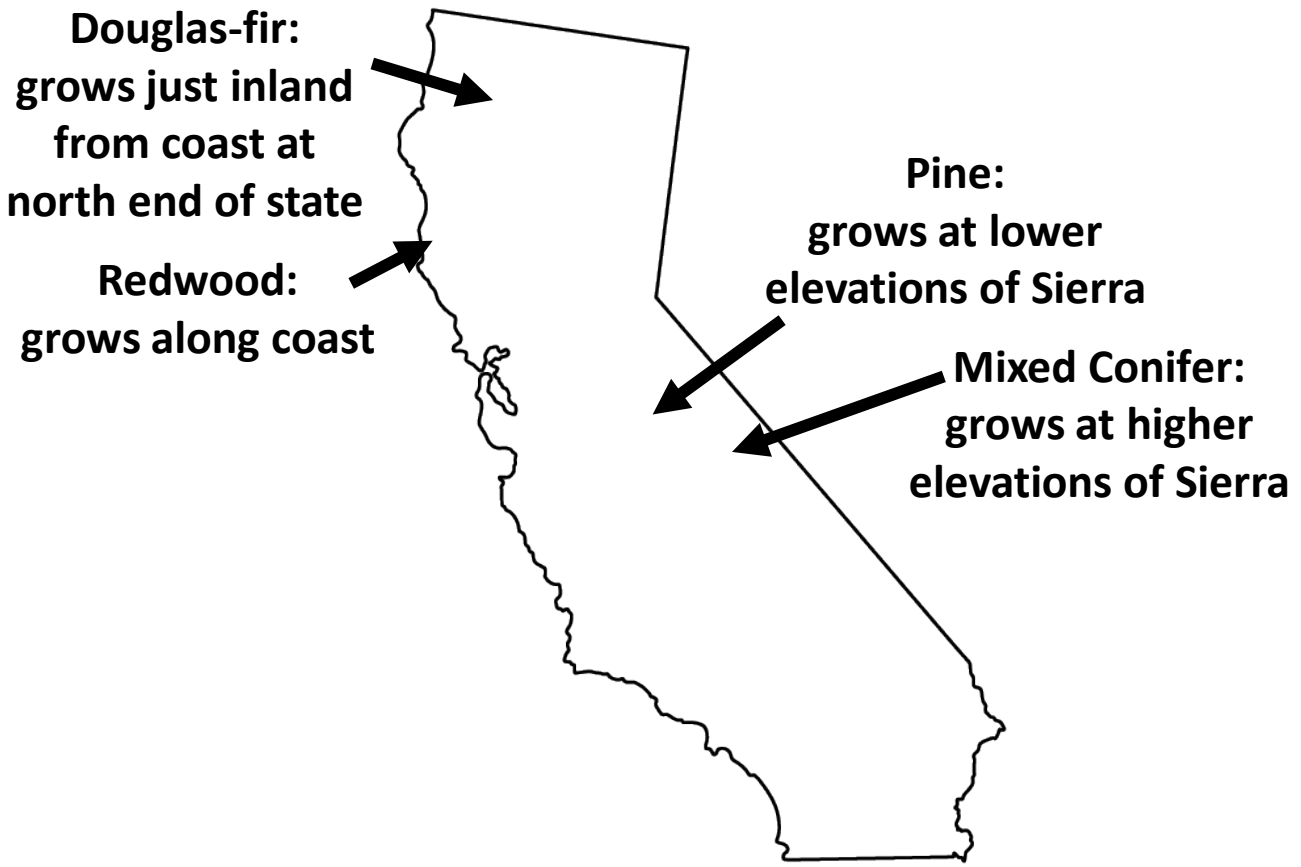
Module 2 – TREE ID AND FOREST TYPES

1. California Forest Types
    a. Look at CA maps
2. Tree Identification by sight - use Virginia Tech Dendrology website to know these species
    a. Ponderosa Pine: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=108
    b. Sugar Pine: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=229
    c. White Fir: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=94
    d. Douglas-fir: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=105
    e. Incense-cedar: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=196
    f. Coastal Redwood: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=180
    g. Madrone: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=194
    h. Tanoak: http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=215
3. Using an Identification Key
    a. Look at “Leaf Types”
    b. Look at plant ID keys including the Pacific Coast Tree Finder (in the Class Drive)
    c. Watch key ID videos using the Pacific Coast Tree Finder
        i. Key ID for Coastal Redwood (4:33) https://youtu.be/EI8eJ5A3BJ4
        ii. Key ID for Tanoak (6:16) https://youtu.be/liqDR4Z6TVc
4. Species Composition
    a. Read “Determining Species Composition - Mixed Conifer”
    b. Read “Determining Species Composition - Coastal Redwood”


Douglas-fir:
grows just inland
from coast at
north end of state
Redwood:
grows along coast
Pine:
grows at lower
elevations of Sierra
Mixed Conifer:
grows at higher
elevations of Sierra

CALIFORNIA FORESTS:

Diverse and Plentiful

CALIFORNIA'S FORESTS CONTAIN A WIDE VARIETY OF EVERGREEN AND DECIDUOUS TREES.

THE MAP BELOW DEPICTS THE DISTRIBUTION OF SOME OF CALIFORNIA'S MORE SIGNIFICANT CONIFERS.

REDWOOD
(Sequoia sempervirens)
Featuring reddish-brown bark, short flat needles, and inch-long cones, the Redwood is found in coastal Northern California. This unique conifer species reproduces most readily by sprouting from the trunk.

PONDEROSA PINE
(Pinus ponderosa)
Common throughout the West, this species grows to 180 feet, and features long, dark yellow-green needles.

WHITE FIR
(Abies concolor)
This "true fir" species occurs at higher elevations, and is identified by its blue-green needles, oblong olive-green or purple cones, and branches that extend down the trunk nearly to the ground.

SUGAR PINE
(Pinus lambertiana)
So named because of the white, sugar-like crust that forms around scars in its bark, the Sugar Pine grows to 200 feet, making it the tallest American pine.

INCENSE CEDAR
(Libocedrus decurrens)
Found throughout California's mixed-conifer forests, Incense Cedar can be identified by its flattened branchlets covered with very short, overlapping scales.

