LONG THE SHORELINE

"The natural beauty of the region lying between Lakes Erie and Huron has been recorded by all the early travelers, with words of admiration. Many of the islands were low, and ome of the river margins scarcely above the vater. But all was green and peaceful. Dark orests extended to the river edge, and many a tall monarch of the wood waved its gigantic arms over the brink, and was reflected in the glassy surface which not tide or flood ever disturbed. The marshes were luxuriant with wild rice that furnished a sumptuous repast to a great ariety of birds and waterfowl, and even a welcoming supply o the Indians. Occasional villages and bark wigwams nlivened the shore, surrounded with gardens and cornfields, nd the most elevated points were crowned with burial rounds. Most of the shores had high banks and were overed with timber."

–Bela Hubbard, a historical address in 1879 marking the bicentennial of the discovery of Lake St. Clair by LaSalle in 1679.


ERNIE BERGEN


DAN PAVUCK


ANDREW FOOT


ANNE C. HAMMERSCHMIDT

(Above left) The great egret (Ardea alba) hunts in the shallows of the coastal marshes throughout the Lake Huron to Lake Erie Corridor, feeding on fish, frogs, small mammals and birds. The great egret nested on Stony Island in the Detroit River from the late-1940s to 1978, but abandoned that site due to high water and industrial activity.(Above) Dawn at the mouth of the Thames River at Lake St. Clair.

ft) Brighton Beach in West Windsor, Ontario is one of the last natural shorelines on the Detroit River. (Right) Twenty cent of the Canadian shoreline and 87 percent of the Michigan shoreline along the Detroit River have been modified with eheading and other shoreline hardening structures. As a consequence, in Michigan, only three percent of the original stal wetlands remain in the Detroit River.

Prior to European settlement, the shoreline of the Lake Huron to Lake Erie corridor looked very different than it does today. Extensive Great Lakes marshes skirted the shoreline, especially along Lakes St. Clair and Erie. Upland from these marshes there was generally hardwood swamp on poorly drained clay soils and beech-maple forest on better-drained sites. Tallgrass prairie and oak savanna grew in the lakeplain's sandy areas.

Great Lakes Coastal Marsh

Great Lakes coastal marsh is a wetland ecosystem distinct to the Great Lakes. It is the most productive natural system in Earth's temperate zones, providing habitat for mammals, waterfowl, shorebirds, songbirds, reptiles, amphibians, fish, insects, crustaceans and many plant species.

"All the rivers and creeks enter from both sides, through low, swampy land covered with folle avoine, or wild oats. This aquatic grain, though thus named, is nevertheless essentially different from either oats or rice; no vegetable that I ever seen, has a more beautiful appearance than is exhibited by the immense marshes, covered with folle avoine; it is now in blossom, exhaling a peculiarly pleasing fragrance."

–William Darby, 1819, describing the Ontario and Michigan shorelines on the Detroit River.


AMELIA HANSEN CORVUS ART

The aquatic plant, "folle avoine," of which American geographer William Darby wrote is wild rice (*Zizania aquatica*) and once was common in the region's coastal marshes. Wild rice is very sensitive to changes in water flow. As a result of major shoreline alterations, it no longer thrives. In fact, today it is listed as a threatened plant species in Michigan.

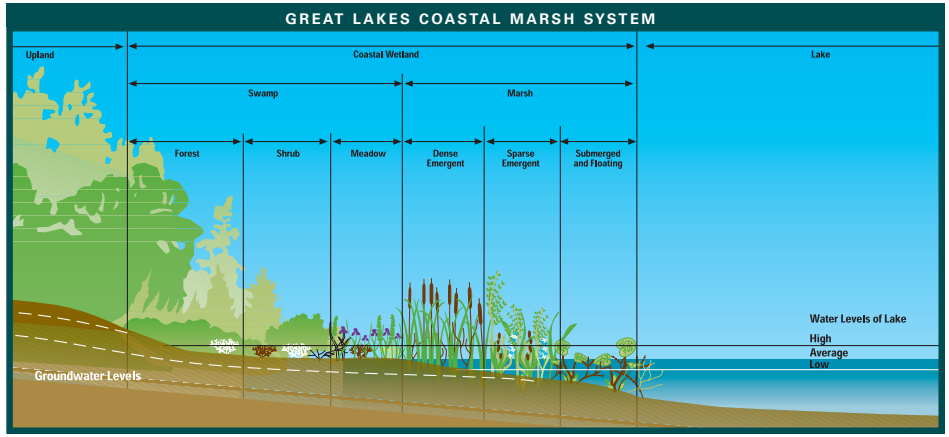
Great Lakes marshes are dynamic systems. Since their topography is almost flat, they are highly influenced by fluctuating Great Lakes water levels. This is especially true in the St. Clair River Delta where a change of only a few inches greatly affects the size and position of wetlands. In high-water years, strong on-shore winds produce s ufficient wave action to uproot plants and cause erosion. In low-water years, marsh habitat becomes more abundant. Changing water levels often cause dramatic shifts in vegetation in a short period of time, shaping the abundance and diversity of habitat available to wildlife. Mudflats appear in the shallows of coastal marshes when the water is low. Mudflats provide habitat for shorebirds that stop to rest and feed during migration. They use their long, pointed bills to probe exposed soil for insects and other invertebrates.


