WEEK 1. HISTORICAL FOREST AND PRESENT NATURAL DIVISIONS OF ILLINOIS

The structure and compositions of temperate climate forests changed continually throughout the Quaternary. During this period of geological time, which started about 2 million years ago, the surface of the earth was shaped and modified by numerous glacial events, and the diverse climatic conditions responsible for these events. The geographic position and the extent of our present biotic communities have been determined by these geological and climatic events that have occurred during this period. The Pleistocene, or age of glaciation, is very extensive and accounts for all but the last 10,000 years of the Quaternary Period. This last 10,000 years is commonly referred to as the Holocene. We are living in the Holocene, or modern era.

During the Quaternary Period North America has experienced a trend toward climatic cooling and climatic oscillation. These climatic changes have resulted in a series of at least 20 glacial-interglacial cycles, and this alternating cycle of glacial and interglacial regimes have created numerous environmental changes. The increase in the magnitude and the frequency of these climatic oscillations has resulted in the development of our modern flora and created the natural biotic divisions that currently exist in the Midwestern United States as well as the rest of the world.

Glaciation and the Illinois landscape

The state of Illinois occupies a unique position in Pleistocene glacial geology of North America. In this region there are glacial deposits from glaciers that invaded from the northeast that are overlapped by glacial deposits from glaciers entering Illinois from the northwest. It also contains the area of the southernmost advance of continental glaciation in North America, and was the region where the outwash drainage from the northeast, north, and northwest converged on their way to the Gulf of Mexico. In this area glacial oscillations have occurred many times, but the last few glacial events have been the most important in shaping our present day landscape and natural biotic division boundaries. The last four major glacial advances occurred over the last 1 million years: they are referred to as the Nebraskan, Kansan, Illinoian, and Wisconsinian.

Of these last four glacial advances into Illinois, Nebraskan glaciation was the earliest followed by Kansan glaciation. Remnants of Nebraskan and Kansan drift are rare in Illinois. The third major glacial advance was Illinoian glaciation. At the maximum extent of Illinoian glaciation, about 125,000 years ago, an ice sheet covered nearly 90 percent of Illinois. During Illinoian glaciation one glacial lobe entered present day Illinois from the Lake Michigan region, while another lobe that originated in the Lake Erie region entered from the east. As a result, the eastern lobe was diverted into a more southerly course and reached the northern slope of the Shawnee Hills of southern Illinois. This was the maximum southern extent of continental glaciation in the Northern Hemisphere, which reached to about 30 km north of the Mississippi Embayment. The glacial drift left behind by Illinoian glaciation and its subsequent erosion is mostly responsible for the present topography of most of the western and the southern half of present day Illinois.

The last glacial advance, the Wisconsinian glaciation (also called the Wisconsin glaciation), was the most important in the distribution of our present day natural biotic divisions, and the distribution of plant and animal species. At the Wisconsinian glaciation maximum, approximately 18,000 years before present (B.P.), Midwestern North America (including Iowa, most of Wisconsin, northeastern Illinois, central Indiana, Ohio, and Pennsylvania) was covered by the Laurentide Ice Sheet. Glaciation extended from coast to coast and from central Illinois northward to the Arctic Ocean. Ice thickness near the center of the ice sheet, which was centered over Hudson Bay, was probably more than 5 km thick. This ice sheet was probably more than 2 km thick over parts of northeastern

Illinois.

The entire northeastern quarter of Illinois was covered by the ice sheet at the maximum extent of Wisconsin Glaciation (Woodfordian glacial advance). The terminal moraine created by Wisconsinian glaciation extended in the south to Paris, Charleston, and Shelbyville, and in the west to Decatur, Peoria, and Dixon. The pattern of the Woodfordian moraines in present day Illinois and adjacent Indiana indicate a minimum of 32 episodes of moraine building in the interval from 14,000 to 20,000 B.P. This period was also a time of excessive loess accumulation. More than 90 percent of these wind blown deposits in Illinois are of Woodfordian age. By the end of Wisconsinian glaciation, these wind blown loess deposits covered nearly all of Illinois, and averaged 1 to 2 meters thick over much of the state.

Maximum Wisconsinian glaciation to total deglaciation extended from 18,000 B.P. to about 5,000 B.P. At glacial maximum the sea levels were lowered by as much as 200 meters. This resulted in broad expanses of the continental shelves around the world being exposed. These extensive continental shelves were colonized by plant and animal species and provided migration routes. During this time the Bering Strait was dry land, allowing migration of animals and plants between eastern Siberia and Alaska. By 14,000 B.P. the ice sheet had receded from most of Illinois, and late advances of the Woodfordian substage only covered most of the present day Northeastern Morainal Natural Division in extreme northeastern Illinois. At this time the Valparaiso morainal system was being deposited. Also, extensive lakes were forming at the margins of the receding ice sheet between the morainal deposits and the ice sheet. At this time morainal deposits were breached and the resulting Kankakee Torrent deposited excessive amounts of sand and gravel in the Illinois River valley south of present day Hennepin. By 12,000 B.P. the ice sheet was no longer in Illinois.

