WOODED COMMUNITIES

Pillars of Mighty Cathedral Aisles

The crown of a bur oak spreading out as wide as it is tall recalls the open savannas of pre-settlement times. The lowest limbs on this tree would probably have been pruned by fire in that era.

Marsh marigolds (Caltha palustris) brighten spring days in wet forests and flatwoods in Chicago Wilderness.

Trees in Chicago Wilderness once grew as lone sentinels on the prairie. They grew in open groves and sun-dappled woodlands where they sometimes attained the noble shapes that reminded visitor Ellen Fuller of cathedral pillars 150 years ago.

These wooded communities varied over time and space. They blended into each other on their borders. The categories we have created to describe them are only rough descriptions of nature.

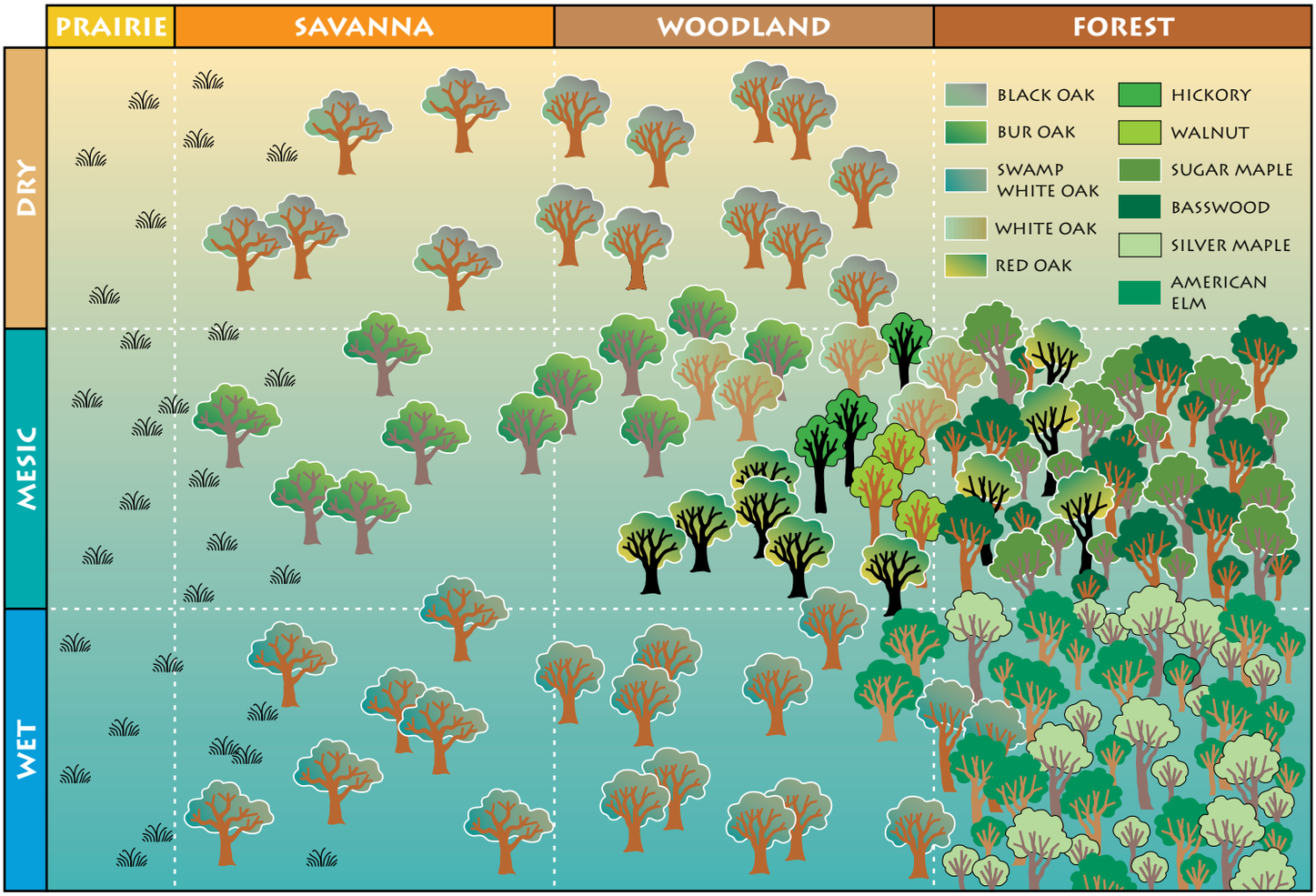
Climate, soils, topography, and drainage set limits on the kinds of natural communities that can live in our region. Other forces shape the landscape within the limits created by these factors. In our landscape, in the thousands of years before large-scale settlement, fire was the most important shaping force.