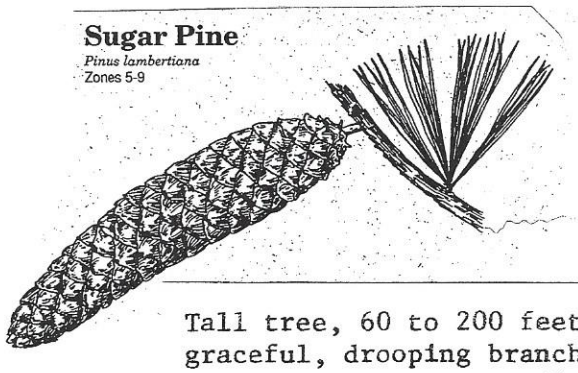
FOREST TYPES
- *Douglas Fir*
- *Redwood*
- *Ponderosa Pine*
- *California Mixed Conifer*
  - *Douglas Fir*
  - *White Fir*
  - *Incense Cedar*
  - *Sugar Pine*
  - *Ponderosa Pine*

DOUGLAS FIR
(Pseudotsuga menziesii)
With its small, bristly cones, short blunt needles, and long branch-free lower trunk, the Douglas Fir is easily recognized. It grows in both coastal and inland regions of California.

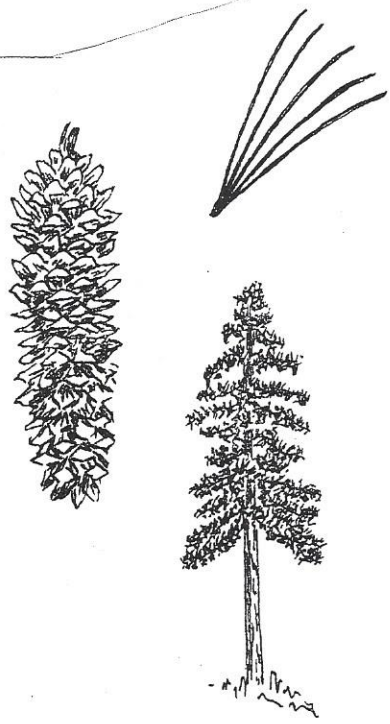
Mountain Tree Identification Guide

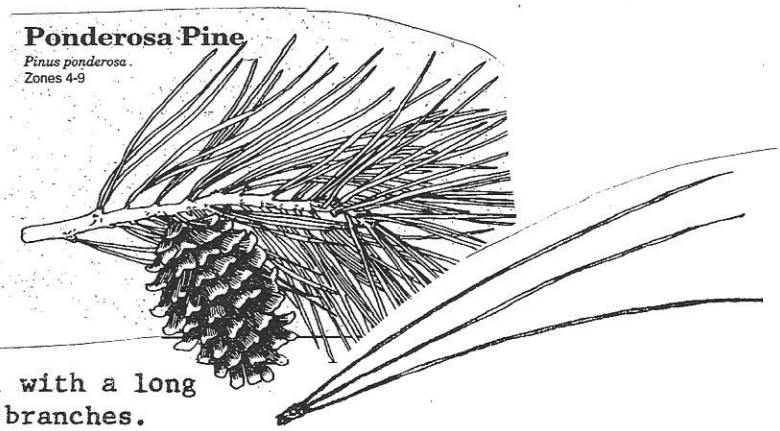
Pest Management Operations

Sugar pine
Ponderosa pine
Jeffery pine
Coulter pine
Lodgepole pine
Limber pine
Knobcone pine
Incense cedar
Sierra redwood
Black oak
White alder
White fir
Big Cone Douglas fir
Single leaf pinyon
Western juniper
Canyon live oak

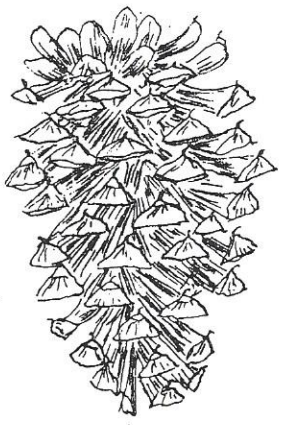


Tall tree, 60 to 200 feet high, with graceful, drooping branches and pendant cones. Leaves are needle-like and slender with 5 in a cluster; 2 and 3/4 to 4 inches long. The cones are long and cylindric, up to 18 inches long and 3½ inches in diameter. The cone scales are about 1½ inches wide and are red-brown with thin tips. Cones are open at maturity, releasing the winged seeds. Cones are quite prolific and easily found at the base of older trees. Young cones are coated with sugary sap which looks almost like ice and glistens in the sun. Sugar pine is common in the montane zone of the southern California mountains. It grows on mountain slopes from 6,000 to 10,000 feet elevation and first appears in most places after Jeffrey pine is well established.



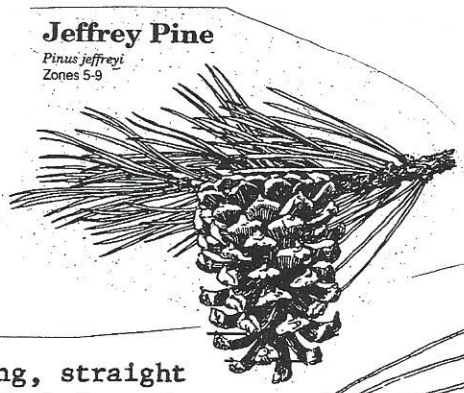


Tall tree, 45 to 200 feet high, with a long straight trunk below the first branches. Bark is red-brown and peels into irregular shaped pieces. The interior portion has the sweet odor like that of vanilla. Needles are somewhat stiff, 3 in a cluster, and 4½ to 10 inches long. Cones are generally prolific, oval-cylindric, and 2 and 3/4 to 6 inches long. Cone scales have a short prickle at the tip which points outward. Ponderosa pine is abundant in some localities, forming park-like forests. It is more abundant in Arizona and northward into Washington than it is in southern California. It can be found from 2,000 to 9,000 feet elevation, but in most places in southern California it occurs from 5,000 to 9,000 feet elevation.

