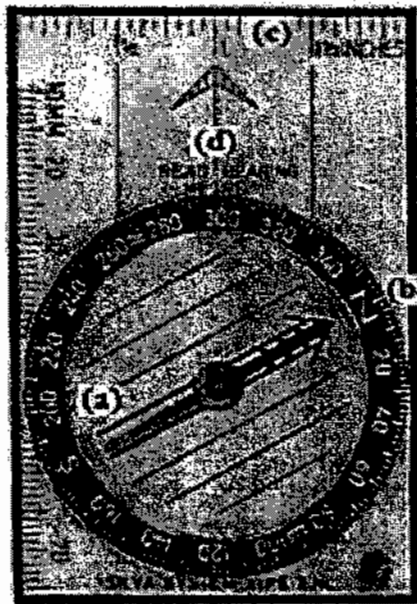
Azimuth is expressed as a single number describing the number of degrees around a circle beginning with 0° az indicating north and proceeding clockwise around a circle such that 90° az indicates east, 180° az indicates south and 270° az indicates west. Numbers between these cardinal directions are indicated by the consecutive degrees as we move clockwise around the circle.

Bearings are written noting north or south with the angle of deflection given on either the east or west sides of north or south. For example, a bearing of N 45° E is in the northeast quarter of the circle half way between north and east. S 45° W is in the southwest quadrant. N 45° E indicates the same direction as 45° az, while S 45° W is 225° az.

Using a Compass (refer to picture)

1. Determine the direction you need to go and set that azimuth or bearing where the compass says "read bearing here" (d. note the arrow that indicates direction to travel).
2. Turn your body (not the compass) until the floating red arrow points to the "N" on the movable rim (b). Your designated direction of travel is then the front edge of the compass (c). Be sure the compass is held level so the needle can float freely in the liquid contained in the compass.
3. Look along the line pointing in the correct direction and select a target downrange that is on this line. Be certain to keep the red floating arrow pointed at the "N" on the movable rim as you site your target (a), this maintains the correct angle. Walking in a straight line toward this target allows you to concentrate on your pacing without using the compass again until we reach the target or need to set up a new direction.

As with pacing, using a compass well requires a bit of practice. Have fun!



COMPASS AND PACING SCORESHEET

STARTING POINT _____

ENDING POINT _____

Contestant's No. _____ Score _____

JUNIOR PACING SCORESHEET

Estimated Distance _____

Contestant's No. _____ Score _____

FOREST EVALUATION

Objectives

Teams of four contestants will learn to evaluate site factors and stand factors which affect the growth of forest crops. In addition, they will learn to plan the future management of a forest stand.

To successfully compete in this event, it is necessary for the participants to carefully study the material in the Forest Evaluation Study Guide (pages 19 - 24). Each part of the event is closely related to the others. It is very important to gain an understanding of these relationships.

Contest Rules

1. Forestry teams will complete the forest evaluation contest as a group. This is not an individual event.
2. Forest Evaluation is divided into four parts: I. Site Evaluation, II. Forest Stand Evaluation, III. Forest Inventory and IV. Recommended Practices.
3. Competing teams will be given a situation description for the plot designated for the event. This situation description may include information about the landowner, his or her management objectives, local markets for forest products, etc. Teams will be responsible for completing all four parts of Forest Evaluation.
4. Devices and conditions to aid participants in making their decisions may include a compass, clinometer, Abney level, a tree scale stick, marked plot boundaries, designated trees for Section III, Inventory, and a soil pit for Section I Site Evaluation.
5. Twenty-five (25) points are possible for each part; a total of 100 points is possible for the entire contest.

Part I categories A, B, C, D and E have a possible point value of 5 points each.

Part II categories A, B, C, D, E and F have a possible point value of 4 points each.

Part III - for a correct answer of tree species, crown class, DBH, and height in 16-foot logs, the point value is worth one (1) point each. Board-foot volume per acre and tree value per acre are worth 2.5 points each, provided that they are within $\pm 10\%$ of the correct value.

Part IV - each management practice is worth 2 points.

FOREST EVALUATION STUDY GUIDE

Every acre of land should be devoted to its best use. This is an idea that landowners have had about agricultural land for many years. Level and slightly rolling land was used for row crops and grain, and rolling and better upland slopes for pasture and meadow. The general idea about forest land is that forests will grow well on all lands not suited for other crops. **This is not correct.** There are excellent, good, fair, and poor sites for timber production just as there are different kinds of farm crop land. Some forest lands will economically support cultural practices and permanent physical improvements, and other stands in the same area might barely pay land taxes. Some acres can be harvested every 10 years, and there are other acres that may never produce commercial timber. Forest evaluation is based on the premise that trees will be harvested, now or in the future, to maximize the goals of a specified landowner.

SITE EVALUATION

The site is the habitat or environment in which a plant or plant community lives. A number of site factors determine the desirability of a particular location for tree species. Some of the factors are soil depth, slope percent, aspect and slope position. These factors can be used to determine the forest land capability class of a particular tract of land.

Soil depth is the distance from the soil surface down to unweathered rock or an impermeable layer which restricts water movement and root penetration. For contest purposes, shallow soils are less than 24 inches deep, and deep soils are greater than 24 inches deep.