In those times it was the frequency and intensity of fire that determined whether a given piece of ground would be an open grove or a dense forest. We can arrange the pre-settlement wooded communities on a shade gradient, and when we make such a division, we find that our shade gradient is also a fire gradient. The more open communities grew in places where fires came often and burned with some intensity. Shadier places saw fewer fires or less intense fires. Some of our dense forests are fire sensitive communities that could live only where fires were rare events.

Our sunniest places were prairies where no trees grew. The next community on our gradient is the savanna. Savannas are considered grasslands with some trees. Ample sun reaches the ground, promoting the growth of a heavy turf of grasses and wildflowers that is fuel for fires.

Our open woodlands are some of the most distinctive communities in the region. Here grew white oaks (*Quercus alba*), bur oaks (*Quercus macrocarpa*), and red oaks (*Quercus rubra*), along with shagbark hickory (*Carya ovata*), bitternut hickory (*Carya cordiformis*), and black walnut (*Juglans nigra*). The understory in these woods was equally varied. Some had thickets of shrubs like American hazel (*Corylus americana*) and wild plum (*Prunus americana*). Other forests were open enough to allow farmers to drive a team and wagon through them. The species of trees in these woods were adapted to frequent fire. The canopy was open enough to allow oak seedlings and saplings to grow.

Our dense forests included some communities where fire was still a factor. At the heart of many prairie groves were stands of red oak (*Quercus rubra*) and black maple (*Acer nigrum*). And small areas had communities dominated by sugar maple (*Acer saccharum*) and basswood (*Tilia*



WOODED COMMUNITIES IN THE CHICAGO WILDERNESS

This diagram arranges the pre-settlement wooded communities of this region on two axes. One separates them according to soil moisture from wet to dry and the other according to the density of the tree canopy. This density gradient is also a fire gradient. Fires burned hotter and more often in the communities to the left of the diagram. Communities to the right saw fewer fires.

americana) where fire played little or no role.

We can also divide our wooded communities into categories based on soil moisture. In our region moisture conditions for plants are mainly affected by soil texture and drainage.

The classifications scientists use to describe natural communities give a short, simple name to a very complicated thing. When we talk of "oak savannas" or "oak-hickory forests," we are referring to communities that may include hundreds of species of plants, and—when you add up all the beetles, spiders, snails, and centipedes—thousands of species of animals. When we study a real natural area and decide what communities are present, we look at the entire biota, all the living things. Overall differences in the biota tell ecologists whether a given community developed as an open woodland or a dense forest. The biota also help us identify communities that have been seriously harmed by the changes that large-scale settlement has brought.

All of our wooded communities have been changed by the altered conditions that have followed settlement. The suppression of fire, in particular, has had a profound effect. With fire gone from the community, fire sensitive trees such as box elders (*Acer negundo*), ashes (*Fraxinus spp.*) and sugar maples have moved into oak forests, open woodlands, and savannas, places where they could not survive when fire was an active force.

These trees cast a dense shade. If we looked only at the amount of shade, we might today identify a remnant open woodland or a savanna as a dense forest. But if we look at the more conservative plants and animals, those most tied to a particular community, we see herps and wildflowers typical of open woodlands. The biggest and oldest trees are white and bur oaks, open woodland trees.

All these things tell us we are not looking at land that was originally a dense forest; we are looking at a savanna or open woodland undergoing a process of decay. The species that live in these communities, the species that with their combined activities create these communities are dying out. Thousands of years of history in this place and millions of years of evolutionary history are dying with them. Only a poor mix of a few trees, some weeds and much bare ground remains. Fortunately restoration can reverse this trend.

WOODED COMMUNITIES

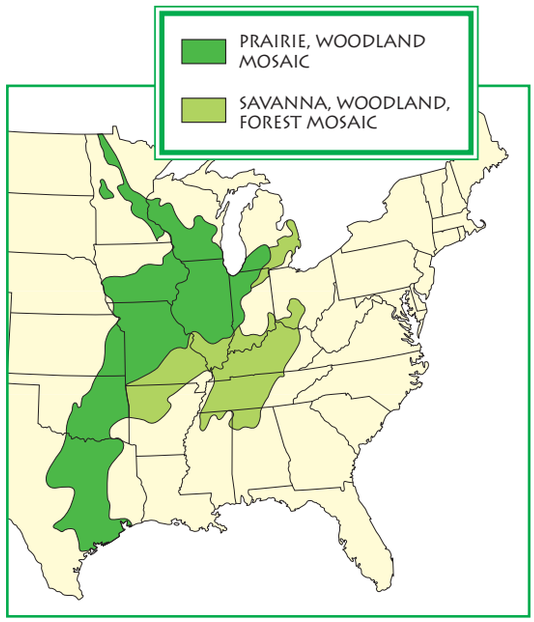
Savannas

Swamp white oaks and pin oaks (Quercus palustris) shade the wet savanna while tall joe pye weed (Eupatorium maculatum) brightens late summer with its purple flowers.

