

## **WEEK 4. FOREST ASSOCIATIONS OF ILLINOIS AND THE NORTHERN MIDWEST**

The eastern deciduous forest of North America is a tree-dominated vegetation type in which most of the woody species lose their leaves during part of the year. The trees of this forest are typically tall with the canopy reaching a height of 30 meters. Though distinct dominant tree species occur in the various parts of this vegetation type, generally 10 or more species enter the canopy. In most of the region the canopy is closed except for tree-fall gaps and where edaphic (soil) factors prevent dense tree growth. Usually a definite subcanopy exists along with a distinct woody understory consisting of numerous shrubs and the seedlings and saplings of the many tree species. A well-developed herbaceous understory usually exists.

The eastern deciduous forest extends from the Gaspé Peninsula on the east coast of North America west through southern Canada and the Great Lakes region to Minnesota, eastern Iowa, most of Missouri, eastern Oklahoma, a small part of eastern Texas, and south to the Coastal Plain of the Gulf and Atlantic states. It is bounded on the north by the taiga or Boreal Forest Formation that extends across Canada; on the west by the Prairie Formation of the central prairies and plains; and on the south, and up the Mississippi River embayment, by the evergreen forest of the southern Coastal Plain. The Coastal Plain is dominated in most areas by evergreen pine forests. The vegetation, however, varies from grasslands and savannas to shrub-lands to closed canopy forests with both needle-like and broad-leaved tree species common. Also, rich mesophytic forests are occasionally found and many of the broad-leaved species are evergreen. Many authors have considered the Coastal Plain forests as an association within the deciduous forest of North America.

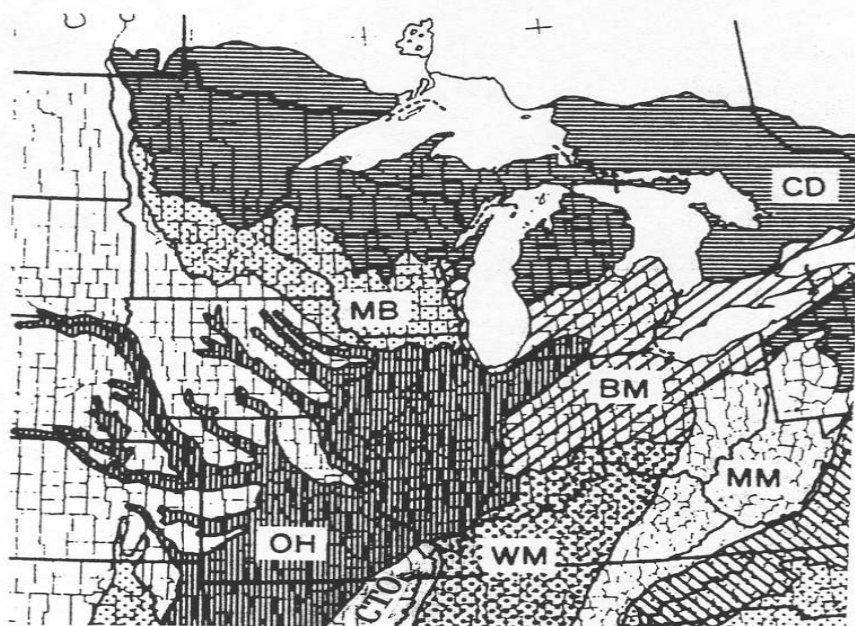
Within this extensive deciduous forest are a number of forest associations. Each association is dominated by a group of species that mostly dominate the mesic upland sites. A number of other tree species are found growing in these forests but they generally have a relatively minor role, occurring in relatively low numbers in most environmental, topographic, and edaphic condition. Throughout an association the composition and structure of the forest varies, depending on various environmental factors, particularly the amount of available moisture. Along streams and rivers within an association, distinct changes in forest structure occur. On these sites usually more mesic to hydric species grow. Commonly these are completely different species from the dominant species of the uplands.

Boundaries between forest associations are rarely exact with many environmental and anthropogenic factors controlling the vegetation of a particular site. In the transition zones between two associations both may occur side by side simply because of topography, which controls slope exposure. In some areas moisture availability due to soil type and topographic relief may be an important controlling factor. Overall, these associations represent a shift in the dominant tree species due to a series of environmental factors that created better growing conditions for a certain group of species over another. As these environmental factors are never the same in any one area over time the geographic position of these vegetation associations have continued to slowly shift. Climatic changes, as a result of human activity, have the potential of increasing the rate and direction of these geographic shifts.

