A FIELD GUIDE TO WINTER FLOODPLAIN TREES

Dr. Craig 2/4/07

PURPOSE

We will examine the trunks and twigs of floodplain (lowlands along rivers that regularly flood) trees so that we can identify them. By knowing their identity, we can measure the species composition of the floodplain forest and determine species density and basal area. We will examine some of the most characteristic trees found on the floodplain.

DESCRIPTION

Trees are identified in winter by characteristics of their twigs and trunks. In particular, patterns exhibited by the bark of trees can be used to identify quickly individuals. Twig characteristics are often the key to definitive identification, however.

Bark terms:

Furrowed- deep vertical crevices in the bark.
Plated- the bark is divided into plates.
Scaly- the bark peels in small sheets.
Blocky- the bark is divided into small blocks.

Twig terms:

Buds- leaf and flower buds that occur on the sides and end of twigs; they are usually covered in scales.
Opposite- branches arise on opposite sides of the twig.
Alternate- branches arise on alternating sides of the twig.
Hairy- twigs have hair-like down covering them.
Smooth- twigs have no hairs covering them.

SPECIES

Red Maple (*Acer rubrum*)

Twigs- with opposite branches and red buds.
Trunks- gray and scaly with large, smooth areas on the upper trunk.

Notes- the most common tree of the floodplain.

Silver Maple (*Acer saccharinum*)

Twigs- with opposite branches and brown buds.
Trunks- scaly and silver gray, often with multiple trunks in larger individuals.

Notes.- a common floodplain tree of large rivers.

Pin Oak (*Quercus prinus*)

Twigs- with alternate branches and brown buds; dead branches are persistent and often hang down toward the ground.
Trunks- dark gray and comparatively smooth.

Notes.- very tolerant of waterlogged soil.

Swamp White Oak (*Quercus bicolor*)

Twigs- with alternate branches and brown buds; branches show flaking bark.
Trunks- whitish, furrowed, and frequently in standing water.

Notes.- usually uncommon and restricted to the wettest spots, where it often grows in water.

Black Oak (*Quercus velutina*)

Twigs- with alternate branches and brown buds; twigs and buds are hairy.
Trunks- black, blocky bark.

Notes.- uncommon on the floodplain; more typical of the upland.

American Elm (*Ulmus americana*)

Twigs- with thin, drooping, alternate branches and rounded, brown buds.
Trunks- gray, scaly, flaking bark; trees often have a vase shape.

Notes.- often a common floodplain tree.

The closely related and similar looking **Slippery Elm (*Ulmus rubra*)** also occurs in floodplains. It is only distinguishable by using technical characters.

American Sycamore (*Plantanus occidentalis*)

Twigs- with alternate branches and brown buds.
Trunks- brown and scaly near base, and with white and tan patches in upper areas.

Notes.- grows in drier portions of the floodplain, often near the riverbank and river levee.

White Ash (*Fraxinus americana*)

Twigs- with opposite, thick smooth twigs and dark brown buds.
Trunks- deep furrowed, braided gray bark.

Notes.- often a common floodplain tree.

The closely related and similar looking **Green Ash (*Fraxinus pennsylvanicum*)** also occurs commonly in floodplains, particularly wetter parts. It differs from White Ash in having hairy twigs. The swampiest areas sometimes also have **Black Ash (*Fraxinus nigra*),** a usually smaller tree with scaly bark.

Eastern Cottonwood (*Populus deltoides*)

Twigs- with thick, alternate branches and large, shiny brown buds.
Trunks- brown and scaly near base, and with white and tan patches in upper areas.

Notes.- grows in drier portions of the floodplain, often near the riverbank and river levee.

Black Cherry (*Prunus serotina*)

Twigs- alternate, dark red, thin, branches with a strong, acrid odor when broken.
Trunks- black with rounded flakes.

Notes.- an uncommon floodplain tree.

American Linden (*Tilia americana*)

Twigs- with alternate, curved branches and brown buds.
Trunks- often curved trunks with drooping branches; bark thin, furrowed in vertical lines.

Notes.- grows in drier portions of the floodplain, often near the riverbank and river levee.

Shagbark Hickory (*Carya glabra*)

Twigs- with alternate, thick, bendable, smooth twigs and brown buds.
Trunks- gray with large, peeling plates.

Notes.- grows in drier portions of the floodplain, often near the riverbank and river levee.

Bitternut Hickory (*Carya cordiformis*)

Twigs- with alternate, thick, bendable, smooth twigs and bright yellow buds.
Trunks- tightly braided thin furrows and pale gray bark.

Notes.- fairly common in wetter areas of the floodplain.

Eastern White Pine (*Pinus strobus*)

Twigs- with evergreen needles in bundles of five.
Trunks- black and deeply vertically furrowed.

Notes.- an uncommon floodplain tree that is more typical of uplands, although it can grow even in wet soils.

Eastern Redcedar (*Juniperus virginiana*)

Twigs- an evergreen with tiny, scale-like needles.
Trunks- reddish with peeling, scaly bark.

Notes.- grows in forest openings on the floodplain; typically a small tree, although it can grow large.

Forest Type Data

Point	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

POINT-QUARTER SAMPLING

Dr. Craig 2/07

PURPOSE

Now that we have developed the ability to identify the native trees of the flood plain, we will make use of this knowledge in characterizing the structure of the flood plain forest. We will examine the density, frequency of occurrence and dominance of each tree species present, and draw conclusions about the nature of this forest habitat.

