

# **Forestry CDE Workshop**

**OCTOBER 2009**

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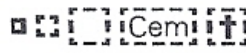









# FORESTRY CAREER DEVELOPMENT EVENT

## MAP READING

### Map Symbols






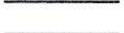




Map symbols are an important part of map reading. Symbols can depict many various features such as roads, boundaries, buildings, landmarks, places of interest, water supplies, mines, etc. Following is a list of the required map symbols participants in the Forestry CDE must be able to identify along with the symbol. These symbols were taken from the USGS website,




<http://egsc.usgs.gov/isb/pubs/booklets/symbols/topomapsymbols.pdf>.

Building	
Cemetery	
Quarry or open pit mine	
Gravel, sand, clay, or borrow pit	
School; house of worship	
Perennial stream	
Perennial river	
Intermittent stream	
Perennial lake/pond	
Spring or seep	
Highway or road bridge; drawbridge	

### **ROADS AND RELATED FEATURES**

Please note: Roads on Provisional-edition maps are not classified as primary, secondary, or light duty. These roads are all classified as improved roads and are symbolized the same as light duty roads.

Primary highway	
Secondary highway	
Light duty road	
Light duty road, paved*	
Light duty road, gravel*	
Light duty road, dirt*	
Light duty road, unspecified*	
Unimproved road	
Unimproved road*	
Trail	

Power transmission line; pole; tower	
Standard guage railroad, single track	
Standard guage railroad, multiple track	

## CONTOURS

### *Topographic*

Index	
Approximate or indefinite	
Intermediate	
Approximate or indefinite	

According to this website, there is not a symbol for a lookout station (number 10 on the identification list).

## FORESTRY CAREER DEVELOPMENT EVENT TOOL AND EQUIPMENT IDENTIFICATION

### ◆ Altimeter

- Used to measure heights of objects, An optical rangefinder may be attached to the Altimeter. Used with its multi-range target, this rangefinder enables you to determine quickly and precisely base length distances of 15, 20, 25 or 30 feet, yards or meters.



### ◆ Backpack Fire Pump

- Used to put out hot spots and mop-up work after fires.



### ◆ Bark Gage

- used to measure bark thickness of trees



◆ **Canthook**

- Sometimes called a peavey. Used to roll logs.



◆ **Chain saw**

- Used for brush and tree removal and cleanup



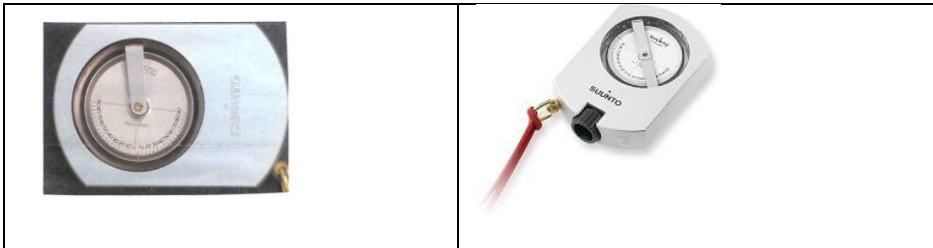
◆ **Chainsaw Chaps**

- filled with a fiber to stop a chainsaw, required for safety of the saw operator.



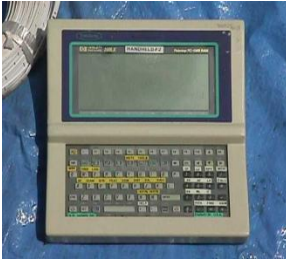
◆ **Clinometer**

- used to measure slope and tree heights.



◆ **Data Recorder**

- used to record data in the field during timber cruising or compass and pacing figures.



◆ **Densiometer**

- used to measure the density of the forest canopy (tree tops).



◆ **Diameter Tape**

- measure around the tree to determine its diameter.



◆ **Dot Grid**

- used to measure maps and determine plot layout.



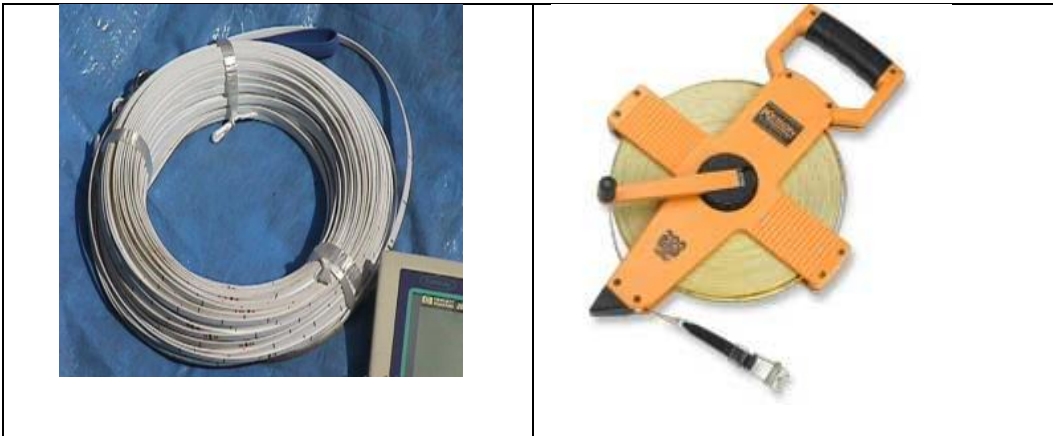
◆ **Drip Torch**

- used to set back fires for fighting forest fires and prescribed burns.



◆ **Fiberglass Tape**

- usually 100 ft, used to measure distances.



◆ **Fire Rake**

- also called a McLoed
- rake on one end and hoe on the other to dig fire line.





◆ **Fire-Swatter**

- use to fight small fires
- smothers the flames so the fire will go out



◆ **Fire Weather Kit**

- Contains instruments to determine wind speed and direction, humidity and recording booklet.



**Flow/Current Meter** - used to measure the rate of stream flow



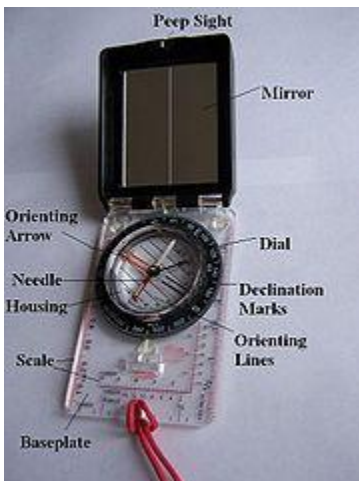
◆ **GPS Receiver**

- Hand Held Global Positioning Satellite Receiver.
- Used when setting up logging plots and mapping areas



◆ **Hand Compass**

- A device to record a precise [bearing](#) or [azimuth](#) to a given target or to determine a location.



◆ **Hand Lens/Field Microscope**

- used to read maps



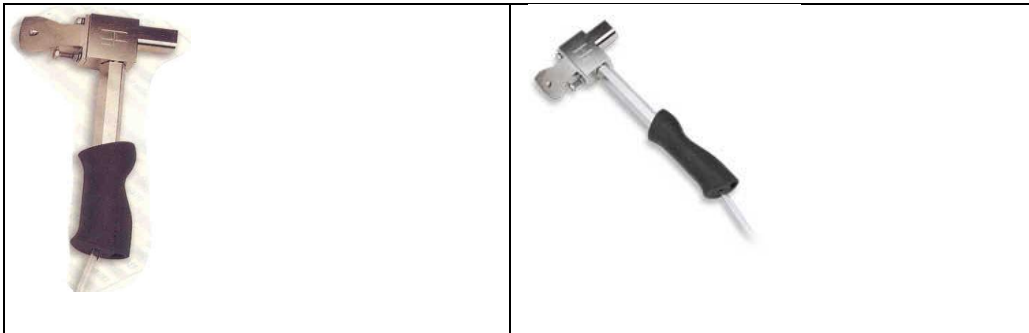
◆ **Hip Chain**

- used to determine distances for forest plots.



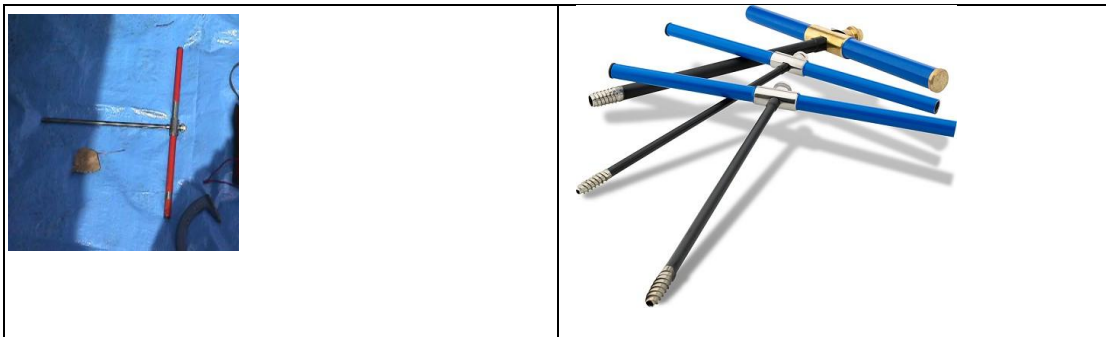
◆ **Hypo Hatchet**

- used to insert preset amount of herbicide into a tree to kill it.



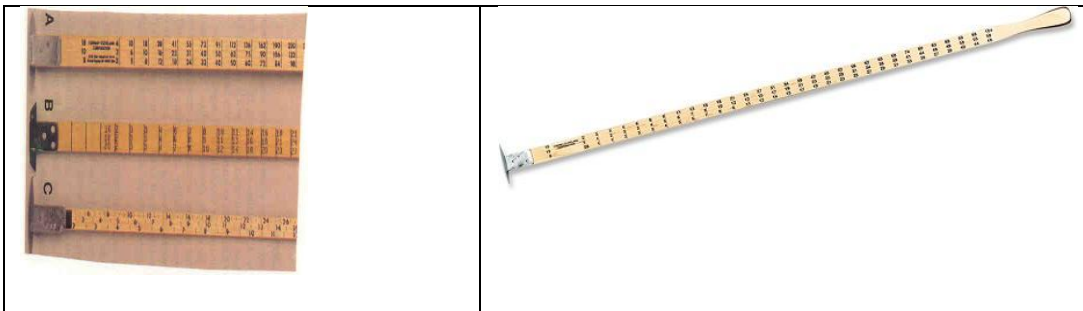
◆ **Increment Borer**

- used to take core samples from trees to determine growth rate.



◆ **Log Scale Stick**

- Used to measure log diameter to figure board foot volume.



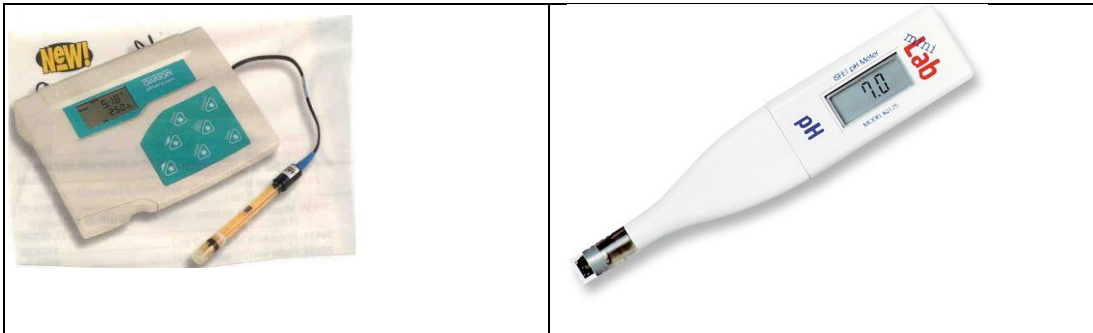
◆ **Logger's Tape**

- used to measure log lengths for log scaling.



