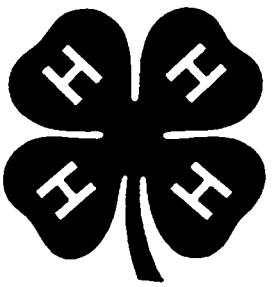
Oregon 4-H



Forestry Fact Sheets

The Oregon Forestry Fact Sheets are designed for the leader as tools to support the group experience. Leaders are encouraged to make copies for their members.

OREGON STATE UNIVERSITY EXTENSION SERVICE

4-H 33100L
September 1993

4-H Forestry Fact Sheet

Tree Identification Collection

Good collections of plant specimen mounts for tree identification not only help club members get acquainted and stay acquainted with trees, but also enable members to help others learn to identify trees. They provide a good visual aid for discussion of trees and what they do for us.

There are five steps in making a collection of high quality tree identification mounts:

Gather good materials.
Keep them fresh before pressing.
Press them to retain fresh, natural appearance.
Mount them securely and attractively.
Protect them against breakage, insects or other damage.

Gathering Your Material

Since a collection of mounted specimens from trees becomes an identification guide, it has highest value if each mount presents as many identification aids as possible. In addition to leaves, therefore, collect fruits, flowers, bark, twigs and any other parts that are particularly helpful in identifying the species. For example, the pitchfork-like bracts on the cones of Douglas fir are a helpful identification aid. A whole cone need not be mounted. You can use half a cone, or take a cone apart and mount several of the bracts. Identification aids that are hard to obtain or are too bulky to mount can be sketched on the mount card beside the leaves.

Collect fully grown leaves in the early part of the summer. Young leaves are not representative of size, and they often darken in the press because of their high moisture content. If collecting is delayed until late summer, it will be difficult to find leaves that have not been damaged by the wind and sun, insects, or diseases. Collect twigs of deciduous forest tree species while the trees are bare of leaves. Flowers should be fully developed, in their prime; and fruits should be mature or nearly so.

Select materials that look average for the species. Pick leaves from a seedling, sprout, or sucker, and they usually will be characteristic for the species. Avoid choosing damaged leaves. Remember that the material will be mounted on an 8½-by 11-inch card. The specimens picked should be reasonable for the size of the mount card. Large flowers or fruits, thick bark or heavy twigs would be better sketched than mounted. Sometimes it is possible to make thin cross-sections or longitudinal sections of cones, nuts, twigs or bark and mount these sections.

Keeping the Materials Fresh

Leaves and flowers are the main concern. One good way to keep them fresh is to carry presses along on collecting trips. Put specimens in the presses as they are collected, before they wilt.

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Tree Identification Collection page 2

If you go collecting without a press, one of these methods will help keep your materials in acceptable condition until they can be pressed:

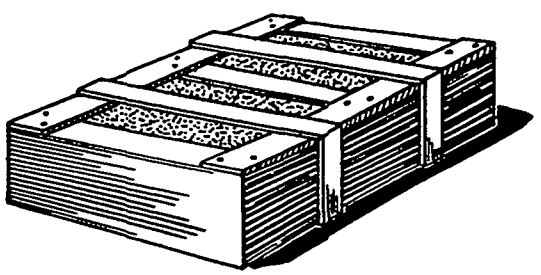
1. Select one or two magazines to take when collecting. Carefully place specimens in the magazines until you press them. This method works best if you cut two pieces of stiff cardboard the same size of your magazine(s). Keep the magazine(s) between the cardboards. Use two or three strong rubber bands to hold the packet together.
2. Cut several pieces of cardboard 9 by 12 inches. Place paper towels or sheets of newspaper between them. Put collected specimens between the towels or newspaper. Hold these together with two or three stout rubber bands.
3. Use a covered cardboard, plastic or light metal box of convenient size. Place specimens in the box as you collect them and keep the box as cool as possible until you can put them in the presses. If possible, mark specimens to be collected and wait until departure time to cut them so they will be fresh when you get home.

Pressing Specimens for Fresh, Natural Appearance

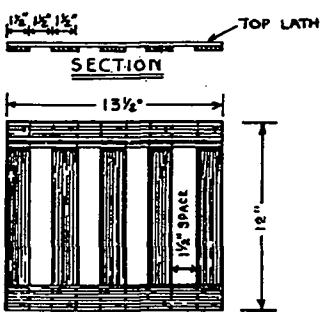
The first condition for success in this step is to have a satisfactory press. The easiest press to make is described in Item 2, in the preceding list. Use corrugated cardboard and cut the pieces so that all corrugations run the same direction. If possible, get enough blotting paper to have at least one sheet for each plant expected in the press at any one time. Put the plant specimens between sheets of newspaper, then insert a blotter between the newspapers. Insert a cardboard every third or fourth plant. Corrugation should run crosswise so the rubber bands won't curl the press into a tube. Use rubber bands (or straps with rubber sections inserted) to hold the press packet together. When the press is loaded, keep it dry and warm with air circulation around it. Put it on a hard surface and place about 50 pounds of weight on it. This weight can be a box of books, rocks, sand, bricks, or metal scrap.

Another type of press is the wooden frame press. The inside of a wooden press can be identical to the cardboard press just described. The wooden frames with good binders take the place of the weight. The best binders are adjustable canvas straps with built-in binding devices. A press can seldom be cinched tightly enough with string, rope or rubber band binders, so supplement them by placing weights on the press.

Follow these directions for making a wooden plant press: Obtain wood lathe or other suitable strips to cut 10 pieces 12 inches long, and 4 pieces 13 inches long. You'll need 40 small nails or roundhead ½-inch wood screws. You need a square, a saw, and a hammer or screwdriver, and a small drill to make holes so that nails will not split the wood. Smooth the lath surface with a hand plane or a wood rasp, followed by sandpaper. Stain, varnish or paint is optional. Make frames for the top and bottom. Assemble the press, using corrugated cardboard, blotter paper (if available), and newspaper as filler.



Plant Press



Plan View

Tree Identification Collection page 3

In addition to a satisfactory press, it is important to have fresh plant materials. Carefully read the instructions on keeping the materials fresh.

It is also important to carefully place each specimen in the press. An arrangement cannot be changed after it is pressed. Do not fold leaves; make them lie flat. If leaves are attached to a twig, be sure at least one is turned so that the under surface shows. Avoid putting bulky twigs, flowers, or fruits in the same press chamber with the leaves. If bulky parts need to be pressed, place them in another chamber. Twigs and many tree fruits need not be pressed but simply cured by keeping them in a dry place. They can be added to your mounting sheet later.

Place each specimen between sheets of newspaper and then between blotters. Use a piece of corrugated cardboard every third or fourth specimen. Be sure to use enough binder pressure or weight to press materials flat so the leaves will not wrinkle.

Allow seven to ten days for pressing. It is a good idea to open the presses two days after putting specimens in them. If you have extra blotters, change them in the presses. If not, carefully change the newspaper sheets, and let the blotters dry while the presses are open. The plant's moisture is absorbed by the papers and blotters near them. If the papers and/or blotters are not changed, some of the leaves may turn black. One change of papers or blotters usually is enough unless you are pressing fairly large specimens with succulent leaves or fruits.

Mounting the Pressed Specimens

One of the most satisfactory methods of mounting the pressed specimens to the cards is to spread a milk-base (casein) glue on the back or underside of each specimen. Place the specimen (with glued surface down) in the exact position desired on the mounting card. Lay a sheet of wax paper over it and then place a 12–pound bag of sand with enough slack that allows it to spread over the entire specimen. Let the sand remain on the mount until the glue has had time to dry.

Some herbariums use a liquid plastic to fasten stems and to smooth rough ends, but not to hold leaves. Similar plastics are available in tubes at hobby shops and bookstores. It is hard to mount spruce, larch, or hemlock foliage with glue. The needles fall from the twig. Exhibit spruce or hemlock needles in a small cellophane or plastic bag taped to the card.

Protecting the Mounted Specimens

After you have collected, pressed and mounted some attractive tree identification aids, no doubt you would like to protect them from damage–scuffing and breaking, insect damage, and discoloration from light.

The best protection is acetate or cellophane sheets for the mounting sheets. Often two mounts can be placed back to back in one cover. Less satisfactory is plastic kitchen wrap to cover the front of the mount. The wrap can be taped down on the back of the mounting card if it will not adhere to the card.

Keeping Your Mounts

An ordinary three-ring notebook will hold your mounts securely and can be used for exhibiting and storing at home. A one-inch ring binder will hold up to 20 mounts. One-and-one-half-inch ring binders will hold 30 to 40 mounts. Two binders can be used for larger exhibits and linked together. A clean, sturdy cover with neat lettering is adequate. Mounted specimens may be enclosed in a transparent plastic sheeting such as clear contact or plastic page protectors.

Tree Identification Collection page 4

Numbering Your Mounts

All notebooks should be indexed.