Vegetation of Illinois during Wisconsinan Glaciation

Plant fossils, particularly fossil pollen, have been used to determine the major vegetation changes in eastern North America during Wisconsinan glaciation. Pollen profiles are commonly obtained from post glacial sediment by long probes that remove a core of sediment from the bottom of present day lakes, ponds, organic soil layers, and even from shoreline oceanic deposits, or any other place that preserves pollen. Plant pollen has many characteristics that make this possible. First, plant pollen is commonly preserved in many situations where there are reduced levels of oxygen; second, the genus (and sometimes the species) that produced the pollen can be identified; third, many species of plants have wind-blown pollen that is easily transported by the wind; and fourth, the outer layer of the pollen is very resistant to decay.

Large blocks of ice were commonly left behind in the glacial drift as the glacier melted. When these blocks of ice melted they left depressions that fill with water. These depressions are commonly called kettle-lakes or kettle-ponds. Many of these kettles occurred in areas where drainage was poor, and they lacked an outlet. With warming climates the area re-vegetated with the plant species that were adapted to the climatic condition of the area. Pollen from these plants entered these bodies of water along with the remains of plant material and sediment from the surrounding area. If conditions were good for the preservation of this organic material, it was deposited in layers over the bottom of the lake. In more northern areas with cool climates, the water of these lakes and ponds became highly acidic, this reduced oxygen levels which prevented bacterial decay and preserved the pollen. The increase in acid levels was enhanced by dense growths of sphagnum moss that was common in these cool water lakes and ponds. In northern climates these lakes commonly filled with organic material, and the resulting bogs developed a unique flora due to the acidic water and highly organic soils.

Cores of these sediments can be removed and the pollen identified. Also a sequence of layers can be determined by using the abundance of pollen of the various plant species present at any particular time to develop a pollen profile of the sediment. Since most plant species are habitat specific, by identifying the pollen in the various levels of the sediment, it is possible to determine the type of vegetation surrounding the pond or lake at various times in the past. Also, the organic material of each layer can be radiocarbon-dated, creating a time sequence of vegetation changes that occurred around the lake or pond sediments being studied. By studying these pollen profiles from many lakes and ponds in a region it is possible to determine the sequence of vegetation changes over a large area during the time the sediments were being deposited. Since the species of plants present in an area is largely dependent upon climate, the general changes in climate during the time interval of the pollen profiles can be determined. These pollen profiles have been used to determine the changes in vegetation and climate throughout the Midwest during Wisconsinan glaciation.

Plant fossil records, particularly fossil pollen profiles, have been used to show the major vegetation changes in eastern North America during and after Wisconsinan glaciation. Based on these profiles, at the maximum extent of Wisconsinan glaciation tundra vegetation was situated just a little south of the ice sheet (Figure 1.1). Tundra did not occur as a continuous vegetation zone, but as isolated units in areas where the climatic condition would allow. Tundra is presently found in arctic regions where vegetation consists of mostly shrub heaths, low sedges and grasses, and many lichens and mosses.

South of the tundra was an extensive boreal forest dominated by *Pinus banksiana* (jack pine) and various species of *Picea* spp. (spruces), and *Abies* spp. (firs). This forest extended as a broad band across the Great Plains and the Ozark Mountains to the Atlantic coast, with a narrow extension south into the Mississippi River alluvial valley to the Gulf of Mexico. Prairie species may have been common in the understory of this boreal forest, but extensive prairie tracts were not present. Presently the boreal forest (sometimes called the taiga) occurs as a broad band across most of Canada and Alaska just to the south of the Arctic tundra.

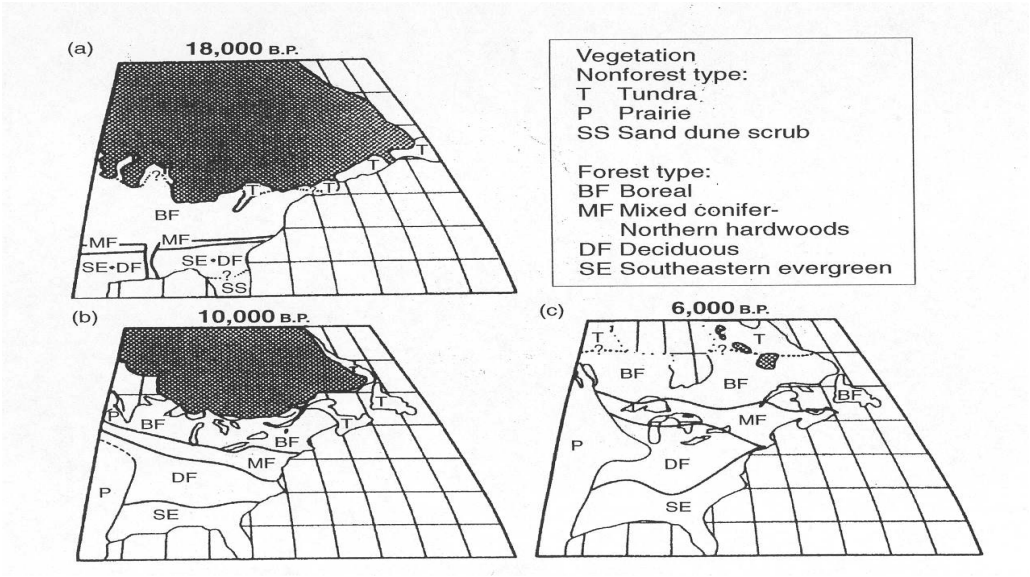

Figure 1.1. Extent of the Wisconsinan glacial ice sheet (shaded regions) and vegetation mapped across eastern North America at: (a) 18,000 years before present (B.P.), (b) 10,000 B.P., and c) 6,000 B.P.