At the time of settlement by Europeans, prairie occupied over 61 percent of Illinois, with forest, woodland, and savanna accounting for most of the remainder. To the west in northern Missouri, Iowa, and western Minnesota, prairie was even more extensive, the forests being restricted to areas of rough topography that was usually associated with

rivers and major streams. Toward the east, north, and south prairie gave way to the eastern deciduous forests. In Indiana, prairie accounted for only about 13 percent of the land surface and was reduced to small isolated patches within the predominantly forested landscape of Ohio. The swamps and lowlands in extreme southern Illinois along the Mississippi and Ohio rivers are part of the Mississippi River embayment, an extension of the evergreen forests of the southern Coastal Plain.

The northwestern part of the eastern deciduous forest, which includes Illinois and surrounding states, is the main focus of this chapter. Five major forest associations (oak-hickory, beech-maple, basswood-sugar maple, western mesophytic, and the bald cypress-water tupelo-oak of the Mississippi River embayment) exist in this region (Figure 4.1). These five associations share many of the woody species found in Illinois forests.



**Figure 4.1. Map of the forest associations of the deciduous forests of the northern midwestern United States. Abbreviations of the associations shown are: CD-conifer/northern hardwoods (not discussed); MB-sugar maple/basswood; BM-beech/sugar maple; OH-oak/hickory; WM-western mesophytic forest; CTO-bald cypress/water tupelo/oak; MM-mixed mesophytic forest (not discussed).**

### **Oak-hickory Forest Association**

Oak-hickory dominated communities are most common in the western part of the eastern deciduous forest. This association is generally considered to represent an ecotone between the tallgrass prairie to the west and the beech-maple and other mesophytic forests to the east and south. This association extends throughout nearly all of Illinois except for the extreme northern and southern parts of the state (Figure 4.1). Within this association a distinct transition occurs, from closed forest to more open woodland to savanna and tallgrass prairie. Also, many other edaphically controlled subordinate communities existed in the oak-hickory association such as hill prairies, glades, and barrens. The overstory is typically dominated by any of several oak and hickory species. Also, regionally subdominant trees include a variety of deciduous hardwood species (Table 4.1).

In presettlement times oak-hickory forests dominated nearly all of Illinois, parts of northern and southern Indiana, Missouri, and Arkansas, and extended along river valleys through Iowa, and into eastern North Dakota, Nebraska, and Kansas (Figure 4.1). This forest had its best development in the Ozark Plateau Province of northern Arkansas and southern Missouri where it dominated the entire landscape.

Oak-hickory forests frequently have a less well developed subcanopy layer than the more mesic forests of the eastern United States. In most forest stands only two to five native species were encountered (Table 4.1). In the woody understory of these forests, the shrub layer was typically dominated by only a few species, with the composition depending upon moisture and the extent of canopy openings. Presently, it is not uncommon for a dense woody understory to exist. Numerous seedlings and saplings of shade-tolerant and usually fire-sensitive tree species are present, which in presettlement times would be absent or rare due to a high fire frequency.

Toward the western edge of this vegetation type the trees become stunted, and the canopy becomes more open due to drought conditions. It was not uncommon for the oak-hickory forests to the west in South Dakota, Iowa, Kansas, and Nebraska to exist as gallery forests, occurring as finger-like extensions along the river valleys. These gallery forests, which represent the western edge of the eastern deciduous forest, were dominated by *Quercus macrocarpa* (bur oak) and *Quercus muhlenbergii* (chinquapin oak, yellow chestnut oak). The distribution of tree species in these forests is related to topography and soil. On Konza prairie in northeast Kansas, bur oak usually dominated mesic and intermediate sites while chinquapin oak dominated the more xeric, droughty sites.

In northeast Illinois the forest was more open, varying from savanna to woodland that was determined largely by fire frequency that, in turn, was controlled by topographic relief and the occurrence of firebreaks. Dissected landscapes do not readily carry fire; the well-developed drainage systems serve as firebreaks. Because of fires and the prevailing westerly winds, closed forests were usually associated with the east sides of waterways, rough topography, and bodies of water. Reduced fire frequency permitted the establishment of tree species such as bur oak, and *Quercus alba* (white oak) with their fire-resistant barks.