All pages should be numbered.

Since you are required to have an index every year, and arrange your trees and shrubs by family and genus from the third year on, it is recommended that you place the page numbers on the outside of your protective cover with a small piece of masking tape or a small circular dot or patch that can be purchased. If the number is placed on the plastic cover, you may change the mounted specimen, replace poor and damaged specimens each year, and keep your page number the same.

Labeling Your Mounts

Your best method for labeling is to use a pencil and print or write legibly. Remember that it is easier to erase a mistake if it is in pencil.

DO'S

1. Press leaves firmly and smoothly.
2. Press leaves, flowers and fruit until dry so they won't stain mounting cards. If specimens get too brittle, they can be toughened slightly by placing them over steam for a short period of time.
3. Be sure to have a flower, fruit, cone, cone bract, or drawing of one of the above to go with the leaf.
4. Mount specimens for exhibit that can be positively identified.
5. Center specimen on mounting card.
6. Keep mounting card clean and neat.
7. Names must be spelled correctly.
8. Hyphenate and capitalize names as appropriate.
9. When mounting a fern, turn a leaflet over to show the spores.
10. Use leaves that are characteristic of the specimen (not too large or small and of the right shape). Also, get a mature leaf.
11. Be sure to glue your specimen down tightly.
12. Use powdered boric acid or glycerin on specimens to help keep natural color.
13. Use a glue that will dry clear. A milk base glue is very good.
14. If you are mounting a specimen that has a thick part such as a dogwood flower, it is a good idea to place layers of paper or Kleenex over the thin part of the flower so that pressure will be placed on it as well as on the thick part.
15. When mounting compound leaves such as the Oregon grape, be sure to use a complete leaf.
16. Use more than one cluster of needles when mounting pines.

Tree Identification Collection page 5

DON'TS

1. Don't extend leaf over edge of mounting card.
2. Don't extend leaf into lettering on card.
3. Don't overdo your mount. One extra part is all that is required and artistic work on card doesn't necessarily make the mount better.
4. Don't use specimens that are not native to Oregon, except when listed as acceptable.
5. Don't mount the specimen too high or too low on the card.
6. Don't use scotch tape. (Use cloth mending tape if it is absolutely necessary to hold the stem down.)
7. Don't crowd specimens on card.
8. Don't mound undried berries on the card.
9. Don't omit any part of the name.
10. Don't wait until the last minute to gather your specimens. If you do, they will be graded down for not being dry.
11. Don't smear your card with excess glue.
12. Don't exhibit wrinkled specimens.
13. Don't keep your plant press in a damp place because the leaves might mildew or mold.
14. Don't try to mount too many leaves together on a card.
15. Don't overlap leaves on the card.
16. Don't bruise the leaves when pressing because they may turn brown.
17. Don't forget that it takes a lot of practice to become good at the job.

Prepared by Ralph Wilkinson, former Linn County 4-H leader; Rick Fletcher, Benton County Extension forester; and John Abell, former Extension specialist, 4-H Youth Development, Oregon State University.

4-H Forestry Fact Sheet

Facts about Trees and Shrubs

Douglas fir	Is used for more plywood lumber and lumber product purposes than any other species.
Ponderosa pine	Has the greatest growth range of any commercially important lumber species in America.
Lodgepole pine	Is the only 2-needle pine in Oregon.
Ponderosa pine	Has Oregon's record for largest pine tree. The largest ponderosa located near the Deschutes River 32 miles south of Bend is 9 feet in diameter.
Sugar pine	Has the largest cones of any species. Cones average over one foot in length.
Western red cedar	Has swollen bases which have grown to 20 feet in diameter—largest of any species.
Douglas fir	Is the state tree of Oregon.
Western hemlock	Is one of only two conifers with droopy leaders. The other is Port-Orford cedar.
Incense-cedar	Is used in an estimated 75% of the world's supply of pencils. Located in Oregon's southwest counties.
Sitka spruce	Has the stiffest and sharpest needles of any tree in Oregon. The needles bristle out like quills from a startled porcupine. The largest Sitka is east of Seaside near the Sunset Highway.
Western larch	Is Oregon's only cone-bearing tree that sheds all of its needles in the winter. In fall, needles are bright yellow and contrast sharply with surrounding conifers.
Redwood	Holds the world's record for tall trees. It is Oregon's only conifer that has the ability to grow trees from root sprouts. Its scientific name, *Sequoia sempervirens,* means "ever living Sequoia." Sequoyah was the Cherokee Indian who invented an alphabet for Indians.
Pacific yew	Is heavy tough wood used for making bows. Although the yew is a small tree, its wood is very durable and is used for large gateposts.
Western juniper	Is a hearty tree of central and eastern Oregon that will grow where no other tree can. The heartwood of juniper is used for fence posts and it is said the wood is so tough that the post easily outlasts the post hole.
Red alder	Is used in paper mills probably more than any other species. It also leads in use for furniture, cabinets and woodenware.
Bigleaf maple	Is the largest leafed maple. Leaves are usually 6 to 12 inches in diameter. Burls from this tree are in demand by American and European craftsman.

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Oregon white oak Is recognized by the round lobes on the leaves; others are spine tipped. Trunks are usually short and stubby, and disappear into a mass of leaves. If you find acorns, you have located oak trees.

Golden chinkapin Is an evergreen with leathery leaves, 2 to 4 inches long and tapered at both ends. Look for the golden color underneath. The edible fruit is a yellowish brown nut located inside a spiny burr.

Pacific madrone Has a reddish-brown colored smooth bark that can be easily spotted. The leaves are thick and leathery and stay on for a year. Clusters of orange-red berries appear in the fall. Madrone is a broadleaf evergreen.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

4-H Forestry Fact Sheet

Tree Study Quiz

Multiple Choice

1. Which of the follow pines have 3 needles in a cluster?
   a. Ponderosa pine b. Western white pine c. Lodgepole pine d. Jeffrey pine e. Sugar pine

2. Which of the following trees can you identify by its sharp-pointed red bud?
   a. Grand fir b. Lodgepole pine c. Incense-cedar d. Douglas fir

3. Which of the following trees bear cones that hang down from the branches?
   a. Grand fir b. Hemlocks c. Pacific yew d. Pines

4. Which of the following have a berry for a fruit?
   a. Pacific yew b. Western red cedar c. Western juniper d. Ponderosa pine

5. Which of the following trees have droopy leaders?
   a. Douglas fir b. Western hemlock c. Spruce d. Port Orford cedar

True or False

6. Western larch is the only native needle bearing tree that loses its needles in the winter.
7. Port Orford cedar grows naturally only in the extreme north part of the state.
8. Redwood may be found growing naturally in the southwest corner of the state.
9. Ponderosa pine gets its name from the fact that it is a large tree.
10. Noble fir is usually found naturally at elevations over 3,000 feet.
11. Lodgepole pine grows only in eastern Oregon.
12. Douglas fir is not a true fir for several reasons. One of these reasons is that the cones hang down from the branches.
13. There are no true cedars growing naturally in Oregon.
14. Lodgepole pine has the smallest cone of any of the pines that grow naturally in Oregon.
15. Sugar pine cones sometimes reach a length of 24 inches.
16. The cones of Pacific yew sometimes reach a length of 2 inches.
17. Incense-cedar grows only in damp places along creeks and streams.
18. Western hemlock is a tolerant tree.
19. Sitka spruce grows naturally along the coast.
20. Grand fir should not be called white fir.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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4-H Forestry Fact Sheet

Tree Study Quiz

Answer Sheet

Multiple Choice

1. Which of the following pines have 3 needles in a cluster?
   a. Ponderosa pine b. Western white pine c. Lodgepole pine d. Jeffrey pine e. Sugar pine

2. Which of the following trees can you identify by its chart pointed red bud?
   a. Grand fir b. Lodgepole pine c. Incense-cedar d. Douglas fir

3. Which of the following trees bear cones that hang down from the branches?
   a. Grand fir b. Hemlocks c. Pacific yew d. Pines

4. Which of the following have a berry for a fruit?
   a. Pacific yew b. Western redcedar c. Western juniper d. Pondersoa pine

5. Which of the following trees have droopy leaders?
   a. Douglas fir b. Western hemlock c. Spruces d. Port Orford cedar

True or False

T 6. Western larch is the only native needle bearing tree that loses its needles in the winter.

F 7. Port Orford cedar grows naturally only in the extreme north part of the state.

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F 17. Incense-cedar grows only in damp places along creeks and streams.

T 18. Western hemlock is a tolerant tree.

T 19. Sitka spruce grows naturally along the coast.

T 20. Grand fir should not be called white fir.

Prepared by Gary H. Sander, Extension Forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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4-H Forestry Fact Sheet

Methods of Making Leaf Prints

Soot method

In the soot method of leaf printing, the material needed is: paper on which to make the print; three sheets of absorbent paper (mimeograph weight) for each print desired; candle ¾ to 1 inch in diameter; matches; and a small piece of lard.