Slope percent is the number of feet of rise or fall in 100 feet of horizontal distance. For contest purposes, slope percent is broken into the following categories: 0-20 percent - *rolling*, 20-40 percent - *steep*, and 40 percent plus - *very steep*. Slope percent can be measured with an Abney level or a clinometer. Figure 7 below illustrates a 24 percent slope.

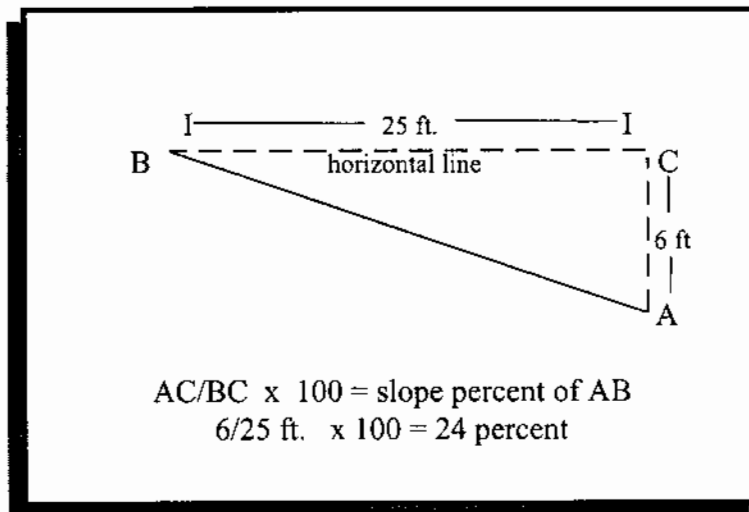


Figure 7. Method of determining slope percent.

Aspect is determined by taking a compass reading while facing down a slope. The direction water would run gives the compass direction. Any slope facing north and east of a line extending from northwest (315°) to southeast (135°) is considered to have a desirable northeast (NE) aspect. Any slope facing south and west of the same line is considered to have a “less desirable” southwest (SW) aspect. See figure 8 below.

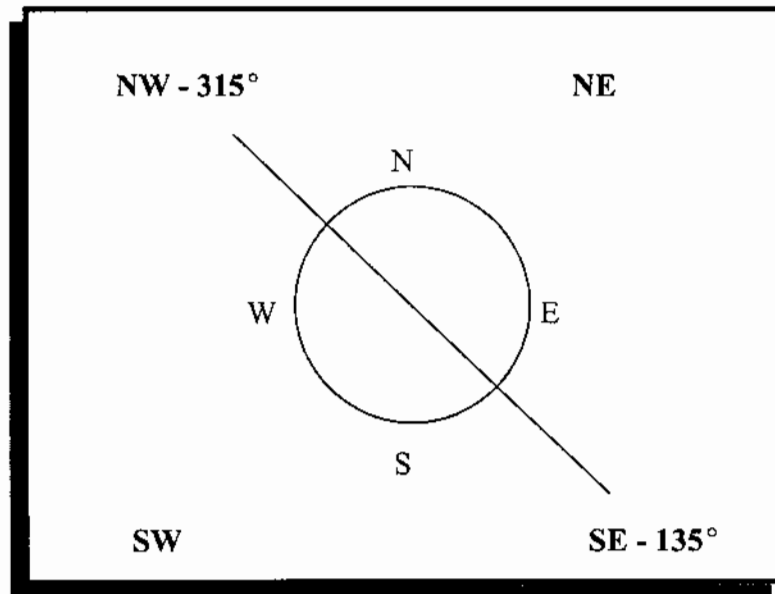


Figure 8. Method of determining aspect.

Slope position is determined only on hilly sites. The positions are classified as upper 1/3, middle 1/3 and lower 1/3. Ridge tops or level plateaus and bottom lands are classified separately in land capability.

Forest land capability classes are described below for the purpose of this contest:

- Class I.** **Excellent** has few limitations for tree growth. Most sites have little slope and no erosion problems. The soil is fertile and holds water well. It is well drained, but not droughty. These sites will produce timber well.
- Class II.** **Good** is usually gently sloping. In some cases there are drainage problems that affect tree growth.
- Class III.** **Fair** may be fairly steep. Soils may have low fertility and tend to be droughty.
- Class IV.** **Poor** may be very steep with shallow soil. Sites may be rocky, shaley, have low fertility and be very dry.

FOREST STAND EVALUATION

Grazing damage is defined by the following categories for the purpose of this contest:

Grazed - tree seedlings eaten or trampled, soil compacted, and bark rubbed off, and

Ungrazed - no evidence of grazing damage.

Fire may be present as a destructive agent or a management tool. **Wildfire** can be very destructive particularly in hardwood forests. Destruction of the litter layer on the forest floor, crown scorch or burning of the foliage, and scalds or scars on the tree trunks are all evidence of wildfire damage. A **prescribed fire** or controlled burn is a forest management tool that can be used to manage competing vegetation, prevent fuel accumulation, and improve wildlife habitat without damaging the crop trees.

Tree size distribution is classified into four (4) categories for the purpose of this contest. In all-aged stands there may be two (2) or more size classes represented. In many even-aged stands there will be only one size class. Specific size classes are defined as follows: 0-1 inch DBH - **reproduction**, 1-3 inch DBH - **saplings**, 3-12 inches DBH - poles, and more than 12 inches DBH - **sawtimber**.