**Table 4.1. Major woody species encountered in oak-hickory forests.****Dominant overstory trees**

white oak (*Quercus alba*)  
 black oak (*Q. velutina*)  
 red oak (*Q. rubra*)  
 shagbark hickory (*Carya ovata*)  
 bitternut hickory (*C. cordiformis*)  
 mockernut hickory (*C. tomentosa*)  
 pignut hickory (*C. glabra*)

**Locally dominant overstory trees**

bur oak (*Q. macrocarpa*)  
 blackjack oak (*Q. marilandica*)  
 post oak (*Q. stellata*)  
 chinquapin oak (*Q. muhlenbergii*)  
 black hickory (*C. texana*)

**Other common trees**

American elm (*Ulmus americana*)  
 slippery elm (*U. rubra*)  
 black walnut (*Juglans nigra*)  
 sugar maple (*Acer saccharum*)  
 black cherry (*Prunus serotina*)  
 white ash (*Fraxinus americana*)  
 green ash (*F. lanceolata*)

**Common understory tree**

hop hornbeam (*Ostrya virginiana*)  
 flowering dogwood (*Cornus florida*)  
 juneberry (*Amelachier arborea*)  
 redbud (*Cercis canadensis*)  
 musclewood (*Carpinus caroliniana*)

**Dominant shrubs**

dogwood (*Cornus* spp.)  
 coral-berry (*Symphoricarpos orbiculatus*)  
 fragrant sumac (*Rhus aromatica*)  
 New Jersey tea (*Ceanothus americanus*)

**Shrubs of wet sites**

bladdernut (*Staphylea trifolia*)  
 spicebush (*Lindera benzoin*)  
 hop-tree (*Ptelea trifoliata*)  
 wild hydrangea (*Hydrangea arborescens*)

**Shrubs of open woodlands**

hazelnut (*Corylus americanus*)  
 New Jersey tea (*Ceanothus americanus*)  
 blackberries (*Rubus* spp.)  
 smooth sumac (*Rhus glabra*)  
 hairy sumac (*Rhus hirta*)  
 pasture rose (*Rosa carolina*)

dogwoods (*Cornus* spp.)  
oak grubs (*Quercus* spp.)

**Shrubs of sandy, acid soils**

blueberry (*Vaccinium* spp.)  
huckleberry (*Gaylussacia* spp.)  
prickly ash (*Zanthoxylum americanum*)  
hazelnut (*Corylus americana*)  
sumac (*Rhus* spp.)

Toward the east in Indiana, the oak-hickory-dominated forests typically occupied the driest sites. Where slightly more mesic conditions occur, *Acer saccharum* (sugar maple) and sometimes *Fagus grandifolia* (American beech) enter the canopy, usually the result of fire suppression since settlement times. Some of the forests in extreme east-central Illinois are commonly oak-hickory forests that now have a massive influx of sugar maple in the seedling, sapling, and lower diameter classes. In the upland forests of Beall Woods Nature Preserve, Wabash County, Illinois, white oak, *Quercus rubra* (red oak), and *Quercus velutina* (black oak) are represented by large veteran trees that are mostly in the 40-70 cm diameter classes while the sugar maples are common in the 10-30 cm diameter classes. In Bradford Nature Preserve, located in Morgan County in southeastern Indiana, the steep slopes contain a forest that is in transition from the oak-hickory to beech-sugar maple. The combined importance of white and red oaks is 41, while that of American beech and sugar maple is also 41. Again sugar maple dominates the smaller diameter classes.

Few oak-hickory forests remain in the undisturbed condition, having been subjected to at least some cutting, and probably all having been grazed to varying extents since European settlement. Also, during the 150 years of agricultural development, periodic fires ceased in the prairie peninsula, and the oak savannas and woodlands have become closed forests. Most of the present day woodlots are undergoing a change to forests dominated by mesic, shade-tolerant, fire-sensitive species such as sugar maple, *Ulmus americana* (American elm), *Ulmus rubra* (slippery elm), *Celtis occidentalis* (hackberry), *Fraxinus americana* (white ash) and *Fraxinus lanceolata* (green ash). In particular, sugar maple has shown a dramatic increase in importance. Most of our best quality oak-hickory forests, except on drier sites, are apparently undergoing an irreversible change as sugar and other mesic, shade-tolerant species replace the veteran oaks and hickories when they die. In these forests, oaks and hickories are found in the largest size classes, with sugar maple along with other mesic species dominating the smaller diameter classes. Also, sugar maples usually dominate the seedling and sapling layer.