Just to the south of the boreal forests existed a narrow band of forest composed of various conifers and northern hardwoods, and probably represented the ecotone between the more northern boreal forest and the most southern temperate forests. Most of the tree species of this narrow region were elements of the boreal forest to the north and the southeastern evergreen and temperate deciduous forests to the south. Farther south were temperate deciduous and southeastern evergreen forests that extended through the lower coastal plains to the Gulf of Mexico (Figure 1.1).

By 10,000 B.P. the Wisconsinan ice sheet had retreated to southern Canada, and the pattern of natural vegetation throughout the Midwest was becoming similar to that of today. With the glaciers receding to the north, a re-advance of the flora occurred. This plant invasion was probably relatively rapid. Probably scattered areas of tundra followed closely behind the retreating ice. This was followed by species of the present day boreal forests of Canada. Then there was a long period in which deciduous forest tree species, particularly *Quercus* spp. (oaks), were prominent. The increased warmth and aridity during the Hypsithermal Interval (8,000 to 5,000 B.P.) resulted in prairie, oak-savanna, oak-hickory forest, and the southeastern evergreen forests shifting to the north (Figure 1.1). During this period the growing season of the prairie peninsula of Illinois was about two weeks longer than it is today, and there was a 10 to 20 percent decrease in precipitation.

Since 6,000 B.P. the Midwest has experienced a slight cooling trend as well as a nominal increase in precipitation. These climatic changes, under normal conditions, would have resulted in an increase in forest at the expense of prairie throughout much of Illinois. The flat to gently rolling landscape created by Wisconsinan and Illinoian glaciations, however, provided the ideal terrain for the movement of fire that would shape and perpetuate the prairies of Illinois for the next 6,000 years. The presettlement distribution of the major vegetation types (prairie, savanna, woodland, and forest) throughout much of the prairie peninsula was determined largely by firebreaks, such as lakes and rivers, and by rough topography that controlled the frequency and intensity of fires.

Natural Divisions of Illinois

John Schwegman, a botanist with the Illinois Department of Natural Resources, mapped and described the natural divisions of Illinois. He separated these divisions according to differences in significant aspects of topography, glacial history, bedrock, soils, and the distribution of the flora and fauna of the state. Fourteen natural divisions were recognized in Illinois. These were then divided into 33 sections according to lesser differences in the geological and biological features of each natural division. Each of the natural divisions and their sections has its own unique combination of bedrock and surface geology, and plant and animal species. Each of these natural divisions is discussed below, while the number preceding the division name refers to its position on the accompanying map (Figure 1.2).

1. WISCONSIN DRIFTLESS NATURAL DIVISION

The northwestern corner of Illinois, including nearly all of Jo Daviess County and the northwestern corner of Carroll County, is included in this natural division. Also, small parts of northeastern Iowa, adjacent southeastern Minnesota, and southwestern Wisconsin are included in this region that apparently escaped Pleistocene glaciation. Though ice sheets moved past one side or the other of this region during past glacial events, none covered the region. Consequently, unlike most other parts of Illinois, this division is characterized by rugged topography and large amounts of exposed bedrock. Some of the most scenic areas of Illinois are found in this division that is well known for its outcrops of limestone, dolomite and shale.

