



Texas Agricultural Extension Service  
The Texas A&M University System

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# Texas 4-H Forestry



INVITATIONAL



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Texas Agricultural

Extension Service,

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University System

# Texas 4-H Forestry Invitational



Sweetgum

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This handbook was prepared by the Texas 4-H Forestry Invitational Committee. This is a revised edition; the event and handbook may have additional changes.

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Photographs and drawings courtesy of the Texas Forest Service.

## Overview



American basswood

THE TEXAS 4-H FORESTRY INVITATIONAL is a competitive event on forestry knowledge and skills. Each year in East Texas, teams of three or four youths from participating counties compete in six contest areas:

- Tree identification
- Forest evaluation
- Tree measurements
- Compass orienteering
- Forestry Bowl
- Insect and disease identification

The Texas 4-H Forestry Invitational provides an opportunity for 4-H Forestry members from all counties to:

- Develop leadership skills and work on improving character and becoming effective citizens;
- Appreciate the importance of conserving woodland as a source of products and services needed for quality living and a healthy environment; and
- Learn practical forestry skills in forest management and forest product use.

Although competitive in nature, the invitational is managed as an extensive forestry educational experience. The setting, contests, leadership and supplementary events provide opportunities for participants to explore the broad aspects of forestry as a potential career field.

## Team development

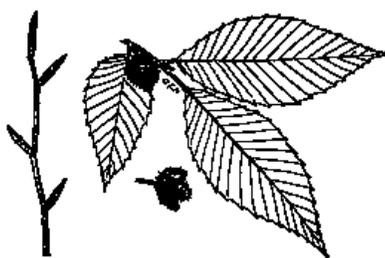
Teams must be developed based on county structures and resources. We recommend that each county set up a system for potential team members to become thoroughly familiar with the invitational events.

This handbook is intended as both a manual for the Texas Invitational and as a guide for team development. We suggest that it be supplemented with other materials to broaden the 4-H members' understanding of forestry. Such understanding is essential not only to success in the invitational, but also to future successful management of forests and influences on them.

## Goals

THE TEXAS 4-H FORESTRY INVITATIONAL is a competitive event for teams of three or four 4-H members from each county. The event is designed to promote better forestry knowledge in 4-H members, volunteer leaders and Extension agents at local, county, district and state levels by:

- Presenting, identifying and locating the renewable resources of the forest environment, such as forest products, water, outdoor recreation, wildlife and selected grazing;
- Establishing a natural resource value system for participating 4-H members;
- Helping 4-H landowners understand techniques of managing their lands and improving the understanding of 4-H'ers as potential landowners; and



American beech

- Furnishing facts and scientific procedures for future landowners, administrators and planners who are not professional land managers who will need a framework for making decisions.

Although they are not forest landowners, as future adults, the 4-H'ers will learn to weigh and understand renewable resource management needs.

The Competitive Team Approach used in the Texas 4-H Forestry event offers:

- A fun, exciting learning experience that involves collaboration and teamwork.
- Intensified learning opportunities using scientific management information and factors concerning forest resources;
- Standard or similar references, materials guides and understandings about tree identification, forest measurements and silviculture in management, insect and disease problems, etc;
- Encouragement for rural, suburban and urban teens to share ideas and visit potential management areas with a new perspective of 4-H forestry;
- New insight to senior members who serve as teen leaders with younger 4-H members in beginning forestry projects;
- Opportunities for teen members to set goals and discuss management procedures with other 4-H'ers and with professional land managers; and
- A new dimension for older 4-H member activities and incentives for younger members beyond the present project-oriented program.

## General rules

THIS EVENT MUST COMPLY with all policies and guidelines for 4-H competitive events issued by the Texas Agricultural Extension Service.

### Contestants and eligibility

1. Each county may enter up to three teams. A team consists of no less than three and no more than four official entrants who are up-to-date 4-H members. If a county cannot assemble a three-member team, up to two individual members may participate in individual events.
2. All contestants must not have passed their 19th birthday on January 1 of the contest year.
3. An individual may enter the Texas 4-H Forestry Invitational event as often as desired providing he/she has not previously been a member of the senior first-place team in the invitational.
4. The team of contestants must be certified as the official entry by the county Extension agent. The county may select individuals or the team by any procedure it considers appropriate. It is advisable to have one team of senior 4-H members only, because only a senior team can represent Texas at the national invitational.



American sycamore

## General contest rules

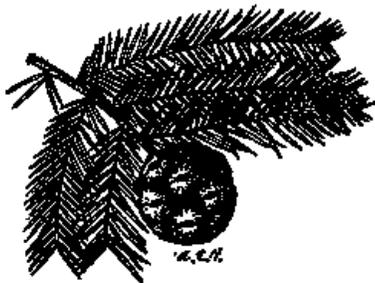
1. Team entries must be submitted on an official entry blank, by the specified due date.
2. Each team shall have no more than one coach and two assistants (or other noncontestants) accompanying the team to the invitational. Current 4-H members may serve as coaches for the team.
3. Adult representatives from counties not competing in the current invitational are welcome to observe. They may be asked to assist in the invitational administration.
4. Only contestants and designated officials can be within the perimeter of an event other than certain parts of the Forestry Bowl. Once a contestant has started an event, he/she may not talk with anyone other than a designated official until that particular event is completed, unless it is a team event.
5. A team may be composed of either three or four members. Each county will choose a team captain for the invitational contest. Team scores will be based on the **three highest scoring team members in each individual contest area**. Individual contestants with highest scores will also be selected and recognized.
6. Each team member must bring a pencil, calculator and clipboard or writing board. Contestants are encouraged to wear field clothing and heavy shoes.
7. No alcoholic, narcotic or tobacco substances may be used during the invitational. The invitational rules will be enforced.
8. After the invitational, individual and team scores will be sent to the team coach. Contest score sheets will not be distributed.

## Appeals procedure

The 4-H Forestry Invitational contest is primarily an educational program; few problems should be associated with it. However, because it is human nature to feel pressured to win, the Appeals Procedure, as stated in the ECOP Policies and Guidelines for National 4-H Competitive Events, will be used if any questions arise.

The Invitational Management Committee will serve as the Appeals Committee and review recommendations for operational and procedural changes. Appeals must be filed by the invitational team captain with the invitational chairman within 30 minutes of the end of the day's scheduled contest events and before supper of that day. Forestry Bowl appeals will be handled according to bowl rules as stated on page 16.

# Tree identification



Bald cypress

BECAUSE DIFFERENT SPECIES of trees have various requirements for good growth, and they also differ in merchantability, 4-H Forestry Invitational contest participants must be able to identify trees of the forest.

All trees to be identified will be taken from the Official list of trees below.

## Contest rules

1. Contestants will be required to identify species from the Official list of trees. They 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 wrong. Example: Maple instead of Red Maple, or Shortleaf instead of Shortleaf Pine.
2. Contestants will be given time to identify the tree specimens and record the information on the score sheet.
3. 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 one used on the official species list.