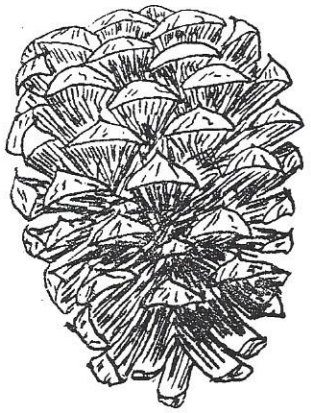


Jeffrey Pine

Pinus jeffreyi
Zones 5-9

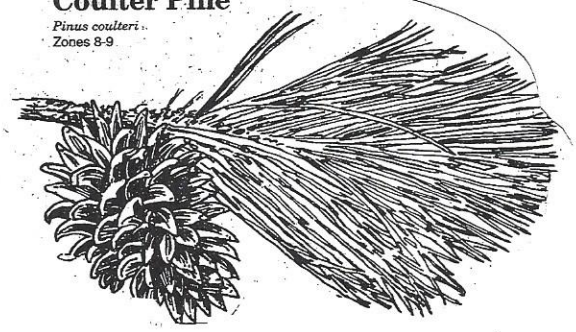


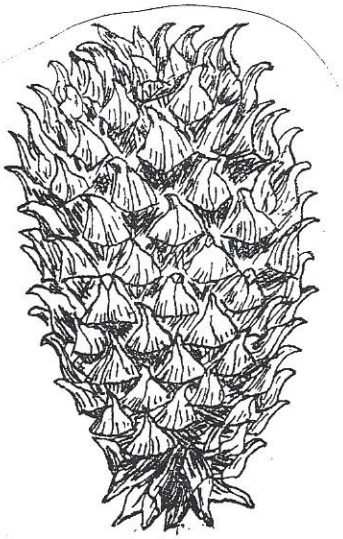
Tall tree, 60 to 180 feet high, with a long, straight trunk before the first branches appear. Bark is reddish brown and peels in characteristic odd-shaped plates. Inner bark has vanilla-like odor. Leaves are blue-green, 4½ to 11 inches long, and in clusters of 3. Cones are extremely prolific and have an ovoid-cylindric shape; 6 to 10 inches long. Scales are fairly stout and numerous. Scale tips have a sharp, prickly point which turns down, not out. Jeffrey pine is common in our southern California mountains. It is characteristic of the montane zone of southern California and is dominant in this region. At higher elevations, above 8,000 feet, other species begin to take over. Jeffrey pine first occurs above about 4,500 feet elevation. It is much more common than yellow pine, although similar in appearance and habitat.



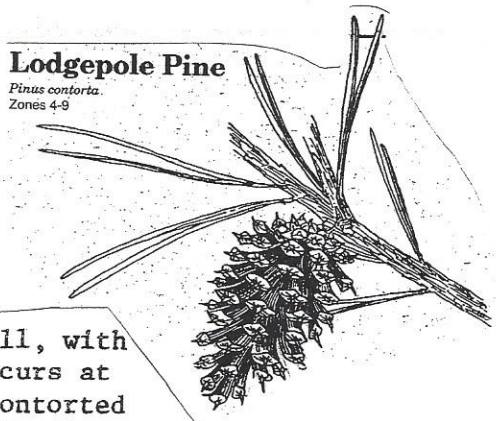
Coulter Pine

Pinus coulteri
Zones 8-9

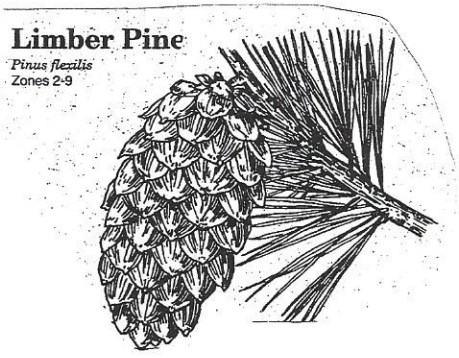




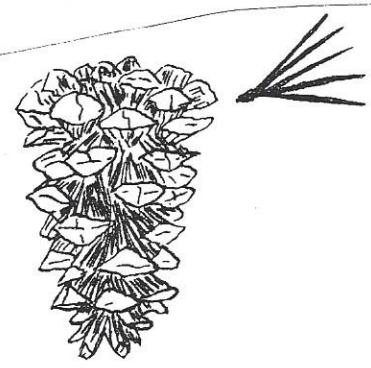
Tall tree, 35 to 75 feet high. Needles are stiff and stout, 6 to 12 inches long, occurring in clusters of 3. Pale brown or buff-colored cones are large, 8 to 12 inches long, and the heaviest cones, some weighing as much as 5 to 8 pounds. Scales are large and curve down and out to form hook-like projections with sharp, strong points. Cones persist on trees after releasing seeds. Coulter pine occurs on dry slopes at lower elevations, in most places below the Jeffrey pine belt.



Tall tree, 45 to 120 feet tall, with slender, straight trunk. Occurs at lower elevations, but much contorted and stunted at timberline. Needles are yellow-green, 1¼ to 2¼ inches long, occurring in clusters of 2. Cones are not quite symmetrical at the base and persist on the trees, adhering to the branches for many years. Cones are small, 1¼ to 2 inches long, with slender, sharp prickles at the tips of the scales. Lodgepole pine is common at higher elevations, in some places forming pure stands. It also tends to become established after fires, because the heat of the fire causes the cones to open and release their seeds.

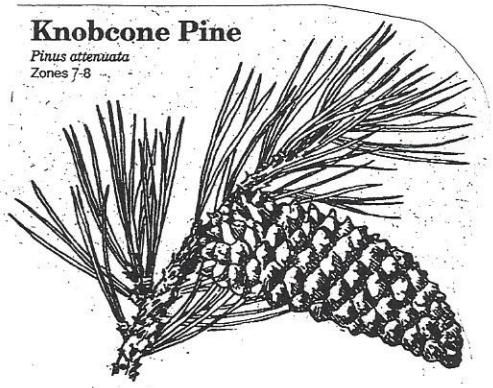


Low tree, 25 to 50 feet high, with short trunk. Leaves are stiff, thick, and erect; 1½ to 3 inches long, 5 in a cluster. Cones open at maturity, are 3 to 10 inches long, and have thickened scale tips. Limber pine occurs on dry mountain slopes, mostly above the montane zone, 7,500 to 11,000 feet elevation.



