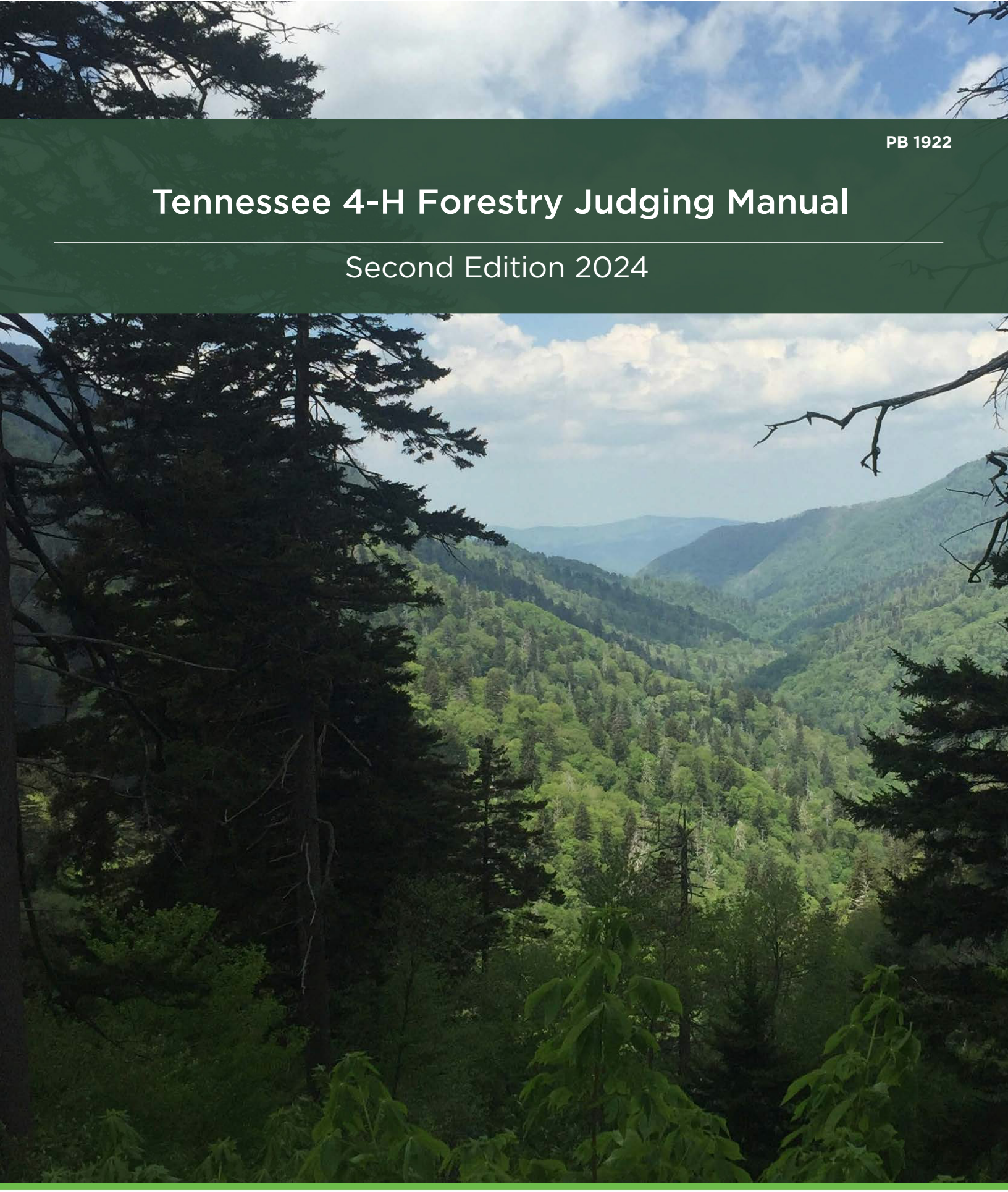

PB 1922

Tennessee 4-H Forestry Judging Manual

Second Edition 2024

Real. Life. Solutions.™

UTEXTENSION
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

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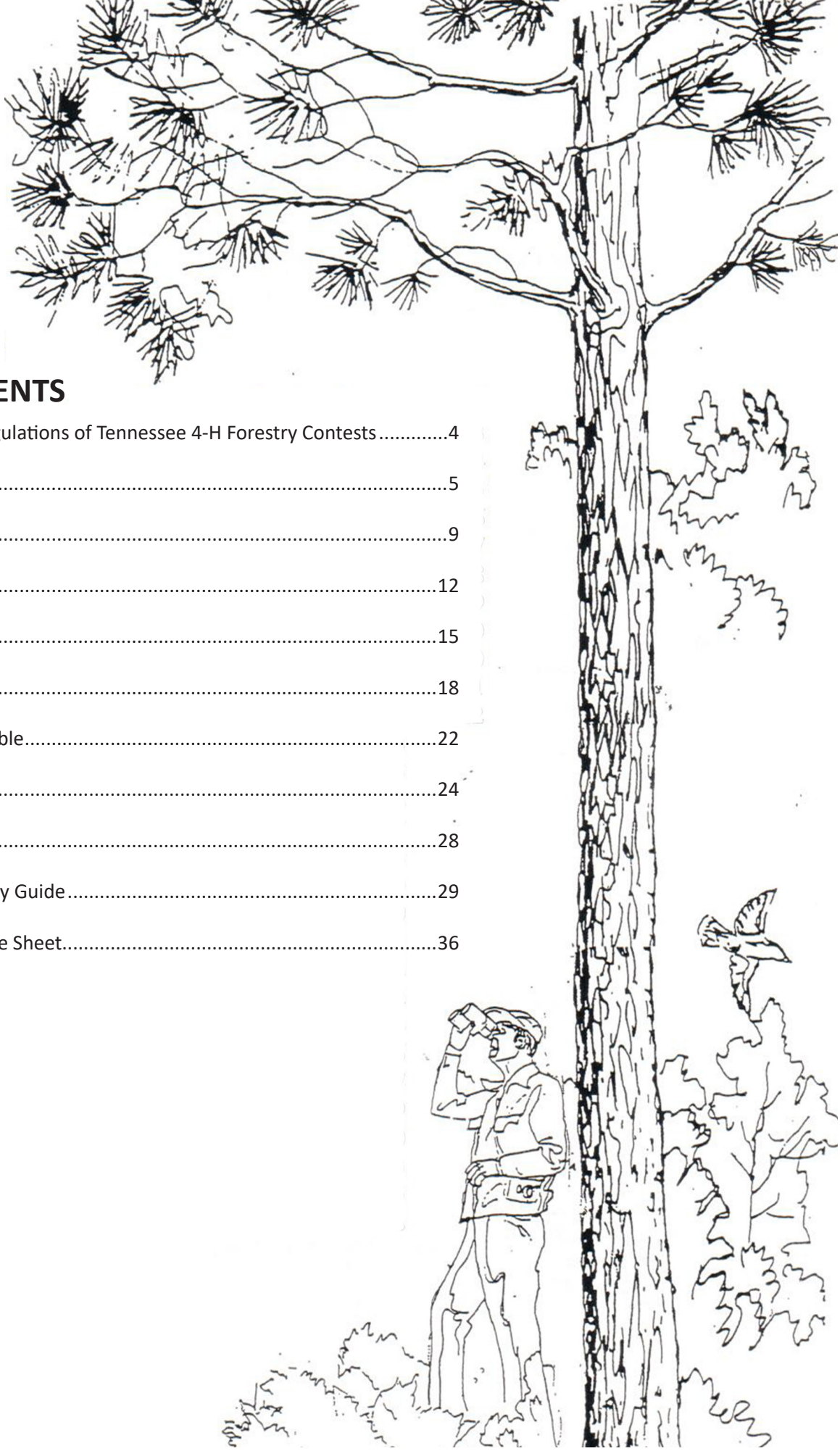
First Edition

Larry Tankersley, former Extension Forestry Specialist, developed the first 4-H Forestry Judging manual for Tennessee. It was modeled after the National 4-H Forestry Invitational Handbook. Dr. John Sharp was the first Extension Forestry Specialist at the University of Tennessee and provided leadership to get the Tennessee 4-H Forestry Judging program started. 4-H Forestry Judging in this great state continues to be inspired by these early leaders.

