# The Arboretum : [the outdoor laboratory after its first fifty years]. 1981

Madison, Wisconsin: University of Wisconsin-Madison Arboretum, 1981

# The Arboretum

**University of Wisconsin-Madison**

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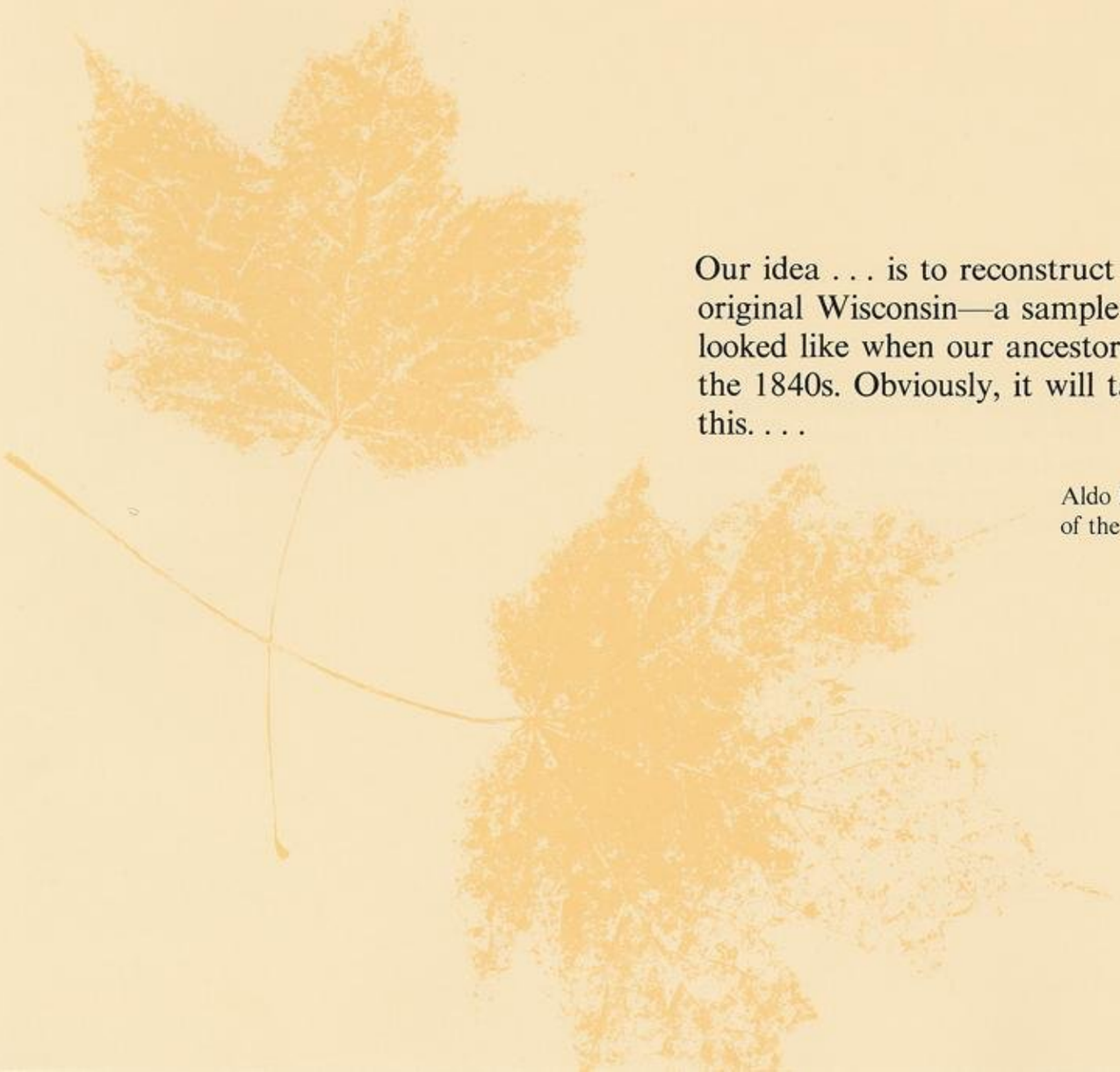
Mark Leach

# The Outdoor Laboratory after Its First Fifty Years



Our idea . . . is to reconstruct . . . a sample of original Wisconsin—a sample of what Dane County looked like when our ancestors arrived here during the 1840s. Obviously, it will take fifty years to do this. . . .

Aldo Leopold at the dedication
of the Arboretum, June 17, 1934

# Dedication

Dedicated to the Memory of
Dr. Herman W. Wirka, Senior (1903-1974)

Dr. Wirka, an orthopedic surgeon at the University of Wisconsin Hospitals and Medical School from 1932 to 1973, was widely respected for his work in reconstructive surgery and especially for his work with victims of polio. Publication of this booklet was made possible by a gift in his memory and by additional funds provided by the Friends of the Arboretum.

*Cover: A forest in the making. Young beeches and maples planted under old oaks make a golden moment for visitors to the maple forest restoration area in the Arboretum's Wingra Woods.*

*Wingra Woods*

# The University of Wisconsin-Madison Arboretum

A microcosm of presettlement Wisconsin,
Site of pioneering research in natural
area restoration,
An outdoor laboratory and classroom,
And a leafy, green hole in the noise.

# Out of the Dust Bowl Years—

# An Idea for a Different Kind of Arboretum

Expanses of shadeless, windswept prairie stretched to the horizon. There were savannas dotted with orchard-like groves of spreading oaks, and scattered glacial lakes bordered by broad marshes and sedge meadows. Here and there, where local climate encouraged growth of trees or where there was some protection from the fires that swept the prairies, were forests of oak and forests of maple and basswood.

Farther north, the prairies and savannas gave way to vast forests in which oak and maple mingled with yellow birch, hemlock, beech, and an occasional towering pine 200 feet high and half a millennium old. Areas with sandy soil and more frequent fires supported pine forests and barrens.

Still farther north, stands of spruce and fir, outliers of the vast boreal forests of Canada, flourished on the shores of Lake Superior and Lake Michigan.

This was presettlement Wisconsin. The early settlers, arriving during the decades just before the Civil War, must have seen this vast patchwork of vegetation as an inexhaustible resource and immediately set about taking advantage of it. In the south, they turned the prairies into fields for wheat, and later for corn, alfalfa, and soybeans. In the north, lumberjacks harvested billions of board feet of pine and later birch, maple, and oak—raw materials for the growing cities of the midwest.

By the turn of the century, only remnants of most of the state's native plant communities remained: scattered marshes too low to drain; patches of prairie along railroad tracks, on rocky hillsides, and in the corners of abandoned cemeteries, and here and there a stand of pines too small or remote to repay cutting. An entire landscape of 56,000 square miles had all but disappeared.

Yet, even as the exploitation of the state's vegetation continued into the twentieth century, thoughtful people were beginning to question the wisdom of such unrestrained destruction. A land that had seemed limitless and inexhaustible, they pointed out, was in fact limited and vulnerable, and its abuse could have disastrous consequences.

These misgivings gained a new urgency during the 1930s, when a series of devastating dust storms moved across the plains states. Many ecologists believed that the dust bowl catastrophe was at least partly the result of ecologically unsound land management, and regarded it as a portent of even worse disasters to come unless Americans developed a more harmonious relationship with their environment. Many new ideas about the environment began to take shape as a result of this growing awareness, and of these one of the most novel was the idea that was to become the UW Arboretum's unique contribution to the conservation movement that grew out of the trials of the '30's.

This was the idea that, in addition to preserving those remnants of the natural landscape that still survived, it might be possible, at least in some cases, and on a limited scale, to reverse the process of destruction and to recreate ecological communities on land that had been disturbed by the plow or the ax.

From the beginning, this idea set the UW Arboretum apart from more traditional arboreta and botanical gardens, in which collections of plants grow in more or less formal, garden-like settings. Here, rather than a garden, the planners envisioned a collection of ecological communities representing those native to Wisconsin and the upper midwest. And, since many of these had not existed on the Arboretum site, or, like the prairies, had been destroyed since the time of settlement, the plan called for their creation by a deliberate and painstaking effort. Thus the development of the Arboretum became a pioneering experiment in land reclamation. And it is this, more than anything else, that distinguishes this Arboretum from more traditional arboreta, wildlife preserves, and natural areas.

The Arboretum's collection of ecological communities now includes examples of all the major plant communities native to Wisconsin, many of them the result of pioneering community restoration efforts. These cover roughly 1,100 of the Arboretum's 1,260 acres; the remainder is devoted to landscaped areas and horticultural collections. Together, these collections of plants and plant communities make the Arboretum an invaluable resource not only for researchers and students, but for the thousands of visitors who come here each year to renew and strengthen their ties with nature and their sense of the varied environment that has helped shape midwestern culture.