Knobcone Pine

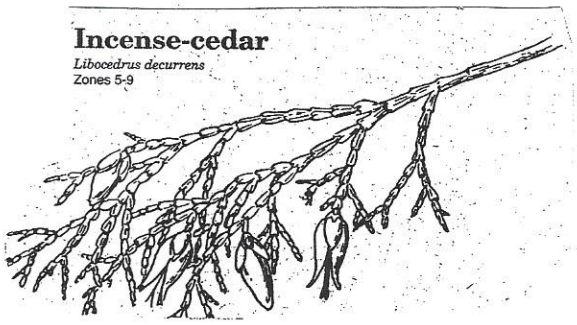
Pinus attenuata
Zones 7-8



Medium tree, 9 to 50 feet tall, with generally straight trunk. Generally located on dry, rocky slopes and ridge tops of the coastal mountain ranges and occurring mainly on western and Southern exposures. Usually found in pure stands. Needles are 3 per bundle, 3-6" long, slender and yellowish green in color. The yellowish brown cones are elongated, broad near the base and strongly incurved. Cones have pronounced knobs on the face of each scale with each knob armed with a thick, flattened, curved spine. Cone clusters persist in a closed state and can become embedded in the branch.

Incense-cedar

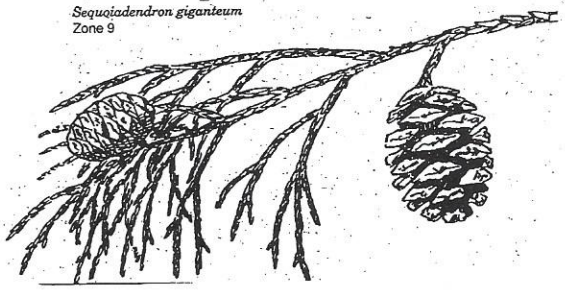
Libocedrus decurrens
Zones 5-9



Tall tree, 75 to 125 feet tall, with evergreen, aromatic herbage and red-brown shredding bark. Branches form graceful, flat sprays. Leaves are scale-like and closely appressed to the branches. The cone is small, 1 inch long, and almost bird-like with 6 scales. Incense cedar is fairly common on the higher mountain slopes, particularly where there is a bit more moisture. In most places in southern California it appears above 6,000 feet elevation.

Giant Sequoia

Sequoiadendron giganteum
Zone 9

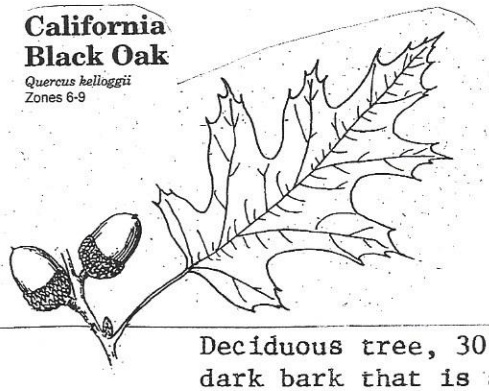


This tree is not native to the local mountains, but well suited to the climate. The trees are generally found at 4900 – 8200 feet elevations on well-drained but moist soils. They generally occur in groves rather than being associated with other species and appear very tall. The trees are known to grow very old (2500 yrs+) with very large trunk diameters. These trees are rapid-growing when young and become slow-growing with age.

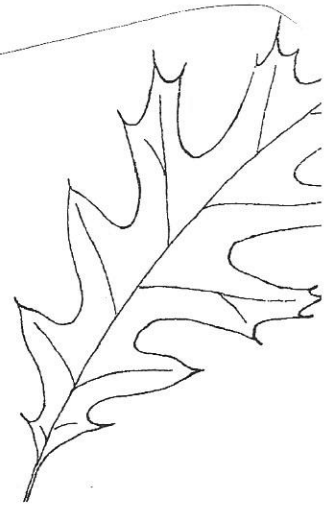
The trees produce cones and seeds each year, with heavy seed crops produced every 2 or 3 years. The bark grows very thick (11 – 24 in), dark reddish or cinnamon brown, often with a slight purplish tinge, deeply furrowed with very large, rounded ridges separating into loose, fibrous scales. The leaves are very tiny, egg shaped to lance shaped, 0.1 – 0.2in long, overlapping and pressed to branchlets. Cones are 1.5 - 2.5 inches long, egg shaped, dark reddish brown in color.

California Black Oak

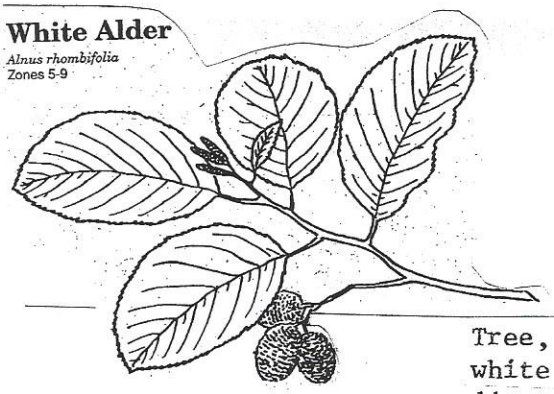
Quercus kelloggii
Zones 6-9



Deciduous tree, 30 to 75 feet high, with dark bark that is smooth when the tree is young, but becomes ridged when older. Leaves are large, 4 inches or more long, and deeply lobed. The lobes are toothed with bristle-tipped teeth. Leaves, glabrous when mature, but tomentose when very young. Male flowers are in catkins, 1½ to 3 inches long. Fruit, an acorn, 1 to 1¼ inches long. Acorn cups are 5/8 to 1 inch deep. California black oak is common in the hills and mountains of southern California from 1,000 to 8,000 feet elevation.