DESCRIPTION

Point-quarter sampling is a plotless method (a method that does not involve laying out a measured grid) for gaining information about the nature of a forest. From point-quarter sampling, you may learn facts like the density of individual tree species, how dominant tree species are, and how important particular tree species are in the forest ecosystem. We will learn to gather the data to make these determinations:

METHODS

1. Establish a straight line transect through the forest. Choose a compass bearing and head along it in a straight line.
2. Establish sample points. At intervals along the transect (say, 20 paces), establish sample points to gather data about trees. Each point should be statistically independent. That is, trees at one sample point should not be the same ones measured at the next point. Mark each sample point with a stick or colored flagging.
3. Establish four quadrats at each sample point. Draw on the ground a line perpindicular to the transect line to establish four sample quadrats. Quadrat one is in front of you (as you look down the transect line) and to the right, two is behind you and to the right, three is behind you and to the left, and four is in front of you and to the left.
4. Starting at quadrat one, measure the distance in meters to the nearest canopy tree (tree that reaches to the top of the forest). Also measure in centimeters the diameter (**not the circumference**) of this tree. Repeat the procedure with quadrat 2,3,4.
5. Sample 10 total points. Move 20 paces or so down the transect line and establish a second sample point. Set up four quadrats and proceed as above. Do this for 10 total sample points. By the end of your sampling, you will have made measurements on 40 trees. The data on distances and diameters are what you will analyze in the laboratory part of this investigation.

ANALYSIS

1. Divide your field data onto separate sheets for each tree species you encountered. **Make sure all your data are recorded in the same units** (centimeters, for example). Then calculate the following:

2. **Mean Distance (D):** Add all the distances you measured for all trees at your 10 sample points. This is the **Total Distance.** Divide this total by the number of quarters you sampled (4 quarters each at 10 sample points = 40 quarters).

$$\mathbf{D = Total\ Distance/40}$$

3. **Absolute Density (AD):** Calculate this for a 100 m^2 area, by dividing 100 by the square of Mean Distance calculated in (2):

$$\mathbf{AD = 100/D^2}$$

4. **Total trees per species:** Add the number of individuals you encountered for each tree species

5. **RELATIVE DENSITY (RD):** Take **Total trees per species** and divide it by 40. Do this for each species:

$$\mathbf{RD = Total\ trees\ per\ species\ /40}$$

6. **Number of Trees per Species/ 100 m^2** Multiply **RD** by **AD** to find the number of trees/ 100 m^2. Do this for each species:

$$\textbf{Number of Trees per Species/ 100 m}^2 = \textbf{RD x AD}$$

7. **Basal Area (BA):** Convert the diameters you measured for each tree into **Basal Areas** by finding the area of a circle:

$$\textbf{BA} = 3.1416 \times (\text{diameter}/2)^2$$

8. **Average Basal Area (ABA):** Add **BA** calculated in (6). Divide this by **Total trees per species** calculated in (4). Do this for each species:

$$\textbf{ABA = BA/ Total trees per species}$$

9. **Absolute Dominance (ADO) :** Take the **ABA** you calculated in (8) and multiply them by **Number of Trees per Species/ 100 m^2** calculated in (6). Do this for each species:

$$\textbf{ADO = ABA x Trees per Species/ 100 m}^2$$

10. **Dominance Sum (DS):** Add all the ADO calculated in (9).

11. **RELATIVE DOMINANCE (RDO):** Divide the **ADO** calculated in (9) by the **DS** calculated in (10) and multiply their quotient by 100. Do this for each species:

$$\textbf{RDO} = (\textbf{ADO}/\textbf{DS}) \times 100$$

12. **Total Frequency (TF): A**dd the number of **points** (not the number of quarters) at which the species occurred. Do this for each species:

13. **Absolute Frequency (AF):** Divide its **TF** by the number of points you surveyed (12), and multiply the quotient by 100. Do this for each species:

$$\textbf{AF} = (\textbf{TF}/10) \times 100$$

14. **Frequency Sum (FS):** Add the **AF** for all species.

15. **RELATIVE FREQUENCY (RF):** Take the **AF** you calculated for each tree species in (13), divide them by **FS** calculated in 14, and multiply the quotient by 100. Do this for each species:

$$\textbf{RF} = (\textbf{AF}/\textbf{FS}) \times 100$$

16. **IMPORTANCE VALUE (IV):** Add **RD**, **RDO**, and **RF**. Do this for each species:

$$\textbf{IV} = \textbf{RD}+\textbf{RDO}+\textbf{RF}$$

17. Rank the tree species you sampled from highest to lowest **IV.**

INTERPRETATION

Once you compile and analyze your data (see separate sheets for computation methods), you must determine what your data mean. Consider the following as you write your lab report:

1. What is the overall density (number of tree trunks/hectare) and basal area (area actually covered by trees) of trees in the forest studied?
2. What are the most important tree species in the forest. By looking at literature on tree habitat requirements (e.g. from books, on the internet), why do you think that these species are the most important?
3. What problems did you encounter while conducting this investigation that may have affected your results?
4. How did your findings compare with the findings from other lab groups? Were the same tree species most important on their transects? How would you account for the similarities and differences in both of your results?