Second Edition

The second edition has been modified from the first edition to better match the current National 4-H Forestry Invitational Handbook. It is our hope that we capture the intent of 4-H forestry on a national level, yet retain and highlight some of the history, uniqueness, and richness of Tennessee's exceptional biodiversity and culture through this program. The majority of the material in this manual has been compiled with permission from various professionals at state and national levels.

UT Extension publication number: PB 1922



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GENERAL RULES AND REGULATIONS
TENNESSEE 4-H FORESTRY CONTESTS

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 the completion of that event, except in certain team events.

2. A team may be composed of three or four members. Team scores will be based on the three highest scores for each competition category. Contestants with the highest individual overall score will also be recognized.

3. Teams are divided by the following grade levels:
   Junior: 4th — 5th (identification and pacing)
   Junior High: 6th — 8th (identification, tree measurement, and pacing)
   Senior High: 9th — 12th (all events except forest evalution, which is only at the state contest)
   *Wood ID is for senior high only.

4. Ties between junior teams and individuals will be broken based on high scores in the tree identification event. Ties between junior high teams and individuals will also be broken based on high scores in the tree identification event. Ties between senior high teams and individuals will be broken based on high scores in the wood identification event.

5. Contestants could earn negative points for some of the competition categories. However, no negative points will be awarded; zero is the lowest possible score.

6. Contestants are expected to behave in a friendly manner to other contestants and to contest officials. No cell phones will be authorized during competition.

7. All team members should participate in all events to the best of their ability and talent. The top four senior high teams in each region will advance to the state contest.

8. The head forestry judge reserves the right to remove a contestant or team at his/her discretion.

9. The decisions of the judge(s) are final.

TREE IDENTIFICATION

Objective

Contestants should learn to recognize and identify different tree species. This skill is valuable because tree species have varying requirements for growth and differ in their use and value as wood products or other resources.

Contest Rules

Contestants will identify 20 tree species at the regional contest and 25 tree species at the state contest based primarily on leaves, other parts of a tree such as bark, twigs, fruit structures, seeds, or the entire tree, may be used if deemed appropriate. All species used in the contest will be selected from the official tree list found on pages 6-7.

Contestants will be judged on their accuracy of identification and spelling of common names. The complete common name, written exactly as displayed on the official tree list, is required for full credit. Incomplete names, such as maple instead of red maple, or pine instead of shortleaf pine, will be considered incorrect. Scientific names will not be required.

Each contestant will be given a sheet with numbered blanks for each tree's common name. Judges will give two points for each correct answer and deduct 0.5 point for failure to write the common name as it is written on the official tree list. Examples of deductions include yellow-poplar written as yellow poplar (missing dash), Virginia pine written as virginia pine (did not capitalize a proper name), eastern redcedar written as redcedar (missing eastern), common persimmon written as common persimon (misspelling). No credit will be given for partially correct names such as cedar, pine, oak, hickory, etc.

Time limits are set by the contest chairperson.

Preparation

Different species of trees have various requirements for optimum growth. They also differ ecologically and economically and provide a variety of benefits to people and wildlife. Therefore, identifying trees is an important skill.

Training materials are available from a variety of sources. There are excellent field guides, websites, and phone applications that can help you identify trees. Websites ending in .gov and .edu tend to provide the most comprehensive and reliable information on the internet. The National 4-H Forestry Invitational website has training materials and references. However, be sure to reference the species lists in this document while studying for the Tennessee contests. You might also contact local foresters, biologists, botanists, Extension agents, and other natural resources professionals to help you with tree identification.

TREE LIST

Common Name	Scientific Name
Fraser fir	*Abies fraseri* (Pursh)
boxelder	*Acer negundo* (L.)
red maple	*Acer rubrum* (L.)
silver maple	*Acer saccharinum* (L.)
sugar maple	*Acer saccharum* (Marsh.)
yellow buckeye	*Aesculus flava* (Ait.)
tree-of-heaven	*Ailanthus altissima* (Mill.)
tag alder	*Alnus serrulata* (Aiton)
yellow birch	*Betula alleghaniensis* (Britton)
sweet birch	*Betula lenta* (L.)
river birch	*Betula nigra* (L.)
pignut hickory	*Carya glabra* (Sweet)
pecan	*Carya illinoinensis* (K. Koch.)
shagbark hickory	*Carya ovata* (K. Koch.)
mockernut hickory	*Carya tomentosa* (Nutt.)
common hackberry	*Celtis occidentalis* (L.)
flowering dogwood	*Cornus florida* (L.)
common persimmon	*Diospyros virginiana* (L.)
American beech	*Fagus grandifolia* (Ehrh.)
green ash	*Fraxinus pennsylvanica* (Marsh.)
honeylocust	*Gleditsia triacanthos* (L.)
American holly	*Ilex opaca* (Ait.)
butternut	*Juglans cinerea* (L.)
black walnut	*Juglans nigra* (L.)
eastern redcedar	*Juniperus virginiana* (L.)
sweetgum	*Liquidambar styraciflua* (L.)
yellow-poplar	*Liriodendron tulipifera* (L.)
cucumber tree	*Magnolia acuminata* (L.)
southern magnolia	*Magnolia grandiflora* (L.)
red mulberry	*Morus rubra* (L.)
blackgum	*Nyssa sylvatica* (Marsh.)
sourwood	*Oxydendrum aboreum* (DC.)
royal paulownia	*Paulownia tomentosa* ((Thunb.) Siebold & Zucc.)
red spruce	*Picea rubens* (Sarg.)
shortleaf pine	*Pinus echinata* (Mill.)
longleaf pine	*Pinus palustris* (Mill.)
pitch pine	*Pinus rigida* (Mill.)
eastern white pine	*Pinus strobus* (L.)
loblolly pine	*Pinus taeda* (L.)
Virginia pine	*Pinus virginiana* (Mill.)
American sycamore	*Platanus occidentalis* (L.)
eastern cottonwood	*Populus deltoides* (Bartr.)
black cherry	*Prunus serotina* (Ehrh.)
white oak	*Quercus alba* (L.)
scarlet oak	*Quercus coccinea* (Muenchh.)
southern red oak	*Quercus falcata* (Michx.)
bur oak	*Quercus macrocarpa* (Michx.)
chestnut oak	*Quercus montana* (L.)
water oak	*Quercus nigra* (L.)

northern red oak	*Quercus rubra* (L.)
post oak	*Quercus stellata* (Wangenh.)
black oak	*Quercus velutina* (Lam.)
black locust	*Robinia pseudoacacia* (L.)
black willow	*Salix nigra* (Marsh.)
sassafras	*Sassafras albidum* (Nees.)
baldcypress	*Taxodium distichum* (Rich.)
arborvitae	*Thuja occidentalis* (L.)
American basswood	*Tilia americana* (L.)
eastern hemlock	*Tsuga canadensis* (Carr.)
American elm	*Ulmus americana* (L.)

Place Contestant Label Here

Tree Identification Score Sheet

No.	Common Name	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.		
	Total Score	

For Official Scoring Use Only

1 2 3 4 5

6 7 8 9 0

FOREST HEALTH — INSECTS

Objective

Contestants will learn to recognize and identify forest insects and/or evidence of insect damage. Recognizing forest insects is an important skill because identification is typically the first step in addressing a problem. Signs of forest insects include the insect, exit holes, galleries, frass, honeydew, skeletonization, webs, and more. Symptoms include the visual response of the plant as a result of an attack by a pest such as defoliation, dieback, chlorosis, and wilt. Insects that cause damage often affect only one tree species or group(s) of related species. Forest insect infestations often cause aesthetic, economic, and sometimes irreversible ecological damage. Forest insect pests also have implications for native wildlife when a tree species that provides important food or cover resources is lost or reduced in prevalence.

Contest Rules

Contestants will identify 10 insects or examples of their damage at both the regional and state contests. Specimens and/or photographs will be selected from the official insect list found on page 10.

Contestants will be judged on the accuracy of identification and spelling of common names. The complete common name, written exactly as displayed on the official insect list, is required for full credit. Incomplete names, such as adelgid instead of hemlock woolly adelgid, or pine sawfly instead of redheaded pine sawfly, will be considered incorrect. Scientific names will not be required.

Each contestant should be given a sheet with numbered blanks for each insect's common name. Judges will give two points for each correct answer and deduct 0.5 point for failure to write the common name as it is written on the official insect list. Rules for deductions are the same as those for tree identification.

Time limits are set by the contest chairperson.

