

A photograph of a field of wildflowers. In the foreground, there are clusters of bright yellow flowers. Behind them, there are tall stalks of purple flowers. A large, leafy tree is visible in the background, its branches framing the top of the image. The scene is set in a natural, open area.

LIVING IN THE
OAK OPENINGS

— A GUIDE TO ONE OF THE —
WORLD'S LAST GREAT PLACES



FORWARD

Welcome to the third edition of the Living in the Oak Openings homeowner's guide. For over a decade, this guide has been bringing the Oak Openings Region and all its natural wonders into the homes and schools of residents and neighbors. Its purpose has been, and continues to be, to inform, inspire and empower the people fortunate enough to live and travel within this unique landscape. With that in mind, the Green Ribbon Initiative, which is the collection of agencies working to protect and restore the Oak Openings, found it important to share with you the substantial new information and activities arising in the region since the second edition published in 2009.

One of the most notable changes you will find in this edition involves its maps: the Oak Openings Region appears to have doubled in size! This, however, is not exactly the case. For generations, the Oak Openings has attracted researchers and naturalists to explore its thousands of native plants and animals. Most of these researchers were from Ohio, and most studies ended arbitrarily at the state line, resulting in a perspective of the region that was very Ohio-centric. However, a broader look at Oak Openings plant communities, soils and geologic history reveal the true extent of this system and the full extent of the Green Ribbon Initiative's focal area. This full extent of the Oak Openings is now reflected throughout this guide.

Additionally, all chapters have been updated to include the most relevant information, from changes in the listed status of a species to new research shaping the way we understand the system. Callout Boxes offer an in-depth look at important species, events and research. Expanded photo spreads give you a head start on identifying the great diversity of flora and fauna just outside your door. Finally, this guide empowers you to make a positive impact on the landscape through its new Call to Action Boxes and How to Save the Oak Openings chapter.

One factor that has not changed is the importance of this region to the health and survival of hundreds of rare and endangered species as well as the area's residents. If you live or play within the Oak Openings, you are part of one of the rarest natural areas in the Midwest. If you read this guide, you are part of the team that has the power to preserve this gem. And if you accept your Call to Action, you become a part of the movement to revitalize our human and natural communities. Thank you for doing your part.

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LIVING IN THE OAK OPENINGS

A GUIDE TO ONE OF THE WORLD'S LAST GREAT PLACES

JENNIFER THIEME, EDITOR

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INTRODUCTION

THE OAK OPENINGS: IT'S IN YOUR BACKYARD

BY ART WEBER

We call it the Oak Openings or, simply, the Oaks. Biologists call it oak savanna.

The Nature Conservancy has anointed it as “One of America’s Last Great Places,” putting it on par with Florida’s Everglades and the temperate rain forests of the Northwest as one of earth’s rarest habitats. This long and relatively narrow band of sandy soil just west of Toledo, Monroe, and Detroit that so many people call home is also home to dozens of rare species.



A TIGER SWALLOWTAIL NECTARS ON DENSE BLAZING STAR



PRAIRIE DOCK AND DENSE BLAZING STAR

To be sure, the Oak Openings is not a land of mountaintop vistas and vast canyons. Its beauty is in the details, the incredible richness of species teeming in a rich variety of habitats.

The Oak Openings must have been a welcome sight to the early pioneers of northwest Ohio and southeast Michigan. After wallowing and hacking their way through the dense woods and mire of the Great Black Swamp—it could take nearly a week to traverse the 25 or so miles between Fremont and Perrysburg—the Oak Openings would have been like a dream come true to those early travelers. There, on the high sandy dunes, tall prairie grasses grew under an open canopy of widely spaced oak trees. They could easily zigzag their wagons through the dry open woodland without even having to cut a path.

Some of these early pioneers eyed the open woods and drooled at the prospect of easily cleared farmland. Their excitement was brief. The land was easy to clear, all right, and the sandy soil turned easily to the plow. But the soil was poor and unproductive, and farming was unprofitable.

EVERY UNDEVELOPED
ACRE, WHETHER
A METROPARK OR A
BACKYARD, CAN HOST
RARE SPECIES

SUNSET AT IRWIN PRAIRIE STATE NATURE PRESERVE
T. CRAIL

PRAIRIE GENTIAN

The Oak Openings is one of the few places in Ohio where prairie gentian is found



T. CRAIL

To the naturalist, though, the Oak Openings is a treasure to be nurtured and protected, a rich land dotted with rare jewels. In the early 1900s, Edwin Lincoln Moseley, naturalist and faculty member of Bowling Green State University, found more than 100 species of plants that were more abundant in the Oak Openings than anywhere else in Ohio. Years after Moseley, researchers continue to discover new species as well as rediscover species seen by Moseley but thought to have disappeared. Today, within the Oak Openings, nearly one-third of all Ohio's endangered plant species can be found, along with a host of rare animals, many of them birds and butterflies.

WHAT IS THE OAK OPENINGS REGION?

To many people, the Oak Openings means Oak Openings Preserve Metropark, largest of the Metroparks of the Toledo Area. The Oak Openings, though, is a much larger geologic region of which the Preserve is only a part.

The Oak Openings Region is a sandy five-mile-wide swath that stretches southwestward over 80 miles through Wayne and Monroe counties in Michigan and Lucas, Henry, Fulton and Wood counties in Ohio. As the last of the great mile-thick glacier—the Wisconsinan—receded from our region some 15,000 years ago, it left in its wake Lake Warren, one of the many stages of ancestral Lake Erie. Lake Warren built up sand bars and beaches in what is now the Oak Openings. They were left high and dry as the waters progressively dropped to today's lake levels.

Wind whipped these sandy lake deposits into ridges and dunes. Underneath is a nearly impervious layer of clay, cradling the water year round. In places the sand can be 50 feet thick, and in other places the underlining clay is nearly exposed. On the dunes where the sand is deep the conditions are arid and harsh, but ideal for the plants of the tallgrass prairie and the large spreading oaks.

In between the sparsely wooded dunes and ridges are swales where the sand layer is thin, and water can stand year-round and suppress the growth of woody plants. Wet prairies formed there, dominated by sedges and grasses. These wet prairies and occasional small lakes were extensive enough that Native American hunters and gatherers could canoe uninterrupted for miles.

Wildflowers grew in such profusion in those early days that there are stories of farmers taking wagonloads of orchids to market with their produce.

Only the trained eye of a naturalist would now recognize much of the Oak Openings. Many of the wetlands have been drained and most of the towering oaks cut down. Dense, stunted second-growth forests now fill many of the "openings" that gave the area its name.



J. RICH

AMERICAN BADGER

Much rarer today than it was historically, the badger remains an icon of the Oak Openings

WOODLAND STREAM

Natural areas help protect the region's water quality



A. WEBER

It's difficult to imagine the Oak Openings that existed as recently as the early 1900s. The labyrinth of ditches designed in the early 1900s changed the face of the Oak Openings forever. Water disappeared from the land and with it the waterfowl. If you doubt how wet the area once was, wait for a big rainstorm and drive some of the rural roads of the Oak Openings that traverse what was once wet prairie. Roads through these former wetlands can be rendered impassable in spite of the extensive drainage system.

The suppression of fire, both natural and otherwise, also dealt a blow to the Oaks. Fire historically suppressed the growth of many shrub and tree species, maintaining expansive openings, the very essence of the region, on the landscape.

Removing water and fire, it turned out, was like a one-two punch to the Oak Openings. Without these two natural interventions, remnants of the Oak Openings that haven't already been altered by agriculture or suburban expansion have been largely overtaken by a denser oak forest, and the sun-loving species that characterized the Oak Openings have greatly declined. Though they are still hanging on, these sun-dependent rare plants and animals are being shaded out.

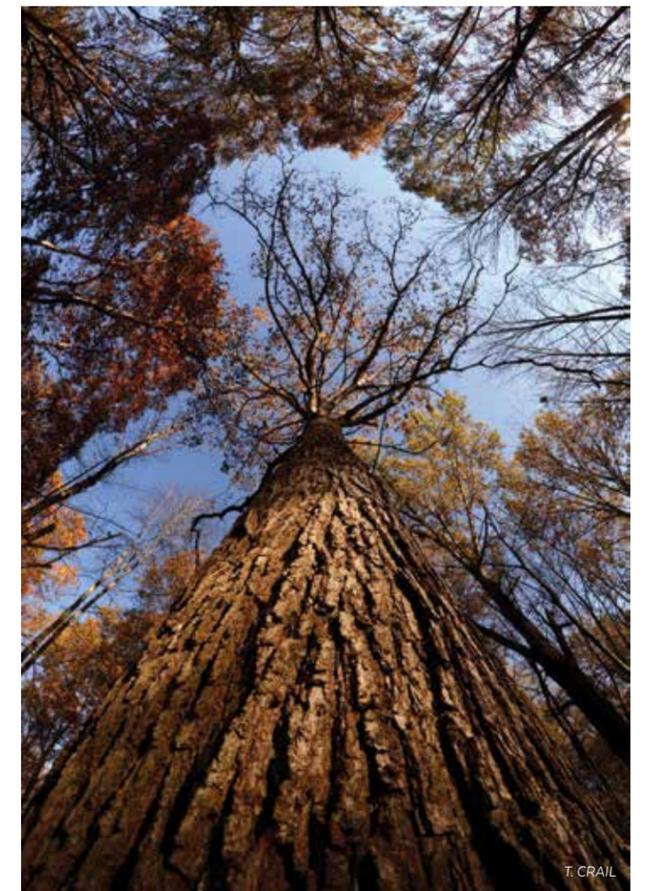
Only in the last three decades has the importance of fire and water to the Oak Openings been realized. Natural area agencies have been working to restore the landscape by selectively reintroducing these natural processes.

We're also now understanding the greater importance of prudent management in the Oak Openings as a critical component to protecting and replenishing the waters of the Maumee River and beyond, into Lake Erie. Preservation and management that benefits a private well in Swanton positively impacts our shared Lake Erie. Those shared benefits extend to such key concerns as ground water absorption, abatement of storm run-off, air quality, and carbon sequestration of wetlands, to name just a few.

Fortunately the land is resilient. We've learned that the Oak Openings responds well to prudent management. Good news for private landowners, too, is that the Oak Openings responds whether the management is on a large or small scale.

In a very real sense, everyone can be part of the fight to save the Oak Openings. So take a seat under a 400 year-old oak and contemplate your place in one of earth's rarest habitats.

Read on—this is our backyard.

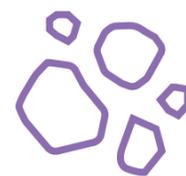


T. CRAIL

EXPLORE, LEARN, AND PLAY IN THE OAK OPENINGS

CHAPTER ONE
GEOLOGY
 OF THE OAK OPENINGS

BY TIMOTHY FISHER, Ph.D.



Much of the Oak Openings Region in northwest Ohio and southeast Michigan is former beach, reflecting higher lake levels in ancestral Lake Erie at the close of the last ice age.

The sand was reworked by the wind to form sand dunes over broad areas when water levels dropped. Also at about this time, rivers began to dig themselves into the landscape as glacial waters drained away.

The landforms representing the surface geology of the Oak Openings Region are subtle. Such subtly reflects past activity of glaciers and lake currents abrading away high points on the landscape and infilling low points. The unique plants and animals of the region reflect the area's sandy soils and adaption to these subtle differences in topography.

WESTERN WINDS
 PERPETUALLY SHIFT
 SAND DUNES ACROSS
 THE OAK OPENINGS
 LANDSCAPE

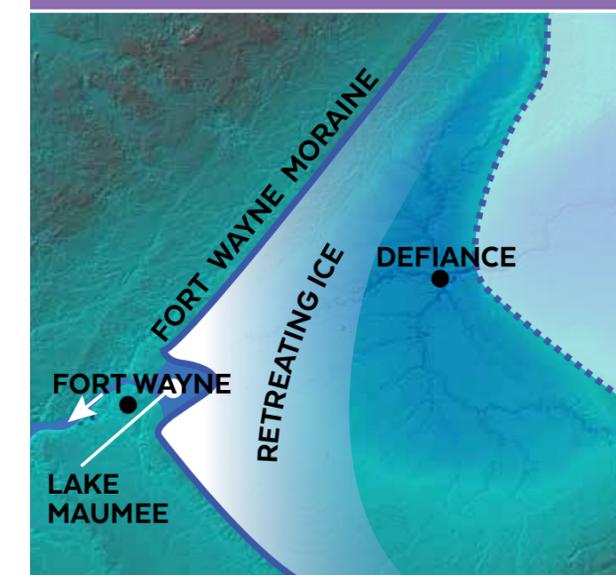
BLUE LUPINE IN SAND DUNES
 T. CRAIL

GLACIATION AND GLACIER LAKES

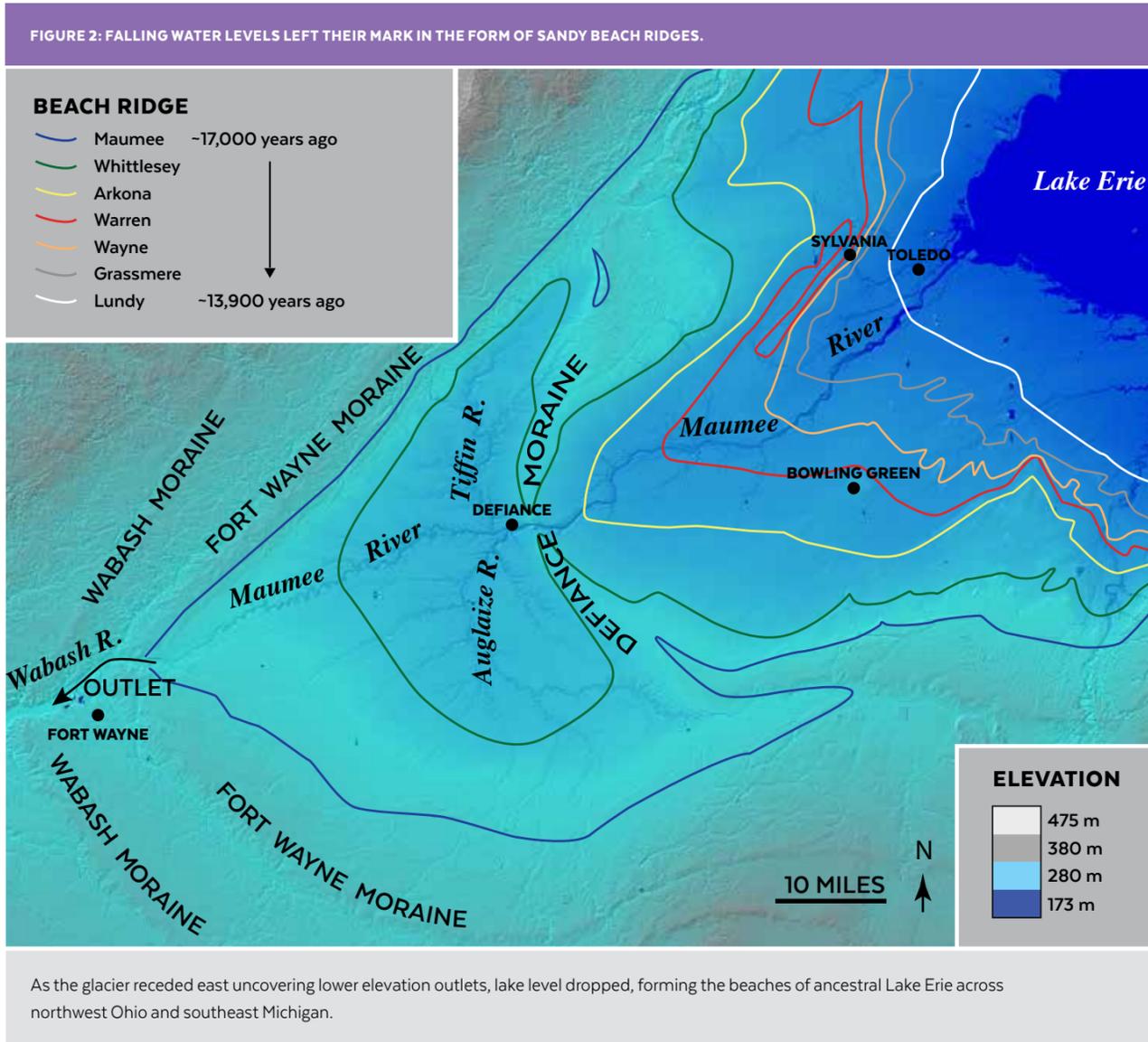
The last ice age to impact northwest Ohio and southeast Michigan was the Wisconsin glaciation, when ice advanced nearly as far south as Cincinnati. Passage of the glacier is recorded in the stony, clay-rich sediment called till that was deposited at the base of the glacier, and by striations—linear scratches and gouges—cut into bedrock by stones carried at the bed of the glacier. Striations can be observed in the upper parking lot of the Bluecreek Soccer Fields in Whitehouse, Ohio, and on bedrock at Fossil Park in Sylvania, Ohio.

Water of ancestral Lake Erie was trapped between higher ground on the west and the margin of the glacier retreating northeast within the Lake Erie basin (Fig. 1). Ancestral Lake Erie extended from the Niagara River in New York on the east to Fort Wayne, Indiana, on the west. Evidence of the former lake remains in its historic shorelines, which extend across Michigan, Ohio, Pennsylvania, New York and Ontario, (Fig. 2). One of these ancient shorelines, called the Warren Beach, forms an important sand ridge extending through the Oak Openings Region that formed about 14,000 years ago. It is important to note, however, that the Oak Opening Region is not just defined by the Warren Beach shoreline, but by wherever there is thick enough sand to maintain the hydrological properties required by the unique vegetation of the Oak Openings Region. The sand acts as a sponge, holding onto water where it can't infiltrate further downwards into the ground because the till or clay-rich lake sediment is impermeable. While the surface of the sand ridge and dunes may be dry, lower down the sand may be saturated with water, nourishing the wet prairies located in depressions between the ridges and dunes.

FIGURE 1: RECEDING GLACIERS PAUSED AT FORT WAYNE, INDIANA AND AGAIN AT DEFIANCE, OHIO



As the ice margin (blue line) of the Huron-Erie glacial lobe retreated east, Lake Maumee formed where water was trapped between the retreating ice and higher land to the west. Dashed line is where the ice paused during retreat to form the Defiance Moraine, and white arrow represents direction of water flow.