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## Official list of trees Common names

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American basswood	Hercules-club,	Pecan
American beauty berry,	toothache tree	Pines:
French mulberry	Hickory:	Loblolly pine
American beech	Black hickory	Longleaf pine
American hornbeam	Mockernut hickory	Shortleaf pine
American sycamore	Holly:	Slash pine
Bald cypress	American holly	Virginia pine
Black cherry	Yaupon	Plum
Blackgum, black tupelo	Locusts:	Red buckeye
Black locust	Black locust	Red mulberry
Black walnut	Honeylocust	River birch
Black willow	Magnolias:	Rusty blackhaw
Boxelder	Southern magnolia	Sassafras
Catalpa	Sweetbay magnolia	Southern bayberry,
Chinaberry	Maples:	waxmyrtle
Common persimmon	Florida maple	Sumac
Devils-walkingstick	Red maple	Sweetgum
Eastern cottonwood	Oaks:	Tree sparkleberry,
Eastern hophornbeam	Blackjack oak	farkleberry,
Eastern redbud	Chestnut oak	Yellow-poplar, tulip tree
Eastern redcedar	Live oak	
Elms:	Overcup oak	Reference: <i>Forest Trees</i>
American elm	Post oak	<i>of Texas: How to Know</i>
Winged elm	Southern red oak	<i>Them</i>
Flowering dogwood	Swamp chestnut oak	Bulletin 20
Green ash	Water oak	Texas Forest Service
Hackberry, sugarberry	White oak	I&E Section, P.O. Box 310
Hawthorn	Willow oak	Lufkin, TX 75902-0310
Hazel alder	Osage-orange, bois d'arc	*Cost: \$4

Team \_\_\_\_\_

Contestant \_\_\_\_\_

### Tree identification

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
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46. \_\_\_\_\_
47. \_\_\_\_\_
48. \_\_\_\_\_
49. \_\_\_\_\_
50. \_\_\_\_\_

Total score \_\_\_\_\_

# Measuring standing trees



Black walnut

STANDING TREES ARE MEASURED to estimate the amount of various forest products that might be cut from the trees. This measure is an estimate of volume present. Most timber sales are based on volume. All forest properties must have some estimate of total volume, volume per acre and volume by product so that future actions can be decided.

**Products:** Forest products that may be measured are poles and piling, sawlogs, veneer logs, pulpwood and fence posts.

**Method:** Because all trees are basically a part of a cylinder, they have a diameter and height that can be measured. The diameter of standing trees is measured by time-honored custom, at  $4\frac{1}{2}$  feet above ground on the uphill side of the tree. This is abbreviated as **DBH** (diameter breast height). How to determine the diameter is explained below.

The **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 for which it will be used. For trees to be made into poles or piling, the height is measured in feet, by multiples of 5 feet. The top diameter is fixed by certain specifications. If a tree is to be cut into logs, the lengths cut will vary, depending on the demand of the mill to which the logs will go. This is true of sawlogs as well as veneer logs.

**Tools:** A caliper, diameter tape or tree scale stick may be used to measure diameter. Because a tree scale stick will be used in the context, the drawing below shows how to use it to find tree diameter.

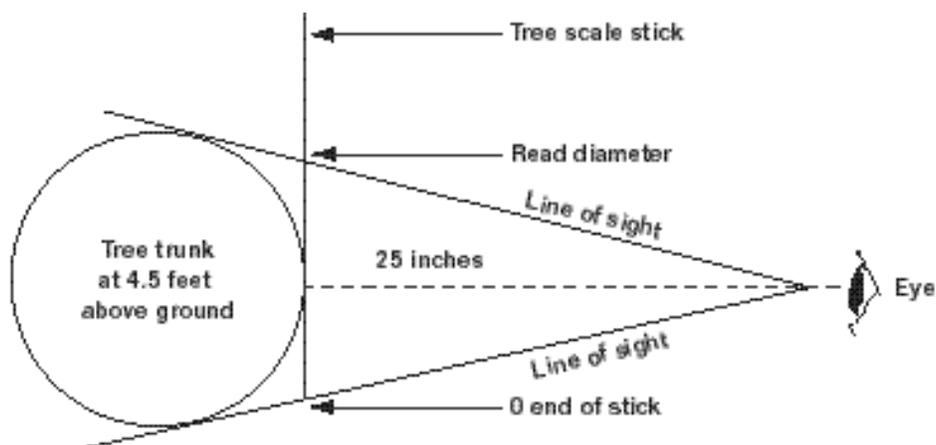


Figure 1. How to use a tree scale stick to measure tree diameter. Do not move head, just eye.

Use the flat side of the stick indicating “Diameter of Tree (in inches).” Hold the stick level at 25 inches from the eye, against the tree, at a height of  $4\frac{1}{2}$  feet above ground. Practice to find both the  $4\frac{1}{2}$  foot point in relation to your height and the 25-inch distance to your eye. After placing the stick against a tree, close one eye, sight at the left or zero end. This and the tree bark should be in the same line.



Boxelder

Now, **do not move your head**. Just move your eye across the stick to the right edge of the tree. Read the tree diameter to the nearest even inch. Hold the stick perpendicular to the tree.

To measure height, pace out 66 feet from the base of the tree, to where you can see the entire tree. Hold the stick so that the “Number of 16 foot logs” side faces you. Point the zero end toward the ground. Plumb the stick, at 25 inches from the eye. Sight the zero end to appear to rest at the stump height. **Do not move your head or the stick**. Look up the stick to the point where the top of the last merchantable cut would be made in the tree (8-inch diameter or at the first major fork or other major defect). Read sawlogs to the nearest full one-half log.

Practice pacing to find the 66-foot point. The 25-inch distance from eye to stick is the same as in measuring tree diameter.

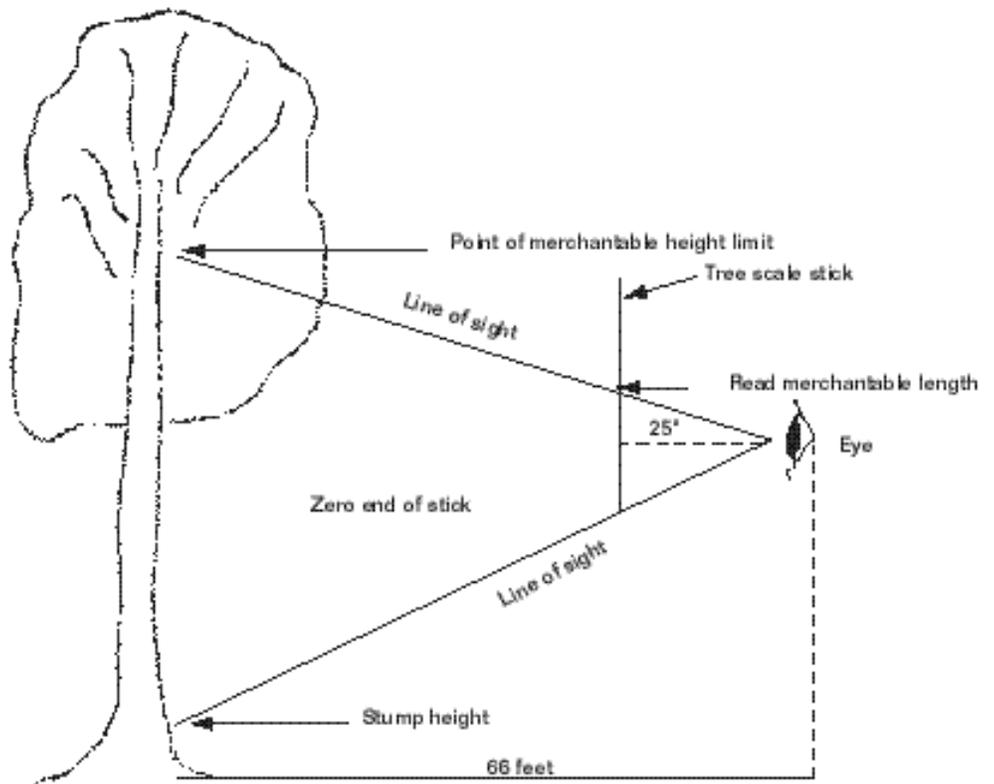


Figure 2. How to use a tree scale stick to measure tree height. Do not move head, just eye.