Preparation

Insect identification involves learning more than just the insect in its adult stage. Nests, eggs, larval stages, signs of damage, and more, may be necessary to positively identify an insect to species. There are native and nonnative insects, and some are ecologically important, whereas others can harm or eliminate a tree species and/or alter ecosystem(s). As a result, entomology is an important part of forestry.

Training materials are available from a variety of sources. There are excellent field guides, websites, and phone applications that may be helpful when learning to identify insects. Websites ending in .gov and .edu tend to provide the most comprehensive and reliable information on the internet. In addition, the bugwood.org website is a reputable website that should be explored. The National 4-H Forestry Invitational website also has training materials and references. However, be sure to reference the species lists in this document while studying for the Tennessee contests. You might also contact local foresters, biologists, entomologists, Extension agents, and other natural resources professionals to help you with forest insect identification.

Guides:

Insects and Diseases of Trees in the South. Protection Report R8-PR, Revised 1999. USDA Forest Service, Southern Region. Atlanta, GA 30367-9102.

Insects that Feed on Trees and Shrubs, by Warren T. Johnson and Howard H. Lyon. Second Edition. 1991. Comstock Publishing Associates. ISBN: 978-0801426025.

INSECT LIST

Common Name	Scientific Name
Asian longhorned beetle	*Anoplophora glabripennis* (Motschulsky)
balsam woolly adelgid	*Adelges piceae* (Ratzeburg)
dubious checkered beetle	*Thanasimus dubius* (Fabricius)
eastern tent caterpillar	*Malacosoma americanum* (Fabricius)
emerald ash borer	*Agrilus planipennis* (Fairmaire)
European pine sawfly	*Neodiprion sertifer* (Geoffroy)
fall webworm	*Hyphantria cunea* (Drury)
forest tent caterpillar	*Malacosoma disstria* (Hübner)
granulate ambrosia beetle	*Xylosandrus crassiusculus* (Motschulsky)
hemlock woolly adelgid	*Adelges tsugae* (Annand)
Ips engraver beetles	*Ips avulsus* (Eichhoff)
Japanese beetle	*Popillia japonica* (Newman)
locust borer	*Megacyllene robiniae* (Forster)
locust leafminer	*Odontota dorsalis* (Thunberg)
Nantucket pine tip moth	*Rhyacionia frustrana* (Comstock)
periodical cicada	Magicicada septendecim (Linnaeus)
red oak borer	*Enaphalodes rufulus* (Haldeman)
redheaded pine sawfly	*Neodiprion lecontei* (Fitch)
smaller European elm bark beetle	*Scolytus multistriatus* (Marsham)
southern pine beetle	*Dendroctonus frontalis* (Zimmermann)
spongy moth	*Lymantria dispar* (Linnaeus) (formerly gypsy moth)
spotted lanternfly	*Lycorma delicatula* (White)
walkingstick	*Diapheromera femorata* (Say)
walnut twig beetle	*Pityophthorus juglandis* (Say)
white pine weevil	*Pissodes strobi* (Peck)

Place Contestant Label Here

Insect Identification Score Sheet

No.	Common Name	Score
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	Total Score	

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1 2 3 4 5

6 7 8 9 0

FOREST HEALTH — DISEASES AND HEALTH INDICATORS

Objective

Contestants will learn to recognize and identify forest diseases and/or evidence of their damage. Learning diseases and associated damage is an important skill because most diseases that cause damage typically affect only one tree species or group(s) of related species. Disease outbreaks often cause aesthetic, economic, and sometimes irreversible ecological damage. Forest diseases also can have severe implications on native wildlife when tree species that provide an important source of food or cover are eliminated or severely reduced on the landscape.

Contest Rules

Contestants will identify 10 diseases or examples of their damage at both the regional and state contests. Specimens and/or photographs will be selected from the official disease list found on page 13.

Contestants will be judged on the accuracy of identification and spelling of common names. The complete common name, written exactly as displayed on the official disease list, is required for full credit. Incomplete names, such as blight instead of chestnut blight, or blister rust instead of white pine blister rust, will be considered incorrect. Scientific names will not be required.

Each contestant should be given a sheet with numbered blanks for each disease's common name. Judges will give two points for each correct answer and deduct 0.5 point for failure to write the common name as it is written on the disease list. Rules for deductions are the same as those for tree identification.

Time limits are set by the contest chairperson.

Preparation

Disease identification involves learning as much about signs of the disease as the disease itself. Specimens and/or photographs will be selected and displayed to represent the disease and/or sign(s) related to its damage. Forest pathology is an important part of forestry and overall forest health.

Training materials are available from a variety of sources. There are excellent field guides, websites, and phone applications that may be helpful when learning to identify diseases. Websites ending in .gov and .edu tend to provide the most comprehensive and reliable information on the internet. In addition, the bugwood.org website is a reputable website that should be explored. The National 4-H Forestry Invitational website also has training materials and references. However, be sure to reference the species lists in this document while studying for the Tennessee contests. You might also contact local foresters, biologists, forest pathologists, Extension agents, and other natural resources professionals to help you with forest disease identification.

Guides:

Insects and Diseases of Trees in the South. Protection Report R8-PR, Revised 1999. USDA Forest Service, Southern Region. Atlanta, GA 30367-9102.

Diseases of Forest and Shade Trees of the United States. Agriculture Handbook no. 386. 1979. USDA Forest Service, USDA publications.

DISEASE LIST

Common Name	Scientific Name
annosum root disease	*Heterobasidion annosum*
artist's conk	*Ganoderma applanatum*
beech bark disease	*Neonectria* spp.
black knot	*Apiosporina morbosa*
brown spot needle blight	*Mycosphaerella dearnessii*
cedar-apple rust	*Gymnosporangium juniperi-virginianae*
chestnut blight	*Cryphonectria parasitica*
clinker polypore	*Inonotus obliquus*
dogwood anthracnose	*Discula destructive*
Dutch elm disease	*Ophiostoma ulmi*
dwarf mistletoes	*Arceuthobium* spp.
fusiform rust	*Cronartium quercuum f.* sp. *fusiforme*
hypoxylon canker	*Biscogniauxia atropunctata*
laurel wilt disease	*Raffaelea lauricola*
lichens	*numerous species*
nectria canker	*Nectria galligena*
needle cast fungi	*numerous species*
oak wilt	*Ceratocystis fagacearum*
red heart of pine	*Phellinus pini*
white pine blister rust	*Cronartium ribicola*

Place Contestant Label Here

Disease Identification Score Sheet

No.	Common Name	Score
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	Total Score	

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1 2 3 4 5

6 7 8 9 0

WOOD IDENTIFICATION

Objective

Contestants will learn to recognize and identify wood of different species or species groups. Wood identification is important because the uses and value of wood differ based on species and wood properties.

Contest Rules

Contestants will identify 10 wood samples at both the regional and state contests. Samples may or may not display bark. Contestants are encouraged to learn to distinguish between samples based on cell structure and arrangement. All wood samples will be selected from the official wood identification list on page 16.

Contestants will be judged on the accuracy of identification and spelling of common names. The complete common name, written exactly as displayed on the official wood identification list, is required for full credit. Incomplete names, such as cedar instead of redcedar, or yellow pine instead of southern yellow pine, will be considered incorrect. Scientific names will not be required.

Each contestant will be given a sheet with numbered blanks for each wood sample's common name. Judges will give two points for each correct answer and deduct 0.5 point for failure to write the common name as it is written on the wood identification list. Rules for deductions are the same as those for tree identification.

Time limits are set by the contest chairperson.

Preparation

Wood of a particular species can be identified by its unique features. These features include strength, density, hardness, odor, texture, and color. Reliable wood identification usually requires the ability to recognize basic differences in cellular structure and wood anatomy. Wood identification is an important part of forestry and the wood products industry.

Training materials are available from a variety of sources. There are excellent field guides, websites, and more that may be helpful when learning to identify wood. Websites ending in .gov and .edu tend to provide the most comprehensive and reliable information on the internet. Be sure to reference the wood identification list on page 16 while studying for the Tennessee contests. You might also contact local foresters, sawmillers, wood products specialists, Extension agents, and relevant natural resources professionals to help you with wood identification.

The contest judge will have a limited number of loupe magnifiers that may be loaned upon request. We recommend you bring your own magnifier so you have the one you are comfortable using.

Guides:

Identifying Wood: Accurate Results With Simple Tools. R. Bruce Hoadley. The Taunton Press, Inc. 1990. Newton, CT 06470-5506.