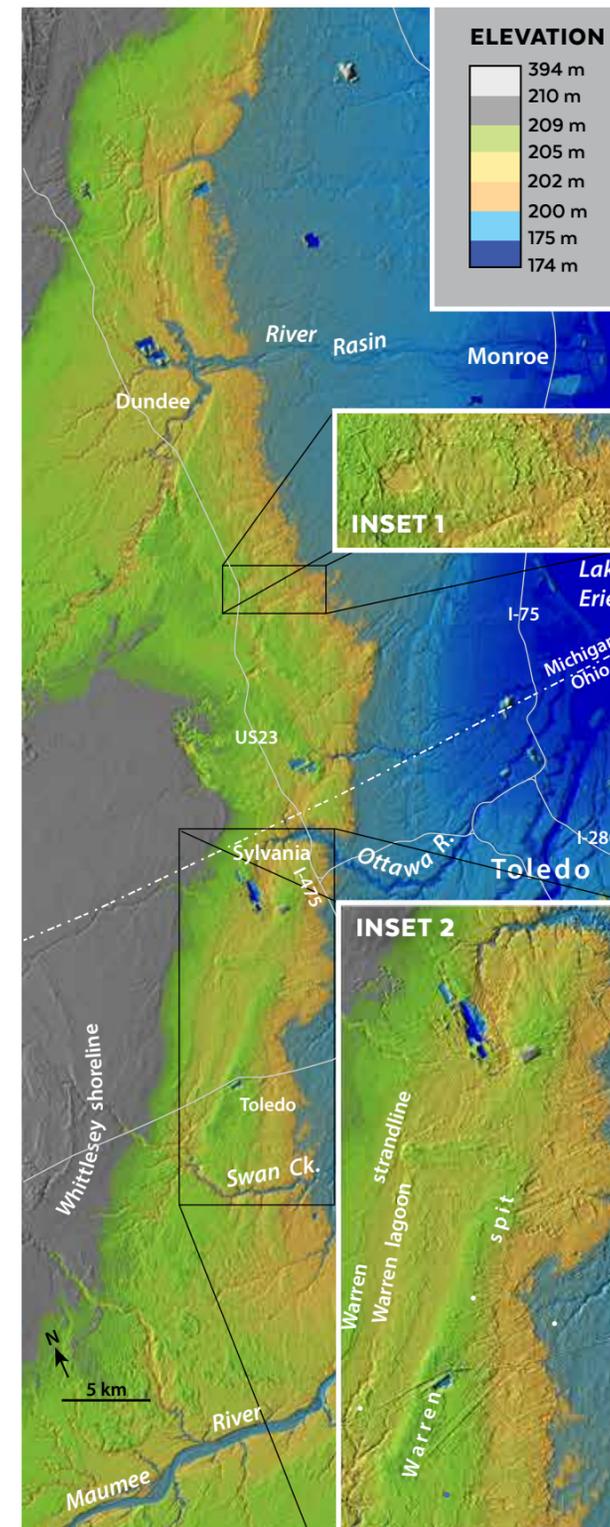


SAND DUNES

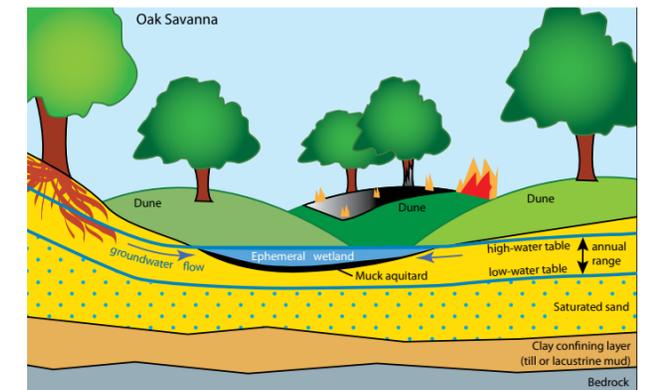
Scattered across northwest Ohio and concentrated in the Oak Openings Region are parabolic, or parabola-shaped, sand dunes that developed when the past climate was drier, cooler, and windier. The dunes are commonly only a few meters high and appear as low hills throughout the Oak Openings Region. The parabolic dunes all point to the east, recording winds from the west. The dunes are always to the east of the sources of sand, and dating of the sand dunes indicates that they were last active between 15,000 and 8,000 years ago. This tells us how long the soils and vegetation have been evolving. Because the dunes cannibalize the sand from older landforms, it is difficult to recognize some of the older landforms made of sand. In southeast Michigan, the Oak Openings Region is not clearly delineated by a topographic ridge as in Ohio. Instead it forms a broad plain of sand dunes with unrecognizable shoreline features that were likely the source of the sand. Since formation of these sand dunes, the landscape remained relatively unchanged.

THE FUTURE

Future geologic events in the Oak Openings Region are expected to be minimal. With ongoing global climate change and changes in land use, rivers will likely be further entrenched in place from spiky run-off events, and may shift in their channels due to higher-intensity precipitation events. Projections for the future generally call for warmer conditions, which could lead to more drought. Drought in the region could lead to more bare sand patches with some minor reactivation of small sand dunes, such as is happening at the Girdham Road dunes in the Oak Openings Preserve Metropark. These dunes are dry and exposed, shifting slowly east as winds from the west transport sand across their tops. Glaciation is not expected for a very long time, thus rising lake levels will not be a problem. Of more immediate concern though, is the falling ground water level due to ditching of fields, the drainage of wetlands, and possibly global climate change. There is a strong relationship between vegetation and the surface geology, and while the latter is subtle, its impact is significant.



Elevation of Oak Openings Region. Lying primarily between an elevation of 200–209 m (highlighted in yellow and green), the historic Warren and Wayne beaches contain sandy soils characteristic of the Oak Openings Region. **Inset 1** highlights the parabolic dunes; note how their ends are curved, pointing to the east as a result of prevailing westerly winds. **Inset 2** highlights Warren ridge, extending from Swan Creek to Sylvania.



OAK SAVANNAS

BY TODD CRAIL, Ph.D.

Oak savanna ecosystems are characterized by low densities of trees among grassland communities. The processes that create oak savanna are largely abiotic factors of geology, water and fire. In the Oak Openings, sand features such as dunes, swales and plains sit over dense clay material that confines groundwater from quickly dissipating.

As precipitation arrives, the surface of the ground water, called the water table, rises, saturating the sand layer, and then falls as water flows out of the system. In many places, the water table will rise high enough that it periodically sits above the surface, forming an ephemeral wetland. This annual process shapes oak savanna, as very few tree species are able to tolerate extreme wet followed by extreme dry.

Variance in soil organic material and water is the secret to the Oak Openings' diversity of plant species, as a wide array of soil conditions are created. As water flows from higher ground into lower areas, it carries organic material from the dunes into the wetlands. A muck soil layer, or aquitard, is created that prolongs the time water is present at the surface, but allows the wetland soil to eventually dry in a typical summer. Where dunes locally supply water, fern-dominated swales form; where regional features (e.g., Lake Warren barrier ridge) supply water, wet prairie community arises.

Fire is the polish on the system. It reduces organic material such as leaf litter through combustion and kills the tops of woody plants that contribute to the organic material. Without fire, organic material continues to accumulate, eventually homogenizing the wide variety of soil conditions found among this geologic context.

CHAPTER TWO

PLANT COMMUNITIES OF THE OAK OPENINGS

BY RICK GARDNER



Five of the six natural plant communities in the region are considered globally rare.

The Oak Openings' six primary natural plant communities are Black Oak/Lupine Barren, Mesic Sand Tallgrass Prairie, Midwest Sand Barren, Oak/Blueberry Forest, Great Lakes Pin Oak/Swamp White Oak Flatwoods and Twigrush Wet Prairie.

A plant community is an assemblage of species that interact with one another and their environment within a certain area. Environmental or abiotic factors such as climate, geology, hydrology, soils and topography are important in determining where plant communities occur.

Following are descriptions of natural communities characteristic of the Oak Openings. Several other communities, such as conifer forests, have been introduced by humans and are discussed briefly in other chapters.



FLOWERING SPURGE
BLACK OAK/LUPINE BARREN

BLACK OAK/ LUPINE BARREN

Black Oak/Lupine Barren is the classic "Oak Openings" community that historically covered about 45% of the region. This community is a savanna, where black oak and white oak are widely spaced (about 14 trees/hectare) and give the community a "park like" appearance. Open stands of these trees occur on the dry sand dunes. Sunlight reaches the surface, which allows for a rich herbaceous layer that includes little bluestem, Pennsylvania sedge, Junegrass, Canada frostweed, blue lupine, plains puccoon, western sunflower, butterfly milkweed, goats-rue, rough blazing star and flowering spurge. The shrub/scrub layer is sparse. Shrubs include New Jersey tea, pasture rose, sweet-fern and low bush blueberries. The high frequency of blue lupine provides habitat for the federally endangered Karner blue butterfly. This community is fire dependent, meaning for this community to sustain itself, periodic fires are needed to inhibit woody invasion and stimulate grass and forb growth. Kitty Todd Nature Preserve and Oak Openings Preserve Metropark of Lucas County, Ohio, have quality examples of this globally vulnerable community.



WHORLED LOOSESTRIFE
OAK/BLUEBERRY FOREST

OAK/BLUEBERRY FOREST

Oak/Blueberry Forest is a frequent community in the Oak Openings. Stands occur on dunes and are low in species diversity. Black oak and white oak are the dominant canopy trees. The canopy is nearly to completely closed, with filtered sunlight reaching the forest floor. Witch hazel, huckleberry, sassafras, pasture rose and low bush blueberries are frequent in the shrub layer. Pennsylvania sedge, large-leaved aster, wild sarsaparilla, bracken fern and whorled loosestrife are common species in the herbaceous layer. The detritus layer is often several inches thick. This community is more frequent today than it was historically due to fire suppression.

THE OAK OPENINGS
REGION CONTAINS
SOME OF THE RAREST
PLANT COMMUNITIES
IN THE WORLD

BLUE LUPINE
BLACK OAK/LUPINE BARREN
T. CRAIL



SHOWY GOLDENROD
MIDWEST SAND BARREN

MIDWEST SAND BARREN

Midwest Sand Barren is an open, dry habitat that is harsh—so harsh that trees are rare or absent. Bare sand is frequent and blowouts, or bowl-shaped areas of exposed sand, are not uncommon. The well-drained, sandy soils and open conditions make it very difficult for plants to survive. Many of the species growing in this habitat have adapted to the harsh conditions by covering leaves and stems with hairs to hold moisture and shade their surfaces. These desert-like conditions are ideal for the prickly pear cactus, the region's only native cactus. Grasses and sedges are the most common vegetation and include species such as purple three-awned grass, little bluestem, Junegrass, low sand sedge, slender umbrella-sedge, panic grasses, Greene's rush and Muhlenberg's sedge. Other forbs growing with prickly pear cactus include hairy pinweed, flowering spurge, rough blazing star, porcupine grass, dwarf dandelion, round-headed bush clover and gray goldenrod. Sand cherry is one of the few shrubs of this community. Fire is important in maintaining this community. Kitty Todd Nature Preserve and Oak Openings Preserve Metropark have excellent examples of this community.

MESIC SAND TALLGRASS PRAIRIE

Mesic Sand Tallgrass Prairie is globally vulnerable and is one of the rarest communities in the Oak Openings Region. It was the most common wetland community in the region, but because of development and fire suppression it is now reduced to small patches. Mesic Sand Tallgrass Prairie is seasonally flooded, holding water from late winter to mid-spring. This plant community occurs on sand flats between the sand dunes. Soils often have thick, dark surface horizons. Vegetation composition varies within the community due to slight changes in soil pH and moisture. Trees are scarce, but shrubs can be locally common. Shrubs include prairie willow, meadow-sweet, steeplebush, dogwoods and black chokeberry. Common grasses include big bluestem, little bluestem and Indian grass. Forbs include dense blazing star, colic-root, tall coreopsis, showy tick-trefoil, yellow wild indigo, Canada goldenrod, showy goldenrod and soapwort gentian. Species often growing in bogs, such as spatulate-leaved sundew, twisted yellow-eyed-grass, grass-pink orchid, rose pogonia orchid and northern bog clubmoss, occur within the low sand flats of the community where pH is between 4 and 5. Kitty Todd Nature Preserve has quality examples of this community.



BLUE VERVAIN
MESIC SAND TALLGRASS PRAIRIE



TWIGRUSH
TWIGRUSH WET PRAIRIE

TWIGRUSH WET PRAIRIE

Twigrush Wet Prairie is unique to the Great Lakes. In Ohio, it is only known from the Oak Openings Region. In Michigan, this community may be called Lakeplain Wet Prairie, and is limited to lakeshore counties near Lake Erie and Saginaw Bay. Twigrush Wet Prairies once covered miles of lowlands before the construction of ditches that lowered the water table, hastening woody invasion. Today, small remnants are seasonally flooded with water levels reaching two or more feet deep from late fall to late spring. The seasonal ponding of water slows tree and shrub invasion of the prairie. Grasses and sedges are the dominant vegetation. Twigrush and wiregrass, also called slender sedge, are the two dominant species. Sartwell's sedge, tussock sedge, northern reedgrass, yellow-seeded spike-rush, Canada bluejoint and brown bog sedge are locally common in this type of prairie. Big bluestem, Indian grass and switchgrass may also occur. Forbs include dense blazing star, Great Lakes goldenrod, tall ironweed, cowbane, spiked lobelia, Riddell's goldenrod, northern blue flag iris, fringed gentian and Virginia mountain-mint. Shrubs such as Kalm's St. John's-wort, beaked willow and slender willow are scattered throughout the prairie. The wettest areas are species-poor and contain over-aquatic species such as false mermaidweed, grass-leaved arrowhead and pondweeds. Periodic fires are also important in maintaining Twigrush Wet Prairies. Irwin Prairie State Nature Preserve in Lucas County, Ohio, is a great example of this community.

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS

Great Lakes Pin Oak/Swamp White Oak Flatwoods is a seasonally flooded, wet forest community. The tree canopy is dominated by pin oak and swamp white oak. The abundance of the herbaceous layer varies depending on water levels and the amount of sunlight. The most frequent plants in this layer include Canada bluejoint, common lake sedge, cinnamon fern, royal fern and fowl manna-grass. The diversity of this layer increases with the amount of sunlight reaching the ground. Shrubs are frequent and can form dense thickets. Shrubs include winterberry, swamp rose, spicebush, dogwoods and black chokeberry. Typically there is a layer of muck over the sand. This community was common and today it is the most frequent wetland community in the Oak Openings. The Mesic Sand Tallgrass Prairies and Twigrush Wet Prairies succeed into this community where fire is suppressed and water levels are reduced.



CARDINAL FLOWER
GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS



G. SYDLOWSKI

BLACK OAK/LUPINE BARREN



A. WEBER

OAK/BLUEBERRY FOREST



J. THIEME

MIDWEST SAND BARREN



TOLEDO METROPARKS

MESIC SAND TALLGRASS PRAIRIE



J. THIEME

TWIGRUSH WET PRAIRIE



J. THIEME

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS



T. CRAIL

BLUE LUPINE



J. THIEME

BLACK OAK



J. THIEME

LITTLE BLUESTEM



J. THIEME

BIG BLUESTEM



R. YOUNG

FRINGED GENTIAN



R. YOUNG

REDOSIER DOGWOOD



T. CRAIL

BUTTERFLY MILKWEED



R. YOUNG

WILD COLUMBINE



A. COLE

PRICKLY PEAR



R. YOUNG

SHOWY TICK-TREFOIL



R. YOUNG

TALL IRONWEED



T. CRAIL

SWAMP ROSE



R. YOUNG

NEW JERSEY TEA



A. COLE

WITCH HAZEL



J. THIEME

WESTERN SUNFLOWER



J. THIEME

YELLOW WILD INDIGO



T. CRAIL

GRASS-LEAVED ARROWHEAD



T. CRAIL

NORTHERN BLUE FLAG IRIS



A. COLE

PLAINS PUCCOON



J. THIEME

LOW BUSH BLUEBERRY



A. COLE

DOTTED HORSEMINT



T. CRAIL

COLIC ROOT



C. HELZER

VIRGINIA MOUNTAIN MINT

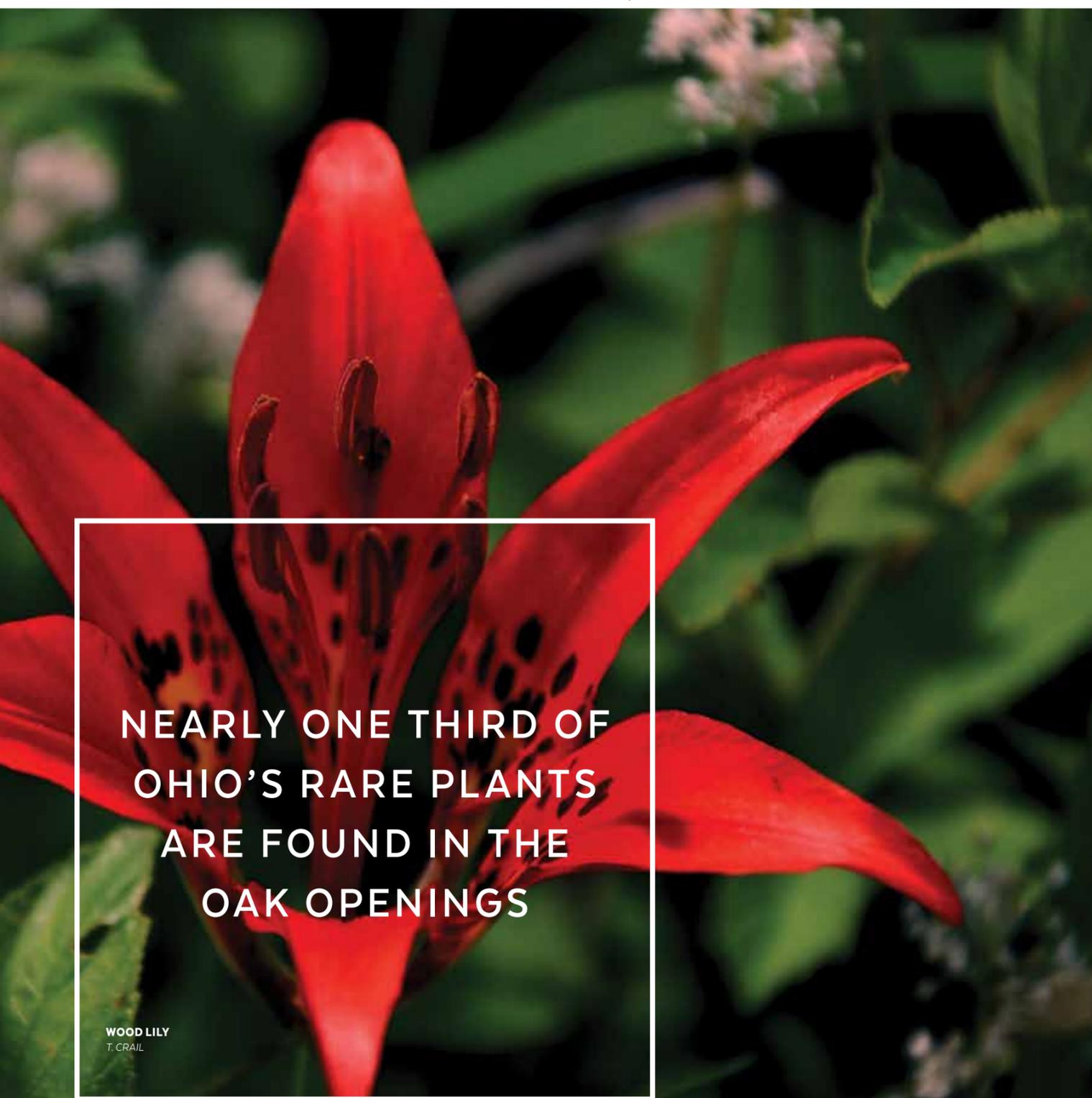


A. COLE

CINNAMON FERN

CHAPTER THREE
RARE PLANTS
 OF THE OAK OPENINGS

BY TIMOTHY L. WALTERS, Ph.D.



NEARLY ONE THIRD OF
 OHIO'S RARE PLANTS
 ARE FOUND IN THE
 OAK OPENINGS

WOOD LILY
 T. CRAIL



Since the earliest naturalist explored this area, the Oak Openings Region has been famous for the diversity and rarity of its local plant life.

The region has gained global attention, especially by The Nature Conservancy, as a matrix of rare global communities. The basis of this attention is the rare and unique flora of the Oak Openings. Since the first rare plant list was created in early 1980, Lucas County has led the state with more rare plant species than any other county in Ohio. This is primarily because of the presence of the Oak Openings Region and, to a lesser extent, the Lake Erie marshes.



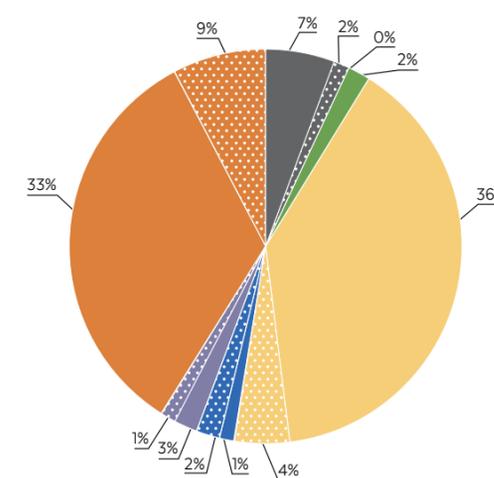
M. GRIGORE

FIREWEED
 MESIC SAND TALLGRASS PRAIRIE

In his 1928 book "The Flora of the Oak Openings," Edwin L. Moseley introduced the botanical community to the Oak Openings. He listed 715 species that he had found in this region and told of the uniqueness of the inland sand dunes and wet meadows. Since Moseley's book was written, approximately 1,200 vascular plant species have been found in the Oak Openings. Of these, 940 are native to the region, and 157 are listed on Ohio's 2014-2015 Rare Species List. Unfortunately, 28 rare species are now extirpated (locally extinct) from the region. Almost half of those are from the various types of open wetlands that used to be so prevalent in this area, but are now extremely rare. This leaves 129 Oak Openings rare plant species that are currently listed as endangered, threatened or potentially threatened in Ohio: the highest collection of rare species anywhere in the state.

The pie chart below shows where Ohio's 157 rare species could be found. Species that can grow in several communities are listed only once in the community where they are most commonly found. Extirpated species are illustrated with dotted pattern. The chart illustrates that 82% of the state-listed species in the Oak Openings Region either occur or occurred in the dry prairie/savanna areas or the wet meadow/wet prairie communities.