The extensive oak-hickory forests of Missouri and Arkansas are the best developed and most continuous. Presently, in many parts of this region mesic, shade-tolerant species are becoming increasingly important. Government Land Office (GLO) survey records of the Red Hills Region of central Missouri found white oak dominated with an importance value (IV) of 99 (out of 300), followed by black oak (IV of 36), with sugar maple third, and elms, hickories, ashes, and hackberry accounting for most of the remainder. Although sugar maple was third in IV, it was unevenly distributed, being associated with ravines and more mesic sites. This uneven distribution no longer exists in the present day forest of the region. The fires that burned into the River Hills Region from adjacent prairie in presettlement time no longer occur, and the fire-sensitive sugar maple increased in importance. Recent studies have found sugar maple is becoming very important in oak-

hickory forests near the xeric western margin of the eastern deciduous forest. On many sites oaks are regenerating successfully only on exposed dry sites. Sugar maple reproduction, in contrast, is abundant in most areas where a source of seed is present.

### **Beech-sugar Maple Forest Association**

In the Midwest, at the time of settlement by Europeans, American beech and sugar maple dominated much of the forest throughout central Indiana, Ohio, and the southern half of Michigan. Generally, this forest association occurred on soils of Wisconsin-aged glacial till. Here, American beech was usually the dominant canopy tree, while sugar maple was co-dominant in the canopy and frequently dominated the woody understory along with several subdominant hardwood species (Table 4.2). To the north in the Great Lakes region *Betula allegheniensis* (yellow birch) and *Tsuga canadensis* (eastern hemlock) were important associates with the sugar maple and American beech. Presently it is not uncommon for beech and sugar maple to make up 80 percent of the canopy on relatively moist sites with little topographic relief.

Though sugar maple was the dominant understory species in this association, numerous other woody species were important (Table 4.2). As is typical with closed-canopy temperate forests, the herbaceous layer was well developed, particularly in the spring when there was extremely high species diversity due to the flowering spring ephemerals. Depending on topography, soil, and climate the tree composition varied extensively in this region. On coarse, dry soils, particularly in areas of rough topography, oaks and hickories were important stand components. Areas of flat topography were commonly dominated by tallgrass prairie, particularly on wet sites and where firebreaks were lacking. In low areas with wet soil, elm-oak-ash forests were important (Table 4.2).

Much of the area historically occupied by beech-maple forest is now farmland. Since this forest association occupied relatively flat, fertile soil, it was some of the first cleared during the mid-1800s. Most of the remaining groves give little indication of the structure and extent of the original forest, though many of the major forest tree species, with their common understory components, are still present. Most of these forests were selectively logged during the late 1800s, and the high-grade species were removed. American beech, and to a lesser extent sugar maple, which are not valuable lumber trees, were left. This selective cutting, as well as the high replacement potential of the two species, has made them overly abundant in our present-day forests.

Present day beech-maple forests are very common in central Indiana and southern Michigan, some being old-growth forest that probably have never been cut. These forests give a relatively good indication of the structure and composition of the presettlement beech-maple forest though the major dominants are probably over represented. In west central Indiana at Pine Hills Nature Preserve is a mesophytic beech-maple climax forest. In this preserve American beech accounted for an IV of 49.0 (possible 100) and averaged 99 stems/ha, with many individuals in the larger diameter classes. Sugar maple was second with an IV of 16, while other important species included *Acer rubrum* (red maple), *Liriodendron tulipifera* (tulip tree), eastern hemlock, and red oak.

**Table 4.2. Major woody species encountered in beech-sugar maple forests.****Dominant overstory trees**

American beech (*Fagus grandifolia*)  
 sugar maple (*Acer saccharum*)  
 red oak (*Quercus rubra*)  
 white oak (*Q. alba*)  
 basswood (*Tilia americana*)  
 black walnut (*Juglans nigra*)  
 yellow birch (*Betula allegheniensis*)

**Common subdominant trees**

American elm (*Ulmus americana*)  
 white ash (*Fraxinus americana*)  
 tulip tree (*Liriodendron tulipifera*)  
 wild black cherry (*Prunus serotina*)  
 eastern hemlock (*Tsuga canadensis*)  
 red maple (*Acer rubrum*)  
 bitternut hickory (*Carya cordiformis*)

