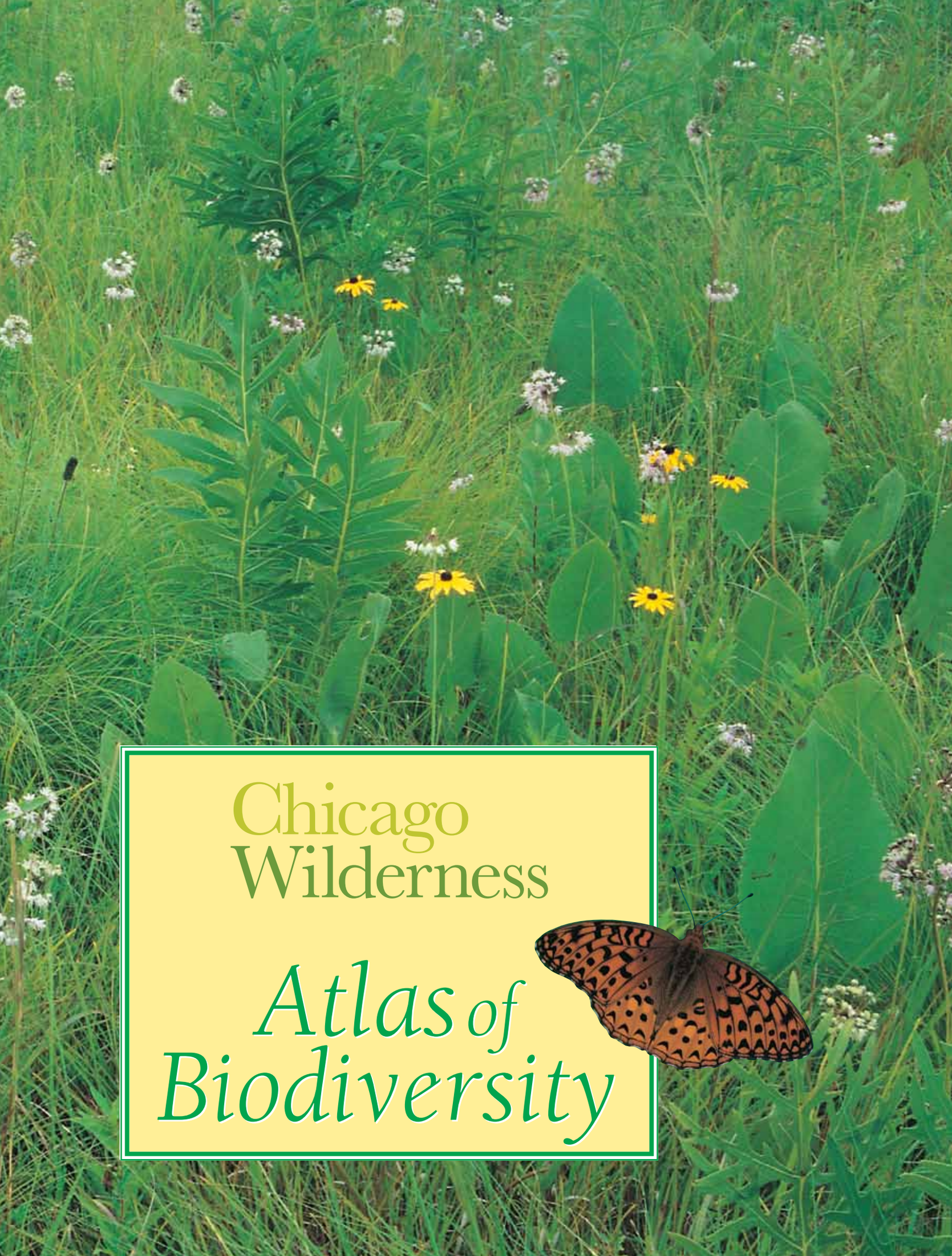

Chicago Wilderness

Atlas of Biodiversity

Chicago Wilderness

Atlas of Biodiversity

First published in 1997, the Chicago Wilderness *Atlas of Biodiversity* provides an introduction to our region's natural treasures. With more than 60,000 copies in circulation, it celebrates our globally significant prairies, woodlands, wetlands, lakes and streams, as well as the many animal species that depend upon them for survival. The nationally-recognized *Atlas* also chronicles the roles that development and urbanization have played in altering our native landscape, along with the restoration efforts of an expanding alliance of local, state and federal agencies, nonprofit organizations, educational institutions, municipalities, corporate partners and individual volunteers.

This updated version of the *Atlas* retains the substance of the first, but has been updated to reflect the many changes over the past several years. New sections include those on climate change and water resources, both of which are growing concerns globally as well as locally. Another new section is the Green Infrastructure Vision, which outlines a strategy to greatly expand the number of acres preserved as natural areas.

The *Atlas* is a vital resource for students, educators and the general public. However, for those who wish to learn more, the Chicago Wilderness *Biodiversity Recovery Plan* provides an outline for recovering the health of the native habitats and animals celebrated in the *Atlas*. To measure progress toward these recovery goals, in 2006 Chicago Wilderness published *The State of Our Chicago Wilderness, A Report Card on the Health of the Region's Ecosystems*.

The *Atlas of Biodiversity* is a publication of the Chicago Wilderness alliance.

Funds for this publication were provided by the USDA Forest Service, the US Fish & Wildlife Service, and the Chicago Wilderness Corporate Council.

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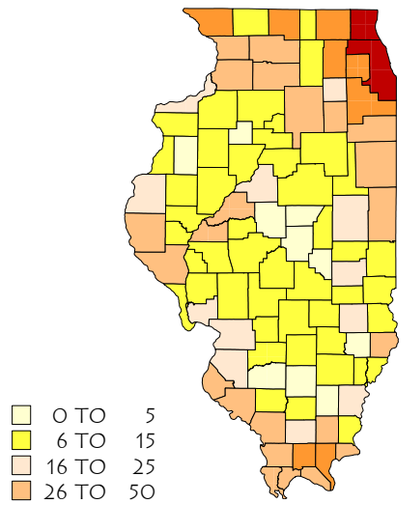
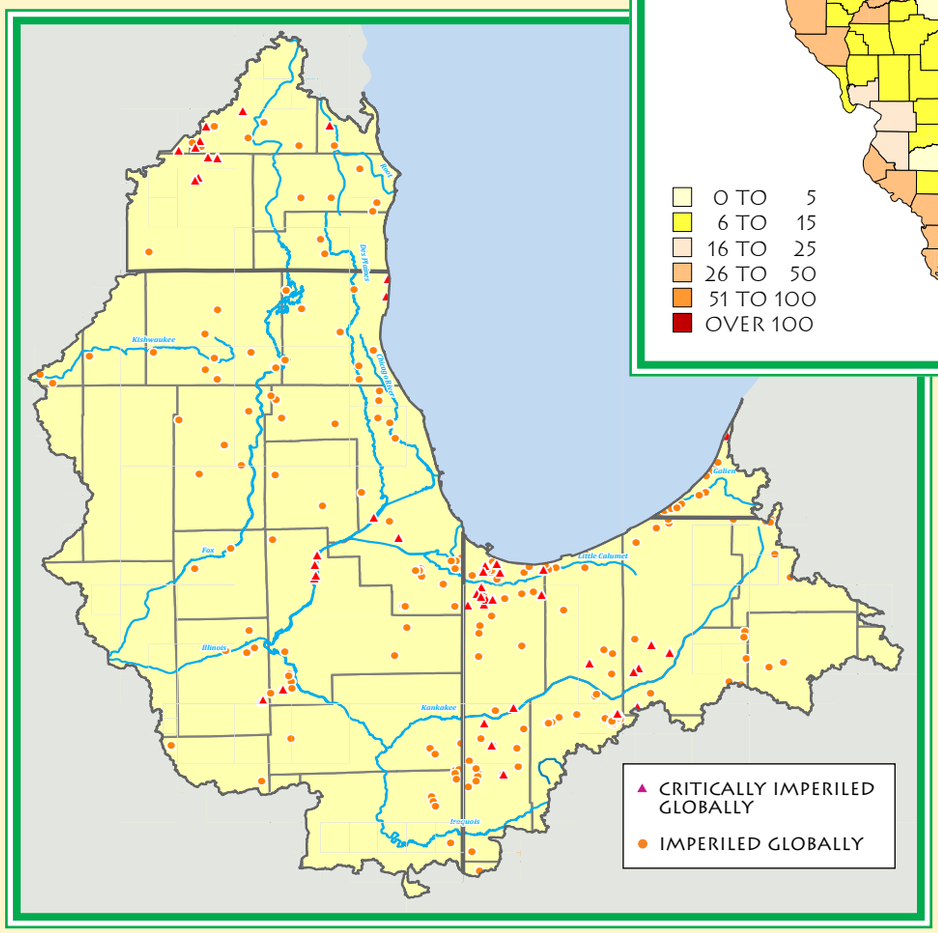
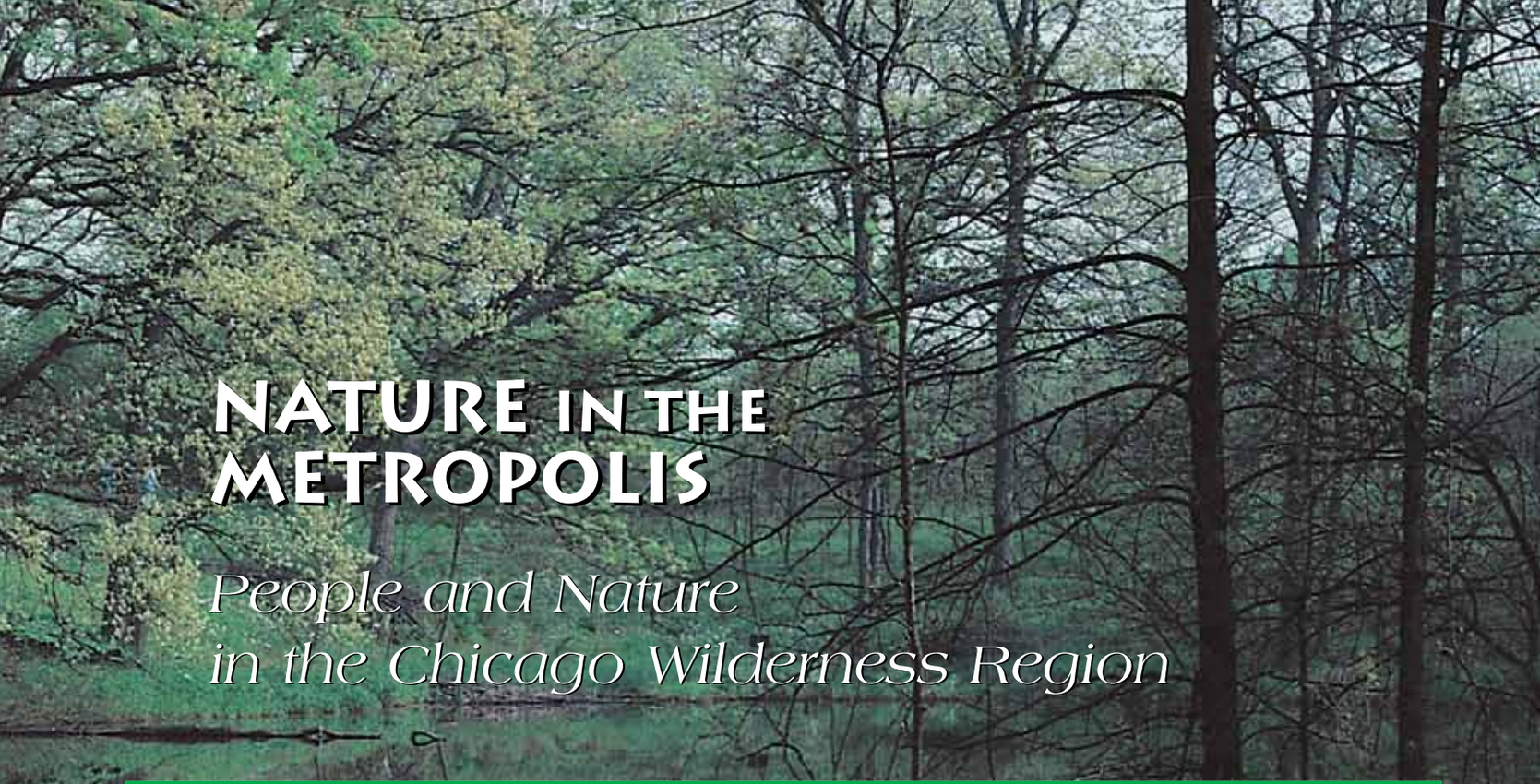


RARE AND ENDANGERED NATURAL COMMUNITIES IN THE CHICAGO WILDERNESS REGION





NATURE IN THE METROPOLIS

People and Nature in the Chicago Wilderness Region

Embedded in one of North America's largest metropolitan regions and stretching along Lake Michigan from southeastern Wisconsin, through northeastern Illinois, into northwestern Indiana and southwestern Michigan is a mosaic of natural areas that includes nearly 370,000 acres of protected lands and waters.

The natural areas of Chicago's wilderness are home to a wide diversity of life and globally rare habitats—prairie, pannes, coastal wetlands, oak savanna, fens, sedge meadows, flatwoods, and more. Thousands of native plant and animal species live here among the more than nine million people who also call the region home.

Nature offers us many benefits: wondrous places for play, recreation, and exploration, as well as opportunities for learning, discovery and spiritual renewal. Healthy ecosystems also provide us essential services, including fresh air, clean water, healthy soil, flood protection, pollution filtering, and habitat for plants and wildlife.

As residents of the Chicago Wilderness region, we are fortunate to have access to a relatively large amount of open space and natural areas. But, over the past two centuries, Chicago's wilderness has been greatly impacted by farming, industry, and development. Local nature now faces serious threats, including fragmentation of green open spaces; invasive plant and animal species like buckthorn, garlic mustard, and zebra mussels; pollution; and the impacts of global climate change.

Founded in 1996 with the mission of preserving and restoring the biodiversity of the region and collectively addressing these threats, the Chicago Wilderness alliance is made up of local, state and federal agencies, large conservation groups, education institutions, grassroots volunteer groups, municipalities, faith-based groups, and corporate partners. Alliance members work together to restore local nature and improve the quality of life for all living things by protecting the lands and waters on which we all depend.

An energized network of volunteers, stewards, citizen scientists, and monitors also works tirelessly throughout the region in collaboration with land management agencies to protect and restore nature for their families and future generations.

Please join us in celebrating our treasured communities of plants and animals. Learn more about them in the *Atlas*, and then go exploring for yourself—there is a lot of nature to see in our metropolis' many parks and preserves.

GEOLOGY OF THE CHICAGO WILDERNESS REGION

Ice built the landscape of the Chicago Wilderness region. Major construction began about 26,000 years ago and ended about 13,000 years ago when the glaciers receded from the Chicago region for the last time. Even after the ice had gone, the after effects of glaciation repeatedly remade the shoreline of Lake Michigan. The lake stabilized at its present size just 2,000 years ago.

The Ice Age, geologists call it the Pleistocene, saw four major ice advances in eastern North America. The first occurred about 500,000 years ago. The last—the Wisconsin stage—began about 70,000 years ago. At one time, the Wisconsin ice spread as far as Shelbyville, Illinois, 200 miles south of Chicago. Our landscape reveals the complex series of ice movements that occurred during the later years of the Wisconsin glacial episode.

The glaciers that covered our region were as much as a quarter of a mile thick. Land around the northern Great Lakes is still rising, still rebounding from the weight placed upon it by the ice thousands of years ago.

It would seem that something that big could go wherever it wanted to go, but in fact, the land under the ice exerted a powerful influence on glacial movements. In central North America, the ice followed river valleys, and over the course of the Pleistocene, scoured those valleys into the deep, broad basins that now hold the Great Lakes. The landscape of the Chicago region records five major advances of the ice out of the Lake Michigan basin alternating with periods when the ice retreated to the basin.

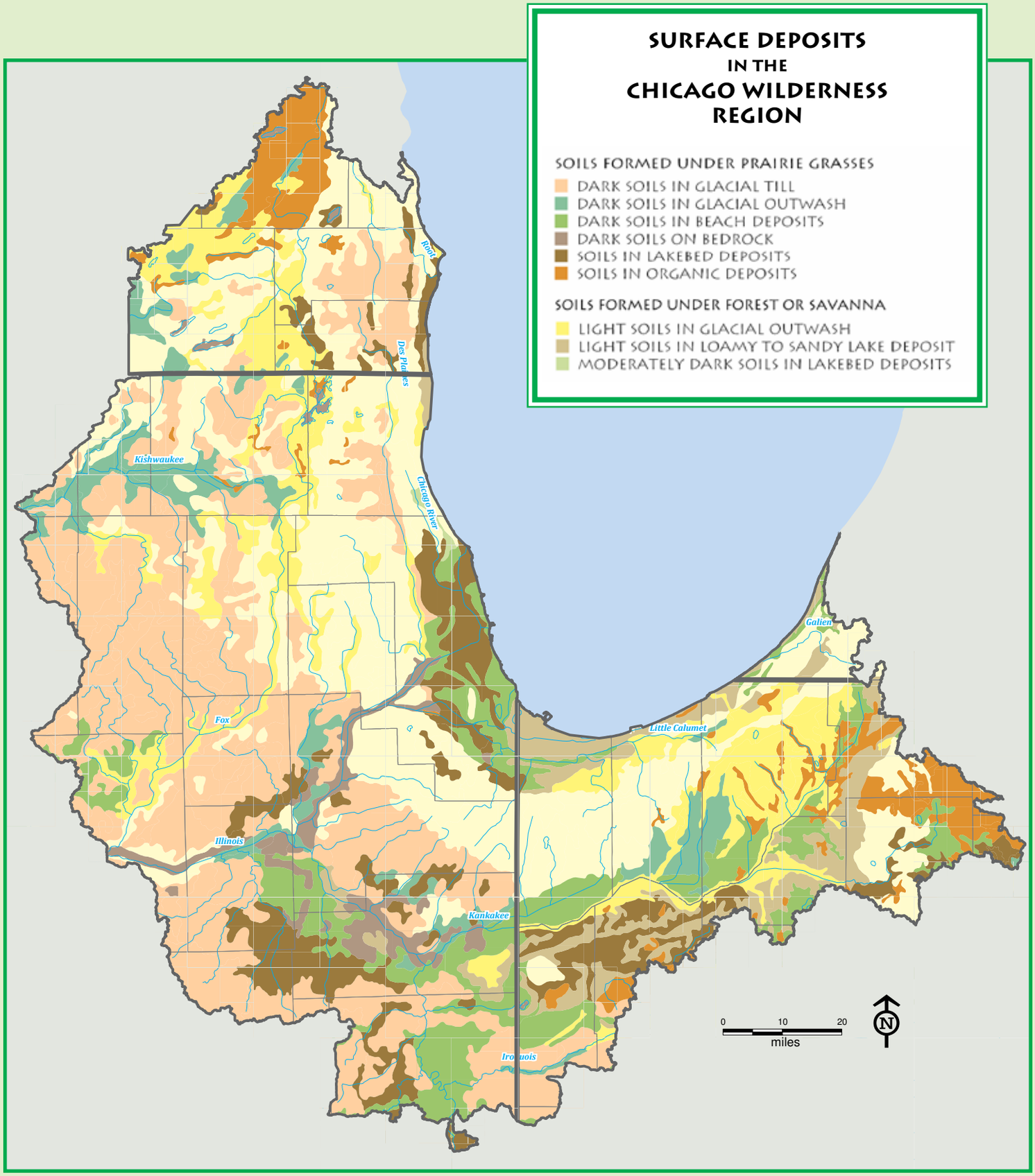
The glacial constructions cover a bedrock foundation made of very old sedimentary rocks. In the Chicago region, the most common type of bedrock is a magnesium-rich limestone called dolomite that was originally deposited on reefs set in shallow seas during the Silurian period about 400 million years ago. The youngest bedrock in our region dates from the Pennsylvanian period about 300 million years ago. This is the rock that contains the coal deposits in Will County.

There are highlands and valleys in our bed-rock, but none of them corresponds to the highlands and valleys visible at the surface. The surface features are all made of material depos-ited by the glaciers or by the lakes that appeared as the glaciers melted. In some places, these deposits are nearly 400 feet thick. Only along the Des Plaines River in southwestern Cook and western Will Counties are bedrock exposures large enough to have an effect on living things. There, unique communities of plants and animals live on soils only a few inches thick that lie above the Silurian dolomite bedrock.

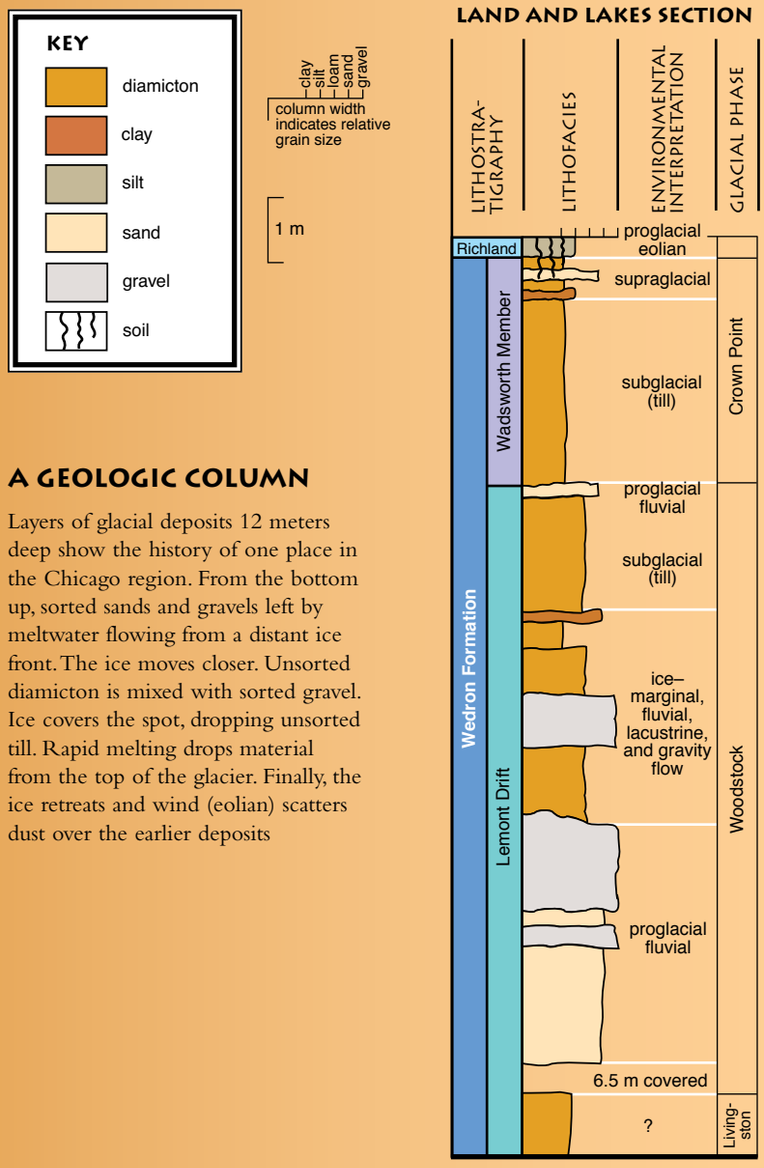
GLACIAL DRIFT

Drift is the traditional term for the material left behind by glaciers. There are two kinds of drift. *Till* is material that was deposited directly from the glacier. *Outwash* is material deposited by meltwater flowing from the glacier.

Glaciers are supreme earth movers. As their enormous weight scrapes across the ground, they easily collect loose surface deposits. Bedrock is harder to dislodge, but they manage to collect it as well. Frozen into the ice as a totally unsorted mixture of giant boulders, cobbles, gravel, sand, silt, and the finest of clay particles, drift can be carried hundreds of miles. When glaciers begin to melt, this material drops out and piles up in front of the ice. Glaciers are always moving, and sometimes their rate of movement is equal to their rate of



Deposits left by the glaciers or by the lakes that formed as the glaciers melted are the raw materials of soils. Topography, drainage, climate, and vegetation shape these raw materials into soils. The process takes centuries. In a dynamic landscape, vegetation may change more rapidly than soils. We may find prairies growing on forest soils and forests on prairie soils. The scale of the map allows us to show only broad categories. Small patches of soil that do not match the surrounding land will not appear.



A GEOLOGIC COLUMN

Layers of glacial deposits 12 meters deep show the history of one place in the Chicago region. From the bottom up, sorted sands and gravels left by meltwater flowing from a distant ice front. The ice moves closer. Unsorted diamicton is mixed with sorted gravel. Ice covers the spot, dropping unsorted till. Rapid melting drops material from the top of the glacier. Finally, the ice retreats and wind (eolian) scatters dust over the earlier deposits

melting. Geologists call such times "still stands." The ice front appears to be standing still, but it is really acting like a giant conveyor carrying an endless supply of fresh drift to the ice front.

At a stationary ice front, heaps of drift can form hills hundreds of feet high. Since these hills are made of till, they are an unsorted mixture of everything from rocks the size of garages to microscopic clay particles. Immense blocks of ice break off from the melting glacier and are buried in this debris. As they melt, they form ponds and lakes.

The landscapes created by these conditions are called *moraines*. Moraines are places where knobby hills and ridges are mixed with kettle-holes where blocks of ice melted into lakes and marshes. The Chicago region has hundreds of square miles of moraines where the varied landscape supports a rich assortment of natural communities that are home to much of the biodiversity of the Chicago Wilderness region.

When a glacier a quarter of a mile thick begins to melt, it floods the land with cascades, torrents, whole lakes full of water. In our region, many proglacial lakes were dammed between the ice front and older moraines. They filled, endured for a few decades or a few centuries, and drained away. Rivers a mile wide scoured valleys. In some places the water just poured over the land in sheets.

Water sorts the particles it carries. It takes a heavy, powerful flow to push a boulder along. As the current slows, smaller and smaller particles settle to the bottom: gravel, sand, and silt along rivers; clays in the lake bottoms. Much of the surface deposits on the lowlands lying between the moraines in the Chicago Wilderness region are made of outwash.

SHAPING THE LAND

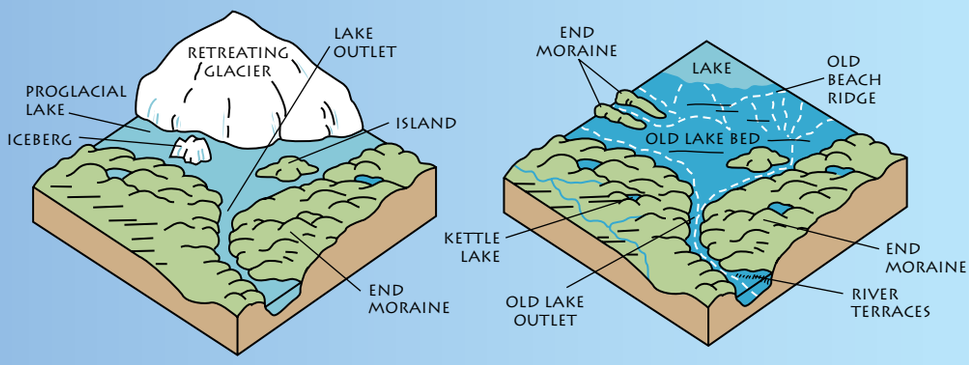
The ice advance of 26,000 years ago that began the process of shaping our landscape brought the ice front to the Marengo Moraine, often called the Marengo Ridge, which runs north and south through western McHenry County to Kane County. This is the westernmost and oldest of the moraines in our region.

The push south to Shelbyville came after the building of the Marengo Ridge, but by about 17,500 years ago, the ice front had once again melted back to the Chicago area. This was the beginning of a very eventful few thousand years. The ice, in a complex dance of advance-retreat-readvance built a zone of overlapping moraines that extends from western Kane County to the shore of Lake Michigan. The ice moved rapidly—by glacial standards—and each episode of moraine building was followed by a retreat when the ice melted back—often as far as the Lake Michigan Basin.