Forest types are different from each other in species composition and management requirements. The following forest types, defined by the Society of American Foresters in *Forest Cover Types of North America*, are used in this contest:

Hard Pines

Dominant species - shortleaf pine and Virginia Pine, loblolly pine

Associated species - pitch pine, various oaks and hickories

Mixed Oaks

Dominant species - white oak and northern red oak

Associated species - black oak, scarlet oak, chestnut oak, white ash and yellow-poplar

White Pine

Dominant species - eastern white pine

Associated species - yellow-poplar, eastern hemlock, oaks, birches, black cherry, white ash, sugar maple, American basswood, shortleaf pine and pitch pine

Cove Hardwoods

Dominant species - yellow poplar

Associated species - eastern hemlock, black locust, red maple, sugar maple, sweet birch, oaks, Cucumbertree, American basswood, Blackgum and white ash

Red Oak, White Oak, Hickory

Dominant species - northern red oak, white oak, black oak and hickories

Associated species - a wide variety of hardwood species

Northern Hardwoods

Dominant species - American beech, sugar maple, (yellow birch - absent at Jackson's Mill)

Associated species - American basswood, red maple, eastern hemlock, white oak, northern red oak, white ash, black cherry, mockernut hickory, sweet birch, yellow poplar, cucumber tree, black walnut

Stand origin can vary from one stand to another even though the stands are of the same forest type and size distribution. Timber stands may originate by several different means. Natural stands may arise from **seedlings, sprouts or a mixture**. Sprout or coppice forests can become unhealthy because disease and decay organisms are sometimes transmitted from the parent trees to the sprouts through the root systems. Stands which originate from planted seedlings are called **plantations**. These stands may be of higher quality than their predecessors if genetically improved seeds or seedlings are used.

Stocking is a term used to describe how well the trees in a stand utilize the available space. Stocking, for the purposes of this contest, is measured using the average diameter of all trees that are 10 inches DBH and larger and the number of trees per acre 10 inches DBH and larger. Figure 9 is used to determine stocking. A **well-stocked** stand is one in which the trees are well distributed and all the space is utilized, but the trees still have room to grow. An **understocked stand** is one in which there are open spaces between the trees so that the stand will not produce to its full potential. An **overstocked stand** is one which is so crowded that trees are growing very slowly and some may be dying because of too much competition.

For example, If the plot size is 1/10 acre, the average DBH of trees 10 inches DBH and larger is 16 inches, and the number of trees in the plot 10 inches DBH and larger is 12; is the stand understocked, well-stocked or overstocked? If there are 12 trees in a 1/10 acre plot there are 120 trees per acre. Look at the Stocking Guide (Figure 9) and find 120 trees per acre on the Y-axis. Now find 16 inches DBH on the X-axis. Extend the trees per acre horizontally toward the right and the DBH vertically toward the top until they intersect. The point of intersection falls in the part of the Stocking Guide labeled “overstocked.” This means the plot is overstocked.

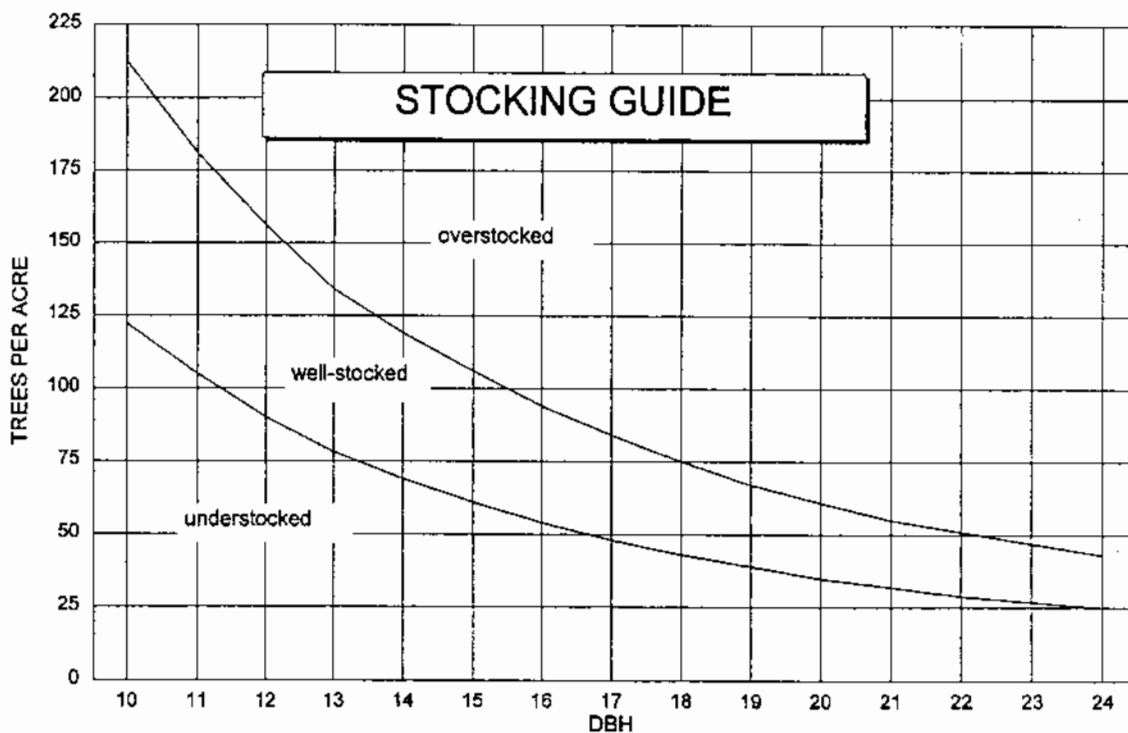


Figure 9. Method of determining stocking.