ALLEN CHARTIER

The American lotus* (Nelumbo lutea) *is a floating plant of coastal marshes in the lower Detroit River and western Lake Erie. Its exotic-looking white blossoms inspire the Lotus Garden Club of Monroe, which works to help ensure there is good habitat for this threatened plant species in Michigan.


MARIE BOYLE

The large pink flowers of the swamp rose mallow* (Hibiscus moschetos) *grace the fringes of coastal marshes. Lake Erie Metropark in Michigan is a good place to view them during the summertime.



The Great Lakes coastal marsh system provides a wide range of habitats: mudflats, emergent and submergent wetlands, wet meadows, and tree and shrub swamps. Each zone is occupied by a different plant community, each of which supports a different animal community.

...EPTILES AND AMPHIBIANS AT RISK

...ptiles of the region are snakes and ...tles. Amphibians are frogs, skinks, ...yts and salamanders. Both reptiles ...d amphibians rely on water and land ...bitats for survival. For turtles, the ...nection between the aquatic wetlands where they feed, and the uplands where they nest, is critical. Unfortunately, roads and development have fragmented habitats and disrupted this connection. Wildlife is forced to cross roads, resulting in high mortality rates. Overall, reptile and amphibian populations are declining due to habitat destruction, pollutants that cause birth defects, and nest predation by raccoons and other suburban wildlife.

JOHN SCHAFER

...eastern fox snake* (Elaphe vulpina gloydi) *lives in coastal marshes and ...ociated wet meadows. This harmless snake may have a copper-colored ...d and will vibrate its tail when disturbed; thus it is often mistaken ...a venomous snake and needlessly killed by fearful people. Historical ...ongoing habitat destruction and persecution have greatly reduced ...tern fox snake numbers.

JOHN SCHAFER

The spotted turtle* (Clemmys guttata) *has distinctive yellow dots on its head and shell that make it easy to identify. This animal inhabits clean, shallow waters with a soft bottom, such as sedge marshes, sphagnum seepages, and fens. They feed on insects, mollusks, crayfish, and other aquatic organisms. Historically, this small, secretive aquatic turtle was fairly common in its specialized habitats throughout southern Michigan and Ontario; however, illegal collection for the pet trade and habitat loss now make it rare.

JAMES H. HARDING

JAMES H. HARDING

The Eastern spiny softshell turtle (Apalone spinifera spinifera) has a distinctive olive colored shell that is flat and leathery looking. It lives in rivers, lakes, and marshes that have soft-bottoms and can be seen basking on logs, rocks, riverbanks, and sandbars.

Rare Birds Dependent on Coastal Marshes find Habitat in the Lake Huron to Lake Erie Corridor

JOHN SCHAFER

Despite being the size of a chicken, the king rail (*Rallus elegans*) is one of the most secretive marsh birds and is not often seen. The king rail nests throughout most of the eastern U.S. and is a permanent resident of the south. The Lake Huron to Lake Erie Corridor lies within the northern edges of its range. King rails were abundant in the area around 1900, especially along the Detroit River and Lake Erie's western shore. It built nests on shrubs or vegetation clumps that grew in shallow areas there. But king rail populations have declined severely following wetland losses throughout their range. In addition, lead poisoning and pesticides may limit rail populations in otherwise suitable habitats.