*A sample of southern Wisconsin oak opening maintained on the Arboretum's Grady Tract.*

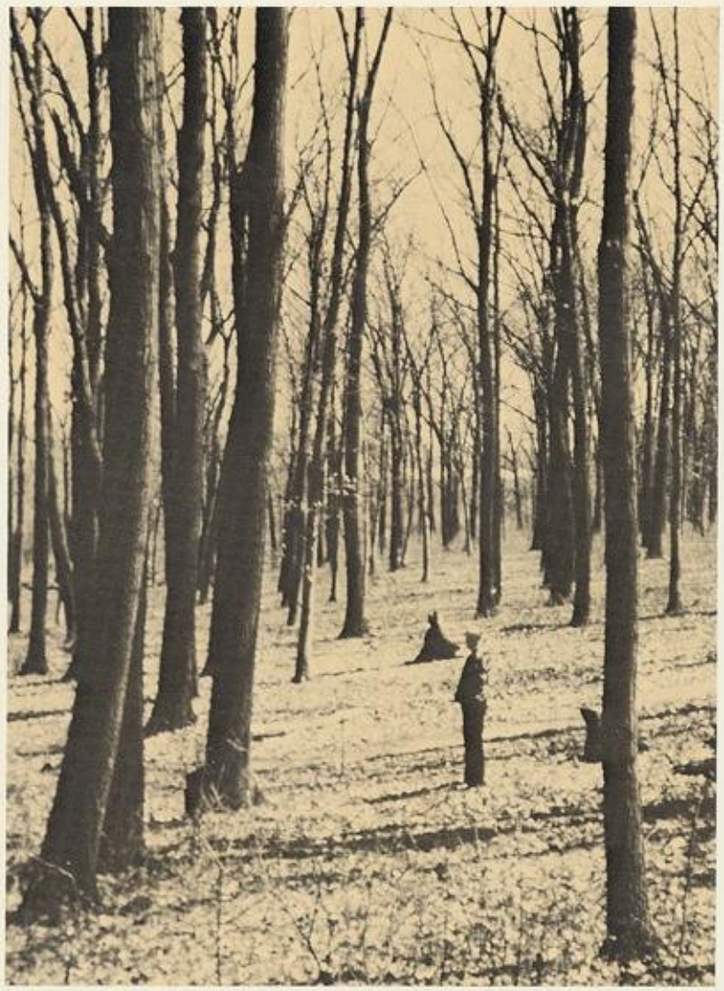
# The History:

## From Derelict Farm to Arboretum

Although first-time visitors sometimes mistake the Arboretum for an undisturbed natural area, it is actually a carefully planned and meticulously developed landscape comprising a collection of plant and animal communities, many of which have been created to resemble the various ecological communities native to Wisconsin. This is, in fact, what makes the Arboretum uniquely valuable as an outdoor laboratory for the development of techniques for restoring and managing ecological communities. But, partly because the restoration efforts have in some cases been so successful, it is easy to lose sight of this while walking in the Arboretum today.

When the university began acquiring land for an arboretum, the area now occupied by the Arboretum was a patchwork of derelict farms on which very little remained undisturbed. The savannas that had originally covered much of the upland areas had long since been grazed or put to the plow. Woodlots had been logged and grazed. Lake Wingra and the wetlands around it had been profoundly disturbed by dredging and damming. And several hundred acres south and east of Lake Wingra had been disrupted by an ambitious —and spectacularly unsuccessful—attempt to develop a model suburb during the second decade of the century.

Little remained to suggest the undisturbed wilderness of a century earlier. And yet, precisely because of this, and because of the diversity of conditions it offered, this site was remarkably well suited for the pioneering work in community restoration that was to be the UW-Madison Arboretum's distinctive activity.



*The overgrazed north slope of Wingra Woods in 1942*

*Right: The view across two farms that would eventually comprise Curtis Prairie, the Longenecker Gardens, and part of the Leopold Pines, about the time they were acquired by the university. Note open pasture, Lake Wingra to the left, and the State Capitol and downtown area on horizon. The tree in left foreground still exists and has been named in honor of Joseph W. Jackson, who spearheaded the drive for land acquisition.*

Acquisition of the land for the Arboretum was the outcome of a remarkable effort by a group of citizens who wanted to ensure preservation of open space for the rapidly growing city. The first land, a 245-acre farm including land now occupied by the McKay Center, Longenecker Gardens and parts of Curtis Prairie, was acquired in 1932. Later acquisitions were the result of the efforts of people like Joseph W. Jackson, a Madison businessman who spearheaded the drive for land, and the generosity of citizens like bakery owner Louis Gardner who, in 1935, donated money needed to acquire the marsh east of Lake Wingra. By 1942, the Arboretum had grown to 1,100 acres; today it covers 1,260.

Presented with this remarkable opportunity, the members of the faculty appointed to supervise development of the new Arboretum responded enthusiastically, and they were the ones who put forward and developed the ideas and plans that were to make the new Arboretum unique. It was Aldo Leopold, speaking at the Arboretum dedication in 1934,

who expressed these ideas most clearly. Leopold, who was to serve as research director for the Arboretum during its early, formative years, was an original and influential thinker, today widely recognized as an early prophet of the environmental movement. Within a year he would purchase the farmed-out Sauk County acreage that was to become the setting for *A Sand County Almanac,* his eloquent account of a decade of country living and low-key experiments in the healing of degraded land. Now he proposed for the Arboretum a similar project, though on a much larger scale. Under the plan he described, the Arboretum would become the site of a pioneer experiment in the science and art of land reclamation and would eventually become, in Leopold's words, "A sample of what Dane County looked like when our ancestors arrived here."

Unquestionably, the plan was an ambitious one. It was possible to undertake the critical first steps toward its realization largely because of work done by Civilian Conservation Corps crews housed in a camp in the area now occupied by the Arboretum administration buildings. Beginning in 1935, CCC crews planted trees, began restoration of Curtis Prairie, dredged ponds, and completed construction of McCaffrey Drive and other building projects. By the time they departed in November 1941, the outlines of the Arboretum had taken shape.

*Left: "The time has come for science to busy itself with the earth itself. The first step is to reconstruct a sample of what we had to start with." Aldo Leopold at his sand county farm in 1947.*

*Right: Making prairie: CCC crews collecting plants, probably near Wisconsin River (above), and preparing ground at the restoration site (below).*

# The Prairies:

## Ecologically and Historically, The Centerpiece

*Spiderwort*

*Monarch butterflies on blazing star*

Of all the Arboretum's attempts to restore plant and animal communities, probably the most ambitious and certainly the most successful have been the attempts to restore prairie.

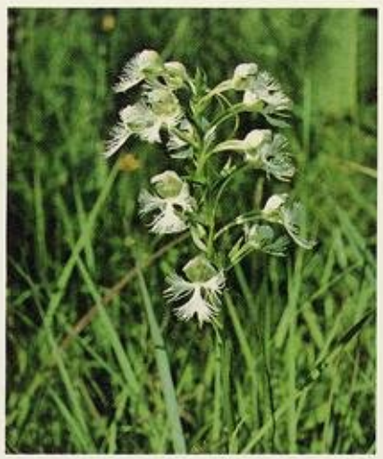
In 1935, when prairie restoration work began at the Arboretum, little was known about prairies or the hundreds of species of plants and animals that inhabit them. Virtually nothing was known about the complex and demanding task of prairie restoration. Yet plans to restore prairie were part of the development plan for the Arboretum almost from the beginning, and prairie restoration was to prove the highlight of the Arboretum's experiments in community restoration and management.

In some ways, the idea of restoring prairie in the Arboretum was an obvious one. The site was ideal for prairie. Surveyors' records from the 1830s showed that much of Dane County had originally been covered by prairie and by

*Curtis Prairie: The riot of bloom, the sway and whisper of grass—the man-made prairie in summer.*

*Phlox and anemone*

the very similar community called savanna, in which the prairie grasses were interspersed with groves of spreading oaks. The pasture on the Arboretum site selected for the first prairie restoration effort had been savanna at the time of settlement. But since then, a century of farming had transformed the landscape. All that remained of the original vegetation was a small area in the northeastern part of what is now Curtis Prairie, which had been too wet to plow.



*Two prairie rarities: grass pink orchid (left), and white fringed prairie orchid, an endangered species.*

*Greene Prairie: Where prairie-making became art.*

Unquestionably, this was a far cry from the replica of native vegetation the planners envisioned on the restoration site. Prairies are incredibly complex communities, harboring hundreds of species of plants—more, in fact, than inhabit any other plant community native to the northern part of the continent. Yet in 1935, botanists were only beginning to study them in detail. Much remained to be learned about prairies and prairie plants, about the frequency and distribution of these plants, about their habitat requirements, and about ways of propagating them. Nothing was known about how to prepare the ground for them, or about how they would fare in competition with the well established, exotic grasses and weeds of the restoration site.

In view of all this, the Arboretum developers' plans for large-scale prairie restoration were ambitious to the point of audacity.

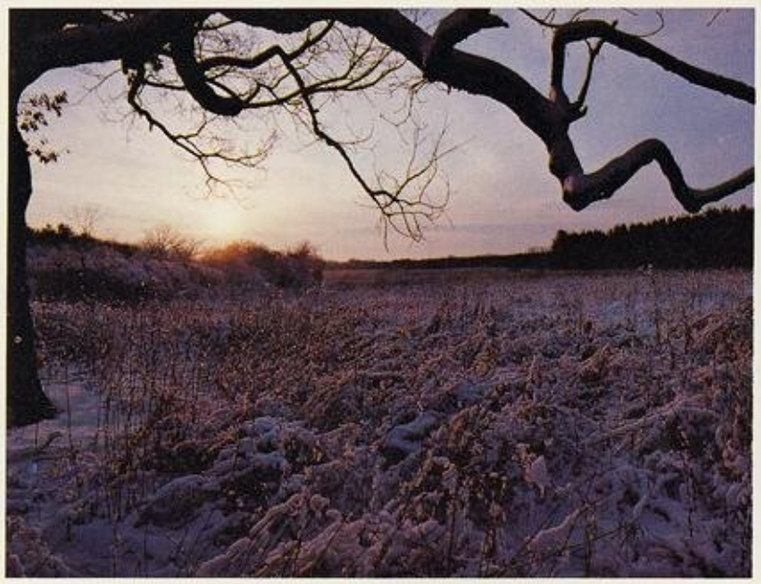
Prairie restoration got under way in the fall of the 1935 with the collection of seeds from prairie remnants in southern Wisconsin. Within a few years, the CCC crews working at the Arboretum were bringing in tons of sods and plants, preparing the soil, and beginning planting of the restoration site.