**Dominant trees in low, wet areas**

American elm (*Ulmus americana*)  
 green ash (*Fraxinus lanceolata*)  
 swamp white oak (*Quercus bicolor*)  
 red maple (*Acer rubrum*)  
 sugar maple (*A. saccharum*)  
 sycamore (*Platanus occidentalis*)

**Subdominant trees in low, wet areas**

pin oak (*Quercus palustris*)  
 red oak (*Q. rubra*)  
 slippery elm (*Ulmus rubra*)  
 quaking aspen (*Populus tremuloides*)

**Common understory trees**

redbud (*Cercis canadensis*)  
 flowering dogwood (*Cornus florida*)  
 musclewood (*Carpinus caroliniana*)  
 hop hornbeam (*Ostrya virginianus*)  
 pawpaw (*Asimina triloba*)  
 red mulberry (*Morus rubra*)

**Dominant shrubs**

spicebush (*Lindera benzoin*)  
 elberberry (*Sambucus canadensis*)  
 leatherwood (*Dirca palustris*)  
 wahoo (*Euonymus atropurpureus*)  
 maple-leaved arrowwood (*Viburnum acerifolium*)  
 blackberry (*Rubus* spp.)  
 wild hydrangea (*Hydrangea arborescens*)  
 witch hazel (*Hamamelis virginiana*)  
 prickly ash (*Zanthoxylum americanum*)

A forest with similar overstory composition is found at Warren Woods, near Three Oaks, Berrien County, southwestern Michigan. This forest is an excellent example of a beech-maple climax occurring in forests bordering the southern end of Lake Michigan. In this woods American beech and sugar maple accounted for nearly 90 percent of the trees entering the canopy. A few other species were present in low numbers, these included American elm, *Tilia americana* (basswood), tulip tree, red oak, *Carya ovata* (shagbark hickory), white ash, and *Prunus serotina* (wild black cherry). Sugar maple dominated the understory and accounted for nearly 60 percent of all woody seedlings and saplings, with *Lindera benzoin* (spicebush) second in importance.

In east central Illinois occasional small wooded areas are found in which American beech and sugar maple dominate. Generally these small remnants are in sheltered ravines and small valleys where the microclimatic conditions allow for the growth and reproduction of American beech, a species that rarely enters central Illinois. American Beech Wood Nature Preserve in Clark County, Illinois, was dominated by American beech, which had an IV of 26.2 (possible 100) and averaged 63 stems/ha, most less than 60 cm dbh. Second was sugar maple with an IV of 15.7. This species dominated the small diameter classes and seedling and sapling layers. Black oak and *Carya glabra* (pignut hickory) were third and fourth in IV with IVs of 11.9 and 10.0, respectively. Tulip tree ranked fifth with 19 other trees also found on the site. American beech is also found at Rocky Branch Nature Preserve, Clark County, Illinois, where it grows on the steep slopes of a narrow valley.

#### **Sugar Maple-Basswood Forest Association**

This association, in which sugar maple dominates the understory and is a major overstory component along with basswood, occurs in extreme northwestern Illinois, the southern half of Wisconsin and Minnesota, and the extreme northwest corner of Iowa. In these forests, sugar maple was usually more important than any other species, various oak species were commonly present, and basswood was very numerous. In Wisconsin, basswood replaced American beech, which occurs in the extreme southeastern part of the state as a narrow band along Lake Michigan.

Mesic forests, with basswood and sugar maple as dominants, did not occur as a single unit even in presettlement times, but rather as scattered islands or groves. Between these islands of mesophytic forests were tallgrass prairies, oak savannas, open oak woodlands, and oak forests. Local topography, streams, and other natural features, which afforded some protection from fire, undoubtedly determined the boundaries of the sugar maple-basswood forests. The numerous fires in presettlement and early settlement times created extensive areas of oak savanna on the more exposed xeric sites of central Minnesota and Wisconsin. In contrast, sugar maple, basswoods, and the numerous other thin-barked, fire-sensitive species were commonly top-killed by these fires (Table 4.3).

Presently, only small remnants remain of the sugar maple-basswood association. Many of the forests were destroyed or significantly altered by fire, while much of the land has been cleared for agriculture or logged. The fragmented remains give only a slight indication of the structure, composition, and extent of this association.