FOREST INVENTORY

Species of each numbered tree should be listed using the common names from the Official Trees List on page 4.

Crown class of each tree should be determined and recorded as either dominant, co-dominant, intermediate, or suppressed. These crown classes are defined as follows:

Dominant - - Trees with crowns that extend above the average of tree crowns and receive light directly from above and some from the sides.

Co-dominant - - Trees with crowns that form the general level of the crown cover and receive full light from the top, but very little from the sides.

Intermediate - - Trees that are shorter than the two preceding classes but with some branches extending into the general crown cover. These trees receive little light from above and none from the sides.

Suppressed - - Trees with crown entirely below the general crown level and receiving no direct light from above or from the side.

DBH (diameter at breast height) of each tree should be measured and recorded in 2-inch diameter classes.

Height in 16-foot logs of each tree should be measured and recorded to the nearest full half-log.

Board-foot volume per acre. The board-foot volume of each tree should be determined and recorded using the table provided by the judge (see page 12). Then, after taking into account the plot size, the board-foot volume per acre should be calculated.

Tree value per acre. The dollar value of each tree should be determined by multiplying the volume of each tree, expressed in thousand board feet (MBF), by the value of that species per thousand board feet (\$/MBF). Values for each species will be given in the written situation description. For example: if a 20 inch, 2 ½ log white oak contains 348 board feet, and white oak sells for \$300 per thousand board feet, then the value of the tree equals $300 \times 0.348 = \$104.40$. Then, after taking into account the plot size, the tree value per acre should be calculated.

RECOMMENDED PRACTICES

A list of forest management practices appears on the **Forest Evaluation Score Sheet**. Each team will be given a **written scenario** with information about the landowner and his or her objectives for management. Based on the data you collected about the site and forest stand in Parts I, II and II, and on the landowner's management objectives, consider each practice listed on the score sheet. Mark the practices you recommend. The practices recommended should be those that will improve the stand and help accomplish the landowner's objectives.

Sample Scenario – Henrik and Dolores Svensen are a couple in their late forties. Their twins will be starting college next fall and they are looking to a 40-acre woodlot to supply them with some cash to help pay for some of the college expenses. Henrik enjoys hunting deer and turkey on his property and often invites one or two friends to hunt with him. They would not want any activity in their woods to damage the wildlife habitat. They have owned the woodlot for about 20 years and have managed it diligently over that time. They have a stewardship plan that was drawn up right after they purchased the property and it has been updated once since then. Local markets are good with red oak worth \$300, white oak worth \$250, and mixed hardwoods worth \$200 per thousand board feet on the stump. After your inventory and observation of their woodlot, what recommendations would you make that would help them meet their objectives at this time?

Thinnings are partial cuttings in even-aged timer stands. They are designed to improve future growth by regulating stand density. Thinnings can be commercial, where some or all of the wood harvested is put to use, or pre-commercial, where no wood is utilized.

Salvage or Sanitation Harvests are cuttings by which the dead, dying, damaged, or deteriorating trees are removed to prevent the spread of pests as well as using the wood before it deteriorates further.

Selection Harvest is a regeneration method used in uneven-age stands, or to create uneven-age stands, in which individual trees or groups of trees are removed. Some trees in each age class are removed including mature trees, poorly formed trees, and trees of undesirable species.

Shelterwood or Seed Tree Harvests are regeneration methods designed to create an even-aged timber stand. These harvests remove the mature stand, leaving only a few trees for seed or to shelter the new stand.

Clearcut or Clearcutting is a regeneration method that involves the removal of the entire stand in one cutting to create an even-aged stand. Regeneration is provided for naturally, where desirable tree species exist, or artificially, where conversion to a more desirable species is required.

Prescribed Burning is generally used to control hardwood vegetation in softwood stands. Prescribed burning also improves wildlife habitat, stimulates sprouting seed germination, and encourages the growth of herbaceous plants.

Wildlife Habitat Improvement. Wildlife species generally coexist with any forest management scenario, but the type of wildlife will vary depending on the management system employed. Most wildlife species prefer a varied landscape with many edge and riparian zones. The type of wildlife a forester manages is largely dependent on landowner objectives, but also the type of forest a particular site will support.

Recreational Opportunities. Recreation often goes hand-in-hand with forest management and is an increasingly important objective. Hiking, hunting, fishing, cross-country skiing, A.T.V. riding, mountain biking, bird watching are only a few of the types of recreation for which a landowner might manage a forest. The ultimate decision should be largely based on the objectives of the landowner.

Non-Timber Forest Products. This area of forest management can work simultaneously with other forest management practices and is more developed in some regions of the United States, such as the Pacific Northwest. It may be a hobby for some landowners, yet can also generate a significant cash income for other landowners. Such things as ginseng, St. John's wort and a whole host of mushroom species are items that a landowner should be aware of and could be managing, given proper site conditions.

FOREST EVALUATION SCORE SHEET

County _____

Total Score _____

I. SITE EVALUATION: Circle(A) Soil Depth, (B) Slope Percent, (C) Aspect, and (D) Slope Position as they apply to the area.