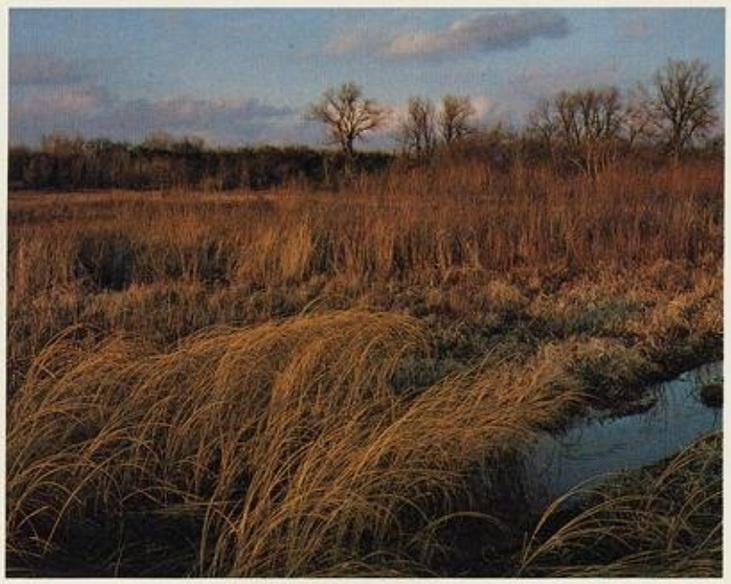
It was when the early results of the prairie restoration effort proved disappointing that Professor John Curtis, who was then in charge of botanical research at the Arboretum, began experimenting with the use of fire in prairie

restoration. The results of these classic experiments eventually made possible the largely successful restoration of Curtis—and later Greene—prairies. They also led to a new appreciation of the role of fire in plant communities generally, and today this work is widely recognized as an important contribution to the science of community ecology as well as to the development of techniques for restoring and managing ecological communities. Today the Arboretum's prairies—possibly the oldest restored prairies in the world—are still burned regularly to encourage the prairie plants and to discourage weeds and woody plants.

While restoration of Curtis Prairie was the work of hundreds of persons, the 40-acre Greene Prairie in the southern part of the Arboretum's Grady Tract was almost entirely the work of one man, UW botanist Henry C. Greene, who planned the project and personally collected and planted most of the plants in this area between 1945 and 1950. Today, it is well worth the half-mile walk into the Grady Tract to see the results of Professor Greene's work.

Altogether, more than 300 species of prairie plants bloom on the Arboretum prairies, an average of a dozen each week, creating an unbroken succession of bloom that begins with the opening of the first pasque flower in March or April and ends only when the last aster fades away in November.



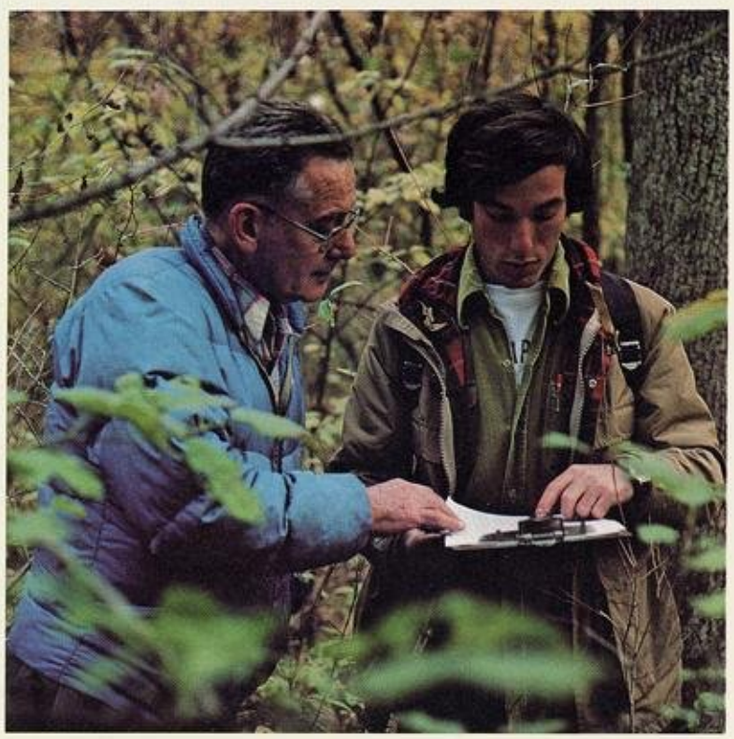


# Noe Woods:

## In the Middle of a 300-Year Experiment

If the distinctive feature in the development of the UW-Madison Arboretum has been the active restoration and management of plant and animal communities, there are also areas which have been deliberately left alone—some because they represent challenges the Arboretum has not yet been prepared to meet, others because they had escaped major disturbance during the years when the Arboretum was farmland.

An excellent example of such an undisturbed Arboretum community is Noe Woods at the western edge of the Arboretum. Oak forests like Noe Woods are abundant in southern Wisconsin, many of them having grown up on prairie following settlement and the cessation of frequent wildfires. Noe Woods, in fact, originated in this way, and, as a result, many of its largest oaks date from about 1850—the time of the last major prairie fires in the Madison area.



*What now? What in another hundred years? Botanist Grant Cottam with a student.*

Since that time this forest, which served for some three-quarters of a century as a farm woodlot, has suffered remarkably little disturbance. Part of it may have been grazed at one time. A small area, near McCaffrey Drive was logged about 1910 and has few trees predating this time. The central part includes an old savanna-like opening, once an orchard, where honeysuckle, cherry, and boxelder are growing up around old, open-grown bur oaks. But a large area in the southern part of this woods escaped significant disturbance and is today a choice example of southern Wisconsin oak forest.

Because of this, Noe Woods has been set aside as a minimal-management area. No large-scale species introductions have been made here, and management has consisted mainly of judicious removal of exotic species such as honeysuckle and buckthorn.

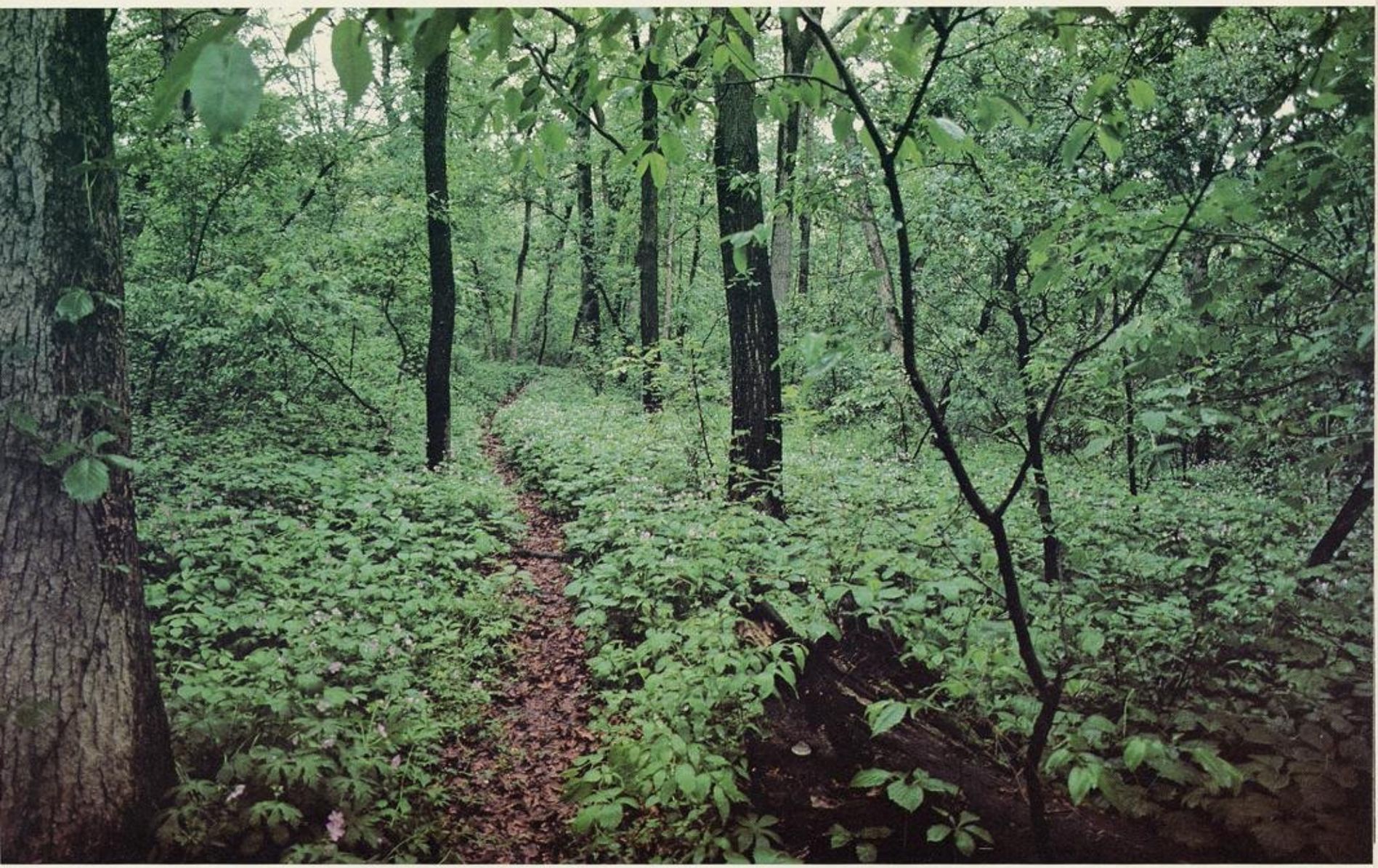
The idea here is to use this forest as a benchmark community—a reference area for assessing the condition of other oak forests, and for following over a long period of time the changes that take place in an oak forest left to its own devices.