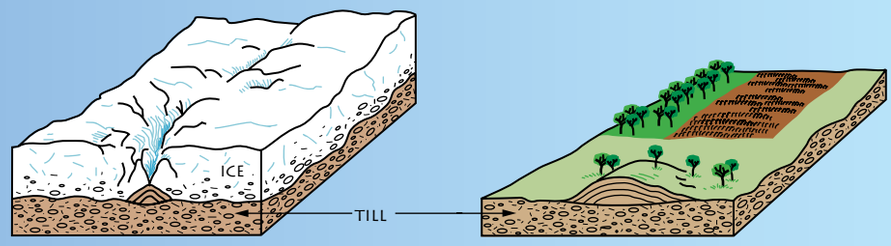
The oldest moraines in our region are to the west and south. The land gets progressively younger toward Lake Michigan. Our largest moraine belt is the Valparaiso Moraine which runs south through Lake, Cook, and DuPage Counties before swinging east through Will County and Lake and Porter Counties in

GLACIAL PROCESSES

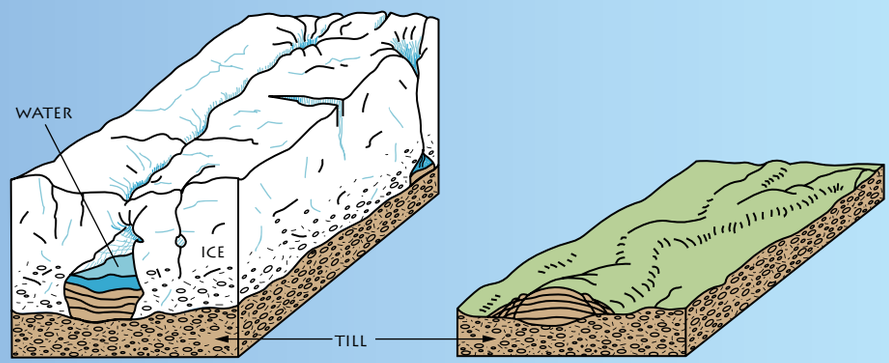
A glacier melts back from an end moraine. The moraine acts as a dam, holding in the waters of a proglacial lake. The water cuts a single outlet channel through the moraine. As the lake drains away, the lake bottom becomes a plain marked with sandy beach ridges located along the old shoreline.



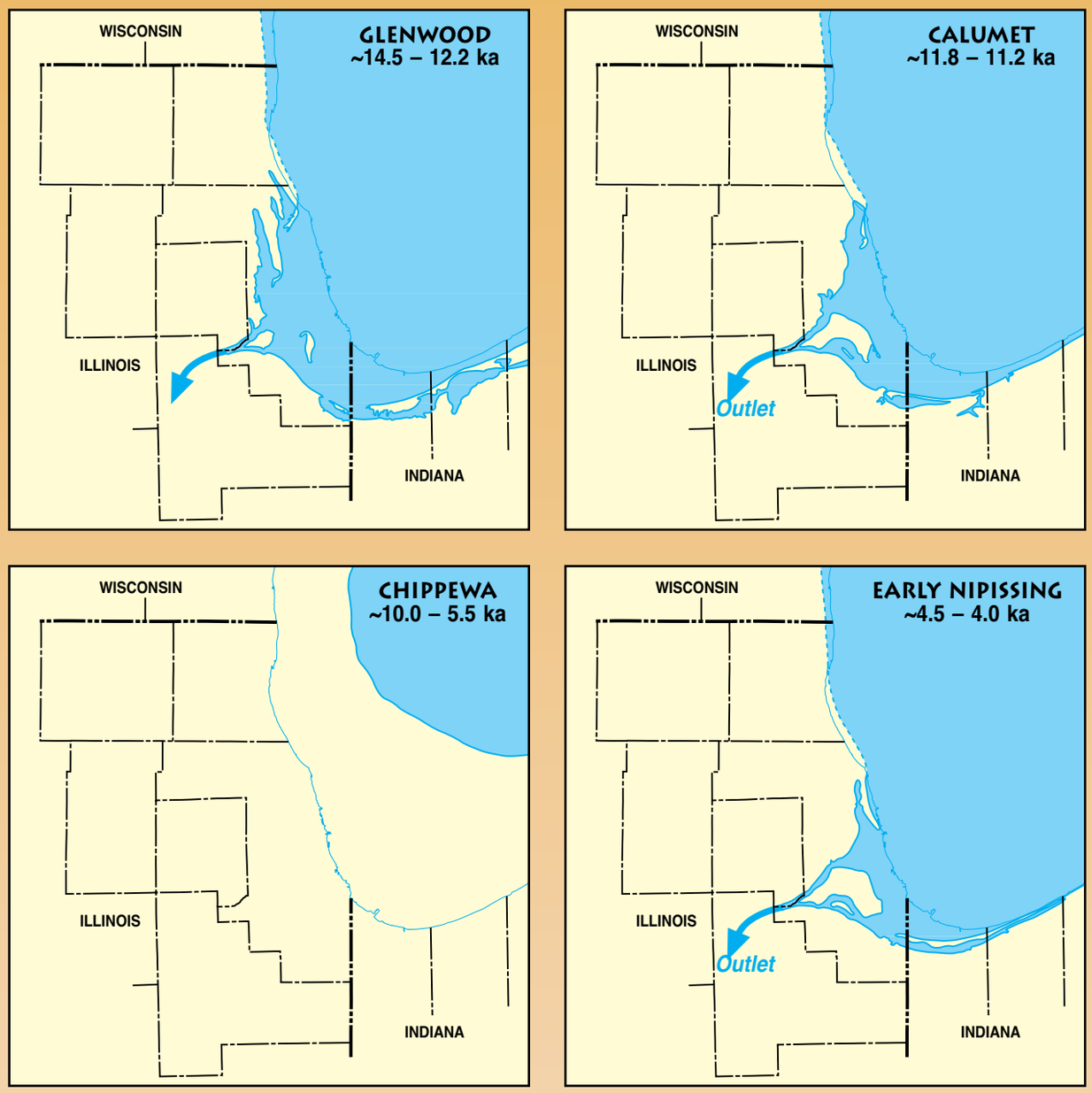
Meltwater swirls down through a hole in the ice. The moving water carries away smaller particles, leaving a mound of gravel called a *kame*.



Meltwater flows under the ice in a winding channel like the meandering course of a river. With the ice gone, deposits left by the water make an *esker*, a ridge that winds like a river.



The narrow ridge of the Visitation Esker in southwestern Cook County meanders through Cap Sauers Holdings, a Forest Preserve District of Cook County reserve.



LAKE MICHIGAN'S EVENTFUL HISTORY

The lake began as a proglacial lake dammed between the ice front and the moraines that circle the southern end of the Lake Michigan Basin. This Glenwood Stage was 55 feet above the present level of the lake. Sand ridges on the moraines mark that early shore. The lake overtopped the moraine in what is now southwestern Cook County and rapidly eroded an outlet (the Sag Valley) nearly a mile wide.

The Calumet Stage was about 35 feet above the present level. Blue Island, where resistant bedrock had prevented erosion by the ice, stood above the water.

The low-water Chippewa Stage occurred when a temporary outlet opened for Lakes Michigan and Huron through North Bay, Ontario. Water fell to 300 feet below the present level. Forests grew in what is now deep water.

Geologists call these early stages Lake Chicago. The title "Lake Michigan" refers to stages that occurred after ice had completely left the basin.

The Nipissing Phase of Lake Michigan saw water rising again over the lake plain and drainage from the lake flowing south through the Sag and down the Des Plaines to the Illinois. This phase left several prominent landmarks, including the beach ridge that provided the route for Clark Street in Chicago.

Indiana. The Valparaiso Moraine is as much as 25 miles wide with many high ridges and kettlehole lakes and marshes. Our youngest moraines are the Lake Border Moraines in Lake and northern Cook County, Illinois. Five separate Lake Border moraines, all lying parallel to the shore of Lake Michigan, have been named. The low areas between these moraines are the valleys of the Des Plaines and Chicago Rivers. Glaciers never returned to land in the Chicago region after the easternmost of these morainal ridges fell from the ice about 14,000 years ago.

However, the history of Lake Michigan was just beginning. The earliest proglacial lake, the Glenwood Phase of Lake Chicago, was 55 feet above the present mean level of Lake Michigan. As the lake went up and down with the geological changes that followed the retreat of the ice, it left behind beaches, sandspits, and thick layers of clay fallen from quiet waters. These features mark the largest of our lake plains, the Chicago Lake Plain. Most of the modern city is located on this plain.

The early stages of Lake Chicago drained south to the Illinois and Mississippi Rivers through a gap in the moraines called the Chicago Outlet in what is now southwestern Cook County. The rush of water through this gap cut the Sag Valley and eroded the Des Plaines River channel down to bedrock in Cook and Will Counties.

After cutting the channel of the Des Plaines down to bedrock, the lake stabilized for a time, then dropped again after a new outlet opened to the north, shutting down the so-called Chicago Outlet. However, the lake returned to the Chicago Outlet in later times, most recently during the Nipissing Phase of Lake Michigan, a period that ended only 4,000 years ago. The youngest land in the region is along the shore of Lake Michigan in northern Lake County (IL). The land in Illinois Beach State Park is sand deposited by lake currents since the end of the Nipissing Phase.

Since the ice departed, the pace and scope of change has drastically slowed. Deposits of wind blown dust called loess (pronounced "luss") have accumulated on the glacial drift. Our rivers have cut more definite channels in the intermorainal areas, although marshes, bogs and other wetlands show that much of the land is poorly drained or not drained at all. Peat has built up in undrained basins and blowing sands have built the high dunes of the Indiana shore.

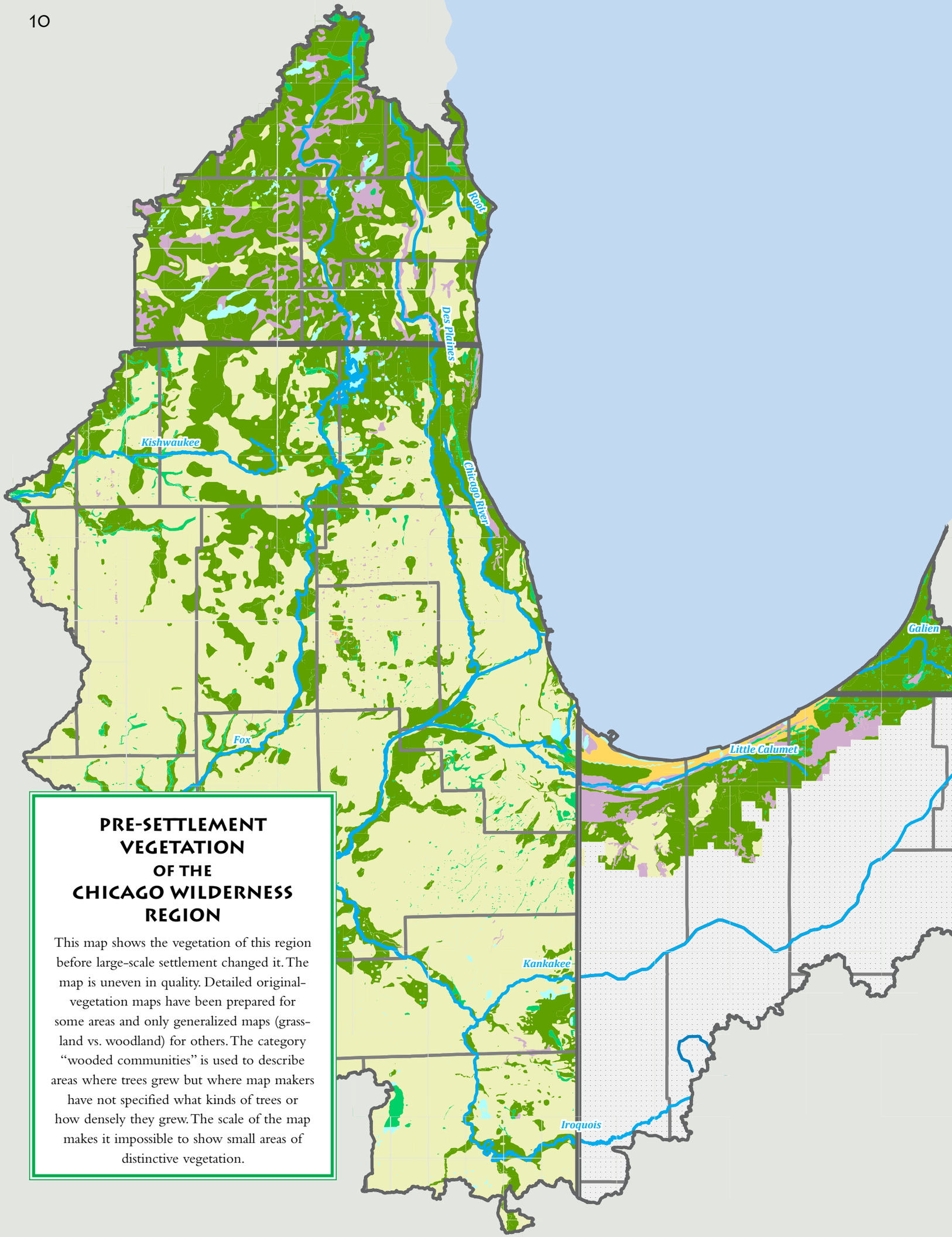
SOILS

The deposits left by the glaciers and the lake stages are the raw materials of soils. The soils themselves develop over centuries, products of climate, topography, and the effects of living things.

Soils that develop on hilltops are quite different from those that develop in low valleys—especially if the valleys are subject to regular flooding. Soils on steep slopes may erode as fast as they develop.

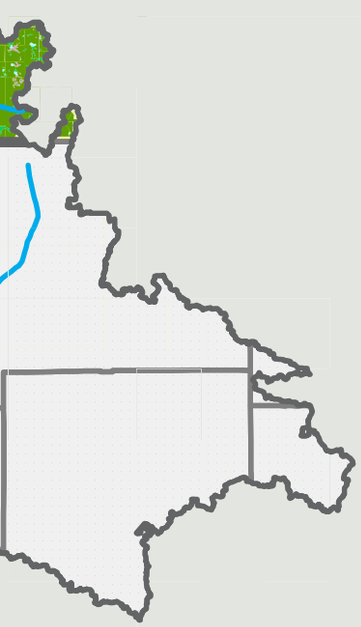
Soils developed under forests are quite distinct from those that were created under prairies. Wetland soils are equally distinctive. We will describe these soils in more detail in the coming pages.

Chicago Wilderness is part of three separate physiographic regions. The regions differ in their geological history, their terrain, and their vegetation.



PRE-SETTLEMENT VEGETATION OF THE CHICAGO WILDERNESS REGION

This map shows the vegetation of this region before large-scale settlement changed it. The map is uneven in quality. Detailed original-vegetation maps have been prepared for some areas and only generalized maps (grassland vs. woodland) for others. The category "wooded communities" is used to describe areas where trees grew but where map makers have not specified what kinds of trees or how densely they grew. The scale of the map makes it impossible to show small areas of distinctive vegetation.



LIVING COMMUNITIES

The varied landscape that remained when the ice departed and the lake retreated to its present shoreline is the base that supports the biodiversity of the Chicago Wilderness region. Sands and clays, hilltops and plains offer different opportunities to different plants and animals. Geology, topography, and climate combine with living things to create *ecosystems*. When we talk of a prairie ecosystem or a forest ecosystem we include both the living things and the non-living things that have an effect on life.

The term *community* or *natural community* refers just to the living things in the ecosystem. Since plants respond more specifically to moisture and light, communities are usually described or named by the vegetation. The members of a natural community are connected in many ways, and these connections are so complicated that we will never understand all of them.

We do know that the loss of a single species in a community can lead to the loss of more species. A flower disappears because the insect that pollinated it is gone. Insects vanish because their food plants have died out.

Healthy natural communities have room for all their species. In healthy communities, we see biodiversity. "Biodiversity" refers to the variety of life, from variations in the genes of individuals to the whole planet and all its millions of species. On a regional level, biodiversity can refer to the many communities that exist side by side.

Biodiversity helps natural communities survive catastrophes. Indeed for some species, events such as floods and storms are opportunities rather than catastrophes.

In the Chicago Wilderness region, we see biodiversity within communities and in the great variety of communities found in the region. We have nearly a dozen kinds of wooded communities. Our prairies are wet prairies, dry prairies, gravel hill prairies, and others. Our wetlands are a very diverse collection of marshes, fens, sedge meadows, bogs, swamps, and the coastal wetlands of Lake Michigan. Each of these separate types has its own special combination of animals and plants.

The next section of this *Atlas* will introduce you to the natural communities of the Chicago Wilderness region and describe some of the animals and plants that make their homes in these communities.

PRAIRIES

In all my life, I never saw or dreamed of so beautiful a sight as the rolling prairies. Nothing can equal the surpassing beauty of the rounded swells and the sunny hollows, the brilliant green of the grass, the numberless varieties and splendid hues of multitudes of flowers. I gazed in admiration too strong for words.

Ellen Bigelow
1835

Miss Bigelow's reaction was shared by many who were lucky enough to see the tallgrass prairie in all its glory. She was a New Englander who had grown up among forests. There are prairies as far east as Massachusetts, but they are small, sunny islands in a sea of trees. In the Illinois country, people moving west found tall waving grasses and the "splendid hues" of wildflowers covering much of the land. Here the prairies were the sea, and the woodlands were shady islands. The prairies of Illinois were the first real American experience of the wide-open spaces. Here you could find yourself in a prairie that stretched to the horizon, without a single tree in sight.

Many early visitors expected the prairies to be of little use to farmers. Their belief was that any soil too poor to grow trees was too poor to grow crops. Others noted the advantages of land that did not need to be cleared of trees. The prairie was instant pasture for cattle and horses and needed only a plow to make it ready to grow crops.

However, the first settlers who tried turning prairie sod with the light wooden plows they had used in the forests got a rather nasty shock. A plow that would turn a clean furrow in forest soil skittered over the surface of the prairie sod like a pebble skipping across a pond. Prairie soils seemed to be mostly roots.

Breaking prairie sod became a business. Men traveled the settlements with heavy plows pulled by several teams of oxen and hired out to plow land at so much an acre. The sound of the tearing roots, they said, was like the rattle of small arms fire, as if an infantry company was engaged in battle. Individual farmers couldn't plow the prairie until 1837 when an Illinois blacksmith named John Deere invented the steel moldboard plow.

EVOLUTION OF THE PRAIRIE

Prairies are grasslands. The dominant plants are grasses—although many other kinds of plants are present. The group of plants we call grasses evolved during the Miocene Epoch, a period that began about 25 million years ago. Grasses have since become the dominant vegetation over large areas of the earth. The prairies of North America, the pampas of South America, the steppes of Central Asia, and the plains of East Africa are all grasslands.

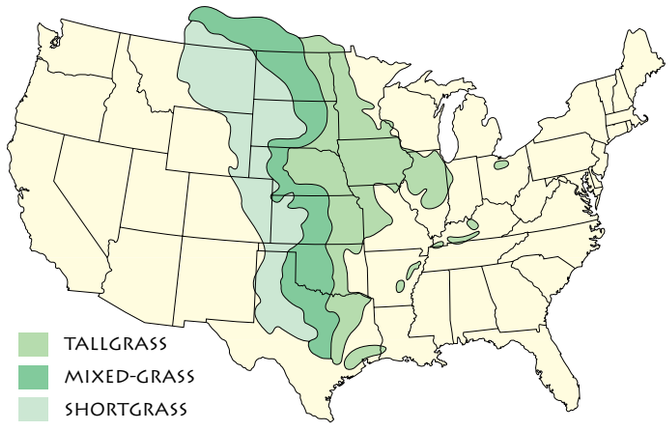
Grasslands develop on flat lands in areas where long periods without rainfall are common—although the climate is not as dry as it is in deserts. These periods of drought may be regular seasonal occurrences—like the dry seasons of tropical lands—or they may happen only in some years—like the summer droughts of the American Midwest.

Those periodic droughts and the flat ground that offers few obstacles to advancing flames have made fire a major force in the ecology of the world's grasslands. Millions of years of evolution in the presence of fire have

Blazing star and goldenrod create a colorful display in a mid-summer prairie. The flower show starts in spring and continues until October.

HISTORIC RANGE OF THE PRAIRIE

Little remains east of the Mississippi, but some of the biggest and best of the surviving remnants are in the Chicago region.



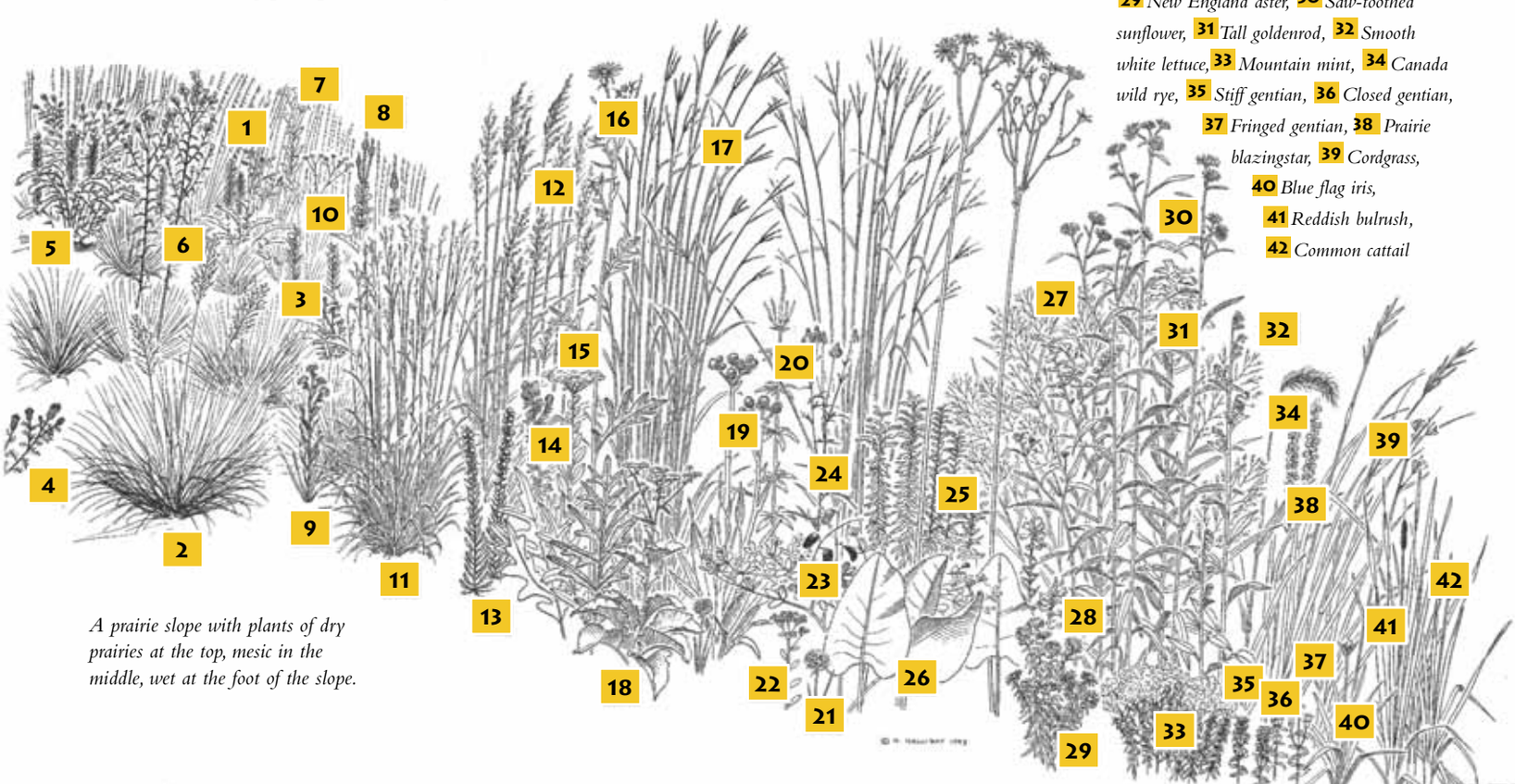
made the tallgrass prairie dependent on periodic fires for its survival.

The prairies of central North America form a triangle extending from the foothills of the Rockies on the west to Ohio on the east. In the Chicago Wilderness region, the prairies share the land with a variety of wooded communities. To the west, trees become more rare. On the high plains in the shadow of the Rocky Mountains, they grow only in narrow strips along the rivers.

The western prairies—the grasslands of eastern Montana, Wyoming, and Colorado, are considered short-grass prairies. Precipitation averages less than 20 inches a year. In the dry, windy environment, plants hug the ground, seldom growing much above a foot in height. With increasing precipitation, the grasses and other prairie plants get taller. From central Nebraska east, tallgrass prairies dominate the treeless parts of the landscape. Early accounts tell of grasses tall enough to hide a man on horseback. That height must have been rare, but settlers often lost cattle in the pastures of August.

ROOTS AND SOILS

Most of the biomass, the living material, of both prairie grasses and prairie wildflowers—botanists call them forbs—is underground. On deep soils, the root systems of some prairie species extend nearly 20 feet below the surface. They may live for decades, each spring sending up new green shoots to flower, set seed, and die.



A prairie slope with plants of dry prairies at the top, mesic in the middle, wet at the foot of the slope.

1 *Side-oats grama grass,* **2** *Prairie dropseed,* **3** *Whorled milkweed,* **4** *Purple prairie clover,* **5** *Gray goldenrod,* **6** *False boneset,* **7** *Tall boneset,* **8** *Hoary vervain,* **9** *Cylindric blazingstar,* **10** *Daisy fleabane,* **11** *Little bluestem,* **12** *Indian grass,* **13** *Rough blazingstar,* **14** *Round-headed bush-clover,* **15** *Stiff goldenrod,* **16** *Compass plant,* **17** *Big bluestem,* **18** *Wild quinine,* **19** *Rattlesnake master,* **20** *Culver's root,* **21** *Wild onion,* **22** *Flowering spurge,* **23** *White wild indigo,* **24** *Yellow-headed coneflower,* **25** *Canada goldenrod,* **26** *Prairie dock,* **27** *Switchgrass,* **28** *Obedient plant,* **29** *New England aster,* **30** *Saw-toothed sunflower,* **31** *Tall goldenrod,* **32** *Smooth white lettuce,* **33** *Mountain mint,* **34** *Canada wild rye,* **35** *Stiff gentian,* **36** *Closed gentian,* **37** *Fringed gentian,* **38** *Prairie blazingstar,* **39** *Cordgrass,* **40** *Blue flag iris,* **41** *Reddish bulrush,* **42** *Common cattail*

Dr. Robert F. Betz
of Northeastern Illinois University led campaign to save Indian Boundary Prairies; initiated first large scale prairie restoration at Fermi National Accelerator Lab near Batavia, Illinois.

These huge root systems are constantly growing and constantly dying. New roots seek new sources of minerals and water in the subsoil. Old roots die and decay, adding organic matter to the soil.

Organic matter may form a layer nearly two feet thick in prairie soils. It is this organic matter that gives prairie soils their dark color. Organic matter also made prairie soils extremely productive of crops such as corn and soybeans. This fertility doomed nearly all the prairies.

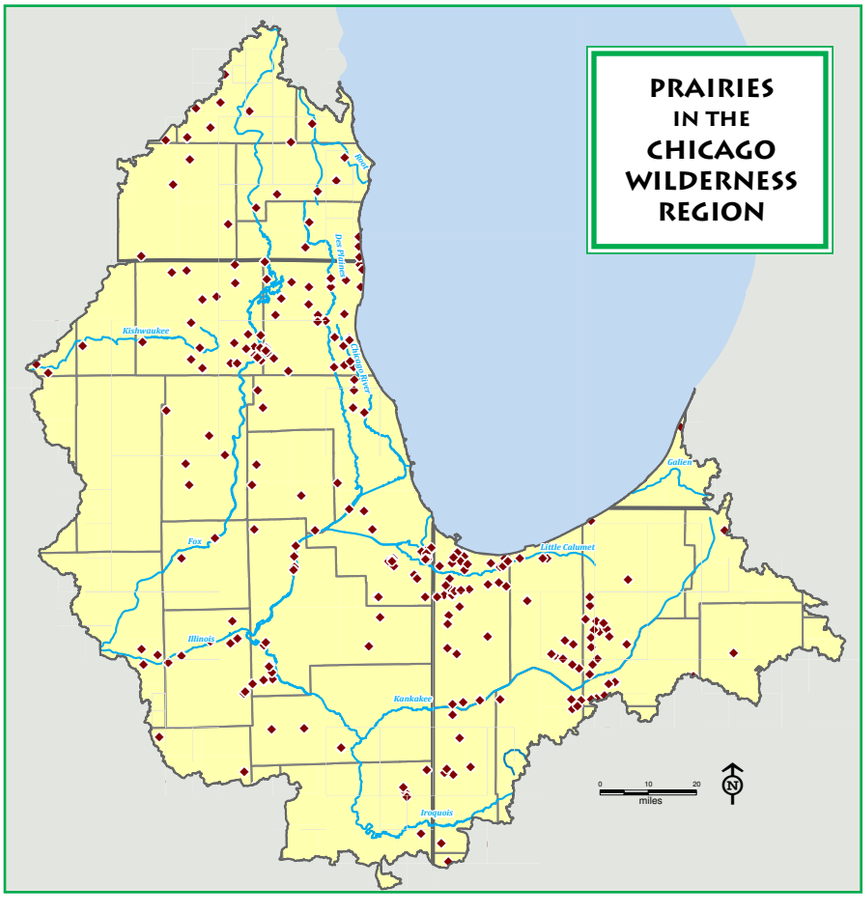
TYPES OF PRAIRIES

As many as 350 different species of plants grew on the prairies of Illinois, Indiana, Wisconsin, and Michigan but they didn't all grow together. Instead they grew in distinctive communities. Each community had its own unique mix of species. Soil moisture and soil texture are the two most important factors in controlling where these communities grew. Prairies on wet soils shared many plants with such wetland communities as sedge meadows and fens. Prairies on sandy soils, where the coarse soil texture lets water drain away quickly after rains, often contained plants more common in the drier lands to the west.