PB1692 Wood Identification for Hardwood and Softwood Species Native to Tennessee, The University of Tennessee Agricultural Extension Service, PB1692-1.5M-2/02 E12-4915-00-010-002, https://trace.tennessee.edu/utk_agexfores/10

(298) Wood Identification for the 4-H contest – YouTube (Dr. Adam Taylor)
https://www.youtube.com/watch?v=G8_NlVBW6vE

The Wood Database Website: https://www.wood-database.com/

WOOD IDENTIFICATION LIST

Common Name

ash
beech
birch
black locust
cherry
cottonwood
elm
gum
hickory
maple
oak
redcedar
southern yellow pine
sycamore
walnut
yellow-poplar

Place Contestant Label Here

Wood Identification Score Sheet

No.	Common Name	Score
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	Total Score	

For Official Scoring Use Only

1 2 3 4 5

6 7 8 9 0

TREE MEASUREMENT

Objective

Contestants will learn to measure standing trees. Timber is often bought and sold on a volume basis (usually by board foot volume), so it is good to have some estimate of total tree volume, volume per acre, and/or volume by product before selling timber. Tree size is ecologically important in that it can indicate age class, seed production, value for wildlife, and more.

Junior High and Senior High Divisions

Contestants will measure DBH and merchantable height of five designated trees. Contestants then will estimate sawtimber volume. Points will be awarded for the correct measurement of each tree's diameter and merchantable length, depending on how close contestants are to the judges' volume estimate. The contestant obtaining the total volume closest to that calculated by the judges will be the individual winner.

Contest Rules

Contestants may use any standard tree scale stick (often referred to as a Biltmore stick). Scale sticks may be purchased from companies such as Forestry Suppliers, Inc., Ben Meadows Co., etc. Diameter tapes, calipers, and other measurement devices will not be allowed. If a contestant does not have a 25-inch reach, the National 4-H Forestry Invitational website has tree scale stick rulers for shorter reaches. https://4-Hforestryinvitational.org/training/tree-measurement-contest/scale-stick-download

Contestants must determine diameter to the nearest inch. Diameter at breast height (DBH) is the standard for measuring trees and refers to tree diameter measured at 4.5 feet above ground.

Tree heights will be measured to the nearest full half-log for sawtimber. A half-log is defined as 8 feet long. Minimum tree size will be 10 inches DBH, one log merchantable length, and have a minimum top diameter of 8 inches.

A standard International 1/4-inch Log Rule tree scale volume table will be provided by the contest judge. Record saw log volumes as found in the volume table (International 1/4-inch Log Rule is the official rule of all contests). Do not use volume tables other than those provided by the contest judge.

Contestants will be required to give the total volume of all the trees.

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 volume per acre. The concept of an expansion factor should be emphasized during contestant training. Time limits are set by the contest chairperson.

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 +- 5% of the official volume, 15 points for +- 10%, 10 points for +-15%, and no points over +-15%.

Example: If 4,000 board feet is the official volume per acre, then an answer between 3,800 bd. ft. and 4,200 bd. ft. receives 20 points; 3,600 to 3,799 and 4,201 to 4,400 receives 15 points; 3,400 to 3,599 and 4,401 to 4,600 receives 10 points; and less than 3,400 and more than 4,600 receives no points.

Preparation

Training materials are available from a variety of sources. There are publications and websites that may be helpful when learning to measure trees and for tree volume estimation. Websites ending in .gov and .edu tend to provide the most comprehensive and reliable information on the internet. The National 4-H Forestry Invitational website also has training materials and references. It is important to measure your arm length. If it is not at least 25 inches, you should construct a personalized tree scale stick. Examples of these are provided on the National 4-H Forestry Invitational website under Training Materials / Tree Measurement links. You might also contact local foresters, biologists, Extension agents, and other natural resources professionals to help with tree measurement and volume estimation.

Judges

Select and number five trees of sawtimber size. If possible, measure each one with a diameter tape and altimeter or clinometer. Careful "stick" measurements are acceptable. Judges will avoid borderline trees; that is, those trees with a diameter or height that might easily be estimated one inch larger or smaller or one-half-log longer or shorter. Judges will give each contestant a scale stick (if needed) and a sheet numbered with spaces for DBH, height, and volume.

Contestants should wait their turn to measure trees and 4-H'ers from the same county must split up. After calculating the total volume for all trees, an appropriate expansion factor should be applied to yield a per-acre estimate of sawtimber volume. Contestants then will complete the tree measurement scoresheet.

MEASUREMENT OF STANDING TREES STUDY GUIDE

Since a tree is similar in shape to a cylinder, volume may be determined by measuring its diameter and merchantable height. The diameter of standing trees is measured by a time-honored custom, at 4.5 feet above ground on the uphill side of the tree (if the tree is on a slope). 4.5 feet is a standardized height at a convenient location that is usually above the butt swell on most trees. Since trees are rarely perfectly round, a good practice is to include a second measurement 90° from the first measurement. Example 1: the first measurement = 16 inches, the second measurement = 14 inches, DBH = 15 inches. Example 2: the first measurement = 15.5 inches, the second measurement = 16 inches, DBH = 16 inches.

The height of a standing tree might be measured as total height (the entire height from ground line to the tree top) or merchantable height. Merchantable height varies, depending on the products that might be cut from the tree. The top diameter is sized by certain specifications. If a tree is to be cut into logs, the height usually is measured in 16-foot logs to the nearest full half-log. Merchantable height then should be measured from a 1-foot stump height to the merchantable height cutoff point, which is 8 inches in diameter toward the top of the tree. If the tree has an obvious fork or a major defect, such as a crook, holes, or rot, then stop the merchantable height measurement at that point.

Figure 1 on page 21 shows how the tree scale stick is used to estimate tree diameter. Use the flat side of the stick, which should read diameter of tree in inches. The instrument on this side of the tree scale stick is called a Biltmore stick. Hold the stick perpendicular and level against the tree, 4.5 feet above the tree's base, and 25 inches from the eye. When the stick is held level against the tree at the appropriate height and distance from the eye, then close one eye. Without moving your head throughout this process, line up the left side of the stick with the left side (edge) of the tree. Move your eye (not your head) across the stick to the right side (edge) of the tree and where the tree edge intersects with the stick, then read the tree diameter mark on the stick to the nearest inch.

Figure 2 on page 21 shows how the tree scale stick is used to estimate merchantable height. To measure the merchantable height of a tree, pace the distance required by your Biltmore stick away from the tree (typically 66ft.) to a point where the merchantable height can be seen. You should move away from the tree on the same contour as the tree rather than uphill or downhill. Also, it is best if the tree does not lean strongly toward or away from you. Hold the tree scale stick such 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 bottom of the Biltmore stick (zero end) should point toward the ground. Plumb (hold straight up and down) the stick 25 inches from the eye. Sight the zero end at stump height (1ft. above ground line). Do not move your head or the stick. Move your eye to look up the stick to the point where the top of the last merchantable cut would be made (8-inch diameter, or at the first major fork or major defect). Read the merchantable height to the nearest full half-log. For example, if the merchantable height is slightly more than 2.5 logs, you can record it as 2.5 logs. But, if the merchantable height is slightly less than 2.5 logs, you should record it as 2 logs.

Accurate pacing is needed to find the appropriate distance from the tree. Practice pacing prior to the contest to improve your distance accuracy. The 25-inch distance from your eye to the stick is still the same as in measuring tree diameter.

Note: Extension agents are advised and strongly encouraged to bring the same sticks that are used in practice to the contest so each 4-H'er will have consistency in measuring sticks for competition. A limited number of sticks will be available for loan at the contest.