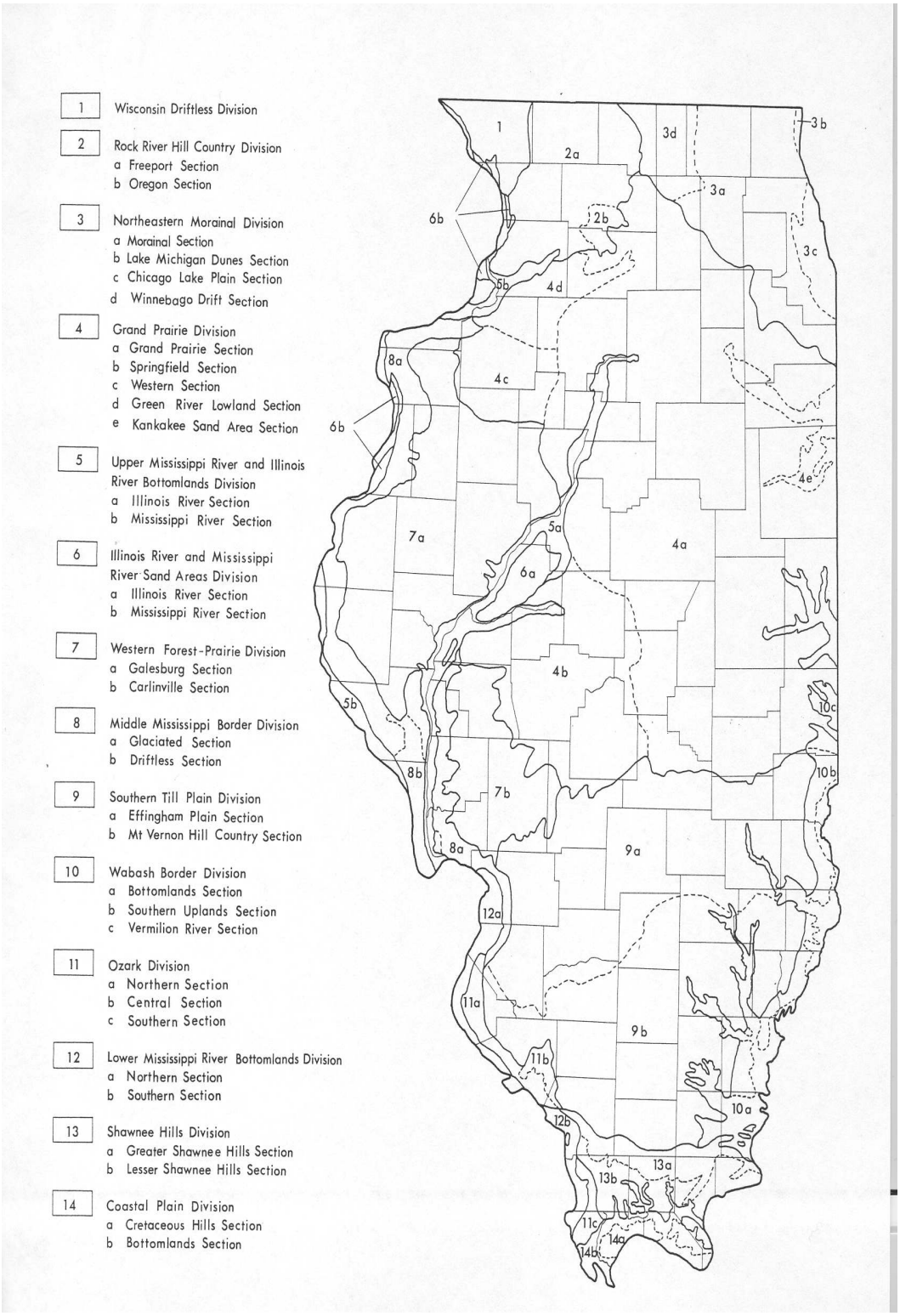

Figure 1.2. The Natural Divisions of Illinois.

Bedrock outcrops and palisades occur along the Mississippi River valley, while narrow valleys are also common with high vertical cliffs. Also, many prominent "mounds" or hills have persisted due to the presence of an erosion-resistant dolomite cap. One of these, Charles Mound, is the highest point in Illinois at 383 meters (1,257 feet). Small caves are sometimes found in the limestone and dolomite, while old "crevice mines" are present in the dolomite cliffs. These date to pioneer times when lead ore was mined and processed. Galena, the county seat of Jo Daviess County, takes its name from the lead ore that was once mined here.

In presettlement time the vegetation of the driftless region was very diverse. Prairies and oak-hickory forests existed on the dryer uplands and ridges, while sugar maple-basswood forests were restricted to the narrow, moist valleys. Prairie groves were common. These isolated clumps of trees on the open prairie were mostly dominated by *Quercus macrocarpa* (bur oak). The thick bark of this species resisted the numerous prairie fires. Along the cliffs of the larger streams several northern species are common, including *Pinus strobus* (white pine) and *Taxus canadensis* (Canada yew).

Several distinctive plant species, that are considered relics of the preglacial or interglacial floras, are found here: these include *Dodecatheon amethystunum* (jeweled-shooting star), *Sullivantia sullivantii*, *Solidago sciaphila* (cliff goldenrod), and *Primula mistassinica* (bird's-eye primrose). Many other species rare to Illinois' flora also occur in the cool shaded ravines and on the cliffs and river bluffs. One unique habitat is algific slopes. These slopes remain cool throughout the summer since ice that accumulated in the talus layer over winter slowly melts during the next summer. This microclimate is ideal for *Corylus cornuta* (beaked hazelnut), a species rare to Illinois.

2. ROCK RIVER HILL COUNTRY NATURAL DIVISION

This natural division is a region of rolling topography that is drained by the Rock River and its tributaries. Extending through most of Carroll, Ogle, Stevenson, Winnebago, and Whiteside counties, this region was glaciated during the early stages of Illinoian and Wisconsinan glaciations. Only a thin mantel of glacial drift is present, and much of the area is covered by wind blown loess.

In presettlement times the large expanses of uplands of this division were dominated by tallgrass prairie, the dominant grasses being *Andropogon gerardii* (big bluestem), *Sorghastrum nutans* (Indian grass), and *Sporobolus heterolepis* (prairie dropseed). Forests were present along the watercourses and areas of topographic relief. Oak-hickory forests dominated the upland slopes and shallow valleys where protection from fire was relatively marginal. Sugar maple-basswood forests dominated moist sites, particularly in steep sided valleys and ravines. Fires rarely penetrated these habitats and fire-sensitive tree species could survive.