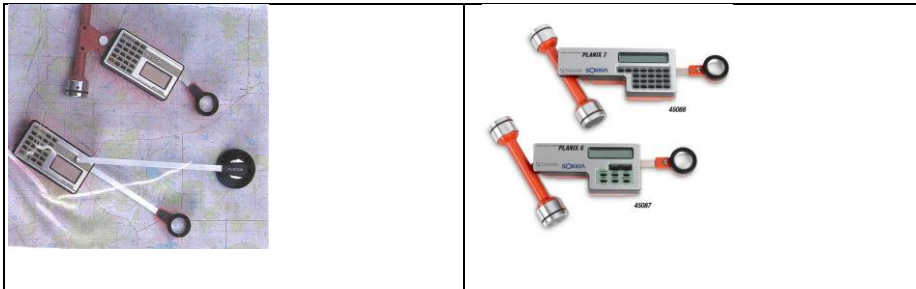
◆ **pH Meter**

- Tests the pH in soil or water samples

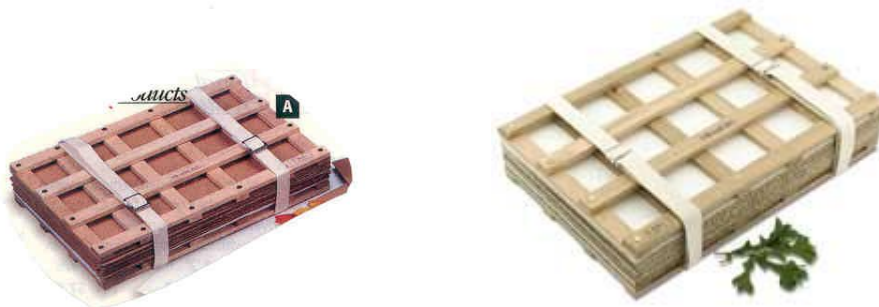


◆ **Planimeter**

- Used to determine coordinates on maps

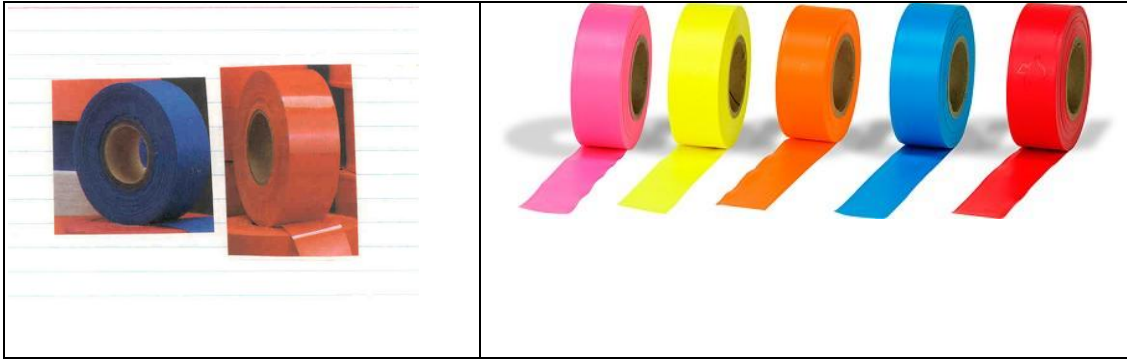


◆ **Plant Press** – Used to press plants for samples.



◆ **Plastic Flagging**

- Used to mark or identify trees, brush, trails, etc.



◆ **Pulaski-Forester Axe**

- Axe on one end and hoe on the other end.

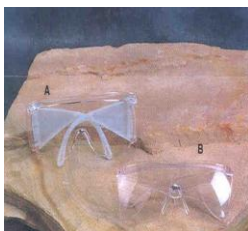


◆ **Relaskop** -- can be used for many things: tree heights, tree diameters, slope, cruising prism.



◆ **Safety Glasses**

- Eye protection is required on almost every job site



- ◆ **Safety Hard Hat** -- for personal safety.



- ◆ **Soil Sampler**

- Takes sample of soil from the ground to be tested.



- ◆ **Soil Test Kit**

- Analyze soil samples for a variety of things such as Nitrates, pH and individual nutrients.

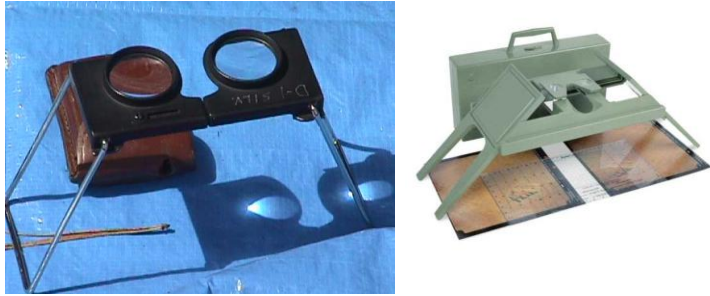


- ◆ **Staff Compass**

- used during surveying and laying out logging plots for accuracy.



◆ **Stereoscope** -- used to read topographic maps, gives a 3-D view.



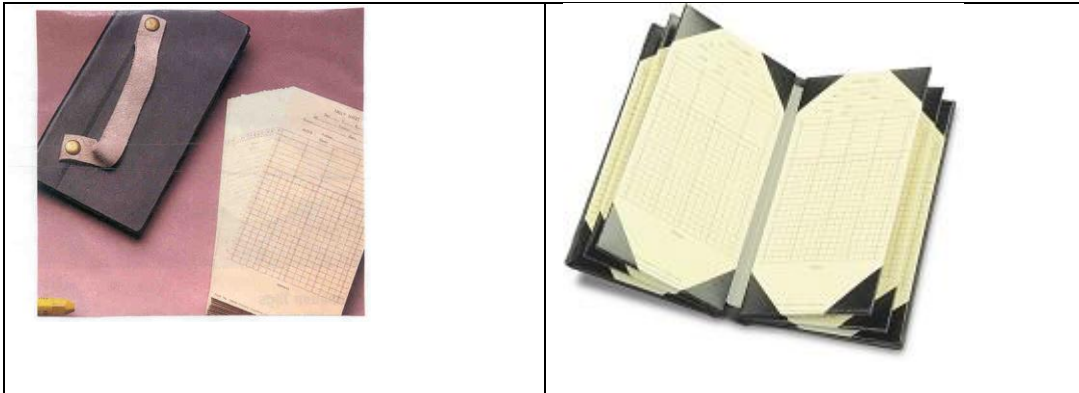
◆ **Survey Instrument**

- Used to survey land to layout plots of trees for harvest and building roads



◆ **Tally Book**

- Used to record data from field work.



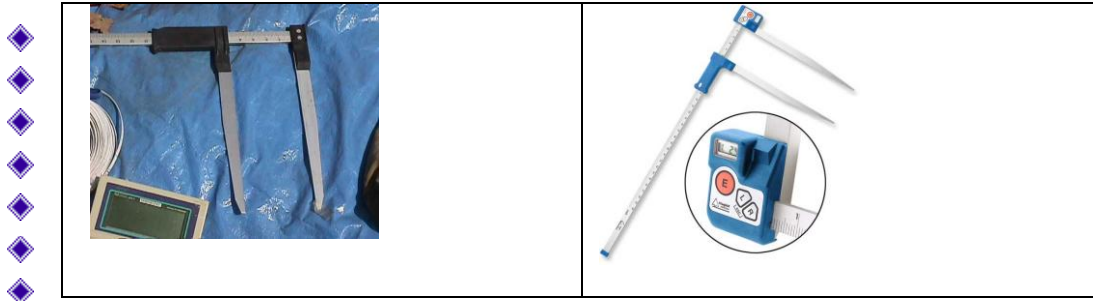
◆ **Tally Meter**

- Used to tally or record the number of something
  - Steps taken
  - Trees counted



◆ **Tree Caliper**

- used to measure tree diameters.



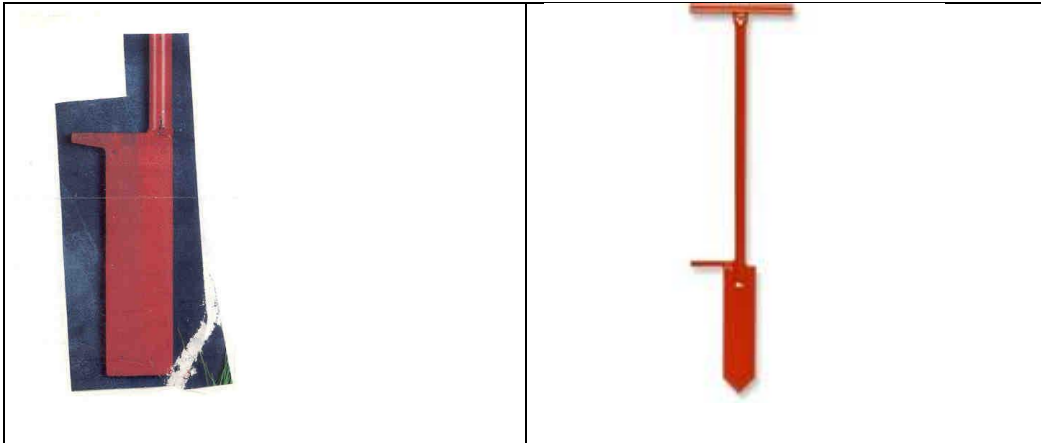
◆ **Tree Marking Gun**

- Used to mark trees with paint for harvest



◆ **Tree Planting Hoe or Bar**

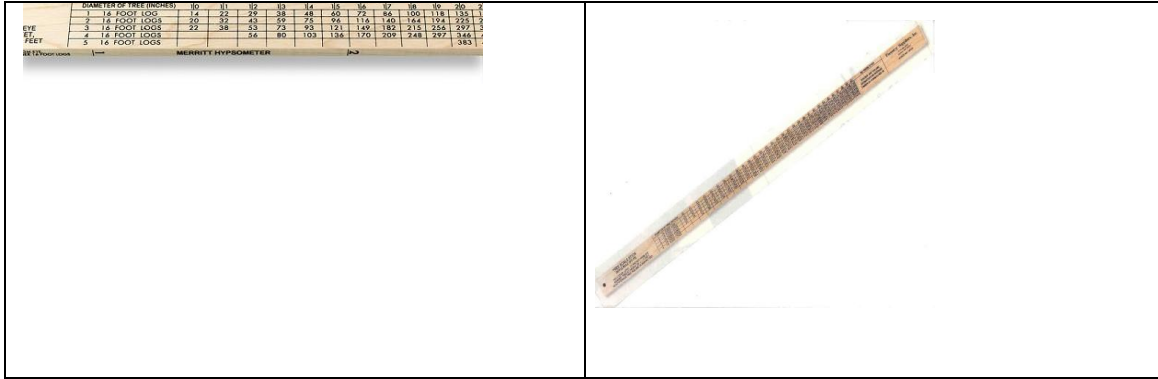
- Used for planting seedlings after fires or logging





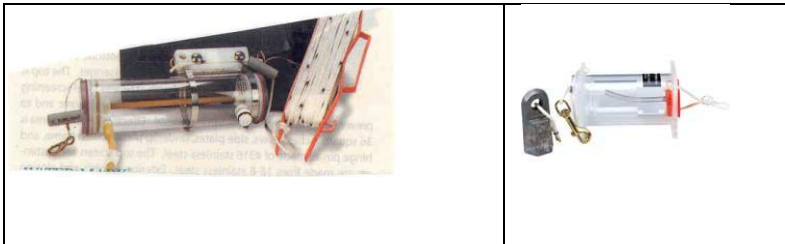
## ◆ Tree Stick

- Used to measure tree height, diameter and board foot volume



## ◆ Water Sampler

- Put into streams, rivers, lakes or ponds to obtain a water sample for testing



## ◆ Water Test Kit

- Used to test water samples for a variety of items
  - Nitrates
  - Oxygen levels
  - pH

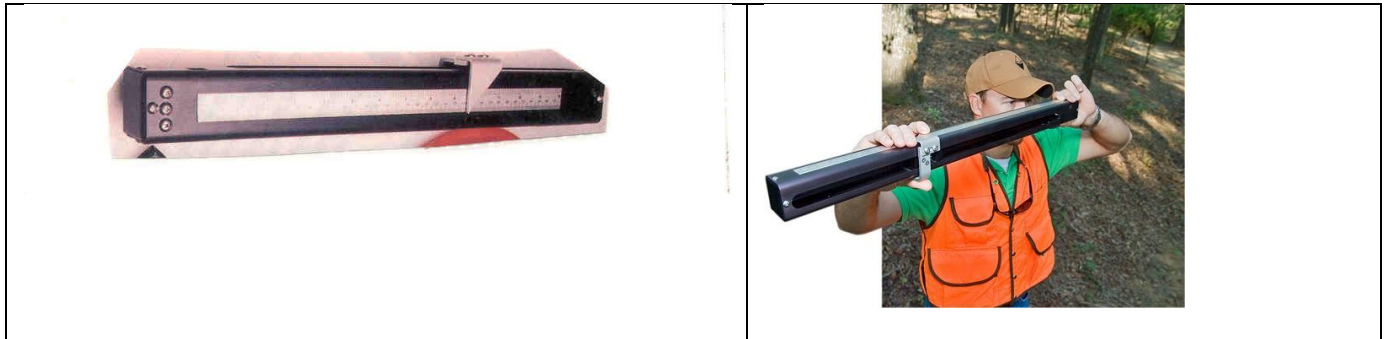


◆ **Wedge Prism**

- used to determine during timber cruising to determine if trees are in or out of the plot.