To make the print, first take one of the sheets of absorbent paper. Place a piece of lard about the size of a pea in the center of the sheet and work it over the surface of the paper. Light the candle and with the greased side down, hold the paper above the flame. At first the paper should be one foot above the flame. As the grease melts and is absorbed, gradually lower the paper and increase the speed of rotation as it nears the flame. When the paper has absorbed the grease, hold it close to the flame so that it bends or spreads the flame and rapidly rotate the paper with a circular motion.

This partial smothering of the flame gives off black smoke containing soot which will adhere and mix with the grease. When the surface of the paper is black, place the face surface of the leaf to the blackened area, cover with a sheet of paper, and press firmly with your fingers so that all parts of the leaf are well covered with soot. Be careful not to move the leaf. Pick up the leaf by the stem and place it on the sheet where the print is to be made. Cover the leaf with another sheet of paper and press as before.

If the print is smudged, the leaf moved. If the print is not clear, there is either too much or too little soot on the paper.

Ink method

For the ink method of leaf printing, one needs: a pane of glass, 6 by 8 inches or larger; a small quantity of dark green printer's ink; paper on which to make the print; and three sheets of mimeograph weight (or soft and absorbent paper). Place several drops of the printer's ink on the surface of the clean glass. Spread this over the glass to make a thin film over the entire surface or the area the size of the leaf to be printed. Place the leaf face surface down on this inked glass. Follow the procedures of the soot-grease method to complete your leaf print.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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4-H Forestry Fact Sheet

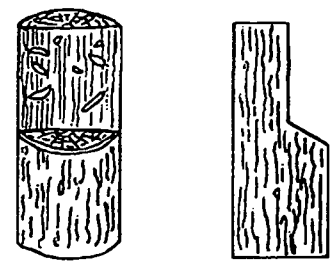
Preparing Wood Specimens for Mounting

Preparing wood specimens for mounting is a major activity in the second year of the forestry project. Members will learn the characteristics and structure of important forest trees.

The wood collection should contain specimens of the important forest trees of the locality; Junior requirement - 10–12 specimens; Intermediate requirement - 12–15 specimens; and Senior requirement -15–20 specimens. These wood specimens should be properly mounted on a board with a hook and eye to allow removal for examination and with a space for labeling with common and scientific names below the mount.

Collect specimens uniform in size and character as to the parts of the trees from which they are taken. Some may be collected from branches of older trees or from saplings which are too crowded in the forest. Label wood they represent, that is, branch wood or main stem wood.

For each specimen select a section 2 or 4 inches in diameter and about 4 inches long. One of two methods may be used to display the specimens: cut rounds about one-half inch in thickness, or as shown in the diagram at the right, saw the end squarely. First, saw the block lengthwise through the center to about 2 inches from the end. Next cut at an angle, as shown, from the bark to the first cut you made. Be careful that both cuts join; it may be best to finish the last one-eighth or one-quarter inch of the cuts with a knife.



Members have the option of leaving mounts unfinished or finished. If they choose to finish the mounts, they can proceed in two ways. Members can sandpaper the cut surfaces and apply at least two, or preferably three, coats of varnish. This prevents or slows down the drying of the specimens and the splitting of the wood.

The second way to prepare specimens for mounting is to submerge them in paraffin. Cut surfaces should be rough-sanded and then submerged in a can of melted paraffin. (Keep this solution melted in a double boiler or a can placed in a pan of boiling water. Do not heat paraffin over open flame or in a can placed directly on the burner. The paraffin itself need not boil.) The water in the specimen will boil out rapidly and the specimen will be ready for cooling after 30–45 minutes. The specimen can be cooled in the paraffin solution or removed and dried on newspapers.

After lightly sanding with fine sandpaper, the specimen is ready for mounting. Some paraffin will be absorbed by the wood; after light sanding, the wood will have a highly polished, pleasing appearance.

Each specimen should be properly labeled. When the sections are first cut, they should be marked so that each one may be easily identified. On the finished labels include the common and the scientific name of the tree, the part of the tree from which the specimen was taken, and the location where the tree was found. See example below.

Oregon White Oak
(*Quercus garryana*)
Branch Wood
Collected 12-12-91
Veneta, Oregon

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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4-H Forestry Fact Sheet

How Old Is That Tree?

All trees grow each year. Some grow very rapidly, some very slowly. The annual growth is not only in height, but also in diameter. We can count the growth rings on a stump of a tree to tell the age of a tree when it was cut. Many times foresters want to know the age of standing trees, the rate of growth, or if the wood is rotten inside. There are three ways to tell the age of trees or tree stumps.

How old was this tree when it was cut?

A = 35 years and B = 16 years growth

Just inside the bark is a layer of cells called the *cambium*. In the growth process, the cells divide and form both wood and bark. Rapid spring growth is lighter colored than growth made in the summer. One light and dark colored ring equals one year's growth. These rings are easily counted on the stumps of cut trees.

How old was the tree when it was cut?

Find a tree stump in the forest and answer the following questions:

- Was this tree growing fast when it was cut?
- How old was it? (Note: you'll need to add 3 years to account for tree growth to stump height.)
- What was the diameter of the tree when cut?
- How tall was it? You can compare the size with living trees nearby or find the top of the cut tree and measure the distance from the stump to the top.

How old are young trees?

Living trees always have a cluster of buds at the top of the tree. As growth begins, the center bud sends up vertical growth and the buds around the center send out a series of horizontal branches. This is repeated each year. The age of young conifer trees can be determined by counting the number of sets of whorls of these annual horizontal branches. Thus, if we count 25 whorls of branches, the age of the tree is about 25 years. As the tree gets older, it is difficult to count the whorls.

Problems:

If young conifer trees are growing in an area that was logged, can you tell how long ago it was logged?

The farther apart the branches are on the tree, the faster the trees are growing. Study young trees in different areas and compare growth rates.

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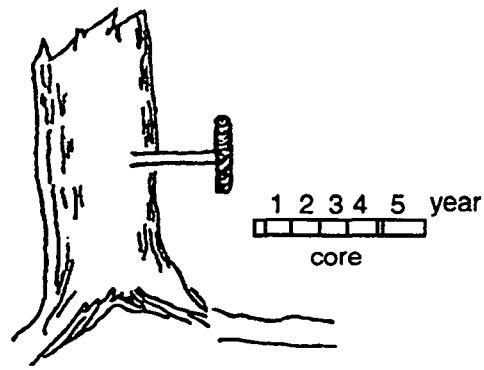
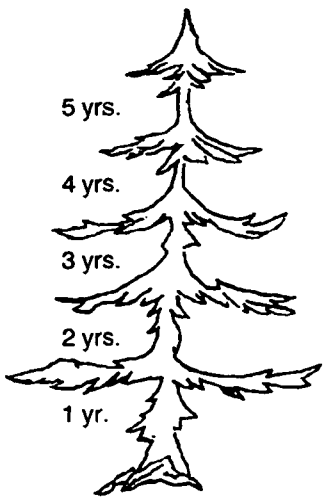
How old are large standing trees?

The most accurate method of determining the age of older trees is to use an increment borer. This instrument is a hollow wood-boring bit that cuts a core instead of shavings, as with a regular wood-boring bit.



To determine the age of the tree, the instrument is bored into the center of the tree at diameter breast height (d.b.h.); the core is removed from the hollow stem of the borer, and the growth rings from the cambium layer to the center of the tree, as shown in the core, are counted.

Estimate number of years it took this tree to grow to d.b.h. Be careful not to chip the sharp bit of the borer; it must be cleaned and oiled daily so it doesn't rust.



Problems:

- Did the tree grow faster when it was young or older?
- How old is the tree? Should it be cut for lumber? What other uses does it have in the forest?
- Did the borer go in easily? Why do some trees have harder wood than others?
- What are hardwoods and softwoods?
- How can you tell when you have bored to the center of the tree?
- Practice with these tree tools until you can become proficient in their use.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

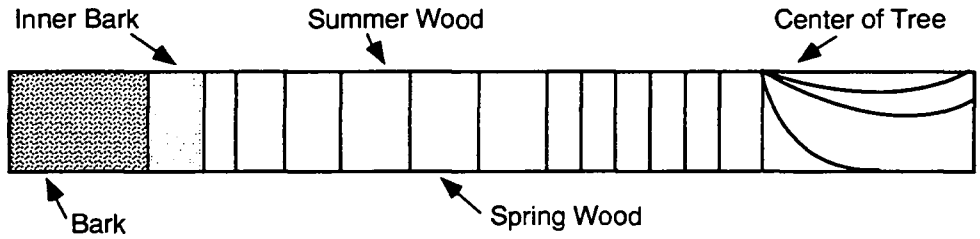
4-H Forestry Fact Sheet

Measuring Tree Age and Growth

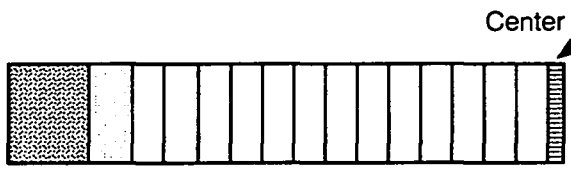
Tree Age

Count the annual rings on a stump, if available. Add number of years to grow to height of stump.