Black oaks are the most common trees in the sand savannas.

Bur Oak

*Bur oaks (*Quercus macrocarpa*) are the most common trees of the Midwestern mesic savanna groves. Their thick, corky bark helped the large trees survive intense fires. Even fires hot enough to kill the above-ground parts of the tree could not harm the roots. Dormant buds at the base of the dead trunk could spring to life and produce new stems. Enormous root masses called grubs grew over the years. With these well-established root systems feeding them water and nutrients, the young stems needed only a few years without fire to grow tall enough to get their crowns above the flames, giving them a good chance of surviving fires. Concentrations of bur oaks in the Chicago Wilderness often mark places where fire was frequent in the past. The heart of this species' range is in the savanna region of the Midwest.*



Savanna trees have broad crowns, an indication that they grew in places where they had space to spread out. Some old savanna oaks are as wide as they are tall.

Sand savannas grow on dunes along Lake Michigan and inland on sandy soils. Black oaks (*Quercus velutina*) are the dominant trees in these savannas, although white pine (P*inus strobus*) and jack pine (*Pinus banksiana*) are part of this community in the Indiana Dunes. The understory of the sand savanna is mainly species typical of dry prairies.

The sandy soils of the sand savanna create a dry environment that makes it easier for fires to burn through them. However, these soils have very low fertility. Because of this low fertility, the annual production of new leaves, stems, and twigs is small. Low productivity means there is little fuel for fires, so when fires do break out, they are likely to be small.

The ability of oaks to resprout from their roots after the above ground parts of the tree have been killed by fire is one of the reasons they are able to thrive in fire-dependent communties such as savannas. Resprouts often grow into trees with two or more trunks rising from one root system.

Wet savannas grow on land with a subsoil of clay that prevents water from draining away. Standing water may be present in spring and early summer, but by autumn, the ground is dry enough to allow a fire to burn through the grove. Swamp white oaks (*Quercus bicolor*) are the most common trees.

The major tree of the mesic savanna is the bur oak (*Quercus macrocarpa*), our most nearly fireproof local tree. Bur oak savannas occupy silt-loam soils as well as gravel soils.

Bur oak savannas have nearly vanished. Grazing killed off much of the understory and fire suppression allowed fire sensitive trees and shrubs to invade. These cast enough shade to prevent the oaks from reproducing.

The understory in these savannas was either graminoid—which means dominated by grasses—or shrubby. American hazel (*Corylus americana*) and wild plum (*Prunus americana*), which can both grow in areas with moderate fire regimes, were typical shrubs.

Open Woodlands

The open woodlands of the Chicago region were one of the most distinctive and diverse community types in our native landscape. Oaks, as a group, were the most common trees in these woodlands, but the exact composition of the community was quite varied.

On mesic soils—places where soil moisture lay between the extremes of wet and dry—combinations of oaks and hickories (*Carya spp.*) might be found. Mixed oak woods where bur oak, white oak, and scarlet oak (*Quercus coccinea*) grew together were also present. Smaller amounts of black cherry (*Prunus serotina*) might also be present, but the thin bark of this species leaves it vulnerable to fire.

Trees in open woodlands grow much closer together than savanna trees, and their crowns are correspondingly narrower. However, enough light reaches down to the lower trunks to allow branches to grow low on the trees.

The presence of fire in open woodlands prevents invasive species such as ashes and sugar maples from taking over the community, and the open quality lets in enough light to permit the oaks to reproduce and maintain themselves as the principal trees.

In the native landscape, when healthy open woodlands could be found throughout the region, these communities were home to some spectacular concentrations of wildlife. The many nutbearing trees—oaks, hickories, and walnuts—along with the presence of American hazel (*Corylus americana*) shrubs in the understory, provided rich food sources for the now-extinct passenger pigeon (*Ectopistes migratorius*) and for wild turkeys (*Meleagris gallopavo*) as well. The latter species has been extirpated from this region, but could be reintroduced.

In the understory, plants typical of the open woodlands include yellow pimpernel (*Taenidia integerrima*), a species that might be found in border zones between woodlands and prairies. Wild hyacinths (*Camassia scilloides*) grow in woodlands and savannas.