King rails are endangered in both Michigan and Canada. Fewer than 10 pairs were estimated to exist in Michigan in the mid-1980s. Walpole Island still supports a population of these rare birds.

JOHN SCHAFER

With its highly social nature and striking appearance, the black tern (*Chlidonias niger*) is characteristic of biologically rich marshlands. During the nesting season, it is found in inland marshes in much of northern North America. It spends the winter along ocean coasts in the tropics, from central Mexico through northern South America. Unlike other species of terns, which are highly colonial, black terns prefer some space between their nests; they breed in loose colonies in shallow marshes that are an equal mix of open water and marsh vegetation.

This species was once an abundant breeder in the Lake Huron to Lake Erie Corridor. Early Detroit ornithologist Bradshaw Swales (1875-1928) described them as nesting in "immense numbers" along the Detroit River. But from 1966 to 1996, numbers of black terns declined by 61 percent in North America. Today, black terns are a species of special concern in Michigan and Ontario.

Loss and degradation of inland wetlands are the major causes of declining black tern populations. Invasions of purple loosestrife and other exotic plant species that alter the composition of marshland vegetation may also play a role. Environmental contaminants also may have negative impacts, as some marshes that appear to be appropriate habitat are not occupied by these birds.

The least bittern (*Ixobrychus exilis*) is the smallest member of the heron family. It breeds throughout much of the eastern U.S. and Ontario. Winters are spent in southern Florida and Texas, the West Indies and parts of Mexico and Central America. It nests in freshwater or brackish wetlands with tall, dense vegetation. Semi-open cattail and bulrush marshes are ideal habitat.

The least bittern was once a common summer resident in southern Michigan and Ontario, notably Grassy Island in the Detroit River, and on Grosse Ile, Michigan. Population trends are difficult to assess because this secretive species is not adequately surveyed, but most

JOHN SCHAFER

sources agree populations have declined to the point that the least bittern is now rare. The main cause is habitat loss, with additional pressures from pollution and predators such as raccoon. Least bitterns are considered threatened in Michigan and Canada, although they continue to inhabit Walpole Island's coastal marshes.

aterfowl

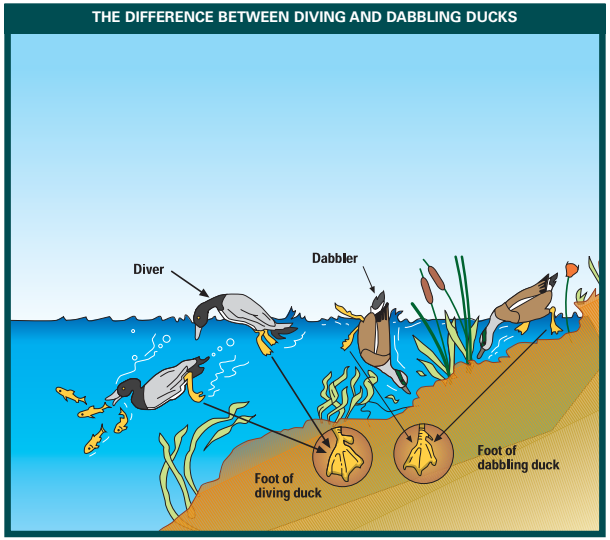
astal marshes are very important as ding and resting areas for migrating terfowl such as geese, swans and bbling and diving ducks.

bbling ducks have broad, flat bills t they use to feed on plants and ects in water less than one foot ,5 cm) deep. They prefer shallow as of rivers, lakes and ponds. Dabbling cks include the common mallard and erican wigeon.

ving ducks have stout bodies, short cks and tails, and large paddle feet. ey dive to feed on fish, mussels, ects and aquatic plants. They prefer deeper, open water areas of large