This is a matter of great interest not only to ecologists but to foresters as well. Oak forests are an important source of timber and fuel in the midwest, yet their long-term development is not thoroughly understood—mainly because most oak forests are still quite young. It is not clear, for example, how a forest like Noe Woods will change as the dominant oaks begin to succumb to disease and wind damage. Will young oaks replace the old ones as they die? Or will a forest like Noe Woods last through only one

generation of oaks. If this is the case, what kinds of trees will succeed the oaks? And how should a forest of this kind be managed for sustained timber yield?

To answer questions like these, students in UW ecology classes have surveyed the vegetation here each year since 1951. As the years go by, the record of this work will develop into a unique time-lapse record of an oak forest, perhaps through the lifetimes of several generations of researchers.

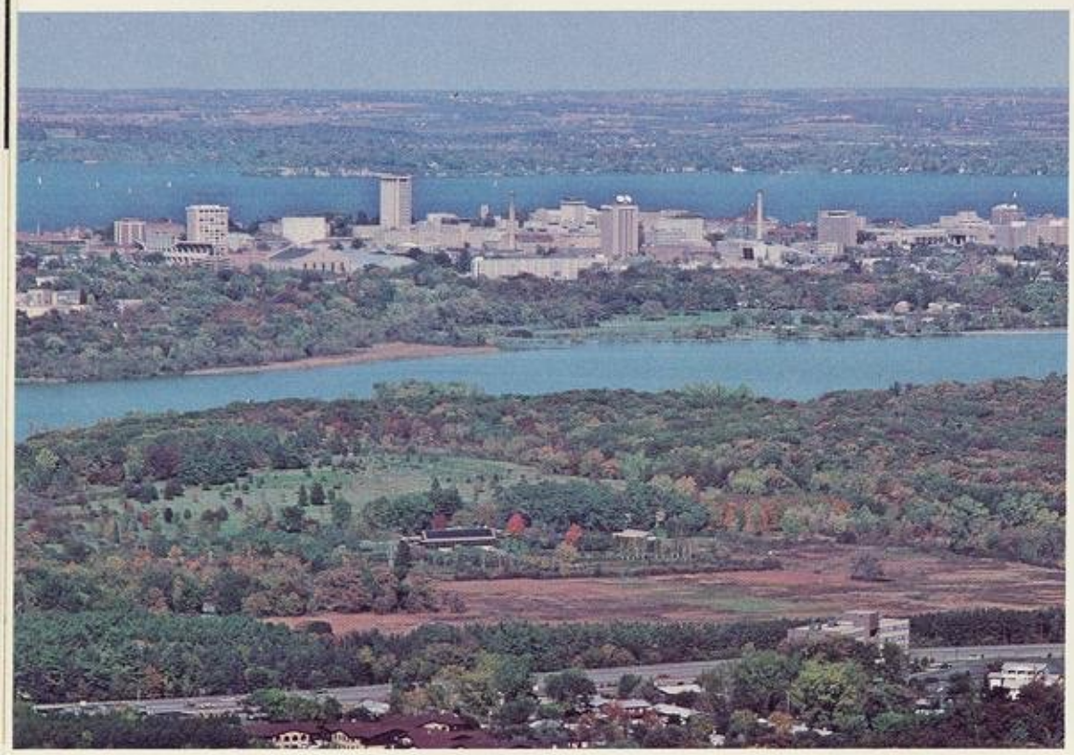
At this stage in its development, Noe Woods is a magnificent forest, dominated by mature white and black oaks whose tall trunks rise like pillars through the understory to the canopy eighty feet above. The dense, brushy undergrowth here is typical of oak forests and is the result of the fairly open canopy, which admits considerable sunlight. Characteristic shrubs are hazelnut, gray dogwood, and blackberry. Honeysuckle, also present, is not a native, and attempts are under way to eradicate it. Characteristic animals here are deer, squirrels, rabbits and mice; typical spring flowers are wild geranium and false Solomon's-seal.

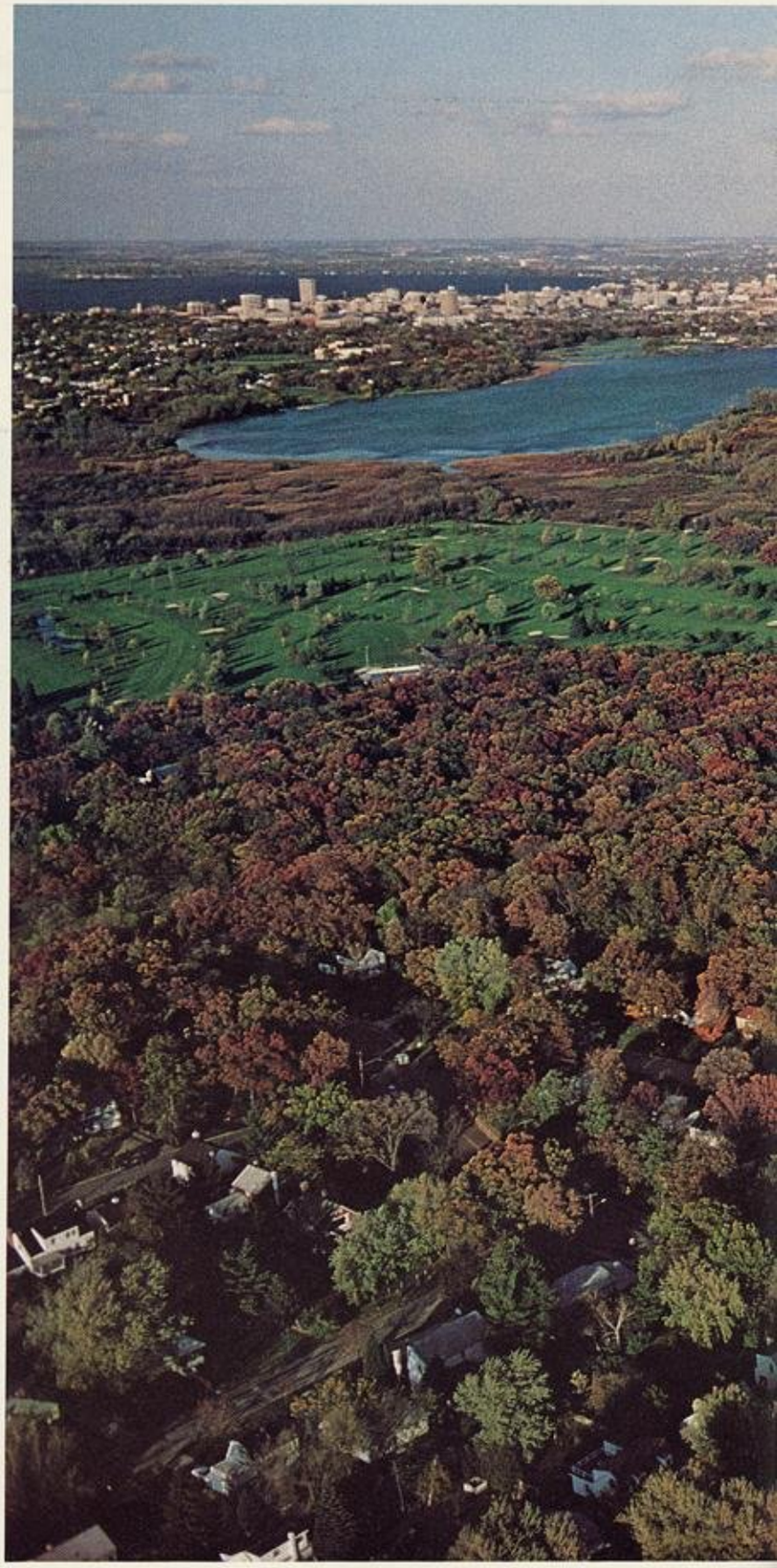


*Noe Woods*

*The outdoor laboratory from the air. Bottom: Across the Arboretum from the south, dramatizing the University's proximity to its outdoor study area. Right: The view east along the Beltline Highway. In the foreground are the reddening oaks of Noe Woods, separated by the highway from the Grady Tract pines. Beyond Noe Woods are the Leopold Pines and Curtis Prairie, with Wingra and Gallistel Woods, Lake Wingra and downtown Madison in the background. The green area (center left), is Nakoma Golf Course.*

*Below, left: A view across Curtis Prairie of the solar-heated McKay Center. Below, right: Leaf-fall, the floor of Gallistel Woods in autumn.*