◆ **Wheeler Caliper -- Used to determine tree diameters and heights**



# FORESTRY CAREER DEVELOPMENT EVENT

## COMPASS READING – PACING

### Pacing

Pacing is a skill in which you determine distances by walking. It is important that competitors in the Idaho FFA Forestry CDE become skilled in this area because it is used in 2 contest areas: compass reading and timber cruising.

A pace is 2 steps, measured by starting on one foot (right for example) and counted each time that same foot hits the ground. You need to start by determining the length of your own pace. This is done by measuring a distance on the ground (100 feet is the best place to start), and counting how many paces it takes you to travel that distance. For example, if you step off 21 paces in a 100 foot distance, then dividing 100 by 21 gives you the length of each pace (4.76 feet). Two digits beyond the decimal should be used for accuracy.

While pacing you should practice walking a normal, steady pace in order to be consistent each time. A pace should also be checked regularly and adjusted as needed. Be aware that your pace can be greatly affected by terrain, the shoes you wear, and even the clothes you wear. Once you have established your pace size, you should remember both the length of your pace (example: 4.76 feet) and the number of paces in 100 feet (example: 21). You may also want to determine how many paces are in a 66 foot (1 chain) distance, if you want to use this measurement in timber cruising.

Note: Instead of paces, individual steps may be used. Just remember the number of steps in 100 feet, and calculate the size of each step the same way you calculate paces.

### Application of pacing to timber cruising

An accurate reading of tree height using a clinometer, requires that you are a specified distance from the tree. Two scales are commonly found on clinometers: a percentage scale, which is based on 100 feet distance from the tree; and a chain scale, which is based on 66 feet from the tree. If you choose to use the percentage scale on your clinometer, make sure you are 100 feet from the tree (example: 21 paces). If you choose to use the chain scale on your clinometer, make sure you are 66 feet from the tree. You would do this by simply counting your paces in a 66 foot distance. (For the example already given, this should equate to 21 times .66, or 13.86 paces).

### Application of pacing to the compass portion of this CDE

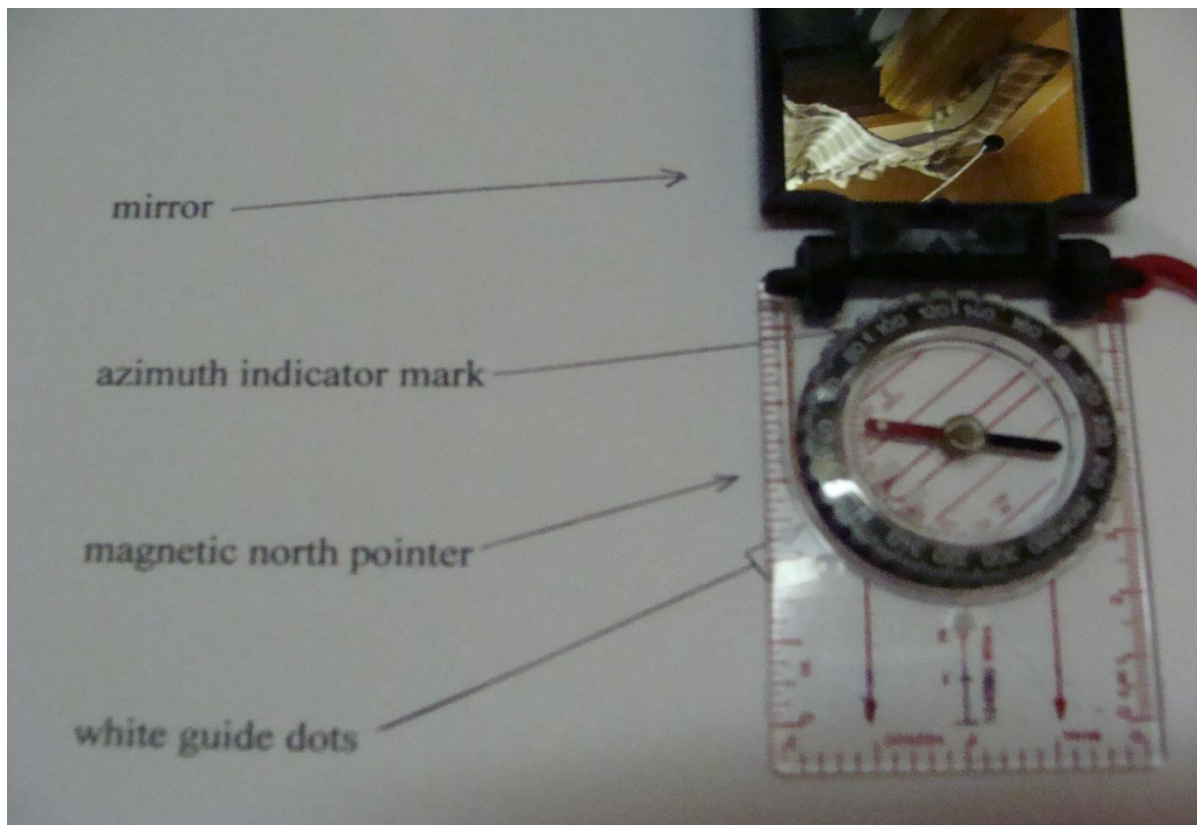
The compass reading portion of the Idaho forestry CDE requires that you measure distances between 3 stakes in the ground: stake 1 to 2, stake 2 to 3, and stake 3 to 1. This is done by starting with your foot at stake number 1 and counting your paces as you walk to stake number 2. You then take that number and multiply it by the length of your pace. For example, if you walk from stake 1 to 2 and count off 16.5 paces and your pace length is 4.76, then multiplying 16.5 by 4.76 gives you a distance of 78.54 feet. You would record that in the appropriate space on your scorecard. You would then do the same from stake 2 to 3 and 3 to 1, recording each in the appropriate space on your scorecard. (Recommendation is have your students pace each distance twice and then take an average)

## Compass Reading

Before stepping off the distance between stakes as explained above, the compass reading portion of this CDE requires you to use the compass provided to determine the azimuth (degree reading) between each set of stakes.

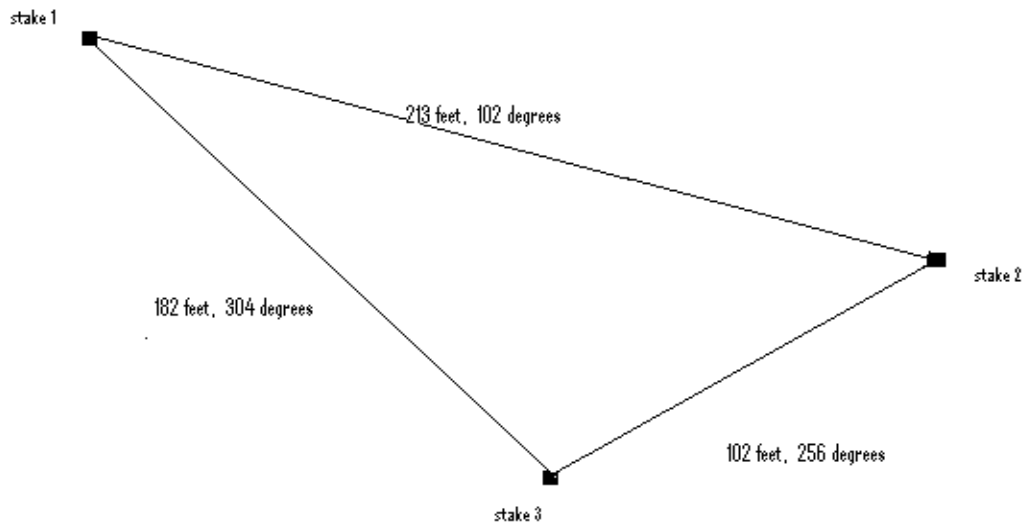
If the first azimuth we are recording is from stake 1 to 2, then we would get that reading by doing the following:

- 1) Stand or squat behind stake number 1 far enough to see it and stake number 2 at a distance. Align your body and compass with the 2 stakes, holding the compass in front of you with the cover mirror tipped toward you about 45 degrees. Hold the compass level and away from any metallic objects such as watches, belt buckles, face jewelry, etc. Steady the compass so that the vertical line through the mirror divides the reflection of the compass in half, and the compass aligns with stake 1 and stake 2.
- 2) Rotate the compass dial until the magnetic north pointer needle (red end) is centered between the white guide dots (there is also a pointer outline on the bottom of the compass which is in the same location, which is 360 degrees/North). Check to see that the pointer is aligned as explained while still aligning the compass body with the 2 stakes.
- 3) You can now read the azimuth from the compass by looking at the dial just below the mirror, in the center. There is a white line which will be set at a specific azimuth or degree reading. Note: every mark on the dial represents 2 degrees. Write this azimuth reading in the appropriate blank on your scorecard. Do the same from stake 2 to 3, and from stake 3 to 1, recording each reading on your scorecard.



Sunnto compass model MC1 – (see forestry CDE rules)

# Example Compass Course Layout



## FORESTRY CAREER DEVELOPMENT EVENT TREE AND PLANT IDENTIFICATION

### Alder

**Leaf:** Alternate, simple, deciduous, ovate, 3 to 6 inches long, prominently pinnate leaf with doubly serrate margins that are tightly rolled under at the edges (revolute); petiole 1 inch long and grooved; green to yellow green above and paler green below.

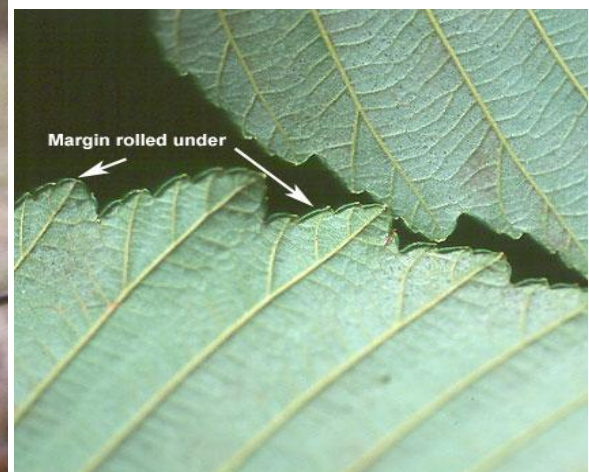
**Flower:** Monoecious; but borne in unisexual aments (catkins), preformed males are slender, pendent, and hang in clusters of 2 to 5; female catkins are short and thick, borne at the ends of branchlets.

**Fruit:** A small semi-woody cone about 1/2 to 1 inch long, persists through the winter, brown, seeds are tiny winged nutlets, shed in the fall.

**Twig:** Young twigs are distinctly triangular in cross-section; olive to reddish brown; prominent lenticels; clearly stalked buds.

**Bark:** Ashy gray to grayish brown, generally smooth but breaking into flat, irregular plates near the base, increasingly covered with white lichens as it ages; inner bark is tan but turns red when exposed to air.

**Form:** A medium sized tree reaching 120 feet tall and 1 to 3 feet in diameter. Typically has a moderately straight bole with an open, broadly pyramidal or dome-shaped crown. Lower trunk is usually free of branches due to intolerance to shade.



## Ash

**Leaf:** Opposite, pinnately compound, deciduous, 5 to 14 inches long, 5 to 9 leaflets; leaflets are broadly ovate, obovate, or elliptical, densely pubescent at first but smoothing with age, margins are entire to irregularly serrate, leaflets 2 to 4 inches long, green above and paler below.

**Flower:** Dioecious; small, greenish-white, inconspicuous flowers borne in dense clusters.

**Fruit:** Dry, flat samaras with terminal wings, 1 to 2 inches long, samaras are attached singly but hang in dense clusters.

**Twig:** Stout, round but flattened at each node, olive-gray and pubescent when young, but turning gray-brown and smooth with age; large crescent-shaped leaf scars are opposite.

**Bark:** Thin, smooth, and gray-green when young but eventually becoming up to 1 1/2 inches thick and furrowed with thin, flat ridges, gray-brown.

**Form:** A medium sized tree commonly 40 to 80 feet tall and 1 to 3 feet in diameter, crown may be narrow or spreading.



## **Quacking Aspen**

**Leaf:** Alternate, simple, 1 to 3 inches long, green above and paler below, heart-shaped to nearly round with a fine toothed margin, petiole is flattened.

**Flower:** Dioecious; male and female hanging catkins 1 to 3 inches long.

**Fruit:** Catkin (2 to 4 inches long), with attached light green capsules which contain many small hairy seeds.

**Twig:** Slender, glabrous, reddish brown often with a gray, waxy film; buds conical, reddish brown, terminal bud 1/4 inch long, may be slightly resinous.

**Bark:** At first smooth, creamy yellowish-white to very light green; later developing thick furrows and becoming dark, especially near the base.