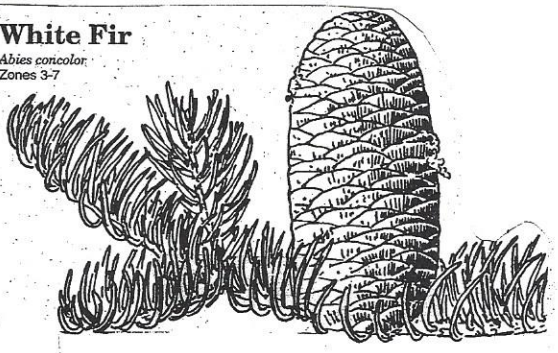


White Alder
Alnus rhombifolia
Zones 5-9



Tree, 30 to 100 feet high, with grayish-white bark and trunk, up to 24 inches in diameter. Leaves, alternate, ovate, 2 to 4 inches long, dark green and glabrous above, lighter green beneath, toothed and fine, felty pubescent; lateral veins parallel. Male flowers in catkins, 1¼ to 3 inches long. Fruit, a woody cone, 3/8 to 3/4 inch long, resembling a small cone from a conifer. White alder can be found in moist areas along streams, below 5,000 feet elevation. Flowers from January to April.

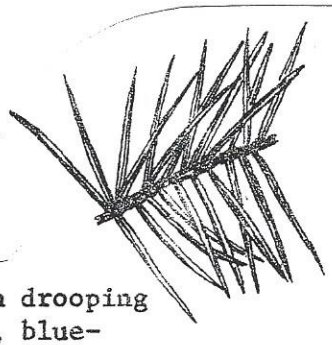
White Fir
Abies concolor
Zones 3-7

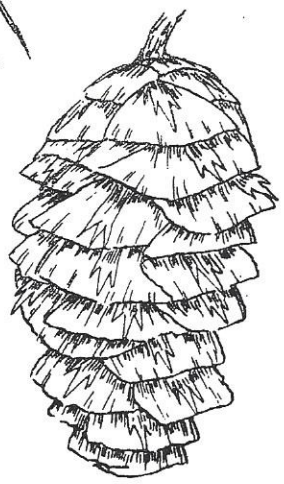


Tree, 45 to 200 feet high, with pyramidal growth. Leaves are needle-like, spirally arranged on the branches, and 1¼ to 2½ inches long with blunt tips. Cones are erect on the tree and are found on most trees near the top. Cones are oblong, 2 and 3/4 to 4 and 3/4 inches long. Scales are closely imbricated and fall off separately when they open to release the seeds. For this reason, you will not be able to collect fir cones around the base of the tree. White fir grows on moist mountain slopes at slightly higher elevations than the first occurrence of the Jeffrey pines. It is common in the southern California mountains, in most places from 6,000 to 9,000 feet elevation. During the Christmas season, it is sold under the name: silver fir.

Big Cone Douglas fir

Zones 4-8



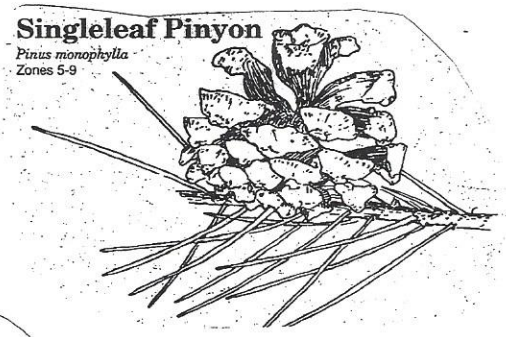


Tall tree, 35 to 60 feet high with drooping branches. Leaves are needle-like, blue-green, and spirally arranged on the branches, but appear to be in a flat spray because the needles are turned at the petiole base. Needles are 3/4 to 1¼ inches long and pointed at the tip. Cones are cylindrical, 4 to 6 inches long, with 3-fingered bracts overlapping the scales. The bracts are characteristic of *Pseudotsuga*. Big cone spruce grows throughout southern California on dry mountain slopes at lower elevations.

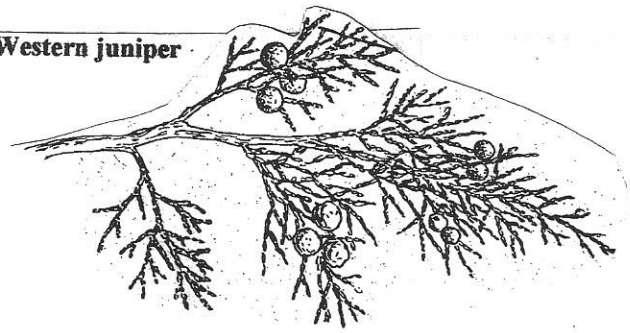
Singleleaf Pinyon

Pinus monophylla

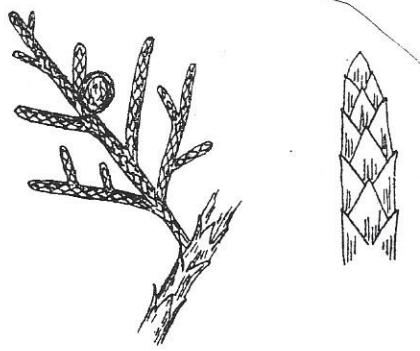
Zones 5-9

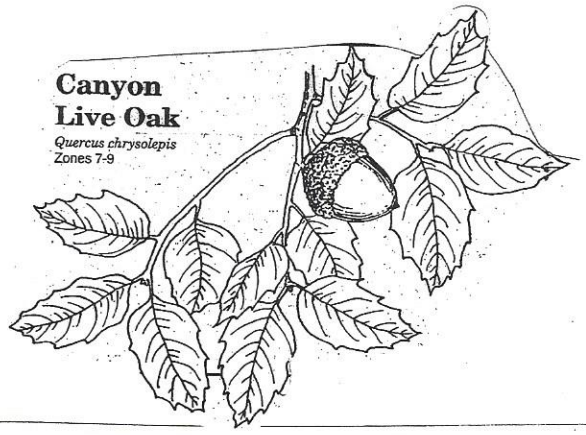


Low tree, 15 to 45 feet high, but most are about 25 feet high with a short trunk and rather sprawling growth. Leaves are needle-like, 1 to 1½ inches long, and occur singly in a fascicled base. Cones are ovoid, 1½ to 2¼ inches long, with a squat appearance. The scales are 4-sided, thick, and open at maturity. Seeds are edible and are usually eaten by the animals. One leaf pinyon is common on desert mountain slopes at lower elevations, mostly between 3,500 to 5,000 feet. In many places it occurs with juniper in the zone below Jeffrey pine.