Common Name	Scientific Name
Wood duck	*Aix sponsa*
Northern pintail	*Anas acuta*
American wigeon	*Anas americana*
Northern shoveler	*Anas clypeata*
Green-winged teal	*Anas crecca*
Blue-winged teal	*Anas discors*
Mallard duck	*Anas platyrhynchos*
Black duck	*Anas rubripes*
Gadwall	*Anas strepera*
Lesser scaup	*Aythya affinis*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Greater scaup	*Aythya marila*
Canvasback	*Aythya valisinera*
Bufflehead	*Bucephala albeola*
Common goldeneye	*Bucephala clangula*
Long-tailed duck	*Clangula hyemalis*
Hooded merganser	*Lophodytes cucullatus*
Red-breasted merganser	*Mergus serrator*
Ruddy duck	*Oxyura jamaicensis*
Snow goose	*Chen caerulescens*
Canada goose	*Branta canadensis*
Tundra swan	*Cygnus columbianus*
Mute swan	*Cygnus olor*

he Lake Huron to Lake Erie Corridor's oastal marshes are frequented by at least 4 different species of waterfowl during igration. Some species, such as northern intail and common goldeneye, are present only uring migration. Others, such as the mallard uck and Canada goose, are present roughout the year.



This illustration shows the differences between diving and dabbling ducks.

The mallard (Anas platyrhynchos) is the most abundant species of duck in the Lake Huron to Lake Erie Corridor. Here, mallards are shown congregating along the shoreline of the St. Clair River with the Blue Water Bridge in the distance.


TREVOR FLOYD

lakes and rivers. Common diving ducks include the canvasback, scaups and redheads.

Geese have heavier bodies and longer necks. They have strong legs, well-suited to walking, and prefer to graze on grass and grain in farm fields far away from water.

The most recognizable of these is the Canada goose, whose population has increased to nuisance status, congregating in large numbers around stormwater detention ponds, golf courses and public parks.

Swans are the largest and most graceful waterfowl. Their feathers are completely white and they have long necks which they use to feed on submerged vegetation. Although the tundra swan is native to the Corridor region, the introduced mute swan is now much more common.


JOHN SCHAFER

The tundra swan* (Cygnus columbianus)*, native to North America, migrates about 4,000 mi (6,000 km) a year between its breeding areas in the Arctic and its wintering habitats in western and eastern North America. The open waters and coastal marshes of the Corridor are important resting areas during migration. Once known as the "whistling swan" because of its distinctive melodious voice, the tundra swan is now rare compared with the mute swan.


JOHN SCHAFER

The wood duck* (Aix sponsa) *is considered to be one of our most beautiful native ducks. It was common to the region in the late 1800s, and then became rare. Today, this species has made a comeback due to hunting regulations and nest box programs.


DOROTHY L. FRANCIS

The strong current and heated-water discharges often keep portions of the Corridor's waters from freezing during winter. Large numbers of waterfowl concentrate in the areas of open water. Mute swans* (Cygnus olor)*, shown in front, have become common in the region since their introduction from Europe in 1919. Like many introduced animals they displace certain native species and over-graze vegetation. The knob on their beaks is the feature that distinguishes them from native tundra swans.


SHELLEY M. HICKS

Canada geese* (Branta canadensis) *are abundant in the Lake Huron to Lake Erie Corridor. Large numbers can be seen in open waters and congregating on mowed grounds. Unlike some other animals, they have thrived in manicured landscapes.

JOHN SCHAFER

muskrat* (Ondatra zibethicus)** ***common wetland mammal. Muskrats l on the rhizomes and tender bases attails, arrowhead and other aquatic etation along with the occasional crayfish l clam. They carry their dinner to feeding forms constructed of vegetation where they the food they prefer and discard the rest, ing traces of their activity.

rbearers of the Marsh

e first European settlers of the Lake ron to Lake Erie Corridor were nch trappers and explorers who were acted by the abundant fur-bearing mals that lived in coastal marshes. e fur trade was the first commerce the region, based on the great mbers of beaver, muskrat, mink l river otter. It is thought that the ver played an important role in ping the local landscape of Detroit.

is account given by Bela Hubbard blished in 1887 provides insight to the ion before the fur trade locally rpated the beaver.

ustrations of this beaver-made country numerous enough in our immediate nity. In a semi-circle of twelve miles und Detroit, having the river for base, l embracing about 100,000 acres, fully -fifth part consists of marshy tracts or iries, which had their origin in the k of the beaver. A little further west, rly one whole township, Wayne County f this character.

e lands referable to this origin occupy the lowest, but elevated and slightly ing tracts. Numerous small streams have ir sources in these prairies, or meander ough them. These, flowing with little ent through the lower connecting levels, ramified in every direction, and form a work or connected chain through the whole surface. Dry ridges intervene, mostly sandy, and producing a scattered growth of white and yellow oaks. The broader marshes, which often extend several miles, are occasionally varied by low islands, containing a heavy growth of timber.