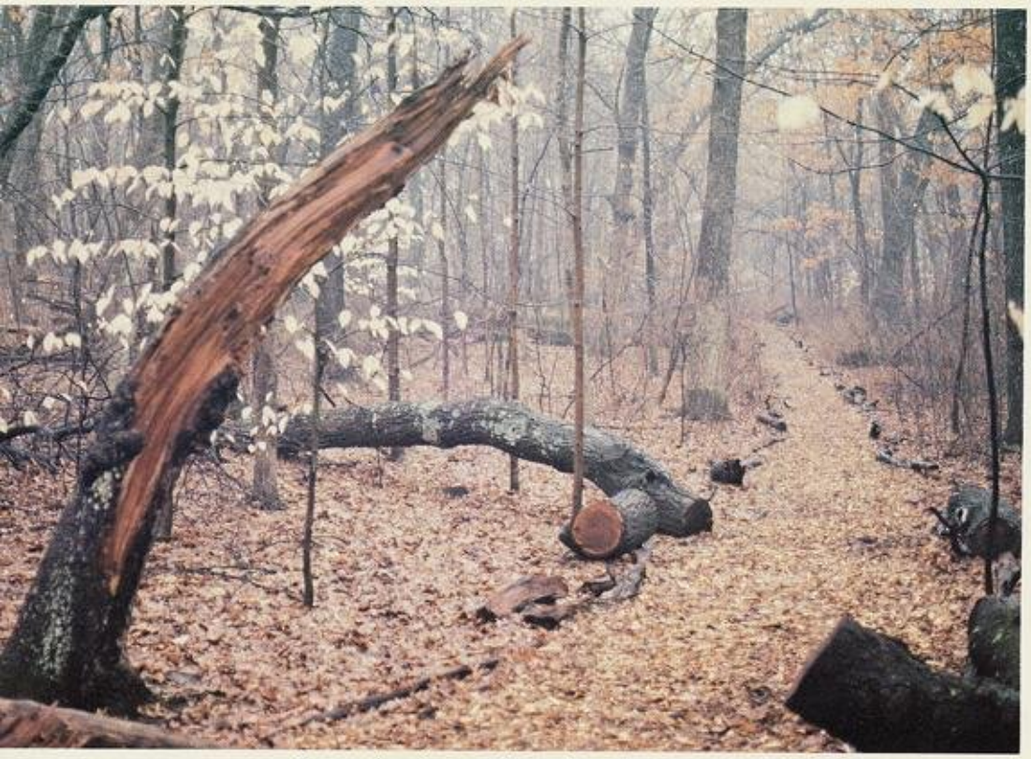


# Wingra & Gallistel Woods:

## Forests in Transition

In contrast to Noe Woods, where the management plan is minimal management, Wingra and Gallistel Woods on the hill south of Lake Wingra in the heart of the Arboretum, are gradually being altered by management, and are expected someday to provide examples of several of the kinds of forests native to Wisconsin and the midwest but not originally present on Arboretum land.

Here, on the south-facing slope of Gallistel Woods (the part of the forest south of McCaffrey Drive), the Arboretum developers have underplanted sugar maples, basswoods, and beeches—species characteristic of the forests that tend to develop naturally on suitable, moderately moist (mesic) sites in southern Wisconsin. On the cooler, north-facing slope of Wingra Woods (north of the Drive), they have planted species characteristic of forests growing on mesic sites in the northern part of the state. In both woods, the underplanted trees have grown well and are now conspicuous in the understory and lower canopy, especially in the fall when the brilliant yellow of the basswoods and the flaming orange of the maples contrast with the bronze-reds of the older oaks overhead.



*Young beeches and maples: The southern forest plantings.*

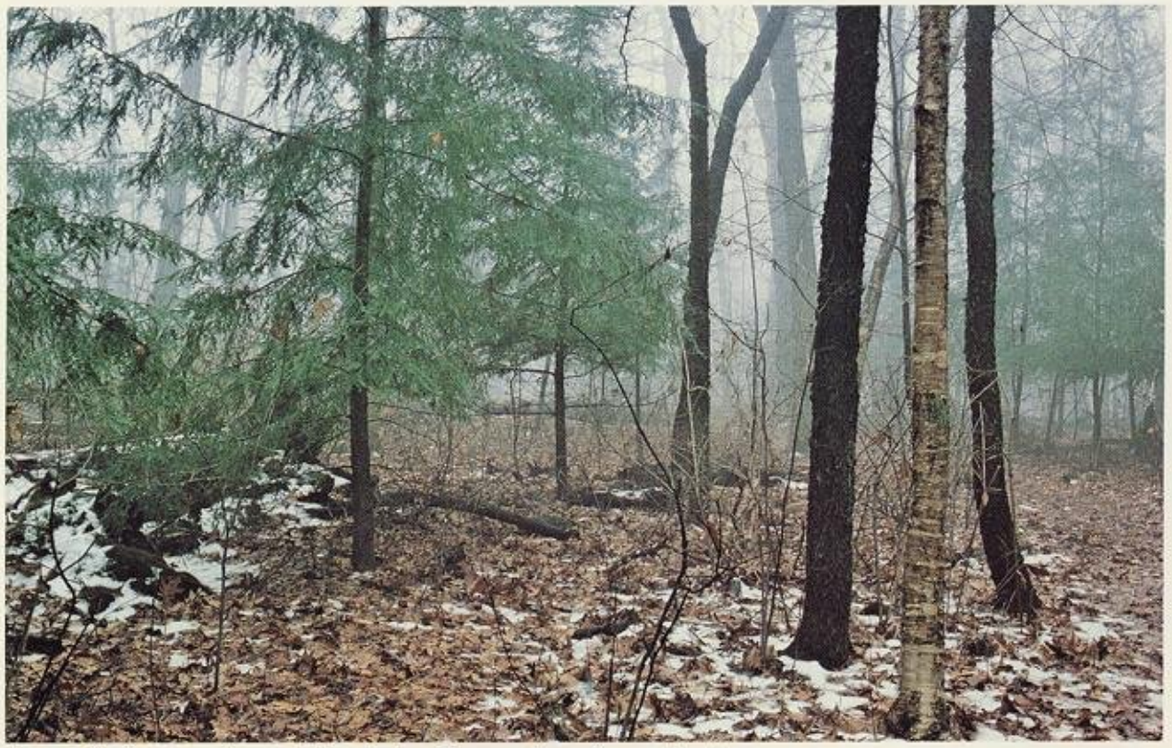
In general, these attempts at plant community development have been quite successful. In parts of Gallistel Woods, for example, the underplanted maples and basswoods now cast the deep shade characteristic of maple forests and, as a result, the forest floor here is almost free of shrubs. As the shade has deepened, wildflowers planted here during the 1940s have varied in their response. Some, like the trilliums, have decreased in number while certain spring ephemerals like toothwort and trout lily have spread.

During the early stages of Arboretum development, a small, moist area in the lower southern part of Gallistel Woods was selected for establishment of an experimental sample of the Ohio Valley lowland forest. Here the planners were stretching their objectives slightly, for many of the trees of this forest type are not native to Wisconsin but to the Ohio River Valley several hundred miles to the southeast and, no doubt partly because of this, this experiment has not been highly successful. Some of the southern hardwoods planted—notably tulip tree, redbud, and Ohio buckeye—have grown well; others like sassafras and flowering dogwood have not.

In Wingra Woods the terrain continues to rise gently from McCaffrey Drive then drops abruptly to the lake. The forest covering the northern slope of this hill includes the Arboretum's most magnificent stand of red oak. Selecting this slope for its cool, northern exposure, the Arboretum developers have planted hemlock and yellow birch, along

with sugar maple, basswood and beech—all species characteristic of the northern mesic forest which was, at the time of settlement, Wisconsin's largest single plant community. These underplanted trees grew slowly at first, but are now well established and conspicuous, especially along the eastern end of the trail that runs parallel with the shore of the lake. A number of shrubs characteristic of the northern mesic forest have also been planted here and, as the hemlocks and yellow birches become larger, more may be added.

The development of the Arboretum's mesic forests, like the development of its other ecological communities, has been accompanied by detailed studies of natural communities that have provided information needed for authentic restoration. Carried out under the direction of John Curtis during the early decades of Arboretum development, these studies were part of exhaustive studies of Wisconsin's vegetation which culminated in the publication of Curtis's classic book, *The Vegetation of Wisconsin*, in 1959.



*Young birches, maples, and hemlocks: The northern forest plantings.*

*Interrupted fern*

# Conifer Forests:

## A Management Challenge and a Hint of the Northwoods

During the late decades of the nineteenth century, when farmers were breaking sod on the last of the prairies and savannas of southern Wisconsin, lumberjacks were leveling the forests of the north. Among the first trees to attract their attention were the pines. These grew in dense stands on the sandier soils and in clearings in the mesic forests created by fire and windstorms. White pines were also scattered in the mesic forest, and some of these, towering up to 200 feet, were among the state's oldest and tallest trees. To the lumbermen they were, of course, irresistible, and by the turn of the century all but scattered patches had been cut.

Though there were no pine forests in southern Wisconsin at the time of settlement, pines can be grown here and, from the beginning, the Arboretum planners intended to include a pine forest in the Arboretum's collection of native plant communities. During the 1930s, '40s, and early '50s, red, white, and jack pines were planted in several areas in the Arboretum, the largest of these being the area near the Beltline between Noe Woods and Curtis Prairie. This plantation is now called the Leopold Pines.

In a few areas these pines have grown well, but for the most part the pine forests have been among the Arboretum's less successful attempts at plant community development. Part of the reason for this is probably the climate here, which is not ideal for pines. Furthermore, the trees in the Leopold Pines, planted thickly and then left unthinned for several decades, eventually became extremely crowded. By the mid-'70s, many of them were losing vigor and beginning to die. As their tops became sparse, allowing increasing amounts of sunlight and rain to reach the forest floor, weedy plants like nightshade and honeysuckle have invaded the forest floor. Pine forest understory species such as gaywings and starflower, planted during the early years, grew poorly. And even in the best areas, where the pines grew reasonably well, this forest had become a monotonous stand of crowded trees, not at all like a native pine forest.

A major attempt to remedy this situation began in 1976. As this project proceeds, openings created in the pines by cutting are being planted with red maple, red oak, aspen, paper birch, and basswood to create some of the diversity that was typical of the native pine forest. Clearing of a corridor leading from the west end of the Curtis Prairie up the hill to a knoll just east of Noe Woods will improve the area for wildlife. In addition, drastic thinning throughout the forest will give the remaining trees more room to grow and, it is hoped, a new lease on life.

Similar thinning and creating of clearings in the border of pines along the Beltline and planting with a mixture of junipers and appropriate deciduous and herbaceous species will help make this stand a more effective screen between the Arboretum and the Beltline and a more natural, less abrupt edge for the Curtis Prairie.

The Arboretum pines may never rival the primeval pine forests of the far north, but they may someday resemble the mixed pine and hardwood forests of the Baraboo Hills closer to Madison; in any case, they do provide some of the flavor of the northwoods and are invaluable for teaching and research.