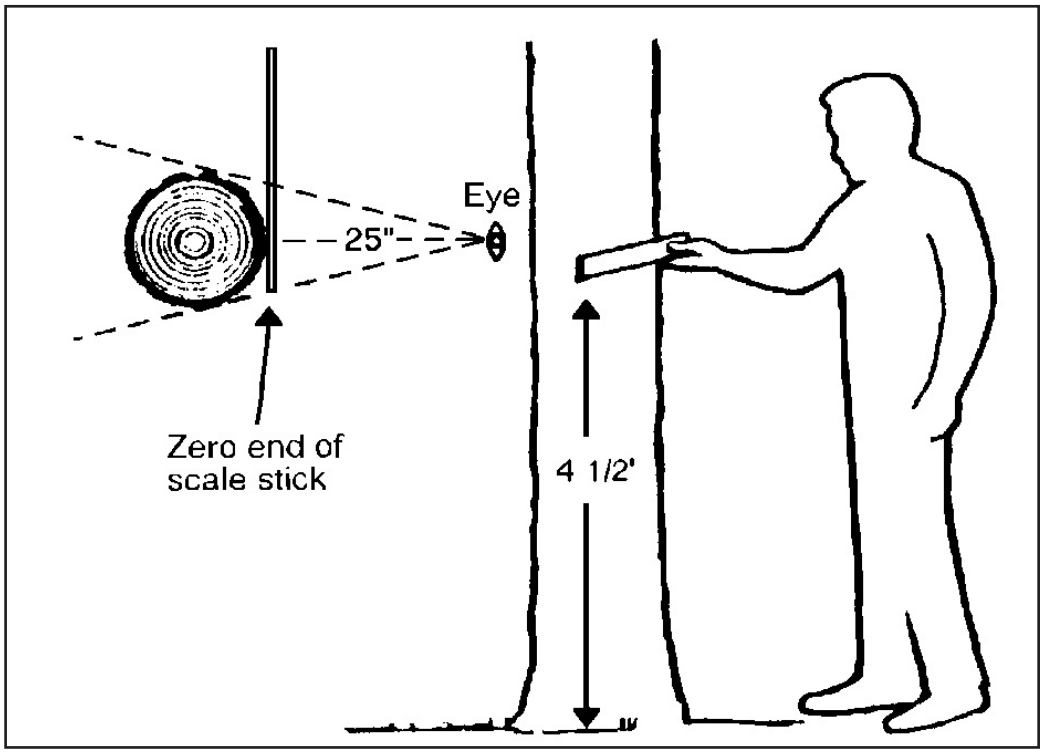

Figure 1. Use of tree scale stick to estimate tree diameter 4 1/2 feet above ground.

Contestant should note the appropriate distance for a given tree scale stick.
Some sticks are graduated for varying reach.

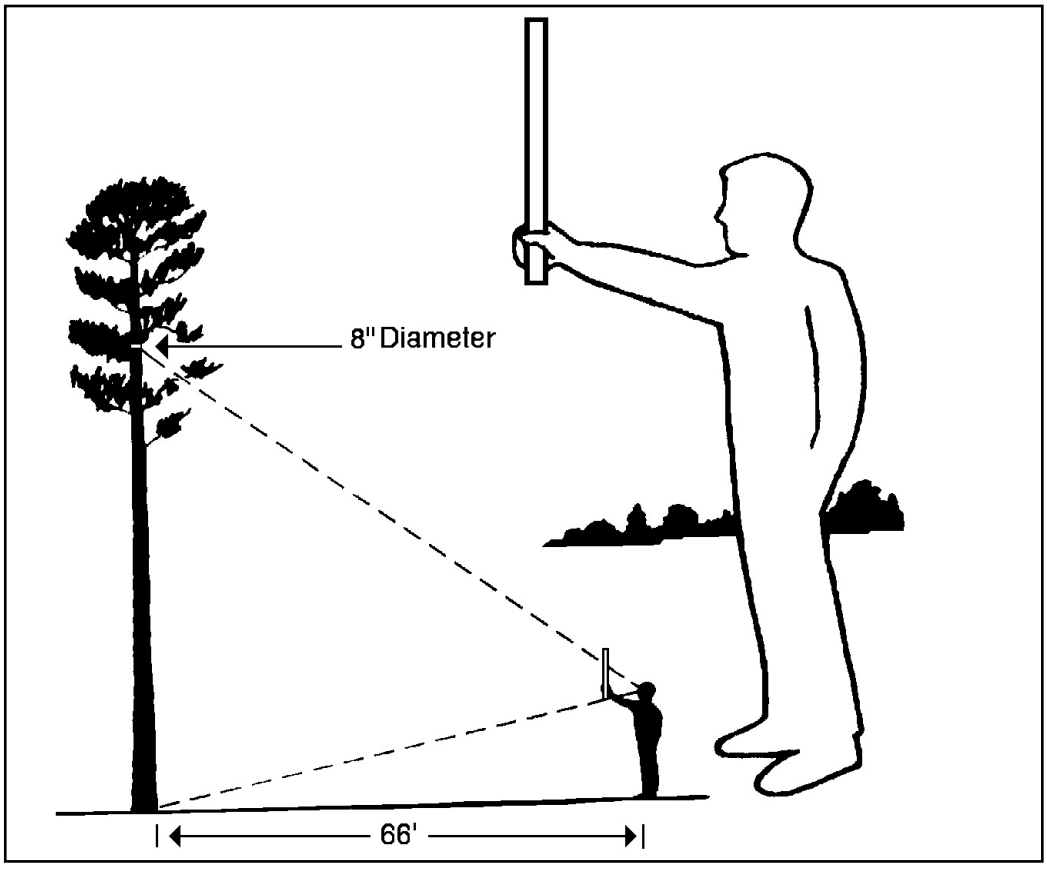

Figure 2. Use of tree scale stick to estimate merchantable height.

BOARD FOOT VOLUME TABLE

To use this table, first measure the diameter at breast height (DBH), then the merchantable height of the tree to the nearest full half-log. Read down the left column until you come to the row listing tree diameter (i.e., DBH). Move across from left to right until you come to the column listing tree merchantable height at the top (i.e., the number of 16-foot logs). At the intersection of that row and column, you will find merchantable board foot volume of the tree. Read and record each tree volume directly and separately. Do not use the volume table on the tree scale stick. Ask the judge for an official 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

Place Contestant Label Here

Tree Measurement Score Sheet

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.**

For Official Scoring Use Only 1 2 3 4 5 6 7 8 9 0

Place Contestant Label Here

Tree Measurement Score Sheet

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.**

For Official Scoring Use Only 1 2 3 4 5 6 7 8 9 0

COMPASS AND PACING

Junior and Junior High Divisions

Contestants are only required to estimate ground distance by pacing. The course layout will consist of three lines. For example, A to B, B to C, and C to D. Contestants should get in the habit of writing down their answer at the end of each line, then totaling their distances at the end. For each 1 foot off from the actual total, one-half point will be deducted from 50 total possible points for this portion of the contest.

Senior High Division

Contestants will learn to estimate ground distance by pacing and determine direction of travel using a compass. This portion of the contest will be accomplished by measuring a course of five lines. Lines may be level or may slope uphill or downhill. Successive lines may or may not be continuous.

Contest Rules

Each contestant should determine the number of paces he or she takes per 100 feet on a practice course prior to the contest. Pacing distances must be estimated using a walking stride. No heel-to-toe or other measurement is allowed.

A Silva Ranger mirror-sighting type azimuth compass will be used during the contest. A contestant may use his or her own handheld compass as long as it is neither more accurate nor more sophisticated than a Silva Ranger compass. The contest judge will have a limited number of compasses that may be used upon request. It is strongly encouraged that all participants bring their own compass. Compass declination should be set at zero. No bearing / quadrant compasses will be allowed.

The course layout will consist of five lines with staked corners. Effort will be made to avoid dense brush, large rock outcrops, steep slopes, and flooded wetlands on the contest course. No major water crossings will be allowed (i.e., no swimming or wading across deep water).

The judge(s) will provide instructions before beginning the course. The exercise will be completed on an individual basis. No more than one contestant is allowed at each starting point at a time (i.e., other contestants should wait in line at a distance). Each contestant will measure the azimuth and distance for each line, record the measurements on a score sheet, and return the score sheet to the judge.

Contestants may receive a maximum total score of 50 points. A maximum of 10 points is possible for each of the five lines, 5 points for the correct azimuth, and 5 points for the correct distance. One-half point will be deducted for each degree of error of the azimuth up to a maximum of 5 points per line. One-half point will be deducted for each foot of error in distance up to a maximum of 5 points per line.

Time limits are set by the contest chairperson.

COMPASS AND PACING STUDY GUIDE

Foresters often are required to estimate horizontal distances by pacing and to determine the direction of travel using a compass. These methods are useful in cruising timber and locating property boundaries, so it is important to know how to pace and use a compass.

A compass is used to tell the direction of travel by estimating the angle of deflection from magnetic north. Magnetic north is the direction toward which the compass needle always points. Most compasses are designed to measure direction in either azimuths or bearings. Azimuths range from 0° to 360°. Bearings range from 0° to 90° in each of four quadrants. Only azimuth measurements will be allowed during the contests.