Our open woodlands have been hit especially hard by the changes settlement has brought. In addition to invasions by native trees, this community has been especially vulnerable to the exotic invading shrub called common buckthorn (*Rhamnus cathartica*). The conditions of medium shade seem ideal for this species. Buckthorn and the native invaders create such dense shade that they kill the understory plants and effectively prevent the oaks from reproducing.

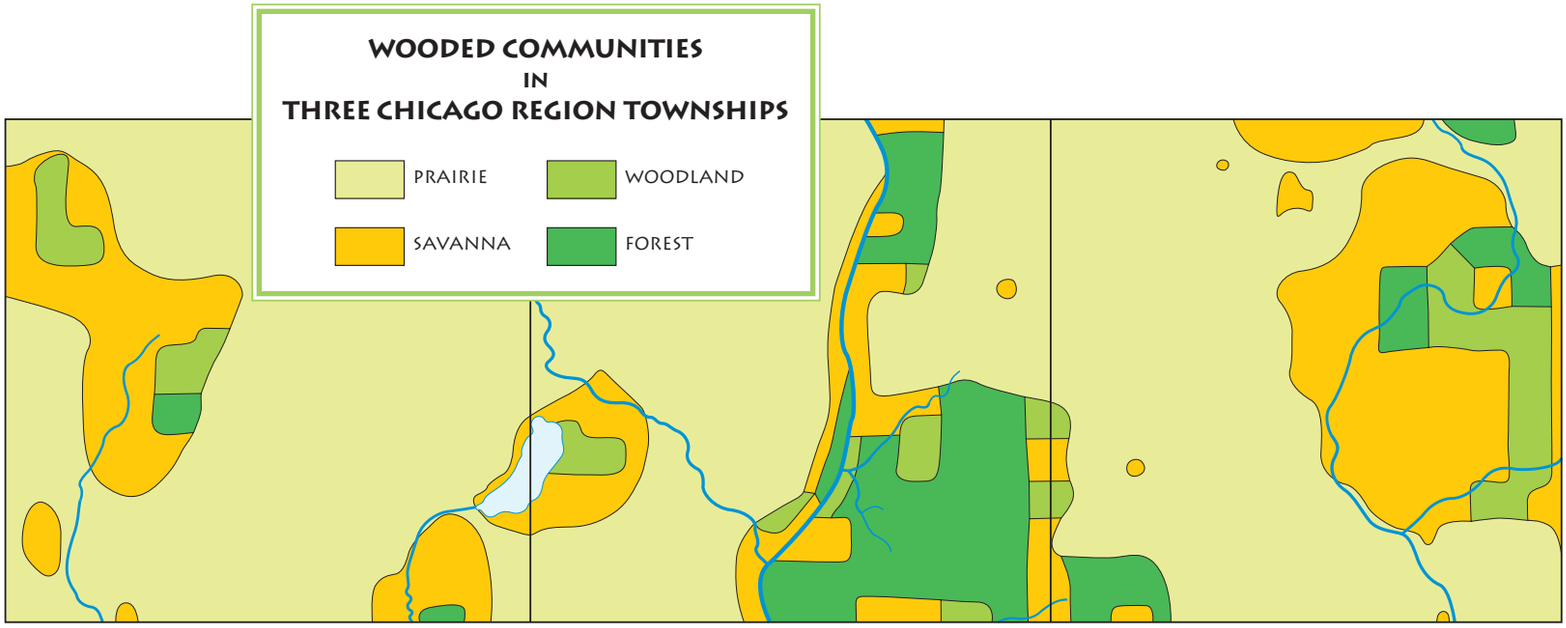
In recent years, restoration and management, including prescribed burnings, have revived many open woodlands. Typical understory plants have returned, and oaks are beginning to reproduce again.

In dense forests, most wildflowers bloom in early spring before the trees leaf out. In woodlands such as the one shown here, more light reaches the ground and more flowers bloom in mid and late summer.

Open oak woodlands with rich understories are one of the natural wonders of Chicago Wilderness.

Black Maples and Sugar Maples

*Botanists still argue about the differences between black maples (*Acer nigrum*) and sugar maples (*Acer saccharum*). The two species appear quite similar in many important respects, and some specimens today show characteristics of both. Older trees are more distinctive, and in the pre-settlement landscape, they behaved in quite distinctive ways. Sugar maples were confined to places where fire almost never came, while black maples could be found in forests and woodlands where fire was a regular occurrence. Black maple would have been the more common species then and the major local source of maple sugar.*



This map of the presettlement vegetation in three townships in eastern Kane and western DuPage County shows the effects of fire on the distribution of wooded communities. Prairie areas on the map are on flat glacial outwash. Wooded areas are on moraines where hills give fires a patchy distribution. Land east of rivers and Nelson Lake Marsh was relatively protected from fire. The most fire-sensitive community, a mesic forest, grew on the east bank of the Fox River.