These marshes have a soil of black muck and fibrous peat, averaging two or three feet in depth, and often much more. This is underlaid by clay, with a thin stratum of sand or gravel intervening. Wild hay and cranberries on the open portions constitute a natural product of considerable value; other portions being covered by tamarack trees.

The beaver dams are still discernable. Their builders, so the Indians say, disappeared from this region about the beginning of the present century. Is there another instance where the operations of a single animal have so changed the face of a country, over extensive areas? For the region of which I treat is but a sample of many others, stretching through the border counties of eastern Michigan, and about the tributaries of the Saginaw… The beavers and Indian hunters and Canadian trappers have alike disappeared. Other furs, or substitutes for them, have superseded their value to the dealer, and the skins are but rarely met with in this whole region, which once yielded little other marketable product."

HOLLY JENSEN

LARRY CORNELIS

Today, beavers* (Castor canadensis) *commonly live along the more remote treed watercourses of the region. This beaver dam is located within a hardwood swamp in Bickford Oak Woods in Lambton County, Ontario.

Development of the shoreline has resulted in the extensive loss of Great Lakes Coastal marshes.

ST. CLAIR COUNTY METROPOLITAN PLANNING COMMISSION

In 1850, early surveyors noted that Wallaceburg, Ontario was a potential center of regional commerce. However, it was also under the blighting influence of the "immense quantities of marsh and swamp within convenient reach."*

This quote reflects the attitudes of many early European settlers who considered the vast Great Lakes marshes as an obstacle rather than a resource. The settlers went to great lengths to drain and fill wetlands.

Urban growth, industrialization, agriculture and waterfront development have dramatically reduced the acreage of Great Lakes marshes along the Lake Huron to Lake Erie Corridor. Where coastal wetlands once reigned, steel break walls now prevail. The Detroit River has lost 97 percent of its coastal marshes. Similar losses occur along the shorelines of Lake St. Clair and the St. Clair River.

*1965. *Sydenham Valley Conservation Report.* Department of Energy and Resources Management, Conservation Authorities Branch. Toronto, Ontario.

U.S. GEOLOGICAL SERVICE

Along Lake St. Clair's southern and western shores, very few wetlands have survived after years of residential, recreational and commercial development. Man-made canals are now a common feature of the shoreline. These photographs, one taken in 1937 and the other in 1999, illustrate dramatic changes.

In the distance, great egrets perch on a sumac grove in Canada's St. Clair National Wildlife Area, located in the eastern basin of Lake St. Clair. The Canadian Wildlife Service manages this 289-ha site. Its marshes and shallow water habitat are interspersed with sandy beach ridges formed by wave action. The marshes provide excellent waterfowl habitat and are an important resting point for migrating waterfowl during spring and fall. More than 30 species of wetland-dependent birds breed in the National Wildlife Area, including the least bittern and Virginia rail. The importance of this marsh to bird life has been recognized through its designation as a "RAMSAR" site, meaning it has wetlands listed under the Convention on Wetlands of International Importance Especially as Waterfowl Habitat.

day's Coastal Marshes

spite significant changes to the reline, coastal marshes persist he Lake Huron to Lake Erie rridor, particularly in the St. Clair er Delta and the islands of the lower troit River. The St. Clair River, with relative straightness, uniform width l depth, and fast current, affords little portunity for wetland growth.

e largest contiguous tract coastal wetlands in the Great Lakes, compassing more than 25,000-ac ,000-ha), is found on Walpole Island. ety percent of today's coastal lands in the Detroit River are th of Grassy Island.

ke systems now are used to manage ny of the Corridor's largest coastal lands, including Pointe Mouillee te Game Area in Lake Erie as well portions of Walpole Island and the Clair Flats State Game Area. Using es, water levels within the marshes can regulated to maximize the growth of land vegetation that is beneficial waterfowl.

ERNIE BERGEN

DEBORAH MAIORANO

A coastal marsh along western Lake Erie.

TRISH BECKLORD

Pointe Mouillee State Game Area is located where the Huron River empties into Lake Erie. Pointe Mouillee means "wet point" in French. It has been known by this name since 1749 when French explorers first appreciated its vast delta and wetlands.