Use an increment borer to determine age. Bore the tree at d.b.h. - diameter breast height - 4½ feet above average ground level. Drawings of cores taken from trees with increment borer follow.



Rings counted _____ Factor to be added _____ Age of tree _____

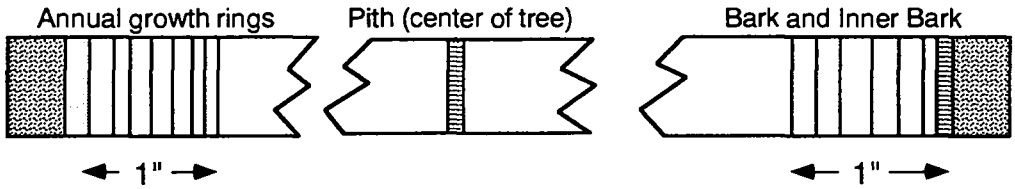


Rings counted _____ Factor to be added _____ Age of tree_____

Height Growth

Years for tree to reach 4½ ft. above ground:	*W. Oregon* *Douglas fir*	*E. Oregon* *Ponderosa Pine*
Very good site	5	8
Average site	7	12
Poor site	8	15

Diameter Growth



Shown above is a core through the full diameter of a tree. The diameter grows at the rate of seven rings per inch. This means it takes seven years to grow one inch on the "radius". We see that the tree will have grown two inches in diameter during the last seven years.

If the above tree were 14 inches in diameter how many years would it take to reach 18 inches in diameter?
Answer: _____

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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4-H Forestry Fact Sheet

Collecting Cones for Seed

The cone collecting season lasts several weeks in any area. Cones are usually ready to pick by mid-August in southern Oregon at low elevations and in northern Oregon. Before picking cones in any number, members will want to see if the seeds are ripe and free of insect damage.

Whether picking Douglas fir, pine, hemlock, spruce, larch, or cedars, remember to check the seeds by cutting lengthwise through the middle of the cones. If you see at least 3 or 4 firm seeds in each half cone, proceed with the picking.

Cones can be collected from standing trees, those that have been felled, and from the ground where squirrels dropped or stored them. If you must climb the tree to collect the number needed, make sure at least one person is with you for safety.

Remember, one sack of Douglas fir cones will yield one pound of seed. There can be up to 40,000 seeds in one pound.

For those who process cones on a commercial basis, equipment such as dry kilns, tumblers, dewingers, fanning mills, and vibrator cleaners are used. A 4-H member can process the cones in an easier and less expensive way at home. Consider storing the cones for several days on top of a furnace, above a hot air register, or any dry, heated area where temperatures are close to 100° F. When the seeds shake out of the cones, they are ready for extraction.

Screening

Seeds are separated from cones by shaking and tumbling.

Select a wooden box and replace the bottom with a one-half inch size screen for Douglas fir. Use a slightly larger screen for other species. Place dried cones on screen and shake box vigorously. Loose seed will fall through.

Repeat the process using a smaller screen which will retain the seed but allow impurities such as needles and broken wings to fall through.

Dewinging

At this point you have seed with wings still attached for the most part. Put the seeds in a small sack; rub and squeeze the seeds gently to remove the wings.

Fanning

Separate the seeds from loose wings, hollow seeds, and other debris by pouring the seeds from one container to another in front of an electric fan. The air movement will blow away debris but the good seed will stay in front of the fan.

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Storage

Place the seed in a shallow tray for two weeks at room temperature before storing. Stir seed from time to time.

Now place the seed in a jar or can with an air-tight lid. Store in a freezer with temperature at 0 to 10° F. The seed should stay alive from two to four years or longer.

Sowing

The process of preparing the seed for planting or stratification and the planting itself is explained in another 4-H Forestry Fact Sheet.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

4-H Forestry Fact Sheet

How To Plant a Tree

When the trees arrive from the nursery and you are not ready to plant, store them in a cooler or refrigerator where the temperature is 33° to 38° F. If you are ready to plant and will do so over several days, then open the bundle or box and wet down the root systems. Let excess water drain off. When planting the seedlings, be sure the roots do not dry out.

Ground preparation

The amount of ground preparation needed prior to planting depends on where you are going to plant. If the planting area is a logged slope with few stumps and weeds, all that is necessary is to clean off or scalp an area bout 20 inches square. Seedlings are unable to compete with grass and weeds. If the planting area is a part of a field, it will be necessary to turn the soil by tilling or plowing. If plowing, smooth out the surface with a disk and harrow. If there are a lot of grasses and weeds in the field, it is advisable to work the soil a year ahead of planting.

Spacing

If you are planting one acre (208.17 feet square) and wish to let the trees grow into timber without thinning, use a spacing of 12 feet by 12 feet and plant 300 seedlings.

Another option is to plant the seedlings closer and thin out every other one for Christmas trees or wait several years and cut alternate trees for small firewood logs. This spacing uses 5½ feet by 5½ feet and plants 1,440 seedlings.

Planting procedure

Any bucket, bag, or planting tray can be used for carrying the trees during the planting operation. In the container, the material around the roots should be wet to prevent damage through exposure. Never carry a handful of trees exposed to the sun and wind. Take one tree at a time from the carrying container and plant it immediately.

Trees should be planted as deep as they grew in the nursery. A color change on the stem above the root system marks the former soil line.

Be sure the planting hole or slit is large enough in width and depth so the root system will not be crowded or doubled up. In slit planting, push the tree down to the bottom of the slit, and with a shaking motion, raise it back to the correct level. This helps to arrange the roots in as natural position as possible.

While holding the tree in an upright position at the correct depth, bring loose, moist soil in around the root system. Do not let dry soil or surface litter fall in around the roots for it will damage or kill the tree. When the slit or hole is filled with moist soil, press it down firmly. Place a layer of loose soil or fine material around the tree to act as a mulch to conserve soil moisture.

Care after planting

The first two years after planting are critical for young trees. Survival and soil moisture go "hand in hand." Any practice or procedure that will maintain good soil moisture should be followed.

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For field planted trees keep your planting free of weeds and grasses by **shallow** cultivation when weeds are small and by the use of pre-emergent herbicides. Tree plantings should be clean cultivated as long as equipment can go through the trees.

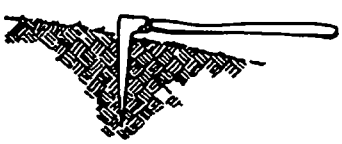
If possible, irrigate plantings to keep the soil moist and the plants in active growth.

Use herbicides to reduce weed growth in the tree row. Some herbicides can be applied at low rates per acre over the tops of newly planted seedlings with very good results. Follow label instructions carefully.

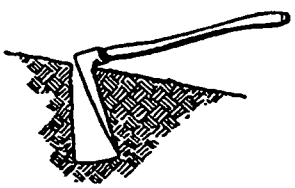
Keep livestock and poultry out of tree planting. Examine your trees often for damage by disease, insects or rodents. Clean cultivation greatly reduces the rodent risk.

Replace all missing trees the spring after planting. Usually very few plants are lost after the second year.

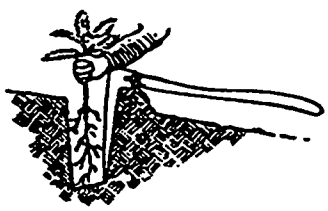
Planting With A Hoe



1. Swing hoe to get full penetration.

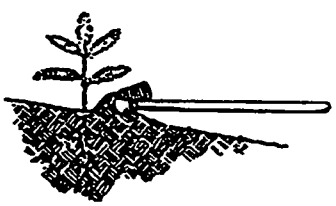


2. Lift handle and pull to widen hole.



3. Place seedling while using hoe to hold back soil.

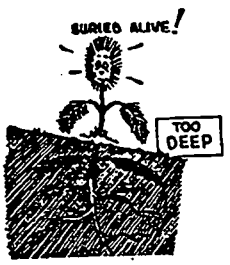
4. Use hoe to pack soil at bottom of hole.

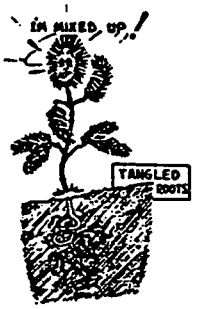


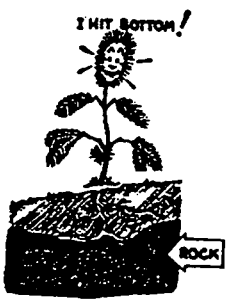
5. Use hoe to pack soil at top of hole.