Based on differences in bedrock and the resultant differences in the flora, this division is divided into two sections. The **Freeport Section** is much larger and underlain with limestone and dolomite bedrock. Prairie is common on the level-to-rolling uplands of this section. The **Oregon Section** is underlain with St. Peter's sandstone. The sandy and slightly acidic soil supports a unique assemblage of northern relict species such as *Gymnocarpium dryopteris* (oak fern), and *Woodsia ilvensis* (rusty woodsia). The Oregon section was mostly forested.

3. NORTHEASTERN MORAINAL NATURAL DIVISION

Most of this division was covered by the late Woodfordiana stage of Wisconsinan glaciation, and is the most recently glaciated part of Illinois. The soils are mostly derived from glacial drift rather than loess. Glacial landforms are responsible for the hilly, and rolling terrain of much of this division. Various morainal features are common including

eskers, kames, kettles, drumlins, and moraines. Due to the recent glaciation, drainage is poor and throughout most of the region wetlands are common.

Prairie vegetation covered nearly 60 percent of the flat land surface in presettlement times. White and bur oak forests dominated the dry morainal ridges. Forests protected by firebreaks were dominated by *Acer saccharum* (sugar maple), *Tilia americana* (basswood), *Quercus rubra* (red oak), and *Fraxinus americana* (white ash), all thin-barked species that were commonly killed by fire. Much of the upland forest of early settlement times, particularly the forests associated with prairie, was prairie groves and savannas. These woodlands commonly had an open canopy with a ground layer dominated by prairie species. The trees of the savanna were mostly fire-resistant oaks with thick, fire resistant bark.

Four sections are recognized based on differences in topography, soil, glacial history, flora, and fauna. The **Morainal Section** contains the moraines and morainic systems of the late advances of the Woodfordian substage of Wisconsinan glaciations. Most of the glacial lakes (kettle- lakes) present in Illinois, as well as the bog communities, are found in this section. The **Lake Michigan Dunes Section** is restricted to the north shore of Lake Michigan. These sand deposits contain many unusual and rare plant species such as *Juniperus horizontalis* (trailing juniper), *Ammophila breviligulata* (beach grass), and *Arctostaphylos uva-ursi* (bearberry). The **Chicago Lake Plain Section** is a flat, poorly drained area of lakebed sediments that were deposited by glacial Lake Chicago. The original vegetation was mostly prairie and marsh with scrub oak forests on the sand ridges. The **Winnebago Drift Section** was covered by an earlier stage of Wisconsinan glaciation and was mostly prairie and savanna. It is better drained than the other sections and does not contain glacial lakes.

4. GRAND PRAIRIE NATURAL DIVISION

This natural division covers most of the northeastern quarter of Illinois and encompasses most of the region that was covered by the maximum extent of the Woodfordian substage of Wisconsinan glaciation, though some additional areas of Illinoian glaciation are included. This division is a vast plain that in presettlement times was mostly occupied by black-soil tallgrass prairie. The soils were developed from recently deposited loess that usually overlay deep layers of glacial drift. The land was exposed between 18,000 and 14,000 years B.P. when the Wisconsin glacier receded. Therefore, the natural drainage was poor, resulting in many marshes, lakes, and prairie potholes (kettle-ponds). Tallgrass prairies are now extremely rare in Illinois; mostly only small, degraded patches remain.

In presettlement time, forests bordered rivers and streams throughout most of this region. Savannas were common, usually forming an ecotone between the prairie and the forest. On dryer sites, particularly areas of rough topography or firebreaks such as marshes, lakes, and rivers closed canopy upland dry forests were common. Fire-tolerant oaks and occasionally hickories mostly dominated these forests. Where fire rarely reached, fire-intolerant, shade-tolerant tree species, such as sugar maple, basswood, ashes and elms were common. Prairie groves were also common on the prairie. These groves of trees were mostly associated with natural firebreaks and were usually dominated by fire-tolerant oaks.

Five sections are recognized in this division based on variations in soils, topographic relief, and glacial history. The **Grand Prairie Section**, which is the largest section, was dominated by mesic tall-grass prairie, though both wet and dry prairie communities were common. The Shelbyville and Bloomington terminal moraines are the boundaries of this section. The **Springfield Section** is located at the southwestern edge of this division. The soils are of Illinoian drift that are relatively well drained and was mostly covered with prairie at the time of settlement. The **Western Section** is also on Illinoian drift, is well

drained and was mostly in prairie vegetation at the time of settlement. The **Green River Lowland Section** was not covered by Wisconsinan glaciation, but was formed by glacial melt-water that deposited extensive amounts of sand in the broad valley of the Green River and the lower Rock River during Wisconsinan glaciation. This section has extensive sand prairies, with scrub-oak savannas and forests on the sand ridges and dunes. The **Kankakee Sand Area Section** was formed when glacial lakes were drained during the Kankakee Torrent about 14,500 B.P. These extensive sand deposits were left, and wind action created the dune and swale topography that is present today. Closed canopy sand forests, sand savannas, sand flatwoods, sand prairies, and marshes were common in this section.