LEROY DERR

St. John's Marsh in Algonac, Michigan, provides important stop-over habitat for migratory birds. In the foreground is giant reed grass, **(Phragmites australis)**, *an invasive wetland plant that now dominates many marshes in the Great Lakes system. It degrades the quality of marshland habitat by crowding out native wetland plants that are more beneficial to wildlife. Once established, it is very difficult to control and eradicate.*

BRUCE MANNY

(LEFT) VISUAL IMAGE PRODUCTIONS, WINDSOR, ONTARIO. COURTESY OF THE GREATER DETROIT AMERICAN HERITAGE RIVER INITIATIVE

Humbug Marsh is the last remaining natural coastal wetland on the U.S. side of the Detroit River. The one-mile (1.6-km) stretch of undeveloped shoreline is a nesting, resting and feeding island for many resident and migratory birds species. Shorebirds, raptors, migratory songbirds, waterfowl (even the common loon) make use of this unaltered, thus special, habitat. The diversity of birds, fish and insects found in the Humbug Marsh is the highest of any site studied in the Detroit River. It is an important spawning area for walleye that migrate from Lake Erie. Because of its unparalleled natural resource values, the recently acquired Humbug Marsh has become a centerpiece of the Detroit River International Wildlife Refuge.

Protected coastal marshes with rich, abundant wildlife that are open for visitors' enjoyment include:

United States	Canada
St. Clair Flats State Game Area	9. Point Pelee National Park
St. John's Marsh	10. St. Clair National Wildlife Area
Pointe Mouillee State Game Area	11. Tremblay Beach Conservation Area
TNC Erie Marsh Preserve	12. Ruscom Shores Conservation Area
Sterling State Park	13. Holiday Beach Conservation Area
Metrobeach Metropark	14. Lighthouse Conservation Area
Lake Erie Metropark	15. Big 'O' Conservation Area
Belle Isle	

Migrating raptors from northern and eastern Canada are reluctant to cross large bodies of water. Therefore they funnel down the corridor, concentrating their numbers as they cross the comparatively narrow Detroit River near the western end of Lake Erie.

MICHIGAN NATURE ASSOCIATION

ALLEN CHARTIER

MARY BOHLING

(Above Left) A flock of broad-winged hawks passes over the Lake Erie Metropark.

(Above Right) A mute swan forages among spiky blue flowers of pickerel weed (Pontedaria cordata) that bloom throughout the marshes of the Lake Erie Metropark.

Lake Erie Metropark

Lake Erie Metropark is a 1,600-ac (640-ha) park near Gibraltar, Michigan, owned by the Huron-Clinton Metropolitan Authority. Situated at the mouth of the Detroit River at Lake Erie, the unique location contains an array of habitats, including Lake Erie shoreline, coastal marshes, islands and oak woodlands, which are home to a wide variety of wildlife.

Since the 1930s, warm-water effluent discharged from upstream industries has kept much of the Detroit River and northwestern portions of Lake Erie ice-free in winter. Many waterfowl stay in the open waters, making the Metropark an ideal location for viewing waterfowl during the winter.

Bald eagles often fish along the Metropark's shoreline. Most notably, a pair recently made its first nesting attempt in Wayne County in 100 years.

The Metropark is best known for tens of thousands of raptors, or birds-of-prey, that can be seen passing overhead during their annual fall migration. Southeast Michigan Raptor Research is a non-profit organization that monitors and counts the hawks that fly through Lake Erie Metropark and Pointe Mouillee State Game Area each fall. The 10-year annual average for their counts is more than 225,000.

Holiday Beach Conservation Area

The Holiday Beach Conservation Area is a 525-ac (212-ha) park managed by the Essex Region Conservation Authority. It is located on the north shore of Lake Erie near the mouth of the Detroit River in Amherstburg, Ontario. This conservation area offers the natural beauty of the Lake Erie shoreline as well as trails that lead through meadows, woods, coastal marsh and a pine plantation.

Like the Lake Erie Metropark, the unique geography of Holiday Beach provides tremendous opportunities to view the annual fall hawk migration. As many as 96,000 raptors have been seen migrating over the conservation area in a single day! The numerous eagles, hawks, falcons, and vultures flying overhead are best viewed from the three-story hawk tower shown at the right.