Common persimmon

## Volume tables

Below is a composite of actual volumes, on an average basis, for the product indicated. Once the tree is measured, enter the tree diameter (DBH) on the appropriate table from the left. Move across to the right to the column containing tree merchantable height at the top. At the intersection of these two points is that tree's volume. Read and record each tree volume directly and separately. **For contest purposes, do not use the volume on the tree scale stick.**

### Doyle Rule - Form Class 78

Volume (board feet) by number of usable 16-foot logs

Tree diameter dbh (inches)	1	1 <sup>1</sup> / <sub>2</sub>	2	2 <sup>1</sup> / <sub>2</sub>	3	3 <sup>1</sup> / <sub>2</sub>	4	4 <sup>1</sup> / <sub>2</sub>
10	14	17	20	21	22	—	—	—
12	29	36	43	48	53	54	56	—
14	48	62	75	84	98	98	103	—
16	72	94	116	132	149	160	170	—
18	100	132	164	190	215	232	248	—
20	135	180	225	261	297	322	346	364
22	174	234	295	344	392	427	462	492
24	216	293	370	433	496	539	582	625
26	266	362	459	539	619	678	737	793
28	317	434	551	650	750	820	890	961
30	376	517	658	778	898	984	1069	1160
32	441	608	776	922	1068	1176	1283	1386
34	506	700	894	1064	1235	1361	1487	1608
36	581	808	1035	1234	1434	1583	1732	1878
38	655	912	1170	1402	1635	1805	1975	2148
40	740	1035	1330	1594	1858	2059	2260	2448



Black cherry

## Tree measurement rules

1. A standard Doyle, Scribner, or International  $\frac{1}{4}$ -inch tree scale stick will be used in the contest. Any log scale stick may be used for practice, because all are based on the same principles. They may be bought from companies such as Forestry Suppliers Inc., Box 8397, Jackson, MS 39204; Ben Meadows Co., P.O. Box 80549, Atlanta, GA 30366; or TSI Co., Box 206, Flander, NJ 07936. Write for prices. These are the ones we know of now, but there may be others. It is advisable to write to all companies for price quotations, specifying "Tree Scale Stick." A stick may be custom made for smaller 4-H'ers.
2. A fixed radius plot\* will be selected and designated for use in this competition. Contestants must give the total volume of sawtimber on 1 acre as determined from the sample plot volume.
  - \*  $\frac{1}{10}$  acre radius = 37' 2.8" or 37.3'
  - $\frac{1}{5}$  acre radius = 52' 7.9" or 52.7'
  - $\frac{1}{4}$  acre radius = 58' 10.5" or 58.9'
3. Each contestant estimates each designated tree. All values are recorded. Tree diameters are taken to the nearest 2-inch class. Tree heights are taken to the nearest full half-log for sawtimber. A half-log is defined as being 8 feet long or longer but less than 16 feet long. The minimum log is 10 inches DBH (diameter breast height), 16 feet continuous merchantable length, and has a minimum top diameter of 8 inches.
4. Each tree volume will be in the volume table furnished to contestants. Record sawlog volumes as found in the table. Total all sawlog volumes after all designated trees have been estimated. Multiply the total volume by the appropriate factor to arrive at the volume per acre.
5. Two points are awarded for each correct species identification, DBH (diameter breast height), and number of 16-foot logs and board foot volume for a possible total of 80 points.
6. Twenty points are allowed for the correct sawtimber **volume per acre**. Remember: The total volume is the **volume per acre** as represented by the plot. Point allocation is 20 points for  $\pm 5\%$  of the official volume, 15 points for  $\pm 10\%$ , 10 points for  $\pm 15\%$ , and no points over  $\pm 15\%$ .
 

Example: If 4,000 board feet (bd. ft.) is the official volume, then estimates of 3,800 through 4,200 bd. ft. earn 20 points; 3,600 to 3,800, and 4,200 through 4,400 earn 15 points; 3,400 to 3,600, and 4,400 through 4,600 earn 10 points; and under 3,400 and over 4,600 receive no points.
7. The maximum number points for this plot is 100 or less, depending on the number of measurable trees within the plot boundaries for which individual tree figures are scored. The top three individual team member scores are combined for the team score in this event.

Team \_\_\_\_\_

Contestant \_\_\_\_\_

### Tree measurement

No.	Species	D.B.H.	#16 ft. Logs	Board feet	Score
1.	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____
4.	_____	_____	_____	_____	_____
5.	_____	_____	_____	_____	_____
6.	_____	_____	_____	_____	_____
7.	_____	_____	_____	_____	_____
8.	_____	_____	_____	_____	_____
9.	_____	_____	_____	_____	_____
10.	_____	_____	_____	_____	_____
11.	_____	_____	_____	_____	_____
12.	_____	_____	_____	_____	_____
13.	_____	_____	_____	_____	_____
14.	_____	_____	_____	_____	_____
15.	_____	_____	_____	_____	_____
16.	_____	_____	_____	_____	_____
17.	_____	_____	_____	_____	_____
18.	_____	_____	_____	_____	_____
19.	_____	_____	_____	_____	_____
20.	_____	_____	_____	_____	_____

Total board foot volume in plot ..... \_\_\_\_\_

Total volume per acre ..... \_\_\_\_\_

#### Scoring tabulation

a) Score subtotal \_\_\_\_\_

b) Score for volume per acre \_\_\_\_\_

Total score (a + b) \_\_\_\_\_

# Compass traverse or forest orienteering



Devils-walkingstick

FORESTERS ARE OFTEN REQUIRED to estimate ground distances by the pacing method and to determine the direction of travel using a compass. No compass declinations are needed. This exercise emphasizes pacing and compass work. Contestants measure a course of five lines, which may be level or slope up or down hill. Successive lines may or may not be continuous. This competition is done on an individual basis.

## Materials and equipment to conduct a contest

“Silva ranger” type azimuth or quadrant compasses

Course layout

Score sheets

Flagging for corners

Timing devices

## Officials

Officials include one contest area coordinator and assistants, as needed.

## Rules

1. On a practice course before the contest, determine your number of paces per 100 feet.
2. Contestants are given instructions before beginning the course. Each contestant must:
  - Complete the line measurements (distance and bearing/azimuth);
  - Record the measurements on the score sheets; and
  - Return the score sheets to the official.
3. Contestants can use only the following equipment:
  - “Silva ranger” type azimuth or quadrant compass
  - Pencil and clipboard
  - Course layout
  - Score sheet
  - Electronic calculator
4. The course will have five lines with marked corners. Contestants pace the lines using a compass for direction. Azimuth/bearings and distances between corners are recorded on the score sheet for each line. There are possible lines on the course.
5. Each contestant has 30 minutes to complete the course.

## Scoring

1. Contestants can receive a possible score of 100 points.
2. A maximum of 20 points is possible for each of the five lines. One-half point is deducted for each foot of error in distance, up to 10 points per line. One-half point is deducted for each degree of error in azimuth/bearing, up to 10 points per line.
3. The compass and score sheet are collected at the end of 30 minutes.

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### Compass traverse or forest orienteering score sheet

Contestant \_\_\_\_\_ County \_\_\_\_\_ Final score \_\_\_\_\_

Record azimuth/bearings and distances

Line	Azimuth/bearing	Distance	Score
A-B	_____	_____	_____
B-C	_____	_____	_____
C-D	_____	_____	_____
D-E	_____	_____	_____
E-F	_____	_____	_____

Points \_\_\_\_\_

Contestants will pace and shoot the five lines assigned.

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# 4-H Forestry Bowl

THE 4-H FORESTRY BOWL contest provides an opportunity for youths enrolled in 4-H Forestry projects to demonstrate their knowledge of forestry and related subjects in a competitive setting where attitudes of friendliness and fairness prevail.

## Equipment

To conduct this contest, organizers need:

- Panels: Two interconnecting panels, each to accommodate four contestants plus a moderator panel with suitable controls, are needed. Equipment will be checked as each round of competition starts.
- Time-keeping device: A stopwatch or other appropriate device.
- Score-keeping device: This may be a blackboard or flip chart.
- Questions: A packet of questions for each round should be prepared in advance. Each packet should contain at least 30 but not more than 50 questions. Type each question and answer on one side of a 3x5-inch card. If a question or “bonus” has several potential answers, list them all. Bonus questions may be visual.