Low tree, 15 to 60 feet tall, with well defined trunk, 3 to 6 feet thick, and cinnamon-brown, shredding bark. Leaves are gray-green and scale-like, closely appressed to the branches. Juniper has blue-black berries rather than cones. Berries are about ¼ inch long and have a resinous pulp which is quite fragrant when crushed. Western juniper occasionally occurs on dry mountain slopes in the San Bernardino Mountains and northward, in most places at higher elevations.





Evergreen tree, 18 to 60 feet high, with light colored bark and tomentose young twigs. Leaves, 3/4 to 2 inches long; oblong, entire to spinose toothed, pale green above and gray or yellow tomentose beneath. Fruit, an oblong acorn, 1 to 1¼ inches long. Acorn cup, large and thick walled; tomentose inside and scales covered with yellowish felty wool on the outside. Canyon live oak is common on slightly moist slopes and in canyons below 6,500 feet elevation. Catkins in April and May.

SEED CONES OF CALIFORNIA PINES

FROM THE CONE COLLECTION AT THE UC DAVIS CENTER FOR PLANT DIVERSITY

LIMBER
Pinus flexilis

TORREY
Pinus torreyana

FOXTAIL
Pinus balfouriana

MONTEREY
Pinus radiata

BISHOP
Pinus muricata

WESTERN WHITE
Pinus monticola

PONDEROSA
Pinus ponderosa

KNOBCONE
Pinus attenuata

JEFFREY
Pinus jeffreyi

BRISTLECONE
Pinus longaeva

LODGEPOLE
Pinus contorta

SUGAR
Pinus lambertiana

WHITEBARK
Pinus albicaulis