WOODED COMMUNITIES
Flatwoods

Early spring is wet in the flatwoods.

Flatwoods communities are a product of topography and the complex, multi-layered deposits left by the glaciers. They develop on land that is flat or gently sloping. Below the surface, usually between 24 and 36 inches deep, is a layer of clay that restricts the movement of water down into the ground.

This clay layer is not the virtually waterproof hardpan found under southern flatwoods, but the clay is enough of a barrier to force water to move laterally rather than down. Most of the time, the soil above the clay layer is saturated, and the water moves in sheets over the surface.

During spring and early summer, water may stand on the surface in puddles and shallow ponds. By late summer, both the surface and the soils above the clay layer, may be completely dry. Small knolls may support plants typical of dry situations, while wetland species grow in the low places.

Fire played a major role in determining just what sort of community developed in this wet/dry situation, but long term fire suppression has made it difficult for us to gauge the extent of fire's effects. Pin oak (*Quercus palustris*) is now frequent in flatwoods, but fire may have kept its numbers down in the past. Other common species are swamp white oak (*Quercus bicolor*) and various ashes (*Fraxinus spp.*), especially black ash (*Fraxinus nigra*). Huge old bur oaks are a feature of some flatwoods. The absence of fire has also allowed silver maple (*Acer saccharinum*) to become common.

It is likely that in presettlement time when fires were frequent, flatwoods were more open and savanna-like than they are now. The change in tree density can lead to changes in the plants of the understory. Open flatwoods share many ground layer plants with sedge meadows. Fire-starved flatwoods are often too shady for such species. Fire-starved flatwoods also contain some of the largest and most vigorous specimens of poison ivy (*Rhus radicans*) in our region. The vines climb to the sky by clinging to the trunks of the largest trees.

Forests

Dense forests were rather rare in the native landscape of the Chicago region. Probably the most common type, the black maple—red oak forest was adapted to periodic fires.

Our forests were sometimes found along rivers or in sheltered ravines near the shore of Lake Michigan where the topography inhibited fires.

At the eastern edge of our region, the American beech (*Fagus grandifolium*), one of the dominant trees in the forests of the eastern states, reaches the western edge of its range. Other prominent species of the beech-maple forest—trees, shrubs, and understory herbs, grasses, and ferns—also are not found west of Porter County, Indiana. A community that dominates much of the landscape to the east is here more like our fens and bogs. It was confined to islands where special circumstances made things suitable for it to grow.

Climate differences may be involved in these changes and soils play a role too, but fire seems to be the major factor. The dominant trees of the eastern forest have little resistance to fire. In the Chicago Wilderness, oak woodlands and savannas grow on lands that would be covered with beech-maple forests just a few miles to the east.

Our floodplain forests are poorly understood, and few high quality examples exist. Silver maple (*Acer saccharinum*) is a dominant species in this forest, growing along with ashes (*Fraxinus spp.*). Before Dutch elm disease struck, American elm (*Ulmus americana*) was an important species in this community.

White trilliums (Trillium grandiflorum) bloom in early spring in an oak forest in Chicago Wilderness.

The groundlayer today is often rather sparse. However, this may represent a post-settlement condition. Because our sewer and drainage systems direct so much water into our rivers immediately after rains, flooding patterns are quite different than they were before settlement. Other changes in these communities may be involved as well.