OHIO'S RARE SPECIES BY NATURAL COMMUNITY TYPE
 Extirpated (locally extinct) species are indicated by dotted pattern



Dry Forest
 Evergreen Forest
 Dry Prairie/Barren
 Open Water
 Wet Forest
 Wet Prairie

The wet meadows and wetlands include communities such as Twigrush Wet Prairie, grass-sedge meadow and the acid and alkaline wet sand prairies. Because these communities are so dependent on the level of the water table, even slight changes could cause the loss of much of the flora. Not only are 33% of the rare species found in Ohio's communities, but 9% of the wet prairie species are no longer found in the Oak Openings Region. Some of the rarest species found in these wet to seasonally wet unshaded communities include grass-leaved arrowhead, little yellow sedge, Long's sedge, Canadian St. John's-wort, lance-leaved violet, Virginia meadow beauty, several gentians, orchids, nut-rushes and foxgloves. Many of the most beautiful species like the fringed gentians, grass-pink and orange fringed orchids are found in these communities. Species that have been lost from this community are the showy and white lady's-slipper orchids and the eastern prairie fringed orchid.



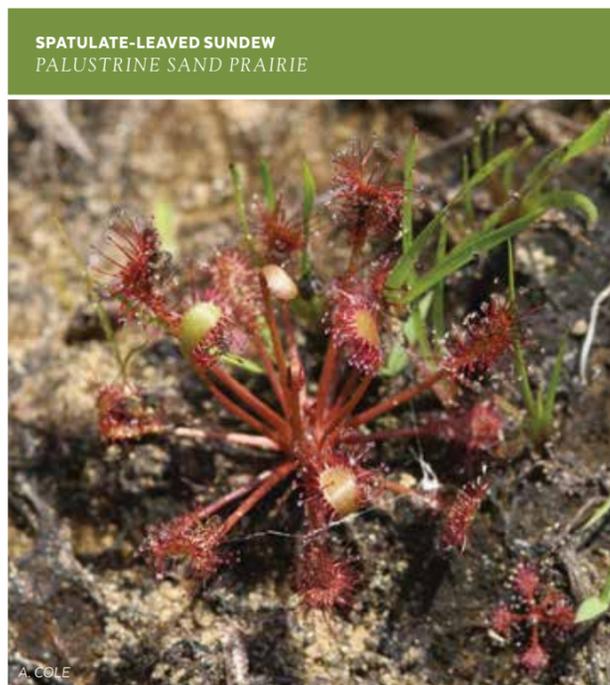
CALL TO ACTION



Participate in prescribed fire to help promote the conditions that these rare plants need to survive. Call 419-867-1521 to be directed to a volunteer prescribed fire program near you.



Volunteer with an agency listed in the Appendix to learn about native plants, preserving local genotypes, and collecting seeds for habitat restoration.



SPATULATE-LEAVED SUNDEW
PALUSTRINE SAND PRAIRIE

The dry prairies and savannas include communities such as Midwest Sand Barrens, Black Oak/Lupine Barrens, Mesic Sand Tallgrass Prairie and sand prairie. Typical rare species of these communities are the blue lupine, plains puccoon, western sunflower, sweet-fern, dotted horsemint and blunt-leaved milkweed. When compared to the 2008 rare plant list, five of the six new species added to the 2014 list typically were found in these communities. The newly listed species include forked triple-awned grass (first collected in 2006), bushy horseweed (first collected in 2010), low serviceberry (new to the state in 2014), tower mustard and showy goldenrod. The latter two species have always been known to the region, but have recently declined.

A very specific community that was included in the wet prairie category, but sometimes is included within the dry prairie is the palustrine sand plain. This micro-community is a seasonally saturated, mineral sand, water table-driven community. It can be described as an area too wet for most perennial upland species and too dry for most perennial wetland species. These areas are often partially human-induced (drying pond edges, borrow areas and tire ruts) where the dry sand has been excavated to the level of ground water interaction. Species of this specialized community are the northern appressed club-moss, both dwarf bulrushes, spatulate-leaved sundew, narrow-headed panic grass and beak-rush. The rarest of these, Drummond's dwarf bulrush, had not been seen for almost 20 years before re-emerging in 2013.

Oak/Blueberry Forest rarities include cow-wheat, spotted coral-root, fringed milkwort and round-leaved dogwood. The moist to wet forests, such as Great Lakes Pin Oak/Swamp White Oak Flatwoods, may contain the long-bracted green orchid, least grape fern and purple fringed orchid. Seven percent of the rare plants of the Oak Openings have been found in the dry Oak/Blueberry Forest, while another three percent have been in the wet Pin Oak/Swamp White Oak forest areas.

Pine woods and ponds, although not part of the original Oak Openings landscape, also support rare plant species. Marsh cinquefoil and a couple of pondweeds have been found in a few human-created ponds or deeper water areas of marshes. Also, the common oak fern, shinleaf and very rare one-flowered wintergreen are all found in the pine-dominated forests. Due to the management of this non-native community, none of these species still reside in the region.

The most evident trend from the above comparisons is the importance of the dry prairie and wet prairie communities for the preservation of the high diversity of plants that we enjoy in the Oak Openings. Today, members of the Green Ribbon Initiative, as well as private individuals, are restoring their lands to a more natural state. Part of this restoration effort includes the reintroduction of native plants that helps to re-create the diversity of these areas.

Oak Openings native plants have been adapting to the conditions of northwestern Ohio and southeast Michigan for close to 10,000 years. These adaptations are most notable with the highly drought-tolerant species such as blue lupine, prairie dock, little bluestem grass and prickly pear cactus. Root systems of prairie plants can reach up to ten feet deep. The prickly pear has large fleshy stems that conserve water. Other species such as black-eyed Susan and western sunflower have coarse hairs that insulate the plant from the sun, helping to prevent excess drying. Whatever the case, native plants have developed a strategy for survival in this area that is unmatched by horticultural hybrid species.

E. L. Moseley wrote after listing over 100 plants, that he felt there were more species in the Oak Openings than all the remainder of the state of Ohio: "When we consider that the total area of the Openings is not 1/3 as great as that of an average Ohio county, it seems rather remarkable that more than half of all the plants of certain kinds to be found in the state live in this small area." It is up to us to keep this statement true. ✨



SHOWY LADY'S-SLIPPER
TWIGRUSH WET PRAIRIE



WILD BLUE LUPINE

BY TIMOTHY L. WALTERS, Ph.D.

The blue lupine is one of the most recognizable species of the Oak Openings flora. Its papilionaceous (butterfly-shaped) blue flowers and palmately compound leaves are easily identified. The lupine is a 10- to 30-inch high perennial. Flowers bloom in May and June and are 5 to 10 inches above the leaves. By early July the fruits are ripe and are spread by seed pods that twist and scatter the seeds for several meters. Lupine can be found from southern Maine to Florida, west to Minnesota and Indiana. In the Oak Openings, lupine is typically found in dry, open woods and clearings in well-drained soil; where you find it, you find oak savanna, often as Black Oak/Lupine Barrens. Lupine is also a keystone species for several endangered species of butterflies—they cannot survive without this plant. These butterflies include the federally endangered Karner blue butterfly, and the Persius dusky wing and frosted elfin butterflies, which are endangered in Ohio and threatened in Michigan.

One of our earliest naturalists, Edwin Moseley, wrote in his 1928 publication: "On May 28, 1927 we rode thru this region southwest of Neapolis, traversing miles of road bordered by lupine and prairie phlox, which were also abundant along the railroad and in other places, more than I had ever seen before, probably millions of blossoms. The next day we rode for miles thru another part of the Openings where we saw very few of these conspicuous blossoms. The contrast was so marked that I marveled at it, but could not, at the time, explain it. I now think that the difference in flora was due to the difference in the drainage of the two regions and the fact that the water-table was well below the surface in the region traversed on the first day. Over much of the Oak Openings the water table is less than three feet below the surface."

He later listed lupine as one of the species that he felt may have more individuals living in the Oak Openings than in all the remainder of the state of Ohio. Now these large patches of lupine are restricted to protected areas, principally at The Nature Conservancy's Kitty Todd Nature Preserve, the Metroparks of the Toledo Area's Oak Openings Preserve Metropark and Michigan DNR's Petersburg State Game Area.



G. SYDLOWSKI

BLACK OAK/LUPINE BARREN



A. WEBER

OAK/BLUEBERRY FOREST



J. THIEME

MIDWEST SAND BARREN



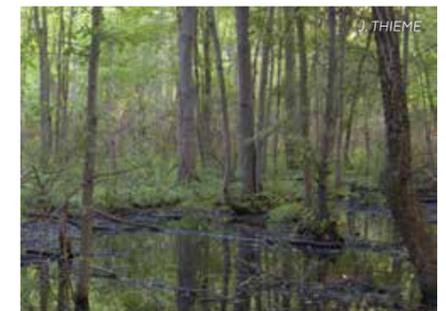
TOLEDO METROPARKS

MESIC SAND TALLGRASS PRAIRIE



J. THIEME

TWIGRUSH WET PRAIRIE



J. THIEME

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS



T. CRAIL

KALM'S ST. JOHNS-WORT



R. JACKSY

FRINGED MILKWORT



A. COLE

CANADA FROSTWEED



R. YOUNG

PRAIRIE THIMBLEWEED



A. COLE

ATLANTIC BLUE-EYED GRASS



T. CRAIL

LONG-BRACTED GREEN ORCHID



T. CRAIL

CROSS-LEAVED MILKWORT



D. IVERSON

SPOTTED CORAL-ROOT



T. CRAIL

SCALY BLAZING STAR



A. WEBER

RATTLESNAKE MASTER



T. CRAIL

LANCE-LEAVED VIOLET



T. CRAIL

YELLOW LADY'S-SLIPPER



T. KEMMERER

BLUNT-LEAVED MILKWEEED



M. GRIGORE

SWEET-FERN



T. CRAIL

DWARF DANDELION



R. YOUNG

OHIO SPIDERWORT



T. CRAIL

ORANGE FRINGED ORCHID



T. WALTERS

BACKWARD SEDGE



G. SYDLOWSKI

BIRDSFOOT VIOLET



T. WALTERS

SPRENGEL'S SEDGE



R. YOUNG

ROUND-HEADED BUSH CLOVER



T. CRAIL

TWISTED YELLOW-EYED-GRASS



T. CRAIL

GRASS-PINK ORCHID



T. CRAIL

PURPLE FRINGED ORCHID

CHAPTER FOUR
BIRDS
 OF THE OAK OPENINGS

BY ELLIOT J. TRAMER, Ph.D.



THE OAK OPENINGS
 IS HOME TO BIRDS
 TYPICAL OF
 NORTHERN FORESTS,
 WESTERN PLAINS,
 AND SOUTHERN
 HARDWOODS

RED-HEADED WOODPECKER
 OAK/BLUEBERRY FOREST
 B. ZWIEBEL



The Oak Openings
 is a prime destination
 for bird watchers,
 especially during the
 spring and summer.

The unusually diverse array of plant communities attracts a wide variety of bird species to the Oak Openings, and a remarkable feature of the area's bird life is the occurrence in summer of species many miles from their normal geographic limits.



GOLDEN-WINGED WARBLER
 SHRUBLANDS



BLUE GROSBEAK
 BLACK OAK/LUPINE BARREN

Here are some examples:

- **Lark sparrow:** Although pairs show up occasionally elsewhere in Ohio, there are no other established populations of this western prairie bird in Ohio or Michigan.
- **Golden-crowned kinglet:** Their normal breeding range extends northward from central lower Michigan, but several times during the past 20 years, they have nested in conifer plantings near Oak Openings Preserve Metropark.
- **Summer tanager:** Several pairs nest each year in the Oak Openings; their normal summer range extends from southern Ohio southward.
- **Blue grosbeak:** Another southern species, these are now a regular summer resident in Oak Openings Preserve Metropark and have also been recorded at Kitty Todd Nature Preserve and Whiteford Township Park.
- **Red-breasted nuthatches, pine warblers, and blue-headed vireos:** A few pairs nest annually in conifer plantings in the Openings. It is at least 100 miles to the next established breeding populations of these species.

A glance at a satellite photograph of the Oak Openings reveals why this unique and diverse subset of birds nests here: even from space, the Oak Openings is clearly distinguishable as a green corridor surrounded by an extensive urban/agricultural landscape with far less tree cover. A partial list of additional birds dependent on the habitats in the Openings includes barred owl, broad-winged hawk, Acadian flycatcher, white-eyed vireo, veery, wood thrush, ovenbird, blue-winged warbler, hooded warbler, brown thrasher, yellow-breasted chat, rose-breasted grosbeak and eastern towhee. For all these species, the Oak Openings is their stronghold, and their continued survival as breeders in our region may well depend on the plant cover the Openings provides.

PRIMARY HABITATS

Black Oak/Lupine Barren: Birds of oak savannas appear to be on the increase since conservation organizations have focused their efforts on restoring this habitat. Signature birds of this open woodland habitat include red-headed woodpecker, eastern bluebird and summer tanager. The red-headed woodpecker and eastern bluebird nest in cavities of the sparsely scattered trees of this habitat. Eastern wood-pewees, great crested flycatchers, and yellow-throated vireos also thrive in this habitat.



CALL TO ACTION



Leave unmowed areas with native plant cover; mowed grass provides no cover and little food for birds.



Plant shrubs, such as dogwoods and serviceberry, to provide shelter for young birds and food for fall migrants.



Add a bluebird nest box to open yards over an acre in size. Install them 3-6' above the ground with a 1.5" diameter entry hold.



Add a bird feeder to your yard to increase your enjoyment of these creatures, but make sure it is not accessible to nest predators such as raccoons.



Organized and hosted by Black Swamp Bird Observatory (Oak Harbor, Ohio), The Biggest Week In American Birding is a 10-day festival featuring some of the most sensational birding North America has to offer. Held in May, and timed to coincide with the peak of songbird migration through the area, the festival helps attract more than 75,000 visitors to northwest Ohio each spring, generating an annual economic impact of more than \$37 million.

The festival offers workshops, keynote presentations, a variety of vendors, evening socials, and free workshops on how to get started in birding. Often selling out within minutes after registration opens, the most popular festival activities are the field trips to various birding hotspots. Many birding areas are featured; however, Oak Openings is an event highlight. Daily field trips share this unique ecosystem and the birds mentioned in this chapter with festival participants.



Scan this QR code to learn more about these events

ROSE-BREASTED GROSBEAK OAK/BUEBERRY FOREST



Oak/Blueberry Forest: Deciduous forests provide essential habitat for many of our threatened and declining tropical migrant songbirds. Typical birds include wild turkey; red-shouldered and broad-winged hawks; barred owl; black-billed and yellow-billed cuckoos; pileated, hairy, and red-bellied woodpeckers; great crested flycatchers; red-eyed vireos; veery; wood thrush; ovenbird; hooded warblers and scarlet tanager. However, drier, more open stands of this habitat type have relatively lower bird diversity.

Midwest Sand Barren: This open habitat, maintained by controlled burns, selective herbicide application and cutting of invading woody vegetation, is essential to the continued presence of the lark sparrow. Where sufficient low shrub cover exists, sand barrens are also inhabited by field sparrows, eastern towhees, and (rarely) prairie warblers.

Mesic Sand Tallgrass Prairie: Historically, tallgrass prairie extended for miles through the Oak Openings, but now heavy fragmentation renders remaining patches too small for many grassland bird species. Although the Henslow's sparrow, dickcissel and bobolink were once widespread, they are now only found in a few of the largest remaining patches. In general, tall dense stands of grass contain relatively low abundance and diversity of birds in summer; they present difficulties for nest placement and mobility. Tallgrass habitat for birds may be enhanced by creating a few openings to increase structural diversity and adding limited shrub cover to act as perches for territory displays and predator surveillance.

Twigrush Wet Prairie: In earlier times, the area between Irwin and Schwamberger Roads in Swanton, OH, was especially wet, and bird surveys by John Stophlet in the early 1950's suggest that many wetland species nested there at least into the middle of the 20th century. Birds formerly present in the wet prairies included northern harrier, least and American bitterns, sora, king and Virginia rails, common gallinule, American woodcock, Wilson's snipe, willow flycatcher, sedge wren, common yellowthroat and swamp sparrow. Although sora and Virginia rails and snipe may nest in exceptionally wet years, only the woodcock, flycatcher, yellowthroat, swamp sparrow, and red-winged blackbirds remain as regular summer residents.

Great Lakes Pin Oak/Swamp White Oak Flatwoods: Where sufficient undergrowth exists, this moist forest type can support many of the neotropical migrant species listed above under Oak/Blueberry forest.

ADDITIONAL HABITATS

Although the habitats below are not the dominant Oak Openings communities, they are very important for the continued welfare of many bird species that depend on them.

Shortgrass meadows and fallow fields: Populations of grassland birds are especially fragile in the Oak Openings, since very few large expanses of grassy meadow exist. Most of the fields extensive enough to provide habitat for grassland birds are in or around airport properties. Typical birds are savannah and grasshopper sparrows, red-winged blackbird, eastern meadowlark, and (occasionally) Henslow's sparrow and dickcissel. Three other species, sedge wren, upland sandpiper and bobolink, no longer nest in the Oak Openings. Some summer records of the sedge wren at Kitty Todd Nature Preserve in the 1990's provide hope that this species might return if more habitat were provided.

Shrublands: This habitat invades when farmland is abandoned, or when prairies and meadows are not maintained by fire and other disturbances. Shrublands often get little love since they tend to be invaded by aggressive non-native species such as buckthorn, multiflora rose and autumn olive. But with management, native plants such as gray dogwood, American hazelnut, New Jersey tea and young oak trees can also provide shrubland habitat. Shrublands are crucial for the continued survival of some declining species, including white-eyed vireo, eastern towhee, brown thrasher, blue-winged and chestnut-sided warblers and yellow-breasted chat.

Conifer plantings: Conifers are not native to this area, but are essential for the continued presence of blue-headed vireo, red-breasted nuthatch, and pine warbler. The occasional local nestings of pine siskins and golden-crowned kinglets are also entirely conifer-dependent. The sharp-shinned hawk, a rare summer resident, often chooses a dense, secluded conifer stand for nesting. Dense conifers are also used for daytime roosting by owls.

Floodplain forests: Extensive floodplains exist along Swan Creek, Ottawa and Huron Rivers, and River Raisin, four watersheds draining the Oak Openings. Dominated by silver maples, eastern cottonwoods, sycamores and (formerly) American elms and ash trees, these tall-canopied forests are among the most bird-diverse vegetation types in the region. Raptors, cuckoos, woodpeckers and a wide variety of songbirds make their homes there. In Ohio's Oak Openings, the regionally rare yellow-throated warbler nests exclusively in tall sycamores along these watercourses.



AMERICAN WOODCOCK
TWIGRUSH WET PRAIRIE

RED-BREASTED NUTHATCH CONIFER



Recent efforts by Green Ribbon Initiative partners to restore some of the plant communities on their landholdings have been beneficial to birds of dry prairie and oak savanna habitats. Lark sparrows, eastern bluebirds, and red-headed woodpeckers have responded especially well to these enhancements. Woodpeckers have also responded favorably to a chance event, the tornado of June 5, 2010, which cut a swath across the Swan Creek valley in Oak Openings Preserve Metropark, leaving a forest of dead snags in its wake. Wetlands and extensive grassy meadows are the two habitats in shortest supply, making birds of these communities most critically endangered locally.

Residents of the area should watch the sky from mid-September through early November, because the Oak Openings is a major flyway for birds of prey migrating southward. Mid-September is the peak migration time for broad-winged hawks; on fair weather days hundreds or even thousands may pass overhead. Other raptors that pass over the Oak Openings each fall include turkey vultures; sharp-shinned, Cooper's, red-shouldered and red-tailed hawks; northern harriers; ospreys; bald and golden eagles and three species of falcons.

Because this article has focused on "special" birds of the Oak Openings, little mention has been made of some of the commonest species in the area. Widespread species such as red-bellied woodpecker; eastern kingbird; red-eyed vireo; black-capped chickadee; tufted titmouse; white-breasted nuthatch; gray catbird; field, chipping and song sparrows; house and Carolina wrens; indigo bunting; Baltimore oriole and American goldfinch are especially abundant in the Oak Openings and can be located there with relative ease. 