Ecologists have named five moisture groups: wet, wet-mesic, mesic, dry-mesic and dry. The word "mesic"—which means "in the middle" or "moderate"—turns up often in ecology. In addition, two kinds of prairies are classified by the texture of the ground they grow in. Sand prairies grow along Lake Michigan and inland as well. Gravel hill prairies often grow on top of kames.

If we survey the plants growing in a wet prairie, we are likely to find that cordgrass (*Spartina pectinata*) and blue joint grass (*Calamagrostis canadensis*) are the most common grasses. In dry prairies, side-oats grama (*Bouteloua curtipendula*) becomes important. In mesic prairies, the dominant grasses are big bluestem (*Andropogon gerardii*) and northern dropseed (*Sporobolus heterolepis*). The forbs show similar shifts.

A line of life-restoring fire crackles across a natural area. Fire is essential to the health of many different kinds of natural areas.



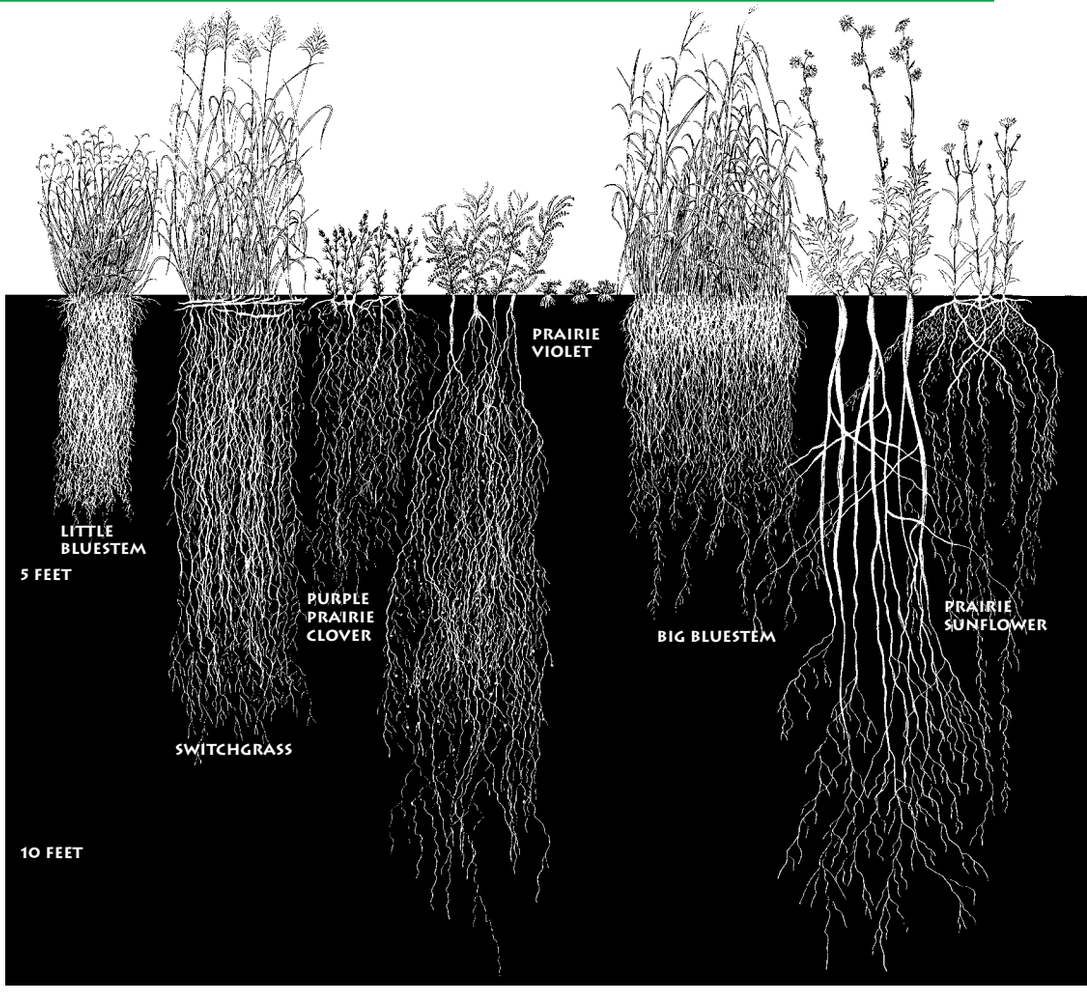
Prairie remnants are scattered over the Chicago Wilderness region. Most of the prairies shown on this map are less than 20 acres in size.

PRAIRIES AND FIRE

Prairies are fire-dependent communities. Without fire, tallgrass prairies are invaded by trees and shrubs that kill the prairie plants with their shade. Without fire, species begin to vanish from the prairie. Smaller plants and plants with small seeds seem to go first. Legumes also disappear. Their removal makes it easier for weeds to invade.

Some trees can survive regular prairie fires. Bur oak (*Quercus macrocarpa*) and black oak (*Quercus velutina*) can live for a century or more even though regular fires repeatedly kill all parts of the plant that are above ground. They survive as roots—called "grubs." The grubs are not harmed by the fires and each year, they produce new sprouts. When large scale settlement began, people noticed communities they called "brushy prairies." These were prairies where bur oak, black oak, and sometimes white oak grubs were common. Fire suppression after settlement quickly turned these brushy prairies into oak woods.

New growth sprouts with the help of minerals released by fire.



Most of the living stuff in a prairie is underground. The huge root systems of prairie plants live for many years, sending up new green shoots every year. The death of old roots adds organic matter—called humus—to the soil.

Historical accounts tell us that Native Americans set fires every year to improve forage for bison and elk. If the weather was right, these fires might burn for days.

Fires burn best on level ground. In hills, they burn well uphill but are likely to go out on the downhill side. In the Chicago Wilderness region, prairies dominated the flat land unless that land was on the downwind side of a river, lake, or other permanent body of water. Fires burning from west to east often went out on the west banks of rivers or the western shores of lakes and permanent wetlands.

PRAIRIE SUCCESSION

In the presence of fire, prairies are very stable communities. Many of the common prairie plants live for many years, but they do not readily invade new ground. Before settlement, disturbed places—like buffalo wallows—would be quickly filled with weedy prairie species—plants that grow fast and specialize in invading disturbed ground. In time, the more conservative species would replace these invaders.

During the past 175 years, millions of acres of tallgrass prairies have been converted to cornfields or covered with buildings. Surviving prairies are small and widely scattered. It is impossible for seeds from these small prairies to reach all the lands where they could grow.

With the native prairie species so rare, a cornfield left idle for a few years is likely to be invaded by plants from Europe and Asia that have been imported into this area since settlement. Most of the grasslands in the Chicago Wilderness region are dominated by exotic (non-native) species such as Hungarian brome grass (*Bromus inermis*) and Queen Anne's lace (*Daucus carota*).

The tallgrass prairie survives in tiny fragments. Conservationists have mounted protracted campaigns on behalf of prairie remnants of five or ten acres. Hope for the survival of this ecosystem rests on good management of these fragments and on restoration projects that return prairie to lands where it has not grown for a century or more.

VIOLA PEDATIFIDA
Prairie violet

POTENTILLA ARGUTA
Prairie cinquefoil

SISYRINCHIUM ALBIDUM
Common blue-eyed grass

POTENTILLA SIMPLEX
Common cinquefoil

ZIZIA APTERA
Heart-leaved meadow parsnip

PHLOX PILOSA
Prairie phlox

The Beauty of

Imagine a circle the size of a hula hoop. All 30 of the plants pictured on these two pages were found growing in just such a circle randomly placed at the Somme Prairie Nature Preserve in Northbrook, Illinois. Biodiversity is typical of tallgrass prairie. If we studied a few acres of prairie, we might find a hundred species of plants.

In our hoop, the violets bloom first. Their flowers open in late April. From that point until the moment in October when the last aster fades, something would always be blooming inside this small circle. A bumble bee in search of pollen, a butterfly looking for nectar would stand a good chance of finding what it needs.

HEUCHERA RICHARDSONII
Prairie alum root

TRADESCANTIA OHIENSIS
Common spiderwort

FRAGARIA VIRGINIANA
Wild strawberry

LITHOSPERMUM CANESCENS
Hoary puccoon

VIOLA PAPILIONACEA (VIOLA AFFINIS)
LeConte's violet

SMILACINA STELLATA
Starry false solomon's seal

PARTHENIUM INTEGRIFOLIUM
Wild quinine

ERYNGIUM YUCCIFOLIUM
Rattlesnake master

COMANDRA UMBELLATA
False toad flax

SORGHASTRUM NUTANS
Indian grass

RATIBIDA PINNATA
Yellow coneflower

CAREX CONOIDEA
Prairie gray sedge

CAREX BICKNELLII
Copper-shouldered oval sedge

ASTER ERICOIDES
Heath aster

ALLIUM CANADENSE
Wild onion

Biodiversity

Several species of the tiny butterflies called skippers could reproduce in our hoop. Skipper caterpillars feed on grasses and sedges. On the violets, we might find caterpillars that would grow into gaudy orange and black fritillaries.

In healthy ecosystems, energy flows freely through the system. There are many pathways for it to follow. Plants of many species support a variety of insects. Snakes, salamanders, and meadowlarks eat the insects and northern harriers eat the insect eaters. Thanks to the biodiversity in our hoop, the flow of energy can support them all.

ASTER NOVAE-ANGLIAE
New England aster

LIATRIS SPICATA
Marsh blazing star

SOLIDAGO JUNCEA
Early goldenrod

LIATRIS ASPERA
Rough blazing star

ANDROPOGON SCOPARIUS
Little bluestem grass

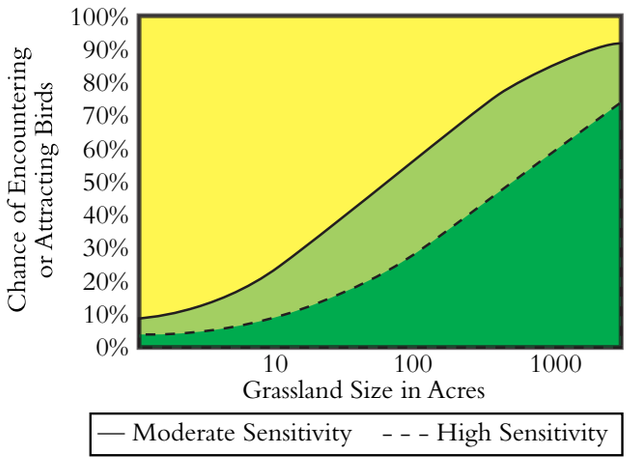
SILPHIUM TEREBINTHINACEUM
Prairie dock

AGROPYRON TRACHYCAULUM
Bearded wheatgrass

BROMUS KALMII
Kalm's brome

ASTER AZUREUS
Sky-blue aster

Grassland Bird Area Sensitivity



Moderate Sensitivity	High Sensitivity
Eastern Meadowlark	Northern Harrier
Western Meadowlark	Upland Sandpiper
Grasshopper Sparrow	Greater Prairie-Chicken
Sedge Wren	Bobolink
	Savannah Sparrow
	Henslow's Sparrow

Some grassland birds require large areas of suitable habitat and are considered to be "area sensitive."

*One of the few populations remaining of the Illinois state-endangered upland sandpiper (*Bartramia longicauda*) is at Midewin National Tallgrass Prairie.*

Dickcissels are wanderers. They change nesting grounds from year to year.

PRAIRIES

Birds

On the green prairies of early summer, early in the morning before the sun burns off the dew, you might hear a long eerie whistling cry as if the wind were alive and singing. From overhead comes a tinkling song: a long, complex melody delivered from high in the sky. These are songs of prairie birds. The cry comes from the upland sandpiper (*Bartramia longicauda*). The overhead tune is the flight song of the bobolink (*Dolichonyx oryzivorus*).

The tallgrass prairie supports two distinctive groups of birds. Adapted to life in a treeless environment, grassland birds sing in the air or from swaying perches on the stems of prairie grasses. Shrubland birds prefer scrubby patches within the prairie landscape.

Most grassland birds are migratory, but a few species have found ways to survive prairie winters. The cold winds are a severe test, but those same winds serve to keep some areas free of snow, revealing food for the resident birds.

Upland sandpipers and bobolinks are the champion long-distance migrants among our grassland birds. They fly all the way to Argentina for the winter. Dickcissels (*Spiza americana*) winter as far south as Venezuela. This grassland species is known for its nomadic habits. They may nest in some numbers in a location one year, be completely absent the next year, only to return in subsequent years. These movements may be triggered by changes in food availability or moisture level.

Meadowlarks are partial migrants. Some birds go south, but a few remain throughout the winter. We have two species: the eastern (*Sternella magna*) and the western (*S. neglecta*). Meadowlarks eat a varied diet, specializing in insects in summer and switching to seeds in winter. They can nest in fields as small as 20 acres if the surrounding land is open, which makes them one of the least area sensitive of our prairie birds. Area sensitivity refers to the need which many birds have for large blocks of uniform habitat around their nesting territories.

*Common in our shrublands, brown thrashers (*Toxostoma rufum*) are great singers—they have more songs in their repertoire than most any other bird in North America.*

Eastern kingbirds come by their genus and species name honestly: Tyranus tyranus. *Fierce protectors of their nests, they will attack birds much larger than themselves, including jays, crows and hawks.*

(Left) Grasshopper sparrows use only a small space for nesting territory, but they will not nest on small patches of grassland.

The discovery of area sensitivity has made us aware of the need for large preserves to sustain all our species. Henslow's sparrows (*Ammodramus henslowii*) claim a territory of only a few acres, but they rarely nests in any grassland smaller than about 80 acres.

Northern harriers (*Circus cyaneus*) and short-eared owls (*Asio flammeus*) are the principal hunters of the prairie. They seek their prey—rodents, small birds, frogs, snakes and insects—by flying low over the ground and pouncing on anything that shows itself. Both of these birds favor wetter prairies and often hunt over wetland areas.

Birds are highly affected by the structure of their habitat. Grassland birds like open habitat, even meadows filled with non-native grasses. As long as a grassland is sufficiently large and has little or no woody vegetation, open grassland birds will continue to use it.

The ability of grassland birds to adapt to life among strange grasses helped sustain their populations even after agriculture had destroyed almost all the prairies. The birds simply moved into pastures and hay fields. However, the switch from general farming to an almost exclusive reliance on corn and soybeans produced a disaster for prairie birds. Since the 1950s, populations have declined 90 percent or more for all our open grassland species.

Because few of our prairie remnants are large enough to support bird populations, most of our grassland birds nest in meadows of Eurasian grasses and invasive shrubs. But the birds' plight has inspired dozens of large-scale prairie restorations in the last 10 years.

Shrubland birds have declined almost as much as many prairie bird species. Field sparrows (*Spizella pusilla*), eastern kingbirds (*Tyrannus tyrannus*), and brown thrashers are the three most commonly encountered shrubland birds in our region. These three birds generally nest in areas with widely scattered shrubs.

Bell's Vireos (*Vireo bellii*), another shrubland bird of conservation concern in the region, usually are found in small shrub clumps within grassland areas. As the density of shrubs increases, yellow-breasted chats (*Icteria virens*) begin to appear. Shrubs in wet grassy areas are good places to find willow flycatchers (*Empidonax traillii*).

Shrubland birds usually achieve higher nest success than prairie birds do in the region's grasslands, perhaps because their nests are usually up off of the ground.

PRAIRIES

Butterflies and Moths

*Symbiotic relationships are a kind of mutual back scratching. Here, ants protect the pink caterpillar of the silvery blue butterfly (*Glaucopsyche lygdamus*) from predators and parasites. In return, the ants enjoy sugars and amino acids secreted by the caterpillar.*

Most of the animals on earth are insects, so it is not surprising that most of the animals of the prairie are insects. In the Chicago Wilderness region, this is truer than it ought to be. Our prairie remnants are mostly so small and scattered that they support few animal species larger than mice, voles and insects.

Although a number of insect species can adapt to other habitats, some even to weed patches, others are able to survive only in healthy prairie communities.

Extended investigation into more than 800 species belonging to seven families of insects of prairies and savannas has revealed that about one quarter of the total species in these groups are confined to remnants of the native landscape. That means that more than 200 different kinds of insects—known as remnant dependent species—could not continue to live in our area if the last prairie and savanna remnants were destroyed.

Remnant dependence is particularly high among butterflies and moths, with 40 percent of our local grassland butterflies confined to prairies. This high rate of remnant dependence is largely due to certain species relying on particular plants for food. Some caterpillars, for instance, feed on only a single species.

The rare moth, Papaipema cerina*, lives on prairie remnants in the Chicago Wilderness region.*

The caterpillars of regal fritillaries (*Speyeria idalia*) and Aphrodite fritillaries (*Speyeria aphrodite*) feed only on different types of clover, while the adults sip the nectar of various milkweeds, thistles and blazing stars.

Among root-borer moths of the genus Papaipema, more than 80 percent of our local species are confined to remnants of the natural landscape. One species of these moths, Papaipema eryngii, has only a single host plant: rattlesnake master (*Eryngium yuccifolium*), a plant common on prairies but rarely seen outside them. This moth is known from only three sites in the world: two in the Chicago region and one in Oklahoma.

*Aphrodite fritillaries (*Speyeria aphrodite*) are prairie specialists. They depends on certain native prairie plants, such as butterfly weed (*Asclepias tuberose*), for their survival.*

Mammals

The big grazers are long gone from the Chicago region. Bison (*Bison bison*) was the first species to be killed off following settlement, followed by elk (*Cervus elaphus*). Long gone, too, are the large predators, including wolves (*Canis lupus*) and mountain lions (*Felis concolor*).

The absence of these large mammals is keenly felt throughout the Chicago Wilderness region. Few prairie remnants are large enough to sustain bison, but historically they were a key factor in prairie ecosystem health. Bison grazed in such a way that they actually promoted a greater biodiversity of plant life. And their waste acted as an important means of cycling nitrogen back into the soil.

Without top-of-the-food-chain predators, such as wolves and mountain lions, the population of native white-tailed deer (*Odocoileus vir-*

ginianus) has exploded to many times its original numbers. Although there are few things as endearing as a spotted fawn, too many deer have been squeezed into too few preserves. Evidence of this is plainly visible. Because deer eat just about everything they can reach, many of the region's wooded areas are relatively bare to the height of four to five feet.

Coyotes (*Canis latrans*) are native predators that have adapted to the changing landscape. Portrayed in many Native American traditions as crafty and clever, they generally maintain a low profile, feeding on small prey, including mice, voles, and even insects.

In their abundance, common prairie species such as deer mice (*Peromyscus maniculatus*), prairie voles (*Microtus ochrogaster*) and meadow voles (*Microtus pennsylvanicus*) play a critical role in the food chain. They consume the energy stored in plants, which in turn they pass on as protein when preyed upon by coyotes, foxes, snakes, hawks and owls.

Bison were probably the first large mammal species extirpated from this region after settlement.

Herps

People who study reptiles and amphibians are called herpetologists. The name comes from a Greek word meaning "creeping." Herpetologists call the creeping creatures they study "herps." It is a useful word, short and easy to remember, and it saves us from the endless repetition of the cumbersome phrase "reptiles and amphibians." We will use "herps" to refer to these animals throughout this Atlas.

The Chicago region is rich in garter snakes. We are at the eastern end of the range of the plains garter snake (*Thamnophis radix*). A few isolated populations of the western ribbon snake(*Thamnophis proximus*) and northern ribbon snake (*Thamnophis sauritus septentrionalis*) can be found in our region. We even have our own special garter snake, the Chicago garter snake (*Thamnophis sirtalis semifasciatus*) a subspecies of the eastern garter snake.

In the chaotic conditions of a booming metropolis, you might discover one of these snakes almost anywhere, but in places where natural conditions are a bit more stable, they begin to sort themselves out. At the Fermi National Accelerator Lab near Batavia, Illinois, a large scale ecological restoration project has been underway for more than 20 years. Inside the accelerator ring, an enormous half-buried steel doughnut a mile in diameter, is a small grove of oaks surrounded by a recovering prairie. Search among the oak trees and you will probably find *sirtalis*, the eastern garter snake. Out on the prairie, the usual snake is *radix*. Search a transition zone, the land within about 200 yards of the trees, and you might find either species. The snakes are a walking—or rather slithering—demonstration of the need to protect all the varieties of natural habitat in our region.

Herps can serve as guides to conditions on the land. Their limited mobility makes it difficult for them to travel in search of a better home, especially in a land of six-lane expressways. As a result, they are vulnerable to local extinction. If a small population dies out, new animals of the same species are unlikely to be able to colonize the vacated habitat.

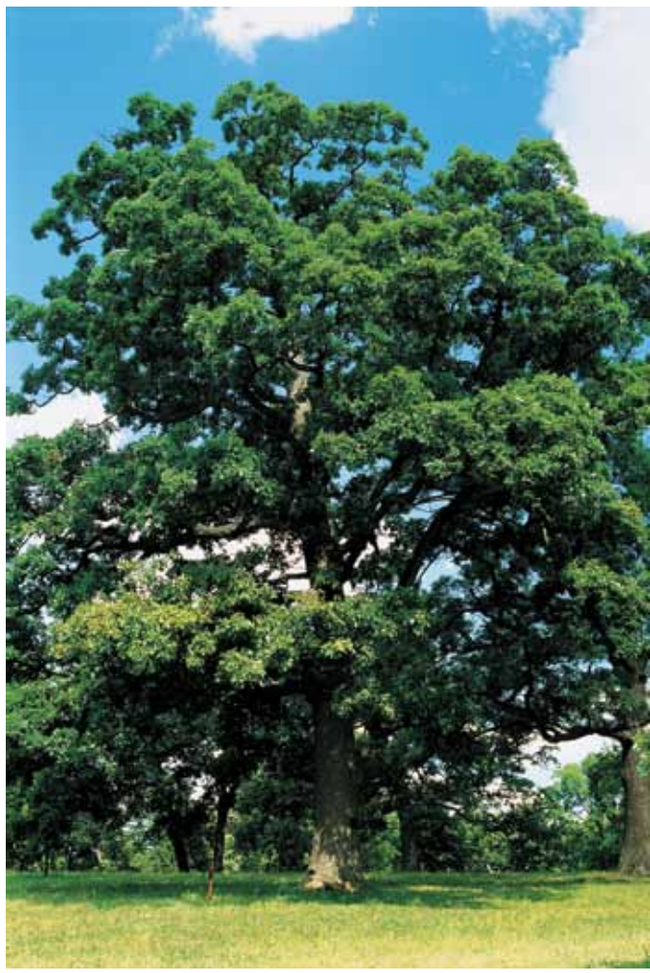
The Smooth Green Snake

*In the Chicago Wilderness region, the herp most closely associated with the prairie is the smooth green snake, a lovely little serpent whose smoothly scaly skin practically glows with a Kelly green tint. The presence of a smooth green snake (*Opheodrys vernalis*) can be taken as an indication of the quality of a prairie remnant. Found in an old field full of recently imported Eurasian weeds, the smooth green snake is a sign that the land was once a prairie, and that it has not been too heavily dosed with pesticides.*

Smooth green snakes are small. The largest specimen ever measured was 26 inches long. Their diet is principally insects.

WOODED COMMUNITIES

Pillars of Mighty Cathedral Aisles



*The crown of a bur oak (*Quercus macrocarpa*) spreading out as wide as it is tall recalls the open savannas of pre-settlement times. The Millennium Oak, located at The Morton Arboretum in Lisle, Illinois, pre-dates Illinois' 1818 statehood.*

Trees in the Chicago Wilderness region 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.

*Marsh marigolds (*Caltha Palustris*) brighten spring days in wet forests and flatwoods in the Chicago Wilderness region.*

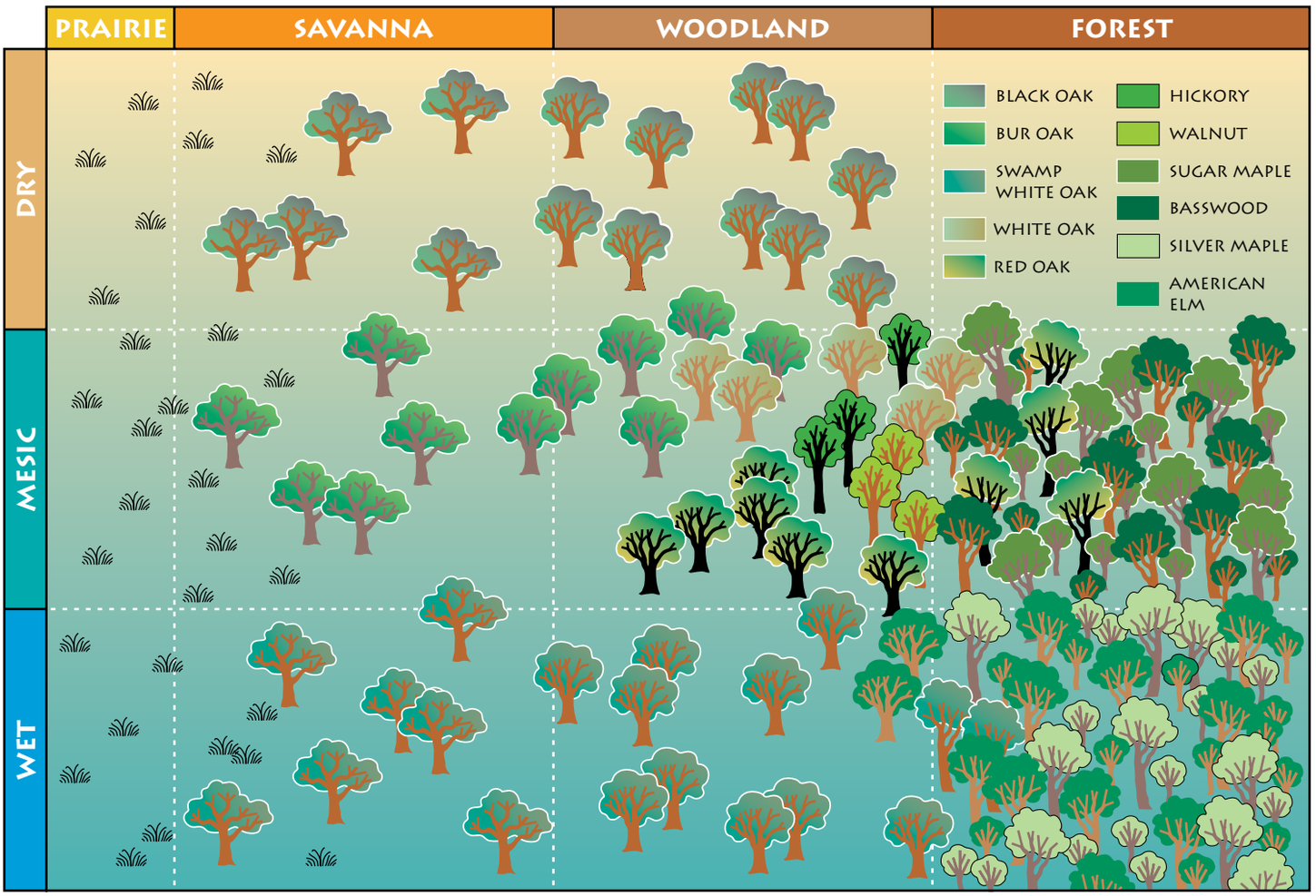
Our sunniest places were prairies where no trees grew. The next community on our gradient is the savanna. Savannas are considered grasslands with some trees. Ample sun reaches the ground, promoting the growth of a heavy turf of grasses and wildflowers that is fuel for fires.

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 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 (*Frax-inus 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 IN THE CHICAGO WILDERNESS REGION

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.

WOODED COMMUNITIES

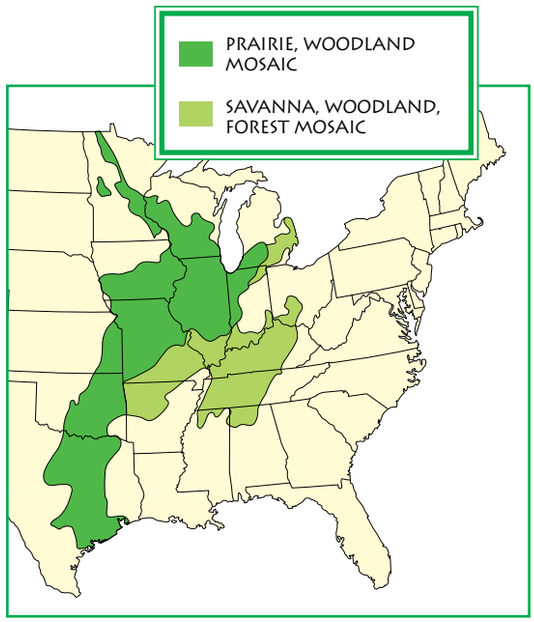
Savannas

At Rollins Savanna in central Lake County, more than 450 acres of former farmland have been restored as part of a massive habitat restoration and preservation project.

