

FOREST EVALUATION

Objectives

- Participants will be able to define silviculture
- Participants will be able to conduct a forest evaluation using methods identified in this activity

Background

Every acre of land should be devoted to meet the owner's objectives. This is a concept that landowners have held for many years regarding their agricultural land. Level and slightly rolling land was used for row crops and grain, and rolling and better upland slopes for pasture and meadow. The general idea about forest land is that forests will grow well on all lands not suited for other crops. This is **incorrect**. There are excellent, good, fair and poor sites for timber production just as there are different kinds of farm crop land. There are forest lands that will economically support **intensive management** (using a wide variety of silvicultural practices, such as planting, thinning, fertilization, harvesting, and genetic improvement) and other stands in the same area might barely pay land taxes. Some acres that can be harvested every ten years while others may never produce commercial timber.

Silviculture

Volumes have been written about trees: how they are grown; how stands are established; the growth requirements of the trees as well as the factors that affect these requirements. The study of these factors and requirements is a branch of forestry known as ***silviculture***.

Silviculture is the art of managing the establishment, growth, and reproduction of forest stands by manipulating light, water, nutrients and other available resources.

To be successful, a forest manager must know how to adjust or compensate these factors effectively and how to avoid making serious mistakes in developing a sound forest management program.



OSU EXTENSION
4-H YOUTH DEVELOPMENT

Materials:

- Compass
- Abney level or clinometer
- 25 ft. tape measure (100 ft. would be better)

Life Skills:

- Keeping Records
- Critical Thinking
- Problem Solving
- Decision Making
- Learning to Learn

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Conducting a Forest Evaluation

Site Evaluation

The *site* is the environment in which a plant or a plant community lives. There are a number of site factors that determine the desirability of a location for a tree crop. Some factors used to determine the forest land capability class of a particular tract of land include: soil depth, slope percent, aspect and slope position. Forest managers use these factors to determine whether the trees will grow in a vigorous and healthy manner and reach maturity in a sound state.

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

Slope percent is the number of feet of rise or fall in 100 feet of horizontal distance. For our purpose, slope percent is broken into the following "steepness" categories:

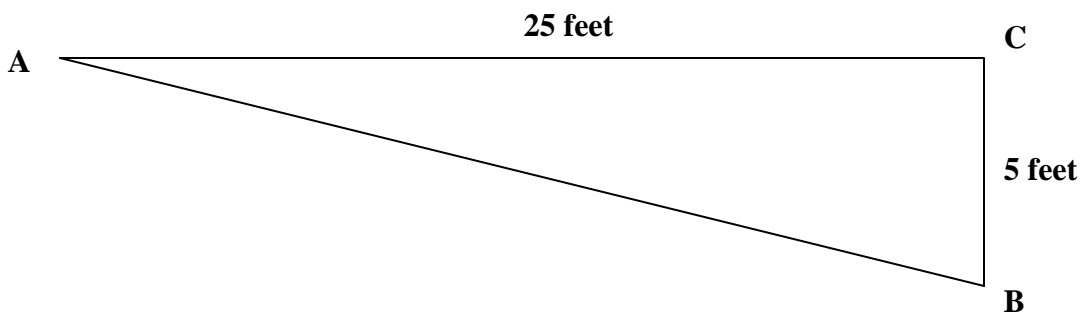
Rolling	0 - 20% slope
Steep	21 - 40% slope
Very Steep	40+ % slope

Slope percent can be measured with an Abney level or a clinometer. However, one way to **approximate** slope percent if a clinometer is not available is to measure a typical section of slope using a 100 foot tape and starting at an upslope position.

1. Measure downhill (from point A to point B) 25 feet.
2. Have a partner at the starting point (point A) hold the tape or string at his/her feet.
3. Standing at point B, draw the tape tight and hold it level to your partners feet
4. Measure the distance the tape is being held above the ground (point B to point C).
5. Divide that distance by 25 feet and multiply the quotient by 100 to obtain the slope (formula is shown below).

The figure below is an example of figuring slope percent.