Eastern redbud

## Officials

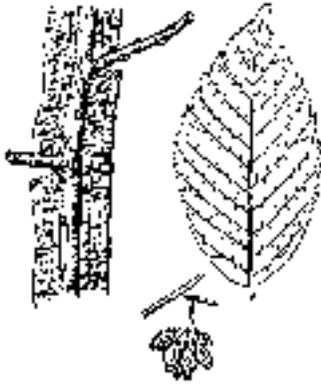
The people needed to officiate the contest include:

- **Moderator** (Quiz Master): The moderator is in charge of all rounds, asks all questions, designates contestants to answer questions, and accepts or rejects all answers unless overruled by the referee judges, but may seek interpretation of questions ruled on unanimously.
- **Referee Judge** (two judges may be used): The referee judges may rule individually or jointly on whether an answer is acceptable. Either both referee judges, or one referee judge and the moderator must agree on the acceptability or rejection of a question and/or answer if either is challenged by team captains. (See page 19.)
- **Time-keepers**: One or two people will be used to tell the moderator when the time allowed to answer questions has expired.
- **Score-keepers**: Two people keep scores on each round: one written so that all points awarded or taken away in penalties may be checked, and one to maintain scores visible to the moderator, contestants and insofar as possible, the viewing audience.

## Procedure

The contest is conducted as follows:

1. Teams are assembled and seated at their respective panels.
2. The invitation team captain is seated nearest the moderator. (See page 7, rule 5.)
3. The moderator opens the question packet.



Winged elm

4. The moderator does not give the correct answers until the final round, and no discussion is permitted.

## Part 1

5. A coin is tossed to determine which team captain will answer the first question in Part 1.
6. The opposing team's captain answers the second question. Succeeding questions are asked alternately of each team, and rotated among team members, until a total of 24 questions has been asked.
7. Only the designated team member may answer the question. The member has 10 seconds to begin the answer.
8. If the answer is correct, the team earns 10 points. No points are given for partial or incorrect answers.

## Part 2

9. Part 2 begins with the moderator reading a toss-up question (as with all succeeding questions) until a contestant activates a buzzer.
  - a. If a buzzer is activated while a question is being read, the moderator must stop reading the question immediately and the contestant activating the buzzer must begin the answer based on the portion of the question read.
  - b. If the answer given is incorrect, or no answer is given, five (5) points are taken from that team's score and the moderator repeats the question. The opposing team then has 10 seconds for any member to activate the buzzer and answer the question. If the answer is incorrect, 5 points will be taken from that team's score. No team consultation is permitted.
  - c. If a bonus question is attached to an incorrectly answered toss-up or a toss-up question is unanswered after a buzzer is activated, that bonus question is transferred to the next possible toss-up question to which no bonus question is attached.
10. When a question has been read or a buzzer activated, 10 seconds are permitted in which to begin an answer. The answer must be given by the contestant activating the buzzer. No consultation on toss-up questions is permitted.

It is the moderator's responsibility to determine if an answer is started within this 10-second period.

11. If the time in which to answer a question elapses without a contestant activating the buzzer, the question is discarded.

If a bonus question was attached to an unanswered toss-up question, the bonus question is then transferred to the next toss-up question to which no bonus is attached.



Flowering dogwood

12. If the toss-up question is answered correctly within the 10-second time limit, that team scores 5 points.
  - a. If a bonus question is attached to the correctly answered toss-up question, the moderator then reads the bonus question and a 10-second discussion period is permitted for the team consultation to determine the answer. A timer signals the end of the 10-second period. At the signal from the timer, a 10-second period is then permitted for the team captain to begin the answer.
  - b. If the answer is right and within the time allotted, that team gets 10 points for that bonus question.
  - c. All parts of the bonus questions must be answered correctly; no partial points are permitted regardless of the number of parts of the question answered correctly.
  - d. A team that fails to answer a bonus question or fail to answer it correctly will receive no penalty (loss of points).

## Completing the contest

1. The moderator continues reading toss-up and bonus questions until all toss-up and accompanying bonus questions have been asked or 30 minutes have elapsed, whichever comes first, except for the last round, which may last 45 minutes.
2. After the final question, the scores of the two score keepers will be compared. If there is disagreement on the score of the game, the score tabulated on the written score card will be used.
3. After a winner is declared, no protest of any question or answers will be allowed. Team captains may protest questions or answers to questions at the time a particular question is read or answered, **except** when the **moderator** gives the correct answer.

## Protest procedure

If a protest is sustained, the moderator will take one of the following actions as he or she sees fit:

- If a question is protested before an answer is given and the protest is sustained, the moderator discards the question.
- If an answer is protested (either correct or incorrect), at least one of the referee judges and the moderator or both referee judges determine the validity of the protest. Points are added or subtracted as appropriate.
- If a question is protested after an answer is given (correct or incorrect), at least one referee judge and the moderator or both referees determine the validity of the protest and question. The question may then be discarded, with points lost. If the question is allowed, points will be added or subtracted as appropriate.



Hercules-club, toothache tree

Spectators, parents and visitors may not protest any question, answer or procedure during the course of play. They may, however, submit in writing to the contest officials any suggestions, complaints or protests at the end of the contest.

Those who exhibit unseemly behavior, unsportsmanlike conduct or any actions generally accepted as detrimental to the contest may be dismissed from the immediate area of the contest.

## Recorders and cameras

Tape recorders may not be used at any time while a match is being conducted.

No recording devices, such as videotape cameras, movie cameras or any other type of camera requiring auxiliary lights, may be used while a match is under way. Photographs are permitted only before or after a match and then only if they do not disrupt the contest.

## Equipment failure

If equipment fails during a match:

- Any contestant or moderator may call a “time-out” if the device being used stops working or is believed to be malfunctioning.
- The faulty part or parts will be replaced and play will be resumed if, after checking, it is determined that the equipment has malfunctioned.
- Scores accumulated up to the point of the “time-out” shall stand, and all further points given or taken during the remainder of the match will be added to or subtracted from this total.

If both referee judges or one referee judge and the moderator deem it advisable, they may recall the points awarded for the two questions asked immediately before determination of equipment failure, and use two additional questions.

Under no conditions will a match in which there was equipment failure be replayed.

## Selecting bowl questions

The Forestry Invitational Committee chooses the questions for the bowl competition. All questions used are eliminated for the remainder of the bowl competition.