The Holiday Beach Migration Observatory is a non-profit volunteer organization that studies fall raptor migrations by counting and banding hawks at the conservation area. Observers strive to record exact numbers of all migrant bird species that fly over the site during daylight hours from late-August to early December.

ROBERT STEWART

The Hawk Tower at the Holiday Beach Conservation Area.

The Lake Huron to Lake Erie Corridor is a Major Pathway for Migration

ONGBIRDS are known for their
ching behavior and musical song.
oes of songbirds include thrushes,
rblers, sparrows and finches. The
cies featured on these pages nest in
Lake Huron to Lake Erie Corridor.
ny species throng to the University
Michigan-Dearborn Campus
tural Area, where the Rouge River
d Observatory studies the
portance of urban natural areas
birds. This nearly 300-ac (120-ha)
que green space is a natural area
nated by the Henry Ford estate
the University of Michigan and
yne County to ensure its
servation as an urban-based
dlife habitat.

JIM SIMEK, NATURE'S IMAGES

gray catbird
metella
olinensis)
uents shrubby,
ndoned fields
are in the early
es of succession.
despread in
th America,
birds winter along the Atlantic and
f coasts and in the West Indies. Although
ely related to the mockingbird, catbirds
t often mimic other species. They have
mplicated, garbled song and a very
like call.

JIM SIMEK, NATURE'S IMAGES

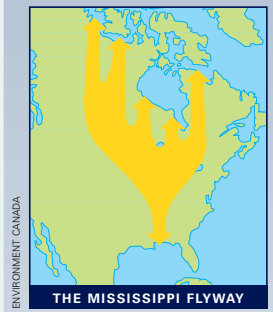
***The rose-breasted grosbeak* (Pheucticus ludovicianus)** *is aptly named, with a large, stout bill that it uses to glean insects from trees and open a wide variety of seeds. The male has a stunning appearance and sings a beautiful song similar to that of the robin. These birds consume large numbers of grasshoppers, caterpillars and beetles when they can find them, thereby helping to control local insect populations. They nest primarily in open deciduous woodlands in central and southern Canada east of the Rockies, the upper Midwest, New England and the Mid-Atlantic States. Rose-breasted grosbeaks winter in southern Mexico through to northern South America.*

JIM SIMEK, NATURE'S IMAGES

***The yellow warbler* (Dendroica petechia)** *is one of the most common and widely distributed warblers in North America, nesting across much of the continent. It winters in Central and South America. They often are victims of the brown-headed cowbird* **(Molothrus ater)**, *which lays its eggs in other birds' nests. The host parents are left to raise cowbird young, usually at the expense of the hosts' own eggs and chicks. Yellow warblers have developed a strategy to combat this parasitism by building a new nest floor over the cowbird eggs, and restarting the nesting process.*

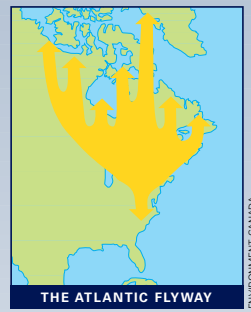
Bird migration is one of the most incredible phenomena in nature.

Many bird species travel thousands of miles annually between their nesting and wintering areas. While routes vary among species and even ages of individual birds, there are four general migratory flyways in North America. The Lake Huron to Lake Erie Corridor is located at the convergence of the Atlantic and Mississippi Flyways. The approximate north-south orientation of the Corridor makes it an important migratory flyway for more than 90 species of birds.



ENVIRONMENT CANADA

Migration is often the most perilous part of a bird's annual cycle. It is estimated that half of all birds flying south for the winter will not live to migrate north in the spring. Causes of death include: bad weather; predation; collisions with windows, buildings, autos and communication towers; and the loss or deterioration of places to stop, rest and refuel (known as stopover sites). Populations of many migrant birds, particularly those that migrate to the tropics, have been in decline.



ENVIRONMENT CANADA

RAPTORS include 17 different types of eagles, falcons, hawks and vultures that either reside in or pass annually through the Lake Huron to Lake Erie Corridor. Lake Erie Metropark and the Holiday Beach Conservation Area are excellent places to view raptors during their spectacular fall migrations.