6. Firm soil around seedling with feet.

Errors in Planting







Prepared by Gary H. Sanders, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

4-H Forestry Fact Sheet

Growing Tree Seeds and Seedlings

Growing tree seedlings is similar to growing garden plants. Under natural conditions, seeds drop to the ground in the fall and winter months and undergo actions that prepare them for germination in the spring. Those that fall on a suitable seed bed, usually mineral soil, will germinate and establish young trees in the early spring.

If you want to collect your own tree seed, find out what the different tree seeds look like when they are ripe. Most seeds ripen in the fall.

Seeds may be planted in the fall, winter, or early spring. Some will begin pushing through the soil in about two weeks.

Growing trees from seed should duplicate or improve on the stratification and sowing practices found in nature. Growing trees from stored seed involves three practices: stratification, sowing, and seed and tree care. The following instructions describe these practices.

Stratification (of seeds)

The storing of seeds in layers with a moistened medium (for example, peat or sand), so as to maintain viability and overcome dormancy. When done in conjunction with near-freezing temperatures, it is termed cold stratification even if no medium is used.

Seed planted in the late fall or early winter will stratify naturally and start growth in the spring.

Seed planted in the spring should be prepared for planting as follows:

Place seed in porous cloth and seal or tie off the ends. Soak seeds 24 hours in cool (about 60° F) water. Drain, dry and store in polyethylene bag in vegetable crisper of refrigerator about six weeks. Do not store seed in freezer. (If possible, mix seed in damp layers of peat moss or vermiculite while in the polyethylene bag.) When seed is ready to be sown, separate it from the other material.

Planting the seed

Soil for the seed bed should be deep, loose, sandy loam. Heavy soils containing a large amount of clay can be made usable by mixing sand, peat moss, or possibly sawdust to a depth of at least 10 to 12 inches. You may also need to check soil fertility. Check with your county Extension office if you want to test the soil.

Soil should be loose and spaded to a depth of about 12 inches. Materials such as rocks, sticks, and large, hard lumps should be removed.

After the soil is worked, the seed beds should be raised 6 to 8 inches to provide maximum drainage.

Surface should be raked smooth and gently pressed down with a board to provide the uniform surface for planting.

Plant about ten seeds per square foot, uniformly spaced. Press the seed into the soil, and cover with a thin layer of fine topsoil, sand, or peat moss.

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Seed and tree care

Protecting the seed and young trees up to eight weeks from insects, birds, and mice should be done by constructing a seedbed frame 6 to 8 inches high and by covering the top with window screening. The lower edge of the frame should be buried an inch or so in the ground.

Watering during the first summer should be a light spray in amounts to assure moderate moisture content on the surface and first 12 inches of soil. Do not flood the area. Watering should be stopped after mid-August to allow the seeds to harden before the cold weather begins.

Shading for first year seedlings should be about 50 percent during the hot weather. Shade can be provided by brush, or lath over the seedbed.

Seedlings should not be left in the seedbed longer than two years. At the end of the second year's growing season, transplant them to a bed 6 inches apart in rows 18 inches apart.

Planting seedlings in pots

Members may want to plant seedlings in pots to observe at 4-H meetings as well as at home:

Use a flower pot 6 inches deep for each seedling.

Dig the trees out of the seedling bed, keeping the tree roots moist at all times. (Wrap seedlings in moist newspapers.)

Place roots of tree into pot with the lowest needles on stem just higher than rim of cup.

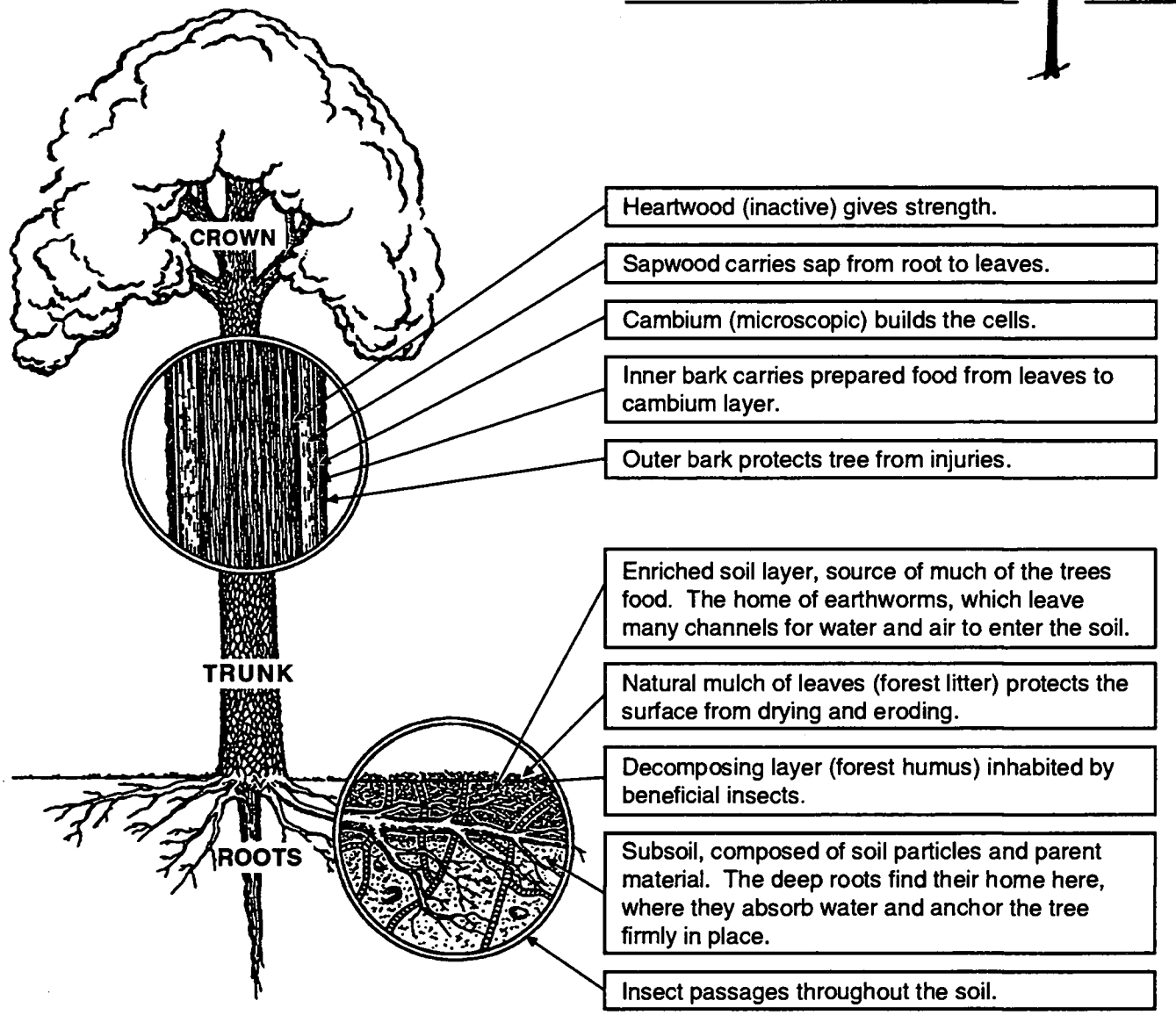
Fill pot with fine textured topsoil. Shake pot to be certain the sand is filled in around all the roots.

Saturate soil with water at first, then keep moist, but not flooded.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

4-H Forestry Fact Sheet

The Tree and the Soil



The buds, root tips, and cambium layer are the growing parts of the tree. Water containing a small quantity of minerals in solution is absorbed by the roots, carried up through the sapwood to the leaves, and there combined with carbon from the air to make food. This food is carried by the inner bark to all growing parts of the tree, even down to the root tips.

Natural forest soil is loose and mellow. It is permeated by rodent burrows and angleworm and insect passages. These allow air and moisture ready access to the feeding roots. The roots in turn help hold soil in place, thus helping to prevent erosion.

Loose and mellow forest soils also allow rain water and water from melting snows to seep into underground reservoirs. This water is later released into springs, small streams, rivers, and lakes.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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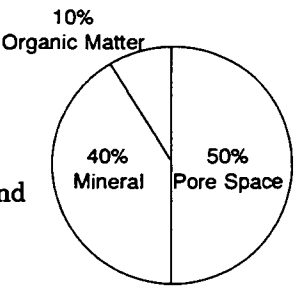
4-H Forestry Fact Sheet

Forest Soils

Most of the food you eat, the clothes you wear, and many of the things you use in everyday living are products of the soil. Soil is the basic forest resource.

Forest trees need sunlight, air, water, and minerals to live and grow. Sunlight and air are readily available but the water and minerals must be taken from the soil.