**Form:** Small (30 to 40 feet tall) upright tree, which often occurs in thickets.





## **Black Cottonwood**

**Leaf:** Alternate, simple, deciduous; variable in size and shape on same tree, commonly 3 to 6 inches long, but can be much larger; ovate-lanceolate to deltoid, dark green above and silvery white below with rusty smears of resin, margins wavy to crenate; petiole long, and most often round but may be flattened.

**Flower:** Dioecious; borne in long, drooping aments that appear before the leaves.

**Fruit:** Rounded, 3-valved capsules (1/4 to 1/2 inch in diameter) which open to release many cottony-tufted seeds; seeds are very tiny and black.

**Twig:** Moderately stout, greenish brown to olive-gray, often ribbed or angled in cross section when young, covered with distinct lenticles, spur shoots are common on older branches; buds are long (1/2 to 3/4 inch) and sharp-pointed, resinous and aromatic, covered with imbricate scales. Twig has a bitter aspirin taste.

**Bark:** When young it is smooth and yellowish tan to gray; later gray to gray-brown and broken into deep furrows and flattened ridges, up to 2 1/2 inches thick.

**Form:** The tallest broad-leaved tree in the West, growing to 200 feet tall and 6 feet in diameter. Has a broad, open crown



## **Black Walnut**

**Leaf:** Alternate, pinnately compound, 12 to 24 inches long with 10 to 24 leaflets (poorly formed or missing terminal leaflet), leaflets are ovate-lanceolate, finely serrate, and 3 to 3 1/2 inches long, rachis is stout and somewhat pubescent; yellow-green to green above, slightly paler below.

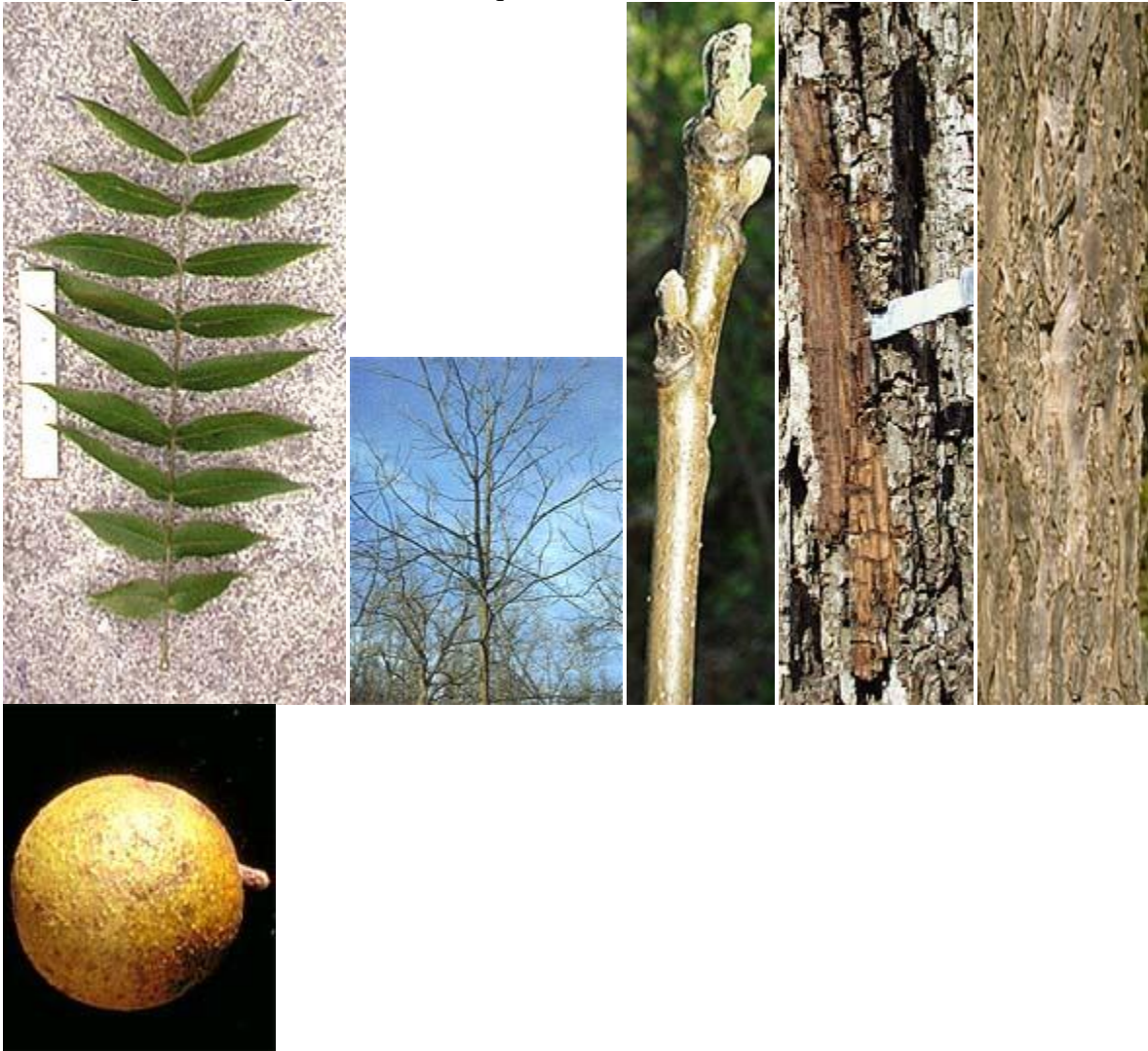
**Flower:** Monoecious; males are single-stemmed catkins, 2 1/2 to 5 1/2 inches long; females on short spikes near twig end, yellow-green in color, appearing in late spring.

**Fruit:** Round, 2 to 2 1/2 inches across, with a thick, green indehiscent husk. The husk contains an irregularly furrowed, hard nut that contains sweet, oily meat (edible), mature in late summer to fall.

**Twig:** Stout, light brown, with a buff-colored chambered pith; buds are tan, and large with a few pubescent scales; leaf scars are 3-lobed, resembling a "monkey face".

**Bark:** Brown on surface, darker brown when cut, ridged and furrowed with a rough diamond pattern.

**Form:** A medium to large tree up to 100 feet in height that develops a straight, clear bole with a narrow crown under competition, twigs and branches quite stout.



## Douglas Fir

Leaf: Evergreen, single needles that lack woody pegs or suction cups, yellow-green to blue-green, 3/4 to 1 1/4 inches long, tips blunt or slightly rounded, very fragrant.

Flower: Monoecious; males oblong, red to yellow, near branch tips; females reddish, with long bracts, occurring near branch tips.

Fruit: Very distinctive, 3 to 4 inches long with rounded scales. Three-lobed bracts extend beyond the cone scales and resemble mouse posteriors. Maturing in late summer.

Twig: Slender and red-brown, with long, sharp, pointed, red-brown buds.

Bark: Smooth and gray on young stems, becoming thickened, red-brown with ridges and deep furrows.

Form: A pyramidal crown that is somewhat open and self-prunes poorly. Stems are characteristically straight.



## Elm

**Leaf:** Alternate, simple, ovate to oblong, 3 to 5 inches long, 1 to 3 inches wide, margin coarsely and sharply doubly serrate, base conspicuously inequilateral, upper surface green and glabrous or slightly scabrous, paler and downy beneath.

**Flower:** Monoecious; small, in drooping clusters of 3 to 5, appear in early spring before leaf buds open.

**Fruit:** Rounded, flat, papery, wafer-like samaras, 3/8 to 1/2 inch across, deeply notched at apex, hairless except for margin; ripen in spring.

**Twig:** Slender, glabrous, slightly zigzag, reddish brown; buds ovate, over 1/4 inch long, reddish brown with darker edged scales, often placed a little to one side of the twig.

**Bark:** Dark, ashy gray, flat-topped ridges separated by diamond-shaped fissures; outer bark when sectioned shows distinct, alternating, buff colored and reddish brown patches. When young it is often quite spongy.

**Form:** In the open, the trunk is usually divided into several large, ascending and arching limbs, ending in a maze of graceful drooping branchlets.



## Engelman Spruce

Leaf: Evergreen, four-sided needles (1 inch long), which are sharp, flexible and bluish-green. Flower: Monoecious; male flowers cylindrical, purple and hanging in lower crown, females cylindrical, red and upright in the upper crown.

Fruit: Cone, 1 1/2 to 3 inches long, thin, flexible scales are somewhat wavy, light brown.

Twig: Brown, with fine hairs present. Bud scales tighter than some other spruces.

Bark: Thin, reddish-brown, sometimes with purple tint, becoming very scaly and loose.

Form: Medium to large tree (80 to 100 feet tall), straight trunk, narrow crown. At the highest elevations it will appear very windswept.



## Grand Fir

**Leaf:** Flattened needles, about 3/4 to 2 inches long, dark yellow-green above with 2 white bands below; apex rounded or notched; spirally arranged but flattened into 2 ranks especially lower in the crown; vary in length with lengths alternating on the twig; grow parallel to one another but perpendicular to the twig.

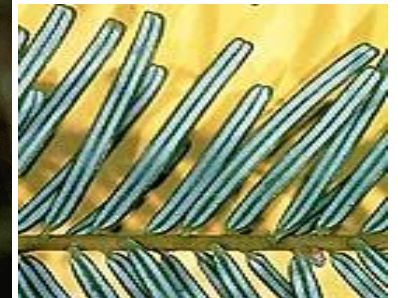
**Flower:** Monoecious; male cones yellowish and borne beneath the leaves; female cones yellowish-green to green and borne upright near the top of the crown.

**Fruit:** Cones are 2 to 4 inches long, barrel-shaped, and borne upright on the twig; cone scales are deciduous, falling from the cone as seeds ripen; green to purplish green when mature.

**Twig:** Stiff, olive to reddish brown, and covered with round, flat leaf scars when needles fall. Buds are large, rounded, and covered with pitch; terminal buds usually occur in clusters of three or more.

**Bark:** When young grayish green and covered with resin blisters; with age becoming 2 to 3 inches thick, grayish brown and mottled, often furrowed with flattened ridges; inner bark is purple-red.

**Form:** A large evergreen, commonly 150 to 200 feet tall and 3 to 4 feet in diameter. It develops a long narrow crown of dense foliage, often rounded or flat-topped at maturity.



## **Western Hemlock**

**Leaf:** Evergreen, flattened, single needles, spirally arranged (but somewhat 2-ranked); short (1/4 to 3/4 inch long), rounded tips, short but distinct petioles, two distinctly different sizes that alternate on the twig, yellow-green to green above with two white bands below.

**Flower:** Monoecious; male cones are tiny, yellow, and occur axillary on previous year's growth; female cones are tiny, purple, and terminal.

**Fruit:** Small, woody, egg-shaped cones (about 1 inch long) with numerous thin, imbricate scales; pendent, sessile, and terminal; reddish brown; mature in one season, abundant.

**Twig:** Slender, flexible, and minutely pubescent, roughened by diagonally-raised and rounded leaf scars.

**Bark:** Young bark is thin, superficially scaly, and brown to black; on mature trees bark is thin (about 1 inch) with flattened ridges; inner bark is dark red streaked with purple.

**Form:** A large evergreen conifer that reaches 200 feet tall and 4 feet in diameter, mature trees have a pyramidal crown and lacy foliage that droops at the terminal ends.



## **Western Juniper**

**Leaf:** Persistent, scale-like and awl-like (in combination), and mostly ternate (arranged in whorls of 3), although some are decussate (in pairs); appressed tightly to the twig, tips of awl-like needles are free of the twig. Back side of needles are glandular and resin dotted, very aromatic.

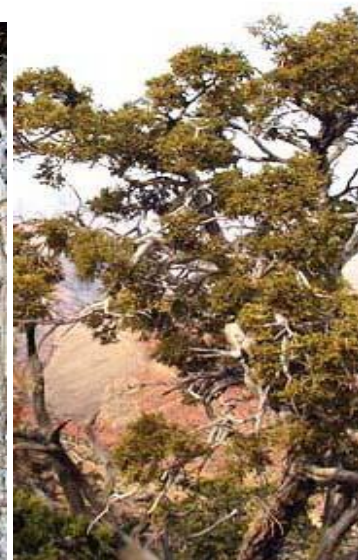
**Flower:** Mostly Dioecious; rarely Monoecious; male cones small, yellow, and terminal; female cones small, ovate, and at ends of branches.

**Fruit:** Cones are small (about 1/4 inch diameter) and round with smooth, leathery scales; green when young and bluish black when mature, but always covered with white bloom, require 2 growing seasons to mature.

**Twig:** Round and reddish brown, smooth when young but becoming scaly with age.

**Bark:** Mature bark is thin (less than 1 inch thick), reddish brown, but weathering to grayish brown with broad, shallow furrows and flattened ridges.

**Form:** Small, dry-site evergreen tree growing 20 to 60 feet tall and 1 to 3 feet in diameter; trunk is typically short, thick, and many-branched.