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 help the large trees survive intense fires. Even fires hot enough to kill the above-ground parts of the tree cannot harm the roots. Dormant buds at the base of the dead trunk spring to life and produce new stems. Enormous root masses called grubs grow over the years. With these well-established root systems feeding them water and nutrients, the young stems need 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 region often mark places where fire was frequent in the past.*



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 (*Pinus 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.

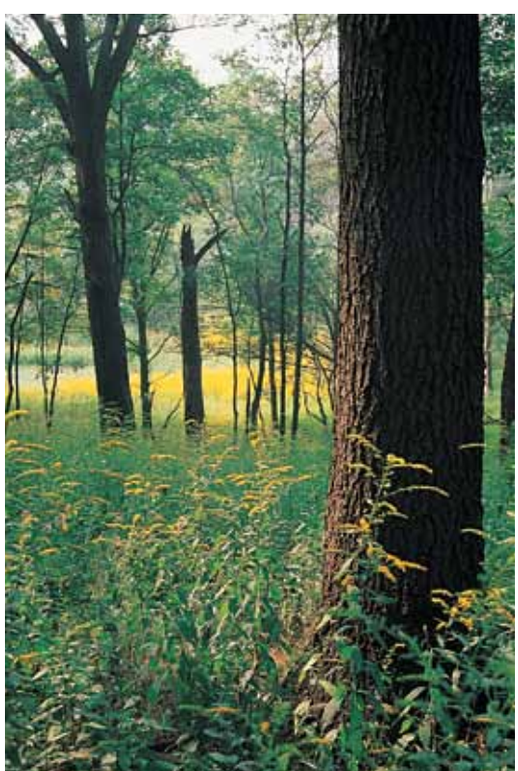
The presence of fire in open woodlands prevents invasive species such as ashes and sugar maples from taking over the community, and the open quality lets in enough light to permit the oaks to reproduce and maintain themselves as the principal trees.

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 nut-bearing 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.

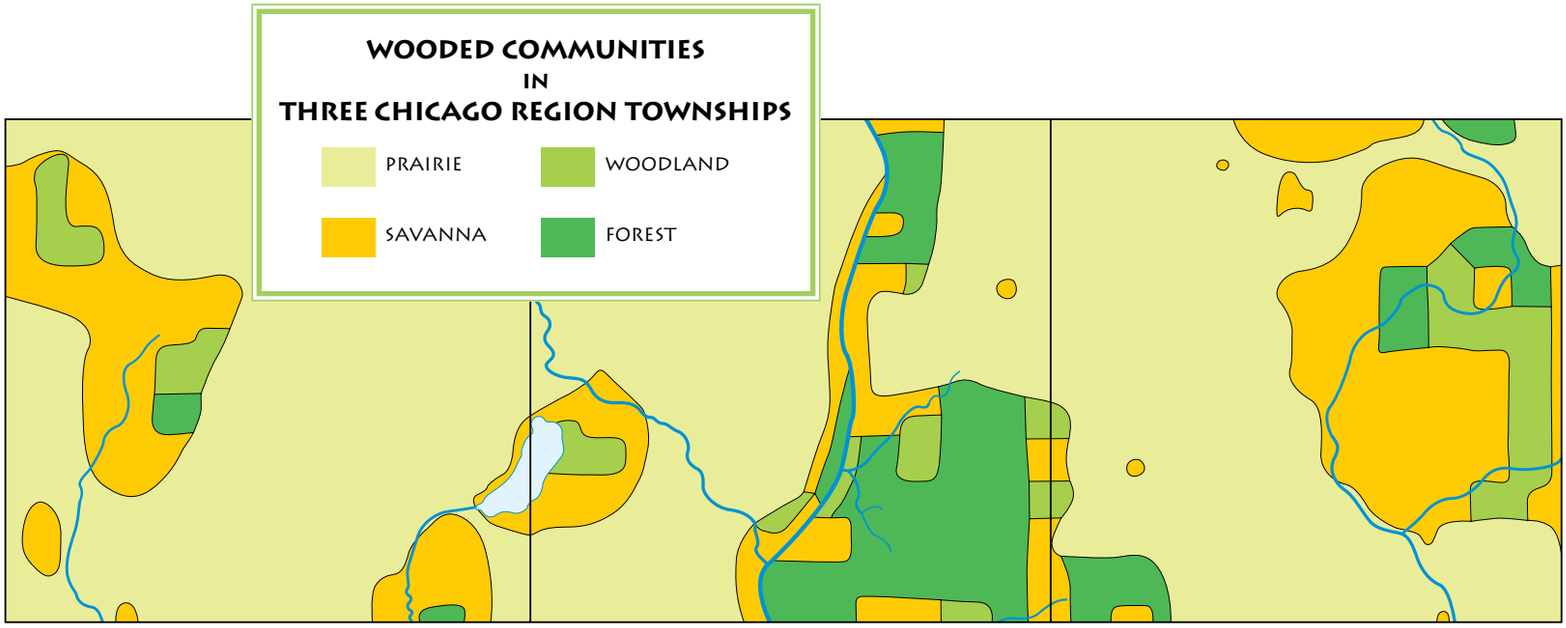


In dense forests, most wildflowers bloom in early spring before the trees leaf out. In woodlands such as the one shown here, more light reaches the ground and more flowers bloom in mid and late summer.

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

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

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 hold back water for long periods. 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. 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 allowed silver maple (*Acer saccharinum*) to become common.

Early spring is wet in the flatwoods.

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 grandifolia*), 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 region, 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 region.*

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.

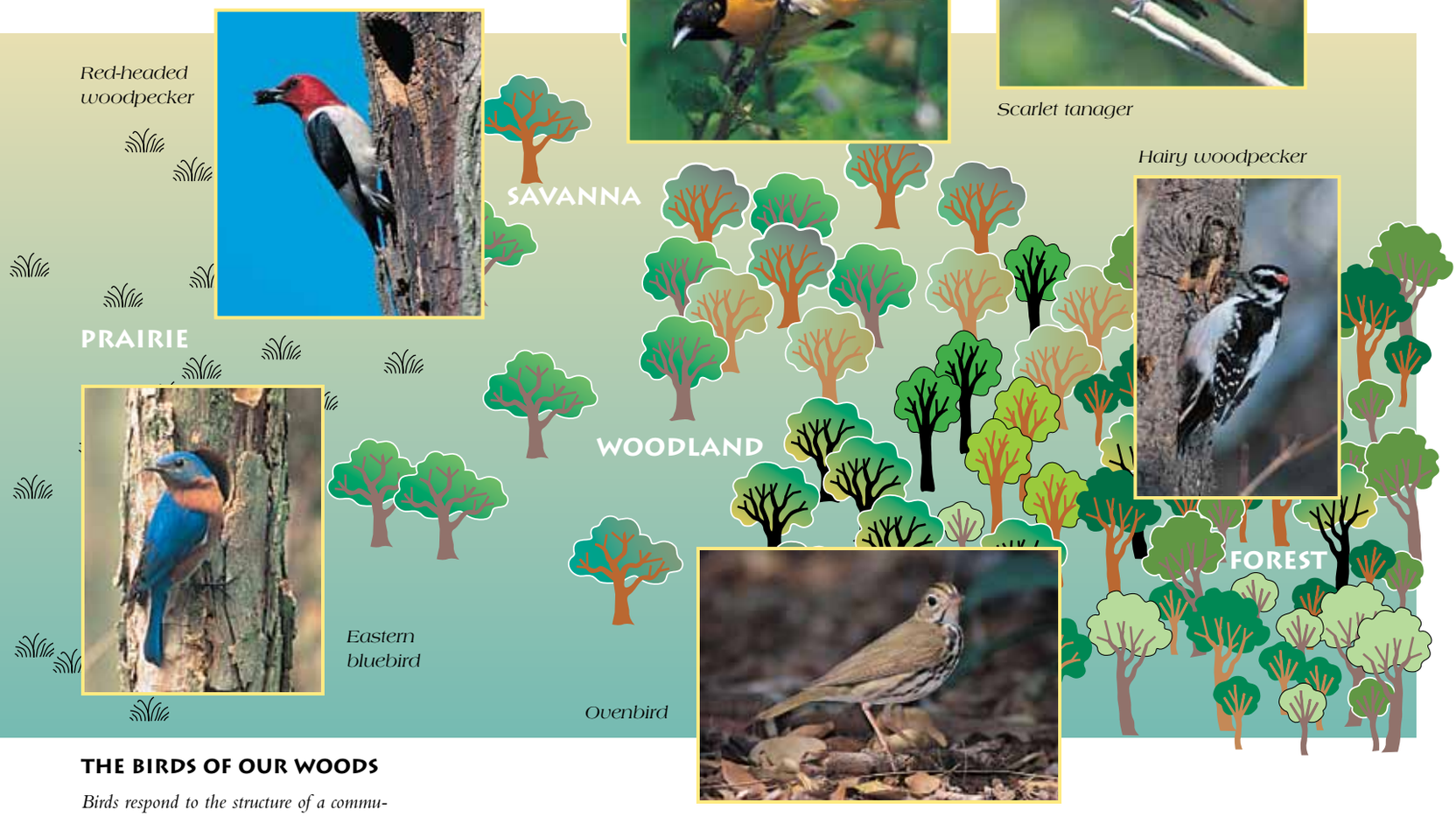
Fire suppression has allowed trees of the floodplain forests to invade upland sites where they did not grow prior to settlement. Swamps, forested areas that stay wet year around, are absent from the Illinois portion of the Chicago Wilderness region . They do occur at the Indiana Dunes. Red maple (*Acer 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 cause by a fungus. And they grow on plant roots and help plants absorb nutrients from the soil. These mycorhizzal (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 the Chicago Wilderness region, 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 the size and density of trees and shrubs 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 search the bark of trees, mainly on trunks and larger limbs, for insects. 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 tend to respond strongly to the structure of the plant community. In wooded communities, the size and density of both trees and shrubs affect bird populations far more than the presence or absence of any particular species of woody vegetation.

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.

Northern (or Baltimore) orioles (*Icterus glabula*) favor open savanna groves. However, they have also adapted to the artificial savannas we create in parks, where 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. Their populations have dropped precipitously in recent years, perhaps because of the influx of red-bellied woodpeckers (*Melanerpes carolinus*), which may outcompete their brethren for food and nesting sites. Closely related to red-headed woodpeckers, red-bellied woodpeckers also favor woodlands and forests. They are one of several species that

has expanded their range northward into the Chicago Wilderness region, likely in response to climate changes.

Eastern bluebirds (*Sialia sialis*) inhabit our savannas. They need trees for nest sites—they nest in holes—but feed over open ground. Groves scattered across the prairie are ideal habitat for this bird.

Down on the forest floor, ovenbirds (*Seiurus aurocapillus*) and wood thrushes (*Hylochichla mustelina*) search for insects amid the leaf litter. Ovenbirds build their nests on the ground, while wood thrushes nest in tall shrubs and small trees. Nesting success of both these bird species is thought to be low, because our fragmented forests allow for predation and parasitism.

Cooper's hawks (*Accipiter cooperii*) are bird-eating species that seems to favor open woodlands as nesting sites. They are one of the predator bird species that has rebounded dramatically since the pesticide DDT was banned in 1972.

Red-tailed hawks (*Buteo jamaicensis*) are definitely birds of the savannas. Our most common large raptor, they build their nests high in the trees, but hunt by soaring over open fields. A landscape that mixes prairies and woodlands is ideal habitat for this bird.

The red-tailed hawk is a savanna specialist.

Eastern towhees (*Pipilo erythrophthalmus*), yellow-billed cuckoos (*Coccyzus americanus*) and loggerhead shrikes (*Lanius ludovicianus*) are among the birds that nest in shrubby openings within or at the edge of woodlands.

Of the eight owl species that frequent our region, great horned owls (*Bubo virginianus*) are the most common. But barred owls (*Strix varia*) may have the most recognizable call. Their hooty "who cooks for you, who cooks for you all" can be heard in the deep, moist forests and wooded swamps it prefers.

Shrews are among the most active mammals because they need to eat almost constantly. Just a few hours without food could mean starvation. With poor hearing and eyesight, they rely on smell and touch to find their prey, and then disable it with paralyzing venom in their saliva.

Mammals

Although coyotes are the biggest local predators, northern short-tailed shrews (*Blarina brevicauda*) may be the fiercest in spite of their tiny size. Measuring up to five inches from base of tail to pointy snout, the gray, velvet-furred animals spend much of their time underground or under leaf litter. Voraciously omnivorous, their diet ranges from fungi and seeds, to insects and slugs, to woodland voles (*Microtus pinetorum*) and even the occasional fellow shrew.

White-footed mice (*Peromyscus leucopus*) are another woodland species that are common but seldom seen. Unlike shrews and voles, which build elaborate tunnel systems in search of food, white-footed mice mostly wait until dark to forage—sometimes by climbing trees and shrubs—in search of the seeds and fruits that make up the majority of their diet.

Other woodland mammal species that wait until dusk or dark to feed are bats. Species common to our region are big brown bats (*Eptesicus fuscus*), eastern red bats (*Lasiurus borealis*), and hoary bats (*Lasiurus cinereus*.) The only mammals that can fly, bats feed exclusively on insects. A single bat can eat up to 3,000 insects in one night. During the day, they take refuge from predators and the weather by tucking themselves under the loose bark of trees, or roosting upside down in hollow tree cavities.

Flying squirrels don't really fly, but rather glide on loose folds of skin that stretch from their front to back feet. Strictly nocturnal, they are rarely seen. But their presence in wooded areas is an indicator of good ecosystem health.

*White-footed mice (*Peromyscus leucopus*) often wait until dark to feed. Because of their abundance, they are an important part of the food chain.*

WOODED COMMUNITIES

Herps

The larva 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.

In early spring, long before the leaves have emerged on the forest trees, the thumbnail-across-a-comb songs of western chorus frogs (*Pseudacris triseriata*) and the clear whistles of spring peepers (*Pseudacris crucifer*) bring life to the dormant woods.

The center of life for these spring singers and other amphibian species is the woodland vernal pond. Formed of melting snow and early spring rain, the ponds dry up during the summer. Their temporary nature makes them ideal breeding grounds for amphibians because fish—which feed on eggs, tadpoles, and salamander larvae—cannot live in them.

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

FROGS AND TOADS

There are 13 species of frogs and toads in the Chicago Wilderness region. All of them court and mate in the water. Their young begin as eggs, which hatch into tadpoles. Without limbs or lungs, they remain in the water until they metamorphose into adults. As adults, spring peepers take to the trees. American toads (*Bufo americanus*) prefer moist areas with plenty of insects to eat. Mature western chorus frogs are equally at home in the woods and wet prairie areas.

Throughout their lives, frogs continue to absorb water through their skins. For this reason, they are considered an important indicator species; meaning that changes in their populations can help us detect changes in the environment. Pollution from agricultural pesticides, urban run-off, and acid rain are suspected in the dramatic decline of certain frog populations. Northern cricket frogs (*Acris crepitans*), which are smaller than many insects, once were found in large numbers throughout Illinois, but in the 1970s, they all but vanished from the upper Midwest. Another likely reason for the decline in frog populations is the lack of groundlayer plants in many of our wooded areas. The shade cast by infestations of invasive trees and shrubs has killed off low-growing plants that provide food, shelter and life-sustaining dew.

SALAMANDERS

Like frogs and toads, the 11 species of salamanders found in our region begin life in the water. Salamanders lay their eggs in the water. Developing young remain there, breathing through gills, until their lungs develop. Their dependence on water can be a problem in dry years. If ponds dry up before the young mature, they will die. Human alterations to hydrology—draining certain areas or diverting natural water flows—can be equally harmful.

Tiger salamanders (*Ambystoma tigrinum*), one of the most common salamanders in our

region, are particularly vulnerable to changes in hydrology. Because of the long time it takes to reach maturity, they must remain in the water until late July. Other common species, including spotted salamanders (*Ambystoma maculatum*) and blue-spotted salamanders (*Ambystoma laterale*), usually emerge about a month earlier. All three are called mole salamanders because they spend most of their adult period either underground or under something on the ground. Dead logs offer good cover as do the undersides of rocks.

Some of our native salamanders are quite rare. Four-toed salamanders (*Hemidactylium scutatum*), fond of boggy places with sphagnum moss, are known from only a few locations. Southern two-lined salamanders (*Eurycea cirrigera*) and smallmouth salamanders (*Ambystoma texanum*) live only along the Kankakee River.

SNAKES

Woodland snakes are not dependent upon vernal ponds. But like many other herp species, they are threatened by an insufficient amount of healthy, intact habitat. Eastern racers (*Coluber constrictor*) require large forested areas of 500 to 700 acres. Redbellied snakes (*Storeria occipitomaculata*) range widely from moist woods to prairie. However, like eastern racers, many are killed on roads, especially as they travel to and from their hibernation areas. Like many snake species, eastern racers often hibernate communally, in a den site called a hibernaculum.

Insects

Insects are the unsung heroes of our natural landscape. Among the hundreds of different species that populate our wooded communities, some break down waste material, cycling nutrients back into the soil. Some pollinate plants, enabling trees and wildflowers to flourish. Many anchor the bottom of the food chain, their eggs, larva and adult phases providing nourishment for herps, birds, mammals, and even other insects.

Like many plants and animals in our region, however, some insects are threatened by the one-two punch of habitat loss and invasive species. For certain butterflies and moths, the knock-out blow could be the treatment used to control their non-native counterparts.

First introduced to the United States in the late 1860s as an attempt to develop a better silkworm, gypsy moths (*Lymantria dispar*) have been responsible for defoliating huge swaths of wooded lands. One of the primary treatments to slow the spread of the gypsy moth is the spraying of Btk. This naturally-occurring bacterium kills gypsy moth caterpillars by disrupting their digestive systems. Unfortunately, Btk is equally lethal for about one hundred other species of moths and butterflies, whose larval stages coincide with that of gypsy moths. Many of these species are conservative, meaning that they are largely restricted to specific woodland habitats. Because of the fragmented nature of many of our wooded areas, the fear is that if conservative species are eliminated from a particular site, they could be gone from that site forever.

Although efforts to eradicate invasive Asian long-horned beetles (*Anoplophora glabripennis*) have been successful, many fear that emerald ash borers (*Agrilus planipennis*) are here to stay. Their larvae feed on the cambium layer of ash trees, which ultimately severs their circulatory systems. Since 2002, emerald ash borers have killed tens of millions of ash trees across 12 states and two Canadian provinces, and threaten to kill millions more, which could have a significant effect on many plant and animal species in our region's wooded communities.

*Eastern milk snakes (*Lampropeltis triangulum*) were named by way of myth. Early farmers, finding them in their dairy barns, imagined that they drew milk from cows. In truth, the snakes were there to feed on mice, which were attracted by waste cattle feed. Today, milk snakes still may be found on farmsteads—both active and abandoned. But their natural habitat is open savanna, where, in addition to mice, they prey upon voles, frogs, fish, birds, and even other snakes.*

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.

WETLANDS

In geological terms, the landscape of the Chicago region has existed for just the blink of an eye. Young landscapes like ours, landscapes that have just emerged from under mountains of ice or lakes of water, are very poorly drained.

The elaborate systems of streams and rivers, branching like trees, that develop on older lands, have not yet appeared. Substantial parts of our landscape don't drain at all. Water either sinks into the ground or evaporates. Undrained depressions with no outlets—or with outlets that function only during periods of very high water—are scattered over the entire region.

This young landscape, combined with the many layers of varied deposits left by the glaciers and by post-glacial lakes, produces one of the most diverse collections of wetlands in North America. The pages that follow will describe major features of the most distinctive of these wetland types.

HOW WET ARE THEY?

Some wetlands are submerged year around. Others are wet in spring and early summer and dry by August. In some wetlands, water can be hip-deep. In others, the soil is saturated but little or no water stands above the surface. These differences exert a powerful influence on the vegetation of a wetland. The vegetation, in turn, exerts a major influence on what animals live there.

WHAT IS THE CHEMISTRY?

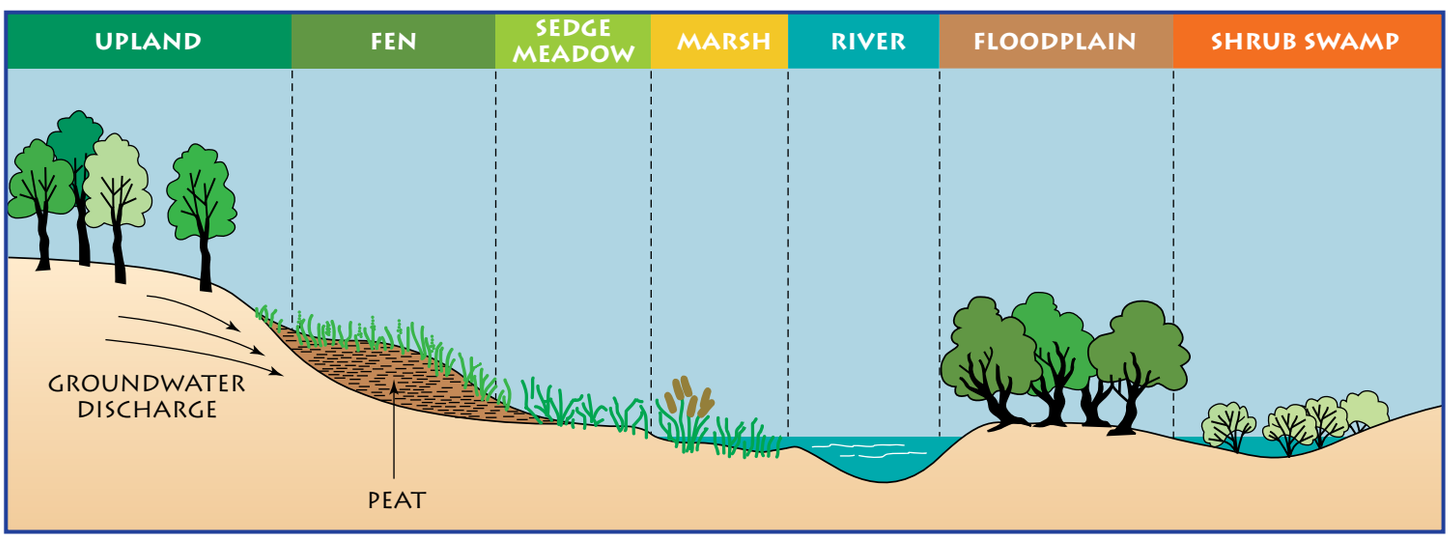
Soil chemistry plays a particularly important role in two of our wetland types: fens and bogs. Both of these communities depend on conditions created by the glaciers. Fens grow on slopes that are constantly fed by ground water flowing out of sand or gravel deposits. The ground water picks up calcium and magnesium carbonates from the sand and gravel. The highly alkaline water creates conditions that only a select group of calcium-loving plants can tolerate.

Bogs are at the opposite end of the pH scale. Their highly acidic conditions favor the growth of another select group of plants. While fens depend on a constant flow of water, bogs are usually in basins where drainage is either non-existent or extremely limited. Kettleholes in moraines are prime locations for bogs.

Sedge meadows share many species with wet prairies. A string of dry years would allow a sedge meadow to be invaded by prairie species, while a period of unusually wet conditions would allow sedge meadow species to invade the normally drier prairie.

WHERE ARE OUR WETLANDS?

Most of the wetlands in the Midwest have been either drained or filled. In Illinois the loss has been greater than 90 percent. In Indiana it is more than 85 percent. Losses in the Chicago Wilderness area have been less drastic than in



Typical wetland distribution in the Chicago Wilderness region. Fens occupy hillsides where a constant flow of ground-water keeps them wet. Sedge meadows often grow where soils are saturated but there is little standing water. Marshes need standing water for at least part of the year. Shrub swamps are likely to be in permanently wet ponds. Bogs are usually in isolated depressions.

*Early spring in Cowles' Bog at the Indiana Dunes National Lakeshore. The huge leaves of skunk cabbage (*Symplocarpus foetidus*) grow next to the unfolding fiddle-heads of ferns.*

other parts of these states, but nonetheless most of the wetlands that were here 200 years ago are gone.

Much of the lakeplain where Chicago now stands was wet prairie, sedge meadow, and marsh. Large scale drainage projects have lowered the water table several feet, turning wetland into dry land. The remnant marshes around Lake Calumet are the only surviving wetlands in the city.

For the past century, farmers in our region and throughout the Midwest have been laying drain tiles in their fields to make wetlands farmable. Drain tiles are placed in deep trenches which are then refilled. The separate pieces of tile are laid end to end, but the joints are not cemented. Water percolating down through the soil enters the tile at the joints and then flows away through the tile.

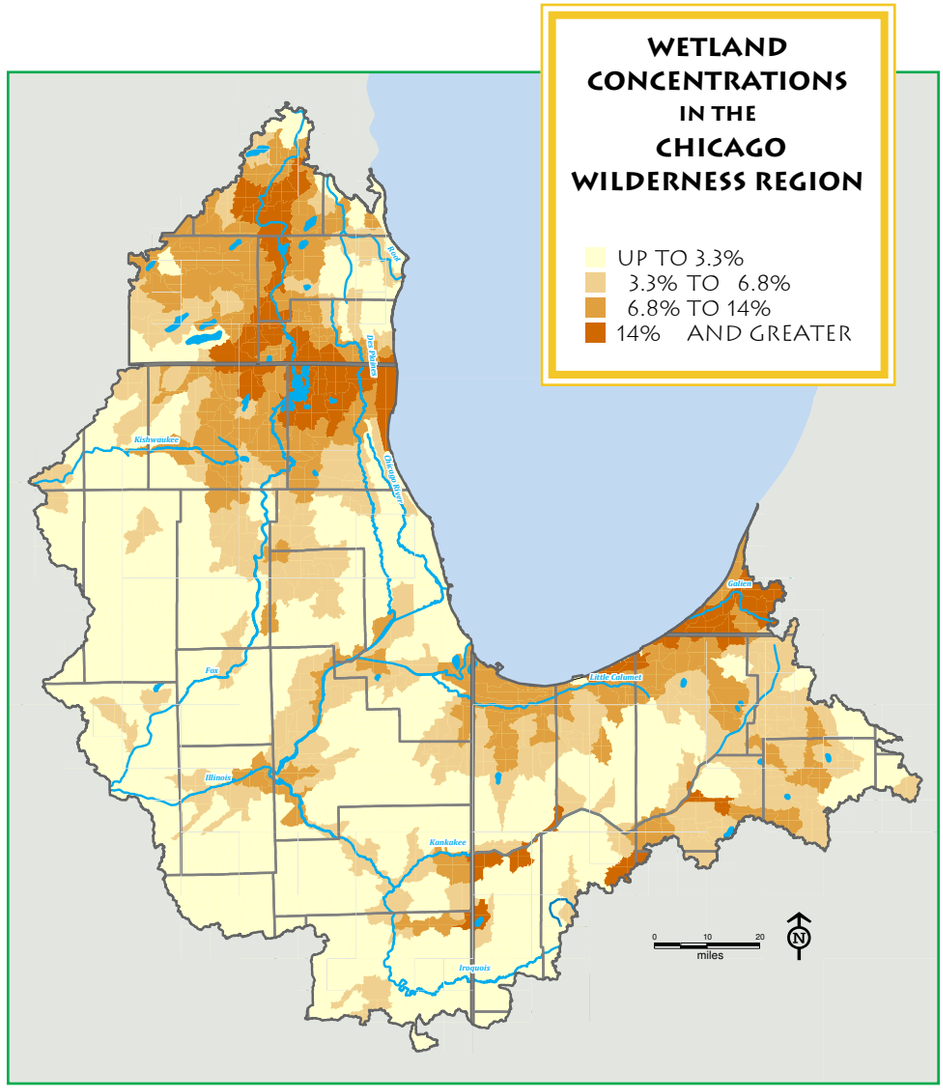
Elaborate tile systems have been created, with small lines of tile feeding into larger lines which ultimately connect with drainage ditches and rivers.

When conservation agencies buy former farm lands, they either allow these tile systems to decay naturally or deliberately break them up. With the tile gone, former corn fields may return to the hydrology that existed before they were plowed. Frogs and toads may sing again in places that, for a while, were dry land.

LEGAL WETLANDS

The federal Clean Water Act forbids the filling of wetlands. The passage of this law led to the creation of an official legal definition of a wetland. The U.S. Army Corps of Engineers, which oversees this section of the Clean Water Act, defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

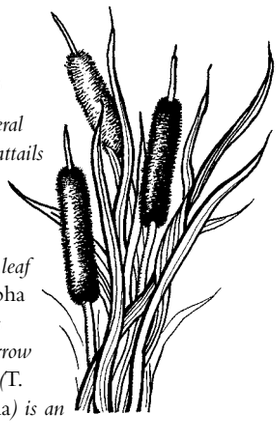
The major concentrations of wetlands in the Chicago Wilderness region are along the upper Fox River, the upper Des Plaines River, and along the southern rim of Lake Michigan. The percentage figures in the map key refer to the amount of land in each area that is wetland.