A. Depth of Soil	Deep - 24 inches or more						Shallow - less than 24 inches					
B. Slope Percent	Rolling 0-20%		Steep 21-40%		Very Steep 41% +		Rolling 0-20%		Steep 21-40%		Very Steep 41% +	
C. Aspect	NE	SW	NE	SW	NE	SW	NE	SW	NE	SW	NE	SW
D. Slope Position												
Bottom	I	II	I	II	I	II	I	II	I	III	II	III
Lower 1/3	I	II	I	II	I	III	I	III	II	III	III	IV
Middle 1/3	I	II	II	III	II	III	II	III	III	IV	IV	IV
Upper 1/3	II	III	III	III	IV	IV	III	IV	III	IV	IV	IV

E. Forest Land Capability Class: Determine the proper class by drawing a line down from the Aspect circled and across from the Slope Position circled. The Roman numeral where these lines intersect indicates the class. Circle the class below.

I. Excellent	II. Good	III. Fair	IV. Poor
--------------	----------	-----------	----------

PART I SCORE _____

II. FORESTS STAND EVALUATION: Check the correct answer in each section, A-F.

A. Grazing Damage

Grazed _____
 Ungrazed _____

B. Fire

Unburned _____
 Wildfire _____
 Prescribed Fire _____

C. Site Distribution:

(May be more than one answer)

Reproduction _____
 Sapling _____
 Pole _____
 Sawtimber _____

D. Forest Type

Hard Pines _____
 Mixed Oaks _____
 White Pine _____
 Cove Hardwoods _____
 Red Oak, White Oak, Hickory _____
 Northern Hardwoods _____

E. Stand Origin

Seedling _____
 Sprout _____
 Mixed _____
 Plantation _____

F. Stocking

Under stocked _____
 Over stocked _____
 Well-stocked _____

PLOT SIZE _____

PART II SCORE _____

III. FORESTS INVENTORY

Tree Number	Tree Species	Crown Class	DBH	Height in 16 ft. longs	Board-foot Volume	Tree Value
1						
2						
3						
4						
5						
Per acre values (2.5 points each)						

Crown Class: D = dominant
I = intermediate

C = do-dominant
S = suppressed

PART III SCORE _____

IV. PRACTICES RECOMMENDED: *Mark those practices you recommend.*

Which species (1 or more) would you favor on this site? _____

Practice recommendations:

- _____ Protect the area from wildfire. Report any fire to the state forestry agency.
- _____ Clearcut the stand and plant with a desirable species.
- _____ Conduct a shelter wood or seed-tree harvest.
- _____ Use Best Management Practices such as seeding landings and haul roads, installing water bars to prevent erosion, leaving buffer strips along streams, minimizing stream crossings, and abiding by the Sustainable Forestry Guidelines.
- _____ Manage stand for non timber forest products.
- _____ Conduct a selection harvest.
- _____ Manage stand for wildlife habitat improvement.
- _____ Stand is not yet merchantable, leave alone to grow.
- _____ Conduct a prescribed burn.
- _____ Clearcut the stand and allow for natural regeneration.
- _____ Manage stand for recreational opportunities.
- _____ Conduct a salvage or sanitation cutting.
- _____ Conduct a thinning.
- _____ Fence the area from livestock.

PART IV SCORE _____

FOREST UNDERSTANDINGS AND FACTS

The following concepts and facts cover the broad range of forestry. An understanding of each statement will benefit resource managers, well rounded citizens, and forestry team members. Some are so logical or simple that they may be taken for granted and overlooked.

Characteristics, Distribution, and Status of Forest Resources

1. Trees have distinctive characteristics by which they can be identified.
2. Trees depend upon water, soil nutrients, sunlight, and air for growth.
3. Climate, soil, and topography influence the natural range and distribution of the different types of forest communities.
4. Forest communities influence their climate and their soil.
5. Forest litter, humus, and roots give forest soils an exceptional ability to absorb moisture and resist erosion.
6. In the forest some organisms are adapted to living in the forest soil, some on the forest floor, some in the undergrowth, and some in trees.
7. Forests are constantly undergoing change, and as they mature and are harvested or die, some species of plants and animals may be replaced by others.
8. The interrelationships among the plant and animal members of forest communities and their environments determine the characteristics of a particular forest.
 - a. Each plant and animal in a forest community influence that community.
 - b. Forest communities influence the plants and animals of which they are composed.
9. Fires, diseases, insects, man, and animals may be harmful or beneficial to the forest.
10. Some lands are better adapted for the growing of forests than for other uses.
11. Forests have certain characteristics which make them attractive for recreational activities.
12. An expanding population and new uses for forest products and services make necessary more intensive multiple purpose management of forest resources.

Understanding the Uses of Forest Resources and Their Importance to Man

1. The original forests of the nation were primary sources of building the nation.
2. Forests yield many essential products for man's use.
3. Many communities are highly dependent upon local forests, forest industries, and forest recreation for economic stability.
4. New uses for the products of the forest are being discovered through research and development.
5. Forests provide a wide variety of recreational opportunities.
6. Forests are important in helping to protect watershed from floods and droughts.

