Should recognize landforms and their influence on species composition — influences by soil erosion and deposition, hydrology.

Role of water — not a limiting factor in overall growth as in uplands. However, too much water can have consequences — frequency, duration, seasonality, and depth of flooding/water has impacts of limiting soil oxygen (pore spaces are saturated with water) and roots need oxygen to stay alive.

Actually, management of bottomland trees is not that much different from the uplands, however, the added variable or influencing factor is water.

Different landforms support different vegetation.

Landforms and species composition changes based on elevation (sometimes a few inches to several feet) and distance from the river/stream channel.

Hydrologic Influence — reference slide

Impacts of water — erosion, deposition, saturation, duration/frequency, flowing water, seasonal timing.

Erosion — caused by increased velocity of flowing water.

Deposition — soil particles are deposited with the decreased velocity of water, heavy particles (sand) first, and lightest particles (clay) last.

Saturated soils limits soil oxygen as water fills the pore/air spaces. The longer the duration of flooding, the less oxygen. Short durations (a few days) has limited influence on soil oxygen. How often the flooding occurs and the duration will influence soil oxygen.

Flowing water has oxygen dissolved in it, so limited oxygen depletion is flooding is only for a few days.

Seasonal timing of flooding: If during the dormant season when trees are dormant (leaves are not on the trees), little impact on vegetation. However, if during the growing season when leaves are beginning to emerge or are fully leafed out, tree roots need oxygen and flooding can be detrimental to trees.
Green-Tree Reservoirs (waterfowl). Little impact on tree health if flooded during the dormant season. Water must be off the site once trees begin to grow in the spring. Green-Tree Reservoir research indicates the site can tolerate dormant season flooding for 2 or 3 years. Flooding should not take place for one year after the 2nd or 3rd years of flooding so the soil can recharge with oxygen for one year ---- trees which may be stressed from flooding can recover somewhat.

Landforms and species composition changes based on elevation (sometimes a few inches to several feet) and distance from the river/stream channel

Page 3

Species vary in their tolerance (adaptability) and susceptibility to flooding. Stress, mortality and difficulty in regeneration processes are common in bottomland systems since flooding often occurs in late winter and early spring.

Realize with flooding, soils are always eroding and aggrading/depositing

In floodplains will have both lateral and vertical changes in the floodplain

Page 4

Lateral accretion schematic ---- meanders in stream. Erosion where force of water directly flows into streambank, deposition where water velocity slows on the leeward side of the stream

Vertical accretion (deposition) based soil particle size as in the schematic.

Both vertical and lateral accretion ----- erosion and deposition contributes to heterogeneity across the landscape

Page 5

3 slides showing the variability of landforms and the oxbow topography of bottomlands near major rivers. The last aerial photo on the page is an image where the Ohio River flows into the Mississippi River and the resulting landforms that are constantly changing because of frequent flooding events of varying intensities with time

Page 6

Different features of the floodplain ---- again different landforms which will have different species compositions

Vegetative spatial patterns are influenced by the environment including competition, substrate, and regeneration processes as altered by flooding/water
Typically, species grow where they can compete successfully and tolerate local conditions (environment, substrate, competition), NOT where they grow best

Page 7

Bottomland forests are some of the most diverse and productive ecosystems in the US. Scarcity of water is not limited

Myriad of
- Different species
- Different sites
- Different growth habits
Make management extremely complex and variable

Flooding is unpredictable and uncontrollable ----- must may attention to site-species relationships to be successful

Referenced before impact of depth, frequency, duration, and seasonality of flooding in relation to soil oxygen

Pages 8-9

Note the relationships of landform to soil drainage, texture, and deposition. Recall soil particle size and deposition as discussed earlier

Schematic of the floodplain ----- usually the bar and fronts are composed of coarse-textured soils (deposited first as flooding/water velocity slows down. Flats is where floodwater is trapped behind the front and cannot get back to the river channel. Soils are inundated and composed of deposited fine clays as the water slowly recedes or is absorbed. Swamps and sloughs are low places that remain inundated for much of the year.

Of course, species that do not tolerate flooding occur mostly on the high ground (front, levee, ridge) while those than can tolerate flooded conditions are located on the bar, flats, sloughs, and swamps. Please realize that a ridge in a bottomland may only by 4 to 6 feet above the floodplain.

Schematic show the water levels during flooding and after flooding. Changes in elevation of landforms of a few inches to 2-3 feet influences hydrology and subsequently species relationships

Rivers often rise during the winter and early spring and dry out at different rates based on soil textures, landforms, and elevations

We often have what is called backwater flooding too. This is when the major river is fully-flooded above the water level of tributaries, such that the tributaries cannot drain and water becomes
backed-up in the tributary floodplains. They will not recede until the water in the major river recedes to allow water in the tributary to flow.

**Pages 10-12**

Classification of Bottomland Systems. There are two systems: one that drains to the Atlantic Ocean and the other drains in to the Gulf of Mexico

Atlantic Coastal Plain ----- Red River drains the Piedmont physiographic province and Black River drains the Atlantic Coastal Plain

Mississippi Alluvial Plain and Gulf Coastal Plain ----- minor and major river bottoms

Note definitions for each stream type (reference slides) and the species associated with each. Again, generally those species that do not tolerate flooded condition well are on the higher ground and those that are more adaptable or tolerant of flooding will be in the lower landforms in the floodplain

**Page 13**

Summary of bottomlands:
- Know sites
- Know hydrology
- Know species ecology/silvics

Integrate species and site relationships

Bottoms are incredibly dynamic because of constant change