## Lodgepole Pine

Leaf: Evergreen needles, 1 1/2 to 3 inches long in fascicles of two, twisted, fascicle sheath present; yellow-green to green.

Flower: Monoecious; males are yellow, cylindrical and clustered at branch tips; females reddish purple at branch tips in the upper crown.

Fruit: Woody cone, 1 to 2 inches long, often asymmetrical and becoming lumpy near the base, apophysis armed with a short spine; light brown to brown; may remain closed for several years.

Twig: Orange-brown, turning darker with age, needles are persistent for several years; buds are narrowly ovoid, reddish brown and resinous.

Bark: Thin, typically grayish brown but can be very dark with many small close scales.

Form: Tall, slender trees with a narrow loose crown reaching up to 80 feet tall; some varieties which grow along the Pacific Coast are very short and scrubby.



## **Big Leaf Maple**

**Leaf:** Opposite, simple, deciduous, 6 to 12 inches in diameter, but sometimes larger; palmately lobed with 5 deep lobes, terminal lobe has a distinct waist; dark green above and lighter green below. Petiole exudes a milky sap.

**Flower:** Monoecious; small yellow flowers borne in long racemes; may be perfect or imperfect.

**Fruit:** Double samaras with wings 1 1/2 to 2 inches long, wings occur at acute angle, seed head hairy, seeds tan when ripe.

**Twig:** Stout, smooth, round, and pale green, turning bright green or red, then grayish brown; buds opposite, terminal bud large, stout, with 3 or 4 greenish red scales.

**Bark:** When young it is smooth and grayish brown, later becoming darker brown with interlacing ridges and furrows.

**Form:** A large tree, commonly 40 to 100 feet tall and 2 to 4 feet in diameter. In the open, it branches low to the ground and forms a rounded crown; in dense stands it grows taller and straighter. Commonly sprouts from the base and forms large basal burls.



## **Pacific Ninebark**

Leaf: Alternate, simple, deciduous, maple-like, palmately lobed (3 to 5 pointed lobes); almost circular in outline, 1 1/2 to 3 1/2 inches in diameter; dark green above and paler below, somewhat pubescent.

Flower: Monoecious; perfect, small (1/2 inch) white flowers borne in dense, upright, hemispherical clusters, appearing in late spring to early summer.

Fruit: Small (1/4 inch long) brown follicles borne in dense, upright hemispherical clusters.

Twig: Slender and orange-brown; young twigs have tight bark but on older twigs the bark splits and exfoliates in long strips.

Bark: Thin and yellow- or orange-brown; shredded and exfoliating in long strips, especially on older stems.

Form: A large erect shrub to 12 feet tall.



## Ocean Spray

Leaf: Alternate, simple, deciduous; 3/4 to 2 1/2 inches long, ovate, and either coarsely toothed or lobed and serrate; entire near the base, prominently pinniveined, green above and paler below.

Flower: Monoecious; perfect, very small creamy white flowers borne in very large, loose, hanging clusters, appearing in mid-summer.

Fruit: Tiny, light brown, 1-seeded follicles borne in large clusters; fruit clusters persist through the winter and into the next growing season.

Twig: Slender; slightly ridged when young but becoming round with time; pith is large, white, and spongy.

Basal spouts are very straight and were historically used for arrow shafts.

Bark: Smooth and gray-brown.

Form: An erect, loosely branched shrub growing to 15 feet tall. Typically has multiple, straight stems arising from the base.



## **Oregon Grape**

**Leaf:** Alternate, pinnately compound, persistent, 6 to 12 inches long; 5 to 9 broadly lanceolate leaflets each 2 to 3 inches long, leaflets are dark, glossy green above and paler green below; thick, waxy cuticles, sharply spined teeth along their margins. Lateral leaflets are opposite and sessile, while the terminal leaflet has a petiole; each leaflet has a distinct midrib.

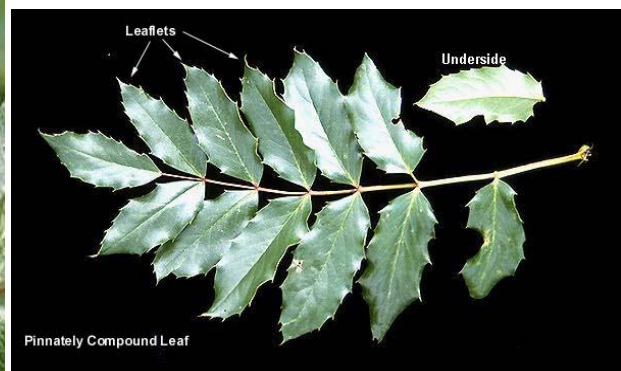
**Flower:** Monoecious; perfect, small bright yellow flowers are borne in long, upright racemes.

**Fruit:** Small (3/16 inch), dark blue berries, edible, but sour.

**Twig:** Main stems are largely unbranched, with compound leaves arising directly from main stems; green when young, turning gray-brown with age.

**Bark:** Gray-brown and smooth or slightly rough, sometimes appears striped as the bark matures.

**Form:** A tall, erect, evergreen shrub reaching 3 to 10 feet tall. Most commonly grow in clusters with numerous, erect, unbranched stems.



## Ponderosa Pine

Leaf: Evergreen, 5 to 10 inches long, with three (sometimes 2) tough, yellow-green needles per fascicle. When crushed, needles have a turpentine odor sometimes reminiscent of citrus.

Flower: Monoecious; males yellow-red, cylindrical, in clusters near ends of branches; females reddish at branch tips.

Fruit: Cones are ovoid, 3 to 6 inches long, sessile, red-brown in color, armed with a slender prickly, maturing late summer.

Twig: Stout, orange in color, turning black. Buds often covered with resin.

Bark: Very dark (nearly black) on young trees, developing cinnamon colored plates and deep furrows.

Form: A large tree with an irregular crown, eventually developing a flat top or short conical crown. Ponderosa pine self-prunes well and develops a clear bole.



## **Red Oak**

**Leaf:** Alternate, simple, 5 to 8 inches long, oblong in shape with 7 to 11 bristle-tipped lobes, sinuses extend 1/3 to 1/2 of the way to midvein, generally very uniform in shape, dull green to blue-green above and paler below.

**Flower:** Monoecious; males in yellow-green slender, hanging catkins, 2 to 4 inches long; females are borne on short axillary spikes, appearing with the leaves in spring.

**Fruit:** Acorns are 3/4 to 1 inch long and nearly round; cap is flat and thick, covering about 1/4 or less of the acorn, resembling a beret; matures in 2 growing seasons, in late summer and fall.

**Twig:** Quite stout, red-brown and glabrous; terminal buds multiple, quite large, conical, and covered with red-brown, mostly hairless scales but terminal scales may bear some frosty pubescence.

**Bark:** On young stems, smooth; older bark develops wide, flat-topped ridges and shallow furrows. The shallow furrows form a pattern resembling ski tracks.

**Form:** A medium sized to large tree that reaches up to 90 feet tall, develops a short trunk and round crown when open grown, straight with a clear, long bole when grown with competition.



## Snowberry

**Leaf:** Opposite, simple, deciduous; variable in shape, generally oval, but may have entire or lobed margins (on the same plant); 3/4 to 2 1/2 inches long; green above and paler below.

**Flower:** Monoecious; perfect, small (1/4 inch), pinkish-white, and bell-shaped; occur in small terminal clusters, appearing in early summer.

**Fruit:** Round, white, waxy, and berry-like, up to 1/2 inch in diameter, often 3 to 5 per cluster; last well into winter. Inedible and commonly considered TOXIC.

**Twig:** Slender, smooth, yellow-brown; pith is hollow; opposite branching.

**Bark:** Tan to grayish brown and often splitting lengthwise on older stems.

**Form:** Finely branched, upright shrub reaching 6 feet tall.





## **Sub Alpine Fir**

**Leaf:** Flattened needles, usually about 1 inch long, thickened in the middle, bluish white bloom on all surfaces; tips mostly rounded, but may be notched (or pointed near top of tree); spirally arranged but uniformly upswept; commonly have a manicured appearance.

**Flower:** Monoecious; male cones bluish and borne beneath the leaves; female cones purple and borne upright near the top of the crown.

**Fruit:** Cones are 2 to 4 inches long, cylindrical, slender, and borne upright on the twig (frequently in clusters); cone scales are deciduous, falling from the cone as seeds ripen; purple when mature.

**Twig:** Stiff, orange-brown, and covered with round, flat leaf scars when needles fall. Buds are small, rounded, and covered with pitch; terminal buds usually occur in clusters of three or more.

**Bark:** When young, grayish green and covered with resin blisters; later turning gray to white, unbroken except near base of large trees. Resin pockets scattered throughout inner bark.

**Form:** When mature 40 to 100 feet tall and 1 to 2 feet in diameter. Very narrow crown of dense foliage; often spire-like with branches to the ground.



## Sycamore

**Leaf:** Alternate, simple, deciduous, 5 to 10 inches long, palmately lobed (usually 3-5 lobes) with lobes about half as long as the leaf; hairy when young; petioles are long, swollen at their base, and hairy.

**Flower:** Monoecious but imperfect, male and female flowers are tiny and borne in dense, round heads (like fuzzy marbles on a string).

**Fruit:** Golf ball sized heads of tufted achenes; 3 to 7 hang on a long pendulous stalk designed to fracture at maturity; seeds are wind dispersed.

**Twig:** Slender and covered with numerous fine hairs when young; becoming smooth and reddish brown with age. Terminal buds absent; lateral buds conical.

**Bark:** The most striking feature of this tree. Young greenish-gray bark exfoliates leaving almost pure white inner bark; older bark is thicker (1 to 3 inches), furrowed, and dark brown.

**Form:** A medium to tall tree (40 to 100 feet tall) that sometimes reaches 11 feet in diameter. Crown is open and rounded.



## **Western Larch**

**Leaf:** Deciduous, yellow-green in spring turning golden yellow in fall; borne singly on current year's twigs, but clustered on spur shoots on older twigs; 1 to 1 3/4 inches long, linear, and flattened to triangular in cross-section.

**Flower:** Monoecious; male cones are round to oblong and yellow to yellow-green in color; female cones are small, erect, and bright red when young.

**Fruit:** Small (1 to 1 1/2 inches long), egg-shaped cones with thin, woody scales with finely toothed apices. Bracts have spines that are longer than the scales (similar to Douglas-fir, but smaller).

**Twig:** Twigs are yellowish brown and covered by short, thick spur shoots; may be finely hairy the first year.

**Bark:** Young bark is thin, scaly, and gray-brown, later becoming 3 to 6 inches thick with deep furrows and flattened ridges, yellow to reddish brown.

**Form:** A large deciduous conifer growing 100 to 180 feet tall and 3 to 4 feet in diameter, very straight bole topped with a lacy, open crown.



## **Western Paper Birch**

**Leaf:** Alternate, simple, pinnately-veined, ovate in shape, 3 to 5 inches long, with irregularly doubly serrate margins, an acute tip and rounded base (occasionally heart-shaped), green above and paler below.