5. UPPER MISSISSIPPI RIVER AND ILLINOIS RIVER BOTTOMLANDS NATURAL DIVISION

This division includes the floodplains of the Mississippi River above its confluence with the Missouri River, and the bottomlands and associated backwater lakes and sloughs of the Illinois River and its major tributaries south of La Salle, Illinois. Both rivers were major drainage ways during Pleistocene glaciation and presently are characterized by broad floodplains and terraces formed by glacial floodwaters. Two sections occur here, the Illinois River Section and the Mississippi River Section. The more sluggish nature of the Illinois River and its extensive backwater lakes and sloughs distinguish this section from the Mississippi River Section.

Although a considerable amount of this division was forested in presettlement times, extensive marshes and prairie were common in the broad lowlands. The species composition of these prairies and marshes was similar to that of the prairies and marshes of the Grand Prairie Division. The presettlement forests were mostly composed of trees commonly associated with mesic and hydric sites, the most common being *Celtis occidentalis* (hackberry) *Carya illinoensis* (pecan), *Ulmus americana* (American elm), *Ulmus rubra* (slippery elm) *Fraxinus lanceolata* (green ash), *Populus deltoids* (cottonwoods), *Acer saccharinum* (silver maple), *Platanus occidentalis* (sycamore), and *Quercus palustris* (pin oak).

6. ILLINOIS RIVER AND MISSISSIPPI RIVER SAND AREAS NATURAL DIVISION

This natural division is divided into two sections based on the origin of the sand deposits and differences in the flora and fauna. The **Illinois River Section** was formed when the Kankakee Torrent entered the broad Illinois River valley at Big Bend. Here the valley became wider and the sands being carried were deposited, particularly below present day Peoria. The broad terraces along the Illinois River valley below Hennepin are erosional surfaces of the Kankakee Torrent, and most are presently covered with sand deposits. These sand deposits occur in the southern half of Tazewell County, nearly all of Mason County, and parts of Cass, Morgan, and Scott counties. The **Mississippi River Section** consists of scattered sand deposits from Jo Daviess County south to Hancock County. Some of these deposits were formed when glacial lakes drained, other were formed during the retreat of the Wisconsin Glacier when moraines and ice dams were breached and glacial lakes to the north of Illinois drained. *Hudsonia tomentosa* (beach heather) and *Selaginella rupestris* (rock spikemoss) form large clumps here, but have not been found in the Illinois River Section.

During presettlement time sand prairie vegetation was common. Unlike the tallgrass prairies of Illinois the sand prairies were dominated by shorter grasses, and many of the species had western affinities. *Schizachyrium scoparium* (little bluestem) was the dominant grass with *Dichanthelium villosissimum* (hairy panic grass), and *Koeleria macrantha* (June grass) common. The dominant forbs included various species of *Opuntia* (prickly pear cactus), *Tephrosia virginiana* (goat's-rue), A*mbrosia psilostachya*

(western ragweed), and *Oenothera clelandii* (sand evening primrose). Sand forests and sand savanna were common on sites associated with firebreaks. *Quercus velutina* (black oak), *Quercus marilandica* (blackjack oak) and *Carya texana* (black hickory) dominated the dryer sites, while white oak became important on moister sites.

7. WESTERN FOREST-PRAIRIE NATURAL DIVISION
Located in the west-central part of Illinois, this natural division was not subjected to Wisconsinan glaciation. Most of the bedrock is covered by glacial drift of Illinoian glaciation though a small section in Pike and Adams counties is covered by older Kansan drift. Because of the age of the glacial drift the terrain is strongly dissected, being subjected to weathering since Illinoian glaciation. Most of the soils are relatively young and were developed from loess that was deposited during Wisconsinan glaciation. The two sections of this division are geographically separated by the Illinois River valley, and also have some faunal differences.

The **Galesburg Section** occurs to the northwest of the broad Illinois River valley. At the time of presettlement oak-hickory forests were the dominant forests in the well-dissected areas along tributaries of the Illinois River where fire frequency and intensity was fairly low. Mesic forest occurred in more protected areas with sugar maple, red oak, basswood, elms, and ash trees common. On the level to rolling uplands prairie dominated, and covered about half of the land surface of this section. The **Carlinville Section** is well-dissected land southeast of the Illinois River valley. The original vegetation of this section was mostly oak-hickory forests with only about 12 percent of the section covered with prairie. Barrens were probably common in both sections in presettlement time when fires were nearly a yearly occurrence. Barren communities are open woodlands on shallow soil of dry exposed slopes with stunted oaks and a sparse grass layer that was maintained by recurring fires.

8. MIDDLE MISSISSIPPI RIVER BORDER NATURAL DIVISION
This division is a narrow band of river bluffs and rugged terrain bordering the Mississippi River bottomlands that stretches from Rock Island County to St. Clair County. The prominent bedrock is limestone and dolomite that is exposed as extensive bluffs and palisades. This strongly dissected glacial till plain of Illinoian and Kansan age is covered in most areas by deep loess deposits. The loess is common along the bluffs, often capping the bedrock. Loess hill prairies are common on these bluffs.