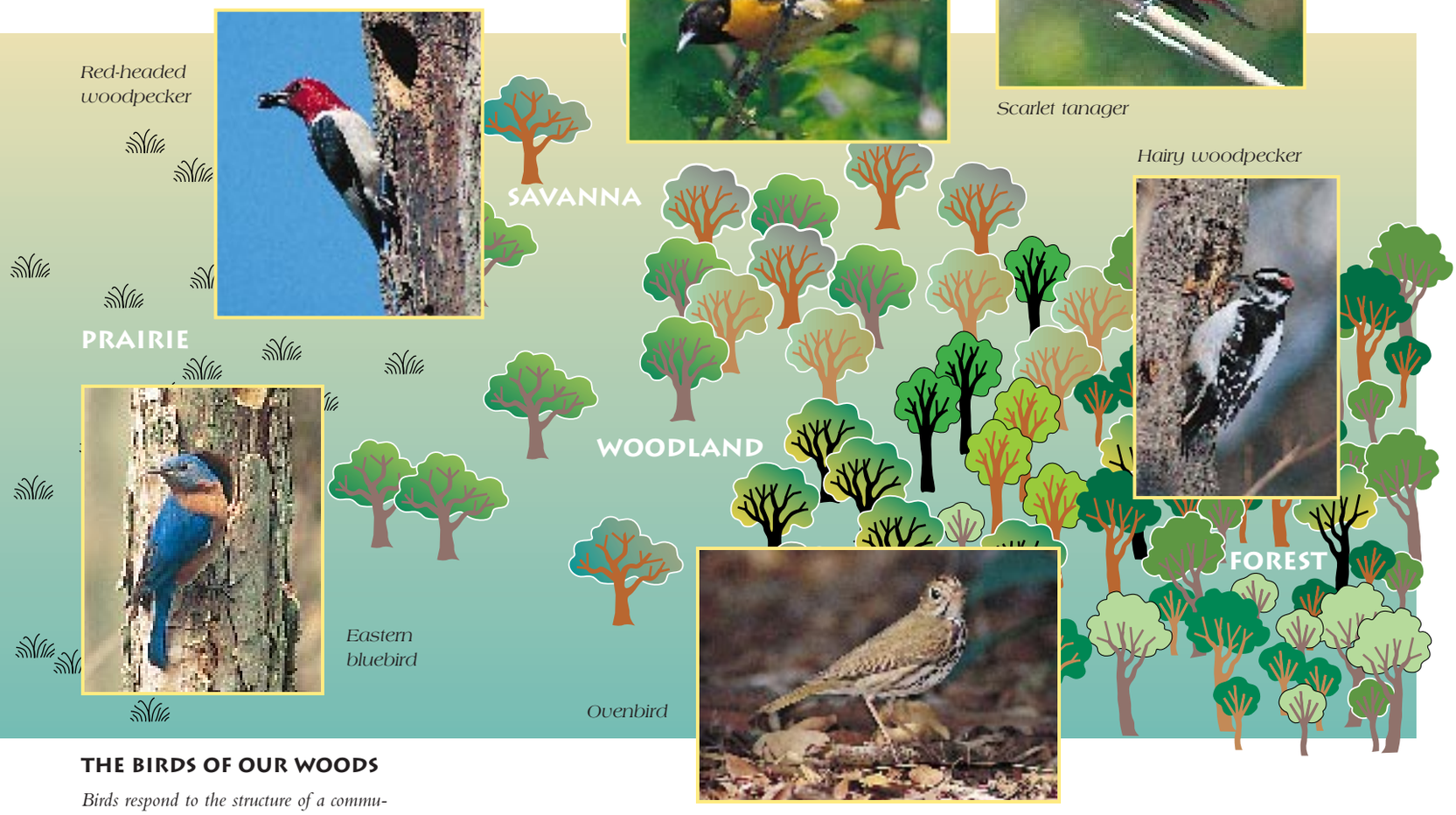
Fire suppression has allowed trees of the floodplain forests to invade upland sites where they did not grow prior to settlement. Swamps, forested areas that stay wet year around, are absent from the Illinois portion of the Chicago Wilderness. They do occur at the Indiana Dunes. Red maple (*Acer rubrum*) is a major species in these swamps.

Fungi

Fungi play three major roles in ecosystems. They are decomposers that break down dead tissue and release nutrients in the tissue for reuse in the system. They are disease-bearers—Dutch elm disease, for example, is caused by a fungus. And they grow on plant roots and help plants absorb nutrients from the soil. These mycorrhizzal (the word means "root-fungus") fungi absorb plant juices as food and deliver minerals to pay for their keep. In laboratory experiments, trees grown without mycorhizzal fungi are seriously stunted. The earth-star fungus (far right) is a decomposer. The ecology of the fungus at near-right is unknown. In Chicago Wilderness, our backyards may be as mysterious as the Amazon.

WOODED COMMUNITIES

Birds



THE BIRDS OF OUR WOODS

Birds respond to the structure of a community, nesting where tree density and size meet their needs. Within each community, they fill different niches based largely on what they eat and how and where they get their food. Woodpeckers look for insects in and on the bark of trees. They search mainly the trunk and larger limbs. They do not compete directly with insect-eating species that search chiefly among the leaves and small twigs in the crown of the tree or with ground feeding species. These divisions of the habitat allow large numbers of species to occupy the same grove of forest.

Birds are usually the most conspicuous animals in any wooded area. In nesting season, their songs are the most characteristic sound. Even in the dead of winter, resident birds sound their call notes as they search for food.