Figure: Figuring Slope Percent



The simple **formula** to calculate the percent of slope is:

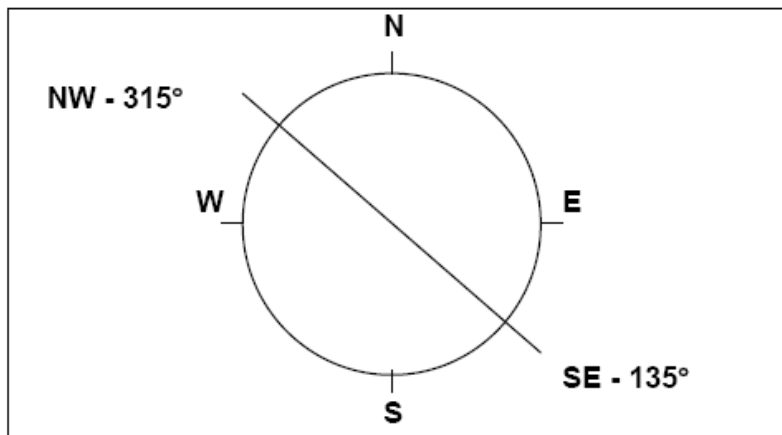
$$BC/AC \times 100 = \text{slope percent of AB}$$

Sample problem: (from illustration)

$$(5 \text{ feet} / 25 \text{ feet}) \times 100 = \text{Slope \%}$$

$$.20 \times 100 = 20\% \text{ slope}$$

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



Slope position is determined only on hilly sites. Positions used in this activity are classified as:

Upper 1/3

Middle 1/3

Lower 1/3

Ridge tops or level plateaus and bottomlands are classified separately in land capability classes.

Forest land is divided into four **Land Capability Classes**: excellent, good, fair and poor. Much of the information obtained in evaluating the site requirements (aspect, slope position, slope percent) will be used in determining the classification.

Class I: Excellent

This land has few limitations for tree growth. Most sites have little slope and no erosion problems. The soil is fertile and holds water well. It is well drained, but not droughty. These sites will produce a good stand of timber.

Class II: Good

This land is usually gently sloping. In some cases there are drainage problems that may affect tree growth.

Class III: Fair

This land may be fairly steep (having a greater slope %). Soils may be shallow, have low fertility and tend to be droughty.

Class IV: Poor

This land may be very steep with shallow soil. It may also be rocky or shaly and have low fertility. Additionally, it can either be extremely wet or extremely dry. Good examples are ridge tops and swamps.

Forest Stand Evaluation

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

Grazing/browsing damage is defined by the following categories for the purpose of this activity:

- Severe:** tree seedlings are eaten or trampled, soil is compacted and bark is rubbed off the larger trees.
- Slight:** animals only slightly affected forest conditions (apparently had enough grass or meadow available for bulk of grazing or browsing).
- Ungrazed:** no appreciable evidence of grazing.

Evidence of *Fire*, either as a destructive agent or a management tool, may be present.

Wildfire can be very destructive, particularly when fuel buildup is heavy. Destruction of the litter layer (undecayed to mostly decayed organic matter) of the forest floor, crown scorch or burning of the foliage, and scalds or scars on the tree trunks are all evidence of wildfire damage. Seeds awaiting germination may be destroyed when the litter layer is burned.

A *prescribed fire* is a forest management tool which can be used to manage competing vegetation, increase biodiversity and stand structure, prevent fuel accumulation, and improve wildlife habitat without damaging the crop trees.

Size Distribution of a stand considers the sizes of all stems present on the site. In all-aged stands, there may be 3 or more size classes represented. In many even aged stands there will be only one size class. In a good stand, a ratio of sizes of reproduction, saplings, poles, and sawtimber should be fairly evenly distributed. This is necessary in a sustained yield program. Specific stem sizes include:

- Reproduction (seedling):** 0-2 inches diameter
- Sapling:** 2-6 inches diameter
- Pole timber:** 6-12 inches diameter
- Sawtimber:** 12+ inches diameter

Forest types have been defined by the Society of American Foresters since 1932, and are used under Society recommendations. The recognition of forest types is necessary because different forest types require different types of management. Oklahoma forests may include the following classifications.