Metal objects can interfere with the magnetic needle on a compass. Do not use your compass near vehicles, metal posts, or other metal objects, including those on yourself. For the compass portion of this contest, contestants will aim their compass from one known point to another and write down the azimuth. “Red Fred in the Shed” is a rhyme that is used to remember the process of orienting your compass. Consider the floating red needle (North arrow) as “red Fred,” Consider the orienting arrow as the “Shed.” Step 1: move your body such that you are facing the desired direction point. Step 2: hold the compass level in front of you and directly over your exact location. Step 3: aim (using the sight if the compass has one) the compass perfectly at the desired direction point. Step 4: carefully turn the azimuth ring (or dial) until “red Fred” is “in the shed” and double check while being sure to hold the compass perfectly level and in a perfect line of sight. Step 5: read and write down the azimuth reading at the index line (or index pointer).

Pacing is an expedient but crude method of determining ground distances. A pace is two steps (Figure 3). On level, open ground, pacing can be fairly accurate with practice. However, the accuracy of pacing diminishes on slopes and across rough terrain (Figure 4). To correct for slope, the following suggestions from the Forestry Handbook are provided:

In difficult terrain, no attempt should be made to maintain a standard pace. Instead, allow for its inevitable shortening (uphill) by repeating the count at intervals. For example, on moderate, uphill slopes, count every tenth pace twice: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 10, 11. etc. On steeper slopes, it may be necessary to repeat every fifth pace twice: 1, 2, 3, 4, 5, 5, 6, etc. Consistent accuracy in pacing under such conditions is attained only by practice and is maintained only by constant checking. On downhill slopes, pace may lengthen. In this case, do not count the tenth pace on moderate downhill slopes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11. On steeper, downhill slopes it may be necessary to not count every fifth pace: 1, 2, 3, 4, 6, 7, 8, 9, 11 etc. These are simply suggestions, so be sure to practice and figure out what works best for you. (Forestry Handbook, 1955)

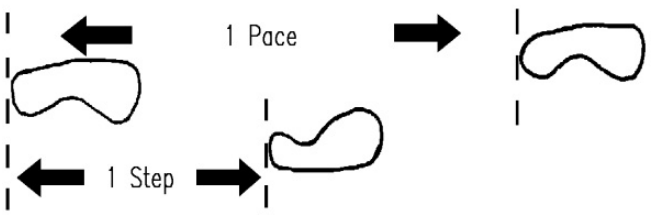

Figure 3. Illustration showing the difference between a step and a pace.

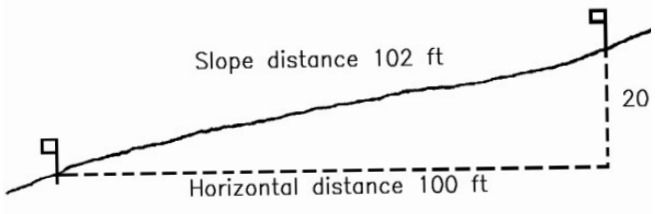

Figure 4. Estimating horizontal distance on a 20 percent slope.

To determine your pace, you should comfortably walk a measured distance (100 feet) and count your 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 paces. For example, if it takes 17 paces to cover 100 feet your pacing factor is 100 divided by 17, or 5.88 feet/pace. So, if you were asked to measure the distance between two points during a 4-H contest, 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 25 paces between two flags. 25 times my pacing factor of 5.88 feet/pace, means the distance should be 147 feet." Considerable practice is required for accurate pacing.

A chain (66 feet) is a common unit of measurement in forestry (80 chains = 1 mile). Practice your pacing by measuring a 66-foot course with a measuring tape to establish your pace accurately. Pace the course two or three times and compare the results. Knowing how many paces per chain is an important skill when doing forestry-related work. Feel free to nail down your pace at both the 100-foot and 66-foot distances. Have fun!

Practice Course

Contestants can set up labeled pin flags (or other markers) as a practice course. Metal pin flags can interfere with compass readings, however, so wooden stakes may be better. A parent, guardian, or coach can measure the azimuth and distance using a measuring tape from point A to point B and so on. A practice course should contain at least five lines to best mimic the actual contest. For example, A to B, B to C, C to D, D to E, E to F. Contestants should get in the habit of writing down their answers on a scorecard like the one on page 27. Setting up a practice course that traverses a variety of terrain and vegetation types is recommended to help you gain experience in real settings similar to an actual contest.

Color coding and labeling markers may help with organization and execution of practice sessions.

For example:
A-B (orange)
B-C (blue)
C-D (pink)
D-E (green)
E-F (yellow)

Place Contestant Label Here

Compass and Pacing Score Sheet

SENIOR HIGH

Contestants should fill in the azimuth and distance for each line.

Line	Azimuth	Points	Distance	Points	Score
A-B					
B-C					
C-D					
D-E					
E-F					
				Contestant Score	

JUNIOR/JR HIGH PACING SCORE SHEET

Total Estimated Distance _____	
Contestant Score	

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1 2 3 4 5

6 7 8 9 0

FOREST EVALUATION

The Forest Evaluation is only part of the state contest.

Objectives

Teams will learn to evaluate site factors and stand characteristics that affect the growth of trees. Each team will conduct a forest inventory, which will lead to recommended management practices. It is necessary for participants to carefully study the Forest Evaluation Study Guide on pages 29-35 to successfully compete in this portion of the contest. Various components of the forest evaluation are closely related, so it is very important to gain an understanding of these relationships.

Contest Rules

Teams will complete the Forest Evaluation as a group. Therefore, group discussion is expected and encouraged.

Forest Evaluation is divided into four parts; 1) Site Evaluation, 2) Forest Stand Evaluation, 3) Forest Inventory, and 4) Recommended Practices.

Teams will be given a forest management scenario for the plot designated for the event. The scenario may include information about the landowner, management objectives, local markets for forest products, etc. Teams will be responsible for completing all four parts of the Forest Evaluation.

Devices and conditions to aid participants in making their decisions may include compass, tree scale stick, marked plot boundaries, designated trees flagged for measurements, management scenario including timber prices, board-foot volume table, and stocking table.

Twenty-five points are possible for each part; a total of 100 points is possible for the entire contest.

> **Part 1** Site Evaluation: Categories A, B, C, D, and E have a possible point value of 5 points each totaling 25 points.
>
> **Part 2** Forest Stand Evaluation: Categories A, B, C, D, E, and F have a possible point value of 4 points each. One point is given for completing the task totaling 25 points.
>
> **Part 3** Forest Inventory: For each correct answer of tree species, crown class, DBH, and height in 16-foot logs, the point value is one point each. Board-foot volume per acre and tree value per acre are worth 2.5 points each, provided that they are within +-10% of the correct value (No points are awarded outside of +-10%).
>
> **Part 4** Recommended Practices: Total number of correct answers minus total number of incorrect answers provided by each team is then divided by the actual number of correct answers times 25.

Time limits are set by the contest chairperson.

FOREST EVALUATION STUDY GUIDE

Every acre of land is different in its capabilities and potential uses. Consequently, professional foresters and other land managers understand that each acre should be evaluated, understood, and treated according to what is ecologically and economically appropriate. It is best when the management objective(s) for a property aligns with the capabilities of the land and addresses the conservation needs, while also restoring (in some cases) and maintaining the overall ecological integrity of the site. Every acre has conservation potential and often, management can lead to both ecological and economic success.

Timber harvesting practices associated with forestry are sometimes viewed as destructive, but this is misleading. Forestry is both science and art. Natural resources conservation is rooted in the forestry profession. Forestry gave birth to wildlife conservation and ecological restoration. There is more to forestry than timber harvesting, yet harvesting timber is sometimes necessary to restore and/or maintain naturally functioning ecosystems.

The forest evaluation component of the Tennessee 4-H Forestry contest is intended to combine the knowledge, skills, and abilities of the participants so that each team will work together to produce a management plan. Although the evaluation is on a stand level, each part of the Forest Evaluation covers important steps involved in forest management planning and land stewardship. Teams will learn that together they can promote and produce healthy forests.

Some forested lands produce valuable timber whereas others do not. The Forest Evaluation is based on the premise that trees may be harvested, now or in the future, to maximize the goals of a specified landowner.