## Scoring

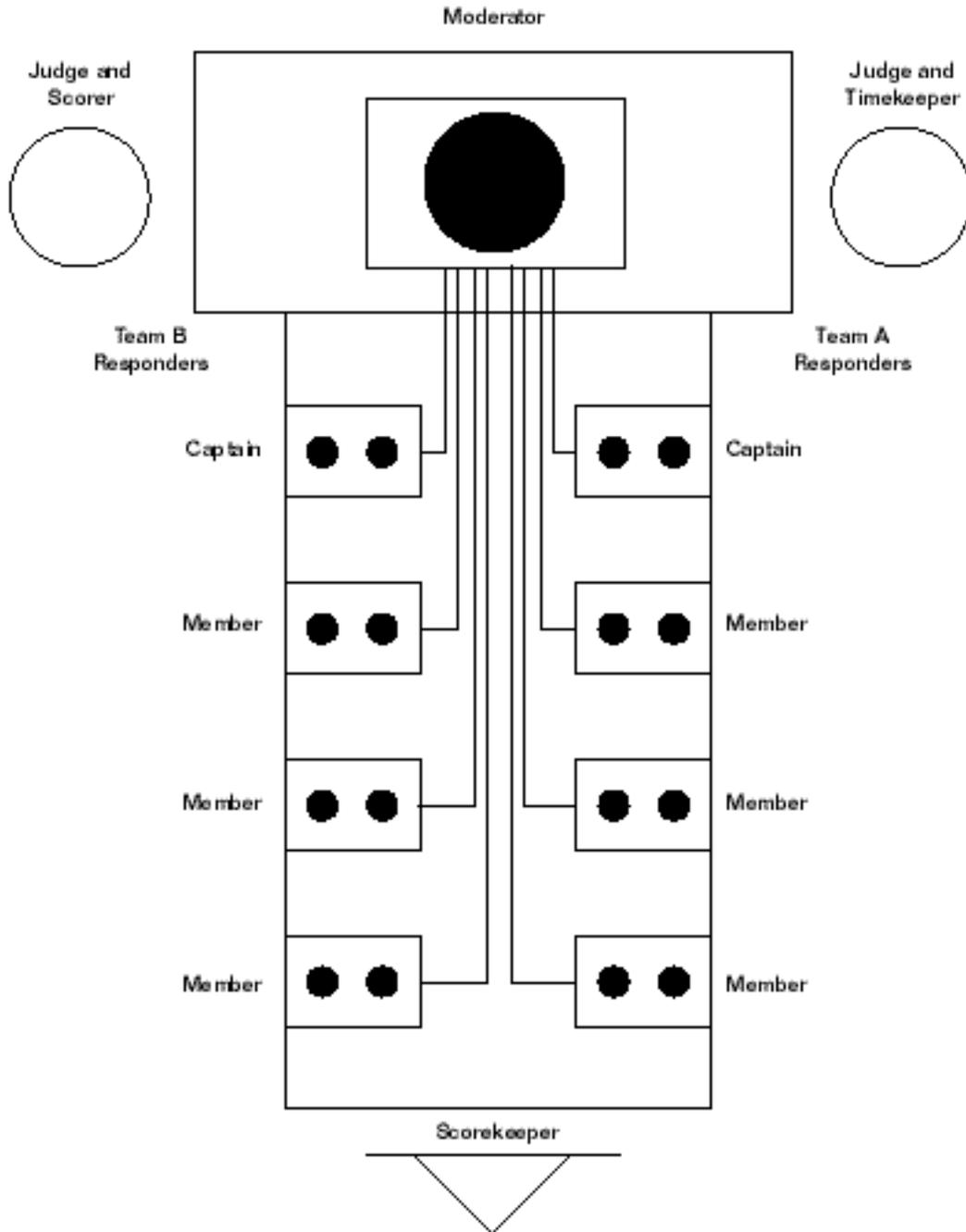
The winning team receives 100 points. Other teams receive points commensurate with their highest round of competition; for example, the next round before final = 90 points, the round before that = 80 points, etc.

## Sample questions for bowl contest

A. A board foot is equivalent to a board that measures:

ANSWER: 12” wide, 1” thick, 12” long, or 144 cubic inches.

## Suggested Bowl Setup



Equipment Needed	Materials Needed	Personnel Needed
Tables (60" x 30")	Bowl questions	Moderator
2	Notepad	Judge
Chairs	Pencils	(1 may be sufficient)
11	Markers/chalk	Scorekeeper
Bowl equipment		Timekeeper
(console, 8 responders)		
Easel and flip chart or chalkboard		
1		

Figure 3. Suggested arrangement of Forestry Bowl equipment, materials and personnel.

## Forest evaluation contest



Black hickory

B. The board foot formula is:

ANSWER: Length in feet x width in inches x thickness in inches divided by 12.

C. Diameter at breast height (DBH) is measured on the tree trunk at what distance above the average ground level?

ANSWER: 4.5 feet

D. A standard cord of wood is measured:

ANSWER: 4' x 4' x 8' (128 cubic feet)

E. What is habitat?

ANSWER: The area where a plant or animal lives.

EVERY ACRE OF LAND should be devoted to its best use — landowners have adhered to this principle of agricultural land use 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.

This principle, however, has not been applied to woodlands. It was generally thought that forest lands were all lands not suited for other crops. This is incorrect. Sites can be excellent, good, fair or poor for timber production, just as for farm cropland. Some forest lands support cultural practices and permanent physical improvements economically; other stands in the same area might barely pay land taxes. Some acres can be harvested every 7 to 10 years; others should never be expected to produce a woods crop.

This contest provides participants an opportunity to learn first-hand the characteristics affecting the growth of a forest crop. It is divided into four parts: Site evaluation, Stand evaluation, Recommended practices and Inventory. To be successful in this contest, participants must carefully study the material on the following pages. It is important that they understand the close relationships among the parts.

### Silviculture

Much has been written about trees after they are grown and stands established — of their requirements and the factors affecting these requirements. The study of these factors and requirements is known as silviculture, the branch of forestry dealing with the establishment, development, care and reproduction of stands of timber. A successful tree grower must know how to adjust or compensate for these factors effectively, as well as how to avoid making serious mistakes in his or her program.

### Site

The site is the habitat or environment in which a plant or a plant community lives. Many determine whether a plant can exist and reach maturity in a sound, healthy and sturdy state. Factors determining the desirability of a site include aspect, slope position, percent of slope, and others of a more technical nature.

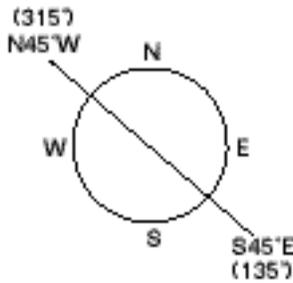


Figure 4. Aspect: desirable exposure sites.

## Aspect

Aspect is a compass reading facing down a slope; the direction water flows gives the compass direction. Usually a site located on a northeastern exposure is regarded as favorable, and one on the opposite or southwestern as rather unfavorable. Taken from a compass reading, a good growing site is considered to be an area from North 45 degrees West (315°) to South 45 degrees East (135°). Figure 4 illustrates the desirable northern exposure and the less desirable southern exposure.

Several factors and conditions of a technical nature determine the exposure of a site, but for the purposes of this guide, moisture and how it is used or lost is the determining factor in exposure and in aspect. These are the reasons a northern exposure is more desirable.

Exposure is just what the term implies: The surface of the land is open, or exposed, to the forces of the sun, wind and rain. The exposed site loses more moisture by transpiration and evaporation because of the sun and wind. A northern exposure is more protected, less moisture is lost, and the trees grow more quickly and desirably.

## Slope position

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

## Slope percentage

Slope percentage is determined by the feet of rise or fall in each 100 horizontal feet of land. It is divided into categories according to steepness, which ranges from 0 to 20 percent, 20 to 40 percent, and 40 percent plus. The instrument used to measure slope percentage is called an Abney Level, clinometer, etc. Figure 5 at left illustrates a 20 percent slope.

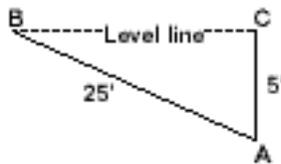


Figure 5. 20 percent slope. The simple formula used to calculate the percentage of slope above is shown on page 23.

$$AC + AB \times 100 = \% \text{ slope}$$

$$5 + 25 \times 100 = 20\% \text{ slope}$$

## Forest land capability

Forest land is divided into four categories: excellent, good, fair and poor. Much of the site requirement information (aspect, slope, position, slope percent) helps to determine the classification.

- **Class I** or Excellent is very good from all points of view. This forest land is fertile and practically level, and holds water well. It has little erosion and is well drained but not droughty. This land will produce a good stand of timber.
- **Class II** or Good is usually gently sloping. In some cases, drainage problems may affect tree growth.
- **Class III** or Fair usually has a higher slope percentage; in fact, it is fairly steep. This slope, together with added factors of shallow soil and low fertility, gives this land its classification of Fair.



Mockernut hickory

- **Class IV** or Poor may be very steep with shallow soil. It may be rocky or shaly, and have low fertility. It can either be extremely wet or dry. Good examples are ridge tops and swamps.

## The forest stand

The forest stand is a community of trees living together in harmony with nature (or in competition with other vegetation). The stand may include a great variety of species and may have more than one forest type.