G. SYDLOWSKI

BLACK OAK/LUPINE BARREN



A. WEBER

OAK/BLUEBERRY FOREST



J. THIEME

MIDWEST SAND BARREN



TOLEDO METROPARKS

MESIC SAND TALLGRASS PRAIRIE



J. THIEME

TWIGRUSH WET PRAIRIE



J. THIEME

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS



B. ZWIEBEL

EASTERN BLUEBIRD



B. ZWIEBEL

HAIRY WOODPECKER



B. ZWIEBEL

FIELD SPARROW



T. MURRAY

EASTERN MEADOWLARK



B. ZWIEBEL

RED-WINGED BLACKBIRD



B. ZWIEBEL

RED-EYED VIREO



B. ZWIEBEL

GREAT CRESTED FLYCATCHER



A. COLE

SCARLET Tanager



B. ZWIEBEL

EASTERN TOWHEE



B. ZWIEBEL

DICKCISSEL



B. ZWIEBEL

COMMON YELLOWTHROAT



B. ZWIEBEL

RED-BELLIED WOODPECKER



T. ANDERSON

YELLOW-THROATED VIREO



T. ANDERSON

WOOD THRUSH



B. ZWIEBEL

LARK SPARROW



B. ZWIEBEL

HENSLOW'S SPARROW



B. ZWIEBEL

WILLOW FLYCATCHER



T. ANDERSON

RED-SHOULDERED HAWK



B. ZWIEBEL

SUMMER Tanager



B. ZWIEBEL

HOODED WARBLER



B. ZWIEBEL

PRAIRIE WARBLER



B. ZWIEBEL

BOBOLINK



B. ZWIEBEL

SWAMP SPARROW



B. ZWIEBEL

BARRED OWL

CHAPTER FIVE

MAMMALS

OF THE OAK OPENINGS

BY BOB JACKSY

WITH TERRITORY SIZES
EXCEEDING 1,000
ACRES, AMERICAN
BADGERS DEPEND ON
LARGE PROTECTED OAK
OPENINGS PRAIRIES

AMERICAN BADGER
P. BERQUIST



The mammals of the Oak Openings Region comprise some of the most obvious and sought-out animals such as white-tailed deer, to the most common, yet seldom-seen creatures, like white-footed mice.

Mammals are a class of animals that have backbones (they are vertebrates), are live born (placental), have hair and as youngsters receive their nourishment from milk that is provided by their mother.

They exploit a variety of den sites, from burrows underground and the hollows of decaying trees, to engineering their dwellings from leaves and sticks. This fascinating group of animals fills many niches, such as scavengers, predators and seed dispersers.



WOODCHUCK

In Ohio and Michigan, American badgers are one of the most exciting members of the weasel family. They are a grassland predator that needs loosely-packed soil in which to easily dig. As carnivores they will eat rodents, snakes, turtles, amphibians and sometimes even insects. Equipped with a dirt-shedding pelt, an extra protective eyelid and very long claws on their forelimbs for digging, badgers are dialed-in for an underground lifestyle. This suits them well, as their most important prey in the Oak Openings Region are woodchucks. Not only do they eat them, but they also frequently take over their dens afterwards. But badgers have no trouble excavating their own burrows, which can be up to 30 feet long. They are famous for being able to dig so quickly that it almost seems as if they disappear underground!

Woodchucks, often called groundhogs, are the largest members of the squirrel family in our region and usually live where woodland meets grassland. They excavate underground dens that can reach 30 feet in length and are true vegetarians, consuming green plant material and seeds. Being true hibernators, they spend several months in their dens each winter. And as noted above, they are often the main course for American badgers!



EASTERN MOLE

Moles are dwellers of the underworld. Throughout all the sandy soiled Oak Openings' habitats, they make their presence known by the lines of raised soil they leave wherever they tunnel. This churning of the soil is important to the ecosystem, as it brings forth seeds that were too deeply buried to germinate and loosens the ground's surface so that new seeds are more easily received. The most common and largest of the moles is the eastern mole. Moles are extremely muscular, hyper-metabolic creatures and have eyelids that have grown shut over their eyeballs to keep out dirt. Moles feel and smell their way through the soil and leave behind a lattice of tunnels while they forage for the invertebrate animals on which they depend. These tunnels are also important "subway systems" for many other creatures such as blue racer snakes, mice and shrews.

WHITE-FOOTED MOUSE



R. JACKSY

The most numerous mouse species in the region is the white-footed mouse. These beautiful rodents of the Black Oak/Lupine Barrens and Oak/Blueberry Forest perform several roles, including dispersing seed, consuming insects and culling woody plants by girdling with their constantly growing four front teeth. These teeth are called incisors, and are what define rodents. Mice will often den in the tunnels created by the roots of trees that have rotted, as well as in the tree cavity itself. Females mark their territories with urine, and the size of these areas varies in relation to the amount of food that is available. Mice are primarily nocturnal and important in the food web; they often become meals for owls, fox, coyotes and badgers.

Squirrels are another group of rodents. In Oak/Blueberry Forest, southern flying squirrels are often the most common, yet seldom-seen of the squirrel species. They are exclusively nocturnal and consume and hoard acorns as well as other forest fruits. They eagerly eat insects and spiders, too. Denning in tree hollows, they frequently use woodpecker excavations. Flying squirrels do not really fly, but silently glide from tree to tree using flaps of skin that stretch from their forelimbs to their hind limbs, and their tail helps them to steer. This mode of transportation enables them to travel in stealth mode to help them evade many nighttime predators such as barred owls and great horned owls. Fox squirrels inhabit Black Oak/Lupine Barrens and Oak/Blueberry Forest and often construct their dwellings, called drays, out of oak leaves and small twigs. They have a reddish-brown pelage, are active in the daytime and eat seeds and nuts, but have occasionally been observed eating carrion. While foraging they have to be alert to predators, especially the red-tailed hawk. Another squirrel of the area, the red squirrel, specializes in eating seeds from pine cones, and therefore is typically associated with conifer forests of northern latitudes or high elevations. However, this small squirrel also occurs in the Oak Openings, both within planted stands of conifers as well as some mixed deciduous forest.

It is hard to believe that white-tailed deer were eliminated from Ohio by the late 1800s. Today, thanks to a very successful conservation program, this large and beautiful mammal is probably more numerous than ever and is one of the most sought-after animals by wildlife watchers. Deer also have become somewhat controversial because of their desire for plants in people's gardens and yards! Their historic predators, cougars and gray wolves, were eliminated from the Oak Openings in the mid-1800s, leaving humans as their only predator.

Gray wolves were eliminated from the region in the 1800s, leaving the niche of a large predator unfilled until coyote backfilled from the western states. Coyotes were not in Ohio or Michigan at the time of European settlement and now reside in every county in these states. These medium-sized members of the dog family are efficient predators, although not capable of taking large prey, such as healthy adult deer, because they are not pack hunters as are wolves. Red fox are successful denizens of oak ecosystems and grasslands and make their livings by preying on small animals, scavenging and even eating forest and prairie fruits. Both coyote and fox use burrows, large hollow logs and the combination of digging under a fallen tree (fox hole!) as shelters.

Raccoons are probably more numerous now in North America than they have ever been. They maraud the trees, forest floor and grasslands in search of anything edible. While cute in appearance, raccoons are voracious predators of songbird and turtle eggs in the Oak Openings, and may take a huge toll on their numbers. With the reduction or elimination of most of the large predators such as cougars and wolves, there has not been much to keep the raccoon population in check. They should be avoided if approachable, as they can carry not only rabies and distemper, but also roundworm.

One could find at least half a dozen species of bats in our region. In natural Oak Openings landscapes, bats will usually roost in tree hollows or behind loose bark. All of our region's bats are nocturnal and insectivorous; during their night feeding forays they can be observed over waterways, grasslands or woodlands—wherever the insects are at that time. With a wingspan of up to 13 inches, the big brown bat is our most common bat and each one can consume thousands of bugs per evening. Bats are the only mammals that truly fly. A bat's wing is really a highly evolved forelimb with very elongate inter-webbed digits or fingers. Bats navigate and find their prey using echolocation (sonar) even though they have decent vision. Bats conserve energy during the insect-free winter months by hibernating. Recently a fungal disease called white nose syndrome has pummeled bat populations and could even lead to some species extinctions.



A. WEBER

DEER FAWN

GRAY WOLF



R. JACKSY

Lately, some of the creatures that became absent in the region have been coming back to claim their niche. Beaver were recently observed swimming down Swan Creek and have even built a lodge and had young in Oak Openings Preserve Metropark. River otter and black bear have been seen within ten miles of the Oak Openings, and there is solid evidence that bobcat may now reside within the area. There may even be opportunities in the future to reintroduce bison, a keystone species and former grazer of Oak Openings grasslands.

One could not write this chapter without including the most influential mammal of all: humans. With our amazing brains and dexterous hands, it's almost as if there is nothing we cannot do. But often people are regarded as only being able to degrade the natural world; that is just not true. The Oak Openings region, as unique and biologically diverse as it is, is in part an artifact of the Native American cultures' interaction with this natural region, especially their use of controlled burns, hunting and gathering. Sure, most of the Oak Openings has been degraded, but we have the opportunity to restore this resilient ecosystem. With understanding, restoring, exploring and just enjoying and playing in the Oak Openings Region, we can bring back this jewel to the marvelous status it deserves. We have truly been given a second chance to get it right. 🐾



TOLEDO ZOO

MAMMAL ACTIVITY IN THE OAK OPENINGS

In the late 1800s and early 1900s, northwest Ohio was clear-cut to make way for the expansive agriculture industry, and many native species of plants and animals became locally extinct, or extirpated. Since then, conservation agencies and private landowners have been working together to restore native ecosystems and habitats. As a result, several extirpated species may be moving back into their former habitat in the Toledo area, as they are throughout the U.S.

The Wild Toledo program at the Toledo Zoo is monitoring the movement of wildlife within a corridor from Secor Metropark to Maumee State Forest by deploying trail cameras in remote areas in the parks. The project will help determine the presence or absence of many animals, including bobcats, badgers, turkey, black bear, coyote, deer and mesopredators, like raccoons, skunks and opossum. In addition, relative abundance, activity and distribution can be ascertained. Monitoring of this region will be an ongoing endeavor in order to survey for cryptic species in the area such as bobcats and badgers. The data collected through this program will give land managers and biologists a better understanding of the interaction between wildlife and their habitats to make informed management decisions.

You can find out more about Wild Toledo and view camera images at www.wildtoledo.org/wildlife-tech/



K. MASON

BOBCAT



G. SYDLOWSKI

BLACK OAK/LUPINE BARREN



A. WEBER

OAK/BLUEBERRY FOREST



J. THIEME

MIDWEST SAND BARREN



TOLEDO METROPARKS

MESIC SAND TALLGRASS PRAIRIE



J. THIEME

TWIGRUSH WET PRAIRIE



J. THIEME

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS



R. YOUNG

EASTERN CHIPMUNK



R. JACKSY

FLYING SQUIRREL



R. YOUNG

WOODCHUCK



R. JACKSY

COYOTE



R. JACKSY

RACCOON



THE NATURE CONSERVANCY

BEAVER



R. YOUNG

FOX SQUIRREL



A. WEBER

LEAST WEASEL



R. JACKSY

RED FOX



R. JACKSY

AMERICAN BISON



A. WEBER

VIRGINIA OPOSSUM



A. WEBER

BIG BROWN BAT



J. ROETZEL

AMERICAN BADGER



R. JACKSY

EASTERN MOLE



R. YOUNG

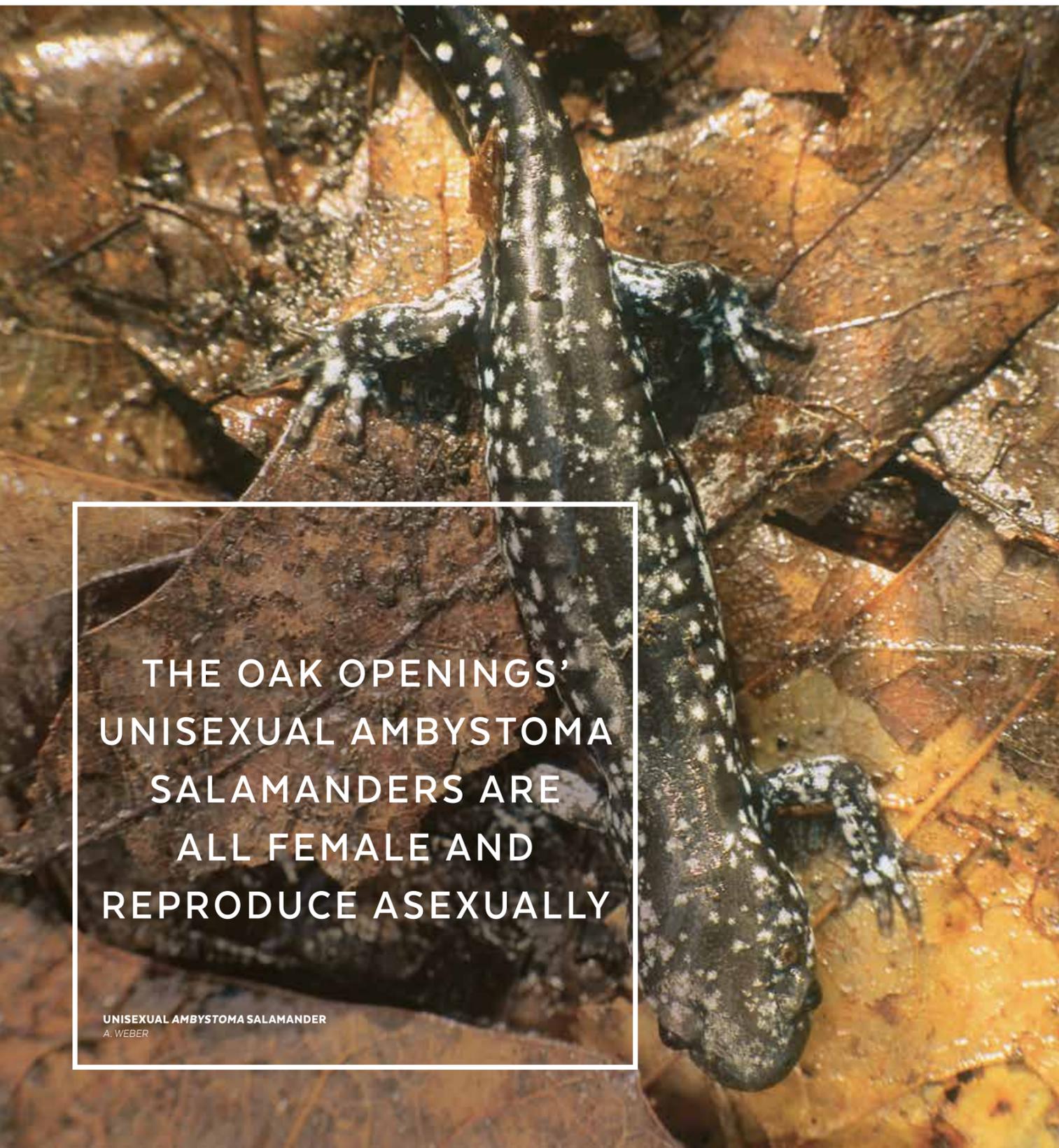
WHITE-TAILED DEER

CHAPTER SIX

AMPHIBIANS & REPTILES

OF THE OAK OPENINGS

BY KENT BEKKER AND GREG LIPPS



THE OAK OPENINGS' UNISEXUAL AMBYSTOMA SALAMANDERS ARE ALL FEMALE AND REPRODUCE ASEXUALLY

UNISEXUAL AMBYSTOMA SALAMANDER
A. WEBER



Amphibians and reptiles play very important roles in the ecosystem and are integral parts of every natural community in the Oak Openings Region, from the dry sand dunes to the wet prairies.

Although amphibians and reptiles are quite different in their characteristics, the study of these two classes of organisms is combined into the discipline of herpetology—Greek for “the study of things that creep and crawl.”



WOOD FROG TADPOLE DEVELOPING LEGS

AMPHIBIANS

Amphibians in the Oak Openings are composed of two orders: Caudata (salamanders and newts) and Anura (frogs and toads). Amphibians are characterized by the porous, thin and usually moist skin that is important for gas exchange, much like a lung worn inside-out on the surface of their bodies. In fact, one family of salamanders (Plethodontidae) does not even have lungs, but relies entirely on its skin for respiration! Historically, 19 species of amphibians have been documented in the Oak Openings, although three have not been recorded in many years and may be extirpated, or locally extinct, from the region. Most amphibians have a life cycle that includes both an aquatic and terrestrial life stage. This cycle begins with eggs deposited into a wetland in late winter or early spring. The eggs are surrounded by a gelatinous material that allows the developing embryo to exchange fluids and gasses with the surrounding water. Upon hatching, larvae emerge. Frog larvae feed on algae, aquatic plants and detritus in the wetland, while salamander larvae eat small aquatic invertebrates and other amphibians. Larvae may stay in this aquatic stage for as little as 4-6 weeks (American toad and Fowler's toad) or as long as 2 years (American bullfrog) before metamorphosing into an adult. For most of the region's amphibians, metamorphosis occurs in the summer months, just before their temporary wetlands dry up for the season. One amphibian found in the Oak Openings Region does not rely on wetlands for laying its eggs. The red-backed salamander chooses a moist spot under a log or underground to lay and brood its eggs. Larvae of this species complete their metamorphosis inside of the egg and hatch as miniatures of the adults.

THE REPTILES

The Oak Openings is home to species from two reptilian orders: Testudinata (turtles and tortoises) and Squamata (lizards and snakes). Reptiles are best identified by the thickened scales of keratin found on snakes and lizards, or the bony plates characteristic of most turtle shells. Unlike amphibians, reptile skin is more impervious to water loss, allowing them to exploit drier habitats. Historically, 22 species of reptiles have been recorded in the Oak Openings Region, although four species have not been recorded from the region in many years and may be extirpated. The reptilian egg and early lifecycle is also less dependent on moisture compared to an amphibian. The reptilian egg is covered with a leathery or hard shell, reducing water loss. Reptiles hatch from these eggs as smaller versions of the parent.

STUDENTS EXAMINING BREEDING SPOTTED TURTLES



T. CRAIL

PRAIRIES AND SAVANNAS

The frogs and toads of the Oak Openings are perhaps the most commonly encountered and familiar of all of the amphibians. In March and April, visitors to Twigrush Wet Prairies are likely to hear hundreds of calling western chorus frogs and spring peepers, as well as the snore-like call of the northern leopard frog. Male American toads begin calling in April, and Fowler's toads take over in late May and June. Given their affinity to sandy soils, Fowler's toads have found excellent habitat in the Oak Openings.

Although the spotted turtle is sometimes found in ditches and pond margins, it is essentially a species adapted to Twigrush Wet Prairie. Unlike many other turtles, spotted turtles may live their entire lives in water no more than a couple of inches deep. In fact, some populations in the Oak Openings only have access to water for part of the year, and burrow down into the leaves and soil during the hot, dry summer months and through the winter.

The blue racer, a large and majestic snake, has adapted to live in the driest habitats of the Oak Openings Region—the Midwest Sand Barrens. It gets its name from the beautiful blue coloration and the extreme speed by which it moves. People who stumble upon this species often only catch a glimpse of the tail and the movement of weeds as the blue racer darts through the field. Racers are one of the most general feeders of all snake species, eating rodents, snakes, amphibians, insects, and even small turtles.

The Oak Openings was home to one species of venomous snake, the eastern massasauga, although its continued presence in the region is in doubt. At one time, this small rattlesnake was common, but it has not been documented since 1981. Intentional killing, habitat destruction, changes in the water table, and uncontrolled succession have all contributed to the massasauga's decline and their listing as a state endangered species.

Only one lizard species ranges through the Oak Openings Region. The common five-lined skink is a small brownish-colored lizard with light stripes extending down its body; young individuals have striking bright blue-colored tails. Five-lined skinks are most commonly encountered in open areas with logs or other debris that offer refuge.

OAK WOODLANDS

When spring peepers begin calling in the prairies, wood frogs begin their quacking call from just-thawed forested wetlands. As temperatures warm, the gray treefrog starts calling. Only during their breeding season are gray treefrogs likely to be found on the ground, and then only under the cover of darkness for a couple of weeks.