Part 1: Site Evaluation

A site is an area in which trees occur and form some type of forested cover such as savanna, woodland, or forest. Site characteristics differ across the landscape. Factors influencing plant occurrence, growth, and reproduction include geographic location, climate, elevation, soil type, aspect, percent slope, slope position, land use, wildlife, livestock, and competition with other plants. These factors can be used to determine the forest land capability class of a particular tract of land.

Soil type is determined largely by the relative proportions of sand, silt, and clay. Soil types vary across the landscape, but each soil type shares a certain set of well-defined soil properties. Soil depth is the distance from the soil surface down to unweathered rock or an impermeable layer restricting water movement and root penetration. Even a high-water table on bottomland sites can restrict 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 and fall in 100 feet of horizontal distance. For contest purposes, slope percent is divided into the following categories: 0-20%, 20-40%, and 40%+. Slope percent can be measured with an Abney level or a clinometer. Rise and run will be provided at the contest.

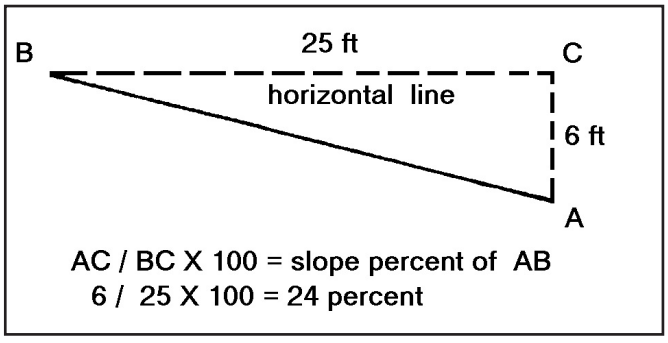

Figure 5. Method of determining slope percent

Aspect is determined by taking a compass reading while facing downhill. The direction water would flow gives the compass direction. Any slope facing north and east of a line extending from NW (315°) to SE (135°) is considered to have a northeast (NE) aspect. Any slope facing south and west of the same line is considered to have a southwest (SW) aspect. See figure 6 below.

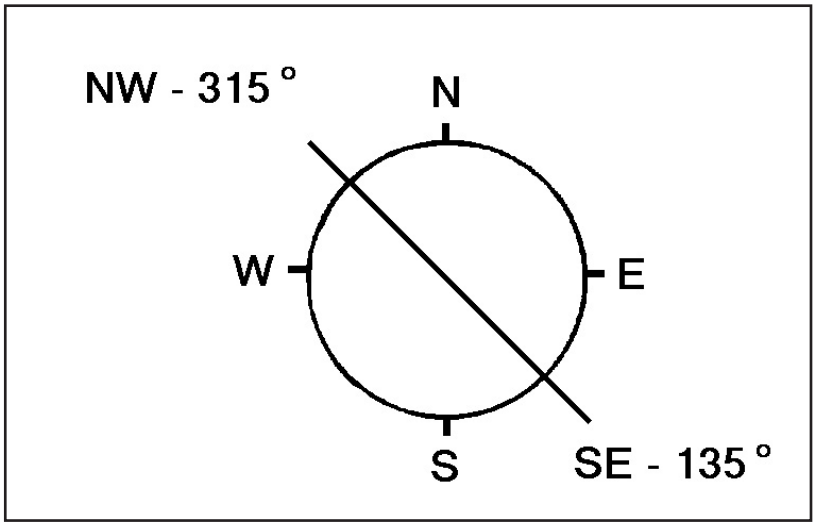

Figure 6. Method of determining aspect.

Slope position is determined only on sites with irregular topography. It is not calculated on flat terrain. Slope positions are classified as upper 1/3, middle 1/3, and lower 1/3. Ridgetops, plateaus, and bottomlands are classified separately in land capability.

Forest land capability classes are described below for 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 retains water at optimum levels for tree growth. It is well drained, but not droughty and will almost always have a northeasterly aspect. These sites produce timber well.
>
> **Class II. Good** is usually gently sloping. In some cases, there are drainage issues 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, shaly, have low fertility, be extremely dry, and often have a southwesterly aspect.

Part 2: Forest Stand Evaluation

Contestants should evaluate the following categories within the designated plot only and nothing beyond the plot perimeter.

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

> **Grazed** – tree seedlings eaten or trampled, soil compacted, and/or bark rubbed off.
>
> **Ungrazed** – no evidence of grazing damage.

Fire can be destructive or used as a management tool. Consumption of the litter layer, crown scorch, bark splitting or sloughing, basal fire scars (trunk wounds), and charred bark are evidence of fire. Wildfire is unplanned, unintended, and uncontrolled fire, except when arsonists start fire intentionally for destructive reasons. Prescribed fire refers to the controlled application of fire by wildland fire management experts to meet specific management objectives that may include fuels reduction, ecological restoration, wildlife management, site preparation, forest stand management, as well as other management objectives. When implemented correctly, fire can be applied without damaging valuable timber. Contestants should look for charred bark at the base of trees and fire scars on the uphill side of trees that generally are triangular in shape.

Size distribution is classified into 4 categories. In some stands, more than one size class may be represented, particularly in uneven-aged stands, which is defined as having three or more distinct age classes. To determine the size class of the stand, evaluate the trees that represent the overstory or main forest canopy of the plot. Specific size classes are defined as: 0-1 inch diameter (seedlings); 1-3 inches diameter (saplings); 4-10 inches diameter (poles); and trees greater than 10 inches diameter (sawtimber). All of these are measured at DBH, but seedlings may be shorter than 4.5 feet.

Forest cover types are different from each other in species composition and management requirements. The following forest cover types, defined by the Society of American Foresters in *Forest Cover Types of the United States and Canada*, 1980, are used in this contest:

> **Hard Pines** (Type 77, Shortleaf Pine – Virginia Pine; and Type 81, Loblolly Pine)
> Dominant species – shortleaf pine and Virginia pine, or loblolly pine
> Associated species – pitch pine, Table Mountain pine, various oaks and hickories, sweetgum, and red maple
>
> **Mixed Oaks** (Type 53, White Oak; and Type 55, Northern Red Oak)
> Dominant species – white oak and northern red oak
> Associated species – black oak, scarlet oak, chestnut oak, white ash, and yellow-poplar
>
> **White Pine** (Type 21, 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** (Type 57, Yellow-poplar; Type 58, Yellow-poplar – Hemlock)
> Dominant species – yellow-poplar and eastern hemlock
> 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 (Type 52, White Oak, Red Oak, Hickory)
Dominant species – northern red oak, white oak, black oak, and hickories
Associated species – a wide variety of hardwood species

Northern Hardwoods (Type 25, Sugar Maple-Beech-Yellow Birch; Type 60, Beech-Sugar Maple)
Dominant species – American beech, sugar maple, (yellow birch)
Associated species – American basswood, red maple, eastern hemlock, white oak, northern red oak, white ash, black cherry, mockernut hickory, sweet birch, yellow-poplar, cucumbertree, and black walnut

Stand origin can vary from one stand to another, even though the stands are of the same forest cover type and size distribution. Timber stands may originate by several means. Natural stands may arise from seedlings, sprouts, or a mixture of both. Sprouts, also known as coppice, can be from either cut stumps or root suckers. Sprouts are important sources of new trees in the regeneration of many hardwood forests. Coppice stands will have several main stems originating from a single larger stump. Stands that 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 use available space. Stocking is measured using the average diameter of all trees 10 inches DBH and larger, and the number of trees per acre 10 inches DBH and larger. Figure 7 is used to determine stocking. A well-stocked stand is one in which the trees are well distributed, and all the space is filled, but the trees still have room to grow. An understocked stand is one in which there are open spaces between the trees such that the stand is not producing its full potential. An overstocked stand is one 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 and the average DBH is 16 inches for 12 trees, is the stand understocked, well-stocked, or overstocked? If there are 12 trees that average 16 inches DBH in a 1/10 acre plot, there are 120 trees per acre. Look at the Stocking Guide (Figure 7) 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." Therefore, you should indicate on your score sheet that the plot is overstocked.