**Table 4.3. Major woody species encountered in sugar maple-basswood forests.****Dominant trees**

sugar maple (*Acer saccharum*)  
 basswood (*Tilia americana*)

**Co-dominant trees**

American elm (*Ulmus americana*)  
 slippery elm (*U. rubra*)  
 bur oak (*Quercus macrocarpa*)  
 red oak (*Q. rubra*)  
 white oak (*Q. alba*)  
 bitternut hickory (*Carya cordiformis*)  
 green ash (*Fraxinus lanceolata*)

**Common understory trees**

musclewood (*Carpinus caroliniana*)  
 box elder (*Acer negundo*)  
 hop hornbeam (*Ostrya virginiana*)  
 witch hazel (*Hamamelis virginiana*)  
 birch (*Betula* spp.)

**Common shrubs**

bladdernut (*Staphylea trifolia*)  
 bush honeysuckle (*Diervilla lonicera*)  
 beaked hazelnut (*Corylus cornuta*)  
 leatherwood (*Dirca palustris*)  
 maple-leaved arrowwood (*Viburnum acerifolium*)  
 prickley ash (*Zanthoxylum americanum*)  
 alternate-leaved dogwood (*Cornus alternifolia*)  
 wahoo (*Euonymus atropurpureus*)  
 dogwood (*Cornus* spp.)

The largest continuous tract of sugar maple-basswood forest was an area in south central Minnesota known as the “Big Woods.” Only small remnants of this once extensive forest remain. In one of these remnants, Minnetonka Woods, sugar maple accounted for 45.2 percent of trees 10 cm dbh and above while basswood accounted for 28.6 percent. Other species encountered in very low numbers included red oak, American elm and slippery elm. Using GLO survey records of the entire Big Woods indicates that in presettlement times the composition of the entire forest was similar to that presently found, except that elms were slightly more important. Fire was extremely important in determining the composition and geographic extent of forests in the upper Mississippi River valley. Many parts of the boundary of the original “Big Woods,” as determined by the GLO survey records, followed approximately along lakes and streams that probably served as fire breaks. These firebreaks were probably important in protecting the area where the sugar maple-basswood climax was best developed.

Sugar maple-basswood forests were also common in northwestern Illinois, adjacent Wisconsin, Minnesota, and Iowa in an area known as the driftless region. Never covered by Pleistocene ice, this area is heavily eroded with deep ravines and rolling ridges and occasional flat-topped uplands. Prairies and oak-hickory forests exist on the drier uplands and upper ridge slopes, while the sugar maple-basswood forests are restricted to the mesic

valleys, particularly those with a northern exposure. Fire, set by Native Americans, greatly modified the vegetation, only a few protected slopes and coves escaped the devastating influences of fire. According to GLO survey notes of the Kickapoo River watershed above La Farge in southwestern Wisconsin the mesic forests were dominated by sugar maple (IV of 34), followed by white oak (IV of 19.7), and basswood (IV of 13.7), along with some elm and other oak species. In Illinois the driftless region is essentially confined to Jo Daviess County in the extreme northwestern corner of the state.

### **Western Mesophytic Forest Association**

The western mesophytic forest association occurs south of the terminal moraine of Illinoian glaciation in extreme southern Illinois, southern Indiana and southwestern Ohio, south through the western half of Kentucky and Tennessee, and into small parts of northern Alabama and Mississippi (Figure 4.1). This association is located just to the west of the geographical center of the deciduous forest region. It represents a transition from the oak-hickory forests to the west, the sugar maple-beech forests to the north, and the more mesic forest of the Cumberland and Allegheny Plateaus. Usually ten or more tree species are common canopy components with black, white, and red oaks usually present along with tulip tree, American beech, sugar maple, basswood, birches, elms, and hickories (Table 4.4). In general, the forests of the western part of this transition have fewer canopy dominants, the number increasing toward the eastern part of this association.

A single group of associated species is not characteristic of the western mesophytic forest. Instead the forests consist of a complex mosaic in which a particular group of species exists in some areas while a different complex of species dominate in another. Throughout the association a mosaic of different climax communities occurs. It is not uncommon for the forest to be dominated by sugar maple and American beech, but other species are co-dominant, or at least relatively common in the overstory. Other forests are dominated by a complex of oaks and sometimes hickories, while more mesic species, such as sugar maple, American beech, and basswood, are still fairly common.