Some of our more common birds—robins, for example—nest wherever there are trees, from city parks and neighborhoods to dense forests. Most species are more specialized.

Birds tend to respond strongly to the structure of the plant community. The size of the trees and the density of tree growth affect bird populations far more than the presence or absence of any particular species of tree.

Northern (or Baltimore) orioles (*Icterus glabula*) favor open savanna groves. They have been able to adapt to the artificial savannas we create in parks. They build their hanging nests high in the crowns of tall trees.

Scarlet tanagers (*Piranga olivacea*), like the orioles, feed on insects and fruit. Orioles feed from the tree tops down to low shrubs, while tanagers do their foraging more exclusively in the crowns of trees. Scarlet tanagers prefer woodlands and forests where trees grow more densely than in savannas.

As a group, woodpeckers feed on the trunks and large limbs of trees. Their powerful beaks and heavy skulls allow them to dig through bark and wood to find beetle grubs and other insects that feed on the trees.

Hairy woodpeckers (*Picoides vilosus*) prefer dense forests and are more likely to be found in large blocks of forest rather than in small wood lots. Their smaller cousins, the downy woodpeckers (*Picoides pubescens*) live among young trees, and in open savanna groves.

Red-headed woodpeckers (*Melanerpes erythrocephalus*) are a species of open woods and groves. They seem to be subject to large population fluctuations. These may reflect the movement of birds to places where insect out-

breaks have made food abundant. The closely related red-bellied woodpecker (*Melanerpes carolinus*) favors woodlands and forests. This species is near the northern edge of its range in our region and is more common in the southern half of the Chicago Wilderness.

The eastern bluebird (*Sialia sialis*) is a savanna species. It needs trees for nest sites—it nests in holes—but it feeds over open ground. Groves scattered across the prairie would be ideal habitat for this bird.

Down on the forest floor, the ovenbird (*Seiurus aurocapillus*) and the wood thrush (*Hylochichla mustelina*) search for insects amid the leaf litter. The ovenbird builds its nest on the ground, while the wood thrush nests in tall shrubs and small trees.

Wood thrushes are among the few species that might benefit from the invasion of our woodlands by common buckthorn, since the growth of more tall shrubs provides additional nesting sites. However, that modest benefit comes at the cost of heavy losses in other animals and plants. Nesting success is also low, so these additional nests add few young to the population.

The red-tailed hawk is a savanna specialist.

Cooper's hawk (*Accipiter cooperii*) is a bird-eating species that seems to favor open woodlands as nesting sites. It has recently been removed from the endangered list in Illinois.

The red-tailed hawk, (*Buteo jamaicensis*), our most common large raptor, is definitely a bird of the savannas. It builds its nest high in the trees, but it hunts by soaring over open fields. A landscape that mixes prairies and woodlands is ideal habitat for this bird.

Gray squirrels do well in dense forests where food is hard to find.

Squirrels

We have two species of squirrels in the Chicago region. One is the gray squirrel (*Sciurus carolinensis*) and the other is the fox squirrel (*Sciurus niger*).

The gray squirrel is mostly gray above, although highlights of buff and brown may show up on the back and head. The belly is white.

The fox squirrel is a bigger animal. Its underparts are rich foxy buff or ochre color, and its tail is richly colored with the same hue.

Scientists have a general consensus that in the pre-settlement landscape, fox squirrels were likely to be found in savannas and open woodlands. Gray squirrels were animals of the denser forests.

This division may be an indicator of the relative importance of predators and the relative difficulty of finding food in the two kinds of habitat. The savannas and woodlands with their acorns, hickory nuts, and walnuts had lots of food, but they probably had many predators as well. Fox squirrels—by size and behavior better able to deal with predators than gray squirrels—could do well there.

The denser forests with fewer nut-bearing trees and sparser groundlayers rewarded food gatherers while predators were not common.

Until about 1950, fox squirrels were increasing in Illinois. Since then, a world of denser woods and fewer predators has seen gray squirrels increase and fox squirrels decline.

Fox squirrels do better in open woods and savannas where both food and predators are abundant.

WOODED COMMUNITIES

Herps

The larvae of a blue-spotted salamander has gills that allow it to live in the water of a vernal pond. Adults hunt on the forest floor.

Vernal ponds are temporary pools wet only in spring. They are essential breeding habitats for amphibians. Fish—major predators on eggs and tadpoles—cannot live in the temporary ponds.

Tiger salamaners are the most common salamander species in savannas. Their long maturation period requires ponds that stay wet well into the summer.