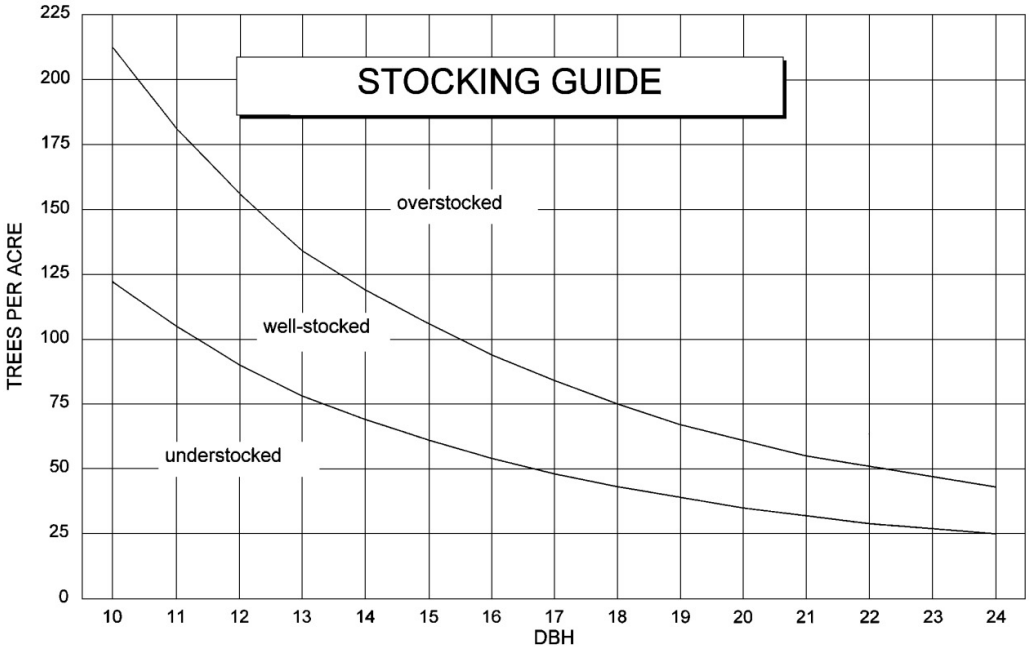

Figure 7. Method of determining stocking.

Part 3: Forest Inventory

Species of each numbered tree should be listed using the common names from the tree list on pages 6-7.

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

> **Dominant:** Trees with crowns that extend above surrounding trees and receive sunlight from above and around the crown (sides).
>
> **Codominant:** Trees with crowns that form the general level of the canopy and receive sunlight from the top, but little sunlight from the sides.
>
> **Intermediate:** Trees that are shorter and their crowns are mostly below the general level of the canopy, receiving sunlight from the top and typically only at midday.
>
> **Suppressed:** Trees with crowns entirely below the general level of the canopy and receiving no direct sunlight.

DBH (diameter at breast height) of each tree should be measured and recorded to the nearest even 2-inch diameter class.

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

Board-foot volume per acre: Board-foot volume of each tree should be determined and recorded using the table provided by the judge (see page 22). Board-foot volume per acre should be calculated after considering plot size.

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 scenario. For example: if a 20 inch, 2.5 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 X 0.348 = $104.40. Tree value per acre should be calculated after considering plot size.

Part 4: 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 their management objectives. Based on the data collected about the site and forest stand, 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 achieve the landowner's objectives.

Sample Scenario: Henry and Betty Stevens are a couple in their late forties. Their twins will be starting college next fall and they want their 40-acre woodlot to help pay for college expenses. Henry enjoys hunting white-tailed deer and wild turkey on the property and often invites his brother and cousin over to hunt with him. They do not want any activity in their woods to degrade habitat for deer and turkey. They have owned the woodlot for about 20 years and have managed it diligently over that time. They have a stewardship plan that was written soon after they purchased the property, and it has been updated once. Local timber 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 reach their objectives at this time?

Thinnings are partial cuttings in even-aged timber stands. They are designed to improve growth of the remaining trees (residuals) by regulating stand density. Species composition can be manipulated in mixed species stands designated for thinning. Proper thinning enhances growth and vigor of fewer but higher quality trees. Thinnings can be commercial, where the wood is of merchantable size, or precommercial, where the wood has no merchantable value (i.e., the trees are too small for commercial value).

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 putting "at risk" wood to use. These harvests commonly are conducted during southern pine beetle outbreaks and after wind damage.

Selection Harvest is a regeneration method used in uneven-aged stands, or to create uneven-aged stands, in which individual trees or groups of trees (group selection) are removed. Some trees in each age class are removed including mature trees, poorly formed trees, and undesirable species. Do not confuse a selection harvest with a select cut. *A select cut typically is a diameter-limit cut, which means the logger will harvest trees above a specific diameter. Select cutting involves cutting the best and leaving the rest, which is high-grading. This is NOT a good practice!*

Shelterwood or Seed Tree Harvests are regeneration methods designed to create an even-aged stand. These harvests remove the mature stand leaving only few, scattered, yet well distributed, trees for seed or more individual trees to shelter (and seed-in) the new stand. The final harvest removes the mature trees once the new stand is adequately established.

Clearcut or Clearcutting is a regeneration method that involves removing the entire stand in one cutting to create an even-aged stand. Regeneration is provided for naturally, where desirable tree species seeds and/or seedlings exist, or artificially through planting, where conversion to a more desirable species is recommended. Clearcutting performed correctly can provide outstanding ecological benefits.

Prescribed burning is the controlled application of fire by professional(s) under specified environmental and fuel conditions to accomplish clearly outlined management objectives. Prescribed fire can be used to restore, manipulate, and maintain desirable forested ecosystems with a wide variety of benefits. Frequent prescribed fire often leads to a biodiverse landscape with more sunlight, a variety of herbaceous plants, pollinators, and a wide array of wildlife species.

Wildlife Habitat Improvement may be achieved through active forest management. However, any forest management activity will have a positive impact on some wildlife species and a negative impact on others. Therefore, it is important to set wildlife management objectives that can be reached and maintained over time. Forestry practices can help landowners accomplish their wildlife management objectives. Examples include riparian buffer establishment, developing brood cover for wild turkey, increasing mast production for black bear, and much more.

Recreational Opportunities often go hand-in-hand with forest management. Hiking, hunting, birding, fishing, mountain biking, cross country skiing, OHV riding, etc., are examples of recreational activities that are commonly included in forest management plans. The ultimate decision is largely based on the objectives of the landowner.

Non-Timber Forest Products may be generated through active forest management. Development of nontimber forest products can happen simultaneously with other forest management practices and is more developed in some regions of the United States. It may be a hobby for some landowners yet in some cases, can generate significant income for other landowners. Examples include hunting leases, livestock grazing, ginseng, mushroom farming, maple syrup production, and much more.

FOREST EVALUATION SCORE SHEET

County _____ Total Score_____

1. 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" or more						Shallow - less than 24"					
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												
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 forest land capability class by circling the correct **Slope Position** below the correct **Aspect**. The Roman numeral inside the **Slope Position** box indicates the class. **Circle the class below.**

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

Part 1 Score_____

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2. FOREST STAND EVALUATION: (Check the correct answer in each section).

A. Grazing Damage
_____ Grazed
_____ Ungrazed

B. Fire
_____ Unburned
_____ Wildfire
_____ Prescribed fire

C. Stocking
_____ Understocked
_____ Overstocked
_____ Well-stocked

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. Size Distribution
(May be more than one answer)
_____ Seedlings
_____ Saplings
_____ Poles
_____ Sawtimber

Part 2 Score _____

3. FOREST INVENTORY **Plot size** _____

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

Crown Class: D = dominant, C = co-dominant,
I = intermediate, and S = suppressed

Part 3 Score_____

4. PRACTICES RECOMMENDED: (Clearly mark the practices you recommend.)

1. Which species (1 or more) would you favor on this site?_____
2. ☐ Protect the area from wildfire. Report any fire by calling 911.
3. ☐ Stand is not yet merchantable, leave alone to grow.
4. ☐ Conduct a thinning.
5. ☐ Clearcut the stand and plant with desirable species.
6. ☐ Cleacut the stand and allow for natural regeneration.
7. ☐ Conduct a shelterwood or seed-tree harvest.
8. ☐ Conduct a selection harvest.
9. ☐ Conduct a salvage or sanitation harvest.
10. ☐ Use Best Management Practices such as seeding landings and haul roads, installing waterbars to prevent erosion, leaving buffer stripes along streams, minimizing stream crossings, and abiding by the Sustainable Forestry Guidelines.
11. ☐ Manage stand for non-timber forest products.
12. ☐ Manage stand for wildlife habitat improvement.
13. ☐ Manage stand for recreational opportunities.
14. ☐ Conduct a prescribed burn.
15. ☐ Fence the area from livestock.

Part 4 Score _____

NOTES

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