Bottomland Hardwoods
Oak-Hickory
Yellow Pine-Hardwood

Cove Hardwoods
Post Oak-Blackjack Oak (Crosstimbers)
Yellow Pine (Hard Pine)

Stand origin can vary from one stand to another, even though the stands are of the same forest type and size distribution. Timber stands may originate by several different means:

Seed
Sprouts (coppice)
Planted Seedlings (plantations)

Among the pines in Oklahoma, only shortleaf pine will sprout as an adaptation to fire. Many of Oklahoma's hardwoods will also sprout, and good quality trees can be produced from sprouts if stumps are cut close to ground level and the less vigorous sprouts are removed. Seeds are often parasitized by animals, insects, fungi or bacteria. Seed crops of many Oklahoma species are unpredictable, being adequate only occasionally. Planted seedlings give control over spacing, species competition, and genetic traits.

Stocking and stand density are two terms that are used interchangeably. Stocking is a term used to describe how well the trees in a stand utilize the available space. In classifying a stand, the following terms will be used.

Well-stocked: a stand in which the trees are well distributed, and all the space is utilized, but the trees still have room for continued growth

Understocked: a stand in which there are large open spaces between the trees. This stand will not produce its full potential.

Overstocked: a stand that is so overcrowded that trees grow very slowly, or have poor form due to heavy competition

FOREST EVALUATION Activity Sheet

I. Site Evaluation: (circle one)

(A) Soil Depth **(B)** Slope Percent **(C)** Aspect, and **(D)** Slope Position as they apply to the area being surveyed

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												
Bottom	I	II	I	II	I	II	I	II	I	III	II	III
Lower 1/3	I	II	I	II	I	III	I	III	II	III	III	IV
Middle 1/3	I	II	II	III	II	III	II	III	III	IV	IV	IV
Upper 1/3	II	III	III	III	IV	IV	III	IV	III	IV	IV	IV

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

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

II. Forest Stand Evaluation: (Check the correct answer in each section A-F)

A. Grazing/Browsing Damage

Severe _____
Slight _____
None _____

D. Forest Type

Bottomland _____
Hardwoods _____
Cove Hardwoods _____
Oak-Hickory _____
Post Oak-Blackjack _____
(Crosstimbers) _____
Yellow Pine – _____
Hardwood _____
Yellow Pine _____
(Hard Pine) _____

E. Stand Origin

Seedling _____
Sprout _____
Mixed _____
Plantation _____

B. Evidence of Fire

Unburned _____
Wildfire _____
Prescribed Burn _____

F. Stocking

Well Stocked _____
Overstocked _____
Understocked _____

C. Size Distribution: (There may be more than one answer)

Reproduction _____ Sapling _____ Pole _____ Sawtimber _____

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Suggested Oklahoma Guide

A recommended study guide for Tree Identification is the 2002 revision of: *Forest Trees of Oklahoma* by Elbert L. Little, Jr.

Tree Scale Sticks

Tree scale sticks may be purchased from the following companies:

Forestry Suppliers, Inc., P.O. Box 8397, Jackson, MS 39204 (18006475368)

Ben Meadows Co., P.O. Box 80549, Atlanta, GA 30366 (18002416401)

Additional Resources

Oklahoma 4-H at <http://oklahoma4h.okstate.edu/index.htm>

Oklahoma 4-H Forestry Judging website at <http://nrem.okstate.edu/Extension/judging.html>

Oklahoma 4-H Forestry Judging Manual. 2007 revision.

4-H Forestry Program—Unit A: Trees

4-H Forestry program—Unit B: Forests

Oklahoma Forestry and Wildlife Camp website at <http://whatisforestry.org/youth-camp.php>

Oklahoma Cooperative Extension Forestry at <http://nrem.okstate.edu/Extension/pubs.html>

On-line Tree Identification Sites

<http://www.arborday.org/trees/treeID.cfm>

<http://www.dnr.state.wi.us/org/caer/ce/eeek/veg/treekey/index.htm>

<http://www.uwsp.edu/cnr/leaf/Treekey/tkframe.htm>

<http://www.extension.iastate.edu/Pages/tree/key.html>

<http://www.cnr.vt.edu/DENDRO/DENDROLOGY/ident.htm>

http://forestry.about.com/library/treekey/bltree_key_id_start.htm

<http://www.cas.vanderbilt.edu/bioimages/tree-key/simple-leaf-trees.htm>

<http://forestry.msu.edu/extension/extdocs/Identkey/opening.htm>

<http://oregonstate.edu/trees/dk/start.html>

References Cited

Oklahoma 4-H Forestry Judging Manual. 2007 revision.