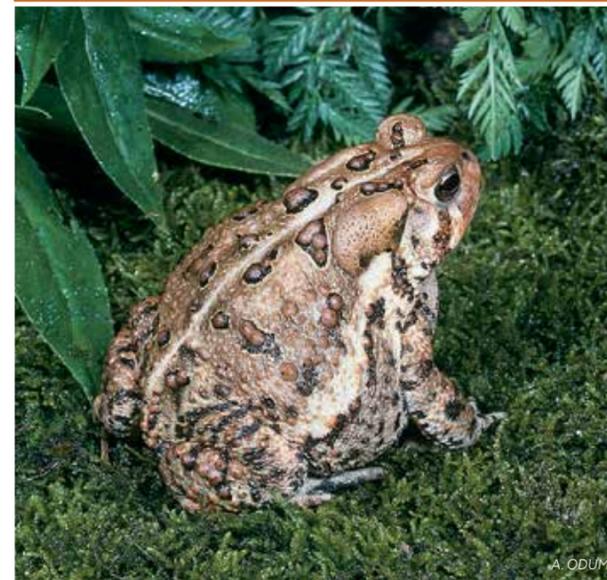
The family Ambystomatidae (mole salamanders) is the best known group of salamanders in the Oak Openings, and includes the blue-spotted and eastern tiger salamanders. These are the first to become active in the late winter as they move overland to vernal (temporary) pools to breed. Males enter the water and search for a females. When a female is encountered, an elaborate courtship dance ensues that includes the male rubbing the female's chin and tail. The most commonly encountered mole salamanders in the Oak Openings cannot be easily assigned to a species. These all-female populations have genes from two or more species (always including the blue-spotted salamander), and usually have more than the usual two sets of chromosomes. In older field guides you may find references to the silvery and Tremblay's salamanders, names given to two of the more than 20 different combinations that have been identified so far. Don't be discouraged by your inability to name each salamander you find; instead, marvel at the wonder of these "unisexual salamanders" and their unique life history that we are only beginning to understand.

T. CRAIL



EASTERN HOG-NOSED SNAKE

AMERICAN TOAD



A. ODUM

Other salamanders found in the Oak Openings include the "lungless" salamanders (Family Plethodontidae), the red-backed and four-toed salamanders. Four-toed salamanders use vernal pools for breeding, but only those that are undisturbed and contain lush moss growth in and around the pool. Unlike the mole salamanders, four-toed salamanders do not enter the water to breed, but instead the female salamander climbs underneath a mat of moss on a log or tree trunk overhanging the water where she lays her eggs. She coils her body around these eggs and remains with them until shortly before hatching, when the larvae hatch and fall into the water.

A rare semi-aquatic turtle of the Oak Openings is the Blanding's turtle. In this region, Blanding's turtles have been observed in and around vernal pools, as well as walking about the forest floor in wooded areas. Studies have shown that this species moves through a complex of wetlands and uplands throughout the year. The Blanding's turtle illustrates typical turtle life history traits very well. Females may take up to 18 years to reach sexual maturity, when they begin to lay clutches of 6-10 eggs every other year. Mortality of the eggs and young is naturally very high, and, in at least one population studied, 98% of the adults must survive each year to have a stable population. Many turtle species, including the Blanding's turtle, live to be over 50 years old.

While not rare throughout the entire state, the eastern box turtle's distribution in northwest Ohio is generally limited to the Oak Openings Region. Here it is often seen after summer rainstorms, munching on worms, berries, or fungi in woodlots, savannas and adjacent prairies.

The eastern hog-nosed snake has one of the most specialized diets of any snake and is often found in the mature Oak/Blueberry Forest. Hog-nosed snakes have evolved a special set of characteristics that allow them to feed on toads, which make up their entire diet. These include an enlarged pair of rear teeth, thought to help deflate toads that puff themselves up when in danger. These snakes also have a large adrenal gland to compensate for the toxins released by the toad's skin. The hog-nosed snake gets its name from the upturned scale on the tip of its snout,

thought to be important for digging in the sandy soil where toads often hide. Should you ever encounter one in the wild, it won't be its toad-eating abilities that will grab your attention, though. When disturbed, hog-nosed snakes go through an elaborate display that includes flattening out their neck and raising their head off the ground, much like a cobra. This is followed by hissing and lunges toward its adversary; however, it rarely bites. Should this impressive display fail to scare off the attacker, the hog-nosed snake plays dead. This begins with death rolls, the expulsion of any food or feces, and even a little blood from the mouth, and ends with the snake lying motionless on its back. Should the snake be rolled onto its belly, it will quickly turn itself back over, as if to convince the attacker it is really dead!

PERMANENT BODIES OF WATER

Several species are dependent on permanent sources of water, including Oak Openings' largest frogs—the American bullfrog and northern green frog. Their calls can be heard late into the summer, with their larvae remaining conspicuous most of the year. Many species of Oak Opening's turtles are only likely to be encountered in and around creeks, rivers, ponds, canals and larger ditches. These include the eastern snapping turtle, eastern spiny softshell, common musk turtle, northern map turtle and Midland painted turtle. The best chance of observing many of these turtles is by canoe or boat, as they often can be seen basking along the shoreline. 🐢



CALL TO ACTION



Allow wetlands in your backyard to flood seasonally and provide breeding habitat for amphibians; it's best if they stay wet until July.



Keep fish out of breeding ponds because they eat amphibian eggs and larvae.



Concerned about mosquitoes? Let salamander larvae do the work! One study showed that seasonal wetlands with salamander larvae had 98% fewer mosquito larvae than those without salamanders.



Help turtles safely cross roads by moving them in the direction they are headed.



G. SYDLOWSKI

BLACK OAK/LUPINE BARREN



A. WEBER

OAK/BLUEBERRY FOREST



J. THIEME

MIDWEST SAND BARREN



TOLEDO METROPARKS

MESIC SAND TALLGRASS PRAIRIE



J. THIEME

TWIGRUSH WET PRAIRIE



J. THIEME

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS



G. LIPPS

COMMON FIVE-LINED SKINK



T. CRAIL

WOOD FROG



T. CRAIL

FOWLER'S TOAD



M. GRIGORE

NORTHERN LEOPARD FROG



A. COLE

SPRING PEEPER



A. COLE

GRAY TREEFROG



R. YOUNG

AMERICAN TOAD



T. CRAIL

EASTERN BOX TURTLE



G. LIPPS

BLUE RACER



A. COLE

NORTHERN GREEN FROG



P. ANDERSON

SPOTTED TURTLE



A. COLE

GRAY TREEFROG



J. THIEME

EASTERN GARTER SNAKE



T. CRAIL

EASTERN BOX TURTLE



G. LIPPS

BLUE RACER



T. CRAIL

EASTERN MILKSNAKE



J. ALBRIGHT

BLANDING'S TURTLE



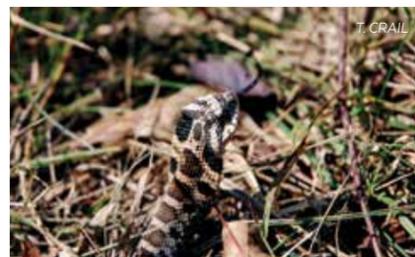
A. COLE

BLUE-SPOTTED SALAMANDER



A. COLE

NORTHERN BROWNSNAKE



T. CRAIL

EASTERN HOG-NOSED SNAKE



A. COLE

COMMON RIBBONSNAKE



A. WEBER

EASTERN MASSASAUGA

CHAPTER SEVEN

INSECTS & SPIDERS

OF THE OAK OPENINGS

BY DAVID K. PARSHALL & RICHARD BRADLEY, Ph.D.



The study of insects has a long history in the Oak Openings Region, while the study of spiders is more recently developing.

Naturalists Dr. Edward S. Thomas and his brother John made many trips from Columbus, Ohio to the Oak Openings during the 1930s researching its plants, birds and insects. John was an avid butterfly collector, and it's to him we owe our early knowledge of the butterflies of the Oak Openings. In the mid-1900s, Homer Price, an amateur naturalist and a collector of butterflies and dragonflies, made frequent trips to the Oak Openings.

He recorded many endemic species, a few of which have since disappeared from the region. In 1961, he was the last person to collect in Ohio the now federally protected dragonfly, the Hines's emerald. This trend of discovery and disappearance continues to this day: researchers continue to document insect and spider species that have never before been recorded in the Oak Openings. At the same time, populations of some sensitive arthropod species are in decline, highlighting the need for continued research, monitoring, and protection of these species and their habitats.



FROSTED ELFIN
ENDANGERED IN OHIO, THREATENED IN MICHIGAN

BUTTERFLIES AND MOTHS

Today, seven species of butterflies found in the Oak Openings are protected by the states of Ohio or Michigan. Of those listed as endangered in Ohio, four are found only in the Oak Openings and nowhere else in the state. Three of these make their home in Black Oak/Lupine Barren and Midwest Sand Barren communities, and all three use blue lupine as their larval host. The Karner blue butterfly, whose larvae feed exclusively upon blue lupine, was once extirpated from the Oak Openings.

The re-establishment and management of large stands of blue lupine for Karner blue butterflies have also benefited the frosted elfin and Persius dusky wing. The frosted elfin is currently known from two sites in Ohio, but only one is protected. It has not been recorded in southeast Michigan since 1975. The true range of the Persius dusky wing in the Oak Openings is not accurately known because this skipper is easily confused with three other species of spring flying dusky wing skippers. However, Persius is the only dusky wing to lay its eggs on blue lupine. Kitty Todd Nature Preserve is the best place to observe all three of the lupine feeders.

The Edwards' hairstreak lives in the company of ants within Black Oak/Lupine Barrens and Midwest Sand Barrens. In much of Ohio, the larvae of this butterfly are tended by the red Allegheny mound ant. However, in Michigan, larvae are associated with the black/redwood mound ant. The butterfly larvae secrete sweet nectar that the ants consume; in return, the ants guard larvae from parasitic wasps while they feed on oaks. In Ohio, this butterfly was once thought to be restricted to the Oak Openings, but it's now known from several Ohio counties. Look for this butterfly near large ant mounds and small oaks in late June or early July.

The dusted skipper and Leonard's skipper can both be found in Mesic Sand Tallgrass Prairie. The dusted skipper is a secretive, but beautiful, skipper that feeds on prairie grasses such as big bluestem and little bluestem. Today it's known from six colonies in the Ohio Oak Openings, and has not been recorded in Michigan's Oak Openings since the late 1980s. The Leonard's skipper is the last butterfly to emerge in the Oak Openings. It flies in late August, and can be found taking nectar from the blooms of rough blazing star. Both the dusted and Leonard's skippers are losing ground to development in the region.

SEVEN SPECIES
OF OAK OPENINGS
BUTTERFLIES ARE
THREATENED OR
ENDANGERED

KARNER BLUE BUTTERFLY
FEDERALLY ENDANGERED
T. CRAIL

Several protected butterfly species can be found in Twigrush Wet Prairies, preferring to feed and lay eggs upon plants within this wet system. The endangered Ohio butterfly, the purplish copper, was found in the Twigrush Wet Prairies of Ohio and Michigan, but there are now no known active colonies of this butterfly in the entire Oak Openings. This species has been greatly affected by the spraying of chemicals and development in the region. Look for the purplish copper around its larval host, water smartweed.

The silver-bordered fritillary is also associated with wet prairies. This species has declined throughout the region since the 1990s, and is threatened in Ohio. This species has been hurt by mis-timed use of fire, chemical spraying, and land development. The larvae of the silver-bordered fritillary feed on a potentially threatened plant, lance-leaved violet.



CALL TO ACTION

 Plant a butterfly garden to provide nectar resources to native insects.

Select a diversity of plants that bloom at different times to ensure a nectar source is available all season.

 In upland areas, consider prairie phlox and blue lupine for early spring, partridge pea and tall coreopsis for mid-season, and sneezeweed and showy goldenrod for late season blooms.

Include several species of milkweed, which are the only plants on which monarch caterpillars feed.

 Monarch populations have been severely declining recently in large part due to the lack of native milkweeds on the landscape.

 Collect seeds from your garden and swap with neighbors or at your local seed swap. Your local botanical garden may have more information on seed swaps.

 Visit www.monarchwatch.org or www.wildones.org to discover more ways to improve pollinator habitat right in your backyard!

ANTENNA-WAVING WASP



R. JACKSY

BEETLES AND OTHER INSECTS

In addition to dragonflies and butterflies, the Oak Openings is home to a number of other interesting insects. The common six-spotted tiger beetle is metallic green with a series of white spots on its back. It is an early-season species. Look for it along sandy trails in Oak/Blueberry Forest. The less common dune ghost tiger beetle is a species that loves early morning and late afternoon. It can be found walking on top of the deep white sand of Midwest Sand Barrens. By its name, you can guess that its almost white appearance makes it very hard to see on the white sand. Unlike a lot of tiger beetles, when it's disturbed it will fly only a short distance before landing.

Midwest Sand Barrens are home to several other unique species. In 2012, the Great Plains spittlebug was discovered at Kitty Todd Nature Preserve. This was a state record for Ohio; the nearest record was 120 miles northwest in Van Buren County, Michigan, where this species is listed as special concern. These spittlebugs are typically found at dry, well-drained sites. The amazing antennae-waving wasp is also found in barrens. The female stings the short-horned grasshopper to immobilize it, then lays eggs on the insect and buries it in burrows in the sand. The larvae develop in the burrows and emerge as adult wasps.

SPIDERS

The spiders of the Oak Openings Region are poorly known, with only 100 species discovered so far. Considering how little spider sampling has been done here, a relatively large proportion of these are rare and unusual species for Ohio and Michigan.

Two burrowing wolf spiders, *Geolycosa missouriensis* and *Hogna baltimoriana* are denizens of sandy soils and are relatively common in the Black Oak/Lupine Barrens. Though these spiders belong to the same family (Lycosidae), they behave differently from each other. The *G. missouriensis* are rarely found away from their burrows. Only juveniles dispersing from their mother's burrow and adult males seeking mates wander. The rest of the year these spiders live at the bottom of their burrow during the day, and hunt near the top at night. In contrast, the *H. baltimoriana* leave their burrows to hunt for prey. Typically they return in the morning and spend the daytime hiding in the burrow. They also spend long periods of inactivity, for example during winter, in the burrow. For both species, it is not unusual to find a small "midden" of indigestible prey remains at the bottom of a long-occupied burrow.

Two northern species of jumping spiders, the ground spider *Gnaphosa muscorum*, and the running crab spider *Philodromus imbecillus*, have been recorded in the Oak Openings Region. Both species are wandering spiders that do not build a web. They often hide under rocks, fallen debris, or under bark of standing dead trees and shrubs. Like the majority of crab spiders that one might find in a flower waiting to ambush prey, the running crab spiders are sit-and-wait hunters. However, when disturbed, running crab spiders differ from most crab spiders in that they are lightning-fast runners. These two species are unknown elsewhere in Ohio. Another rarely-collected Ohio spider that has been recorded in the Oak Openings is the small orb-weaving spider *Singa eugeni*. This species is known from the margins of the Great Lakes and the Atlantic coastline. We know almost nothing about the biology of these beautiful little spiders.

Any new sightings of any listed species of arthropods should be reported to The Ohio Lepidopterists for inclusion in the state data base. Michigan discoveries should be reported to the Michigan Natural Features Inventory. 



R. BRADLEY

GEOLYCOSA MISSOURIENSIS, A BUROWING WOLF SPIDER



T. CRAIL

KARNER BLUE BUTTERFLY

Flitting among the gardens of rare flora are a number of living jewels—the rare butterflies of the Oak Openings. Some, such as the magnificent great-spangled fritillary, are still moderately common. Others, such as the frosted elfin and the Karner blue butterfly, hang on precariously in only a few restricted localities. Endangered Karner blue butterfly, *Lycaeides melissa samuelis*, has suffered catastrophic population declines in the United States over the past two decades and has declined by 99% over its range in the past 100 years. The Karner blue has been extirpated from Illinois, Massachusetts, Ontario, and Pennsylvania. Once extirpated from Ohio as well, it was reintroduced to the state in 1998 as the result of efforts by a powerful coalition composed of the Michigan and Ohio Departments of Natural Resources, the U.S. Fish and Wildlife Service, The Toledo Zoo, The Nature Conservancy, and the Metroparks of the Toledo Area. The Karner blue is dependent upon the blue lupine, which is the host plant for its larvae. Eggs, which are laid the previous summer, remain dormant over the long winter and hatch in April. The 1-mm larvae steadily feed on lupine for about three weeks, growing to about 12 mm in length. They then undergo a week of pupation, the process in which the caterpillar transforms into a butterfly within its chrysalis. The adult butterflies emerge in mid-May, mate, and lay eggs on lupine. These eggs hatch in about three days, and the larval cycle continues again, ultimately producing a second-flight butterfly that emerges in July. These butterflies mate and lay eggs as well, but this time the eggs do not develop until the following spring, completing the two-flight, or bivoltine, cycle of the Karner blue butterfly.

Since the Karner blue butterfly's initial reintroduction to The Nature Conservancy's Kitty Todd Nature Preserve, it has also been reintroduced to areas of Oak Openings Metropark, Ohio DNR's Meilke Road Savanna and Michigan DNR's Petersburg State Game Area. Homeowners in the Oak Openings can speed the return of the Karner blue by retaining the natural communities around them and by landscaping with prairie grasses, blue lupine and other species of native prairie wildflowers rather than exotic plants and expansive lawns.



G. SYDLOWSKI

BLACK OAK/LUPINE BARREN



A. WEBER

OAK/BLUEBERRY FOREST



J. THIEME

MIDWEST SAND BARREN



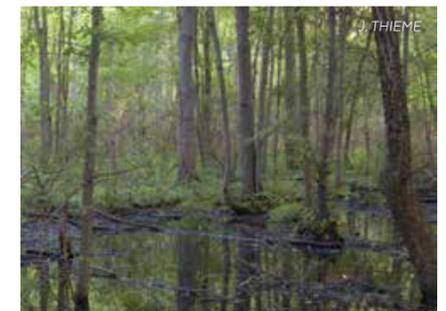
TOLEDO METROPARKS

MESIC SAND TALLGRASS PRAIRIE



J. THIEME

TWIGRUSH WET PRAIRIE



J. THIEME

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS



T. KAMMERER

AMERICAN PAINTED LADY



A. COLE

SILVER SPOTTED SKIPPER



A. COLE

EDWARD'S HAIRSTREAK



R. BRADLEY

HABRONATTUS ORBUS



T. CRAIL

HALLOWEEN PENNANT



D. CUTHRELL

TIGER SWALLOWTAIL



R. BRADLEY

HOGNA BALTIMORIANA



A. COLE

BEAUTIFUL TIGER BEETLE



R. NIRSCHL

DUNE GHOST TIGER BEETLE



D. PARSHALL

LEONARD'S SKIPPER



T. CRAIL

BALTIMORE CHECKERSPOT



A. COLE

QUESTION MARK BUTTERFLY



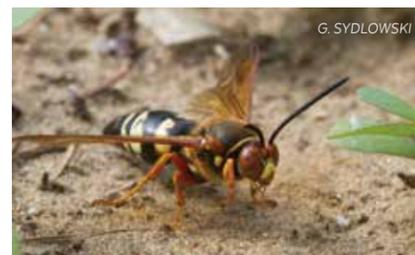
A. COLE

COMMON BUCKEYE



A. COLE

BLACK SWALLOWTAIL



G. SYDLOWSKI

EASTERN CICADA KILLER



R. YOUNG

PEARL CRESCENT



R. NIRSCHL

CHALK-FRONTED CORPORAL



A. COLE

LITTLE WOOD SATYR



D. CUTHRELL

GREAT PLAINS SPITTLEBUG



A. COLE

RED-SPOTTED PURPLE



A. COLE

AMERICAN COPPER



A. COLE

GREAT-SPANGLED FRITILLARY



T. CRAIL

GIANT SWALLOWTAIL



A. COLE

EYED CLICK BEETLE

CHAPTER EIGHT

THE OAK OPENINGS

AT RISK

BY MICHELLE GRIGORE, Ph.D.

ALTHOUGH THE
OAK OPENINGS
SEEM TO THRIVE ON
DISTURBANCES LIKE
FIRE OR HIGH WATER,
THEY ARE ACTUALLY
FRAGILE IN STRUCTURE

WATER, INCLUDING THE NUTRIENTS IT CARRIES,
IS FUNNELED DIRECTLY INTO A STREAM

T. CRAIL

Like a spider's web that needs to be re-spun each night, Oak Openings habitats need constant diligence from stewards who care for this land.

In this chapter, we'll examine what threats exist and the conservation needs of the rare plants and animals of the Oak Openings Region.



J. THIEME
BIG-TOOTH ASPEN, BOTTOM LEFT,
ENROACHES ON A PRAIRIE FRAGMENT

HABITAT LOSS AND FRAGMENTATION

Like all natural areas, the Oak Openings is shrinking as our population grows. Near Toledo and Detroit, urban sprawl is the biggest threat to the survival of Oak Openings species. It leads to incompatible land use like mining sand, paving over natural areas and ditching or filling the low-lying wet prairies. What is lost is often irreplaceable, yet what is built may only last decades before it is abandoned. Land use planning and zoning for natural areas, wetlands and floodplains are valuable tools that can be used to reduce loss of Oak Openings habitat. Even managers of nature preserves must find a balance between preserving the natural area and allowing people to access their splendor, because with people, horses and off-road vehicles often come invasive plants, erosion of sensitive lands and activity that disrupts wild animal behavior.