WETLANDS

Marshes and Shrub Swamps

*The pink bloom of smartweeds (*Polygonum spp.*) rise from the waters of a marsh in DuPage County, Illinois.*



Cattails

*Of the several species of cattails currently found in our region, only broad leaf cattail (*Typha latifolia*) is native. Narrow leaf cattail (*T. angustifolia*) is an eastern species that quickly spread to our region beginning in the mid-1800s. Since then, genetic research reveals it has widely hybridized with our native cattails. The narrow leaf and hybrid forms are considered invasive in wetlands, forming dense stands that exclude other plant species. Land managers must control invasive cattails to maintain healthy, diverse marsh communities.*

Marshes occur in a variety of circumstances in the Chicago Wilderness region. Some are found in isolated kettleholes in the moraines. Others are located in the shallow water at the edges of lakes or along the banks of rivers. There are still a few marshes in low places in the Chicago Lake Plain and in the swales between the beach ridges that mark old shorelines of Lake Michigan in northwest Indiana.

Draining and filling have largely eliminated marshes from Illinois outside the Northeast Morainal and Lake Plain divisions and along major rivers. In Indiana, the once vast Kankakee Marshes have been nearly obliterated by drainage projects and the channelizing of the Kankakee River.

Water depth is a major controlling factor of marsh vegetation. In the deep, open waters of lakes and rivers, typical plants are tiny, floating algae that absorb their nutrients from the surrounding water.

In the deepest marsh waters, floating plants, some with submerged leaves, some with floating leaves, replace the algae. However, the more typical marsh plants are emergent species. They are rooted in the bottom and have erect stems that rise above the water. Cattails (*Typha spp.*) are the most familiar of these, but in healthy, diverse marsh communities, cattails are only a part of the plant life.

In late summer, the waters of marshes may turn bright green as duckweed (*Lemma spp.*), the world's smallest flowering plant, seems to cover every square inch of the surface.

Fire played a major role in the ecology of marshes in the past. Of course, the presence of water would tend to prevent fires, but many marshlands are dry in late summer. The productivity of marsh communities provides abundant fuel, producing very hot blazes. The experience of land managers is that periodic fires help maintain the diversity of marsh plant communities.

Shrub swamps grow in shallow ponds. Buttonbush (*Cephalanthus occidentalis*) is the most common dominant in such communities. Other shrubs often present include red-osier dogwood (*Cornus stolonifera*) and various species of willows (*Salix spp.*).

In recent years, a European plant called purple loosestrife (*Lythrum salicaria*) has invaded marshes and other wet areas throughout eastern North America. This aggressive exotic species can completely take over a marsh, driving out native plants and eliminating birds by wiping out the rigid-stemmed plants they use for nest supports. In some areas, introduction of purple loosestrife-eating beetles in the Galerucella family has proven to be an effective biological control, but purple loosestrife remains a serious problem in parts of the region.

These globular flowers give buttonbushes their common name. The flowers emerge in July and August.

Sedge Meadows

The marshes and sedge meadows of Hitts Siding Prairie Nature Preserve are relicts of the Kankakee Torrent—an immense flood of glacial meltwater that escaped from ancient Lake Chicago, the predecessor to modern Lake Michigan.

Sedge meadows are most easily recognized in early spring. Look for low, flat ground flooded with a few inches of water and studded with lumpy tussocks or hummocks. The tussocks reveal the presence of *Carex stricta*, the most common sedge of the sedge meadow.

Sedges belong to the same order of plants as grasses, but they form a separate family within that order. Papyrus, the plant the ancient Egyptians turned into paper, is a sedge, as are bulrushes.

Some 800 species of sedges belong to the genus *Carex*. Almost 150 species of this genus are native to the Chicago region, and several others have been introduced. Most of these are found in various kinds of wet habitats. Some are quite common; others are quite rare. Illinois lists 32 members of the genus as endangered or threatened. This is a reflection of the massive destruction of wetlands that has occurred in the state. Half of these listed species are thought to survive somewhere in the Chicago region. This is a reflection of the survival of greater biodiversity in this region than in the rest of the corn belt.

ORGANIC SOILS

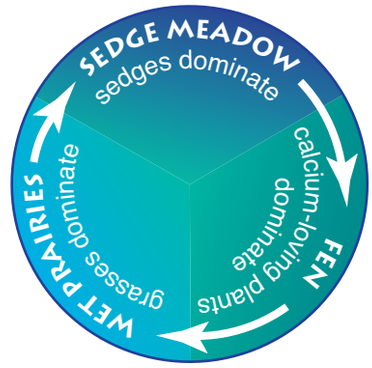
The tussocks of *Carex stricta* are composed of peat formed of the partly decomposed roots and rhizomes (underground stems) of the plant. The soil between the tussocks is also peat. Peat soils are classed as organic soils, meaning they are made almost entirely of the partially decayed remains of once-living plants. Mineral soils, on the other hand, are formed of sand, gravel, silt, clay, and other inorganic materials. Organic soils are common in wetlands where low oxygen levels in the saturated soils prevent the decay of dead plants. If organic soils are composed of peat that has decayed to the point where the individual plant parts that make it up are not identifiable, the soil is called muck.

Several other species of *Carex* are likely to be present in sedge meadows along with a number of species that also occur in other communities—particularly in wet prairies. Canada bluejoint grass (*Calamagrostis canadensis*) is perhaps the most common of these. In late summer, the tall stems of Joe Pye weed (*Eupatorium maculatum*) are topped by large clusters of purple flowers. Joe Pye weed also grows in savannas.

Where the water in a sedge meadow is ahigh in calcium, plants typical of fens can often be found.

Sedge meadows typically flourish where soils remain saturated most of the time, although periods when standing water is present are rare. Fire—which prevents invasion by woody plants—is important to the survival of this community.

Peat will burn if it dries out, so in years when drought strikes, fire could consume the muck soil of the meadow and drastically change conditions. Depending on circumstances such as water levels, marsh vegetation could replace the sedge meadow. If conditions are drier, wet prairie plants could invade.

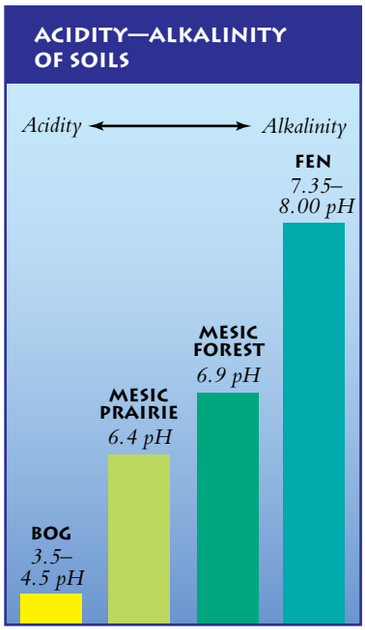


Some Shared Species of Wet Ground

These three wet communities share many species. The differences among them are more likely to be based on the relative importance of various groups of species rather than on the presence or absence of any particular species.

WETLANDS

Fens



The pH scale measures the acidity and alkalinity of organic materials. On this scale, each whole number represents a tenfold change. A fen with a pH of 7.4 is ten times as alkaline as a mesic prairie with a pH of 6.4. Soil pH is an important factor determining the distribution of plants.

Fens come in many varieties, but what they all have in common is a continuous source of calcium- and magnesium-rich ground water. In our region, the source of this ground water is in layers of sand or gravel deposited by melt water flowing from a glacier. These sand and gravel aquifers typically sit atop a relatively impermeable layer of glacial drift that prevents water from sinking farther below the surface.

Since it can't go down, the water flows sideways until it emerges on a slope. Along the way, the water has picked up the minerals that give fens their unique chemistry. The flow from the aquifer may be sufficient to keep the water liquid through the winter.

Terrain, the amount of flow, and the amounts of minerals in the water all affect the precise nature of the fen community. In small amounts, calcium is an important plant nutrient. At high concentrations, it creates caustic conditions that place strong limitations on plant life. Only species adapted to these unusual conditions can live in fens.

Many of our fens are along the Fox River on the slopes of morainal hills, kames, and gravel terraces left from the time when the river was a torrent carrying a flood of meltwater from the wasting glacier. Others are similarly situated in glacial deposits where erosion has exposed gravel aquifers on hillsides.

In some places, the flowing ground water carries such a heavy load of minerals that some of them precipitate out and form a porous rock called tufa. Sometimes, marl, a loose, crumbly material formed of calcium and other minerals, collects. Fen soils are formed of peat.

Places with high mineral concentrations and heavy flows may be separated out as spring runs or marl flats. Calcareous seeps are areas with high flow but with more organic matter and nutrients in their soils than occur in spring runs. Graminoid fens occur where flow is reduced and still more nutrients and organic matter are in the soil. Graminoid fens share many plants with the prairies. Such dominant prairie grasses as big and little bluestem (*Andropogon spp.*) and Indian grass (*Sorghastrum nutans*) can be found growing along with calcium-loving species like grass-of-Parnassus (*Parnassia glauca*) and Ohio goldenrod (*Solidago ohioensis*). Sedges are also common.

Graminoid fens depend on periodic fire. If fire cannot reach them, shrubs and trees invade.

*White lady slippers (*Cypripedium candidum*) are among the beautiful orchids that show an affinity for the alkaline, peaty soils of fens.*

Bogs

Open water, sedge mats, and bog forest appear in this picture of Volo Bog in Lake (IL) and McHenry Counties. The sundew (left) uses sticky filaments to capture insects.

*The grass pink (*Calopogon tuberosus*) decorates summer bogs with its flowers. This species can also be found at the other end of the pH scale in fens.*

Bogs are remnants of a time when the Chicago Wilderness region was covered with vegetation like that of present-day Upper Michigan. In early post-glacial time, a spruce-fir forest dominated this region. As oakwoods and prairies replaced this boreal forest on the uplands, bogs hung on in small glacial depressions where drainage was limited or totally absent.

Bogs are striking examples of the ability of plants to change their environment. They can, over time, fill a pond or small lake with peat that forms a substrate firm enough to support trees.

Bog waters are cold, extremely acid, and very low in oxygen. Mineral nutrients are locked up in the peat and therefore unavailable to plants. These conditions place severe limits on plant life. A group of species has adapted to these conditions. These bog plants dominate this extreme environment and are unlikely to be found anywhere else.

Bog development is likely to begin with the formation of a floating mat of plants. Sedges are a major element in this mat as are mosses, particularly Sphagnum moss.

As this mat thickens, it becomes firm enough to allow shrubs to root in it. Bog birch (*Betula pumila*) may begin to grow, along with leatherleaf (*Chamaedaphne calyculata*) and other species of heaths, among them, cranberries (*Vaccinium macrocarpon*). In time, trees may invade, particularly tamarack (*Larix laricina*), a deciduous conifer whose needles turn a rich gold before dropping in the fall.

In our region, the final stage in this process is considered to be a tall-shrub bog dominated by winterberry (*Ilex verticillata*) and poison sumac (*Rhus vernix*). The exotic shrub glossy buckthorn (*Rhamnus frangula*) has invaded this community in recent years.

The stages in bog development can often be seen as a series of concentric circles in existing bogs. The outermost circle is a narrow moat of open water next to the shore of the lake or pond. Inside that is a sedge mat, then a low shrub bog, a forested bog, and a tall-shrub bog. A small pond of open water may remain at the center of this sequence.

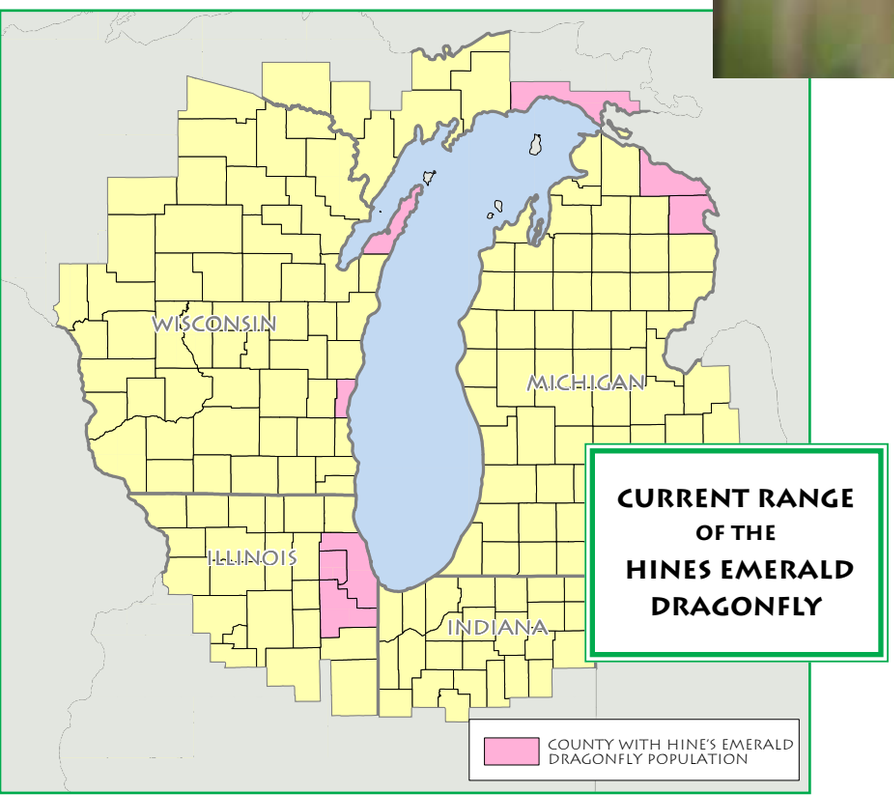
In the nutrient-poor environment of the bog, some plants have developed the ability to capture insects to provide themselves with nitrogen and other essential elements. The sundews (*Drosera spp.*) snare their prey on sticky filaments. The pitcher plants (*Sarracenia spp.*) trap insects in cups baited with sugar water.

Bogs are known for the beauty of their flowers. The heath shrubs produce bell-like blooms and miniature versions of azaleas. A number of orchids—like the stemless lady slipper (*Cypripedium acaule*)—are bog specialists. Others, like the grass pink (*Calopogon tuberosus*) are often found there.

WETLANDS

Insects

*The green darner (*Anax junius*) hawks for mosquitoes above the wetlands of the Chicago Wilderness region.*



The Chicago Wilderness region is at the center of efforts to protect the rare and endangered Hine's emerald (Somatochlora hineana) dragonfly.

Dragonflies are among the most familiar sights at summer marshes. These ancient insects—their ancestry goes back to the coal forests—are predators that win the affection of humans by eating mosquitoes. Their larvae live in water where they prey on small aquatic creatures.

At a few special places in the Chicago Wilderness region, wet places along the lower Des Plaines River where a torrent of glacial meltwater scraped away the glacial debris and exposed the 400 million year old bedrock, an endangered dragonfly called the Hine's emerald (*Somatochlora hineana*) hunts insects over marshes, sedge meadows, and prairies.

The Hine's emerald is found in a few sites in Cook, DuPage, and Will Counties and also in a few other places where the same dolomite bedrock is near the surface in Wisconsin, Michigan, and Ontario. It has disappeared from formerly occupied sites in Ohio, but has been discovered in similar habitat in the Ozarks of Missouri.

The Chicago Wilderness region is at the center of efforts to protect this rare and endangered insect.

Birds

Wetlands are rich in bird life. Dabbling ducks like the blue-winged teal (*Anas discors*) sit on the surface scooping up duckweed, sedge seeds, and snails. Pied-billed grebes (*Podilymbus podiceps*) use their control of their own buoyancy to sink like submerging submarines until only their heads remain above the surface, then dive in search of small fish, crayfish, and tadpoles.

Seldom seen, Soras (*Porzana Carolina*) slip among the reeds searching out snails, insects, and smartweed seeds. Marsh wrens (*Cistothorus palustris*) sing their rattling song from the cattails and yellow-headed blackbirds (*Xanthocephalus xanthocephalus*) often follow up a few musical notes with a harsh, scratchy buzzing, sounding almost like the squealing of rusty hinges.

After decades of absence, sandhill cranes (*Grus canadensis*) once again breed in our region thanks to restoration of sufficiently large habitat. These tall, graceful birds with the chortling trumpet call occupy both wet prairies and marshes, sedge meadows, and other wetlands.

*A common moorhen (*Gallinula chloropus*) helps her chicks learn to recognize food. A threatened species in Illinois, the moorhen nests in several locations in our region. These birds were photographed at Chicago's Lake Calumet.*

However, a recent study revealed that populations of most of the region's wetland birds have decreased significantly since 1980. The Chicago region is a refuge for these birds imperiled simply because so many wetlands still survive here.

Particularly important are the glacial wetlands of Lake and McHenry Counties and the Calumet area wetlands. State-endangered birds like common moorhens (*Gallinula chloropus*), yellow-headed

blackbirds (*Xanthocephalus xanthocephalus*), and black terns (*Chlidonias niger*) are holding on in these areas despite serious threats, primarily loss of habitat.

The habitat where our rarest birds are found is called hemi-marsh, a shallow wetland that is about half-covered with emergent wetland vegetation. Unfortunately, these wetlands are becoming increasingly rare due to unchecked development, which significantly alters wetland drainage patterns.

Our wetlands also host birds that nest in large colonies. State-endangered black-crowned night herons (*Nycticorax nycticorax*), as their name suggests, leave their nesting grounds at dusk and hunt after dark. Great blue herons (*Ardea herodias*) and great egrets (*Ardea alba*) are off and flying by dawn, looking for ponds and marshes that are likely hunting areas. All three species fish shallow waters. Their usual hunting strategy is to stand very still and wait for something to move. They usually grab things in their bills, although the great blue may use its bill as a spear for capturing larger fish.

Double-crested cormorants (*Phalacrocorax auritus*), another colonial nester, nest near wetlands, but prefer to fish in rivers. These diving birds may go down 25 feet or more after fish.

Colonial nesters may travel 10 to 15 miles in search of food. It generally takes several wetland areas to support the birds living in a single rookery. The loss of even one rookery location can leave dozens—in some cases hundreds—of potential nesting pairs without a home.

With their raucous calls and crimson epaulets, it is hard to miss red-winged blackbirds (*Agelaius phoeniceus*) in our wetlands. They seem to do well even where cattails have completely covered all the water in a wetland.

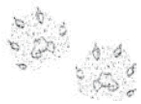
Lake Renwick, an old gravel quarry in Will County, Illinois, is our largest rookery. All five of our colonial nesting waterbirds—great blue herons, black-crowned night herons, great egrets, snowy egrets, cattle egrets—nest on the islands in this lake.

*Once extirpated from the Chicago Wilderness Region, sandhill cranes (*Grus canadensis*) are breeding once again throughout the Chicago Wilderness region, leading to their removal from the Illinois endangered and threatened species list.*

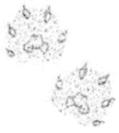
*Soras (*Porzana carolina*) slip between the stems of emergent vegetation in search of insects, snails, and seeds. Smartweed seeds are a favorite food.*

WETLANDS

Mammals



Mink tracks



The river otter was once common in our region, but has been extirpated. As water quality improves in our rivers, the reintroduction of this species is a possibility.

The skins of beavers were the first products of the Midwest to enter the world market. Native Americans controlled this end of the trade in the early days, but late in the 1600s, the French arrived. Later, British and American traders took over the business. The hides of other animals were traded too, but beavers (*Castor canadensis*) made up the bulk of the commerce. Their skins were turned into hats in Europe.

The trapping of beavers was a huge business, so big that it eventually killed all the beavers. Historical accounts say that by about 1850, beavers were completely gone not only from the Chicago region but from the rest of Illinois and Indiana as well.

They are now found in suitable habitat throughout the Chicago region. The return of the beaver was accomplished with a certain amount of stocking, but mainly, the beavers made it back on their own. They were helped by the extensive network of drainage ditches dug to keep the water out of croplands across Illinois.

Beavers not only live in wetlands, they make wetlands. Their dams turn sections of streams into ponds. The dams deepen the water providing room for underwater entrances to beaver lodges. Along larger rivers where banks are suitable the beavers live in burrows with underwater entrances.

Muskrats (*Ondatra zibethicus*) are the most visible of marsh mammals. They are frequently seen swimming, especially near dawn and dusk. Their houses are low domes—much smaller than beaver lodges—roofed with mud and marsh plants. Birds as diverse as Canada geese (*Branta canadensis*) and black terns nest on top of muskrat houses.

Muskrats are prolific animals. When populations are at peak levels, their appetites can significantly reduce cattail stands.

Mink (*Mustela vison*) eat muskrats and virtually anything else they can overpower. They sometimes take over muskrat houses after eating the inhabitants. They are active mainly at night, but sometimes continue hunting into the morning when early visitors might catch sight of one.

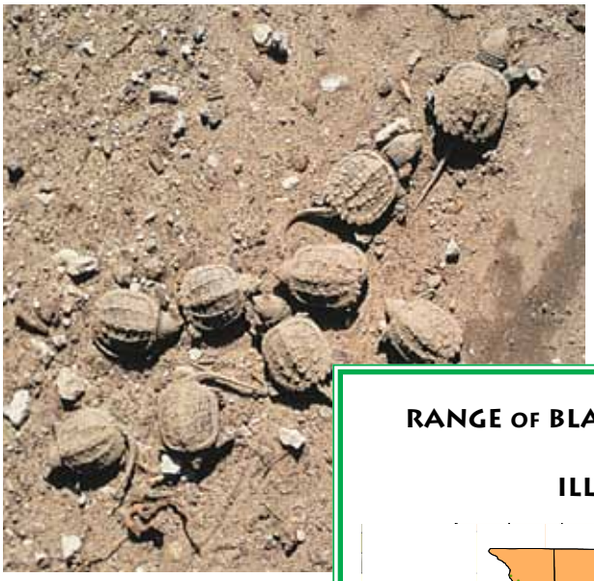
River otters (*Lutra canadensis*) were once part of the Chicago Wilderness region. They have been extirpated from much of their former range in the Midwest. Today, they are occasionally seen along the Mississippi and in extreme southern Illinois.

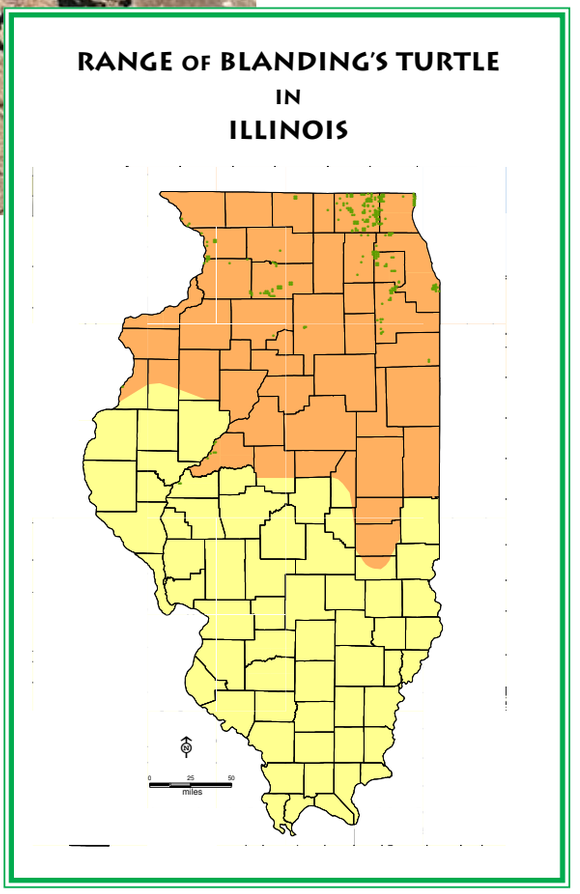
Occasional sightings, including some from McHenry, Kane, and DuPage Counties in recent years, were probably wandering individuals looking for a home. With better water quality and some limits on development along rivers, they might find one.

Due to trapping, beavers disappeared from the Chicago Wilderness region by 1850. Now they have returned and once again are building their lodges in our wetlands and streams.

Herps

A female Blanding's turtle (*Emydoidea blandingii*) was captured at Spring Bluff Preserve, a Lake County (IL) forest preserve on Lake Michigan immediately south of the Wisconsin border. She was equipped with a radio tracking device and released. She began traveling north, crossing the state line into the Chiwaukee Prairie, a preserve managed by The Nature Conservancy of Wisconsin. There she took up residence at a pond. She had traveled a total of 765 meters, about half a mile.





*Blanding's turtle (*Emydoidea blandingii*) (above left) is a once-common wetland species that has been eliminated in most of its historic range by habitat loss. The map shows the historic range in color. The green dots indicate locations of recent sightings of the species. Baby snapping turtles (above) will look for permanent bodies of water to provide them with a home.*

In her wandering, she crossed land held by a county preserve system and a private conservation organization. In Illinois, she was a member of a species on a "watch list." The watch list is reserved for animals and plants whose future is a matter of concern but who are not considered in sufficient peril to make the endangered or threatened list. However, when she crossed the state line, this turtle became a member of a threatened species, since that is the status of Blanding's turtle in Wisconsin.

The travels of this turtle point up the importance of cooperation among conservation agencies and states. They also emphasize the importance of preserving wetlands—even small wetlands. Many animals visit wetlands too small to support permanent populations. Some wetlands can support small populations that may die out from time to time. These populations must be replenished by migrants from other areas, and that recolonization cannot happen if great distances or other obstacles prevent it.

Adult Blanding's turtles prefer shallow ponds with at least some open water. They do not live where dense stands of cattails dominate the wetland. Young animals of this species have been observed in several different kinds of wetlands. They have been known to live in burrows dug into the hummocks created by *Carex stricta* in sedge meadows.

Many wetland herps are confined to areas with permanent water. Snapping turtles (*Chelydra serpentina*) belong to this group as do bullfrogs (*Rana catesbeiana*).

Kirtland's snake (*Clonophis kirtlandii*) is a species that can be defined as an animal of wet prairies, wet savannas, or wetlands. Like the massasauga, it uses crayfish burrows, and it spends much time in them. Earthworms are a major food source and they may be captured underground.

STILL WATERS
Lakes and Ponds

*The longear sunfish (*Lepomis megalotis*) brightens the waters of both lakes and rivers in this region.*

Lakes in our region are concentrated on the moraines and in low spots on the Chicago Lake Plain. Draining and filling have eliminated all but a few of the lake-plain lakes.

Lakes are one of the signs of the youth of our landscape. In areas to the south and west, where the glaciers departed less recently, the various depressions left by the ice have drained away or been filled by erosion from the surrounding uplands.

Glacial lakes are common to the north in Wisconsin and Michigan, but in the states of Illinois and Indiana, they are almost entirely confined to the small portion of each state that lies on the Valparaiso Moraine or on the younger lands between the moraine and Lake Michigan.

Lakes are permanently, not just seasonally, wet. They are too deep for rooted plants to grow except in shallow, near-shore areas. The distinction between a lake and a pond is a matter of size. Lakes are bodies of water large enough to have at least one wind-swept beach. When winds are high, they blow across the water and create waves large enough to wash away any plants attempting to colonize the beach.

Our inland lakes are generally of moderate depth. One, in Lake County (IL), reaches a depth of 50 feet and has been named Deep Lake. Thirty to 35 feet is more usual.

Lakes and ponds can be divided into categories based on abundance of nutrients and how these nutrients are cycled through them. Oligotrophic lakes contain limited nutrients and maintain an approximate balance between production of organic material by photosynthesis and decomposition. The process of decay releases nutrients back to the water. The open waters of Lake Michigan are oligotrophic.

In eutrophic lakes and ponds (the name means "well fed"), nutrients are abundant and more are taken up during production than are released by decay. Such lakes usually receive a continuing supply of nutrients through runoff from surrounding lands. Sediments rich in

organic matter build up on the bottom, and the lake gradually fills. In the deeper waters, the bacteria of decay may absorb all the available oxygen, creating stagnant conditions where few animals can live. Stagnation is most frequent during late summer when the supply of oxygen brought to the deep waters by the spring overturn—see graphic on this page—has been exhausted. Many inland lakes are usually eutrophic.

In dystrophic lakes, production and reduction are wildly out of balance. Bogs are good examples of dystrophic waters. Thick layers of peat build up in the lake basin because very little decay is taking place.

One of the common effects of settlement has been a large increase in the amounts of nutrients flowing into our lakes and ponds. These come from fertilizers, from sewage treatment plants, or leaking septic systems. They push lakes in the direction of dystrophy by greatly increasing the amount of production. Algae blooms fertilized by these nutrients can also be foul smelling.

Lakes are ecologically complex communities with several distinctive kinds of organisms living in them. On the bottom are mussels, tube worms, and fresh water sponges.