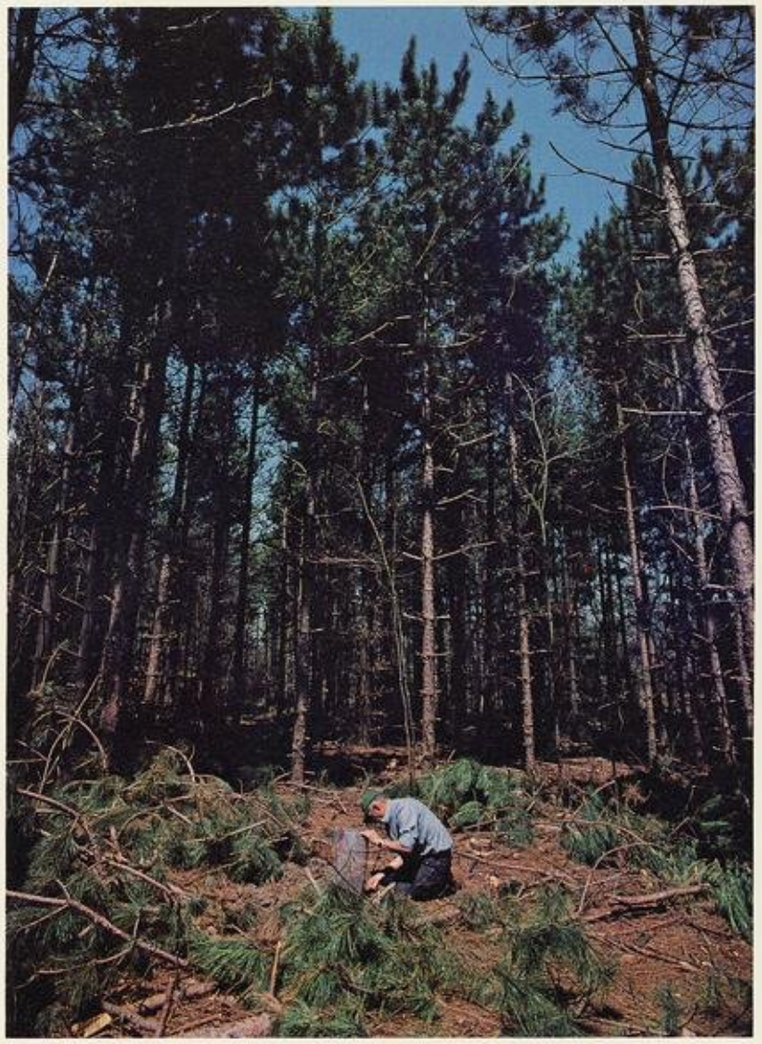
The Arboretum also has several small examples of boreal forest. These are the forests of spruce and fir that are the world's northernmost forests and cover vast areas in Canada extending down into the northernmost counties of Wisconsin, where Lakes Michigan and Superior create the cool, humid summers and snowy winters suitable for them. Three small areas in the Arboretum have been planted with spruce and fir and, though these are not yet authentic examples of boreal forest, the trees have grown well and now show the spire-shaped silhouettes characteristic of these forests.

Like the pines, these are even-aged stands because all the trees in them were planted at about the same time. This, however, is typical of both pine and boreal forests, where

dense shade prevents reproduction of mature trees and new forests usually arise in areas opened up by disease, fire, or windstorms.

The Arboretum's choicest example of boreal forest is in a small area just east of Curtis Prairie. This area is particularly spectacular in fall when the yellow leaves of the aspens contrast brilliantly with the dark spires of the spruces and firs.

*Thinning and planting continue in the Leopold Pines forest restoration project begun during the 1930s. Conifer forest restoration has proved difficult on most Arboretum sites, but modest successes have resulted in occasional patches of spring flowers like bunchberry, starflower, and Canada mayflower (right). Tamarack (below, right) flourishes on several lowland sites.*



# Wetlands:

## Fragile Communities Between Land and Water

While remarkable progress toward realizing the plan to restore the Arboretum to a semblance of the presettlement Wisconsin landscape has been made during the Arboretum's first half century, there remain sizable areas in which little progress has been made.

Of these, perhaps the most notable are the extensive wetlands around Lake Wingra. Originally these virtually surrounded the lake, covering about three times their present area and reaching well into what is now the Nakoma Golf Course to the west and most of the way to Lake Monona to the east. They made the lake itself a paradise for plants, fish, and waterfowl. And by

*Redwing Marsh*

discouraging development in the area and helping to preserve a wilderness atmosphere, they have played an important role in the creation and development of the Arboretum itself.

And yet these fragile communities have been damaged, probably as profoundly as any area in the Arboretum, by human activities that got under way just as the expanding city reached the shores of Lake Wingra about the turn of the century. The edge of the east—or Gardner—marsh was first dredged in 1905 to create the canal now known as Wingra Creek. A decade later, the marsh itself was criss-crossed with canals dredged as part of an attempt by the Lake Forest Land Company to drain the marsh in preparation for construction of a road across it to a development site to the south. These reduced the areas of shallow, fluctuating water, in effect replacing acres of marsh with hundreds of yards of unnaturally abrupt shoreline.

About the same time, the marsh was separated from the lake by the dike along which McCaffrey Drive now runs as it skirts the eastern shore of the lake, and the water in the marsh was lowered. Today the water in Gardner Marsh is some two feet lower than the water in the lake and about a yard lower than it had been in presettlement times. The marsh is a mosaic of cattail marsh, sedge meadow, lowland forests of willow and cottonwood, and shrubby thickets of willow and red osier dogwood. Weedy species like boxelder and buckthorn cover the heaps of spoils dredged out of the canals and lagoons.

The effects of human activity on Wingra Marsh, at the west end of the lake, have been less dramatic than those resulting from the deliberate assault on Gardner Marsh. The major impacts here have been drying up of springs along the north shore, due at least partly to construction of buildings and streets in the neighborhoods to the north, and deposition of silt, trash, and other pollutants from storm water runoff deposited at the edges of the marsh by storm sewers.

Altogether, though at least sixteen springs have ceased to flow along the shores of the lake in recent decades, and storm water deposits continue to encroach on this site, parts of Wingra Marsh remain relatively undisturbed, and measures to prevent its further deterioration are being planned.

Though the condition of these wetlands is clearly unfortunate, the disturbances that have occurred here have made these areas a valuable laboratory for restoration and management research. As the economic and environmental values of wetlands have become increasingly apparent in recent years, interest in developing better ways of rehabilitating and managing disturbed wetlands has grown, and the Arboretum wetlands are obviously ideal areas for intensive, long-term research of this kind. These areas have so far been largely neglected while major Arboretum development has gone on in the uplands. But today it is becoming clear that the wetlands could become what the prairies and deciduous forests are already—major restoration projects leading eventually to showpieces in the Arboretum's collection of restored plant and animal communities. Here, perhaps more clearly than anywhere else in the Arboretum, the past waits, pointing toward the future.

*Gardner Marsh*

*Green heron*

*Teal Pond*

# Lake Wingra:

## The Marsh Lake Transformed

Today the lake which city planner John Nolen described in 1909 as "a beautiful little body of water, a veritable gem," serves as a watery front yard for the Arboretum, precious not only for the wilderness atmosphere it helps preserve but for the rich opportunities it provides for study and research.

Of course, any body of water can be an interesting object of study, but Lake Wingra has proved, and is continuing to prove, exceptionally interesting because of the many contrasts it provides.

First, it contrasts with Madison's other lakes. Smaller, shallower, more productive, and more richly endowed with wetlands than the four big lakes, Lake Wingra has proved useful for comparative studies since late in the last century when E.A. Birge was carrying out pioneering limnology research at the university.

Second, as a result of the extensive urban development north and west of the lake, and creation of the Arboretum south of it, Lake Wingra offers unusual opportunities for comparing the effects on a lake of urban and nonurban environments. Taking advantage of this, between 1970 and 1973 an interdisciplinary team of UW scientists undertook a major study of the lake and its watershed as part of the International Biological Program. That study, carried out by researchers in fields ranging from geology and hydrology to zoology and sociology, has made Lake Wingra one of the most intensively studied lakes in the world.

Even more significant, however, especially from the point of view of the Arboretum as a laboratory for the study of ecosystem restoration and management, are the contrasts between past and present, between the Lake Wingra of today and the Marsh Lake of a century and more ago.

Like the wetlands around it, Lake Wingra has been profoundly altered since settlement times. Early descriptions of the lake emphasized its seclusion and the broad marshes that surrounded it. Early Madison residents avoided the lake and referred to it as Dead Lake, Lost Lake, or the Marsh Lake. Winnebago Indians, whose ancestors had lived around its shores for centuries, still camped and hunted around the lake as recently as the early decades of this century, and the name Wingra is a Winnebago word meaning duck.

Today, the lake that had survived up until the beginning of the twentieth century as a wilderness jewel, rich in game and wild rice, has been altered almost beyond recognition. Drastic change began with the dredging, diking, and filling that altered the shoreline, destroying much of the original wetland, and separating the lake from the extensive wetlands to the east. These alterations, together with dredging of parts of the lake itself in 1915 and 1916,

*Wingra Spring*

prepared the way for invasion by exotic plants and animals, notably carp and the lake weed, Eurasian water milfoil.

While these changes have been severe, they are not unlike changes that have occurred in other midwestern lakes. And this, together with Lake Wingra's small size (about 345 acres) and proximity to the university and the Arboretum, make it an ideal site for detailed, long-term studies of human impacts on lakes, as well as of lake rehabilitation and management. Indeed a number of such studies have already been carried out here, several are under way, and more are being planned.