In Hoot Woods, located in the Illinois till plain of southwestern Indiana, woody stems averaged 180 stems/ha when surveyed in 1961. This undisturbed forest was clearly dominated by American beech that had an IV of 44 (possible 100) and averaged 79 stems/ha with most in the 30-70 cm diameter classes. Sugar maple was second with an IV of 31.5, and averaged 58 stems/ha with most in the 10-30 cm diameter classes. Tulip tree and white ash ranked third and fourth, with IVs of 9.7 and 3.4, respectively. Oaks and hickories were also present, but in low numbers. Fifteen other tree species enter the canopy, with many 37 meters tall and exceeding 75 cm dbh. In contrast, in Donaldson's Woods, located in Spring Mill State Park, Lawrence County, Indiana, the oaks and hickories total 56.6 percent of the IV, while sugar maple and American beech have 30.6 percent of the IV. White oak was the leading dominant with 48.5 percent of the basal area, some trees exceeding 1 meter dbh. Seedlings and saplings of sugar maple dominated the understory though flowering dogwoods, American beech, and green ash were common along with various shrubs, such as *Lindera benzoin* (spicebush), and *Viburnum acerifolium* (maple-leaved arrowwood).

**Table 4.4. Major woody species encountered in the northern half of the western mesophytic forest association.**

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**Dominant overstory trees**

sugar maple (*Acer saccharum*)  
 American beech (*Fagus grandifolia*)  
 white oak (*Quercus alba*)  
 red oak (*Q. rubra*)  
 Shumard's oak (*Q. shumardii*)  
 black oak (*Q. velutina*)  
 tulip tree (*Liriodendron tulipifera*)  
 American elm (*Ulmus americana*)  
 slippery elm (*U. rubra*)  
 bitternut hickory (*Carya cordiformis*)  
 sassafras (*Sassafras albidum*)  
 basswood (*Tilia americana*)

**Common subdominant trees**

white ash (*Fraxinus americana*)  
 green ash (*F. lanceolata*)  
 blue ash (*F. quadrangulata*)  
 red ash (*F. pennsylvanica*)  
 wild black cherry (*Prunus serotina*)  
 red maple (*Acer rubrum*)  
 pignut hickory (*Carya glabra*)  
 shagbark hickory (*C. ovata*)  
 bur oak (*Quercus macrocarpa*)  
 chinquapin oak (*Q. muhlenbergii*)  
 swamp white oak (*Q. bicolor*)  
 sycamore (*Platanus occidentalis*)  
 black gum (*Nyssa sylvatica*)  
 sweet gum (*Liquidambar styraciflua*)  
 sweet buckeye (*Aesculus flava*)  
 honey locust (*Gleditsia triacanthos*)

**Common understory trees**

redbud (*Cercis canadensis*)  
 flowering dogwood (*Cornus florida*)  
 musclewood (*Carpinus caroliniana*)  
 hop hornbeam (*Ostrya virginianus*)  
 pawpaw (*Asimina triloba*)  
 red mulberry (*Morus rubra*)  
 Ohio buckeye (*Aesculus glabra*)  
 butternut (*Juglans cinerea*)  
 Juneberry (*Amelanchier arborea*)  
 cucumber tree (*Magnolia acuminata*)  
 witch hazel (*Hamamelis virginiana*)

**Dominant shrubs**

spicebush (*Lindera benzoin*)  
 elberberry (*Sambucus canadensis*)  
 wahoo (*Euonymus atropurpureus*)  
 maple-leaved arrowwood (*Viburnum acerifolium*)

blackberries (*Rubus* spp.)  
 wild hydrangea (*Hydrangea arborescens*)  
 bladdernut (*Staphylea trifolia*)

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The forests of the western mesophytic association have a well-developed subcanopy consisting of some potential canopy species and other species that never reach the overstory (Table 4.4). The subcanopy components generally form a distinct layer. The woody understory is also well developed with many shrubs being common along with many of the seedlings and saplings of the shade-tolerant overstory species. Usually the herbaceous layer is relatively dense, particular during early spring, when spring ephemerals are common.