Fragmentation, the isolation of natural areas surrounded by development, is also a serious threat to Oak Openings species. Existing preserves will become, in effect, arks adrift in a sea of residential and commercial development unless something is done now to plan for the future. When animals and plants become isolated, disease or inbreeding can wipe out fragmented populations. Connecting corridors of public and private land are the best hope for keeping these important sources of Oak Openings biological wealth connected to each other.

NATURAL PROCESSES GONE AWRY

Woody Plant Succession

In the Oak Openings, woody plants encroach and take over the sunlit prairies and savannas. Thousands of years ago, Ohio was much drier than now, so prairies easily maintained their hold without intervention. The current climate is much wetter and cooler, making it easy for the Oak/Blueberry Forest to overcome the sunny Mesic Sand Tallgrass Prairie and Black Oak/Lupine Barren communities.

To set the clock of succession back to "Prairie" or "Savanna," land managers use selective mowing, cutting, chemical treatments and fire. All of these tools remove woody plants, but fire especially favors the deep-rooted prairie plants. Raising water tables can also reduce woody plant succession and nourish the wet prairies, but this is much more difficult because of the probability of flooding adjacent property owners.



DEVELOPMENT FRAGMENTS THE OAK OPENINGS,
REDUCING ITS ABILITY TO ABSORB AND FILTER RAINWATER

Lowering Groundwater

The Irwin Wet Prairie of Lucas County, OH was once over ten miles long; oral history passed on the stories of Indians canoeing across this prairie expanse in search of waterfowl, even in summer. The Sibley Prairie of Wayne County, MI extended nearly eight miles, from the I-75/US-24 split on the northeast nearly to Oakwoods Metropark on the southwest. Of all the Oak Openings plant communities, this Twigrush Wet Prairie community is now the rarest due to ditching, pumping, private wells and ponds and paved surfaces that quickly whisk away rain into storm sewers and ditches. The result is lower levels of water in the ground because rain doesn't get a chance to soak into the soil and replenish it. At one time, water sat above the ground most of the year in the Irwin and Sibley Wet Prairies. Now you have to dig four to five feet down most of the year to find the groundwater. This dramatic change has led to increased woody plant growth and the demise of nearly all the pre-settlement Twigrush Wet Prairies.

NON-NATIVE SPECIES

As if habitat loss, fragmentation, woody encroachment and lowering groundwater tables weren't enough to contend with, the stewards of the Oak Openings spend much of their time and efforts fighting invasive plants. Species like glossy buckthorn, purple loosestrife and reed canary grass invade the wet prairies and crowd out native plants and wildlife. Oak savannas and prairies feel the push of privet, honeysuckles, and the unbelievably aggressive spotted knapweed. Floodplains and uplands are both overrun by the rampant garlic mustard, which has eliminated thousands of acres of wildflowers in its path. Even the tough, dry sandy dunes sport invasive pasture grasses like brome grass. Non-native plants often have a competitive advantage in a new country because the diseases and insects that kept them in check are absent. Many were introduced as wildlife food and readily spread through natural areas by birds and other animals.

Foreign plants aren't the only issue for Oak Openings species: non-native animals and insects have also been introduced, such as the emerald ash borer—a destructive beetle that has devastated woodlands across the Midwest—or gypsy moth, which defoliates and weakens oak trees. Even non-native earthworms cause changes in soil conditions we are only beginning to understand. Some of the most-studied invasive animals are European starlings and house sparrows. Both nest in hollow trees and aggressively displace our native cavity nesting birds such as eastern bluebirds.



R. YOUNG

PURPLE LOOSESTRIFE IS OFTEN PLANTED IN YARDS AND PONDS, BUT QUICKLY OVERTAKES WETLANDS AT THE EXPENSE OF NATIVE PLANTS.

WHITE-TAILED DEER CAN OVERGRAZE NATURAL AREAS AND STUNT PLANT GROWTH



A. WEBER

ANIMAL COMMUNITIES OUT OF BALANCE

Even our native animal populations can become unbalanced and wreak havoc in the Oak Openings. A healthy natural system usually includes large and medium (or meso) predators that keep the prey animals in check. Prey animals like deer, rabbits and rodents reproduce quickly and feed mainly on plant material. If their populations aren't controlled, they outgrow their food source, which leads to starvation, overcrowding and disease.



CALL TO ACTION



Keep cats indoors to prevent them from killing birds. Free-ranging cats are estimated to kill at least 1.3 billion birds annually. Even well-fed cats hunt and kill wild animals.



Properly dispose of garbage to keep from attracting—and supplementing—raccoons and other mesopredators. Additionally, do not intentionally feed free-ranging or wild mesopredators



Promptly harvest homegrown fruit and vegetables to keep from attracting potential mesopredators.



Keep pets on a leash in natural areas.

Large predators like wolves are gone, so deer populations skyrocket and you can see browse lines, where vegetation is absent as high off the ground as deer can reach, in woodlands and savannas. Deer favor colorful flowers, like blue lupine and the rare wood lily, making it difficult for many rare plants to reproduce.

Populations of mesopredators like raccoon, opossum, domestic cats and skunks have increased as large predators, who once fed upon them, are eliminated. This leads to increased predation on birds, amphibians, turtles and other animals—pushing them to the brink of extirpation in many areas.

GLOBAL CLIMATE CHANGE

The 2014 report by the Intergovernmental Panel on Climate Change predicts a 1.8-5.4 °F average increase in the global surface temperature over the period 1990 to 2100. That may sound like a small amount, but the Earth was only 5 to 9 degrees cooler than today when ice covered most of the northeast United States and Canada! Today the Earth is undergoing the quickest rise in temperature ever seen. What does that mean? Bouts of increasingly hot weather and more violent storms are already occurring in the Midwest, leading alternatively to droughts and flooding. Climate predictions show more severe swings in the future for our area of the U.S.

Although the Oak Openings evolved over time with disturbances and prairies do well under hot, dry conditions, the prediction is that wetlands will dry up more quickly. This will lead to a loss of wetland plant species and a real threat to animals that rely on wetlands, like migrating waterfowl. We could also see a loss of showy flowers in the prairies due to climate change. Grasses appear to outpace forbs (showy flowering plants) in growth under warming conditions with high levels of carbon dioxide and nutrients, such as those experienced through current climate changes.

Besides warming temperatures, man-made pollution also leads to more nitrogen and phosphorus release. Although a majority of the air in our atmosphere is nitrogen (N₂), that type of nitrogen isn't useable by living things. But if the nitrogen is "activated" through a chemical reaction that attaches nitrogen to oxygen, then it can be used by plants. This activation, called "fixation," is done in small quantities by bacteria in the soil, so plants in the Oak Openings have adapted to low levels of nitrogen. However, the use of fertilizers on agricultural fields, golf courses and lawns has dumped huge quantities of active nitrogen—and phosphorus—into the soil. Unused nitrogen is leached out of the soil and ends up in waterways. Anyone who doubts the damage from excess nutrients in lakes and streams only has to look at the Toledo water crisis of 2014, when blue algae growth spurred by excess nitrogen contaminated the city's drinking water with a toxin called microcystin.

The Earth is in delicate balance, but how far we have tipped the balance and how strong the reaction will be is a huge experiment we are performing—one that can have lasting impacts upon humans and the Oak Openings.

A HARMFUL ALGAL BLOOM EXPANDS ACROSS LAKE ERIE IN 2011. THE OAK OPENINGS IS SHOWN IN YELLOW.



J. SCHMALTZ, MODIS RAPID RESPONSE IMAGERY, NASA

YOUR LAKE ERIE WATERSHED

The Oak Openings is part of the Western Lake Erie watershed where, historically, rivers like the Huron and Maumee spilled into wide, shifting, coastal wetlands. Water meandered through thick vegetation that took up nutrients, and sediments settled out in the slow currents.

Now, however, only 5% of historic Lake Erie marshes remain. Wetlands have been ditched and drained, and major rivers are channelized and dredged. Run-off, including the nutrients and pollutants it carries, is funneled directly into waterways. Nutrients, in the form of fertilizer, are imported into the watershed and dispersed across the landscape. Given these changes, one may not be surprised when harmful algal blooms annually close down beaches, or water is deemed unsafe for drinking.

How does one person make a difference in a watershed nearly 30,000 square miles in size? You have already reduced the fertilizer you apply to your lawn, leave unmowed buffer strips near the creek in your backyard, and installed a rain barrel to collect water from your roof for watering your organic garden. But there's more! One of the simplest ways to make a large-scale difference in your watershed is to support legislation that improves the watershed's health. Locally, this may entail supporting local park district millages or funding to install green infrastructure on public properties. Voice your support for state legislation that protects your waters; your opinion does matter to your representatives. For example, strong public support for a bill to improve watershed conditions in Ohio's Western Lake Erie played an enormous role in the bill's passing after the 2014 Toledo water crisis. At the federal level, remind your representatives that the **Great Lakes Restoration Initiative** and **Farm Bill**—which have collectively restored and protected thousands of acres in the Oak Openings alone—are important to you and future generations.

COMBINING FORCES TO PROTECT THE OAK OPENINGS: THE GREEN RIBBON INITIATIVE

BY STEVEN WOODS



“IT IS AMAZING WHAT YOU CAN ACCOMPLISH IF YOU DO NOT CARE WHO GETS THE CREDIT.”
—HARRY S. TRUMAN

AN OHIO DNR DIVISION OF NATURAL AREAS AND PRESERVES
MANAGER EDUCATES STUDENTS ABOUT LOCAL WILDLIFE.
T. CRAIL

At the heart of conservation in the Oak Openings is the collaboration embodied by The Green Ribbon Initiative.

The Green Ribbon Initiative (GRI) is a partnership of governmental agencies, non-governmental organizations, businesses, and individuals that accept the Initiative’s conservation mission and agree to help achieve the stated goals. Its mission is to preserve, enhance and restore critical natural areas of the globally unique Oak Openings Region and to inform residents about why this region is so important.

Led by a Steering Committee composed of representatives from eleven organizations, GRI members partake in working subcommittees focused on protection, science, stewardship, and education and outreach. Committees discuss and take action on important issues, seeking synergies where each partner can bring resources to bear and the resulting whole is greater than the sum of its parts. Participation in the GRI has proven to be a valuable tool for conservation, assisting partners with grant applications, building support for priority projects, sharing resources and ensuring everyone has access to the best tools, information and management practices.



A RESIDENT TAKES PRIDE IN MANAGING HER PROPERTY

Through a comprehensive, collaborative planning effort, GRI has identified strategies and goals that collectively make up the Oak Openings Region Conservation Plan. This plan lays out strategies necessary to achieve measurable conservation goals. To support this plan, the Green Ribbon Initiative also completed a spatially-explicit ecological model to identify priority lands for conservation and restoration, enabling us to target activities where they will have both the highest likelihood of success and the greatest benefit to priority species (Chapter 10).

This partnership prides itself on taking action to implement the Conservation Plan. A growing number of partners contribute to the Green Ribbon Initiative and its projects, and you can too (Chapter 11)! To date, projects funded on behalf of Green Ribbon Initiative have protected and restored several thousand acres throughout the region. These projects have produced tangible benefits for virtually every conservation entity in the Oak Openings Region, as well as improved quality of life for area residents. However, to achieve our goals, we need to ensure that this partnership persists and thrives by engaging a greater number and broader range of landowners, businesses, citizens’ groups and local governments to help us find solutions to some of our society’s biggest challenges.

The Oak Openings landscapes are rare at least in part because the common social benefits they provide were not properly valued. To preserve what’s left of our natural heritage, we need to both illustrate the benefits that nature provides and discuss the consequences of failing to value nature. We attempt to create connections in the minds of residents between the way we collectively treat our lands and waters and the effects they observe in their yards or communities. We must provide opportunities for quality nature-based experiences and immerse people in moments in nature that leave them forever changed. This is a complex task, further complicated by the large geographic area we cover, making it impossible for any single entity to achieve success alone. As a result, the many organizations dedicated to the Oak Openings each fill an important niche in protecting, restoring, and educating the public about the globally rare communities in our backyards.

BLUE WEEK

EXPLORE, LEARN AND PLAY

Each spring, the Oak Openings gets the blues: Karner blue butterfly caterpillars emerge to feed upon blue lupine blanketing the oak savannas. Blue-spotted salamanders make their way to seasonal wetlands scattered with northern blue flag iris and Atlantic blue-eyed grass. Blue racers emerge from winter's rest to warm themselves among little bluestem grass, and eastern bluebirds' sweet songs can be heard as they make their way back to the Oak Openings from their wintering grounds.

To celebrate this occasion, Green Ribbon Initiative partners host a Blue Week festival each May. Blue Week is a time for residents, volunteers, land managers and other outdoor enthusiasts to share in their appreciation for this beautiful landscape and learn more about this gem in their own backyards. The festival includes nature hikes, canoe trips, children's games, native plant sales, bike rides and more. Events occur throughout the entire region and cover a variety of topics from geology to birding to gardening, so you can always find something near you of interest.

Visit www.oakopenings.org to learn more and find events near you.



2050 VISION

We envision a cooperatively managed landscape containing multiple viable examples of each natural community comprising the Lakeplain Oak Openings Ecosystem, spread sufficiently across their historic range to capture the full range of variability within these systems and to buffer against the uncertainty associated with climate change.

2020 GOAL

Facilitate partnership around the protection or restoration of a sufficient number of representative examples of Oak Openings habitat to create resilience in the face of large-scale stochastic events while demonstrating replicable conservation approaches.

GIRDHAM DUNES, OAK OPENINGS METROPARK

A crew representing three conservation agencies and volunteers conducts a prescribed fire at Oak Openings Preserve



L. SPROW

PROTECTION

Setting aside important lands in the Oak Openings Region is one of the most powerful tools at our disposal; however, it is also one of the most expensive. The Green Ribbon Initiative Protection Subcommittee works to make the most of each conservation opportunity and to ensure that a property's values are protected and maintained in perpetuity. In addition to the GRI member organizations, many other partners have protected lands throughout the region. Coordinated identification, prioritization and planning efforts have led to an ambitious goal of protecting an additional 46,000 acres, or 8.3%, of the Oak Openings Region over the next 100 years.

Property can be protected either through acquisition by one of the region's conservation organizations or through deed restrictions called "conservation easements" that landowners place on their property. Two types of organizations typically buy and hold land for conservation: government agencies such as Ohio Department of Natural Resources or the Toledo Olander Parks System (TOPS), and charitable non-profit organizations known as "land trusts" such as The Nature Conservancy or Southeast Michigan Land Conservancy. Ideally, the highest quality natural areas are purchased and owned by an organization dedicated to conserving, restoring and maintaining these habitats while lands of moderate value are often acquired for recreational uses.

In these cases where habitat has been impacted by development or where creating a nature preserve is not practical, conservation easements may be the only way to ensure long-term, legal protection of a site. Conservation easements allow the landowner to continue to own, live on and use the property while placing legal restrictions on future subdivision and development of the parcel. Easements are either voluntarily donated to a land trust by the landowner, or in rare cases a land trust may choose to purchase the development rights. Several land trusts including the Black Swamp Conservancy and Southeast Michigan Land Conservancy accept easements; however, they usually require that a modest fee accompany the easement due to the legal obligations associated with regularly monitoring the site and ensuring compliance with the agreed terms.



CALL TO ACTION



Support the Oak Openings Habitat Protection and Restoration Fund, the Carbon Offset Fund, or General Fund with a financial contribution. Your support enhances and protects land throughout the region, and helps bring educational materials such as this very book to residents.



Tell your township trustees, mayor, or other local officials that conservation of the Oak Openings Region is important to you. Your opinions are valued locally and may contribute to greater local land protection and park access.

In all cases, governmental and non-governmental entities work cooperatively with willing sellers to reach mutually agreeable terms for acquisition and easements. This provides a powerful tool for protecting our natural heritage. It should be noted, however, that even protected lands are vulnerable to degradation resulting from invasive species, altered hydrology and overuse by the public.



T. CRAIL

LOCAL RESEARCH IS PRESENTED ANNUALLY AT THE OAK OPENINGS RESEARCH FORUM IN TOLEDO, OH

COLLABORATING WITH PRIVATE BUSINESSES

The Nature Conservancy meets with ITC Holdings Corp to discuss collaborative efforts to restore habitat under powerlines



THE NATURE CONSERVANCY

SCIENCE

By partnering through the Green Ribbon Initiative, land conservation organizations and local research universities such as University of Toledo and Bowling Green State University are helping each other to achieve their respective goals. The conserved lands of the region provide an opportunity for local researchers to study these plants, animals and ecosystem processes. Their research answers important questions about how humans depend on nature; the distribution, population status and habitat requirements of individual species; and how the region is changing over time. University of Toledo, for example, is developing science-based recommendations that will help land managers prioritize invasive species prevention and removal. Other recent discoveries include new populations of Blanchard's cricket frog and purple milkweed on privately held lands, and habitat requirements of the orange fringed orchid. In another collaborative project, Toledo Zoo's Wild Toledo program is tracking the movements of reptiles and amphibians and is leading a team that will prioritize opportunities to return species to restored habitat within their historic range.

This research provides land managers with new information and insights that help them better understand the species and systems under their care, which in turn allows them to use resources efficiently. Students benefit by gaining practical, hands-on experience while seeing their studies produce tangible benefits in their local environment. Each partner can focus on its area of expertise while benefitting from the expertise of others, resulting in a truly symbiotic relationship.



Scan this QR code to learn more about how you can contribute.



STEWARDSHIP

Green Ribbon Initiative's Stewardship Subcommittee allows land managers to collaborate on restoring natural habitats through the removal of invasive species, the safe and responsible application of prescribed fire, planting of locally native species and the restoration of natural hydrology. Our ambitious goal is to restore sufficient habitat to sustain the region's full range of plants and animals. Adopting shared goals and developing best management practices has helped managers to put their efforts into a broader context. This coordination also resonates with funders who appreciate a comprehensive, regional approach.

Private landowners play an important role in stewardship because over 95% of the region is privately owned. The Green Ribbon Initiative Landowner Registry Program and Interagency Restoration Team, which conducts restoration throughout the region, were developed to help landowners learn about the habitat on their property and to overcome barriers to managing it. Private backyard habitats increase connectivity among conserved lands, contribute to the size and health of regional populations, and raise landowners' awareness of the amazing variety of life on their property. Registry members can enroll in training, receive a "Proud to Live in the Oak Openings" yard sign, and often become ambassadors for the region. There is simply no way to sustain the incredible ecosystem we inhabit without the help of thousands of individuals working to improve natural habitat in their own backyards.

Anyone can be a land steward—even if you don't own land, you can contribute by volunteering at a stewardship workday with one of the Green Ribbon Initiative partners. Virtually all of the GRI partners have regularly scheduled workdays and the collective impact of this work is astonishing. Together, public and private partners have restored over 4,500 acres of rare natural communities in the past ten years! This work makes our parks and preserves more beautiful and more valuable to the nature that lives here. Learn more about how you can be a land steward in Chapter 11!

STUDENT RESEARCHERS EXAMINE VEGETATION IN MANAGED HABITAT



EDUCATION AND OUTREACH

Education and outreach are two of the most important components of conservation in the region because only those who understand its importance will value and protect it. The goal of the GRI Education and Outreach Subcommittee is to ensure that the area's visitors and residents understand not only how globally unique the area is, but also how it serves them. The truth is that the revitalization of our community and our economy depends on the revitalization of our natural communities. For example, wetlands protect water quality in Lake Erie by naturally providing services such as flood attenuation, water filtration and groundwater recharge. As wetlands are lost, so too are these services. The challenge for the Education and Outreach Subcommittee is to elevate this conversation so that low-cost, common-sense solutions to these problems are appreciated by elected officials and supported within the community. We encourage you to join us in promoting a healthy, green community by advocating for the Oak Openings among your local elected officials.

We work on multiple fronts to spread awareness and appreciation to every person in the region. One effort spearheaded by the Oak Openings Region Conservancy is to develop school lesson plans that highlight the region's flora, fauna and ecological processes while still aligning with state curriculum standards. This project creates a base of scientific understanding that will serve these community members for a lifetime while also capturing their imagination with hands-on learning. Education is not limited to classroom settings, so GRI members provide dozens of ways to learn about and share the region's splendor. Outdoor programs include naturalist education events with Toledo Naturalists Association, outdoor skills courses taught by Metroparks of the Toledo Area, native gardening by Wild Ones Oak Openings Chapter, and many others.