## Origin of the stand

A stand of trees may have originated from any of three sources: a seed; a sprout or coppice; or plantation or planted. A forest that is derived from seed or is planted may be more healthy and hardy because it is not contaminated by parent trees. In a sprout or coppice forest, the opposite conditions exist, because many diseases, such as Dutch Elm disease and heartrot, may be transmitted through the union of the sprout and parent stump.

## Forest types

The forests in East Texas are classified by the Society of American Foresters and used under society recommendations. This contest uses these forest types:

- Pine
- Mixed pine and hardwood
- Upland hardwood
- Bottomland hardwood

## Stocking

Stocking and stand density are two terms that mean the same and are used interchangeably. A stand is classified as either Good or Poor.

**Good stocking:** The stems are distributed as nearly evenly as possible in ideal conditions, or each stem has just enough room to grow and do well.

**Poor stocking:** The stand is overstocked and needs thinning, or understocked and needs planting.

## Size distribution

To determine the size distribution of a stand, consider the sizes of all the stems present. In a good stand, the sizes of reproduction, saplings, poles and saw timber should be distributed fairly evenly. Same-aged species may be all of one size or, if in growing from one size into another, a portion may appear in two classes. Specific sizes: from 0 to 1 inch (in diameter) are reproduction; from 1 to 3 inches are saplings; from 3 to 12 inches, pole timber; and 12 inches and more, saw-timber.



Black locust

## Species

Participants need to know the common names of trees likely to be encountered in the woodlot. They also must be able to measure or estimate the diameter of a tree at breast height (4<sup>1</sup>/<sub>2</sub> feet above ground), its merchantable height, volume and crown class. They must be able to determine whether the tree is Dominant (tallest), Codominant (shares top of forest with another species), Intermediate (gets light filtered from higher trees), or Suppressed (lower trees, gets light filtered through all other trees).

## Fire

Wildfire is the most disastrous enemy of the forest. It destroys the duff, or litter, on the forest floor. In this duff are seeds awaiting germination. Timber that survives a wildfire has scars or scalds on it. A controlled fire (prescribed burn) is a forest management tool used to manipulate vegetation and prevent fuel from accumulating.

## Grazing damage

This classification is subdivided into **Severe** (reproduction eaten and trampled out, soil compacted, and bark rubbed off the large trees), **Slight** (animals evidently had enough grass or meadow and affected forest conditions only slightly), and **None** (no appreciable amount of damage evident).

## Wood products

Wood products that might be profitably harvested through good forest management practices include posts, pulpwood, firewood, poles, veneer and sawtimber. These products might be obtained by thinning or harvest cutting.

## Recommended practices

The following recommended practices apply to forest areas to be improved. Multiple land use should be evident as the forest management process begins. These recommendations appear again on the score sheet, and should be marked with a check as they apply to the plot being observed.

## Forest land evaluation

Using information in the guide, the following checklist or score sheet can be used to determine forest improvement practices needed to be carried out in the forestry project. This is a sequence of analyzing various aspects of the project leading to an intelligent, reasonably accurate evaluation.

## Scoring

A total of 75 points is possible for each of parts I, II, III, and IV.

I. Sections A, B, C, D and E have a possible value of 15 points each.

II. Fifteen points are allowed for each of five categories answered correctly. With six categories, one category may be answered wrongly and the contestants lose no points.



Honeylocust

III. One point is allowed for each correct answer in species, DBH, number of logs, volume, and crown class on a 1/4 acre plot.

IV. Soil depth will be given at the site.

County \_\_\_\_\_ Total score \_\_\_\_\_

### Forest evaluation

I. **Site Evaluation:** Circle (A) Depth of soil, (B) Slope, (C) Aspect, and (D) Slope position as they apply to the contest area.

<b>A. Depth of soil</b>	(Circle appropriate answer in A, B and C.)											
	Deep – 24 inches or more						Shallow – 24 inches or less					
<b>B. Slope Percent</b>	Rolling 0-20%		Steep 21-40%		Very Steep 40% +		Rolling 0-20%		Steep 21-40%		Very Steep 40%	
<b>C. Aspect</b>	NE	SW	NE	SW	NE	SW	NE	SW	NE	SW	NE	SW
<b>D. Slope Position</b>												
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	IV	IV	IV	IV
Upper 1/3	II	III	III	III	IV	IV	III	IV	III	IV	IV	IV

E. Determine the proper Forest Land Capabilities 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 capability class. **Circle** the proper class below:

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

Part I Score \_\_\_\_\_

II. **Forest stand evaluation:** (Check correct answer. One category will be given.)

**A. Grazing damage**

Grazed \_\_\_\_\_  
 Ungrazed \_\_\_\_\_

**D. Forest Types**

Pine \_\_\_\_\_  
 Pine-hardwood \_\_\_\_\_  
 Upland hardwood \_\_\_\_\_

**E. Origin of Stand**

Seedling \_\_\_\_\_  
 Sprout \_\_\_\_\_  
 Plantation \_\_\_\_\_

**B. Fire**

Unburned \_\_\_\_\_  
 Wildfire \_\_\_\_\_  
 Prescribe Burned \_\_\_\_\_

Bottomland  
 hardwood \_\_\_\_\_

**F. Stocking**

Good \_\_\_\_\_  
 Poor \_\_\_\_\_

**C. Size distribution:** (There may be more than one answer here.)

Pole \_\_\_\_\_ Sapling \_\_\_\_\_ Saw Timber \_\_\_\_\_ Reproduction \_\_\_\_\_

Part II Score \_\_\_\_\_

III. **Practices recommended:**

1. Leave them alone to grow .....
2. Thin stand for pulpwood, fuelwood, or other products, leaving the desirable trees to grow .....
3. Fence area from livestock.....
4. Have timber marked and estimated for harvest cutting .....
5. Cut mature trees with farm labor for home use or sale .....

6. Girdle or chemically eliminate wolf trees to provide sunlight for natural reproduction now present, or hoped for. Where trees can be used, cut instead of killing ..... \_\_\_\_\_
7. Cut heavily, leaving sufficient seed trees to adequately restock the area ..... \_\_\_\_\_
8. Remove poorly formed and undesirable trees from stand ..... \_\_\_\_\_
9. Remove diseased and insect-damaged trees in a sanitation cutting. If seed source is unavailable, plant area with desirable species ..... \_\_\_\_\_
10. Remove vines causing damage to trees ..... \_\_\_\_\_
11. Plant open areas with recommended trees ..... \_\_\_\_\_
12. Protect area from wildfire. Report any fire to the nearest local Texas Forest Service office ..... \_\_\_\_\_
13. Plant wildlife food and cover ..... \_\_\_\_\_
14. Prescribe burn recommended ..... \_\_\_\_\_
15. Mark out streamside management zone ..... \_\_\_\_\_

Part III Score \_\_\_\_\_

**IV. Inventory** (Identify and measure numbered trees.)

Tree No.	Tree species	DBH	No. of 16' logs	Vol. Bd.Ft.	Tree crown class (Check one for each tree)
1	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____
5	_____	_____	_____	_____	_____

Part IV Score \_\_\_\_\_

# Insects

DIFFERENT INSECTS HAVE various requirements for food, habitat, and development. We have both beneficial and detrimental insects. There will be a display of insect specimens selected from the official list and description in the following pages of this handbook.

## Contest rules

1. Contestants must identify species from those listed on the following pages and corresponding to the master list. Contestants are judged on the accuracy of identification and the spelling of the common names. Scientific names are not required. Incomplete names will be counted as wrong. Example: Caterpillar instead of Eastern Tent Caterpillar.
2. Contestants are given a specific time to identify the insect or insect damage specimens.
3. Five points are 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 following species list.