Understanding Problems and Techniques of Management

1. Forests can be managed to produce a continuous supply of wood and wood products, wildlife, water, and recreational opportunity.
2. Foresters use various practices in managing forest resources:
 - a. Insects and disease control
 - b. Fire control
 - c. Harvesting practices
 - d. Thinning and pruning operations
 - e. Reforestation
3. Volume and growth data are essential in determining management practices necessary to produce the optimum amount of forest products.
4. Research is essential for the development of new and improved forest management practices and the more efficient utilization of forest products and services.

Understanding Policy and Administrative Techniques

1. Public use of forest land carries an obligation for good citizenship.
2. Small woodland owners control a major portion of commercial forest lands which are a potential source of larger quantities of forest products and services.
3. The woodland owner can obtain technical advice and assistance in forest management from many public and private organizations and agencies.

4. Current state and federal programs provide financial assistance as incentives for better management of forest resources.
5. Many progressive public and private owners of forest lands are managing forests for multiple uses rather than solely for timber production.
6. Forest owners have responsibilities as well as rights in the management and use of forests under democratic living.
7. Cooperation between public agencies, private owners, and the general public is necessary in protecting forests against fires, diseases, insects, and excessive animal populations.
8. Policy decisions must be made to settle differences of opinion which arise from competing uses of the forests.

Forestry Facts

1. America's forests cover about 737 million acres, or 32% of the nation's land area.
2. America's forests still cover about 70% of the area they covered when the Pilgrims landed in 1620.
3. Private individuals own about 59% of the U.S. forest land base; local, state and federal governments own about 27%; and the forest products industry owns about 14%.
4. Growth rates exceed harvest rates in America's forests by a wide margin. In 1992 net growth was 21.6 billion cubic feet and harvest was only 16.3 billion cubic feet.
5. More than 244 million acres, about 33% of America's forests, are preserved in wilderness areas, national parks, wildlife refuges, and other parks and preserves where no commercial activity is permitted.
6. The U.S. is a net importer of most raw materials used to sustain the domestic economy, including wood and wood products.
7. The U.S. population is presently growing at the rate of 1% each year. If this rate is sustained the population will double in less than 100 years.
8. The per-person use of wood in the U.S. is about 80 cubic feet each year, an increase of more than 30% since 1970.
9. Wood is the only natural resource on earth that is at once renewable, recyclable, reusable, and biodegradable.
10. The energy required to grow our wood supply is free. It comes from the Sun.

A SUMMARY OF FEDERAL LAWS AFFECTING FORESTRY

Laws form the legal basis for using and managing our nation's forests. Since 1890, more than 140 laws affecting forestry have been passed by the United States Congress and signed by the President. In the early years most laws enabled or authorized the protection and management of the nation's forests. Many of the laws passed in recent years restrict or regulate the use and management of these forests. Some of the more important Federal laws are described below:

Creative Act of 1891 -- Authorized the President of the United States to set aside public lands bearing forests as public reservations commonly called *Forest Reserves*.

Organic Administration Act of 1897 -- Provided that the Forest Reserves, later to be called *National Forests*, were established to improve and protect the forest, to secure favorable conditions of water flow, and to furnish a continuous supply of timber.

Transfer Act of 1905 -- Transferred the administration of the Forest Reserves from the United States Department of the Interior to the United States Department of Agriculture.

Twenty-five Percent Fund Act of 1908 -- Established the procedure for paying the states twenty-five percent of the monies received from national forest timber sales to benefit public schools and public roads in counties where national forests are located. These payments are made in lieu of taxes.

Weeks Law of 1911 -- Authorized purchasing and adding to the National Forest System forested, cut-over, or denuded lands within the watersheds of navigable streams which are necessary to regulate the flow of navigable streams or to produce timber.

Smith-Lever Act of 1914 -- Established a Federal-State Cooperative Extension program to provide education for the public in agriculture and natural resources.

Clarke-McNary Act of 1924 -- Authorized technical and financial assistance to the states for forest fire control and for production and distribution of forest tree seedlings. (Sections 1 through 4 were repealed by the Cooperative Forestry Assistance Act of 1978.)

McSweeney-McNary Act of 1928 -- Authorized a comprehensive Forest Service research program. (This act was repealed and supplanted by the Forest and Rangeland Renewable Resources Research Act of 1978.)

Multiple Use - Sustained Yield Act of 1960 -- Established a policy of multiple use, sustained yield management for the renewable resources of the National Forest System.

McIntyre-Stennis Act of 1962 -- Established a cooperative forestry research program for state land-grant colleges and universities.

Clean Air Act of 1963 -- Gave the Federal government enforcement powers regarding air pollution for the first time. This act and subsequent amendments impact the forest industry by affecting prescribed burning for forest management and emissions from forest products manufacturing plants.

Wilderness Act of 1964 -- Established the National Wilderness Preservation System by setting aside sections of federal forest land as wilderness.

National Environmental Policy Act of 1969 -- Required that environmental considerations

be incorporated into all Federal policies and activities, and that all Federal agencies prepare environmental impact statements for any actions significantly affecting the environment.

Federal Water Pollution Control Act Amendments of 1972 -- Established as a national objective restoring and maintaining the chemical, physical, and biological integrity of the nation's water and required area wide planning to prevent future water pollution that could be associated with growth, development, and land use, including timber management.

Endangered Species Act of 1973 -- Provided for the protection and conservation of threatened and endangered fish, wildlife, and plant species. Directs all Federal agencies to utilize their authorities and programs to further the purpose of the act.