In presettlement times this division was mostly dry to mesic forests. On dryer sites the forests were dominated by black oak, white oak, and a few species of hickories. Sugar maple, basswood, red oak, hackberry, slippery elm, American elm, and black walnut dominated the mesic forests, while the bottomlands were dominated by silver maple, cottonwood, and sycamore. Prairies of this division were limited to the steep slopes and ridges of deep loess on the tops of the river bluffs. The grasses *Schizachyrium scoparium* (little bluestem) and *Bouteloua curtipendula* (side-oats grama) dominated these hill prairies with many of the forbs having western affinities.

This division is divided into two sections based on glacial history and topography. The topography of the **Glaciated Section** has been modified by Illinoian and Kansan glaciation. The **Driftless Section** apparently escaped Pleistocene glaciation, and the topography is rougher than that of the Glaciated Section. Many sinkholes and sinkhole ponds cover the uplands of this section. These sinkholes were formed when the roofs of caves near the surface collapsed, or more commonly, were formed by the slightly acidic water slowly dissolving the limestone.

9. SOUTHERN TILL PLAIN NATURAL DIVISION
The Southern Till Plain Division encompasses most of the dissected Illinois glacial till

plain south of the Shelbyville Moraine, the terminal Moraine of Wisconsinan glaciation, along with the Sangamon River and Macoupin Creek watersheds. Although this division was completely covered by the Illinoian glacier, glacial landforms are rare, mostly restricted to the northwestern part of the division. Extensive glacial lakes were common particularly in the southern part. Exposed to weathering for more than 125,000 years, the topography is mostly gently rolling with some areas of rough topography. The soils are relatively poor due to their high clay content and the frequent occurrence of a claypan subsoil that limits water movement.

At the time of settlement about 40 percent of the uplands of this division supported prairie vegetation, most being mesic tallgrass prairie typical of the Grand Prairie Division. The level, poorly drained uplands of this division supported flatwood forests dominated by *Quercus stellata* (post oak), and blackjack oak, with swamp white oak, and pin oak in slightly wetter areas where a claypan was well developed. Most of the forests of this division were dominated by oaks and hickories, mesic forests being relatively uncommon except where associated with rivers and larger streams.

Two sections are distinguished in the division based on topographic differences. The **Effingham Plain Section** is a relatively level to gently rolling dissected till plain drained by the Kaskaskia River. In presettlement times prairie was common on the rolling uplands with post oak flatwoods common on very flat areas. The **Mt. Vernon Hill Country Section** has a rolling to hilly topography. The limestone and sandstone bedrock is near the surface, accounting from the rougher topography. Most of this section was covered by oak-hickory forest in presettlement times.

10. WABASH BORDER NATURAL DIVISION

This division includes the bottomlands and uplands surrounding the Wabash River and its major tributaries. All but a small area in the extreme southern part of this division was subjected to Pleistocene glaciation. The Wabash River valley was a major waterway during Wisconsinan glaciation. Also, large glacial lakes filled the major tributary of the Wabash River in the southern parts of this division. Some extensive areas of outwash sand are found along the lower Wabash River.

Three sections are recognized in this division that are separated by topography, glacial history, fauna, and flora. The **Bottomlands Section** encompasses the bottomland forests, sloughs, marshes, and oxbow lakes in the floodplains of the Wabash River, the Ohio River, and their major tributaries. Bottomland forests dominated the section with silver maple, hackberry, elms, ashes, swamp white oak, *Carya laciniosa* (kingnut hickory) and *Liquidambar styraciflua* (sweet gum) common components. Wet prairie and marsh vegetation occurred in low areas, sloughs, and oxbow lakes. Some of the most magnificent forest and the largest trees east of the Rocky Mountains once grew in the bottomlands of the Wabash River.

The **Southern Uplands Section** of this division in on Illinoian glacial drift and encompasses the dry and mesic upland forests on the deep loess bluffs and hills along the Wabash River and its tributaries. Oak-hickory forests occurred on the drier sites while more mesic species were associated with the oaks and hickories on moist, protected sites. Sugar maple and *Fagus grandifolia* (American beech) were sometimes associates. The **Vermilion River Section**, located on Wisconsinian glacial drift, occurs on rugged topography along the Vermilion River and its tributaries mostly in Edgar and Vermilion counties, Illinois. Oak-hickory forests occurred on the uplands while beech-maple forests were common in the ravines.

11. OZARK NATURAL DIVISION

This division is a narrow strip of maturely dissected plateau with steep bluffs and rugged

terrain above the bottomlands of the Mississippi River from Monroe County south to Alexander County. In presettlement times this region was mostly forested. Oak-hickory forests dominated the drier sites with mesic forests in ravines and wetter areas that are typical of the forests of the Western Mesophytic Forest Association to the east. Three sections are recognized based on glacial history, bedrock, topography, and differences in the flora and fauna.