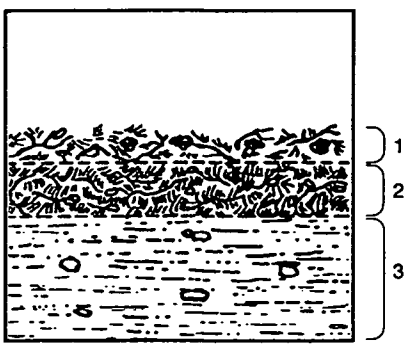
Soil is made up of minerals, organic matter (living and dead), and pore space.

The mineral portion of the soil contains nutrients needed by plants. Soil particles of mineral soil can be grouped by their size. The larger particles are *sand*, the fine ones *silt*, and the very fine ones are clay. These particles were formed from the softening and decay of the bedrock below. Sand makes the soil feel gritty; silt makes it feel smooth; clay makes it sticky and plastic.

Organic matter supports billions of bacteria, molds, earthworms, and other life which break down or rot the organic matter. In this process, acids are released which work on the mineral particles so they can be dissolved in water and used by plants.

Pore space provides storage for water and air, both which are needed by living roots. The pore space provides avenues for the roots to grow to get water and plant food. Rainwater enters and moves into the soil through these pore spaces.

When a leaf, needle, tree, or plant dies, it falls to the forest floor and begins to decay.Its organic matter and minerals are slowly returned to the soil to help other plants grow. This completes the soil-to-plant-to-soil cycle.



1. Duff
2. Humus
3. Mineral Soil

Litter returns to the soil through several stages. The first is *duff*. In this stage you can recognize needles, leaves, cones, and other material. As the duff rots it becomes *humus*. Humus is the organic matter which makes soil fertile.

When trees are harvested, the natural cycle is broken. Surface soil is often disturbed and packed. Some surface organic matter is destroyed so rainwater cannot penetrate and move through the soil and instead runs over the surface causing erosion. Fire can also destroy the cover and result in erosion.

Well-managed soil will produce timber if the growing cover and forest duff are protected. Rainfall is absorbed into soil pores and returns to streams as clear water for drinking, fishing, swimming, and wildlife use.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

Reprinted September 1993
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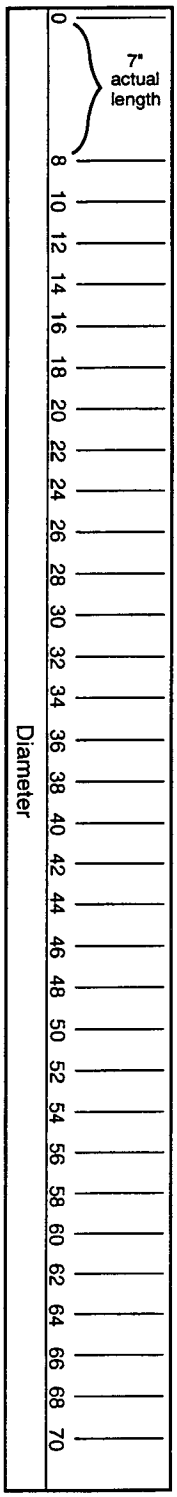
4-H Forestry Fact Sheet

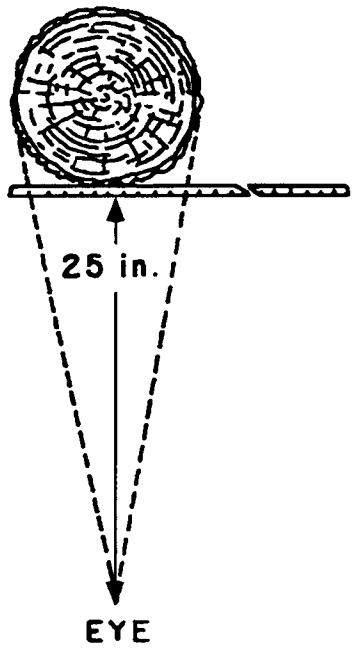
How to Make a Biltmore Stick



A Biltmore stick measures the diameter of a tree at breast height. It is a stick marked off in such a way that when it is held at breast height 25 inches from eye level with one end in line with your eye and one edge of the tree, the tree diameter will be where your line of sight to the other edge of the tree crosses the stick.

One thing that must be correct to obtain an accurate measurement is the distance of the stick from your eye. Below are the approximate distances that should be marked off from the "0" end of the stick for each diameter of the tree.

To make a Biltmore stick, take a strong piece of wood or a narrow strip of plywood up to 1 inch wide. The strip should be about 36 inches long, 1 1/4 inches wide and 3/4 inch thick. A 36 inch stick will measure diameters of 70 inches. Mark off and number the stick to look like the following:



Tree Diameter	*Stick Length*	*Tree Diameter*	*Stick Length*
0"	0"	29"	19 11/16"
On stick, mark off 8" that is 7" actual length		30	20 3/16
9	7 11/16	32	~~2 12/16~~
10	8 7/16	34	22 1/16
11	9 3/16	36	23
12	9 15/16	38	23 7/8
13	10 1/2	40	24 13/16
14	11 1/4	42	25 11/16
15	11 15/16	44	26 1/2
16	12 1/2	46	27 5/16
17	13 1/8	48	28 1/2
18	13 11/16	50	28 15/16
19	14 5/16	52	29 5/8
20	14 7/8	54	30 3/8
21	15 1/2	56	~~3 11/16~~
22	16	58	31 3/4
23	16 5/8	60	32 1/2
24	17 1/8	62	33 3/16
25	17 11/16	64	33 7/8
26	18 3/16	66	34 9/16
27	18 11/16	68	35 3/16
28	19 3/16	70	35 3/4

21 3/16

31 1/16

Prepared by Gary H. Sander, Extension forestry specialist emeritus and Ralph Wilkinson, Linn County 4-H leader.

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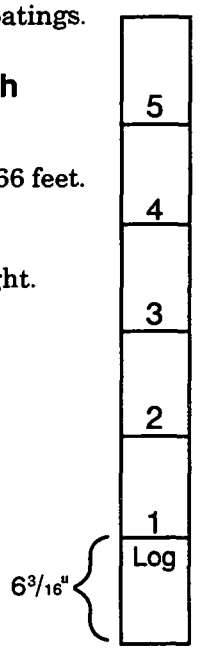
4-H Forestry Fact Sheet

The Hypsometer

To make a hypsometer:

- Select a strong, straight piece of wood about 38 inches long.
- Measure off five sections, each $6^{3}/_{16}$ inches long, from one end. (Each section will measure one 16 foot log.)
- Preserve the hypsometer by applying one or more coats of varnish or other waterproof coatings.

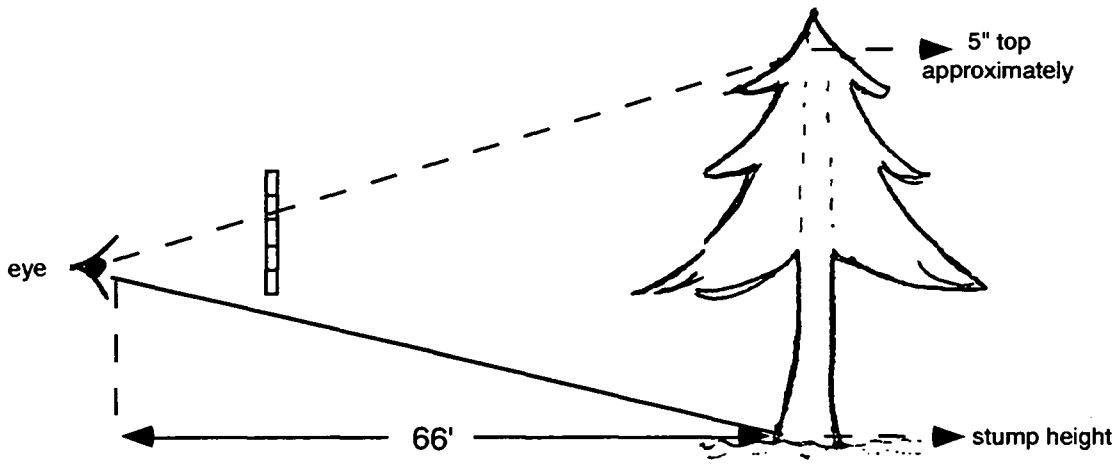


To measure the total height of a tree or the number of logs in a tree (to 5 inch diameter) using a hypsometer:

- Pace or measure as accurately as possible the horizontal distance away from the tree to 66 feet.
- Check the distance from your eye to the stick (25 inches).
- Hold the stick straight up and down, in line with the trunk of the tree and at stump height.
- Move your eyes, not your head, when reading from bottom to top of the stick.
- Read off the number by 16-foot logs from your stick.

To measure the height of a tree using a straight stick:

- Cut a straight stick 4 or 5 feet long.
- Sharpen one end enough to make it easy to sight across.
- Hold stick vertically so that the length of the portion above the hand is equal to the distance from the hand to the eye.
- Move toward or away from the tree keeping on a level with the base of the tree until the portion of the stick above the hand just covers the full height of the tree.
- Pace off the distance from the final viewing position to the tree. This distance is the height of the tree.



Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

Reprinted September 1993
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4-H Forestry Fact Sheet

Pacing

Pacing, as a measurement form, can be used to:

Keep a rough check on distance traveled when hiking.
Check the area of a tract of timber.
Measure the distance for a timber cruise.
Check the area of a field of grain or a garden.

Remember that pacing is not an exact measurement, but with practice, considerable accuracy can be obtained.

In setting up a pacing problem, remember to take a natural step. A pace may either be one or two steps, whichever is more comfortable. Walking naturally is not tiring, and the pace length will be more consistent. Members will also find that their pace is shorter uphill than downhill.

After members determine the length of their pace, they should divide the length of the course by the number of the individual paces. Members should pace the measured course and check it several times to make certain the paces are consistently the same length.

Once members have determined the length of their pace for the measured course, they should determine the length of the unknown course. It might also be a good idea to work a compass problem in conjunction with this pacing problem.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

Reprinted September 1993
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4-H Forestry Fact Sheet

How To Use A Compass

Parts of the compass

Needle — The needle of the compass always points to the magnetic north pole. The north end of the needle is marked by an arrow. This is the end that is always read.

Degree circle — There are 360° in a complete circle and these degrees are marked off on the compass. The quadrant compass has the degrees marked off into four equal "pie cuts" or quadrants, each quadrant marked from 0° to 90°. The azimuth compass has the degrees marked off from 0° to 360°.

Line of sight — There is the line on the compass lid which tells the direction to follow on the ground. We always follow this line of sight - not the direction the needle is pointing.

Declination

The magnetic north pole and the true north pole are located at different points on the earth's surface. It is necessary to allow for this difference. The needle of the compass always points to magnetic north which is about 22.5° to the right of the line of sight. The direction can then be read directly off the compass without adding or subtracting the 22.5° each time.

Why east and west directions are reversed on the compass

When using a compass, the needle always points to magnetic north. The degree scale and line of sight turn underneath the needle. For convenience of reading and in order that the north end of the needle may always be read, the east and west markings are reversed. That is, when the line of sight is turned to the right or east the needle reads to the left of 0° and the true direction can be read directly off the compass.

Using the compass

When using the compass in the woods, hold it in both hands about 12 inches from your stomach. If the elbows are pressed against the body the compass may be held steadily and firmly. When turning the compass be sure to swing the entire body on the heels without changing position of the feet (unless turning an angle greater than 90°).

In running a line across a meadow or open field, some object such as a snag, stump, or tree should be lined up with the line of sight on the compass along the direction you wish to travel. Sometimes the compass may be placed on a stump or log but never on a rock.

When using the compass be sure to hold it away from metal objects such as a knife, belt buckle, hatchet or nails in the pockets. The metal will attract the needle and throw it off true bearing.

My pace is: _____ steps for 100 feet and _____ steps for 50 feet.

Compass Problem

1st course Direction: _____ Distance: _____ ft. 3rd course Direction: _____ Distance: _____ ft.
2nd course Direction: _____ Distance: _____ ft. 4th course Direction: _____ Distance: _____ ft.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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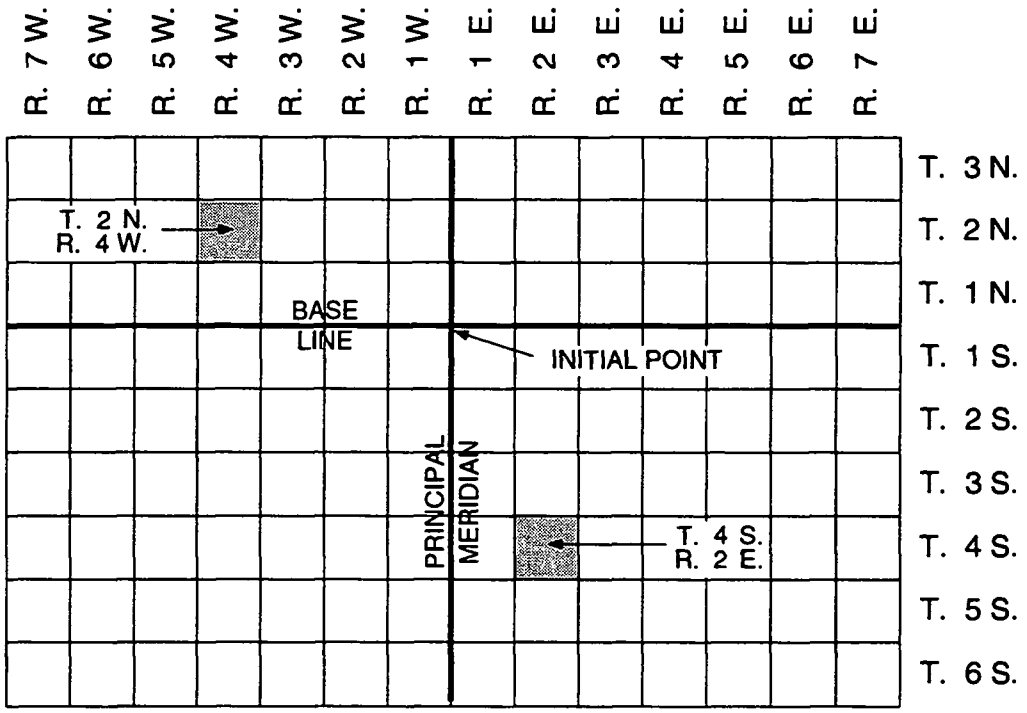
4-H Forestry Fact Sheet

Map Reading

Before reading a map it is necessary to know about how townships and ranges are formed. Since we are going to be primarily interested in reading maps in Oregon, we will study the Willamette Meridian which is the principal meridian for all of Oregon and Washington.

To start with, you must have an initial point. In the case of the Willamette Meridian this point is near Portland. The line running north and south through this point is called the principal meridian or, in this case, the Willamette meridian. The line running east and west through the initial point is a true parallel of latitude and is called the base line. The principal meridian and the base line may also be called standard lines.

In describing the townships, which are areas six miles square, you will be concerned in which way they lie from the initial point. In doing this, the area north or south from the initial point will be called either township north or township south. The area east and west of the initial point will be divided into areas six miles wide and called ranges east or west. Note the diagram which should make this clearer.



To describe an individual township combine the township north and south with the range east or west and arrive at a description like Township 12 South, Range 2 West or in abbreviated form T. 12 S., R. 2 W. You would find Lebanon in this township. You might have a township described as T. 2 N., R. 9 E. which would be near Hood River. Townships can be divided into 36 sections and fractions of sections. For example, the club's tree farm is located in north ½ of the northwest ¼ of Sec. 7, T. 13 S., R. 1 E.

In reading a map that is divided into townships and ranges, the township numbers are usually marked at the top or the bottom of the map and the ranges on the right or left side of the map. Occasionally they are marked within the map itself.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

Reprinted September 1993
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4-H Forestry Fact Sheet

Land Measurement

All professional foresters are concerned with land measurements. Each 4-H Forestry member should become familiar with how land is divided and measured.

Units of measure that you should know are:

1 rod = 16½ feet
4 rods = 1 chain = 66 feet
80 chains = 1 mile

1 mile = 5,280 feet
1 acre = 43,560 sq. feet
1 acre = 10 sq. chains

1 acre square = 208.71 ft. on each side
640 acres = 1 section = 1 mile square
36 sections = 1 township = 6 miles sq.

The sections in a township are always numbered in the same order starting at the northeast corner. On paper, they would start at the upper right hand corner and be numbered as in Figure 1. A section is usually divided into one quarter sections containing 160 acres each and labeled as shown in Figure 2. After you have divided the section into quarter sections, each quarter section may again be divided into one sixteenth sections containing 40 acres each. These are often called "Forties." The section will then look like the illustration in Figure 3.

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Figure 1

NW¼	NE¼
NW¼	NE¼

Figure 2

NW¼ of NW¼	NE¼ of NW¼	NW¼ of NE¼	NE¼ of NE¼
SW¼ of NW¼	SE¼ of NW¼	SW¼ of NE¼	SE¼ of NE¼
NW¼ of SW¼	NE¼ of SW¼	NW¼ of SE¼	NE¼ of SE¼
SW¼ of SW¼	SE¼ of SW¼	SW¼ of SE¼	SE¼ of SE¼

Figure 3

The main use of these subdivisions is describing property. For example, if you owned 40 acres in the northeast corner of the section 6, the description on your deed would probably read: the NE¼ of the NE ¼ Section 6.