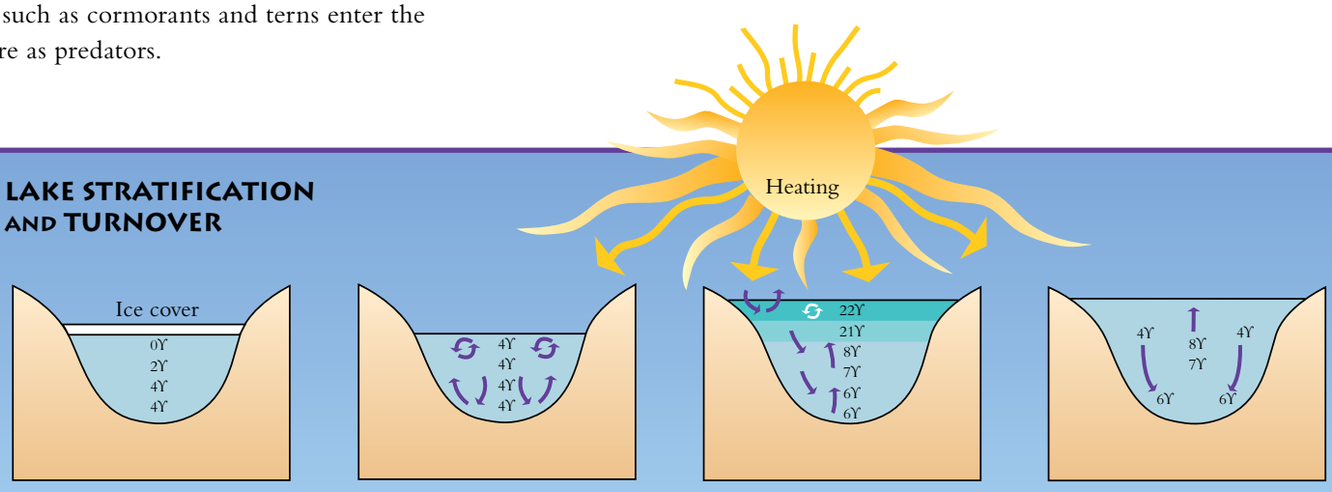
Swimming organisms include crustaceans and other invertebrates as well as fish. Healthy lake communities have animals at different trophic—that is, feeding—levels, from herbivores to top carnivores. Fish-eating birds such as cormorants and terns enter the picture as predators.

*The cup-like leaves and yellow flowers of American lotus (*Nelumbo lutea*) cover the shallow water in Nippersink Lake in Lake County, Illinois.*

Several endangered and threatened species live in the lakes of the Chicago region, most of them in the lakes of the Fox River watershed. They include several small fish belonging to the genus *Notropis* that carry the common name "shiners." Shiners are seldom more than six inches long and often much smaller. They feed on insects and small crustaceans.

The plight of the shiners is usually a product of environmental changes in their home lakes. The Illinois Endangered Species Board has recommended that glacial lakes be protected from further development and from pollution and herbicides, that introduction of sport fish be prohibited, and that native submerged and emergent vegetation be protected and enhanced.

LAKE STRATIFICATION AND TURNOVER



WINTER

Heating and cooling separate lake waters into layers. In winter the cold air chills water near the surface. The warmest water is in the depths.

SPRING *(turnover)*

Spring sunshine heats the surface layers until all the water is the same temperature. Mixing by wind and currents brings oxygen-rich water to the depths.

SUMMER *(layering)*

In summer, the warm water is at the surface. A sharply defined *thermocline* divides the warm surface water from the deep cold water.

FALL *(turnover)*

Fall cooling produces uniform temperatures again and another turnover. The turnovers are the principal sources of oxygen in the deep waters of lakes.

MOVING WATERS
Streams and Rivers

The North Branch of the Chicago River is a peaceful stream on a sunny summer day. The creation of preserves along the rivers is helping return life to the waters.

Before European settlement, shallow streams and rivers lazily drained our landscape—much of it relatively flat, wet prairie. Most of the waterways did not have well-defined natural courses. And because they were largely fed by springs where underground water emerged from the water table, they ran cool and clear.

Farmers, eager to grow crops even in wet areas, installed thousands of miles of drainage tiles. These tiles efficiently drained rainfall to streams, many of which were channelized—that is, dredged into straight, steep-sided ditches of uniform depth to speed the removal of water. The loss of native plant cover on the land, coupled with the compaction of soil by repeated plowing, further increased surface runoff to streams, leading to wildly fluctuating water levels, and high levels of sediment, fertilizers, and pesticides.

So too, did the growth of urban areas visit compound the stresses upon our moving waters. Efforts to control flooding brought pressure to "improve" drainage by deepening and straightening waterways further still. Runoff from impervious surfaces—streets, parking lots, and the like—added yet more water and with it more pollution. Businesses and municipalities long dumped raw sewage and industrial waste, turning some of our waterways into open sewers. The Chicago River in Illinois and the Grand Calumet River in Indiana got the worst of this, although no river escaped without some damage.

Over the last 40 years, since the passage of the Clean Water Act and other legislation, conditions have improved somewhat. Fish that had not been seen in a century have returned to the Chicago River. Herons can be seen in the marshes along the Grand Calumet River. Some stream segments, even some entire streams, have regained a high level of native biodiversity. Examples are the Kishwaukee and the lower Kankakee in Illinois, the Yellow in Indiana and the Galien in Michigan.

Biologists have divided the rivers of the Chicago Wilderness region into four size categories. The smallest of these is the headwater stream, a tiny creek that may flow only intermittently. Headwater streams have few species of fish, and most of those are shiners and other minnows.

Low order streams are small- to medium-sized creeks whose bottoms have been shaped by the water to produce riffles and pools, alternating sections of fast shallow water and slow deep water. Life in these streams often sorts itself into ripple and pool species. Creek heelsplitters (*Lasmigona compressa*), endangered mussels known in recent years from the Kishwaukeee and tributaries of the Kankakee, are a quiet water species. Among fish, threatened river redhorses (*Moxostoma carinatum*) are riffle species, while threatened Iowa darters (*Etheostoma exile*) are a fish of quiet pools.

Mid-order streams are our most complex river habitat. Water flows through both deep and shallow pools. In the riffles, smallmouth bass (*Micropterus dolomieui*) are top predators, while largemouth bass (*Micropterus salmoides*) live in the pools. Floodplains begin to develop along streams of this size.

Our largest rivers have broad floodplains. Floodplains, common in varying degrees to most waterways, are low lands adjoining a stream or river channel that store and soak up excess waters during storms or spring melts. Cutting streams and rivers off from their floodplains further degrades both aquatic and terrestrial biodiversity, and increases the likelihood of flooding of nearby homes and businesses.

In recent years there has been a growing awareness to consider stormwater as a resource to utilize rather than a problem in need of disposal. Detention ponds, rain gardens and bio-swales are but a few of the emerging strategies to convert stormwater into beneficial groundwater.

The irregular shore and varied depth of a natural creek (above) contrasts sharply with the sterile ditch created by channelizing (top).

RIVER SYSTEMS OF THE CHICAGO WILDERNESS REGION

STREAM OR RIVER

HIGH QUALITY STREAM OR RIVER

★ MUSSEL SPECIES OF SIGNIFICANCE

*Rainbow darter (*Etheostoma caeruleum*) is one of the endangered species that still lives in our river systems.*

A continental divide runs through the heart of Chicago Wilderness region. The Chicago, Grand Calumet, and Little Calumet Rivers flow into Lake Michigan. The Des Plaines and Kankakee Rivers join to create the Illinois River which flows to the Mississippi. The Fox also joins the Illinois. The Kishwaukee flows to the Mississippi via the Rock River. A century ago, the flow of the Chicago was reversed. It now flows through the Sanitary and Ship Canal into the Des Plaines and the Illinois.

Disclaimer: This map identifies some of the higher quality streams in the Chicago Wilderness region as reflected by fish, mussel, and/or macroinvertebrate sampling data as well as the professional judgment of experts familiar with the region's aquatic resources. It is intended for illustrative purposes only and does not reflect a comprehensive assessment of every stream segment in the region.

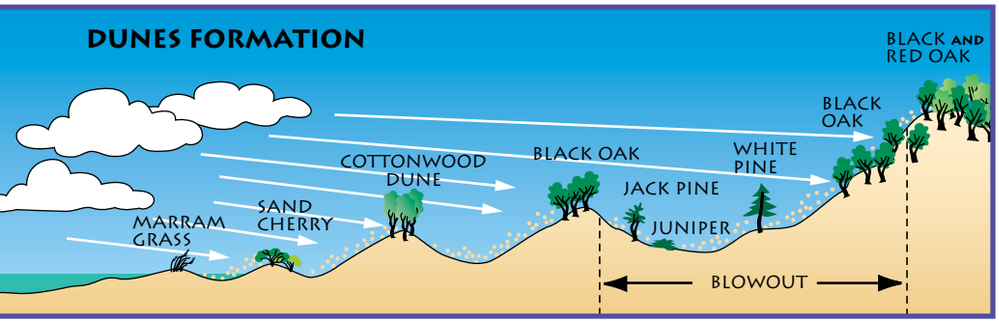
THE DUNES

Henry Chandler Cowles

The University of Chicago's Professor Cowles was one of the founders of the science of ecology. His studies of plant life at the Indiana Dunes developed the idea of ecological succession and connected the history of the land to the life it supports.

*Fowler's toad (*Bufo woodhousii fowleri*) is a duneland specialist not found elsewhere in our region.*

Henry Chandler Cowles is said to have developed his interest in the Indiana Dunes after passing through the area on a train during his first trip to Chicago. The landscape that Cowles glimpsed is one of the most diverse in North America. Open dunes, marshes, prairies, upland forests and swamps, oak savannas, and relict populations of jack pines all grow within a few miles of the Lake Michigan shore. Botanical surveys tell us that more species of plants grow in the Indiana Dunes National Lakeshore than in Great Smoky Mountains National Park.



The beach at the Indiana Dunes is a windswept desert where only a few hardy annuals can live. South from the beach, the land is progressively older and more extensively modified by the plant communities that cover it. The vegetation separates into narrow bands of very different communities. These differences help give the dunes their great biodiversity.

The basis of this diversity is the shape of the land. As part of the lake plain, the dunes show the history of the various stages and levels of Lake Michigan. Long beach ridges parallel the present shoreline. Between them are low swales now occupied by lakes, marshes, and other wetlands.

The most spectacular sights are the dunes themselves, mountains of sand rising nearly a hundred feet above the swales. These dunes sit atop glacial drift. They have formed through the millennia from sand blown by the prevailing westerly winds, sand taken from the endless supply carried by near-shore currents in Lake Michigan.

Illinois has its dune lands too. At Illinois Beach State Park marram grass (*Ammophila breviligulata*) grows on low foredunes immediately behind the beach, and sand savannas dominated by black oak (*Quercus velutina*) are a major community type. But there are no high dunes at Illinois Beach, because the prevailing winds blow toward the lake. Illinois Beach is also a much younger landscape. It was formed in the past 3,000 years, while parts of the dunelands of Indiana go back to the earliest periods of Lake Michigan's development.

The story that Cowles pieced together from his researches at the Indiana Dunes was of changes wrought largely by plants on the landscape in which they grew. Adding organic matter to the soil, changing the microclimate by casting shade or shielding land from the winds, the marram grass of the foredunes would eventually create conditions that would favor the growth of other plants, and these plants would replace the marram grass.

The process was called ecological succession, and it became a major concept in the then young science of ecology. Succession was thought to lead ultimately to a natural community called the regional climax, a single, stable, long-lived community that would cover the entire landscape.

Cowles made ecological change intelligible, although today, we think of the idea of a climax community as too directional. No landscape ever reaches the regional climax. Instead, a variety of forces act to maintain diversity. The winter storm that blows down trees and opens new opportunities for marram grass is not a setback on the road to the regional climax but a predictably recurring event that sustains biodiversity.

LAKE MICHIGAN

The Great Lakes are among the wonders of the world. The five inland seas hold one-sixth of the world's surface fresh water. Lake Michigan is the third largest of the lakes, with a surface area of 22,300 square miles.

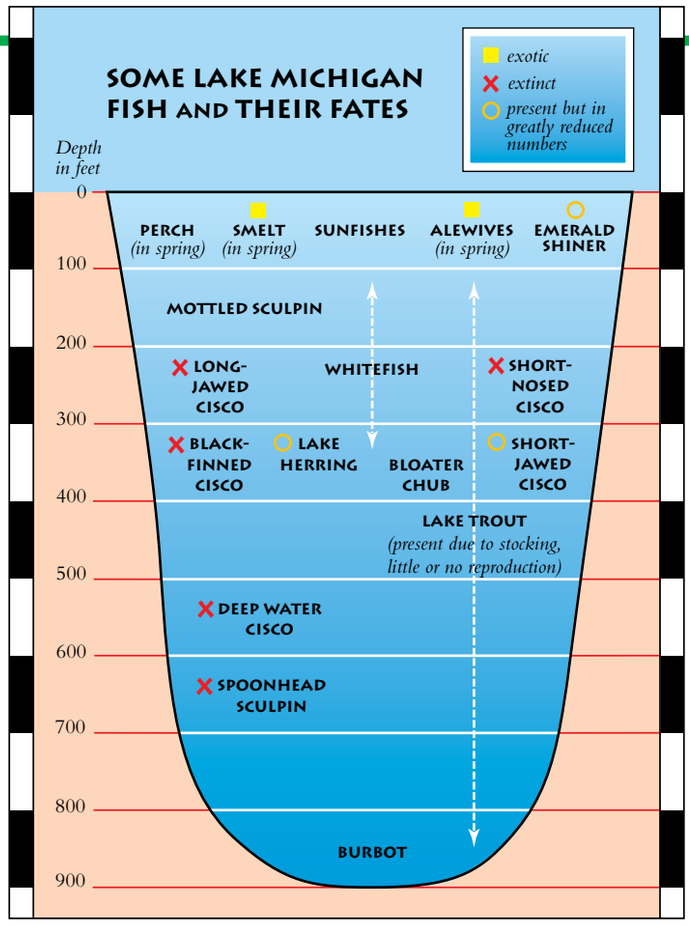
The lake has played a major role in the history of the Chicago region. It has been a highway for traders, travelers, and immigrants.

The natural riches of the lake were major resources. Commercial fishing in the lake was a big business, and for much of its history, it was totally unregulated. Over-fishing pushed some species to the brink of extinction. By the late 1930s, lake trout (*Salvelinus namaycush*) numbers had been seriously reduced. The arrival of sea lampreys (*Petromyzon marinus*) in the forties finished off the species. Lampreys, an Atlantic species that entered the Upper Great Lakes via the Welland Canal, are parasites on fish, and heavy infestations can be lethal. By the time another kind of newcomer, the alewife (*Alosa pseudoharengus*), arrived, the lake had no top predator to help control the numbers of this very prolific exotic species. Alewife populations boomed and then crashed in massive die-offs that littered beaches in the late sixties.

In the early seventies, various species of salmon, including the coho (*Oncorhynchus kisutch*), were introduced to control the alewives. They succeeded at that and, as a sort of side effect, created a multi-billion dollar sport fishing industry.

Meanwhile, lake trout stocking continued, but the species showed few signs of being able to reproduce naturally. New exotic species arrived, the most troublesome being the zebra mussel (*Dreissena polymorpha*), a mollusk that now infests practically every suitable bit of lake bottom. Traditionally abundant species such as the yellow perch (*Perca flavescens*) have been declining alarmingly.

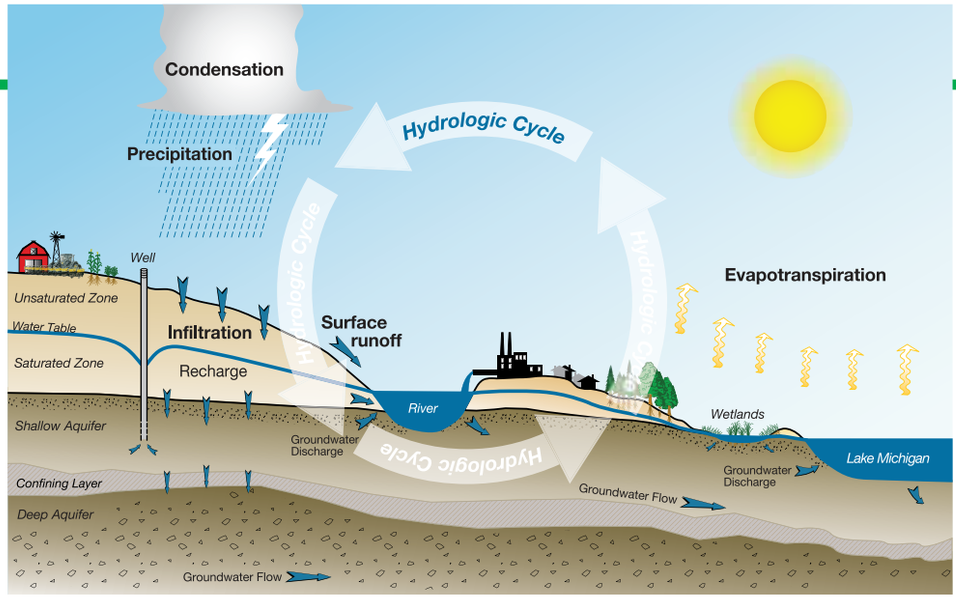
Not long ago, it was the water quality of Lake Michigan that was declining. A concerted international effort has produced major improvements—although problems with persistent toxic chemicals remain. However, the biological quality of the lake is very much in question. Aquatic biologists have the heavy task of trying to maintain a system in the face of the constant arrival of new exotic species and the loss of coastal habitat.



This diagram reveals some of the massive changes in the life of Lake Michigan that have accompanied settlement and the often heedless harvesting of the lake's living resources.

*Zebra mussels (inset) are the latest exotic species to upset the ecological balance of the Great Lakes. These tiny mollusks now occupy practically every square inch of suitable habitat in Lake Michigan. Dune habitat lines much of the southern rim of Lake Michigan. Marram grass (*Ammophila breviligulata*) is among the few plants that can grow in what is known as the foredune. The grass blades and root system help to stabilize the shifting sands.*

THE WATER CYCLE



The water cycle, or hydrologic cycle, describes how water circulates from the atmosphere to the earth and back to the atmosphere. A healthy water cycle allows for much water to follow its natural course, especially into the ground where it recharges a diversity of natural landscapes, rivers, lakes and aquifers.

All the waters of the earth are in constant motion, circulating on and through the earth, into the air, and back to earth again. Over tens of thousands of years, our native plants and animals have carved out particular niches, largely dependent upon how much water is available. Even slight changes in a natural area's hydrology—the amount, frequency, duration and quality of water available—can sharply impact its species composition and overall health.

How water cycles through our landscape has changed radically. During the last century, farmers installed countless miles of drainage tiles and artificial channels to drain water off their agricultural lands as quickly as possible. Water that would have slowly replenished various landscapes or trickled into natural waterways and deep, underground aquifers, was instead flushed as wastewater into our major rivers and swept downstream where it was unavailable for our use.

However, it is population growth that has most severely taxed our water. Like farmers, urban planners largely viewed natural precipitation as a problem to be disposed of rather than a resource to use responsibly. The proliferation of storm sewers and artificial detention basins kept neighborhoods and businesses mostly dry, but led to even more water being diverted from their natural cycles.

By 2050, the 11-Illinois-county area of the Chicago region is expected to grow by 38.5 percent to more than 12 million people. Lake Michigan may look big enough to accommodate all these new people, but not without threatening the long-term sustainability of what is, in spite of its perceived bigness, a finite resource under stress. For instance, groundwater levels, which historically fed a significant percentage of water to Lake Michigan, have been severely drained by suburban growth. Also, higher temperatures and increased evaporation due to climate change are expected to lower lake levels considerably.

In any event, cities and suburban communities outside of the Lake Michigan watershed, where most of the population growth is projected, must rely on other sources—namely from aquifers, underground stores of water. However, many aquifers are drying up because the amount of water being pumped out exceeds how much trickles back in from precipitation.

Hand in hand with diminished water availability has been a decrease in water quality. Since the passage of the Clean Water Act in 1972, the days of industries and communities dumping raw sewage into our region's waterways are all but gone. But there remain many other "nonpoint" sources of pollution that compromise our waters. Chief among them is stormwater runoff, which carries increasingly high volumes of road salt, automotive and other pollutants that are harmful to aquatic plants and animals. An excess of nutrients is another significant nonpoint pollution source. Too much nitrogen and phosphorous—key components of fertilizers used on farmlands and backyard lawns—can create "dead zones" in our waters. Too many nutrients in our waters often leads to algae blooms—thick mats of algae that cover much or all of the surface of ponds and lakes. As algae dies, it is broken down by microbes that consume much of the available oxygen, without which most aquatic life cannot survive.

Fortunately our water future does not need to be all gloom and doom. Although demand will certainly grow, even as supplies may diminish, our waters can be protected. Water conservation is something that everyone—individuals, businesses and other institutions—can do; whether it is using rain barrels, planting rain gardens, or installing high efficiency plumbing and appliances. On a regional basis, a number of governments and urban planners already are better managing our stormwater. Key to their efforts is the protection and restoration of natural areas as re-charge zones. Natural plant communities tend to keep soil loose and increase infiltration and absorption. Natural lands, then—unlike agricultural and urban lands—act like sponges allowing water to naturally replenish our natural areas, aquifers and reservoirs.

CLIMATE CHANGE

Since the dawn of time, the earth's climate has undergone many changes—some of them quite dramatic. During the Pleistocene Period, roughly 2.5 million to 10,000 years ago, numerous glaciers advanced and retreated across the globe, including much of the Chicago Wilderness region. The Ice Age, as it is commonly known, was caused by a combination of factors, including naturally-occurring changes in the amount of water vapor, carbon dioxide, methane, nitrous oxide and other gasses in the earth's atmosphere. Together, these "greenhouse gasses" regulate the temperature of the earth.

With the advent of the Industrial Revolution, concentrations of greenhouse gasses in the earth's atmosphere have increased exponentially—mainly from burning of fossil fuels and destroying native habitats. This increase has trapped significantly more heat in the atmosphere, leading to a number of projected climate change-related effects.

A growing body of research indicates that increasing temperatures will affect the abundance and distribution of fish, wildlife and plant species. Mobile species will tend to migrate northward. The Chicago Wilderness Climate Change Task Force projects that "As many as 44 species of birds that currently breed in Illinois may no longer breed in the state by the end of the century." These include such familiar and widespread species as black-capped chickadees (*Poecile atricapillus*), gray catbirds (*Dumetella carolinensis*), Baltimore orioles (*Icterus galbula*) and American goldfinches (*Carduelis tristis*).

Some pollinator insect species are likely to be negatively affected, but overall insects are expected to increase in numbers. The increase in the number of pest species may pose particular challenges for human, crop, and native ecosystem health.

Although higher temperatures may help expand the range of certain tree species in our region, considerably more may become rare or disappear entirely. These include northern red oaks (*Quercus rubra*), black cherries (*Prunus serotina*), sugar maples (*Acer saccharum*), paper birches (*Betula papyrifera*) and butternuts (*Juglans cinerea*).

Beyond the effect on individual species, climate change is likely to have a significant impact on entire natural communities. Each one is an interdependent, functioning system of plants, animals and microorganisms, which evolved over millennia. Rapid climate change, such as we are experiencing now, will affect different species differently, and at different rates. This could lead to the disruption of key species interactions, such as upsetting the balance between prey and predator, pollinators and their host plants, and other inter-species relationships, potentially causing the collapse of certain habitats.

Climate change could also amplify the existing threats to natural communities, such as habitat loss and fragmentation, invasive species, and pollution; possibly jeopardizing past conservation efforts in the Chicago Wilderness region.

Fortunately, sound conservation management is likely to help our plant and animal communities become more resilient to the challenges climate change brings. More and larger natural areas—better connected and better managed—promote genetic diversity, which allows plants and animals to adapt to changing conditions. A large and diverse number of healthy natural areas is also likely to help offset the effects of climate change for people, since they capture and store excess greenhouse gases.

"Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level." —An Assessment of the Intergovernmental Panel on Climate Change, a scientific, intergovernmental body established by the United Nations Environment Programme and the World Meteorological Organization.

*Populations of the federally-endangered Karner blue butterfly (*Lycaeides melissa samuelis*), already stressed by a lack of suitable habitat, may not be able to survive the additional habitat changes wrought by climate change.*

The balance of nature in preserves such as the Springbrook Prairie Forest Preserve in DuPage County is threatened by climate change. However, in concert with the other reserves in our region, healthy ecosystems help mitigate the effects of climate change.

PEOPLE ON THE LAND

Native Americans

People have been living in the Chicago region for thousands of years. It is likely that hunters followed the big animals such as mastodons north as the glaciers receded. In those times, human populations were small—as they were throughout the world—and hunting and gathering were the sole means of subsistence.

By 2,000 years ago, people in the Midwest were living in settled communities based upon a combination of agriculture and the harvest of natural foods such as fish, shellfish, and game. These communities developed into substantial societies capable of building such impressive works as the mounds at Cahokia, Illinois, and other Midwestern sites.

This Midwestern civilization was centered along the major rivers: the Illinois, Mississippi, and Ohio.

The arrival of Europeans in North America was catastrophic for native societies. Diseases such as smallpox and measles destroyed whole communities. Tribes displaced by the new colonists pushed west and came into conflict with people already there.

The Illini, a confederation of peoples that had greeted the first French explorers in the late 1600s, had practically ceased to exist by 1800. The Potawatomi, recent arrivals from the eastern shore of Lake Michigan, had occupied the Chicago region by the time the city was founded in the 1830s.

Native populations were small. Only a few thousand people lived in the Chicago region. Their way of life and their habitations followed the seasons. Spring and summer were spent in towns living in wooden houses. Fields near the towns were planted in corn, beans, and squash.

After the harvest, most people moved away from the towns. Often only a few elderly people remained there through the winter. The rest of the population moved into winter hunting camps. The camps were occupied by family groups.

The coming of spring was signaled by the gathering of the people at groves of black and sugar maple. There, they collected the rising sap and boiled it down into maple sugar, which they used as a condiment much as we use salt.

The Potawatomi towns were mainly along the rivers. There they had reliable water supplies and firewood. The prairies were places they used seasonally for hunting and gathering. They had no reason to establish permanent towns there.

The permanent villages of Native Americans in this region were mainly along the rivers. People made seasonal use of the lake plain—where the present city of Chicago is located—but they didn't live on that wet, wind-swept land.

The major crops of the Potawatomi were of tropical origin and did not escape into the wild. Extensive trade networks existed throughout North America, but the goods traded were mainly portable commodities and luxury goods. The sort of bulk shipments that led to the accidental importation of large numbers of plants from Europe were not part of Native American commerce.

This way of life began to change after the fur trade became important as men turned more of their time and attention to trapping and hunting beaver and other furbearers. Iron pots and steel axes, acquired in exchange for furs, replaced pottery and stone tools. In the first 150 years of European presence, the newcomers and natives adapted to each other. It was only after the Americans began to pour in that natives were forced to move west.

The largest effect of Native Americans on the landscape came from their use of fire as a land management tool. The earliest account of burning in North America dates from 1528 when Cabeza de Vaca saw people in Texas setting fires. In the seventeenth century, French traders planned journeys west from the Mississippi to miss the fall fire season. Accounts of fires in Illinois, Indiana, and southern Wisconsin are numerous.

Fires gave a competitive edge to the natural communities best adapted to them. They created the varied landscape of prairie, savanna, woodland and forest that

Ruth Duncan and her daughter, members of the Lenape tribe, demonstrate the proper technique for building a wigwam at a maple sugar festival at the Indiana Dunes National Lakeshore.

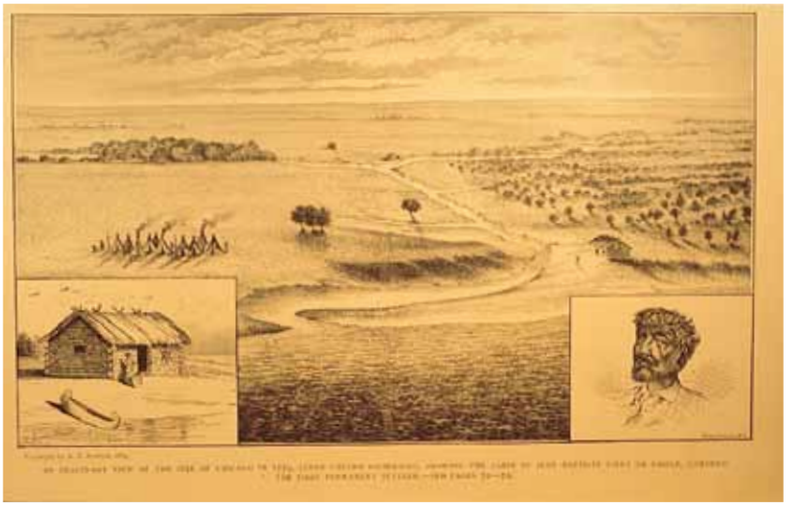
greeted settlers in the early 19th century. Fire is a natural process in many ecosystems, and many natural communities are adapted to regular blazes. The native peoples made use of this process to serve their own needs, but their actions protected and often increased the biodiversity of the region.

Early Settlement

Jean Baptiste Point du Sable set up his trading post at the mouth of the Chicago River just as Americans along the Atlantic coast were rebelling against the colonial government of England and setting up their new republic. Du Sable—of mixed French and African ancestry—was one of many traders in the Midwest who bought furs from the native people. He paid for them with iron pots, steel axes, woolen blankets, and a variety of other commodities that had already, by the 1770s, profoundly changed the lives of Native Americans.