Each May we celebrate Blue Week in the Oak Openings. This event offers people of all ages and experience the opportunity to get outside and enjoy the prairies and woodlands, parks and preserves of the Oak Openings Region. Events are advertised on the Green Ribbon Initiative website www.oakopenings.org and by each member organization. These activities bring people from all over the region and include many opportunities to explore, learn and play in the beautiful spring weather.



VOLUNTEERS PLAY A LARGE ROLE IN MANAGING PRESERVES

COMBINING FORCES TO PROTECT THE OAK OPENINGS: WHERE TO BEGIN SAVING THE OAK OPENINGS

BY JENNIFER THIEME



RESTORED HABITAT
CAN PROVIDE
CORRIDORS FOR RARE
AND MIGRATORY
SPECIES TO TRAVEL

A MONARCH FEEDS ON BLAZING STAR DURING MIGRATION
A. COLE

Protecting the Oak Openings Region can seem a daunting task.

Over 70% of landscape has been developed or is in agriculture, leaving less than 30% in natural cover. Fortunately, there are many organizations and individuals driven to protect this unique landscape, as described in Chapter 9. However, the resources and time that each organization or person can devote to the cause are limited, and therefore the Green Ribbon Initiative recognizes the need to work in priority areas across the landscape. By targeting conservation actions within priority areas, Green Ribbon Initiative members can more efficiently protect the unique plants and animals of the region.

To begin, protecting the few remaining high quality patches is critical because so much of the Oak Openings has been severely degraded. These patches, called remnants, are home to the region's last remaining populations of lyre-leaved rock-cress, four-toed salamanders, lark sparrows, frosted elfin butterflies and other species that make this area unique. If these last holdouts are not protected or maintained in high quality condition, we risk losing these species from the area entirely. Already, we have lost over 30 species of plants, seven species of reptiles and amphibians, and seven species of birds from the region. When we protect the remaining high quality areas, the plants and animals within them can disperse to new areas as they are restored, expanding their populations. Therefore, the protection of high quality areas can help make restoration at nearby areas more successful.

Dr. Richard Bradley, The Ohio State University, examines a wolf spider burrow. Research helps us understand what Oak Openings species need to thrive.



R. BRADLEY

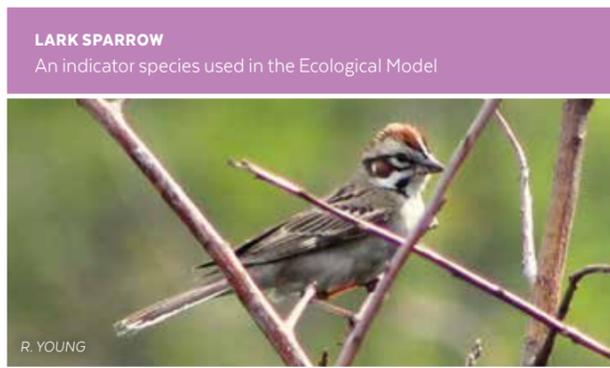
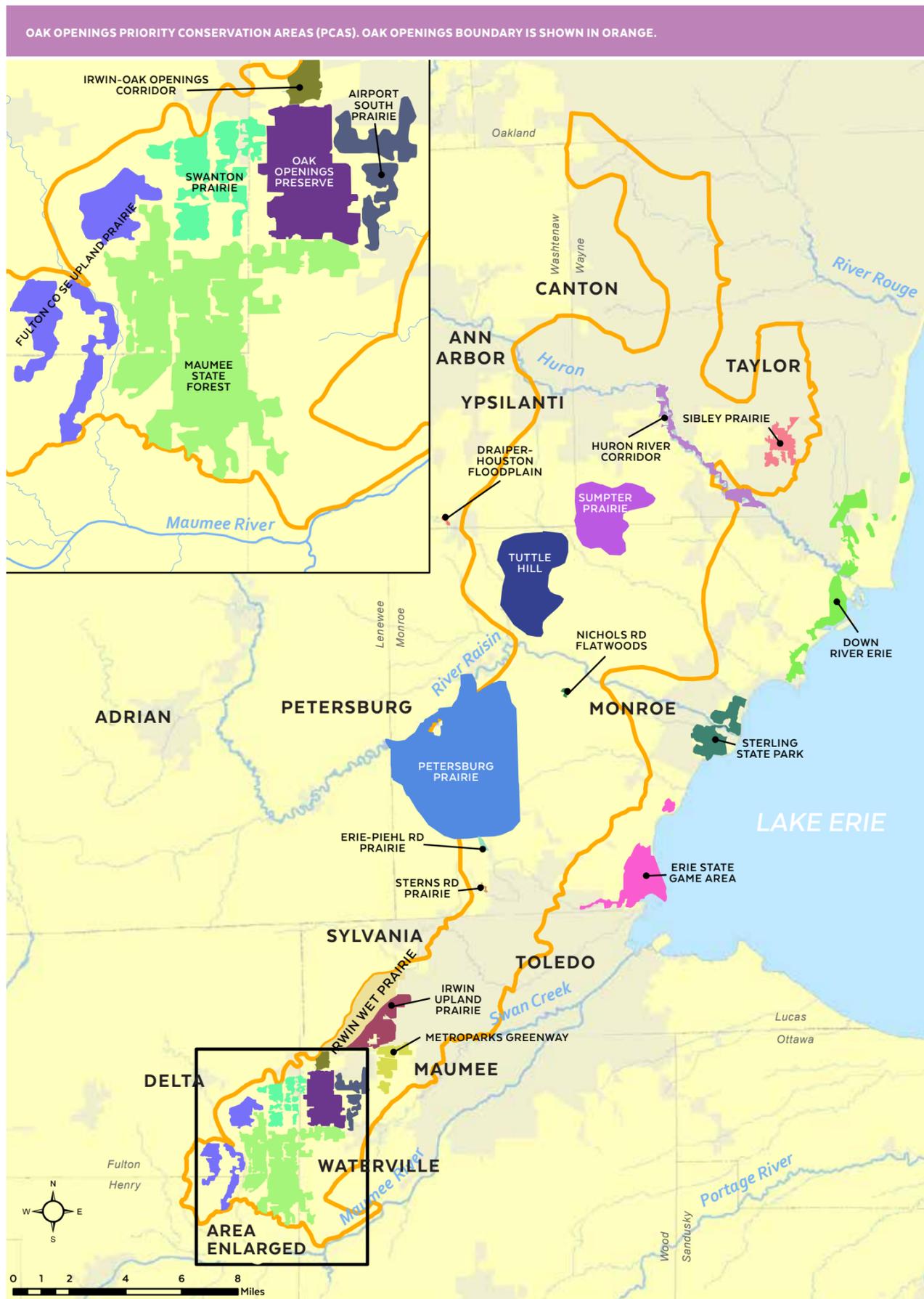
Unfortunately, protecting all of the remaining high quality areas of the Oak Openings is not sufficient to preserve the integrity of these communities or the services they provide in the long-term. Often, the remnants are very small, which renders them more vulnerable to threats such as disease, changes in water levels or invasive species. For example, if an invasive plant species is introduced to a very small Mesic Sand Tallgrass Prairie remnant, the entire remnant could be quickly degraded if the invasive plant is not immediately found and removed.

Therefore, because of the many limitations faced by high quality remnants, the restoration of degraded habitat near or between these remnants is critical. When carefully planned, restored habitat can act as corridor along which rare species can travel among remnants. Most species benefit when individuals can occasionally move from one population to another, bringing new genes, and traits, with them. Additionally, restoring degraded habitat can provide opportunities for extirpated species to return.



T. CRAIL

Orange fringed orchid, Virginia meadow beauty, black-eyed Susans, and dense blazing star bloom in response to restoration in the Irwin Wet Prairie PCA.



When restoring degraded lands, it is important to select areas that will provide a benefit to many species once restored. Otherwise, we risk sinking resources into areas that may support very few—or even no—species critical to Oak Openings communities. To address this, Green Ribbon Initiative supported a project to locate exactly where restoration would be most effective.

First, the Green Ribbon Initiative Science Subcommittee selected a suite of species that require healthy Oak Openings plant communities for their survival. These species, called indicator species, can indicate where high quality habitat remains. For example, where you find the federally endangered Karner blue butterfly, you are likely to find high quality Black Oak/Lupine Barren that is home to many other species requiring similar habitat.

Next, these same Subcommittee members identified the habitat requirements of each indicator species. Project leaders then used a computer mapping program to show where some or all of these habitat requirements were already being met. The result is referred to as the Oak Openings Ecological Model and can be viewed on the Green Ribbon Initiative website.

Areas that met *all* of the indicator species' habitat requirements were places that were already in good condition, such as portions of managed parks and preserves. These places may simply require low-intensity maintenance to retain their high quality and continue hosting populations of indicator species. Areas that met some of these habitat requirements were most likely to benefit an indicator species after moderate amounts of restoration.

Habitat requirement maps were then overlaid to determine where the greatest number of species would benefit from restoration. Other sources, such as Michigan's biodiversity planning process, also contributed to this process. The Green Ribbon Initiative Science Subcommittee members then outlined these areas on the map, selecting them as Priority Conservation Areas (PCAs). Not surprisingly, these areas often aligned with areas that conservation agencies had previously targeted for conservation. In many other cases, however, new hotspots of restoration potential were revealed. As a result, the Green Ribbon Initiative now has a detailed map that can help partners select specific parcels of land to benefit a specific suite of species.

Green Ribbon Initiative is now focusing its conservation efforts in these Priority Conservation Areas. Specific restoration goals are assigned to each PCA to ensure its rare communities are adequately protected. These goals are based on the Ecological Model and input from professionals who, through years of local experience, understand the strengths and limitations of conservation in the region.

Already, conservation partners are taking action to protect and enhance quality habitat in Priority Conservation Areas. Between 2012 and 2015, the amount of protected land in Sibley Prairie PCA has increased from 167 acres to 205 acres. Habitat corridors are being enhanced in the Irwin Wet Prairie PCA that will allow rare turtles to travel among Kitty Todd Nature Preserve, Wiregrass Lake Metropark and Irwin Prairie State Nature Preserve. Sustained, targeted action will ensure these and other rare species continue to call the Oak Openings home, while providing floodwater retention, groundwater recharge, and other benefits from nature for the people who call the region home.

The Green Ribbon Initiative is now working to identify organizations to lead conservation activity in each Priority Conservation Area. In this way, the task of identifying and leading specific projects is distributed among conservation players. This will also keep restoration in the hands of local agencies and volunteers. Given that the majority of the Oak Openings is privately owned, private landowners play an important role in protecting and restoring these areas. In what Priority Conservation Area do you reside, or which is your favorite to visit?

There are many ways to support conservation in areas important to you and to targeted wildlife: Chapter 11 provides guidance to those who wish to be a part of this movement. With collaboration and targeted efforts, we can all contribute to building our Green Ribbon.



INDICATOR SPECIES

Indicator species were selected based on their need for high quality Oak Openings habitats and availability of information regarding their habitat requirements. The first iteration of the Ecological Model focused on wet prairie, upland prairie, and upland savanna habitats. Future iterations will expand to include other Oak Openings communities and their indicator species.

Wet prairie species
Blanding's turtle, blue-spotted salamander, Wilson's snipe

Upland prairie species
Karner blue butterfly, grasshopper sparrow, lark sparrow

Upland savanna species
Eastern box turtle, red-headed woodpecker

COMBINING FORCES TO PROTECT THE OAK OPENINGS: HOW TO SAVE THE OAK OPENINGS

BY MICHELLE GRIGORE, Ph.D.



THERE IS
SOMETHING NEW
TO DISCOVER
ON EVERY
OAK OPENINGS HIKE

G. SYDLOWSKI

You are obviously interested in the Oak Openings Region, or you wouldn't have gotten this far into the guide.

The first chapters introduced the unique plants, animals and communities that make the Oak Openings home to hundreds of rare and endangered species. If you read Chapter 8, you also know that these species are in danger from invasive plants, habitat loss, ditching, drainage, and urban sprawl. This chapter will give you practical tips for helping to conserve and perhaps reintroduce Oak Openings specialties to your property.

The majority of the Oak Openings Region is in the hands of private landowners. As one of those owners, I take the responsibility for preserving the Oak Openings for the future very seriously. I have seen rare animals, like the Karner blue butterfly, disappear from within the preserves that were set aside to protect it. I know that the future of the Region depends on many private citizens, like myself, working with the conservation agencies that compose the Green Ribbon Initiative. They can't do it alone; there is too little land set aside and too many demands on their limited resources. How can a private landowner help save the Oak Openings? There are several things you can do, including:

- Managing your property for existing Oak Openings habitat
- Creating new habitat through seeding and planting
- Registering significant parcels through the Oak Openings Registry
- Volunteering to help in the nature preserves
- Educating your neighbors about their critical role in preserving the Oak Openings
- Considering a conservation easement



NATIVE SEEDS MAY ALREADY BE LYING DORMANT IN YOUR YARD, AWAITING THE RIGHT CONDITIONS TO EMERGE

MANAGING YOUR PROPERTY

You may already have significant Oak Openings habitat on your property, but the pressures from adjacent parcels, woody growth and invading exotic plants will quickly diminish its conservation value. Cutting or chemically treating woody shrubs and exotic plants annually (see Chapter 8) is critical for maintaining the open prairies and barrens of the Oak Openings. Oak savannas also need selective cutting of under story growth if no fire has been through the woods. As a private homeowner, your chance of using fire as a management tool is slim. We'll leave that to the major preserves and trained personnel. But anyone can grab a mower, a set of loppers or an axe and make short work of the woody plants that fire would normally eliminate.

Some plants, like the Russian olive shrub in my home prairie, just keep sprouting back after cutting. Here, you can apply an herbicide labeled for woody plants (like glyphosate, triclopyr or dicamba) to the leaves or cut stump of undesirable plants. Follow the instructions on the label and be sure to wear protective clothing and chemical resistant gloves. In some cases, where Canada thistle is the plant to remove, you may have to resort to a "broad leaf weed killer" which has 2,4,D as an active ingredient. This chemical lasts longer in the environment than glyphosate and may be harmful to humans and pets if used improperly, so use it judiciously and follow the instructions on the label. The focus when using herbicides is to apply one that will have minimal environmental impact, is labeled as effective on the species you want to kill, and to use an application method that doesn't spread herbicide to surrounding desirable species or waterways.

If you have wet prairie areas on your property, don't add ditches to the site that will carry the precious water away. You are fortunate to have a tiny portion of what was once a vast wetland in the Oak Openings. Depending on the site conditions, you may be able to encourage water to stay longer on the site and create the important wetland conditions necessary for amphibians, spotted turtles and wet prairie plants.

CREATING NEW HABITAT

There is a science called "Restoration Ecology" that deals with creating natural habitat like prairie, barren and oak savanna. Through many years of study, well-documented techniques have been developed and outlined in publications like "The Tallgrass Restoration Handbook" by Packard and Mutel or "Planting the Seed: A Guide to Establishing Prairie and Meadow Communities in Southern Ontario" which can be found online.

You can also see a great Oak Openings home demonstration garden and get information on how to create one at Kitty Todd Nature Preserve. As a brief summary, you need to consider the following as you create Oak Openings habitat on your property:

1. How do you eliminate the existing plant cover? If there are a lot of bare sand areas, you may be able to place seed or plants directly into the existing plant cover on your restoration site (called inter-seeding). Otherwise, you'll need to remove or turn over the existing sod cover or kill it with a chemical herbicide (bare ground method). The bare ground you create will be a haven for weed seeds, and you'll see them grow thickly in the first few years.

2. How do I control weeds in the first years of restoration? A prairie will take three to five years to become established. During that time, you'll most likely need to provide some weed control by mowing in the spring at 12 inches above the ground or chemically treating areas with noxious weeds like Canada thistle. If you mow in June, you'll cut off some of the prairie plants that you want to establish. They typically grow June - August, although some species, like lupine may start their growth in April, and others like gentians, may finish their growth in October.

3. Where do I get the plants for my restoration? If you are in the Oak Openings, especially if you are near a nature preserve or in a connecting corridor to a nature preserve, you need to get local plants and seed to conserve our special plants. Prairie seed from Illinois or Wisconsin may not contain the unique genetic codes that our local Oak Openings plants have. Check the Appendix for local sources of seed and plants. Please DO NOT take them from the preserves.

4. How do I plant a prairie? Seed can be spread by hand or machine in spring or late fall right on the surface of the bare ground or placed carefully between existing plants if inter-seeding. Plants can be purchased as small "plugs" and planted like any garden plant, although a long-handled bulb planter makes a big job easier on the back. A cover crop of annual grass or oats is usually planted with the prairie seed to reduce weed growth the first year or so.

5. What about the Oak Opening animals and insects? If you create habitat, they will come. Butterflies, moths, reptiles and amphibians, grassland birds and common mammals have all moved into the restored prairie at my home. They are often waiting on the fringe, looking for new habitat to live in as suitable territory shrinks.



ADOPT A NATURAL AREA NEAR YOU!



A RAIN GARDEN COLLECTS AND FILTERS RAIN WATER WHILE ALSO ADDING COLOR TO YOUR YARD

BECOME PART OF A CONSERVATION TEAM

You can join a network of homeowners in the Oak Openings who are preserving the best of the Region on their properties. The Oak Openings Landowner Registry, a part of the Green Ribbon Initiative, is a great way to get knowledgeable advice and help from others. The program involves a site visit to document the rare habitat on your property, a commitment from you to maintain this habitat, and contact with other landowners and local experts to help you accomplish this goal. See the Call to Action box below for more information.



CALL TO ACTION



Join the **Oak Openings Landowner Registry**. This is a voluntary program designed to recognize regional landowners who have sensitive species or high quality habitat on their properties, or who are working to restore these to their land.



Share the region's beauty with friends by tagging stories, photos and videos with **#oakopenings** or **#blueweek**



Sign up with friends, family, or coworkers for the **Adopt a Natural Area** program. A Green Ribbon Initiative Partnership Specialist will guide you in the selection and management of a natural land near you!

Volunteer Land Stewards

The public and private preserves in the Oak Openings are working toward substantial habitat protection and restoration goals. Much of the work involves manpower to cut and remove invasive plants and collecting seed needed for future restoration work. Most organizations that are a part of the Green Ribbon Initiative can use your help. Contact them for the latest volunteer work project dates and locations by using the information in the Appendix.

Educating Your Neighbors

With so many pressures and people, conflicting uses and habitat loss, the Oak Openings' future is in real jeopardy. Rare species disappear from within the existing preserves, new landowners remove native habitat through ignorance, and governmental leaders create land use plans without thinking about their impact on this important natural area. You can be a voice for the Region and join with others to help spread the word about this gem in our backyard. Look in the Appendix for conservation groups and resources to help you.

Consider a Conservation Easement

You can make a permanent decision to preserve your property through a conservation easement. This easement is a deed restriction placed on a piece of property to protect resources associated with that parcel forever. A conservation easement is different for each parcel, but usually restricts building construction, land subdivision, access and timber or mineral harvesting. The easement can cover the entire property or only a portion based on the landowners wishes. The organizations who hold the easement, and make sure it is upheld by future owners, are local governmental agencies and land trusts.

How does an easement work? As a fee simple owner of your property, you have a "bundle" of rights: the right to sell your property, to mineral rights, to timber rights, to build on or subdivide the property under local laws. A conservation easement lets you deed over some of those rights, like the right to subdivide or timber, without giving up ownership of the property. Your property is less valuable upon resale because of the easement, so it may be possible to claim a tax deduction at the time of donation and even reduce your property tax liability. Easements are usually donated to land trusts, but some are purchased by governmental agencies.



AMELIA JACKSY AND BLUE LUPINE IN 2005 AND 2015
The Oak Openings are a part of our heritage, to be protected for the benefit of generations now and to come.

BENEFITS OF RESTORING NATIVE PLANT COMMUNITIES

Restoring native plant communities and wildlife habitat has benefits that are both local and immediate, and also broad and long-term. Consider the following:

- Healthy Oak Openings plant communities provide habitat that the region's rare species need to persist. They can also provide habitat for species that people like to view or hunt, such as turkey or deer.
- A diversity of native flowers can help bring colorful butterflies and hummingbirds to your garden for your viewing pleasure.
- Healthy prairies and forests can store carbon by absorbing it from the atmosphere and using it to build plant leaves and roots, thereby reducing greenhouse gases.
- Native plant communities save time and money over the long term: they do not require regular watering or fertilizing, and only need occasional mowing or invasive plant removal.
- Wetlands retain storm water and recharge groundwater sources without the cost of building additional infrastructure.
- Wetlands filter out sediment and nutrients from water, which ultimately improves water quality in the rivers and lakes where we swim, fish, and obtain drinking water.
- Natural areas provide opportunities for people to improve their personal lives. Much research now suggests that spending time in a natural outdoor setting can improve mental health and reduce stress and anxiety.