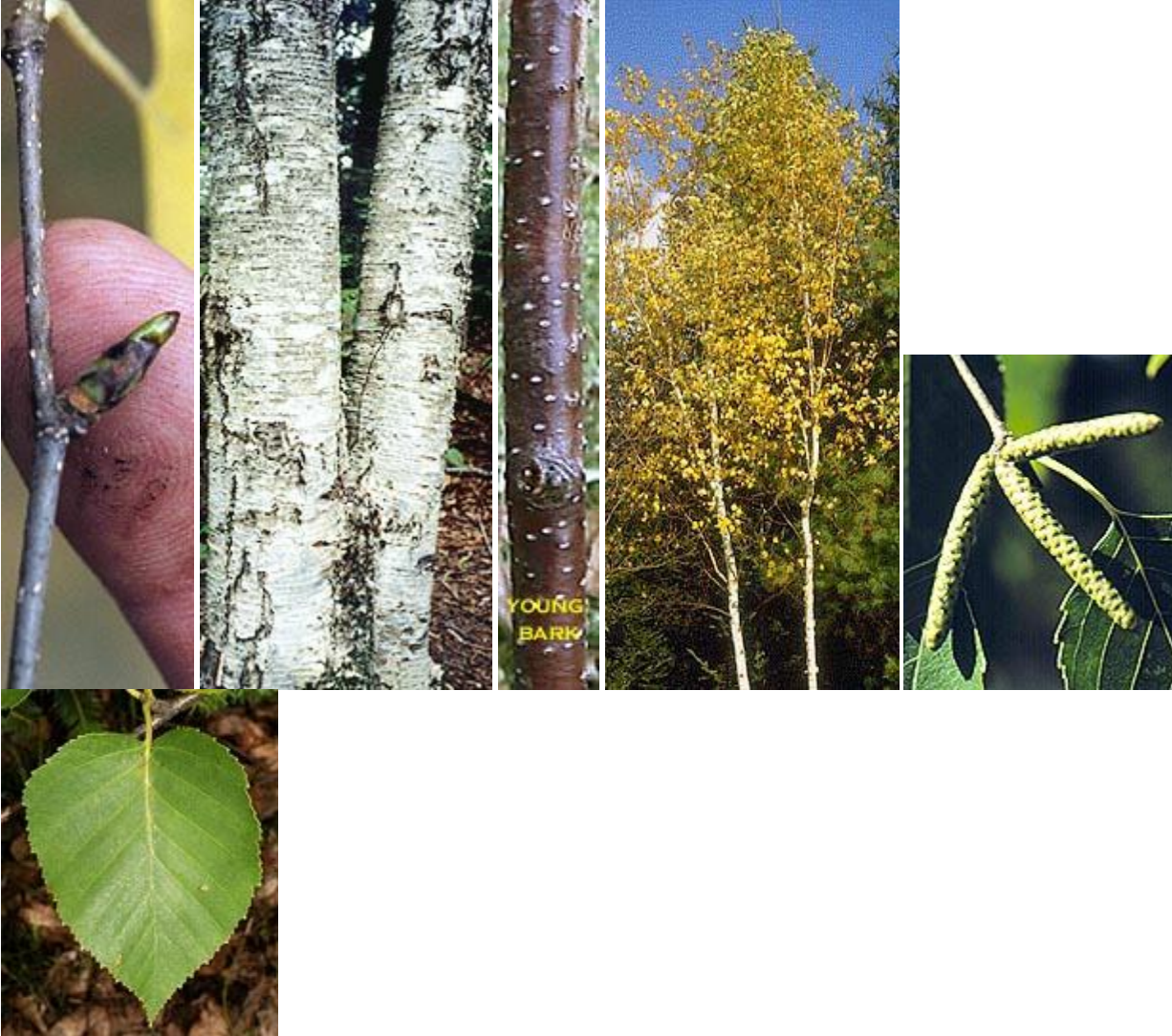
**Flower:** Monoecious; preformed male catkins near the end of the twig in groups of 2 to 5, 3/4 to 1 1/4 inches long; female are upright, 1 to 1 1/4 inches long, appear or elongate (males) in mid-spring.

**Fruit:** Cone like, cylindrical 1 to 1 1/2 inches long, deciduous at maturity, releasing elliptical 2-winged nutlets, mature in the autumn and disperse over the winter.

**Twig:** Slender, dull red-brown, numerous lighter lenticels, lacking wintergreen smell when cut; terminal bud absent, lateral buds are gummy, green and chestnut brown in color, spur shoots present on older growth.

**Bark:** Reddish brown with light lenticels on very young stems; later turning chalky to creamy white, peeling in horizontal papery strips; brown to black and may be furrowed at base; orange inner bark.

**Form:** A medium sized tree to 70 feet with a pyramidal or irregular crown, often with several trunks.



## Western Red Cedar

**Leaf:** Persistent, scale-like, and arranged in decussate pairs; yellow-green on top with a distinctive butterfly shaped bloom pattern on the underside. Individual leaves are typically 1/16 to 1/8 inch long and sets of four are roughly square. Foliage arranged in flattened sprays, dead leaves fall in sprays.

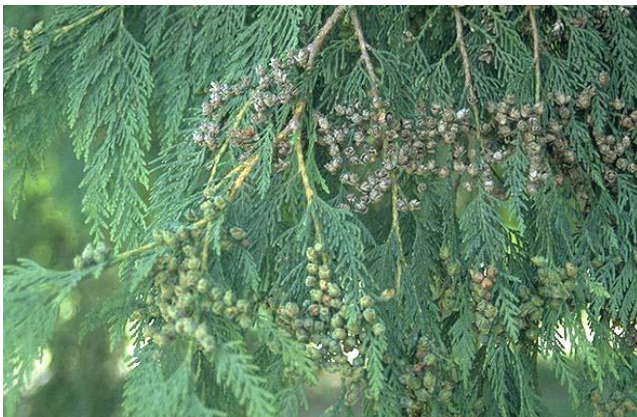
**Flower:** Monoecious; male cones are small and inconspicuous; female cones are small, reddish purple, and borne near the tips of branches.

**Fruit:** Small woody cones (1/2 inch long) with thin, valvate scales arranged in 5 to 6 decussate pairs; typically upturned on the branches.

**Twig:** Younger twigs are flattened while older twigs are round, slender, flexible, and slightly zigzag; reddish brown.

**Bark:** Thin (1/2 to 3/4 inch thick), fibrous, stringy, and reddish brown; finely ridged and furrowed; intertwined; comes off in long strips.

**Form:** A large evergreen conifer that grows to 200 feet tall and 10 feet in diameter (sometimes more). Has an open, pyramidal crown with pendulous, frond-like branches. Base of trunk is often swollen and fluted.



## **Western White Pine**

**Leaf:** Acicular, 2 to 4 inches long, fascicles of 5, blue-green with white lines of stomatal bloom on two of the three needle surfaces, persist 3 to 4 years, bundle sheath is deciduous, apex blunt.

**Flower:** Monoecious; male cones are small, yellow, and clustered near the tips of branches; female cones are larger, almost round, greenish pink in color, and clustered near the tips of branches in the upper parts of the crown.

**Fruit:** Large cylindrical woody cones, 5 to 12 inches long, thin and curved. Brown when mature; scales thin and unarmed, typically tipped with globs of white resin; very short stalk.

**Twig:** Moderately stout and grayish brown.

**Bark:** Initially thin and grayish green later becoming up to 2 inches thick, gray to purplish gray and broken into square or rectangular blocks, not ridged and furrowed. Dark bands commonly encircle the tree where whorls of branches have fallen off.

**Form:** Tall, straight, evergreen conifer growing to 180 feet tall and 4 feet in diameter with an open crown, long up-raised branches near the top (horizontal lower down); bole commonly free of branches for half its length.



## **White Oak**

**Leaf:** Alternate, simple, deciduous, pinnately lobed with 5 to 9 irregular rounded lobes, lobes often touch or overlap, 3 to 6 inches long and 2 to 4 1/2 inches wide, dark green and shiny above and paler below, leathery but not persistent.

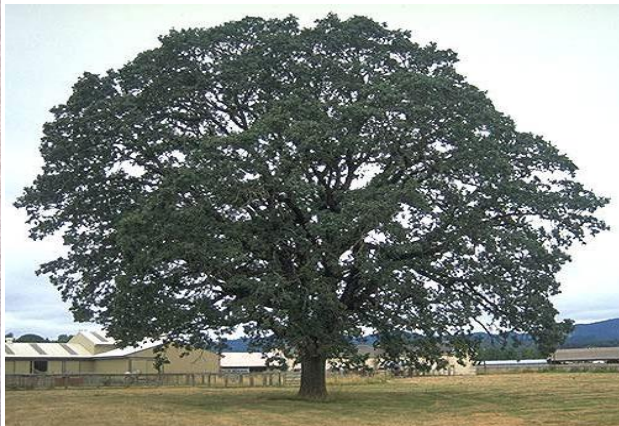
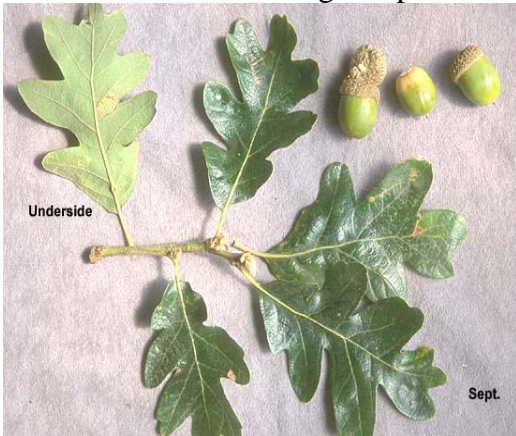
**Flower:** Monoecious; inconspicuous, male and female flowers borne in separate aments (catkins) on current year's twigs, male flowers borne in hanging catkins, female flowers borne in small clusters, appearing with the leaves.

**Fruit:** Solitary or paired acorns on current year's growth; about 1 inch long, light brown, cap is shallow and bowl-like, covering only about 1/3 of the nut, mature in a single season.

**Twig:** Stout, originally hairy but becoming smooth and reddish brown to gray; buds are densely hairy and are covered with imbricate scales, terminal buds are clustered.

**Bark:** Mature bark is thin (less than 1 inch), light gray to gray-brown, shallow irregular furrows separating short, broad ridges.

**Form:** A deciduous broad-leaved tree growing 40 to 80 feet tall and 2 to 3 feet in diameter (sometimes larger). In the open, it has a dense, rounded crown; when grown in stands, its crown is narrow, irregular, and concentrated where sunlight is present.



## FORESTRY CAREER DEVELOPMENT EVENT TIMBER CRUISING

Timber cruising is the method used to determine the board foot volume of a standing tree and the amount of timber in a forested tract.

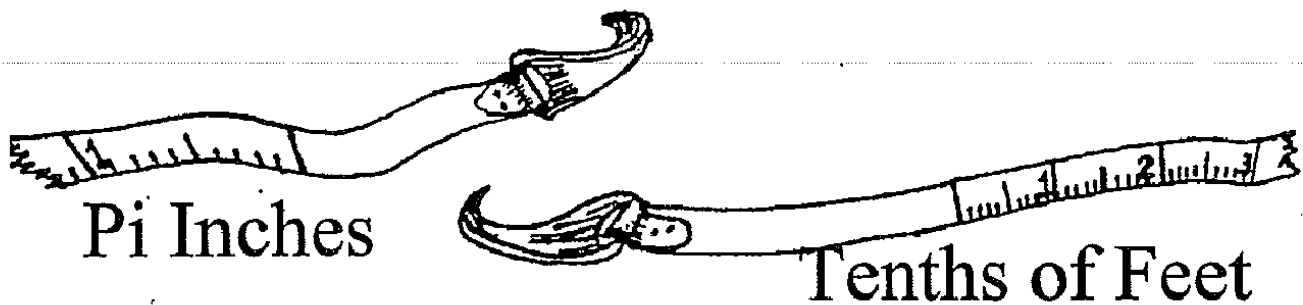
Two (2) basic tree measurements are required in order to measure the board foot content of a standing tree. The **diameter at breast height** (d.b.h.), of the tree, is measured at 4 ½' up from ground level on the uphill side of the tree. The **height** of the tree includes the total height from ground level up to the top of the tree. Once these two measurements have been obtained, a Board Foot Volume Table is used to compute board foot volume. One board foot is 1" thick x 12" long x 12" wide or 144 in<sup>3</sup>.

Here are the three steps involved with calculating board foot volume in a standing tree:

### 1. Measuring Diameter at Breast Height:

A diameter tape is a commonly used tool for measuring d.b.h. A diameter tape differs from a normal measuring tape in that it usually has a hook on one end for attaching to the bark of a tree. Also, when you look at the tape, you will notice that one side is calibrated in feet and tenths of a foot while the other side is calibrated in "Diameter Equivalents of Circumference in Terms of Inches and Tenths of Inches."

Very simply, this scale allows the user to measure circumference of the tree and directly read the actual diameter. (This eliminates the process of dividing the circumference measurement by Pi, or 3.1416, to calculate the diameter.  $d=C/\pi$ )



The procedure to follow is quite simple. First, either measure or estimate where 4 ½' above ground line is—this point is breast height. Place the hook into the bark of the tree and extend the tape counter-clockwise around the tree. You will then read the tree diameter where the tape reaches the "zero" line.