The society of the Midwest at the time was a blend of native peoples and small numbers of traders from elsewhere. Intermarriage was common and close ties developed across cultural barriers. Except for the devastating attack on the beaver, changes in the human landscape had little effect on the natural landscape.

All that changed suddenly and profoundly following the War of 1812, when the United States gained control of the lands that are now in the Chicago region. Settlers began to pour in. The government land office sent out teams of surveyors to mark off the land so it could be sold to settlers. The survey reports are now one of our important sources of information about the native vegetation of this region.

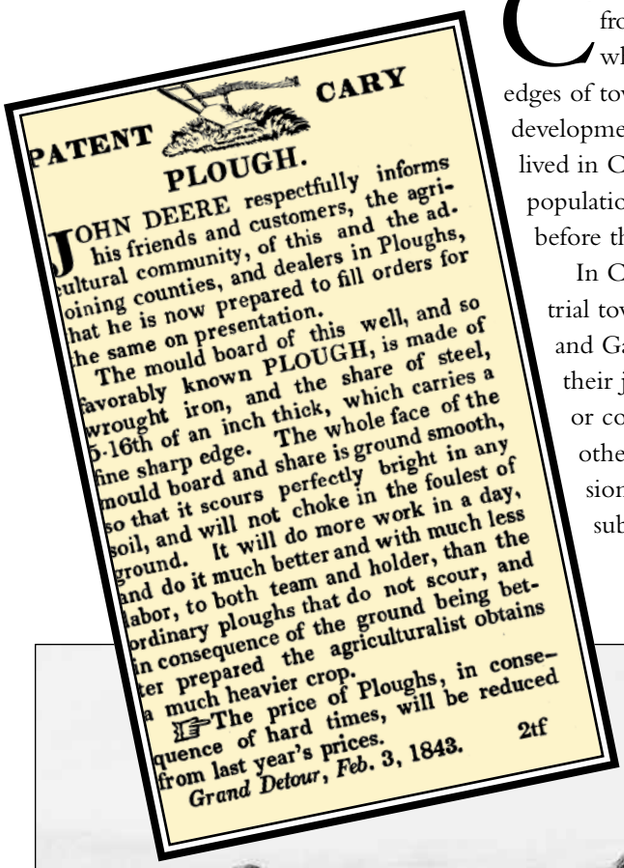


Jean Baptiste Point du Sable, a man of mixed African and French ancestry, established the first trading post at the mouth of the Chicago River when this region was still under British control.

Prairie soils proved to be extraordinarily fertile, and unplowed prairies became pastures. The eating habits of cows and horses proved to be different than those of bison and elk, and some common prairie wildflowers began to disappear. Suppression of fire and the influx of exotic species that came with the settlers also made life difficult for many of the prairie natives.

Land that had been brushy prairie during times when fires were a regular occurrence quickly became oak woods after settlement. Meanwhile, the places that had been forested were cut over, and drainage projects were eating away at the wetlands.

The Rise and Sprawl of the Metropolis


PATENT CARY PLOUGH.

JOHN DEERE respectfully informs his friends and customers, the agricultural community, of this and the adjoining counties, and dealers in Ploughs, that he is now prepared to fill orders for the same on presentation.

The mould board of this well, and so favorably known PLOUGH, is made of wrought iron, and the share of steel, 5-16th of an inch thick, which carries a fine sharp edge. The whole face of the mould board and share is ground smooth, so that it scours perfectly bright in any soil, and will not choke in the foulest of ground. It will do more work in a day, and do it much better and with much less labor, to both team and holder, than the ordinary ploughs that do not scour, and in consequence of the ground being better prepared the agriculturalist obtains a much heavier crop.

☞The price of Ploughs, in consequence of hard times, will be reduced from last year's prices.

Grand Detour, Feb. 3, 1843. 2tf

Chicago was meant to be a city from the beginning. Farmers who took up land at the edges of town were quickly overrun by development. By 1870, 350,000 people lived in Cook County, and the city's population would top one million before the end of the 19th century.

In Chicago and smaller industrial towns, such as Joliet, Elgin, and Gary, most workers lived near their jobs, either walking to work or commuting by street car or other public transit. The expansion of railroads led to some suburban development, but this was confined to towns along the rail lines and was, for the most part, something that only the well-to-do could enjoy.

Settlement patterns began to change dramatically after World War II. Federal mortgage guarantees strongly favored new housing, encouraging the development of new suburban neighborhoods and whole new towns. The building of the interstate highway system in the '50s and early '60s made long-distance commuting practical, not just between the city center and outlying areas but from any point in the metropolis to any other point.

Suburban areas have grown explosively in the past 60 years. Chicago, meanwhile, hit its population peak in the 1950s at 3.6 million. Since then, the population has steadily decreased to a little over 2.8 million according to the 2000 cesus.

Business and industry moved to the suburbs too. Corporate headquarters that occupied a few floors of a high-rise in the Loop became 40-acre corporate campuses in the suburbs. The region grew like a fairy ring mushroom, endlessly expanding at the margins while the center did not.

Chicago lost more than 100,000 jobs in manufacturing in less than 30 years. In northwest Indiana, the older industrial areas in Gary, Hammond, and East Chicago saw major population declines while towns to the south were booming.

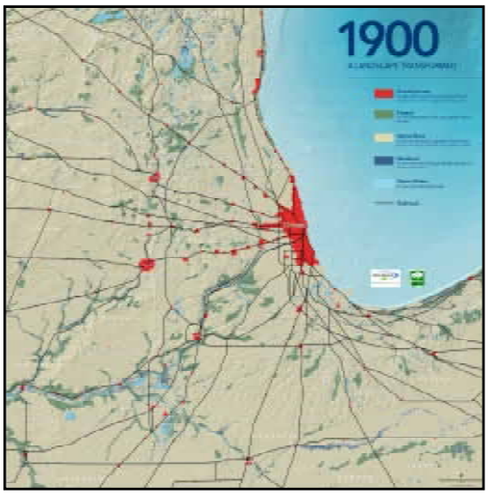
The shift from high density housing and business to low density suburbs has put a heavy demand on land. For decades, the amount of developed land has been increasing at a rate several times larger than the population. Both farm land and natural land are rapidly being converted to homes and businesses. If current development patterns remain unchecked, the anticipated increases in population and developed land threaten the destruction of hundreds of natural areas and critical species' habitats.

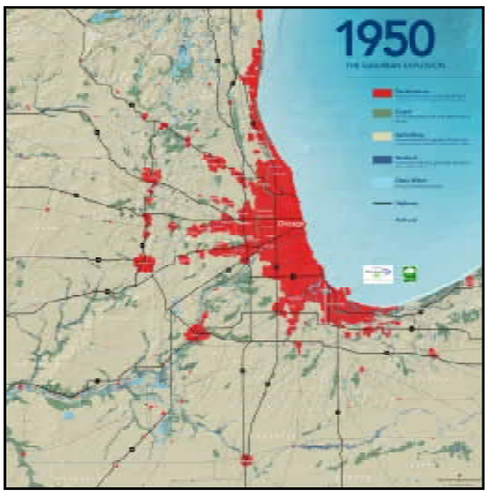
The invention of the steel moldboard plow, pioneered by the likes of Illinois blacksmith John Deere, allowed farmers to till the heavy soils of the prairie.

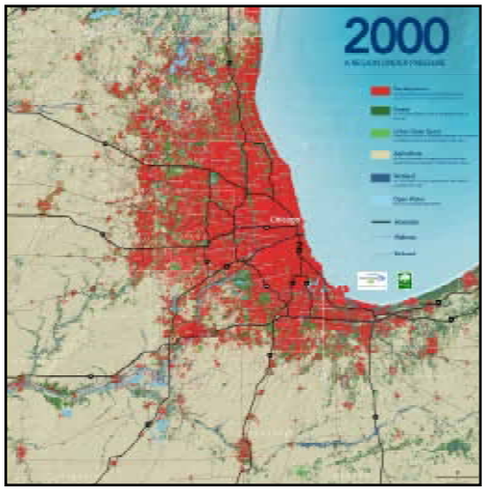
This drawing from an atlas published in 1870 shows a section of the DesPlaines River near Plainfield in Will County. The varied landscape of prairies and groves became a landscape of plowed fields and woodlots as settlement advanced.

Meanwhile, evidence has begun to collect that urban sprawl has an effect on natural areas even when it does not cause their direct destruction. Animals such as raccoons and white-tailed deer that have always been a part of natural communities in the Midwest suddenly undergo population explosions and become problems in isolated preserves surrounded by developed land. It may take decades for the full effects of urban sprawl to be revealed. In an environment of concrete and chemically treated lawns, the preservation of natural areas is a major challenge.

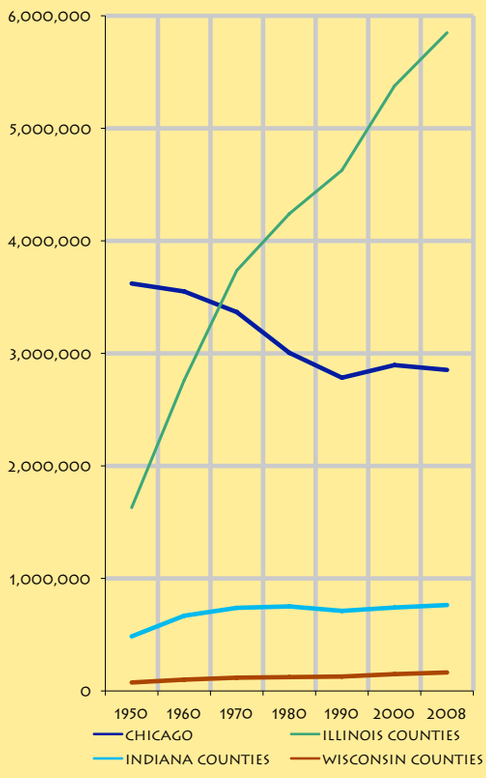
POPULATION CHANGES IN THE CHICAGO WILDERNESS REGION 1950–2000







POPULATION GROWTH



PEOPLE ON THE LAND

The Creation of the Forest Preserves

A pathway leads invitingly into Will County's Messenger Woods. Wildlife from coyotes to white-tailed deer are residents of local preserves.

Members of a committee that first proposed the idea of a system of natural preserves in Cook County. Dwight Perkins (center right), an architect, led the effort to make this idea a reality.

The early years of the twentieth century were a time when Americans began to look at the effects of our growing civilization on the natural environment. The belief of earlier times that the resources of North America were limitless no longer seemed to fit. The frontier was gone. The buffalo nearly killed off. The vast flocks of passenger pigeons that once darkened the skies of eastern North America were extinct. We had lost much and clearly we stood to lose much more if we did not change the way we thought about the land.

It was a time when the U.S. Forest Service and the National Park Service were created, a time when the first National Wildlife Refuges were set aside. There was even a proposal put forward to create a national park at the Indiana Dunes.

In Chicago, an organization called the Municipal Science Club headed by architects Jens Jensen and Dwight H. Perkins proposed that the most beautiful natural areas remaining in Cook County be set aside "for the benefit of the public."

It took 15 years of work to turn that idea into reality, but in 1915, Forest Preserve Districts were created in Cook and DuPage Counties. Land purchases began immediately with a 79-acre tract in DuPage County and 500 acres at Deer Grove near Palatine in Cook County.

The essential idea of the forest preserves was to preserve the native flora and fauna of the region for the "education, pleasure, and recreation of the public." The outcome has been to offer generations of city dwellers a chance to experience nature within a few minutes travel of their homes while simultaneously offering protection to a broad range of natural communities that have been wiped out through most of their former range.

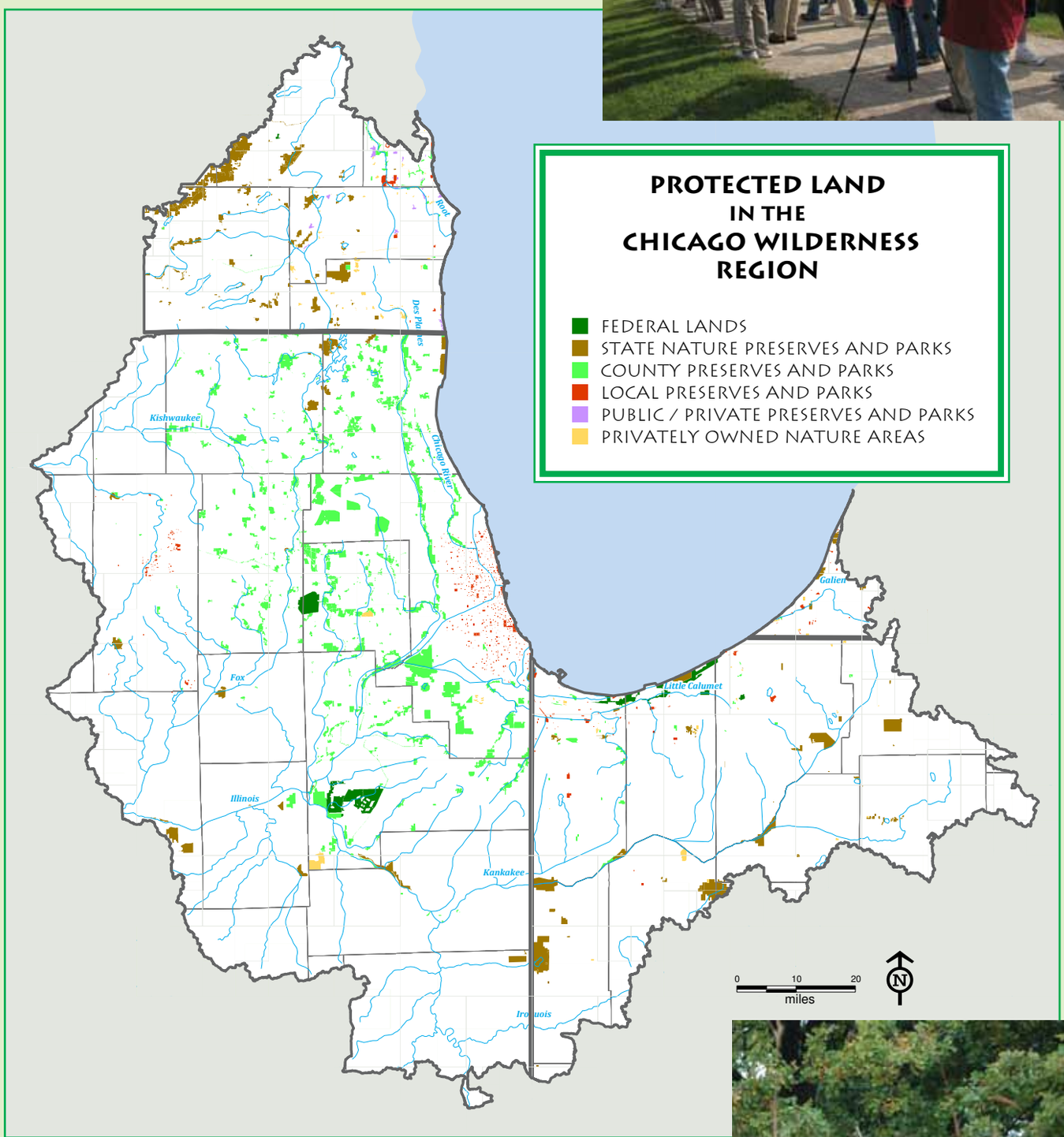
In the following years, the state of Indiana created a park at the Dunes, while Illinois developed parks at Illinois Beach and Chain O'Lakes and later a large Conservation Area where the Kankakee and Des Plaines Rivers join to form the Illinois and another park at Goose Lake in Grundy County.

In the years after World War II, as people began moving in ever larger numbers into the counties around Cook County, Lake, Kane, and Will Counties in Illinois and Lake County, Indiana created their own forest preserve districts. In 1971, McHenry County founded a Conservation District to hold and manage natural lands.

In 1966, 50 years after it was first proposed, the Indiana Dunes National Lakeshore became a reality. Most recently, the old Joliet Arsenal was converted into the Midewin National Tall-grass prairie, adding 15,000 acres of public natural land to the region.

We are lucky that our history has given us nearly 370,000 acres of preserved natural land not "near to," but right in the middle of one of the largest metropolitan areas in the country. Few metropolises can equal this total.

Birders on a field trip led by the Lake Cook Chapter of the Illinois Audubon Society at Rollins Savanna in Lake County, Illinois.



The nearly 370,000 acres of protected natural land of the Chicago Wilderness region include preserves owned by federal, state, county, and municipal government as well as private organizations. These lands are the base that supports much of the biodiversity of the region. They are also the places where the nearly nine million people of the metropolis enjoy the beauties and mysteries of nature.

Fourth-grade students enjoy a Leave No Child Inside field trip at Citizens for Conservation's award-winning Flint Creek Savanna.

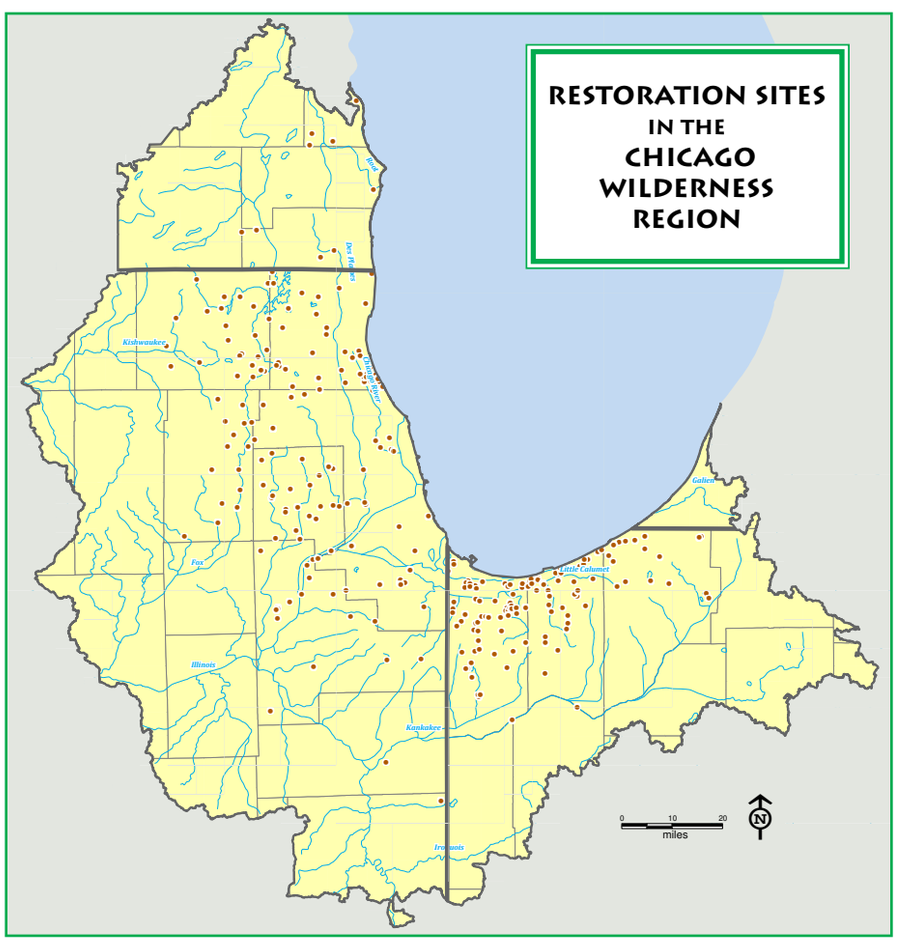
PEOPLE ON THE LAND

Restoration and Management

May Theilgaard Watts
In books and classes at The Morton Arboretum, she taught that the landscape is intelligible and that people can enrich their lives by learning to read it.

Human beings have helped shape the wonderfully diverse landscape of the Chicago Wilderness region for thousands of years. Native Americans set fires to the golden grasses of the prairie autumn, which gave a boost to the natural processes that sustain fire-dependent communities. Bending certain natural processes to their will, indigenous people mostly took what they needed from the environment without harming the ecosystems that supported them.

Settlers that swept across the Midwest in the past 175 years arrived with no knowledge of the workings of the native natural communities. They imposed demands upon the landscape that the land could not sustain. Some ecosystems were lost on land that became farms and towns; others were lost simply because the new arrivals did not know how to protect them.



A close collaboration among scientists, land managers, and citizen volunteers is bringing the benefits of restoration to natural areas throughout the region.

The process called ecological restoration uses the knowledge gained over the past 200 years to restore and maintain the biodiversity of this region. As ecological restoration heals our natural communities, it also reestablishes the old human tie to the land, helping us function as benefactors instead of destroyers.

We can date the beginning of ecological restoration in the Midwest to a time about 70 years ago when scientists at the University of Wisconsin began planting tallgrass prairie species at the University's Arboretum in Madison. That restored ecosystem continues to thrive to this day.

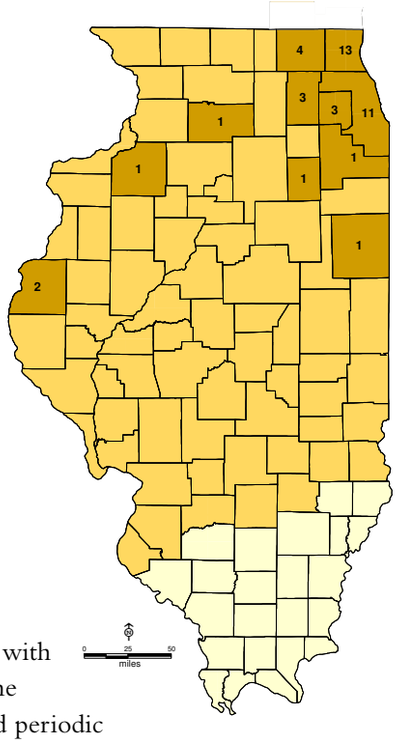
It is not surprising that restoration began with an effort to restore a tallgrass prairie. The prairie, which once covered thousands of square miles in the Midwest, was approaching extinction in the '30s. It obviously needed help.

Those first prairie restorationists were also the first resource managers to apply fire as a tool of land protection. At the time, this was a daring step that was roundly condemned by many who considered fires to be totally destructive.

The first prairie restoration in the Chicago area was begun by Ray Schulenberg at The Morton Arboretum in 1962. Schulenberg used horticultural techniques, hand-planting prairie species and weeding around them to remove

*The federally endangered lakeside daisy (*Actinea herbacea*), once extirpated in the region, has been reestablished on a dolomite prairie in Will County where it is currently doing well.*

*Because populations of the federally-threatened prairie white-fringed orchid are so few and scattered, its main pollinator—the sphinx moth (*Tersa sphinx*)—often has trouble finding them. That's where volunteers step in, pollinating individual flowers by hand.*



Illinois Populations of the Prairie White-fringed Orchid

*This flower (*Habenaria leucophaea*) once ranged over most of Illinois and the lower third of Wisconsin. The numbers show how many populations survive in each county. The existence of these populations has made the Chicago Wilderness region the center of recovery efforts for this species.*

competition. The Schulenberg Prairie, which started out with just half an acre, has now expanded to 80 acres with an additional 20 acres of oak savanna.

For Dr. Robert F. Betz of Northeastern Illinois University, a man with an intense interest in reviving the prairie, the Schulenberg Prairie represented a major step forward. It showed that diversity could be established in a prairie restoration and provided significant information on how to go about the task. But Betz thought Schulenberg's restoration was too small to, in his words, "hold all the species." Holding all the species was a task that demanded space, and a restoration project on the necessary scale could not be done by hand.

In 1972, Betz got permission to conduct prairie restoration at the Fermi National Accelerator Lab in Batavia, IL. Working with Lab staff and volunteers, he planted his first seeds in 1975. Initially, the project concentrated on the 600 acres that lay inside the accelerator's enormous ring. Gathering seeds with a combine and planting them with a machine that had been used to spread salt on highways has allowed the project to be expanded to 1,000 acres. The older parts now support populations of more than 80 species of prairie plants.

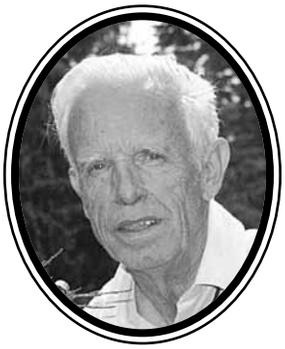
In the late seventies, restoration techniques began to be applied to surviving prairies. These were small prairie remnants where some prairie species could be found growing along with various weeds, shrubs, and small trees. Seeds of prairie species gathered from other sites could be sowed into these remnants. This enrichment, combined with the removal of the woody brush and periodic prescribed burns, could expand the area covered by prairie and help it support a larger number of prairie species.

RESTORING THE WOODLANDS

While prairies were the center of attention for restoration in its early decades, the 1980s saw a major expansion of concern. The condition of those quintessentially Midwestern communities—the oak woodlands and savannas—was obviously worsening. Scarcely any savannas had survived, and those that did remain had been so heavily affected by the changes that large-scale human settlement brought that an intense scientific debate broke out over the fundamental question of what they had been like. Were they

Volunteers in training to monitor butterfly populations check a site for lepidopterans. The nationally recognized program is operating on sites throughout the region.

*Rare Silver-Bordered Fritillary (*Boloria selene*) butterflies are among the species being reared and released by the Butterfly Conservation Team of the Nature Museum as part of the Butterfly Restoration Project to reestablish wild populations previously found in the Chicago Wilderness region.*



Floyd Swink
Long-time chief taxonomist at The Morton Arboretum, he taught generations of students to recognize and appreciate the native landscape. His book, Plants of the Chicago Region, is the ultimate authority on the botany of the Chicago Wilderness region.

simply ecotones—transition zones between forests and prairies? Or were they distinctive communities? Were they places where oaks grew over a ground layer of prairie plants? Or was there a savanna plant community different from either prairies or forests?

The oak woodlands had survived the initial shock of the post settlement changes, but study after study found that the oaks in these communities were not reproducing. Sugar maples were becoming dominant trees, but the species lost to the heavy shade of the maples were not being replaced by typical maple forest species. Instead of ecological succession replacing an oak forest with a maple forest, ecological degeneration was replacing oak forests with an unhealthy landscape of a few tree species, some weeds, and a lot of bare earth. Plainly, conservationists needed to think beyond the edges of the prairie.

The results they got, and the enthusiasm they inspired in other people, led to the formation of other volunteer groups. Changes in environmental laws were also focusing attention on restoration of all sorts of natural communities—wetlands as well as woodlands, savannas, and prairies.

With the backing of The Nature Conservancy, thousands of volunteers throughout Illinois were recruited for the Volunteer Stewardship Network. Through that network, volunteers began to work in collaboration with land-owning agencies—chiefly the county forest preserve and conservation districts—on a wide range of restoration projects. The Volunteer Stewardship Network is still active today, with volunteers supplementing the work of agency staff members, providing tens of thousands of hours of free labor every year. Some of this labor is the sheer hard work of

A burn site at Indiana Dunes National Lakeshore looked blackened and charred right after the fire, but new growth, stimulated by the blaze, quickly clothes it in bright new greenery.

VOLUNTEERS LEND A HAND

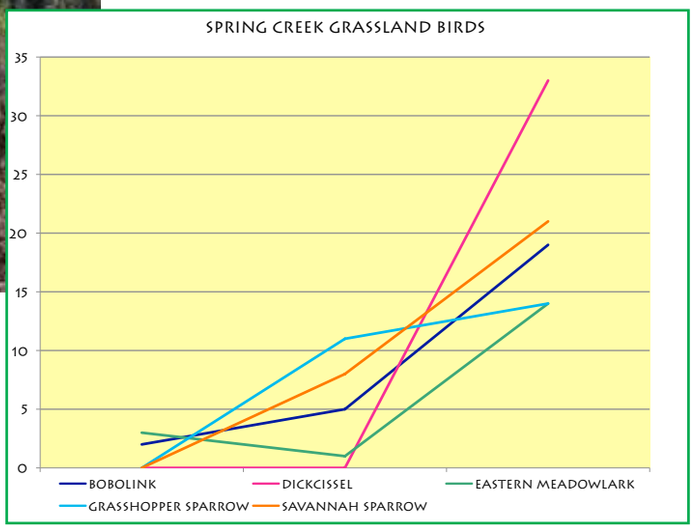
The slow hand-work of the first restoration projects was quite unlike the industrial style of the Fermi Lab project, but the effects of this hand labor began to accumulate, thanks to a growing group of volunteers who donated their time to restoration projects. Restoration can be done by hand if you get enough hands involved.

The first volunteer ecological restoration work was done in the preserves along the North Branch of the Chicago River in Cook County, Illinois beginning in 1977. The volunteers called themselves the North Branch Prairie Project. As volunteers for the Forest Preserve District of Cook County, they recruited and organized interested people to carry on the work.

cutting and removing invasive species like common buckthorn. Some requires a sophisticated scientific knowledge and the experience that only long hours in the field can provide. Volunteers study ecology and land management and, increasingly, ecologists and land managers recognize volunteers as sources of practical information on ecology.