The forests and savannas of the Chicago region are rich in herps. In early spring, long before the leaves have emerged on the forest trees, the raspy, thumbnail-on-comb songs of the western chorus frog (*Pseudacris triseriata*) and the clear whistles of the spring peepers (*Pseudacris crucifer*) bring life to the dormant woods.

The salamanders of the forest floor do not call attention to themselves, but people lucky enough to be in the right place at the right time have seen hundreds at once.

The center of amphibian life in the spring woods is the vernal pond. The key characteristic of a vernal pond is that it exists for only part of the year. Formed of melting snow and early spring rain, it dries up during the summer. Its temporary nature makes it ideal for amphibians, because fish cannot live in it. In permanent bodies of water, fish become major predators on eggs, tadpoles, and salamander larvae, making life much more difficult for the herps.

SALAMANDERS

Eleven species of salamanders live in the Chicago region. Some of them are quite rare. The four-toed salamander (*Hemidactylium scutatum*), a species fond of boggy places with sphagnum moss, is known from only a few locations. The Southern two-lined salamander (*Eurycea cirrigera*) and the smallmouth salamander (*Ambystoma texanum*) live only along the Kankakee River.

The three species most likely to be discovered in wooded areas in the Chicago region are the blue-spotted (*Ambystoma laterale*), the spotted (*Ambystoma maculatum*), and the tiger salamander (*Ambystoma tigrinum*).

All three of these species are called mole salamanders because they spend most of their time either underground or under something on the ground. Dead logs offer good cover as do the undersides of rocks. Herpetologists looking for animals sometimes leave a piece of plywood on the ground. Come back in a few days, and there may be a salamander under it. Rainy nights are the best time to see them out moving around, especially in very early spring when adults are heading for the breeding ponds or in early summer when newly developed juviniles are leaving the ponds.

These three species usually divide the habitat. Tiger salamanders are animals of savannas where trees are widely spaced. Spotted salamanders concentrate in forests, while blue spotted salamanders prefer open woodland situations where the tree canopy is less dense. The blue spotted seems to be most abundant in flatwoods.

Salamanders are predators whose major foods include earthworms, insects, and other small invertebrates.

Salamanders vary in the time it takes them to grow to adults. Blue-spotted salamanders may emerge from the breeding pond during the last week in June. Tiger salamanders do not emerge until three or four weeks later.

Salamanders lay their eggs in the water, and the developing young have to stay there. They breathe through gills, so they cannot leave the water until their adult breathing apparatus is ready. This dependence on water can be a problem in dry years. If ponds dry up before the young have matured, the immature animals die. Animals with longer maturation periods—such as the tiger salamander—are particularly vulnerable. Our alterations of the hydrology of our region, alterations that usually lower the water table, are especially hard on amphibians.

FROGS AND TOADS

The toads and frogs of vernal ponds also leave the water after they mature. The western chorus frogs may move out of the woods into wet prairie areas, if any are available. Spring peepers stay in the trees, although they are unlikely to climb very high. Similarly, the gray tree frog (*Hyla chrysoscelis*) generally stays in small trees or low on the trunks of larger trees. Tree frogs have toes equipped with adhesive pads that help them climb and cling to vertical surfaces.

Frogs absorb water through their skins. They can get water simply by sitting in a puddle, but there is now evidence that some species get the water they need from dew clinging to plants. Many of our wooded areas have been heavily infested by invasive trees and shrubs which cast such a heavy shade that groundlayer plants are killed. Such places are less hospitable to amphibians simply because there are no plants for the dew to cling to.

Our one native venomous snake, the massasauga (*Sistrurus catenatus*) is plainly an animal of the savannas, and particularly, the wetter savannas. It may move back and forth from wooded areas to open prairies. Some of this movement may reflect a search for food, but it may also be a search for just the right temperature. Herps cannot regulate their body temperatures as effectively as birds and mammals, so they need to be able to find places to bask in the sun when they are cold and sit in the shade when they are warm. They can use the cooling effects of standing water as a substitute for shade.

Massasaugas, our only native rattlesnakes, have complex habitat needs. They seem to prefer open savannas where the water table is near the surface. They often occupy crayfish burrows.

Massasaugas eat mice, small birds, frogs, and other snakes. They take over crayfish burrows for shelter, and the bottom of a crayfish burrow is a favored hibernation spot. Crayfish dig down to the water table, so a hibernating massasauga lies in the water, occasionally lifting its head to breathe. Places with clay subsoils that prevent water from draining away are good locations for hibernation.

The raspy songs of Western chorus frogs (above) are a common sound around our forest ponds in spring. Gray tree frogs (right) leave the water after they become adults and ascend into the trees to live.