The **Northern Section** occurs on limestone bedrock and numerous caves and sinkholes are present. This section was mostly glaciated during Illinoian glaciation. On the thick loess deposits, hill prairies are common with the rare plant endemics including *Euphorbia spathulata* (prairie spurge), *Galium virgatum* (dwarf bedstraw), *Heliotropium tennellum* (slender heliotrope), and *Rudbeckia missouriensis* (Missouri orange coneflower). The **Central Section** is underlain with sandstone bedrock, and was completely glaciated by Illinoian glaciation. Distinctive plants include *Talinum calycinum* (fameflower) and *Asplenium bradleyi* (Bradley's spleenwort), which probably entered Illinois from the Missouri Ozarks after glaciation. The **Southern Section** was not glaciated and is underlain with a cherty limestone. Many of the plants and animals of this section are typical of the Missouri Ozarks. *Asplenium resiliens* (black spleenwort), *Pinus echinata* (shortleaf pine), *Styrax grandifolius* (bigleaf snowbell bush), and two species of *Rhododendron* (azalea) are mostly restricted to this section.

12. LOWER MISSISSIPPI RIVER BOTTOMLAND NATURAL DIVISION
This division includes the Mississippi River and its bottomlands from just below the entrance of the Missouri River at Alton, Madison County, south to the Thebes Gorge in Alexander County, Illinois. The broad bottomlands of this division were formed by glacial floodwater. Since glaciation the river has meandered through this broad floodplain creating numerous meander scars and oxbow lakes. The soils have developed from thick deposits of alluvium and are mostly very fertile.

Two sections are recognized based on plant communities and associated species. The American Bottoms to the east of St. Louis, Missouri, is located in the **Northern Section**. Cahokia, a large Native American settlement existed in the American Bottoms in pre-Columbian time, and was the largest aboriginal settlement north of Mexico. Before Cahokia, large areas of wet and mesic prairie and large extensive marshes were present in the oxbows and meander scars. The bottomland forests were similar to those of central Illinois, along the Mississippi and Illinois River valleys to the north. The **Southern Section** was mostly forested. These forests had high species diversity with many species, including many of the oaks of southern Illinois entering the canopy. Also, bottomland swamps were common that contained species typical of the coastal plain. In these swamps *Taxodium distichum* (bald cypress) was the usual dominant, while associated species included *Acer rubrum* (red maple), *Fraxinus profunda* (pumpkin ash), *Gleditsia aquatica* (water locust), and *Populus heretophylla* (swamp cottonwood).

13. SHAWNEE HILLS NATURAL DIVISION
The Shawnee Hills Natural Division is a band of very hilly terrain extending across the southern part of the state. This section has not been glaciated and is very rugged with many bluffs, overhanging bluffs, and steep ravines. Steep-walled canyons are common, along with extensive areas of exposed bedrock.

Two sections are recognized in the Shawnee Hills Division. A high east-west escarpment of Pennsylvanian sandstone cliffs characterizes the **Greater Shawnee Hills Section**. This section has very rugged terrain with numerous bluffs and ravines. Many rare and endangered plant species occur in this section including *Dodecatheon frenchii* (French's shooting star), *Saxifraga virginiensis* (early saxifrage), *Talinum parviflorum* (small-flowered rock-pink), and *Trichomanes boschianum* (filmy fern). The **Lesser Shawnee**

Hills Section is underlain by Mississippian limestone and sandstone. Sinkholes and caves are locally common features. Distinctive plants of this section are *Philadelphus verrucosus* (native mock orange) and *Stellaria pubera* (great chickweed).

In presettlement times most of this division was forested and considerable forest remains. Much of this division is presently included in the Shawnee National Forest. The dryer uplands are dominated by the tree species found throughout much of the oak-hickory forests to the north. The forests of the deep mesic ravines, in contrast, are typical of the Western Mesophytic Forest Association in east central North America. Dominant species of this association include red oak, white oak, American beech, sugar maple, tulip tree, ashes, elms, black walnut, basswood, *Aesculus glabra* (Ohio buckeye), and *Juglans cinerea* (butternut).

14. COASTAL PLAIN NATURAL DIVISION

The Coastal Plain Division occurs at the southern tip of Illinois, and was not glaciated. Glacial melt waters, however, have influenced the topography, and the present day plant communities of the region. One prominent feature during the Pleistocene was Glacial Lake Cache, an extensive lake that formed in the valleys of the Cache and Ohio rivers.

This division is divided into two very distinct sections based on topography and the resulting plant communities. The **Cretaceous Hills Section** encompasses the rolling hills capped by unconsolidated sand, gravel, and clays of Cretaceous and Tertiary deposits. In early settlement times oak-hickory forests dominated drier sites with more mesic forest in ravines and valleys. Small prairies and extensive barrens were common. The **Bottomlands Section** includes swampy forest bottomlands that are the northernmost extension of the Gulf Coastal Plain Province of North America. This section is the northern edge of the Mississippi Embayment, and includes the bottomlands of the Cache, Ohio, and Mississippi rivers in Illinois. It includes the remnants of the once vast bald cypress and tupelo gum swamps that dominated this section.