Here is an example of land measurement:

The Knotty Fir Lumber Co. owns the SE¼ of the NW¼ and the NW¼ of the SE¼ and the SW¼ of Section 15, Township 12 South, Range 1 West. One day the company decided to send out their forester to cruise the timber on this area. The forester learns that the closest road in this vicinity runs north and south near the center of Section 14. The forester gets into the company pick-up and drives into the forest. When the forester reaches the north line of section 14, the section line marker (a section line marker is a board or tag telling how far it is to some known section corner) indicates that it is 1,965 feet east to the northeast corner of Section 14.

How many acres of land does the forester have to cruise? How far would the forester have to go west and south to reach the closest corner of the property? Make a diagram of the area that will be cruised.

NOTE: Our nation is considering converting to the metric system. As another exercise, try one of these exercises in metric figures.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

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4-H Forestry Fact Sheet

Woods Words

Board Foot	Piece of board 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent.
Bole	Stem or trunk of a tree; usually the lower, usable or merchantable portion of the trunk.
Cambium	Soft layer of living cells, one row thick, between the inner bark and living wood of the tree. These cells divide and give origin to wood tissue and bark tissue.
Clearcutting	Method of cutting that removes all merchantable trees on the area to be cut at one time. Clearcutting is usually needed to start a new Douglas fir forest, because the seedling will not grow in nearby shade. Fir seeds fall into the clearcut area from blocks of seed trees nearby, or from artificial reseeding. In many clearcut units, young trees are planted as soon as possible after cutting.
Cord	Unit for measuring volume of stacked wood. The standard cord is 4 feet high, 4 feet wide, and 8 feet long.
Crown	Upper part of the tree including the branches with their leaves or needles.
Cruise	Survey of forest lands to locate and estimate volume and grades by species of standing timber.
d.b.h.	Diameter at breast height. Assumed to be 4½ feet above the average ground line, normally measured outside the bark.
Fungus	Low form of plant life having no green material or chlorophyll. Lives as a parasite on organic material such as a tree or log.
Gooseneck	Abnormally long, bare stem between whorls on a Christmas tree.
Handle	Space between the lowest whorl and the cut on a Christmas tree.
Heartwood	Central portion of the trunk of a tree. It is entirely dead and usually darker and more durable than the outer portion of sapwood.
Peeler	Log used in the manufacture of rotary cut veneer or plywood. Usually over 24 inches in diameter with a minimum of surface knots or defects.
Photosynthesis	Food making process of a plant in which an organic substance (sugar) is made from carbon dioxide of the air combined with water.
Pulp	Wood or other vegetable matter reduced to its component fibers. May be used to make paper or synthetic fabric.
Release cutting	Cutting of larger individual trees that are overtopping young trees, to free the young for better growth.
Reproduction	Young trees growing in an area. Natural reproduction indicates that the young trees started from self-sown seed of the older trees in or near the stand.
Sapling	Outer, light colored wood of trees in which certain cells are still alive and serve to conduct water (sap) from roots to the leaves.

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Saw timber	Trees at least 12 inches in diameter and of such quality that makes logs suitable for sawing into lumber.
Scale	Measurement of a log to figure volume in board feet, cords and cubic feet.
Scalp	Removal of competing vegetation from the surface of the soil where a tree will be or has been planted.
Scarify	Exposure of mineral soil to provide a place for seeds to start to grow. Usually done with a bulldozer.
Second growth	Forest growth which comes up after the removal of the old stand by cutting, fire, or other cause.
Selective logging	Removal of selected, mature, large, or diseased trees as single, scattered trees or as small groups of trees. Commonly used in Ponderosa pine and becoming more common in some types of Douglas fir forests.
Slash	Branches, bark, tops, chunks, cull logs, uprooted stumps, and broken or uprooted trees left on the ground after logging. Slash may create a high fire hazard or an insect hazard.
Stumpage	Value of timber as it stands uncut in the woods.
Stump culture	Leaving the limb on the stump of a Christmas tree when cutting. The limb will often turn up and form a new tree.
Suppressed tree	Tree starving and often dying for lack of light and food. It is overcrowded and overtopped by its neighbors.
Thinning	Cutting made in an immature stand for the purpose of increasing the rate of growth and improving the form and the quality of the trees that remain.
Tolerance	Ability of a tree to withstand shade.
Whorl	Group of limbs growing from the same level on the stem.

Prepared by Gary H. Sander, Extension forestry specialist emeritus, and Ralph Wilkinson, Linn County 4-H leader.

4-H Forestry Fact Sheet

Forest Products

Oregon is Number 1

Oregon grows more trees than any other forest state. One out of every five trees growing in the United States grows in Oregon. Oregon's timber harvest is strictly regulated by the Oregon Forest Practices Act which insures that trees are replanted and streams and wildlife are protected. The forest industry replants over 215,000 acres a year. Statistics show that the volume of trees growing on forest land exceeds the volume harvested each year. The forest products industry employs over 60,000 people with an annual payroll of over 1 billion dollars. Oregon's forest products are shipped throughout the world.

Wood is the strongest natural material for its weight known. Because the forest is a renewable resource, it makes sense to produce wood products instead of using aluminum, steel, or plastic to produce the same products. Aluminum and steel are mined from the earth and are not renewable. Plastics come from oil, also not renewable. Wood is renewable. We can grow more trees just like we grow corn. It just takes a little longer. It is environmentally sensible to use wood because it is renewable wherever possible. The production of wood products requires far less energy to produce than does materials from aluminum, steel, or plastic.

Products Facilities

Oregon has more sawmills than any other state. It ranks second only to Washington in the number of pulp and paper mills. Below is a listing of the forest products production facilities found in Oregon:

- Fiberboard and Particleboard Plants 17
- Sawmills 115
- Shake and Shingle Mills 10
- Post, Pole, and Piling Operations 12
- Pulp and Paper Mills 11
- Veneer and Plywood Mills 65

Species Harvested

The following types and amounts of wood are harvested to make the many wood products manufactured in Oregon:

- Douglas fir 56%
- Hemlock 14%
- Ponderosa pine 18%
- True firs 5%
- Other 7%

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Wood Products Produced in Oregon and Their Uses

Lumber. The primary use of lumber is in the construction of homes. It is primarily used as a framing material for roofs and walls. High grade lumber which is free of knots is used for molding, doors, cabinets, and furniture. Other uses include interior paneling, exterior siding, shipping pallets, laminated beams and general construction.

Plywood. Plywood is a panel product made from thin layers of wood called veneer, laid down at the right angles to each other and glued together. The glue is used to make plywood harden at high temperatures. Because of this, veneers are pressed together in hot presses to make the plywood panels. In building construction, plywood is used for roof sheathing (the wood under the shingles), subflooring, siding, wood foundations, and concrete forms. It is also used in furniture, cabinets, pallets, crates, and general construction.

Fiberboard and Particleboard. Fiberboard and particleboard are reconstituted wood products made from planer shavings and sawdust. They are held together by glue and pressed into panel form using a hot press. The primary use for these products is in the construction of furniture, especially the hidden parts. Particleboard is also used as a construction material in mobile homes and as underlayment (smooth material under vinyl flooring and carpeting) in homes.

Posts, Poles, and Pilings. Small trees, many which are removed during forest thinning, are used to make fence posts. Medium-sized tall straight trees are used for telephone and transmission poles. Material are used to anchor docks and other structures is called piling. Most of these products are treated with a wood preservative before being placed in the ground.

Pulp and Paper. Pulp and paper in Oregon is produced from wood chips produced as a by-product of lumber manufacturing. The "cementing" material which holds and wood fibers together in the chips is dissolved away using chemicals. The remaining individual fibers are washed and dried and sold as pulp to other paper mills, or are washed and formed directly into paper. If the pulp is not bleached, the paper produced is used for making paper bags and corrugated boxes. Paper from bleached pulp is used for making writing paper, tissue and other fine quality papers.

Shakes and Shingles. Shakes and shingles are used for roofing materials and for siding on homes. Shakes and shingles are usually produced from Western Red cedar. Shakes are split from short blocks of wood and shingles are sawn from them.

The Future. It seems that every day the news headlines discuss issues related to forestry and wildlife. The forest industry is in transition. Less old-growth timber will be harvested in the future and more second-growth timber will be harvested instead. The climate in Oregon is so good for tree growing that some sites can grow a two-foot diameter tree in about 80 years. Many people mistakenly think of this as old-growth when it is in-fact, second growth.

Another area of interest is in taking the lumber and plywood products that are produced in Oregon's mills and continue processing the wood into final products such as furniture and cabinets. This is called secondary manufacturing. There will be more secondary manufacturers in Oregon in the future.

The United Nations predicts that the population of the world will double in the next 60 years. This will cause the demand for wood to increase as well. Because the demand for wood and wood products will increase, the trees to produce the wood will have to come from someplace. Mankind will simply not stop using wood. It makes far more sense to cut those trees from a state like Oregon where the forests are harvested responsibly and replanted according to strict laws than it is to "save" the trees in Oregon and cause the wood to be cut from countries that have no forest protection laws.

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