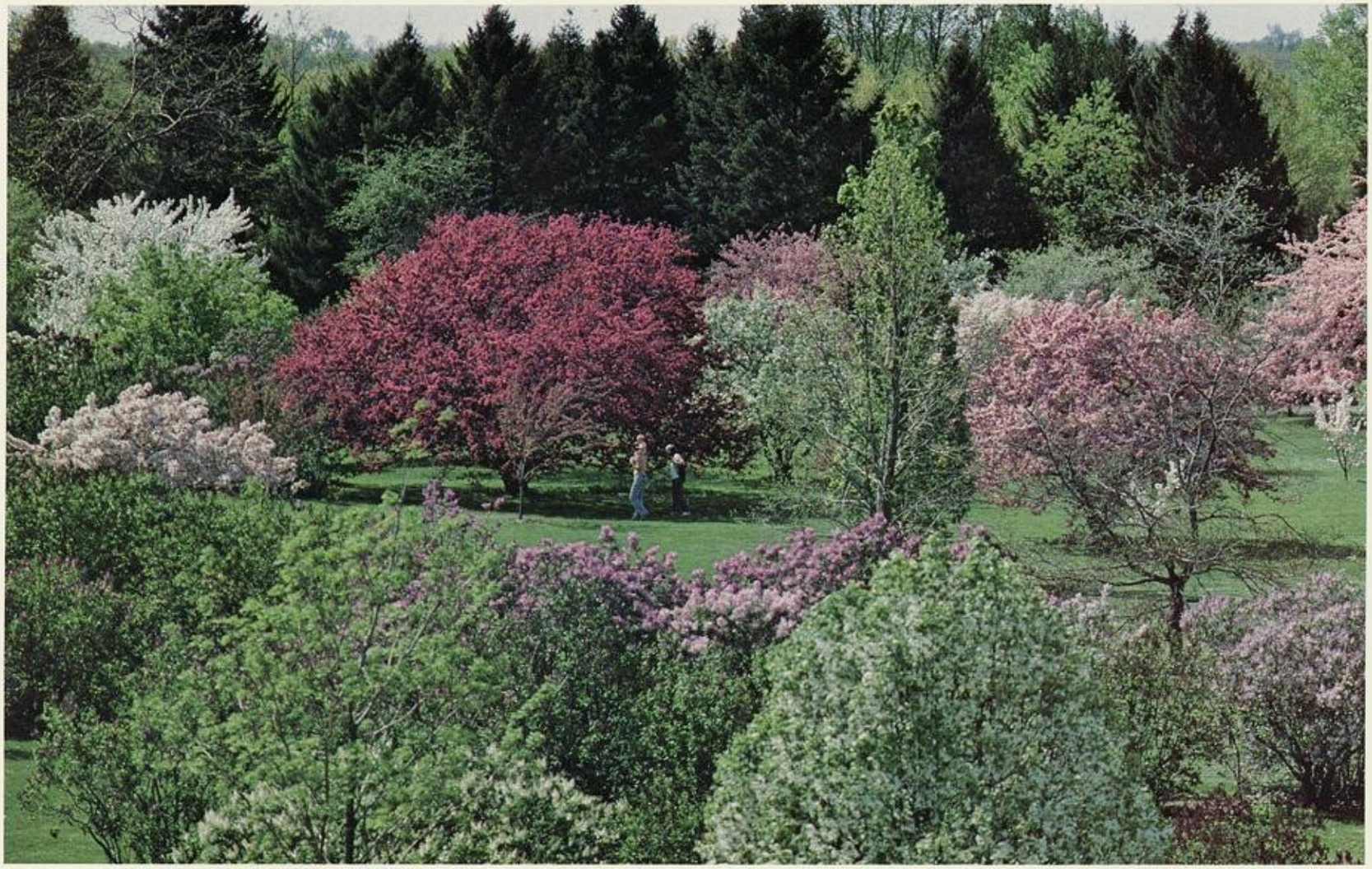
*Lake Wingra*

# Horticultural Areas:

## Gardens of Trees and Shrubs

Although most of the Arboretum's 1260 acres are devoted to restored and preserved examples of native plant communities, two areas—the Longenecker Horticultural Gardens north of the McKay Center and the Viburnum Garden on Manitou Way—have been developed into horticultural collections of a more traditional kind.

Of these, the Longenecker Gardens, which occupy about forty acres, are the largest, oldest and most fully developed. The planning and early development of these gardens were carried out by UW horticulturist G. William Longenecker, who also planned the roads, buildings, stonework, and other landscape features of the Arboretum. Under Longenecker's direction, lilacs were chosen for the first major horticultural



*The Longenecker Horticultural Gardens*

collection, perhaps because lilacs were extremely popular in the United States during the 1930s. The first lilacs were planted in 1935 with the financial assistance of the Madison Garden Club. The lilac collection has since grown to about 230 species and cultivars and is the largest of the Arboretum's collections of ornamental shrubs and one of the finest collections of lilacs in North America.

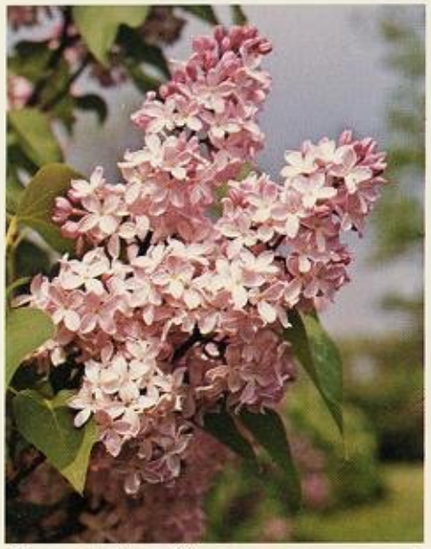
In 1942, with the financial support of Madison's West Side Garden Club, a collection of flowering crabapples was started in the area just north of the lilacs. This collection now includes about 135 varieties. The crabapples bloom in late spring, usually beginning about the second week in May, and are closely followed by the lilacs. Between them, these collections create one of the Arboretum's most spectacular and popular displays of blooms. The colorful fruits of the crabapples provide a second and longer-lasting display from August through December. Less widely appreciated, but well worth a visit, especially in May when they are in flower and later in the summer when many of them bear colorful fruits, are the fifty species and varieties of viburnums in the separate Viburnum Garden on Manitou Way.

Since the mid-1950s, the Longenecker Gardens have grown steadily with the development of a large collection of trees and shrubs in the area east of the lilacs and crabapples. These include both native and exotic species of trees and shrubs labeled, like most of the plants in the horticultural gardens, with metal tags attached to the south side of each plant.

The newest addition to the Longenecker Gardens is the Pinetum, a collection of pines, spruces, firs, and junipers developed since 1972 on the slope at the north edge of the gardens.

Visitors are encouraged to visit the horticultural collections to become familiar with these plants and their environmental preferences, which as far as possible, have been taken into consideration in laying out the plantings. The gardens are also used extensively by students of botany, forestry, horticulture, landscape architecture, and other plant-related fields, who come here to learn the plants and to become familiar with their care and cultural requirements. Much of the pruning in the gardens is done by horticulture students. In addition, the gardens play an important role in the introduction of new species and cultivars to Wisconsin; there are several hundred kinds of plants here which are the only documented specimens of their kinds in the state. A few of them are entirely new cultivars introduced by UW researchers and currently being tested for landscaping value and performance in southern Wisconsin. An example is the *Autumn Purple* white ash, prized for the brilliant purple of its leaves in autumn, and now widely grown throughout the United States. This cultivar was introduced by Professor Longenecker who found a white ash with unusually beautiful fall color growing on campus and propagated it in 1955. The specimen in the driveway loop across from the McKay Center is one of Longenecker's original grafted plants.

*Callery pear*



*Macrostachya lilac*

*Elm breeding research*

# The Outdoor Laboratory:

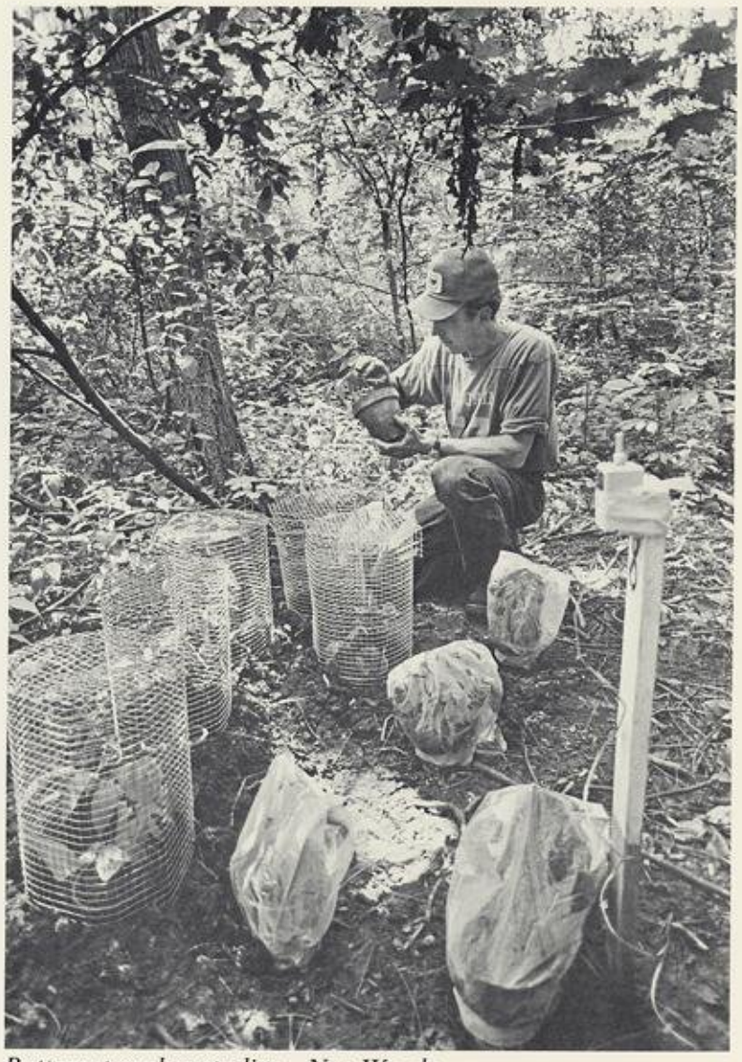
## Pioneering the Science and Art of Making Nature Whole

Initially, the restoring of plant and animal communities at the Arboretum was undertaken largely in order to bring together the various ecological communities needed to represent the diverse vegetation of Wisconsin. Over the years, however, the task of restoration and management has itself proved remarkably rewarding and has remained a major focus of Arboretum research, even as interest in developing improved techniques for restoring and managing ecological communities has grown nationwide.