PARRY PINYON
Pinus quadrifolia

COLORADO PINYON
Pinus edulis

SINGLELEAF PINYON
Pinus monophylla

COULTER
Pinus coulteri

GRAY
Pinus sabiniana

scale bar = 10 cm

herbarium.ucdavis.edu

by Daniel McNair

LEAF

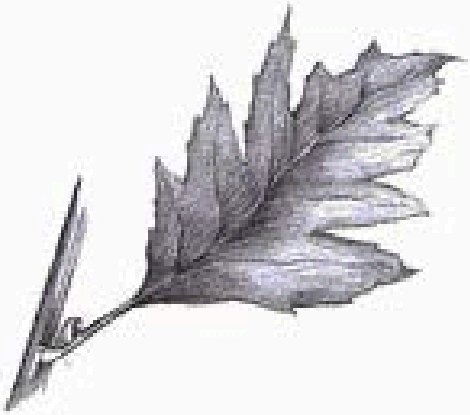
Needle - like

Broad

Alternate

Opposite

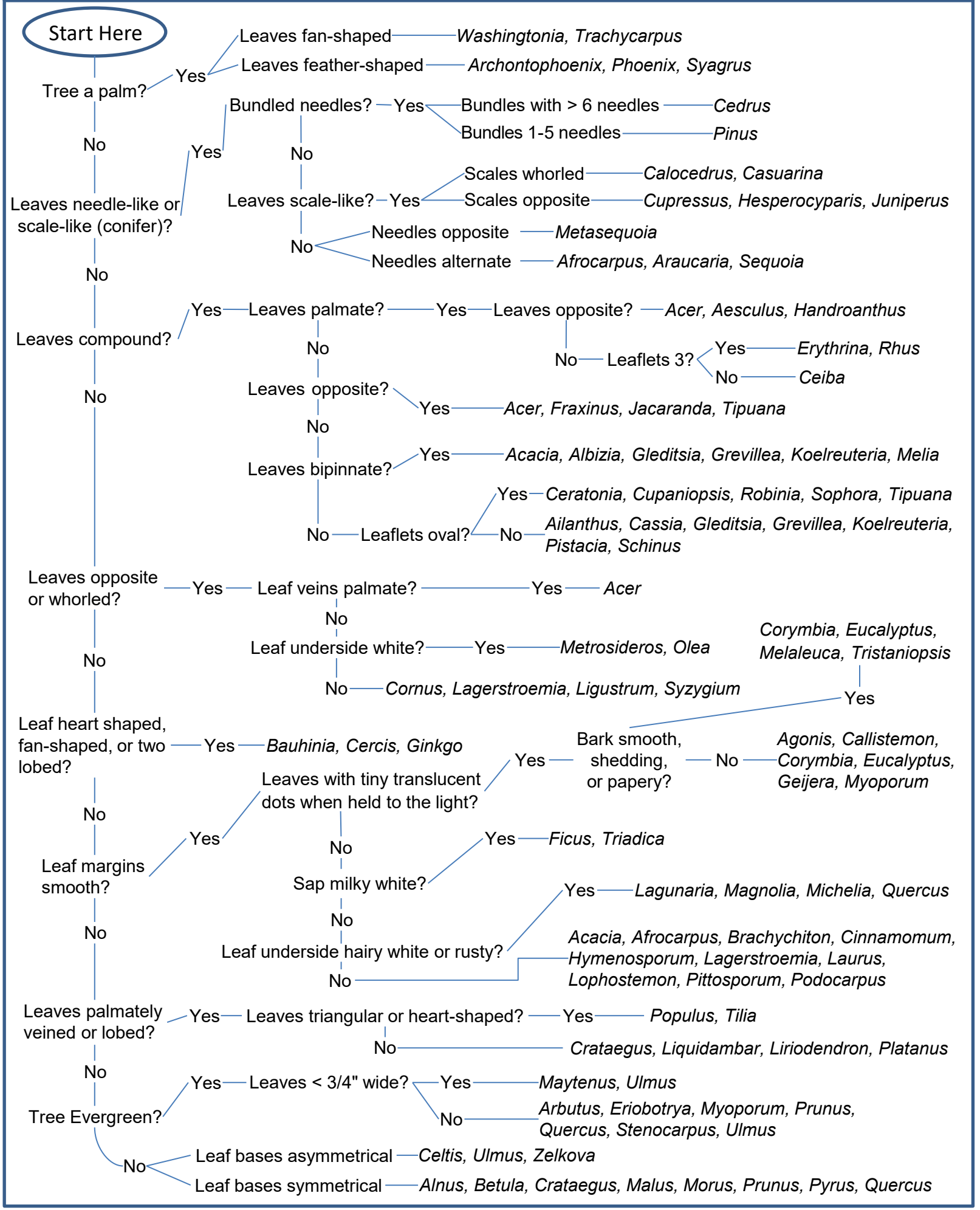
Whorled



Simple

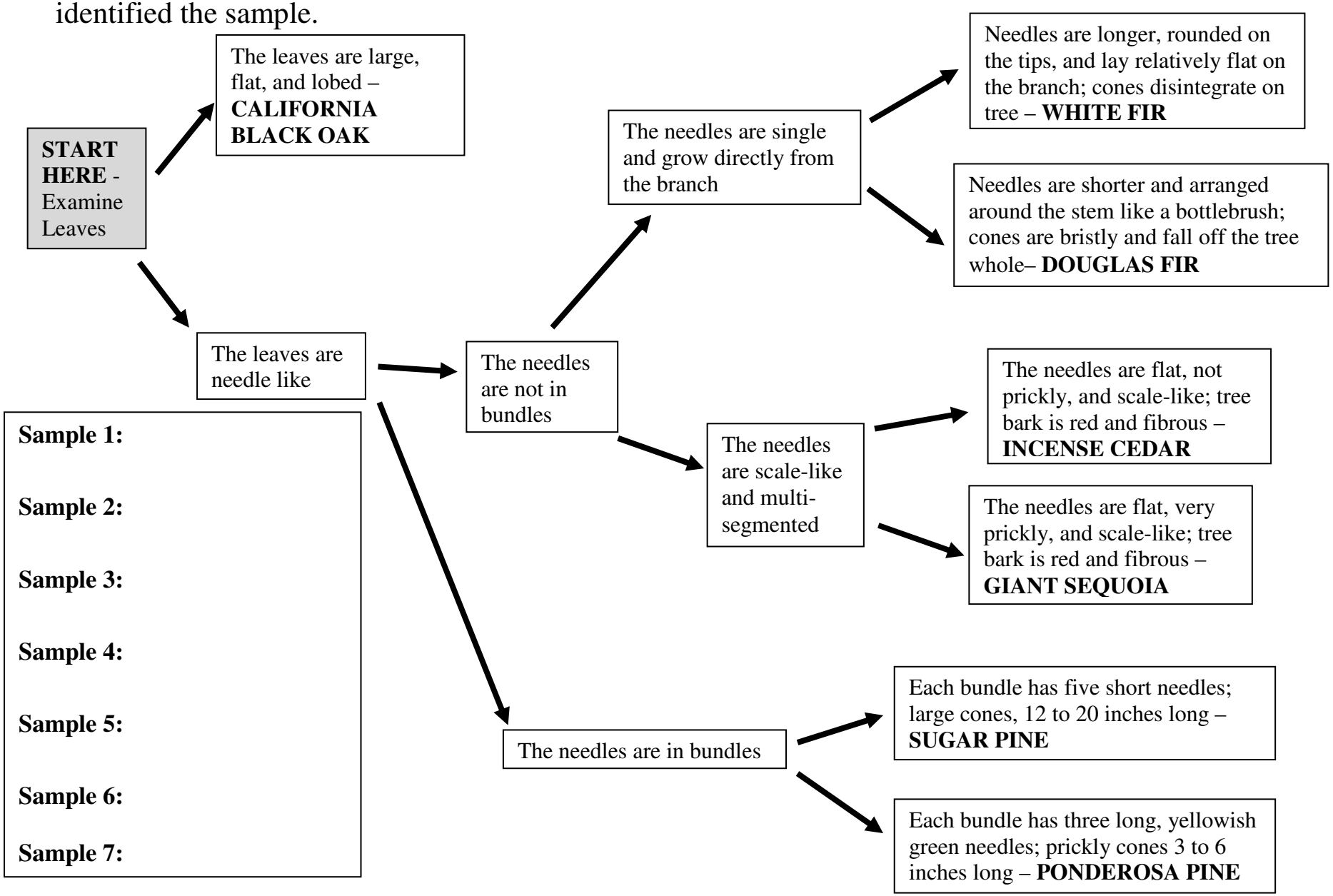
Compound

Tree Identification Flowchart



Forestry Challenge Tree ID Using a Key

Directions: Using a foliage sample (and cone, if available) of the tree you want to identify, start at the gray box and answer each question, which will move you to another box until you have identified the sample.



Conifers of the Sierra Nevada/Southern Cascades

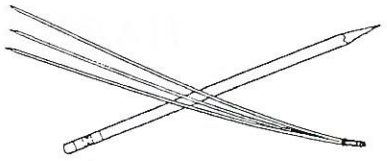
Key for the Identification of Trees With Needles, Scale-like, and Awl-like Leaves

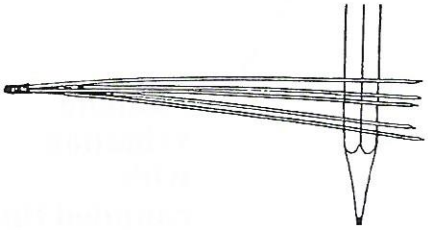
NEEDLES

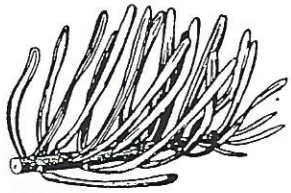
- Needles in bundles of 3 to 5
  - Bundles of 3, 3" to 10" long, green — **Ponderosa Pine** *Pinus ponderosa*
  - Bundles of 3, 7" to 13" long, gray-green — **Foothill Pine** *Pinus sabiniana*
  - Bundles of 5, less than 5" long — **Sugar Pine** *Pinus lambertiana*
- Needles separate
  - Needles 1" to 3" long, blunt tips — **White Fir** *Abies concolor*
  - Needles 1" to 3" long, pointed tips — **Douglas-fir** *Pseudotsuga menziesii*