Southern magnolia

## Official list of insects

Common name	Scientific name
Nantucket pine tip moth	<i>Rhyacionia frustrana</i> (Comstock)
*Locust borer	<i>Megacyllene robiniae</i> (Forster)
*European pine shoot moth	<i>Rhyacionia buoliana</i> (Schiff.)
*White pine weevil	<i>Pissodes strobi</i> (Peck)
Native elm bark beetle	<i>Hylurgopinus rufipes</i> (Eicchoff)
Gypsy moth	<i>Lymantria dispar</i> (Linnaeus)
*Birch leafminer	<i>Fenusa pusilla</i> (Lepeletier)
Eastern tent caterpillar	<i>Malacosoma americanum</i> (Fabricius)
Pine webworm	<i>Tetralopha robustella</i> (Zeller)
Fall webworm	<i>Hyphantria cunea</i> (Drury)
*Bronze birch borer	<i>Agrilus anxius</i> (Gory)
Black turpentine beetle	<i>Dendroctonus terebrans</i> (Olivier)
Ips engraver beetles	<i>Ips</i> spp.
Conifer sawflies	<i>Hymenoptera: Diprionidae</i>
Spiny elm caterpillar	<i>Nymphalis antiopa</i> (Linnaeus)
Southern pine beetle	<i>Dendroctonus frontalis</i> (Zimmerman)
Tussock moth	<i>Lepidoptera: Lymantriidae</i>
*Locust leafminer	<i>Odontota dorsalis</i> (Thunberg)
White oak borer	<i>Goes tigrinus</i> (DeGeer)
Pales weevil	<i>Hylobius pales</i> (Hbst.)
Variable oakleaf caterpillar	<i>Heterocampa manteo</i> (Dblody)
Periodic cicada	<i>Magicicada septendecim</i>
Leaf cutting ant	<i>Atta texana</i> (Buckley)

\*Uncommon for this event

References:

*A Guide to Common Insects and Diseases of Forest Trees in the Northeastern United States.* Forest Insect and Disease Management NA-FR-4 (1979), USDA Forest Service.

*Insects and Diseases of Trees in the South.* USDA Forest Service-Southern Region GR.R8 - GRS (1985).

*Oak Pests: A Guide to Major Insects, Diseases, Air Pollution and Chemical Injury.* General Report SA GR11, March (1980), State and Private Forestry, Southeastern Area (and) Southern Forest Experiment Station, USDA Forest Service.

County \_\_\_\_\_ Contestant \_\_\_\_\_

Forest insects

No.	Common name	Correct +5 Misspell -1/2	Score
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____
11.	_____	_____	_____
12.	_____	_____	_____
13.	_____	_____	_____
14.	_____	_____	_____
15.	_____	_____	_____
16.	_____	_____	_____
17.	_____	_____	_____
18.	_____	_____	_____
19.	_____	_____	_____
20.	_____	_____	_____
			Total _____

# Diseases

CONTESTANTS WILL BE ASKED to identify diseases that cause excessive dollar loss to the forest industry and society. Specimens will be selected and displayed which are representative of diseases and damage.

## Contest rules

1. Contestants must identify species from those listed on the master list. Contestants are judged on the accuracy of identification and the proper spelling of the common names. Scientific names are not required. Incomplete names are counted as wrong.
2. Contestants will be given a specific time to identify the disease or damage specimens.
3. Five points are awarded for each correct common name. One-half point is deducted for each name misspelled. The common name must be the one used in the species list.



Red maple

## Official list of diseases

Common name	Scientific name
Pitch canker	<i>Fusarium moniliforme</i> var. <i>subglutinans</i>
Oak wilt	<i>Ceratocystis fagacearum</i>
Black knot	<i>Apiosporina morbosa</i>
Nectria canker	<i>Nectria galligena</i> or <i>magnoliae</i>
Dutch elm disease	<i>Ceratocystis ulmi</i>
Verticillium wilt	<i>Verticillium albo-atrum</i>
Annosus root rot	<i>Heterobasidion annosum</i>
Brown spot	<i>Scirrhia acicola</i>
Witches broom	Various agents
Fusiform rust	<i>Cronartium quercuum</i> f.sp. <i>fusiforme</i>
Cedar-apple rust	<i>Gymnosporangium juniperi-virginianae</i>
Needle cast	<i>Hypoderma</i> and <i>Lophodermium</i>
Red heart	<i>Fomes pini</i>
White trunk rot of birch	<i>Inonotubliquus</i> (formerly <i>Poria obliqua</i> )
Hypoxylon cankers	<i>Hypoxylon</i> spp.

Descriptions of most of these diseases appear in the references. Others may be obtained from Texas A&M University or Stephen F. Austin State University.

County \_\_\_\_\_ Contestant \_\_\_\_\_

### Forest diseases

No.	Common name	Correct +5 Misspell -1/2	Score
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____
11.	_____	_____	_____
12.	_____	_____	_____
13.	_____	_____	_____
14.	_____	_____	_____
15.	_____	_____	_____
16.	_____	_____	_____
17.	_____	_____	_____
18.	_____	_____	_____
19.	_____	_____	_____
20.	_____	_____	_____
			Total _____

# Forestry concepts



Blackjack oak

BOTH RESOURCE MANAGERS AND well-rounded citizens can benefit by understanding the following basic concepts of forestry. Some are so logical or simple that they are taken for granted and overlooked. Judging team members also can profit from an appreciation of these points.

## Characteristics, distribution and status of forest resources

Trees have distinctive characteristics by which they can be identified. They require water, soil nutrients, sunlight and air for growth. The natural range and distribution of the different types of forest communities are influenced by climate, soil and topography.

In turn, forest communities influence their climate and their soil. Forest litter, humus and roots make forest soils exceptionally able to absorb moisture and resist erosion. 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.

Forests are constantly undergoing change, and as they mature and are harvested, or die, some plants and animal species may be replaced by others. The interrelationships between the plant and animal members of forest communities and their environments determine the characteristics of a particular forest. Each of the plants and animals making up a forest community has an influence on it. Conversely, forest communities influence the plants and animals of which they are composed.

Fires, diseases, insects, humans and animals may harm or benefit the forest.

Some lands are better adapted for growing forests than for other uses.

Forests have certain characteristics that make them attractive for recreational activities. An expanding population and new uses for forest products and services make it necessary to manage forest resources for more intensive multiple-purpose uses.

## Uses and importance of forest resources

Forests yield many essential products for human use. The original forests of the United States were primary sources of building the nation. Many communities depend greatly on local forests, forest industries and forest recreation for economic stability.

New uses for forest products are being discovered through research and development. Forests provide a wide variety of recreational opportunities. They are also important in helping to protect watershed from floods and droughts.



Live oak

## Management problems and techniques

Forests can be managed to produce a continuous supply of wood and wood products, wildlife, water and recreational opportunities. Foresters use various practices in managing forest resources:

- Insects and disease control
- Fire control
- Harvesting practices
- Thinning and pruning operations
- Reforestation

To determine what management practices are needed to produce the best and most forest products, managers need to have volume and growth data. Research is also essential for new and improved forest management practices to be developed and for forest products and services to be used more efficiently.

## Policy and administrative techniques

Public use of forest land carries an obligation for good citizenship. Forest owners have responsibilities as well as rights in managing and using forests under a republic.

Small woodland owners control a major part of commercial forest lands, which are a potential source of more forest products and services. The woodland owner can obtain technical advice and assistance in forest management from many public and private organizations and agencies. Financial assistance is also available from current state and federal programs as incentives for better management of forest resources.

Many progressive public and private owners of forest lands are managing forests for multiple uses rather than solely for timber production.

Public agencies, private owners and the general public need to cooperate to protect forests against fires, diseases, insects and excessive animal populations. Policy decisions must be made to settle differences of opinion arising from competing uses of the forests.

# Federal laws affecting forest and range management



Post oak

THIS SUMMARY MAY BE USEFUL as a historical perspective of resource management practice. Such a perspective may be worthwhile in forestry bowl activities.

The list is Appendix D from a Forest Service review draft of *A Report to Congress On the Nation's Renewable Resources*. The cover of the review draft states that it is subject to revision. However, the historical facts of Appendix D will not change.