Gradually, biologists have come to regard community restoration of the kind undertaken here as an interesting way to approach the study of ecological communities. At the same time, the environmental and economic significance of restoration and management has become increasingly clear as the need for ways of rehabilitating and caring for damaged natural areas has become more and more urgent.

Improved community restoration and management techniques are needed for example, in reclaiming land disturbed by mining, by construction, and even by agriculture. There is a need for better, more effective and

*Soil research—Leopold Pines.*



*Butternut canker studies—Noe Woods.*

more economical techniques for restoring and managing lakes and parklands, and for rehabilitating wetlands damaged by pollution, siltation, or altered drainage patterns. In the long run, developing these techniques will have profound significance, not only for the environment, for the conservation of rare species and endangered habitats, but for the economy as well. The wise and effective management of native vegetation in planned landscapes, for example, and along highway and railroad rights-of-way and utility corridors, promises immense savings in labor as well as in energy in the form of fuel, fertilizer, and pesticides.

Partly for these reasons, the management research begun at the Arboretum a half-century ago has continued. It remains today one of the Arboretum's most significant activities and is likely to remain so.

Established communities, of course, offer opportunities for research on the requirements and habits of the creatures that inhabit them. In the early days, when much of the Arboretum land was undeveloped, important research in wildlife management was carried out here. Since then UW scientists have come to the Arboretum to study the ecology of orchids, sunflowers, and woodcocks, the natural history of trilliums, populations of fish in Lake Wingra, and much more.

An additional advantage of the Arboretum for research is that it is not only close to the university, but that it is sure to be here for a long time and to remain undisturbed. This assurance has led to the initiation of long-term studies which may eventually occupy the attention of several generations of researchers. Examples are studies of the long-term changes in the vegetation of the prairies, Noe Woods, and Lake Wingra, and soil development studies on the prairies that are providing valuable information about the soil-building processes that led to the creation of the rich soils of the midwest.

The Arboretum also provides exceptional opportunities for research on the impact of people on the natural environment. Today, the pressures of urban growth threaten the Arboretum from every side, detracting from its wilderness atmosphere, but at the same time providing still more opportunities for research.

The Arboretum also offers unexcelled opportunities for students and the public to become familiar with the variety of vegetation native to Wisconsin. In recent years, more than 10,000 students from the UW-Madison and from colleges and elementary and secondary schools all over the state have visited the Arboretum annually, and the number is growing.

*Monitoring prairie development—Curtis Prairie.*

# Public Services

While the Arboretum is a part of the University of Wisconsin, its value to the public as well as the importance to it of public support, has long been recognized; and more and more in recent years its teaching mission has been extended to include the public.

A major step in this direction was the opening, in July 1977, of the solar-heated McKay Center, built with funds provided by nurseryman William McKay and other supporters of the Arboretum. The center, situated in the Longenecker Gardens in the heart of the Arboretum, includes a public reception area staffed by volunteers, where visitors may obtain information about the Arboretum, its seasonal highlights, tours, and programs. There are also staff offices and a large classroom for Arboretum-related meetings, classes, and other activities. The building is open to the public during office hours and on weekend afternoons.

Experienced guides conduct free public tours of various Arboretum areas each Sunday during the warmer months. This service is supported by the William Evjue Foundation and by the Friends of the Arboretum, an organization that exists to aid the Arboretum. Exact times and meeting places for these tours are posted weekly at the McKay reception desk and in all Arboretum parking lots, and are announced in the Madison newspapers. Special tours for schools and other groups can be arranged for a small fee.

Trail guides to selected Arboretum areas are being prepared and, as they are published, will be on sale at the McKay Center.

For further information, please call or write: The McKay Center, The University of Wisconsin-Madison Arboretum, 1207 Seminole Highway, Madison, Wisconsin 53711. Telephone: (608) 263-7888.


## Regulations

The public is welcome to hike the Arboretum's twenty miles of trails and firelanes and to enjoy its gardens and ecological communities. Visitors are asked to help protect the area by staying on trails and not removing natural materials.

In order to help preserve an undisturbed atmosphere and to protect experiments in progress, wheeled vehicles (except wheelchairs) are not permitted on trails, and picnicking, pets, fishing and hunting, swimming, fires, sports, and radios are prohibited.

*The Joseph W. Jackson memorial oak—Curtis Prairie.*

# An Arboretum Almanac

### January/February

A season for birds, both permanent residents such as cardinals and chickadees, and migrants from farther north, which winter here. Choice winter birding areas are Lost City Forest (juncos and tree sparrows); Teal Pond and the Nakoma Road duck pond (crossbills and pine siskins); Wingra and Gallistel Woods (woodpeckers, nuthatches, owls, kinglets, and brown creepers); and in the horticultural gardens and along forest edges and old fencerows all over the Arboretum. Altogether some seventy species of birds are found here in winter.

### March

Wingra and Gallistel Woods show early signs of spring: emergence of catkins of hazel and aspen, and swelling buds on many trees and shrubs. Late in the month, buds of hepatica may appear in Gallistel Woods. In the lowlands and in the horticultural collections, some of the maples come into bloom, and the skunk cabbage emerges in the wetland east of Wingra Woods. Early-returning birds include robins, song sparrows, redwing blackbirds, phoebes, and meadow larks. The woodcocks begin their peenting and sky-dancing over semi-open and shrubby areas.

### April

Hepatica starts the spring wildflower show in Wingra and Gallistel Woods, and is followed by bloodroot, toothwort, and blue cohosh. The sandy knolls north of Greene Prairie have pasque flowers; the springs at the edge of Wingra Woods sparkle with marsh marigolds. Choice birding areas are the forest edges and the springs around Lake Wingra, as flickers, brown thrashers, tree swallows, peewees, and the first of the spring warblers return. This is the season for prairie burning; parts of the Arboretum prairies are usually burned between early April and mid-May. The burned areas offer the spectacular regreening and signs of the earliest prairie flowers. Forsythias and magnolias bloom in the Longenecker Gardens.

### May

The month of peak bloom in the Longenecker Horticultural Gardens. Cherries bloom early in the month and are followed by the crabapples, and then the lilacs which usually bloom until the end of the month. Altogether, these make up one of the Arboretum's most popular attractions. This is also peak time for spring wildflowers in the deciduous forests. HoNeeUm Pond is a choice birding area as the spring warbler migration reaches its height. Puccoon, creamy baptisia, and prairie smoke begin blooming on the prairies.

### June

Curtis and Greene Prairies are at their most meadow-like with lupines, shooting stars, Indian painted cups, phlox, and golden alexanders blooming among the young grasses. The deciduous forests are full of late spring wildflowers and the fruits of some of the earlier-blooming flowers. Early in June or late May, the geraniums are spectacular along the trails in Noe Woods. This is also the time for peak bloom in the Viburnum Garden off Manitou Way.

### July

The start of the brilliant late summer show on the prairies: early purple coneflowers bloom now along with prairie dock, butterfly weed, and wood and Turk's cap lilies. Late in the month, the early species of gayfeather begin to appear. Goldfinches are mating, and sedge wrens and yellowthroats are singing on the prairies. There are relatively few flowers in the woodlands, which are often humming with mosquitoes. The potentillas and rugosa roses are blooming in Longenecker Gardens.

## August

The tall grasses reach six to eight feet high on the prairies, and patches of yellow and purple come and go as the goldenrods, blazing stars, asters, and compass plants come into bloom. The viburnums in the Viburnum Garden are loaded with red and black fruits and, in wet years, the late summer fungi begin to appear. Many woodland plants have ripening fruit and are being harvested by wildlife.

## September

The seeds of the tall prairie grasses begin to ripen, and the prairie colors deepen to hues of bronze, gold, and mahogany. Goldenrods and late asters are prominent. Lovely, but rarer and harder to find on the prairies, are the gentians and lady's tress orchids. Autumn bird migrations are under way. Good birding areas are the deciduous forests and the areas around Lake Wingra, including HoNeeUm Pond.

## October

Peak fall color time is usually from mid- to late-October in the Arboretum, and among the most colorful areas are Wingra and Gallistel Woods where young maples, beeches, and basswoods mingle with the older oaks to provide an unusually spectacular and long-lasting show. The Noe Woods oaks are also brilliant, and all three areas can be seen from McCaffrey Drive. The crabapples in the Longenecker Gardens are fruiting and are visited by many fruit- and seed-eating birds.

## November/December

A quiet time to walk in the woods, now open and almost free of leaves, to learn to know trees by their bark, twigs, and fruits, and to identify resident birds before they are joined by the northern migrants as winter sets in. The plant communities show contrasts of texture, coloring, and growth pattern. A last time to visit forest, prairie, garden, and lake edge before the coming of snow.

This booklet is one of a series of guides to the University of Wisconsin-Madison Arboretum's plant communities and the plants and animals in them. Subsequent booklets will provide trail guides and illustrated plant identification guides for selected communities. As these are completed, they will be available at the McKay Center.

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The accompanying color map of Arboretum and early Wisconsin vegetation was prepared and in part paid for by the University of Wisconsin-Madison Cartographic Laboratory.

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