What's in an easement? Each conservation easement is crafted to fit the donor's and easement holder's needs, but common items include the time length (which can be less than perpetual), boundaries, limitations on land use, contact information about the easement holder, any fee donated to the conservation agency to maintain the easement over time, and the requirement to update the deed to reflect the new easement.

Whom do I contact? See the Appendix to find an organization that can provide you with information and hold your conservation easement.

Are there other options? Landowners may want to consider making a donation or sale of their Oak Openings property to a land trust or conservation group. It is usually possible to continue to live on your land until death with a "life estate" or "life lease" clause. Donations of land to recognized non-profit organizations can generate significant tax benefits and savings including federal income tax, estate tax and property tax assessment. But philanthropy and the desire to preserve the property for future generations is usually what drives a landowner to consider donation as a preservation option.

APPENDIX

CONSERVED SPACES & CONSERVATION AGENCIES OF THE OAK OPENINGS

The only thing more diverse than the region's plant and animal communities is the list of parks and activities to explore. Mark the experiences as you enjoy them, and add your own!



HURON-CLINTON METROPARKS

LOWER HURON METROPARK

Lower Huron Metropark covers 1,258 acres and has an 18-hole golf course, hike-bike trails and two self-guided nature trails. It is the northernmost of a trio of Metroparks (Lower Huron, Willow, and Oakwoods) along the Huron River in Metro Detroit.

40151 EAST HURON RIVER DRIVE, BELLEVILLE, MI 48111

Agency: Huron-Clinton Metroparks

Experiences:

- Go fishing from the shoreline or from canoe within the Huron River
- Ice-skate on frozen ponds during the winter months
- Start a bike ride here and continue all the way to Oakwoods Metropark



TOLEDO METROPARKS

OAK OPENINGS PRESERVE

The largest Toledo Metropark at over 4,000 acres, this park takes its name from the surrounding region, which is many times larger than the preserve. Prickly-pear cactus, wild lupine and sand cherry bloom atop dry, hot sand dunes just yards away from orchids growing in low, wet swales. A birder's paradise, it is the nesting place of bluebirds, indigo buntings, whippoorwills and many other species, as well as an excellent location to see migrating songbirds in the spring.

4139 GIRDHAM ROAD, SWANTON, OH 43558

Agency: Metroparks of the Toledo Area

Experiences:

- Take in the fall colors along the 17-mile long scout trail
- Experience the sunset from a bench atop Girdham dunes
- Discover the largest population of lark sparrows in the region by exploring the preserve's Midwest Sand Barrens



TOLEDO METROPARKS

SECOR METROPARK

At the interface between Oak Openings and the Great Black Swamp, a winding road through towering tulip trees and swamp white oaks welcomes you to the 627-acre Secor Metropark. Tall timber gives way to second growth forest, wet thickets and open meadows and prairies.

10001 W. CENTRAL AVE, BERKEY, OHIO 43504

Agency: Metroparks of the Toledo Area

Experiences:

- Pick out your favorite photo of the Oak Openings at the National Center for Nature Photography
- Play at the natural features playground
- Cross country ski on the five-mile trail



HURON-CLINTON METROPARKS

OAK WOODS METROPARK

Oakwoods Metropark is in the Huron-Clinton Metropark system of Metro Detroit. Here, you can enjoy the scenic woods and picturesque Huron River. The Nature Center with live exhibits and surrounding trails are the centerpiece of this 1,756-acre Metropark.

32911 WILLOW RD., FLAT ROCK, MI 48134

Agency: Huron-Clinton Metroparks

Experiences:

- Look for green and great blue herons while canoeing the Lower Huron
- Count how many different species of butterflies you can find on the Butterfly Trail in June
- Sign up for programs at the Nature Center



TOLEDO METROPARKS

WILDWOOD PRESERVE

The prairie community at Wildwood provides critical habitat for many prairie species including ground-nesting birds such as rufous-sided towhees, field sparrows and American woodcock. Summer brings a spectacular display of prairie wildflowers and grasses, such as rough blazing star, big bluestem and Indian grasses, some reaching 10 feet high.

5100 W CENTRAL AVE, TOLEDO, OH 43615

Agency: Metroparks of the Toledo Area

Experiences:

- See the tree that inspired the Metroparks logo
- Witness the summertime wildflowers
- Experience the Ottawa River floodplain and a rare ravine along the Blue Trail



HURON-CLINTON METROPARKS

WILLOW METROPARK

The Huron River runs through the middle of Willow Metropark. The park boasts an 18-hole golf course, a skatepark, a 17-acre pond, a hike-bike trail, a disc golf course and children's play area. Boat and bike rentals are available near Washago Pond, which is also available for fishing.

23200 S. HURON RD., NEW BOSTON, MI 48164

Agency: Huron-Clinton Metroparks

Experiences:

- Watch for hawks and eagles along the river during fall migration
- Look for woodpeckers while enjoying a round of golf
- Bike the paved trail through Oak Openings habitat, keeping an eye out for wildflowers mentioned throughout this book!



J. THIEME

WIREGRASS LAKE

Opened in 2015, Wiregrass Lake offers an opportunity for kayaking, canoeing, paddle boarding, and fishing. The restored natural areas include rare wet prairie, a variety of dragonflies and other prairie insects, and beautiful sunset views.

421 NORTH EBER RD, HOLLAND, OH 43528

Agency: Metroparks of the Toledo Area

Experiences:

- Fish with your kids from the shoreline or dock
- Watch for shooting stars while camping at the rustic campsites
- Enjoy a canoe or kayak outing



TOLEDO METROPARKS

BLUE CREEK METROPARK

Much of this 579-acre park was part of a limestone quarry in the mid- to late- 1800's. The area contains glacial grooves, a pond, a wetland and a globally rare limestone glade. This is where Metroparks of Toledo Area propagates seed for use in restoration. A portion of the park is open for daily use, 7am until dark.

WATERVILLE-NEAPOLIS ROAD AT SCHADEL RD, WHITEHOUSE, OH 43571

Agency: Metroparks of the Toledo Area

Experiences:

- Volunteer to collect and grow native plant seeds
- Learn how restoration can restore water quality at the restored wetlands and two-stage ditch
- View limestone bedrock and glacial grooves



J. THIEME

PETERSBURG STATE GAME AREA

This 484 acre site contains wet prairies and sand barrens and provides public hunting access. The area is also known as the Minong prairie and hosts plants and animals found nowhere else in Michigan.

PARKING: LAT 41° 52' 48"N, LONG 83° 41' 34"

Agency: Michigan Department of Natural Resources - Division of Wildlife

Experiences:

- Hunt turkey during spring and fall
- Gather mushrooms and sauté them up with fresh veggies from your garden or farmer's market
- See the wild lupine bloom in May



J. THIEME

MAUMEE STATE FOREST

The Maumee State Forest is the only state forest in northwest Ohio. It is composed of many parcels throughout Lucas, Fulton, and Henry counties. The area contains hardwood forest, swamp forest, pine forest, and wet prairie.

3390 COUNTY ROAD DSWANTON, OH 43558

Agency: Ohio Department of Natural Resources - Division of Forestry

- Experiences:**
- Take photos of frogs and turtles in vernal pools throughout the forest
 - Take your horse for a ride along eight miles of bridle trails
 - Witness the mid-summer bloom of blazing star at the muck farm, located at 1344 County Rd 2, Liberty Center, OH 43532



G. SYDLOWSKI

SYLVAN PRAIRIE PARK

Sylvan Prairie Park is TOPS's largest park at 230 acres. This park is being rehabilitated into meadow and wetlands. It boasts bike riding on the 5.5 mile quarry ridge trail, a playground and fishing in 2 small lakes.

8601 BRINT ROAD, SYLVANIA, OH 43560

Agency: The Olander Parks System (TOPS)

- Experiences:**
- Come sledding in the winter
 - See the beaver lodge in Willow Lake
 - Watch fireflies on a summer night



OHIO DNR

IRWIN PRAIRIE STATE NATURE PRESERVE

The 226 acre Nature Preserve is a mosaic of distinctive plant communities based on variations in water table levels. The core is the finest remaining sedge meadow in the state dominated by several species of sedges, rushes and wetland grasses.

10009 W. BANCROFT AVE., HOLLAND, OH 43528

Agency: Ohio Department of Natural Resources - Division of Parks and Natural Resources

- Experiences:**
- See sandhill cranes and blue herons hunting frogs in May
 - Listen to deafening chorus frog on an April night
 - See how many plants from this book you can identify in Ohio's finest sedge meadow



WAYNE COUNTY PARKS

CROSSWINDS MARSH INTERPRETIVE PRESERVE

Crosswinds Marsh is a man-made wetland built to replace wetlands that were paved over during the Detroit Metro Airport's expansion in the mid-1990's. The park contains several miles of hiking and equestrian trails. Additionally, a boardwalk extends across the marshes and is a great place from which to fish and watch wildlife and sunsets.

27600 HAGGERTY RD, NEW BOSTON, MI 48164

Agency: Wayne County Parks

- Experiences:**
- Hike seven miles of nature trails
 - Fish for bass, channel catfish, and sunfish with your kids
 - Watch the resident pair of bald eagles



T. CRAIL

LOU CAMPBELL STATE NATURE PRESERVE

Named after a local naturalist and outdoor writer, this 210-acre preserve features a surprising variety of habitats including wet sedge meadows, swamp forest, sand dunes, sand barrens prairie and oak openings.

2742 S. CRISSEY RD., HOLLAND, OH 43528

Agency: Ohio Department of Natural Resources - Division of Parks and Natural Resources

- Experiences:**
- Rest on the dock to watch ducks dabble on the pond
 - Explore the life in numerous vernal pools
 - Enjoy a serene view from under massive oaks while northern blue flag iris bloom in the spring



J. THIEME

WHITEFORD TOWNSHIP COMMUNITY PARK

In addition to baseball diamonds, this park contains a 14-acre natural area of unique clay/limestone prairie unlike any found elsewhere in the region.

7100 WHITEFORD RD, OTTAWA LAKE, MI 49267

Agency: Whiteford Township

- Experiences:**
- Attend Community Days on the second weekend of September
 - Search for rare Oak Openings birds, such as the blue grosbeak
 - See towering chinquapin oaks



C. SCOTT

SIBLEY PRAIRIE NATURE PRESERVE - WEST RD. PRAIRIE

This new 39 acre preserve gives you a glimpse of the Sibley Prairie, which is known statewide for its incredible plant diversity. Trails at the site are open whenever water levels allow, and allow you to explore wet prairie and wooded wetlands.

NORTH SIDE OF WEST RD NEAR THE INTERSECTION OF WEST RD AND ARSENAL RD.

Agency: Southeast Michigan Land Conservancy

- Experiences:**
- Watch colorful dragonflies hunt for insects to eat. What are they catching?
 - Search for gray tree frogs among the oaks
 - Look for blazing star and culver's root blooming in this rare lakeplain prairie remnant



R. SCHIEBER

KITTY TODD PRESERVE

It feels like stepping back in time to visit the Kitty Todd Preserve and see the pristine wet prairie and oak savanna. Established in 1976 to preserve some of the highest quality remaining Oak Openings habitat, the 1,060 acre preserve is the heart of conservation in the region. The preserve gate is open during business hours, but the trails may be accessed during all daylight hours.

10420 OLD STATE LINE RD SWANTON, OH 43558

Agency: The Nature Conservancy

- Experiences:**
- Watch red headed woodpeckers glide through the savanna.
 - Enjoy a family picnic at the Bill Sullivan Memorial Pavilion
 - Make a difference by volunteering to restore this globally rare ecosystem



T. CRAIL

EXPLORE, LEARN, AND PLAY IN THE OAK OPENINGS

CONTACT LIST

Below are agencies involved in the protection and restoration of Oak Openings habitat and the education of its residents and visitors.

Many of these agencies perform additional conservation work outside of the Oak Openings. The checklist below reflects the type of work conducted within the bounds of this great region. Use this list to find the appropriate contact for your needs, such as contracting restoration on your property or donating a conservation easement.

GRI INVOLVEMENT:

- S = Steering committee
- M = Formal member
- W = Working group/subcommittee
- P = Partner

STATES SERVED

-  = Ohio
-  = Michigan

AGENCY	PRIVATE	PUBLIC	GRI INVOLVEMENT	OWNS CONSERVATION LAND	HOLDS CONSERVATION EASEMENTS	STAFF/MEMBERS CONDUCT HABITAT RESTORATION	CONDUCTS RX FIRE	PROVIDES RESTORATION SERVICES FOR HIRE	REHABILITATES WILDLIFE	PROPAGATES NATIVE PLANTS	SELLS OR DISTRIBUTES NATIVE PLANTS OR SEEDS	CONDUCTS RESEARCH
 Black Swamp Bird Observatory	●		S									X
 Black Swamp Conservancy	●		S		X					X		
 Bowling Green Parks and Recreation		●	M	X		X						
 Bowling Green State University		●	M									X
 Huron Clinton Metroparks		●	M	X		X	X					X
 Lucas County Soil and Water Conservation District		●	P		X							
 Metroparks of the Toledo Area		●	S	X		X	X			X		X
 Michigan Dept of Environmental Quality		●		X	X			X				
 Michigan Dept of Natural Resources and the Environment		●	M	X		X	X					
 Michigan Nature Association	●			X	X	X						
 Natural Resources Conservation Service (NRCS)		●	W		X							
 Nature's Nursery	●		P						X			X
 Oak Openings Region Conservancy	●		S	X		X						
 Ohio Bird Conservation Initiative	●		M									
 Ohio DNR - Division of Forestry		●	S	X		X	X					X
 Ohio DNR - Division of Natural Areas and Preserves		●	S	X	X	X	X					X
 Ohio Prairie Association	●		P									
 Ohio State University - Lucas County Extension		●	W									
 Partners for Clean Streams	●					X						

*Excluding conservation easements ** Upon request

IRWIN STATE NATURE PRESERVE IS ONE OF MANY PLACES TO WATCH BEAUTIFUL SUNSETS IN THE OAK OPENINGS



T. CRAIL

OPERATES DEVELOPED PARKS AND PLAY AREAS (E.G., SWINGS, BALL FIELDS)	HOLDS EDUCATIONAL PROGRAMS FOR PUBLIC	COORDINATES VOLUNTEER OPPORTUNITIES	MANAGES AGRICULTURAL CONSERVATION PROGRAMS ON PRIVATE PROPERTY*	LEADS URBAN SUSTAINABILITY PROGRAMS	PROVIDES GUIDANCE TO IMPLEMENTING RESTORATION OR GREEN INFRASTRUCTURE	CONTACT
	X	X				 13551 W. State Route 2, Oak Harbor, OH 43449  419.898.4070
	X	X				 P.O. Box 332, Perrysburg, OH 43552  419.833.1025
X	X	X			X	 1245 W. Newton Rd., Bowling Green, OH 43402  419.354.6223
						 BGSU, Bowling Green, OH 43403  419.372.2531
X	X	X				 13000 High Ridge Drive, Brighton, MI 48114  810.227.2757
			X		X	 130-A West Dudley, Maumee, OH 43537  419.893.1966
X	X	X			X	 5100 W. Central Ave., Toledo, OH 43615  419.407.9701
	Assist				X	 27700 Donald Ct., Warren, MI 48092  586.753.3700
		X			X	 37205 Mouillee Rd., Rockwood, MI 48173  734.379.9692
	X	X			X	 2310 Science Parkway, Ste 100., Okemos, MI 48864  517.580.3021 or 866.233.2231
			X		X	 419.893.1966 x3
	X	X				 www.natures-nursery.org  419.877.0060
	X	X				 facebook.com/OakOpeningsRegionConservancy
	X			X		 Attn: OBCI, P.O. Box 21370, Columbus, OH 43221  614.432.8489
	X**		X	X		 2045 Morse Rd. H-1, Columbus, OH 43229  614.265.6694
	X	X			X	 26093 County Rd F, Archbold, OH 43502  419.445.1775
	X	X				 ohioprairie@aol.com
	X				X	 One Government Center Ste 550, Toledo, OH 43604  419.213.4254
	X	X				 PO Box 203, Perrysburg, Ohio 43552  419.874.0727

AGENCY	PRIVATE	PUBLIC	GRIN INVOLVEMENT	OWNS CONSERVATION LAND	HOLDS CONSERVATION EASEMENTS	STAFF/MEMBERS CONDUCT HABITAT RESTORATION	CONDUCTS RX FIRE	PROVIDES RESTORATION SERVICES FOR HIRE	REHABILITATES WILDLIFE	PROPAGATES NATIVE PLANTS	SELLS OR DISTRIBUTES NATIVE PLANTS OR SEEDS	CONDUCTS RESEARCH
 Pheasants Forever	●		P			X		X				
 Ruffed Grouse Society	●							X				
 Southeast Michigan Council of Governments		●										
 Southeast Michigan Land Conservancy	●		M	X	X	X						
 The Nature Conservancy	●		S	X		X	X	X				X
 The Olander Parks System		●	S	X		X	X			X		X
 The Stewardship Network - Lakeplain Cluster	●		M									
 Toledo Botanical Gardens	●		M							X	X	X
 Toledo Lucas County Sustainability Program		●										
 Toledo Metropolitan Area Council of Governments		●				X		X				
 Toledo Naturalists Association	●		S									X
 Toledo Zoo	●		S									X
 University of Michigan - Ann Arbor		●	P									X
 University of Michigan - Dearborn		●	P									X
 University of Toledo		●	P			X				X	X	X
 Wayne County Parks		●		X		X						
 Whiteford Township		●	P	X								
 Wild Ones - Oak Openings Region Chapter	●		S								X	

*Excluding conservation easements

OPERATES DEVELOPED PARKS AND PLAY AREAS (E.G., SWINGS, BALL FIELDS)	HOLDS EDUCATIONAL PROGRAMS FOR PUBLIC	COORDINATES VOLUNTEER OPPORTUNITIES	MANAGES AGRICULTURAL CONSERVATION PROGRAMS ON PRIVATE PROPERTY*	LEADS URBAN SUSTAINABILITY PROGRAMS	PROVIDES GUIDANCE TO IMPLEMENTING RESTORATION OR GREEN INFRASTRUCTURE	CONTACT
						www.michiganpheasantsforever.org (MI) facebook.com/wlpfohio (OH)
					X	☎ 888.564.6747
				X		📍 1001 Woodward Ave, Suite 1400, Detroit, MI 48226 ☎ 313.961.4266
	X	X				📍 8383 Vreeland Rd, Superior Twp, MI 48198
	X	X			X	📍 10420 Old State Line Rd, Swanton, OH 43558 ☎ 419.867.1521
X	X	X			X	📍 6930 Sylvania Ave., Sylvania, OH 43560 ☎ 419.882.8313
	X	X			X	📍 416 Longshore Drive, Ann Arbor, MI 48105 ☎ 734.395.4483
	X			X	X	📍 5403 Elmer Dr., Toledo, OH 43615 ☎ 419.536.5569
	X			X	X	📍 Board of Lucas County Commissioners, One Government Center, Suite 800, Toledo, OH 43604 ☎ 419.213.4530
				X	X	📍 300 Martin Luther King Jr. Dr., Ste. 300, Toledo, OH 43604 ☎ 419.241.9155
	X	X				www.toledonaturalist.org
X	X	X		X	X	📍 2 Hippo Way, Toledo, OH 43614 ☎ 419.385.4040
						📍 3600 Varsity Drive, Ann Arbor, MI 48108 ☎ 734.615.6200
						📍 4901 Evergreen Rd., Dearborn, MI 48128 ☎ 313.593.6743
	X	X				📍 2801 West Bancroft St., Toledo, OH 43606 ☎ 419.530.2009
X	X					📍 33175 Ann Arbor Trail, Westland, MI 48185 ☎ 734.261.1990
X	X					📍 8000 Yankee Rd Ste. 100, Ottawa Lake, MI 49267 ☎ 734.854.2416
	X	X		Assists	X	www.oakopenings.wildones.org ✉ wildonesoakopeningsregion@gmail.com



A. WEBER

BLUE LUPINE AND PLAINS PUCCOON



T. CRAIL

SUNSET OVER IRWIN PRAIRIE STATE NATURE PRESERVE



DENSE BLAZING STAR IN A MIDWEST SAND BARREN'S MORNING MIST

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