National Forest Management Act of 1976 -- Established additional standards and guidelines for managing the national forests, including directives for national forest land management planning and public participation.

Cooperative Forestry Assistance Act of 1978 -- Authorized the Secretary of Agriculture to work in cooperation with State Foresters in nine cooperative forestry assistance programs. Among these programs is the *Forestry Incentives Program*, a federal cost-share program designed to encourage the management of private forest lands.

Renewable Resources Extension Act of 1978 -- Authorized expanding the forest and rangeland renewable resources portion of the extension education program.

Forest and Rangeland Renewable Resources Research Act of 1978 -- Authorized expanding forest and rangeland renewable resources research.

Reforestation Tax Incentives (part of the Recreational Boating Safety and

Facilities Improvement Act of 1980) -- Provided tax credits and deductions for landowners who reforest their property, as an incentive to encourage reforestation.

Food Security Act of 1985 (1985 Farm Bill) -- Established the *Conservation Reserve Program*. The program was designed conserve 40 to 45 million acres of highly erodible cropland by paying landowners to plant permanent vegetative cover, such as grass or trees, and maintain that vegetative cover for 10 years.

Food, Agriculture, Conservation, and Trade Act of 1990 (1990 Farm Bill) -- Established the *Forest Stewardship Program*, a program designed to encourage multiple resource forest management on nonindustrial private forest lands. A companion program, the *Stewardship Incentives Program*, was designed to provide cost-share assistance funding to encourage the implementation of management practices.

Coastal Zone Act Reauthorization Amendments of 1990 -- Required that states with Coastal Zone Management Programs develop and implement Coastal Nonpoint Pollution Control Programs to control sources of nonpoint pollution (including managed forests) which impact coastal water quality.

GLOSSARY

Abney Level - An instrument used to determine the percent of slope of a site.

Aspect - A compass reading taken facing down a slope in the direction water would run, give the compass direction of a slope.

Best Management Practices (BMPs) - A practice or combination of practices, that is determined by a state to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources (such as managed forests) to a level compatible with water quality goals.

Clinometer - Height measuring device.

Conservation - Gifford Pinchot, a turn of the century forester closely associated with President Teddy Roosevelt, applied the word to describe a natural resource philosophy. It meant "wise use." Through the years it has taken on an extended meaning that really says "wise use over a period of time." The time factor forces us to consider the consequences of current use compared to future use.

Coppice - A stand of forest originating from the stumps or roots of trees previously cut. Most hardwood species sprout readily when cut young. Very few conifers will sprout from the stump.

Crown Class - Tree crowns are classified as to the position in which they are found. The following are the main generally recognized classes.

Dominant - Trees with crowns that extend above the average of the tree crowns and receives light from directly above and some from the sides.

Co-Dominant - Trees with crowns that form the general level of the crown cover and receive full light from the top, but very little from the sides.

Intermediate - Trees that are shorter than the two preceding classes but with some branches extending into the general crown cover. Receives little light from above and none from the sides.

Suppressed - Trees with crown entirely below the general crown level and receiving no direct light either from above or below.

Cull - Tree or log of merchantable size, but no market value.

DBH - Diameter of a tree at breast height or 4 1/2 feet above ground.

Duff - Often referred to as litter which is made up of materials of the upper layer of the forest floor. This includes freshly fallen leaves, twigs and slightly decomposed organic matter.

Erosion - The wearing away of the soil and minerals by climatic agents such as wind and water.

Exposure - That portion of the slope that is directly in the path of wind, rain, sun. That part of a slope open to action of the elements.

Forest Land Capabilities - The productivity of the land as it is affected by particular location or position on a slope.

Forest Types - A classification of species indicating the majority of the species represented in an area.

Germination - This process occurs when viable seed meet favorable conditions that will allow it to grow.

Girdle - To chop or remove a strip of bark or a section of wood containing the food-carrying tissue of a tree in an even strip from the perimeter of the tree or twig.

Harvest - The removal of marketable products from the forest.

Mature Tree - A tree that has reached a maximum growth that the forest manager decides is a merchantable product.

Multiple-Land-Use - A term used to indicate the management of timber wildlife and recreation in an integral, consolidated program.

Merchantable Height - A term used to indicate the marketable length of a tree.

National Forests - These differ from National Parks in that recreation is not their only use. Recreation may be a primary use in some part of the national forest. For example, there are more acres of wilderness areas in national forests than national parks. The national forest system administers 154 forests and 19 grasslands. On most national forest land timber, water, wildlife, recreation, and grazing are compatible resources. These are managed for productive and sustained yields according to the land's capability.

National Parks - The National Park Service was established by Congress to promote and regulate the use of national parks, monuments, and reservations and to conserve the scenery and the natural and historic objects and the wildlife therein. The Park Service administers 295 separate areas. The Service manages some areas for historical or recreational uses. Each of the 35 national parks was established to preserve a unique natural area for our enjoyment and study. National Parks are confused with national forests.

Old Growth - This term describes eastern forests and virgin western forests with trees over 100 years of age.

Partial Cut - Method of cutting mature trees such as shelterwood cut, selection cut, or seed tree cut.

Pole Timber - A young tree that is 3 to 12" in DBH.