Volunteers also offer land managers thousands of extra pairs of eyes. They are often the first people to notice the presence of a rare species in a preserve. They also notice problems like illegal dumping or places where off road-vehicles are entering a preserve. Working on restoration projects has made people more effective conservationists. They are informed supporters of our preserve systems and pioneers in changing the way people in a modern

Trained workers use a drip torch to initiate a controlled burn of a natural area.



Grassland birds are among our most imperiled bird species due to the lack of sufficient habitat. Most grassland bird species require large, open areas with no woody vegetation. At the Spring Creek Forest Preserve in Cook County, a recent effort to re-establish 110 acres of grassland habitat included the removal of brush and trees that fragmented the grassland. Within two years, populations of key grassland bird species increased more than five-fold. Grassland restorations at other reserves in our region—including those at Rollins Savanna, Springbrook Prairie, and Midewin National Tallgrass Prairie—have resulted in similarly encouraging increases in grassland bird populations.

industrial society relate to nature. They are helping put people back in the natural landscape in a constructive way.

THE HOW OF RESTORATION

Restoration of a place begins with an assessment of what remains from the original mix of plants and animals native to a particular site. The next step is to determine what's missing or imperiled and why. Native species frequently are absent or under stress because the natural processes needed to sustain them have been disrupted.

Restoration also involves developing an ecological management plan. A plan, which can take years to implement, is likely to call for the removal of aggressive plant species, as well as the reintroduction of those native plants and animals that are missing. Even former farmland can be restored to a naturalized condition, although such recovery efforts have yet to achieve the level of diversity found in a natural area remnant.

Each site is unique, but there are a number of issues common among different sites that need to be addressed to restore healthy habitats. These include:

• Invasion by aggressive exotic plants. Only a few of the more than 500 species of plants introduced into the Chicago region in the past 200 years create problems, but those few create a lot of trouble. Whether it is common buckthorn (Rhamnus cathartica) in a woodland or reed canary grass (Phalaris arundinacea) in a marsh, exotics can drive out both native plants and native wildlife. Restoration may involve physical removal of exotics and/or the use of controlled fires and herbicides to control them.

• Loss of sunlight caused by too many fire-sensitive native trees. Without fire to keep them in check, some native tree species—including ash, elm and maple—can overrun prairies, fens, and sedge meadows; even woodlands and savannas. Thinning these kinds of trees, in concert with removing exotic tree species, allows ground layer and understory communities the proper amount of sunlight they need to flourish.

• Absence of natural fires. Naturally-occurring fires were critical factors in maintaining the health of many native habitats. The use of controlled burns today not only helps control invasive vegetation, they stimulate the germination and growth of many native species.

• Lack of size and connectedness. Many of our natural area remnants are small—some only half an acre in size—and cut off from each other. The sustainability of such sites can be enhanced by enlarging them or connecting them with nearby natural areas through corridors of restored land.

• Excess populations of white tailed deer. Mainly due to the absence of large predators, populations of white tailed deer have exploded in density by 10 to 20 times since the settlement of our region. Unchecked, they can decimate entire natural areas. Reducing deer to sustainable numbers is the only way to maintain healthy ecological communities

Restoration Goals

Restore
natural processes.

Reintroduce
absent species of plants and animals.

Maintain
natural ecosystems in good health.

and populations of plants preferred by them.

• Changes in hydrology. If a site was drained by ditches or field tile, blocking the ditches or removing the tile can restore the former water regime.

The ultimate goal of restoration and management is to protect and restore biodiversity in our region. Thus far, we have successfully expanded the ranges of rare species and ecosystems. As a result, our efforts have been championed as a model by conservationists around the globe. Continued efforts represent our best hope for preserving the rich ecological heritage of the entire Chicago Wilderness region.

In addition to the natural beauty they afford, native plants are a magnet for many native birds and butterflies. Once established, they can survive without regular watering due to their extensive root systems and require no fertilizers or pesticides. This backyard garden on the far south side of Chicago boasts 33 different native plant species, including common spiderwort, wild geranium, prairie dropseed, prickly pear cactus, cattail, and marsh marigold.

PEOPLE ON THE LAND
How We're Doing

The picture postcard Glacial Park in McHenry County, Illinois, thrives with a rich community of aquatic and bird life.

We have learned much about management practices needed to care for our natural areas and native species, and many examples have demonstrated their effectiveness. But stress caused by development and invasive species are steadily eroding their health wherever management practices are not applied.

In 2006, Chicago Wilderness Alliance compiled a report card on the health of the region's major plant and animal communities. The grades were low, reflecting stresses and lack of management. While there are many examples of successful natural resource management, the overall condition of our natural areas shows that we need to substantially increase our support for management activities.

Encouragingly, the report card also chronicled a growing number of preserves that exemplify how people, working together, can restore our natural lands to health and beauty.

For example, three decades ago, Bluff Spring Fen—located in Elgin, Illinois—was

on ecological life support. The rare fen habitat had been the victim of gravel mining, illegal dumping and off-road vehicle abuse. Ten years later—after extensive trash removal, brush clearing, and the re-sowing of native species—the 100-acre site was dedicated as an Illinois Nature Preserve. Since then, on-going stewardship efforts have continued to improve the health and diversity of the fen and its related habitats. To date, more than 450 species of plants have been recorded there, along with 57 species of butterflies and more than 20 species of dragonflies. Bird monitors have identified nearly 100 bird species on site, 33 of which make their nests there.

In the 1950s, a stretch of Nippersink Creek that runs through Glacial Park in McHenry County, Illinois had been straightened and ditched to make the surrounding land better for agriculture. Half a century later, efforts began to restore the 1.6 mile channel to its winding, 3.2-mile natural pathway. More than 175 thousand cubic yards of soil were excavated from the original channel bed and used to re-build the glacial kames that had been mined for channel fill. Two hundred twenty thousand native plants were installed and 290 acres of adjacent wetlands restored. The picture postcard site now thrives with a rich community of aquatic and bird life. But it also helps neighboring human communities keep safe and dry with its capacity to hold more than 94 million gallons of floodwater during major storms.

In the Calumet region of Northwest Indiana, bald eagles have returned after more than a century in response to coordinated efforts to restore the health of native habitat. To the north, some of the richest and rarest habitat along Lake Michigan has been restored and permanently protected as the Openlands Lakeshore Preserve, adding to the adjacent two miles of lakeshore bluffs and ravines owned by the Lake County Forest Preserves. Inland from the lake, efforts are underway to establish a National Wildlife Refuge straddling the Illinois-Wisconsin border.

These and other success stories underscore the fact that people can make a positive difference. People place stress on natural communities, but we can also take the actions needed to protect their health.

People place stress on natural communities, but we can also take the actions needed to protect their health, such as volunteering for a restoration workday.

GREEN INFRASTRUCTURE VISION

Located near Michigan City, Indiana, Tryon Farm is one of a growing number of conservation development communities. Such communities provide housing for people, but also protect habitat for native plants and animals.

Our region has many kinds of infrastructure, including roads, sewers, telecommunications, power grids and water supply. These are fundamental in determining our quality of life.

Equally important is another kind of infrastructure: green infrastructure. Green infrastructure consists of the network of natural areas—our rivers, lakes, prairies, woodlands and wetlands—that sustain people, plants and animals alike. It also includes street trees, backyards, and the landscaping on university campuses and corporate lands. Properly maintained, our green infrastructure provides numerous benefits, including:

- Clean air and water,
- Flood control,
- Opportunities for outdoor recreation and respite,
- Critical habitat for wildlife,
- Mitigated effects of climate change,
- Increased property values, and
- Attractive communities for people to live and work.

For these reasons, national polls consistently reveal that people strongly support conserving nature. They desire the many benefits that nature affords for themselves, their children, and for future generations.

In our region, people more than say they support conserving nature. They show their support with their pocketbooks. Since 1993, voters in northeastern Illinois have overwhelmingly approved 31 referenda, totaling $1.3 billion, to preserve and restore about 38,000 acres of open space, much of it critical natural habitat.

Completed in 2004, the Chicago Wilderness Green Infrastructure Vision is a map that reveals the region's nearly 370,000 acres of protected natural areas. It is also a roadmap that identifies an additional 1.8 million acres to be preserved in 140 resource protection areas; acres that would expand and connect existing green spaces in a way that complements the planned growth of our region's communities. Fully realized, the Green Infrastructure Vision would ensure that ours is a region where nature is accessible to everyone and improves the quality of life for all.

In some instances, the best option for achieving the goals of the Green Infrastructure Vision would be for units of government or nonprofit organizations to acquire and restore additional open space. In other cases, it might make more sense for private landowners to place conservation easements on their natural area acreage. Conservation easements are legally-binding agreements that allow land to remain in private ownership while permanently protecting the land's natural features. Easements may also afford landowners certain tax benefits.

Another way to realize the Green Infrastructure Vision is through conservation development. By 2030, the population of northeastern Illinois, alone, is projected to exceed 10 million—an increase of two million beyond the 2000 census figures. To accommodate this growth, many communities will need to grow. Conservation development is a proven, cost-effective way to accommodate urban expansion and promote economic vitality while protecting critical open space, natural features and the many plants and animals that depend upon them for their very existence.

Achieving the Green Infrastructure Vision will take some time. But already planning agencies and communities are incorporating conservation development and natural resource preservation principles into regional land use plans and local ordinances. Corporations, universities and schools are greening their campuses with native landscaping. And a growing number of individuals are incorporating nature into their backyards through such simple steps as planting rain gardens or using rain barrels.

There are more than seven million acres within the Chicago Wilderness region. The Green Infrastructure Vision identifies 1.8 million as "resource protection areas." In developing the plan, an emphasis was placed on creating large preserves, particularly those that include a mosaic of different habitat types, and on protecting land that connects or expands existing natural areas.

RECOMMENDED RESOURCE PROTECTION AREAS

EXISTING PUBLIC OPEN SPACE

COUNTY BOUNDARIES

STATE BOUNDARIES

STREAMS AND RIVERS

LAKE MICHIGAN

OPEN WATER

LEAVE NO CHILD INSIDE

Research has demonstrated that outdoor play helps children manage stress and become resilient. Natural spaces stimulate children's limitless imaginations and foster creativity.

A child who grows up with a strong connection to nature is likelier to be not only healthier, but a leader in the next generation of those who care about our natural world.

While the Chicago Wilderness alliance works together to preserve and restore the rich ecological heritage of the region, we are also looking to the future.

The Leave No Child Inside initiative recognizes the need to connect children and nature based on a growing body of research indicating that time spent outdoors in nature is critical to healthy physical, social, and emotional development.

Research has demonstrated that outdoor play helps children manage stress and become resilient. Natural spaces stimulate children's limitless imaginations and nurture curiosity. In addition, young people who grow up spending time in nature are also more likely to be strong advocates for the environment when they reach adulthood.

Of particular emphasis in the Leave No Child Inside movement is a focus on unstructured play. Research indicates that, while time spent outside with parents, caregivers, and other adults is valuable, it is also important that children be encouraged to play on their own, to explore and simply be in nature. This unstructured time fosters creativity, emotional well-being, independent learning and problem solving.

Illinois was one of the first states to support efforts to get children and families outside: Governor Pat Quinn and the Illinois General Assembly proclaimed June as "Leave No Child Inside" month and announced support of the Chicago Wilderness Children's Outdoor Bill of Rights, which states that every child should have the opportunity to enjoy 10 simple activities:

- Discover wilderness—prairies, dunes, forests, savannas, and wetlands
- Camp under the stars
- Follow a trail
- Catch and release fish, frogs, and insects
- Climb a tree
- Explore nature in neighborhoods and cities
- Celebrate heritage
- Plant a flower
- Play in the mud or a stream
- Learn to swim

Chicago Wilderness Leave No Child Inside programs strive to nourish children's curiosity, growth, and creativity through play and discovery in nature and outdoor recreation activities. The initiative also seeks to build a sense of connection to place and appreciation of the unique, globally rare nature in our region in children and adults alike.

CONCLUSION

The communities of living things in our region have developed as a result of the ebb and flow of natural forces since the end of the Ice Age. For much of that time, humans have been present and shaping the landscape. Native Americans influenced animals and plants through hunting and the use of fire. Settlers and farmers cleared out many native animals and plants, suppressed regenerative wildfires, changed the movement of water, and introduced invasive species. Urbanization accelerated these changes, shrinking our remaining natural areas to remnant islands amid a sea of development.

But those remaining islands contain invaluable stores of our natural heritage—diverse communities of native plants and animals that, in some instances, occur nowhere else on the planet. Because of intense pressures from urbanization, much of our biodiversity is threatened. However, it can be protected and restored through coordinated efforts. It is for just this reason that Chicago Wilderness alliance was formed; an acknowledgement that people have had a tremendous impact on our native landscape, but people—working together—can save what prairie, woodland, wetland and water resources remain.

The most direct thing people can do is volunteer their time. Throughout our region, bands of volunteers —from all walks of life—regularly roll up their sleeves to help clear out invasive species, collect and sow native plant seeds, and monitor populations of indigenous plants and animals. Volunteer stewardship is fun. It's effective. It's a way to learn firsthand how nature works and how it needs our help. It connects us not only to the landscape, but to a larger community of people who share an interest in passing along healthy natural systems to future generations.

Closer to home, people can heal local nature and promote biodiversity by using native plants in their gardens and installing rain barrels. Communities can incorporate sustainable and people-friendly design principles into their local land use plans and ordinances.

But perhaps the best thing anyone can do for nature is to take a child out for a walk in one of our many nature areas. A growing body of research reveals that spending time outdoors in nature is critical to a child's physical, social and emotional development. A child who grows up with a strong connection to nature is likelier to be not only healthier, but a leader in the next generation of those who care about our natural world.

WHAT YOU CAN DO

Learn More: Visit the web sites of Chicago Wilderness and its members to learn what they are doing and where you can help. One important action is to support municipal, county, and state referenda that provide for acquisition and management of natural areas.

Volunteer: Among the best sources for learning about volunteer opportunities in our region is the Chicago Wilderness Habitat Project: http://www.habitatproject.org. Another is The Nature Conservancy's Volunteer Stewardship Network: http://www.nature.org/wherewework/northamerica/states/illinois/volunteer/art9844.html.

Talk to Your Community Leaders: The Chicago Metropolitan Agency for Planning's Go To 2040 plan outlines many ways to make our communities more livable by protecting open space and natural resources. The plan is a resource for communities across our region and is available for download at www.cmap.illinois.gov/. Also, the Chicago Wilderness Ecological Planning and Design Directory is a terrific source of information for individuals, businesses, governments and others to help build healthier, more sustainable communities: www.chicagowilderness.org

For more information on these and the many other things you can do help secure a "greener" future, visit www.chicagowilderness.org.

CHICAGO WILDERNESS ALLIANCE

The Chicago Wilderness *Atlas of Biodiversity* is a publication of the Chicago Wilderness alliance. Member organizations, as of March 2011, include:

Air Station Prairie

Alliance for the Great Lakes

Association for the Wolf Lake Initiative

Audubon - Chicago Region

Backyard Nature Center

Barrington Area Conservation Trust

Barrington Area Council of Governments

Batavia Plain Dirt Gardeners

Benedictine University

Biodiversity Project

Bird Conservation Network

Blacks in Green (BiG)

Bolingbrook Park District

Boone Creek Watershed Alliance

Bronzeville/Black Chicagoan Historical Society

Butterfield Creek Steering Committee

Calumet Ecological Park Association

Calumet Environmental Resource Center

Campton Historic Agricultural Lands, Inc.

Campton Township

Canal Corridor Association

Caretakers of the Environment International/USA

Cary Park District

Center for Humans and Nature

Center for Neighborhood Technology

Chicago Academy of Sciences and its' Peggy Notebaert Nature Museum

Chicago Audubon Society

Chicago Botanic Garden

Chicago Cultural Alliance

Chicago Herpetological Society

Chicago Metropolitan Agency for Planning

Chicago Ornithological Society

Chicago Park District

Chicago Wilderness Corporate Council

Chicago Wilderness Trust

Chicago Zoological Society/Brookfield Zoo

Chicagoland Bird Observatory

Chicagoland Councils of the Boy Scouts of America

Chicago's Green City Market

Chiwaukee Prairie Preservation Fund

Citizens for Conservation

City of Chicago, Department of Environment

City of Elgin Parks & Recreation Department

City of Park Ridge

City of Rolling Meadows

Clarendon Hills Park District

Coffee Creek Watershed Conservancy

College of DuPage

Congregational Unitarian Church

The Conservation Foundation

The Conservation Fund

Conservation Research Institute

Cooperative Wildlife Research Laboratory at Southern Illinois University Carbondale

Crystal Lake Park District

Deerfield High School

Deerpath Farm Homeowners' Association

Delta Institute

DePaul University, Environmental Science Program

Downers Grove Park District

Ducks Unlimited-Great Lakes/Regional Office

Dundee-Crown High School

Dunes Learning Center

DuPage Birding Club

Eden Place Nature Center

Elmhurst Park District

Emily Oaks Nature Center

Environmental Defenders of McHenry County

Environmental Law and Policy Center of the Midwest

Environmentally Conscious Oswego (ECO) Commission

Evanston Environmental Association

Experiencia Learning Center

Faith in Place

FamilyFarmed.org

Fermilab Natural Areas

Fernwood Botanical Garden and Nature Preserve

The Field Museum

The Field Station Cooperative

First Baptist Church of Waukegan

Fishin' Buddies

Flagg-Rochelle Community Park District

Forest Preserve District of Cook County

Forest Preserve District of DuPage County

Forest Preserve District of Kane County

Forest Preserve District of Will County

Frankfort Square Park District

Frederick Law Olmsted Society

Friends of Ryerson Woods

Friends of Spring Creek Forest Preserve

Friends of the Chicago River

Friends of the Forest Preserves

Friends of the Fox River

Friends of the Kankakee

Friends of the Morton Grove Forest Preserves

Friends of the Oak Park Conservatory

Friends of the Parks

Friendship Village of Schaumburg

Garden Clubs of Illinois, Inc.

Garfield Park Conservatory Alliance

Geneva Lake Conservancy

Geneva Park District

Global Alliance of Artists

Go Green Wilmette

The Grove National Historic Landmark

Homewood Izaak Walton League

I&M Canal National Heritage Corridor, Civic Center Authority

Illinois Audubon Society

Illinois Audubon Society, Fort Dearborn Chapter

Illinois Butterfly Monitoring Network

Illinois Coalition for Responsible Outdoor Lighting

Illinois Department of Natural Resources

Illinois Endangered Species Protection Board

Illinois Natural History Survey

Illinois Nature Preserves Commission

Illinois Ornithological Society

Illinois-Indiana Sea Grant College Program

Indian Creek Watershed Project

Indiana Department of Natural Resources

Indiana University Northwest

Inverness Park District

Irons Oaks Environmental Learning Center

Izaak Walton League of America – Illinois Division

Izaak Walton League of America – Indiana Division

John G. Shedd Aquarium

Jurica-Suchy Nature Museum

Kane-DuPage Soil & Water Conservation District

Kendall County Forest Preserve District

Kendall County Soil & Water Conservation District

Kenosha/Racine Land Trust

Kettle Moraine Land Trust, Ltd.

Kishwaukétoe Nature Conservancy

Lake Bluff Open Lands Association

Lake County Forest Preserves

Lake County Health Dept-Environmental Health Services

Lake County Parks & Recreation Department

Lake County Soil & Water Conservation District

Lake County Solid Waste Management District

Lake County Stormwater Management Commission

Lake Forest College

Lake Forest Open Lands Association

Lake Katherine Nature Center and Botanic Gardens

Land Conservancy of Lake County

Land Conservancy of McHenry County

Land Trust Alliance

LaPorte County Conservation Trust, Inc.

Liberty Prairie Conservancy

Lincoln Park Conservancy

Lincoln Park Zoo

Lincoln-Way Community High School

Long Grove Park District

Loyola University Chicago, Center for Urban Environmental Research & Policy

Lurie Garden: Millennium Park

Max McGraw Wildlife Foundation

McHenry County Conservation Foundation

McHenry County Conservation District

Metropolitan Water Reclamation District of Greater Chicago

The Morton Arboretum

Naperville Park District

National Association for Interpretation – Region 5

National Parks Conservation Association – Midwest Region Office

Natural Land Institute

The Nature Conservancy - Illinois

North Branch Restoration Project

North Cook County Soil & Water Conservation District

Northbrook Park District

Northeastern Illinois University

Northminster Presbyterian Church

Northwest Indiana Forum Foundation, Inc.

Northwestern Indiana Regional Planning Commission

Northwestern University Environmental Policy & Culture Program

Oak Brook Park District and Sam Dean Nature Center

Oakbrook Terrace Park District

Openlands

Openlands Land Preservation

Palos Park Tree Foundation

Palos-Orland Conservation Committee

Park District of Franklin Park

Park District of Highland Park

Pierce Downer's Heritage Alliance

Portage Park and Recreation Dept (IN)

Porter County Plan Commission (IN)

The Prairie Club

Prairie Crossing Homeowner's Association

Prairie Crossing Charter School

Prairie Woods Audubon Society

Prairies Forever

Pringle Nature Center

Purdue University Calumet

Red Oak Nature Center

Richardson Wildlife Sanctuary

Ridgeville Park District

Riding Club of Barrington Hills

River Forest Park District

Riverwoods Preservation Council

Roots & Shoots Great Lakes

Safer Pest Control Project

Salt Creek Greenway Association

Save the Dunes

Save the Prairie Society

Scenic Illinois

Schaumburg Park District

CHICAGO WILDERNESS ALLIANCE (CONT.)

School of Environmental Education, Riverside Brookfield High School

Seeding the Snow

Shirley Heinze Land Trust

Sierra Club, Illinois Chapter

Southeast Environmental Task Force

Springbrook Nature Center

St. Charles Park District

Taltree Arboretum and Gardens

Taskforce on Waukegan Neighborhoods (TOWN)

Team Green Environmental Network

Thorn Creek Audubon Society

Town Square Condominium Association

Trout Valley Homeowner's Association

The Trust for Public Lands

University of Chicago – Civic Knowledge Project

University of Illinois at Chicago

University of Illinois at Urbana-Champaign

University of Illinois Extension, Northeast Region

Upper DesPlaines River Ecosystem Partnership

US Army Corps of Engineers

US Department of Energy, Argonne National Laboratory

US Department of Energy, Fermi National Accelerator Laboratory

US Environmental Protection Agency, Great Lakes National Program Office

US Environmental Protection Agency, Region 5

US Fish and Wildlife Service

USDA Forest Service

USDA Natural Resources Conservation Service

USDI National Park Service/Indiana Dunes National Lakeshore

Valley Lakes Community Association

Valparaiso Chain of Lakes Watershed Group

Village of Algonquin

Village of Brookfield

Village of Deer Park

Village of Frankfort

Village of Glenview

Village of Hoffman Estates Environmental Commission

Village of Homer Glen

Village of Lake Barrington

Village of Lincolnshire

Village of North Barrington

Village of Oak Park

Village of Orland Park

Village of Riverside

Village of Schaumburg

Warrenville Environmental Advisory Commission

Washington Park Conservancy

Waukegan Citizen's Advisory Group

Wayne Park Commission

West Chicago Park District

The Wetlands Initiative

Wheaton Park District

Wild Flower Preservation Society, Illinois Chapter

Wild Ones Natural Landscapers, Ltd.

Wildflower Preservation and Propagation Committee of McHenry County

Wildwood Nature Center

Woodland Savanna Land Conservancy

CHICAGO WILDERNESS CORPORATE COUNCIL MEMBERS

Applied Ecological Services

ArcelorMittal

Atrium

Ball Horticultural Company

BP America, Inc.

Burns & McDonnell Engineering Company, Inc.

Cantigny Park

Cardno ENTRIX, Inc.

The Care of Trees

Christopher B. Burke Engineering, Ltd.

ComEd

Countryside Industries, Inc.

Cowhey Gudmundson Leder, Ltd.

Environmental Consulting & Technology (ECT)

Futurity, Inc.

Geosyntec Consultants

Gewalt Hamilton Associates, Inc.

GRAEF

Hitchcock Design Group

Integrated Lakes Management

JF New

Kenny Construction Company

Kubasiak, Fylstra, Thorpe & Rotunno, P.C.

McGinty Brothers, Inc.

Midwest Generation EME, LLC

Nicor Gas

Pizzo & Associates, Ltd.

Public Communications, Inc. (PCI)

RFP Mapping, LLC

Roux Associates

SET Environmental, Inc.

Stantec

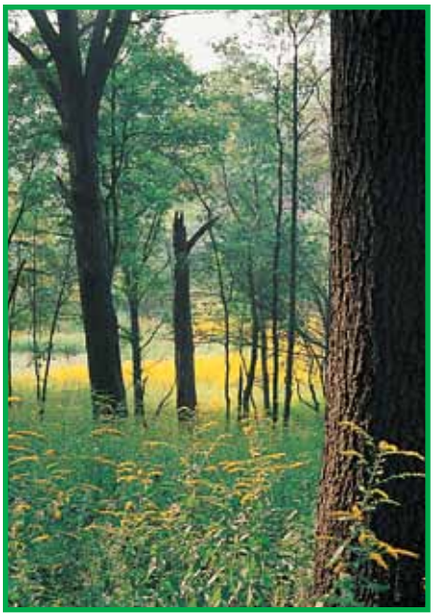
Tallgrass Restoration, LLC

Unilever

V3 Companies

WRD Environmental

SUGGESTIONS FOR FURTHER READING



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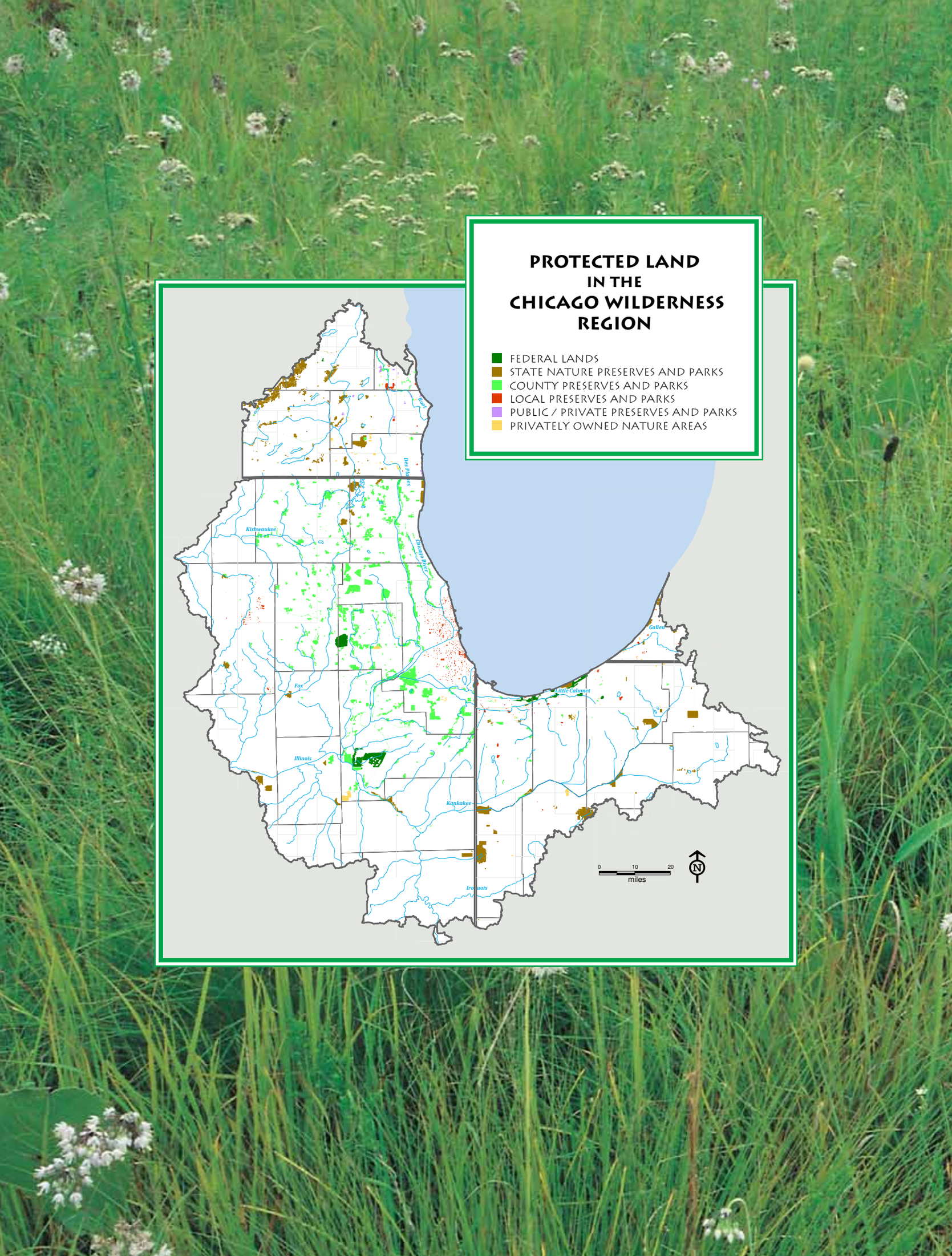
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