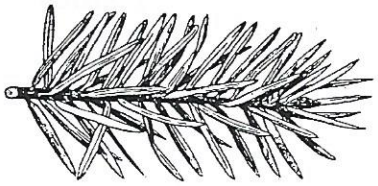
SCALE-LIKE OR AWL-LIKE LEAVES

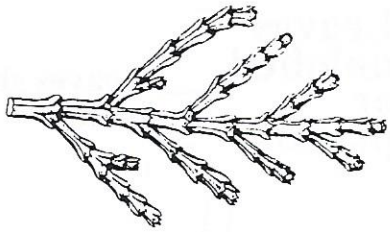
- Scale-like leaves
  - Scales flat — **Incense Cedar** *Calocedrus decurrens*
  - Scales rounded — **Juniper** *Juniperus occidentalis*
- Awl-like leaves, sharp, prickly — **Giant Sequoia** *Sequoia gigantea*

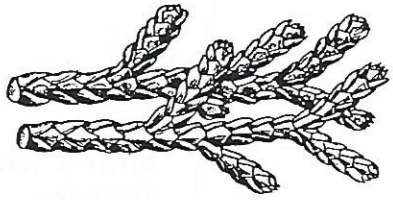


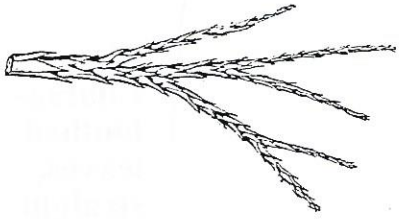












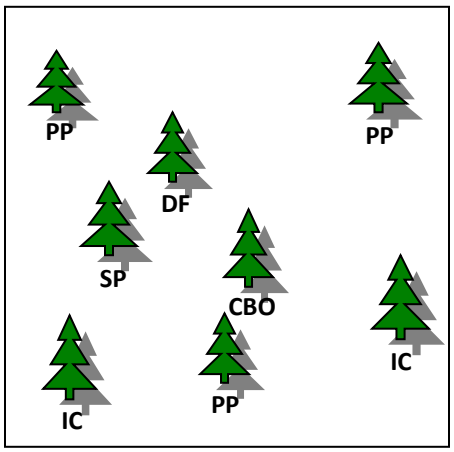
Prepared by: Gary Nakamura & Sherry Cooper, Univ. of Calif. Extension, Redding. February 1996. (Files/Sherry/Cnfrsnsc.PM5)

DETERMINING SPECIES COMPOSITION IN MIXED CONIFER STANDS

One of the basic skills needed in forestry is determining species composition. Species composition is a determination of the tree species present in one place in the forest and their proportion to each other.

First, it is necessary to be able to identify the species that you would expect to find in a particular forest. For whichever event you are attending, you will need to be able to identify the list of species given on the Learning Resources page.

A 1/10 acre square plot will be used. You will see four stakes in the ground, forming a square with 66 foot sides. You will walk through the plot and identify each tree with a DBH (Diameter at Breast Height) of 10 inches or more. The test will have a space for you to write each species and tally the number of trees of each species that are present in the plot. Here is an example:



The test will have the following text: "*The area marked on its corners with stakes and flagging tape is one square chain, or 1/10 acre. Conduct a Species Composition Survey on this plot by identifying and counting by species all trees with a DBH of 10 inches or more.*"

The answer for this plot would be as follows:

Species: ___Ponderosa Pine_____ # trees:____3____

Species: ___Incense Cedar_____ # trees: ____2_____

Species: ___Sugar Pine_____ # trees: ____1_____

Species: ___Douglas Fir_____ # trees: ____1_____

Species: ___California Black Oak___ # trees: ____1_____

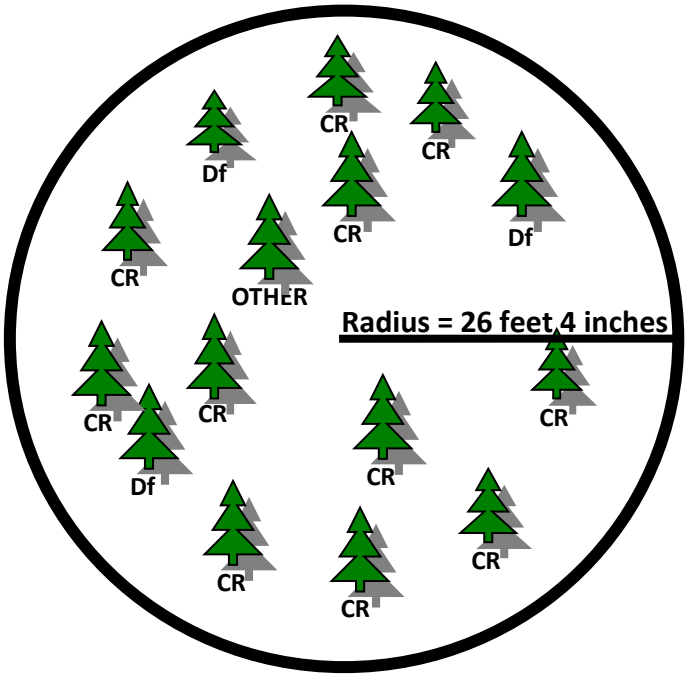
This site is **PINE** dominant.

DETERMINING SPECIES COMPOSITION IN COASTAL REDWOOD STANDS

One of the basic skills needed in forestry is determining species composition. Species composition is a determination of the tree species present in one place in the forest and their proportion to each other.

First, it is necessary to be able to identify the species that you would expect to find in a particular forest. In a coastal redwood forest, you will need to know the difference between coastal redwood, douglas-fir, and other species.

For this example, a 1/20 acre circular plot is used. In a 1/20 acre plot, the radius from the plot center is 26 feet, 4 inches. You will walk through the plot and identify each tree with a DBH (Diameter at Breast Height) of 10 inches or more. You will tally the number of trees of each species that are present in the plot. Here is an example:



The answer for this plot would be as follows:

Species: ___Coastal Redwood_____ # trees:____11____

Species: ___Douglas-fir_____ # trees: ____3_____

Species: ___Other_____ # trees: ____1_____