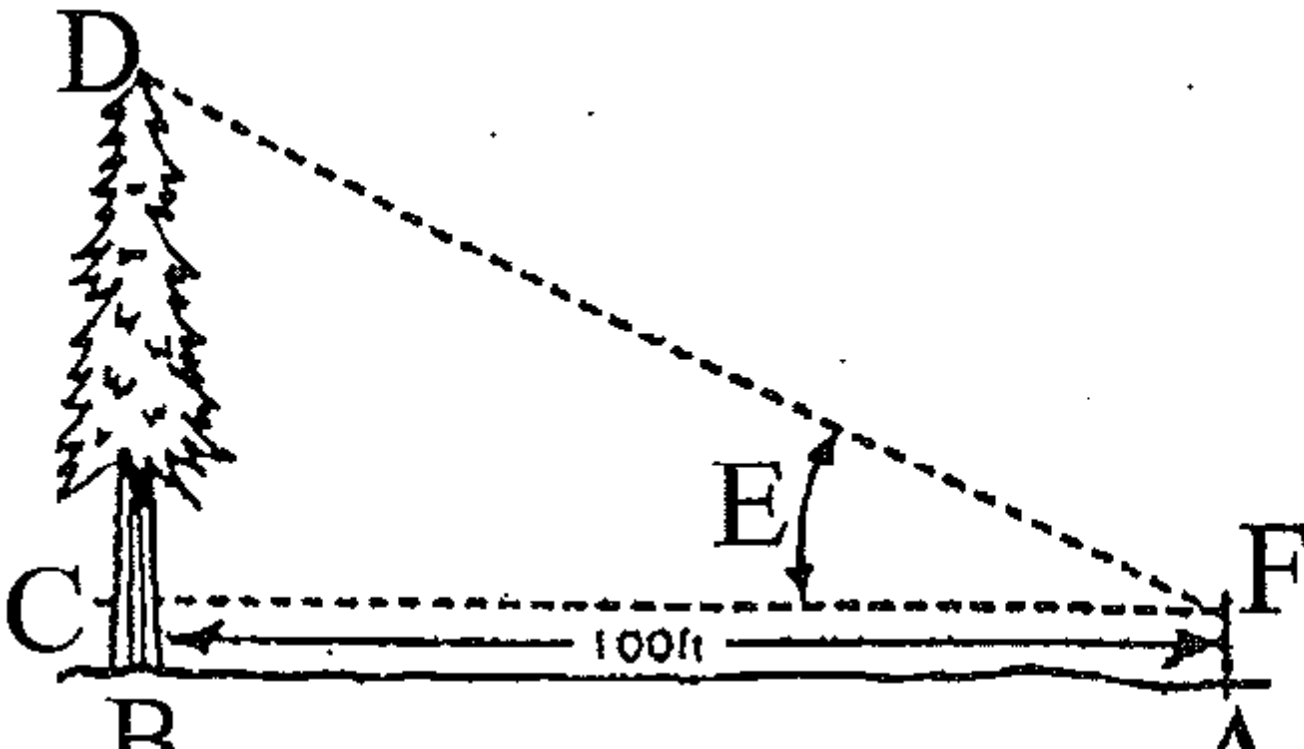
## 2. Measuring Tree Height:

A Clinometer will be used to measure tree heights. With just a little practice, you will be able to accurately determine the height of a tree. Here's how: Keep both eyes open; hold the clinometers up to your eye; simultaneously look through the lens and alongside the clinometers housing. Due to an optical illusion, the horizontal sighting line will appear to project to the side of the clinometers housing. Place the projected sighting line on your target and simultaneously read the scale.



Clinometer use example:

The task is to measure the height of a tree at a distance of 100 ft. on level ground. Position yourself for measurement (represented by F). Back away from the tree the proper baseline distance for the scale you have selected. If using the % scale of your clinometers, 100 ft. is a convenient baseline distance. With your clinometer leveled, sight down to the base of the tree (represented by E), and read the scale. This is the height of the tree from point B to point C. Then sight to the top of the tree (represented by D), and read the scale. This is the height of the tree from point C to point D. Add the two reading together for total tree height, or the distance between B and D.



### 3. Determining Board Foot Volume:

A volume table gives the number of board feet in a tree. This is an estimate of the amount of lumber that can be cut from an individual tree. Here is an example of the board foot volume table that will be used in the forestry contest.

<b>Scribner Board Foot Volume Table</b>								
d.b.h. (inches)	<i>Total Tree Height</i>							
	50	60	70	80	90	100	110	120
12	30	50	100	90	100	120	140	160
14	50	70	140	130	160	180	200	220
16		100	170	170	200	240	260	300
18			210	220	260	290	330	370
20				260	310	360	400	440
22				310	370	420	470	520
24					430	490	540	610
26					490	550	630	690
28						640	710	780
30						710	790	880

To use the table, look down the d.b.h. column (left hand column) to find the proper d.b.h. Then look across the tree height line to find the proper tree height. Let's use the following example:

Example:

A tree has a d.b.h. of 20 inches and a total height of 100 feet. Read down the d.b.h. column to 20" and then read across the height line to 100." You will note that this tree has a board feet volume of 360 board feet.

How many board feet would a tree contain that measures 14 d.b.h. and is 70 feet tall?

(Answer = 100 board feet)

You will notice that the volume table is in 10 ft. increments. If a tree measurement ends up on a 5 or less, you would round down; 6 or more, you would round up.

***Contest Tip #1: Rounding Tree Heights***

**Tree heights are listed in 10-foot increments in the volume table**

If a tree measurement ends up on a 5 or less, you should round down. With 6 feet or more, you should round up. For example, with a tree measuring from 66 to 75 feet tall, you would use the 70 foot tree height line. For a tree measuring between 86 to 95 feet tall, use 90 feet.

***Contest Tip #2: Rounding Diameters***

**D.B.H. is given in 2-inch increments in the volume table**

The standard practice for rounding diameters is as follows: A tree in the 12-inch diameter class will be between 11.1 inches and 13.0 inches in diameter. A 14-inch diameter class tree will be between 13.1 inches and 15.0 inches (and so on).

**From:** IDAHO STATE FORESTRY CONTEST

Instruction Manual for Teachers and Students

**Sponsored by:**

Bonner Soil & Water Conservation District, 1224 Washington Ave., Suite 101, Sandpoint , ID 83864,  
(208) 263-5310

**and**

Idaho Department of Lands, 2550 Highway 2 West, Sandpoint , ID 83864, (208)263-5104 **January 1997**

**Revised October**

# FORESTRY CAREER DEVELOPMENT EVENT

## LOG SCALING

This is a summary of the parts of the Idaho Log Scaling Manual 2008 edition that the FFA CDE uses. For purposes of the Idaho FFA Forestry CDE, Log scaling will require 4 skills.

1. Determination of log length.
2. Determination of scaling diameter.
3. Determination of the number of boards.
4. Determination of species.

### Tools needed:

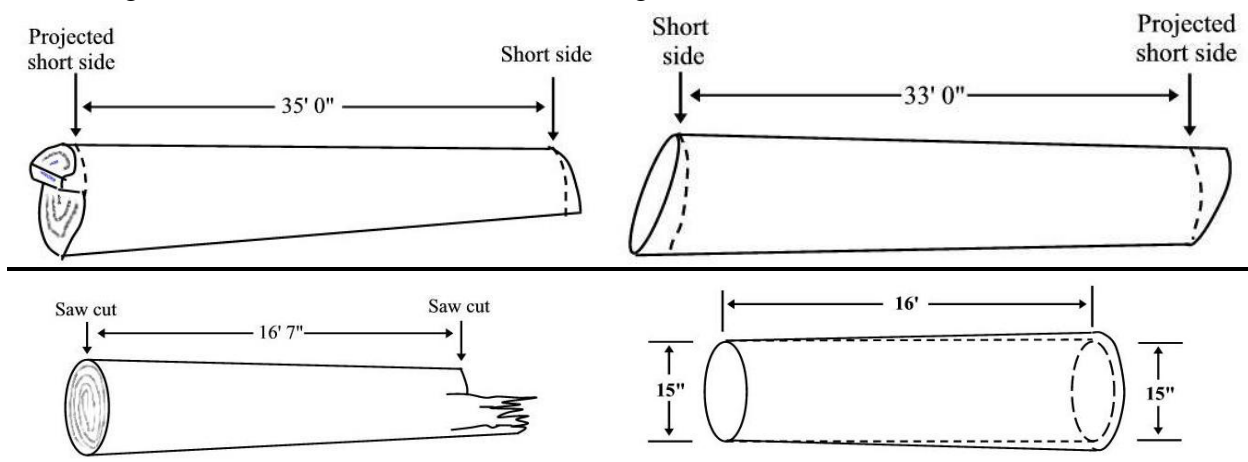
**Scribner Decimal “C” Scale Stick (Coconino-type).** This is a measuring device made of wood with a pointed metal head at the lower end. It has graduated inch-markings on the half-inch (Coconino-type) and lists Scribner Decimal “C” volumes for various lengths and diameters. It also generally includes “squared-defect” volumes printed in red. The scale stick is used for diameter measurement of logs and scale computation.

**Logger Tape.** Marked with feet and inches, scalers generally use 50- or 75-foot self-winding steel tapes for measuring log or defect lengths.

### Determination of Log Length

Log length is determined using a loggers tape and measuring the overall shortest length of the log.

1. To arrive at the scaling length, first measure the overall length of a log in feet and inches. Any fraction of an inch is disregarded in determining this length. For example, a log measuring exactly 16 feet, 8 and 7/8 inches, has a determined measured length of 16 feet, 8 inches (the fraction of an inch is disregarded).
2. Allow for trim. The Idaho FFA CDE specifies that 4 inches of trim must be allowed for. The initial length measurement from above gives a reading of 16 feet, 8 inches. From which you would then subtract the 4 inches of trim which would result in 16 feet, 4 inches. Log lengths are to be specified to the nearest 2 foot length class so the above log would be recorded as 16 feet. For Example: If a log were initially measured as 16 feet 3 inches it would be a 14 foot log. A measurement of 19 feet 4 inches would be an 18 foot log and a log measuring 20 foot 4 inches would be a 20 foot log.

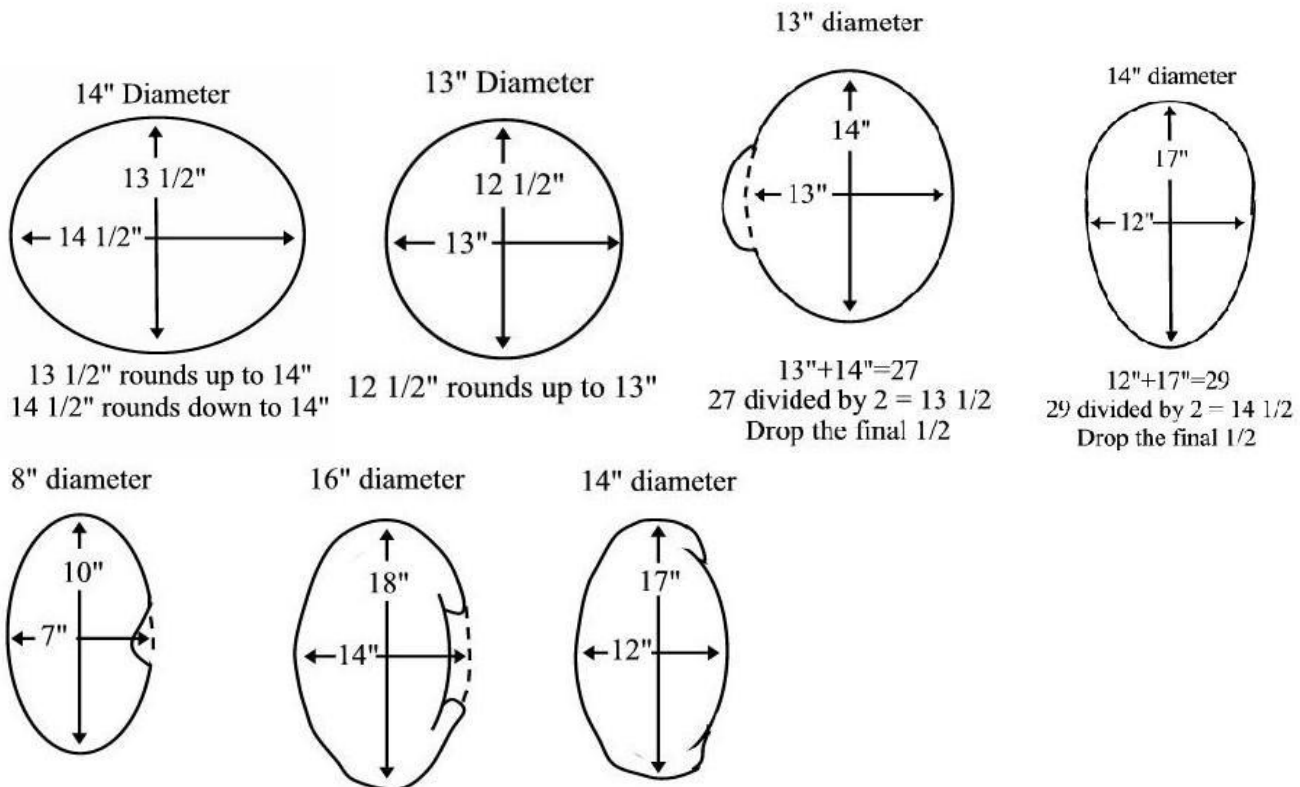


## Determination of Scaling Diameter

Scaling diameters are determined using a Scribner Decimal "C" Scale Stick (Coconino-type).