Laws form a legal base for using and managing the nation's forest and range lands. Some of the more important federal laws include:

**Creative Act of 1891** — Authorized the President of the United States to set aside public lands as public reservations.

**Organic Administration Act of 1897** — Authorized the Secretary of Agriculture to manage the National Forests to improve and protect the forests, to secure favorable conditions of water flow, and to furnish a continuous supply of timber.

**Antiquities Act of 1906** — Protects ruins or objects of antiquity on federal lands.

**Weeks Law of 1911** — Authorized buying and adding to the National Forest System forested, cut-over or denuded lands within watersheds of navigable streams needed 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.

**Taylor Grazing Act of 1934** — Authorized the Secretary of the Interior to establish grazing districts from the unreserved public domain lands and to make rules and regulations for their occupancy and use.

**Soil Conservation Act of 1935** — Provided for the control and prevention of soil erosion, delegated all activities relating to soil erosion to the Secretary of Agriculture, and established the Soil Conservation Service.

**Soil Conservation and Domestic Allotment Act of 1936** — Established the Agricultural Conservation Program, which provides cost-sharing funds to landowners for soil and water protection, including tree planting and timber stand improvement practices.

**Bankhead-Jones Farm Tenant Act of 1937** — Authorized federal acquisition of and exhausted farm lands, which were ultimately designated National Grasslands.



Southern red oak

**Forest Pest Control Act of 1947** — Established a program to protect forest lands under all ownerships from destructive forest insect pests and diseases. This act was repealed and supplanted by provisions of the Cooperative Forestry Assistance Act of 1978.

**Cooperative Forest Management Act of 1950** — Authorized technical and financial assistance to states so they can provide technical aid to private forest landowners and processors.

**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 research program in forestry for state land-grant colleges and universities.

**Clean Air Act of 1963** — Gave the federal government for the first time enforcement powers regarding air pollution.

**Wilderness Act of 1964** — Established the National Wilderness Preservation System.

**National Historic Preservation Act of 1966** — Provided for managing cultural resources on federal lands and established procedures for determining relative significance among cultural resources.

**Wild and Scenic Rivers Act of 1968** — Provided for designation of wild and scenic rivers and for comprehensive studies of other rivers designated as potential additions to the National Wild and Scenic Rivers System.

**National Environmental Policy Act of 1969** — Required that environmental considerations be incorporated into all federal policies and activities, and required all federal agencies to prepare environmental impact statements for any actions significantly affecting the environment.

**Clear Air Amendments of 1970** — Sharply expanded the federal role in setting and enforcing ambient air quality standards, including regulating land management practices to achieve and maintain such standards.

**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.

**Agriculture and Consumer Protection Act of 1973** — Sections 1009 and 1010 authorized a forestry incentives program for nonindustrial private landowners for tree planting and timber stand improvement for the purpose of producing marketable timber crops and other values. These sections were repealed and supplanted by the Cooperative Forestry Assistance Act of 1978.



Osage-orange, bois d'arc

**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.

**Forest and Rangeland Renewable Resources Planning Act of 1974** — Provided for continuing assessment and long-range planning of the nation's forest and range renewable resources under the jurisdiction of the Secretary of Agriculture.

**Archeological and Historic Preservation Act of 1974** — Provided for recovery, protection, and preservation of significant cultural resources that will be irreparably lost or destroyed by alteration of terrain from any federal construction project or federally licensed activity or program.

**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.

**Federal Land Policy and Management Act of 1976** — Set policies primarily for the administration of Bureau of Land Management lands. Includes common statutory authorities for the Secretaries of the Interior and Agriculture in range management, issuance of rights-of-ways, and other aspects of managing lands administered by the BLM and the Forest Service.

**Clean Air Act Amendments of 1977** — Established as a national goal preventing any future impairment, and remedying any existing impairment, of visibility of Class I areas from man-made air pollution. Class I federal areas include all International Parks, all National Wilderness Areas that exceed 5,000 acres, all National Memorial Parks that exceed 5,000 acres, and all National Parks that exceed 6,000 acres.

**Soil and Water Resources Conservation Act of 1977** — Provided for assessment and long-range planning of federal programs to conserve soil, water, and related resources under jurisdiction of the Soil Conservation Service.

**Cooperative Forestry Assistance Act of 1978** — Brought together authorities for nine cooperative assistance programs in forestry and expanded some of them; also authorized consolidated programs to participating states.

**Forest and Rangeland Resources Extension Act of 1978** — Authorized expanding the forest and range land renewable resource portion of the extension education program.

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

**Public Rangelands Improvement Act of 1978** — Amended the Federal Land Policy and Management Act of 1976 and the Wild Horses and Burros Protection Act of 1971 to provide the Bureau of Land Management and the Forest Service with additional direction and authorities in managing public rangelands.

## Glossary



Pecan

Established a statutory grazing fee formula in 16 western states, excluding the National Grasslands, for the period 1979 through 1985.

Many of these laws required regulations for their implementation. In some cases — for example, the National Forest Management Act — regulations are still being developed. Regulations guiding Forest Service programs are found in Title 36, Code of Federal Regulations, Chapter 2.

**Abney level** – An instrument used to determine the percent of slope of a site.

**Azimuth** – A compass reading where the compass is divided into four quadrants, each having 90°. For example: N45°W = North 45 degrees West.

**Bearing** – A compass reading where the compass is divided into 360 continuous degrees. Example: 270°.

**Aspect** – A compass reading taken facing down a slope in the direction water would run, and gives the compass direction of a slope.

**Clinometer** – Height measuring device.

**Conservation** – A relatively new word as it describes natural resources. Gifford Pinchot, a turn-of-the-century forester closely associated with President Teddy Roosevelt, coined the word to describe a natural resource process. It meant “wise use.” Through the years it has taken on an extended meaning of “wise use over time.” The time factor forces us to consider the consequences of current use compared to future use. This removes the element of exploitation that could occur under the “wise use” alone.

**Coppice** – A stand of forest originating from sprouts 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 according to the position in which they are found. The following are the main generally recognized classes:

**Dominant** – Trees with crowns extending above the average of the tree crowns and receiving light from directly above and some from the sides.

**Co-Dominant** – Trees with crowns forming the general level of the crown cover and receiving full light from the top, but very little from the sides.

**Intermediate** – Trees shorter than the two preceding classes, but with some branches extending into the general crown cover. They 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 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.

**Declination** – Deviation between true North and compass North.



Loblolly pine

**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 soil and minerals by climatic agents such as wind and water.

**Exposure** – The part of a slope directly in the path of wind, rain and sun; the part 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** – A process occurring when a viable seed meets favorable conditions allowing 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, national forests have more acres of wilderness areas than do 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 Park Service** – An entity 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. It administers 295 separate areas, and 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 often confused with national forests.

**Old growth** – Eastern forests and virgin western forests with trees more than 100 years old.

**Partial cut** – A method of cutting mature trees such as shelterwood cut, selection cut, or seed tree cut.

**Pole timber** – A young tree 3 to 12 inches in DBH (diameter breast height).



Rusty blackhaw

**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 to 1 inch in DBH (diameter breast height).

**Residual stand** – That portion of trees left after any partial cut.

**Sapling** – A young tree less than 3 inches DBH (diameter breast height). The minimum size is usually placed at 1 inch 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.

**State Forest** – Areas of land set aside in East Texas for demonstration of forest practices and to generate funds for the Texas Forest Service.

**Stocking** – The coverage of an area with trees, which can be classified as good or poor.

**Sustained yield** – Management of a forest stand to provide a constant supply of timber and revenue.

**TSI** – Timber Stand Improvement. Any practice designed to improve a stand of timber by removing vines, culls and undesirable species.

**Wilderness** – In the strictest sense, this means that an area that has never been developed by humans. 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 horsebacking 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.

## References



Sassafras

**Wild fire** – A fire burning out of control regardless of how or why it was started.

**Wolf tree** – A tree occupying more than its fair share of growing space.

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Tree sparkleberry

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