Prescribed Burn - Controlled burning to enhance forest management techniques in silviculture, wildlife management, fire hazard control, etc.

Preservation - In natural resources, other than wood preservation, this term is related to land use. The meaning stems from 19th century land reserves wherein areas and resources were set aside for limited or restricted use and development. Preservation often restricts land to recreation or scientific study. Preservation may be contrasted to the principle of multiple use which rather intensively develops one or more of an area's resources.

Reproduction - A natural establishment of seedlings or sprouts 0-1" DBH.

Residual Stand - That portion of trees left after any partial cut.

Sanitation Cutting - The removal of dead, damaged or susceptible trees; essentially to prevent the spread of pests or pathogens and so promote forest hygiene

Sapling - A young tree less than 3" DBH. The minimum size is usually placed at 1" DBH.

Seedling - A tree grown from seeds.

Silviculture - A term used to indicate the establishment, development, care, and reproduction of stands of timber.

Site - The combination of biotic, climatic, and soil conditions with the ecological factors of an area to produce forests or other vegetation.

Slope Position - A particular location on a slope as upper, middle, or lower slope; ridge top; or bottom land. A specific topographic location.

Sprout - A tree originating from a root or stump.

Stocking - A measure of the proportion of the area actually occupied by trees.

Streamside Management Zone (SMZ) - A strip of land adjacent to a water body or stream channel where soils, organic matter and vegetation are managed to protect the physical, chemical and biological integrity of surface water adjacent to and downstream from forestry operations. An SMZ also may be called a "filter strip" or "buffer zone."

Sustainable Forestry Initiative (SFI) - A comprehensive program of forestry and conservation practices designed to ensure that future generations of Americans will have the same abundant forests and wildlife that we enjoy today. SFI is sponsored by the American Forest & Paper Association (AF&PA). AF&PA member companies have agreed to use sustainable forestry practices on the forestland they manage and to promote sustainable forestry on the forestlands of others.

Sustained Yield - Management of a forest stand to provide a constant supply of timber and revenue.

Timber Stand Improvement (TSI) - Any practice designed to improve a stand of timber by removal of vines, culls, and undesirable species.

Wilderness - In the strictest sense, this means that an area that has never been developed by man. A 1964 Wilderness Act defined it thus: "A Wilderness, in contrast with those areas where man and his own works dominated landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor and does not remain." In common use the word is associated with these undeveloped areas and those set aside with a little development. In some cases man-made items are dismantled to reduce the area to a primitive state. Under these broader uses some roadless areas are considered wilderness when the access is limited to hiking, canoeing, or horse backing and the use is set aside for recreation. To most of the general public, wilderness experiences are gained in a number of settings involving wild but not necessarily true Wilderness areas.

Wild Fire - Fires burning out of control regardless of how or why they were started.

Wolf Tree - A tree that occupies more than its fair share of growing space.

Suggested References

1. *Forestry Handbook*, SAF, 1989. Jules Kazimir, Dept. 8-0318, Wiley- Interscience, A Division of John Wiley & Sons, Inc., 605 Third Avenue, New York, New York 10158.
2. *Important Trees of the Eastern United States*. FS-466. October 1991. USDA FS 112pp. (Available from the USDA Forest Service or your State Forester.)
3. *Forest Cover Types of The United State and Canada*, 1980. Society of American Foresters, 5400 Grosvenor Lane, Bethesda, MD, 20814, 148 pp.
Member price - \$12.00. Non-member - \$15.00. www.safnet.org.
4. *Know Your Trees*. Identification Book of the American Forestry Association. American Forestry Association, 1319 Eighteenth Street N.W., Washington, D. C. 20036. 374 pp.
5. *The Stewardship of Northern Hardwoods: A Forest Owner's Handbook*. 1995 State University of New York, College of Environmental Science and Forestry, 1 Forestry Drive, Syracuse, NY 13210.
6. *National 4-H Forestry Manuals - Units A, B, and C*; available from the "Training References" section of the Invitational web site.
7. *Forests and Forestry* - 5th edition, by Holland and Rolfe. 1997. Interstate Publishers, Inc., Danville, Illinois. 1-800-843-4774. ISBN#: 0-8134-3058-5.
8. *"Insects and Diseases of the South"* Protection Report R8-PR, 16. June 1989. USDA Forest Service, Southern Region, 1720 Peachtree St. NW, Atlanta, GA 30367-9102. Provided to each county through U. T. Ag. Extension Service
9. *National 4-H Forestry Invitational 2003 Handbook*. USDA, Extension Service, 50 pp.
10. 4-H Forestry Invitational web site: www.aces.edu/N4HFI/. The "official" web site to which each insect or disease species is linked from the Invitational's web site. Information presented within the "official" web site links for species in the Insect and Disease Identification contests. Refer to the "Training References" section of the Invitational web site for the "official" Insect and Disease Identification training pages and the web site links to each insect or disease species.
11. *National 4-H Forestry Invitational Insect and Disease Flash Cards* - supplied by U. T. Ag. Extension Service to each Extension county upon request.
12. *National 4-H Forestry Invitational Training CD*, V1-2002, Copyright 2002, National 4-H Forestry Committee, All rights reserved. Supplied by U. T. Ag. Extension Service to each Extension county upon request.
13. *PB1145 Forests Trees of Tennessee*, U. T. Agricultural Extension Service. Available to each Extension county upon request.