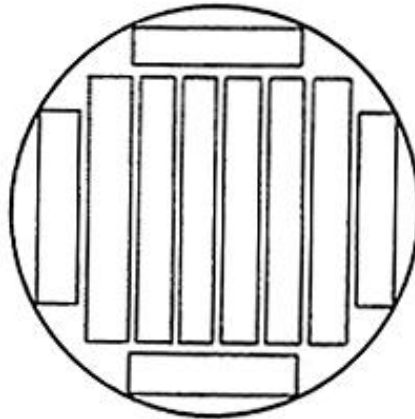
1. Measure log diameters inside the bark at the small end of the log using the measurement side of the Scribner Decimal C scaling stick. (For purposes of the Idaho FFA CDE disregard the red numbers. They are used in figuring log defects)
2. Measure through the true (geometric) center of the log, not the center of the log as shown by the growth rings and pith.
3. In measuring, disregard abnormal bumps, depressions, breakage, brooming, burls, knots, swelling, and flare; in other words, measure as though such conditions do not exist.
4. Where possible, read the scale stick directly from the end of the log, not obliquely from the side.
5. Take a pair of diameter measurements at right angles to each other. Take each of these two diameter measurements to the nearest inch.
6. Measurements that fall exactly on the 1/2-inch are rounded: when only one of the diameter measurements falls on the 1/2-inch round up, when both of the diameter measurements fall on the 1/2-inch, round one up and one down.
7. The scaling diameter is the average of the narrow-way diameter and the right-angle-to-the-narrow-way diameter. When this average of the two diameter measurements results in a 1/2-inch, round down for the final scaling diameter.



### Determination of the Board Volume

Board volume is determined using the scale on the sides and length of the scaling stick.

1. Find the log length on the stick nearest the metal attachment on the end of the stick.
2. Find the log diameter on the side of the stick that reads in inches.
3. The number on the stick that intersects with the length and diameter is the number of boards that can be cut from that log. (Thus the Decimal "C" volume of the log) If multiplied by ten it would give you the Board feet of lumber that the log would yield.
4. Record the number of boards, not the board feet on the score sheet.



**Figure 1. - Diagram showing the number of 1-inch boards that can be cut from a specific log.**

## Species Identification

### **Cedar**

**Species.** (*Thuja plicata*) Common name is Cedar, also called red cedar or western red cedar.

**Bark.** The bark, light reddish-brown on young trees and grayish-brown on old trunks, is thin (1 to 3 inches thick), and forms a network of long, thin, fibrous strips. The stringy shreds of bark adhering to logs are one of the most identifiable characteristics.

**Sapwood.** The sapwood is thin, nearly white, and non-resinous.

**Heartwood.** The heartwood is soft and brittle, reddish-brown to pinkish-brown, and has a pungent, distinctive odor. The contrast between heartwood and sapwood is pronounced.

**Knots.** Knots are generally scattered around the tree with a dark brown center surrounded by lighter brown or tan colored wood.

**Foliage.** The leaves of Cedar, borne in flattened groups of four, are very small and scale-like. The branch-lets have a "fern-like" appearance and are dark, glossy green on the upper surface.



## Douglas Fir

**Species.** (*Pseudotsuga menziesii* variety *glauca*) Common name is Douglas Fir, also called red fir or simply “Doug” fir.

**Bark.** On young trees the bark is smooth, gray-brown, and broken by pitch blisters. On mature trees it gradually becomes corky and deeply furrowed. Mature bark, dark red-brown to a very light gray, usually shows a lighter, almost orange color deep in the furrows. The mature bark is 2 to 6 inches thick. Second growth bark is usually 1/2 inch to 2 inches thick.

**Sapwood.** The sapwood is a pale yellow or off white to a reddish-cream color, rather narrow, and pitchy.

**Heartwood.** The heartwood is hard and yellowish-brown to deep reddish-brown in color. The contrast between heartwood and sapwood is usually very distinct.

**Knots.** Douglas fir knots are usually reddish brown in the center surrounded by a darker brown wood and will generally be pitchy.

**Foliage.** Douglas fir needles -- medium green to blue-green in color, 3/4 inch to 1 inch long, flexible, and with rounded ends -- are borne singly and are arranged all around the twig. The most notable feature of foliage is the pointed, red-brown buds.





## Hemlock

**Species.** (*Tsuga heterophylla*) Common name is Hemlock, also called western hemlock. Similar in appearance to mountain hemlock, it is usually not necessary to separately identify “western” and “mountain” hemlock when scaling in Idaho.

**Bark.** On young trees the bark is dark reddish-brown to purple-brown and is broken into small, rounded scales; on mature trees, the bark has deep furrows between flat ridges, which are covered with close-set, dark brown to purple-gray scales. The underbark on Hemlock of all ages is a bright red streaked with purple when cut lengthwise. Inner-bark on Hemlock is a dark cocoa-brown compared to a lighter brown inner-bark on grand fir. Close-up showing difference of inner-bark between Hemlock and Grand fir Hemlock (left) and Grand fir (right)

**Sapwood.** The sapwood is quite thin. The last few outer rings, sometimes almost white, are the only portion of the sapwood, which may show any contrast to the heartwood. A slightly dented or wavy surface is common in areas where the bark is missing on the outside of the log.

**Heartwood.** The heartwood is hard, tough, and closely-grained, usually pale tan or cream colored; but occasionally it may have a reddish or purplish cast, especially in the summerwood portion of the annual rings. Usually there is little or no contrast between heartwood and sapwood. The absence of resin and lack of contrast between the cream colored heartwood and sapwood are typical of both western and mountain hemlocks.

**Knots.** The larger knots are hard, dark cream colored and may be surrounded by a black ring on the outside edge. Smaller knots are usually black and may show a black stain in the bark.

**Foliage.** The needles are small and flat, 1/4 inch to 1 inch long, and irregular in length. They are dark green on top and pale green with two white bands beneath.



## Larch

**Species.** (*Larix occidentalis*) Common name is Larch, also called western larch or tamarack.

**Bark.** On young trees the bark is scaly and reddish-brown to purplish-brown. On older trees, it is deeply furrowed and broken into irregularly shaped plates, usually purple-gray in color, but sometimes brown to reddish-brown. Bark is relatively thick at all ages, being 4 to 6 inches thick on mature butt trunks. Larch bark, which may be confused with that of Ponderosa pine, has a reddish-purple color under the scales in contrast to the yellow patches under the scales of Ponderosa pine.

**Sapwood.** The sapwood is thin (1/4 inch to 1 inch thick), nearly white to light pale brown, and may be slightly pitchy. One of the most distinguishable features is the sharp color contrast between the narrow band of sapwood and the heartwood.

**Heartwood.** The heartwood is hard, reddish-brown to dull brown in color. The contrast between heartwood and sapwood is distinct. At times the log end may resemble a “target” with distinct bands of light and dark colored rings.

**Knots.** Knots are scattered, light reddish-brown in the center, surrounded by light tan or pale brown wood. Larch knots have a tendency to be clustered with several knots forming small bunions or bulges on the side of the log.

**Foliage.** Needles are borne in dense clusters on small raised bumps on the twigs. They are 1 to 1 1/2 inches long, thin, flexible, and light green in color. In the fall they turn bright yellow and then drop off. This is the only conifer in Idaho that loses its needles.



## Lodgepole Pine

**Species.** (*Pinus contorta*) Common name is Lodgepole Pine, also called jack pine, black pine, or simply “lodgepole”.

**Bark.** The bark on young trees is dark gray to almost black and very scaly. Bark on mature Lodgepole pine differs in northern and southern parts of the state. In northern Idaho the mature bark is made up of narrow ridges, broken into almost square or rectangular plates with the ridges separated by deep furrows. The overall color is almost black to dark gray. Cutting length-wise into the bark reveals numerous, small white specks of pitch. In the southern part of Idaho mature Lodgepole pine bark is light brown or orange-brown to almost gray and is covered by thin, loose scales. Knocked-off scales reveal a greenish color where the scales were attached.

**Sapwood.** The sapwood is narrow, nearly white to pale yellow in color. Often there is no easily discernible difference between heartwood and sapwood, though the sapwood is usually somewhat lighter in color. Pitch exudation is conspicuous on the sapwood.

**Heartwood.** The heartwood is light yellowish white to pale yellow and may have a slight pink hue.

**Knots.** These are scattered and often have a dimpled appearance with small catfaces surrounding them.

**Foliage.** The yellow-green to light green needles are borne in bundles of two and are 1 to 3 1/2 inches long.



## Ponderosa Pine

**Species.** (*Pinus ponderosa*) Common name is Ponderosa Pine, also called “P” pine, bull pine, yellow pine, and western yellow pine.

**Bark.** The bark on young trees (80 to 100 years old) is broken into ridges covered with small, thin platelets, dark reddish-brown to nearly black, and from 1/2 inch to 1 1/2 inches thick. Young trees with this dark bark are often called bull pine. On older trees the bark is often from 2 to 4 inches thick, divided into deep and irregular plates, sometimes 4 to 5 feet long and 12 to 18 inches wide. These larger plates are covered with thick, yellow-brown to orange-brown irregular platelets.

**Sapwood.** Young Ponderosa pine is 80 to 100 percent sapwood. In older growth, the sapwood is usually 2 to 12 inches thick. This sapwood is cream-colored, and pitch exudation on the sapwood is usually conspicuous.

**Heartwood.** The heartwood is yellowish to light reddish-brown and usually has a conspicuous brown center or pith. There is a definite pitchy odor.

**Knots.** Are scattered, bulging, and can be quite large. The knots are usually reddish-brown to a dark brown in color surrounded by cream colored wood. The center of the knot is often hard and brittle.

**Foliage.** The needles of Ponderosa pine are usually borne in bundles of three (sometimes two to five), 5 to 11 inches long, and dark green in color.



## Spruce

**Species.** (*Picea engelmanni*) Common name is Spruce, also called Engelmann spruce.

**Bark.** The bark is from 1/4 to 1/2-inch thick, usually light purplish-gray to orange-brown in color, and broken into larger, thin, loose scales.

**Sapwood.** The sapwood is 2 to 4 inches thick, pale yellow to pale yellow-brown in color, and may be slightly pitchy.

**Heartwood.** The heartwood is usually about the same color as the sapwood, sometimes slightly darker. As a rule, it is extremely difficult to differentiate between heartwood and sapwood.

**Knots.** Knots are generally scattered around the log and are about the same color as the heartwood on Spruce logs.

**Foliage.** The blue-green needles are borne singly and are usually about 1 inch long. They are moderately stiff and sharp-pointed; crushed needles have a pungent odor.



## Grand Fir

**Species.** (*Abies grandis*) Common name is Grand Fir, also called white fir (the common name “white fir” is also used for *Abies concolor* whose native range in Idaho is the southeast corner of the state; for commercial scaling in Idaho, species identification as “grand fir” or “white fir” is used interchangeably for either species).

**Bark.** Young trees have smooth, gray-green bark with numerous pitch blisters. Older trees begin to develop a furrowed, rough bark, which is up to 2 inches thick and is dark gray-brown to purple-gray in color on mature trees. In southern Idaho trees, the bark is corky in texture and resembles Douglas fir bark.

**Sapwood.** The narrow sapwood, light cream to pale yellowish-brown, is not resinous; although some pitch from the inner bark may be present on the sapwood. It may be difficult to distinguish the sapwood from the heartwood.

**Heartwood.** The soft heartwood of Grand fir is not distinctively different in color from the sapwood, although it may be slightly darker. The summerwood portion of the annual rings may be faintly pinkish in color.

**Knots.** The absence of resin exudation from the sapwood on ends of logs and the similarity in color of sapwood and heartwood are marked features. A dark water core is sometimes present and growth rings are conspicuous.

**Foliage.** Grand fir needles are borne singly and those of the lower crown are arranged in flat rows along each side of the twig. They are about 1 to 2 inches long and are dark glossy green on the upper side with whitish streaks on the under side. Crushed needles give off a pleasant aromatic odor.



## Alpine Fir

**Species.** (*Abies lasiocarpa*) Common name is Alpine Fir, also called subalpine fir or balsam fir.

**Bark.** Similar to a young Grand fir but with numerous horizontal rows of dark, almost black colored resin blisters. As the tree matures, the bark remains fairly smooth except in the lowest part of the trunk. The irregular shape in which Alpine fir grows is especially visible in the butt segment. Occasional mature trees may have furrowed bark extending most of its length.

**Sapwood.** The sapwood is thin, almost white, and slightly lighter-colored than the heartwood.

**Heartwood.** The heartwood is soft, coarse-grained, and light yellowish-white or tan in color.

**Knots.** Helpful as an identifying feature are yellow-colored knots and the evidence of down-turned limbs. Branches are small and scattered, hanging towards the ground instead of towards the sun as in most species. The wood is soft and has a pungent odor.

**Foliage.** Needles, borne singly, are massed and brush-like on the upper side of the twig. They are usually about 1/2 inch to 1 inch long, flexible, gray-green and dull on the upper surface.



### References:

Idaho Log Scaling Manual 2008 Edition

Idaho Board of Scaling Practices

3780 Industrial Avenue South

Coeur d'Alene, ID 83815