In Illinois this association extends through the Shawnee Hills Natural Division, the Ozark Natural Division, and the uplands of the Coastal Plain Natural Division. The drier uplands of these Natural Divisions contain many of the species found throughout much of the oak-hickory association just to the north. The forests of the deep mesic ravines, in contrast, have a forest community of red oak, white oak, American beech, tulip tree, sugar maple, *Carya cordiformis* (bitternut hickory), and *Fraxinus americana* (white ash). *Juglans nigra* (black walnut), *Juglans cinerea* (butternut), *Aesculus glabra* (Ohio buckeye) and basswood were occasionally present.

#### **Bald Cypress-Water Tupelo-Oak Forest Association**

Since presettlement times *Taxodium distichum* (bald cypress) and *Nyssa aquatica* (water tupelo) have been the most characteristic tree species of the extensive alluvial plains of the Mississippi River of extreme southern Illinois and south to the Gulf of Mexico (Figure 4.1). Found throughout the Mississippi River Embayment bald cypress also occurs in the bayous, swamps, and backwater sloughs along the Gulf Coast and north along the Atlantic Coast to Delaware. Water tupelo has a more restricted range only reaching east Texas on the Gulf Coast and Virginia on the Atlantic Coast. These species commonly make up more than half of the overstory in the swamps and shallow ponds of bottomland forests.

Other associates of these wet forests include various species of oaks (Table 4.5). The oak species that were found within these bottomland forests varied extensively depending on locality as well as water depth and duration of inundation. In deep swamps, sloughs, and bayous, which are permanently inundated, bald cypress and water tupelo dominated, commonly being the only overstory species present. Where the ground was dry for parts of the growing season, hardwood bottoms occurred with various oak species along with *Liquidambar styraciflua* (sweet gum), red maple, and *Carya illinoensis* (pecan) important forest components along with many relatively uncommon overstory, understory, and shrubby species (Table 4.5). Woody vines were an important part of this association, many becoming very large. Early reports mentioned that some vines were found with a stem circumference of 1 meter just a short distance above the ground.

In early settlement times these swamp forests extended from extreme southern Illinois and Indiana to Louisiana, encompassing an area referred to as the Mississippi Embayment. Though these forests were once common, channelization, drainage, and subsequent clearing for agriculture have reduced the extent of these forests to scattered local areas, particularly in the northern and central part of the Mississippi Embayment. As a result of clearing and drainage only a few relatively undisturbed bottomland forests still remain in southern Illinois. In Missouri, of the more than 1 million hectares of bottomland forest that was present in presettlement times, 96 percent has been lost.

**Table 4.5. Major woody species encountered in the bald cypress-tupelo gum-oak forests of the northern part of the Mississippi River embayment.**

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**Dominant overstory trees**

bald cypress (*Taxodium distichum*)  
 tupelo gum (*Nyssa aquatica*)  
 oaks (*Quercus* spp.)(see below)

**Locally dominant oaks**

overcup oak (*Quercus lyrata*)  
 swamp chestnut oak (*Q. michauxii*)  
 cherrybark oak (*Q. pagoda*)  
 pin oak (*Q. palustris*)  
 Shumard's oak (*Q. shumardii*)  
 willow oak (*Q. phellos*)  
 bur oak (*Q. macrocarpa*)  
 Nuttall's oak (*Q. texana*)

**Other common trees**

black willow (*Salix nigra*)  
 red maple (*Acer rubrum*)  
 silver maple (*A. saccharinum*)  
 pecan (*Carya illinoensis*)  
 pumpkin ash (*Fraxinus profunda*)  
 sweet gum (*Liquidambar styraciflua*)  
 sycamore (*Platanus occidentalis*)  
 common hackberry (*Celtis occidentalis*)  
 southern hackberry (*C. laevigata*)  
 cottonwood (*Populus deltoides*)  
 swamp cottonwood (*P. heterophylla*)

**Dominant shrubs**

swamp rose (*Rosa palustris*)  
 Virginia willow (*Itea virginica*)  
 spicebush (*Lindera benzoin*)  
 buttonbush (*Cephalanthus occidentalis*)  
 pawpaw (*Asimina triloba*)  
 possum haw (*Ilex decidua*)  
 swamp privet (*Forestiera acuminata*)  
 giant cane (*Arundinaria gigantea*)

**Common vines**

pepper-vine (*Ampelopsis arborea*)  
 raccoon grape (*Ampelopsis cordata*)  
 poison ivy (*Toxicodendron radicans*)  
 trumpet creeper (*Campsis radicans*)  
 supple-jack (*Berchemia scandens*)  
 grape (*Vitis* spp.)

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