ALLEN CHARTIER

***The sharp-shinned hawk* (Accipiter striatus)** *is one of the most-traveled hawks. It breeds in northern forests of Canada and Alaska and flies south to Panama for the winter. During migration these hawks can be seen flying in large flocks. They can often be spotted lurking around backyard bird feeders in search of unwary songbirds.*

ALLEN CHARTIER

***The broad-winged hawk* (Buteo platypterus)** *is common in deciduous forests of Eastern North America during the summer. In the fall, these hawks leave in huge concentrations for Central and South America. In 1999, the Southeast Michigan Raptor Research Network counted more than a half million broad-winged hawks passing over Lake Erie Metropark during the fall migration.*

JOHN SCHAFER

***The northern harrier* (Circus cyaneus)** *is a species of special concern in Michigan. It once was common in southeast Michigan, but has been in decline. Harriers require open grasslands and associated wetlands. Their favored prey is the meadow vole, which is usually abundant in grassland habitat. The main reason for the northern harrier's decline is habitat loss. Other causes include human disturbance, predation and pesticides.*

TERRY C. OTT

***The snowy owl* (Nyctea scandiaca)** *is a top predator of the arctic tundra in northern Canada and Alaska. Occasionally it will winter in the Corridor, where it occupies open fields, shorelines and other locations that resemble the treeless habitat of the tundra. This photograph was taken at DTE Energy's Fermi II Nuclear Power Plant near Monroe, Michigan.*

ONARCH
UTTERFLIES

tured are monarch butterflies **(Danaus**
ippus) *on Harsens Island in the St. Clair*
r Delta. During the fall, they can be seen
rating along the shores of the St. Clair River,
e St. Clair and Detroit River in large
nbers while on their way southward to
ico. Resting migrants may cover entire trees.

SHOREBIRDS have some of the longest migrations of all birds, with several species flying between South America and the arctic tundra each year. Their bodies reflect the lifestyle to which they are uniquely adapted: long legs for wading in shallow marshes and mudflats, a long bill to probe for invertebrate prey, and large wings and a streamlined body to allow for speedy long-distance flights. These birds are not residents of the Lake Huron to Lake Erie Corridor but stop here for critical resting and feeding as they migrate south. Pointe Mouillee State Game Area is one of the best places in the Midwestern United States to view migrating shorebirds.

JIM SIMEK, NATURE'S IMAGES

***The semipalmated sandpiper* (Calidris pusilla)** *winters in South America and nests in the arctic tundra near water. It sometimes makes a 2,000-mi (3,200-km) non-stop journey from nesting areas to its tropical wintering grounds.*

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***The short-billed dowitcher* (Limnodromus griseus)** *breeds in the wetlands of northern Canada and can winter as far south as Brazil.*

WATERFOWL More than a million waterfowl visit the Lake Huron to Lake Erie Corridor each year. The corridor lies on the major migration pathways of both dabbling and diving ducks. The region's coastal marshes are excellent places to view them during migration.

JOHN SCHAFER

***Redhead ducks* (Aythya americana)** *can be seen during their migration, when they congregate in large numbers in the Corridor's open waters. In fact, they often are part of mixed flocks of 20,000 or more diving ducks. Redheads winter mostly in the Gulf of Mexico.*

JOHN SCHAFER

***The blue-winged teal* (Anas discors)** *is a relatively small dabbling duck that migrates to Central and South America each year. It often is the last to arrive and earliest to leave the Corridor during migration. It can fly at high speeds and maneuver with great accuracy.*

JOHN SCHAFER

***The American black duck* (Anas rubripes)** *was considered a migrant in the region around 1915, but was suspected to be nesting there as well. Populations then increased and by the mid-20th Century, it was more abundant than the mallard in Michigan. However between the 1950s and the 1980s, the black duck's population declined dramatically due to loss of habitat, hunting and competition with mallards for nesting sites.*

HE LANDSCAPES OF ONTARIO AND MICHIGAN HARBOR XAMPLES OF TWO GLOBALLY IMPERILED NATURAL COMMUNITIES: ALLGRASS PRAIRIE AND OAK SAVANNA

The banks of the strait are vast meadows, and the prospect is terminated with some hills covered with vineyards, trees bearing good fruit, groves and forests, so well disposed that one would think that nature alone could not have made, without the help of art."

–Father Louis Hennepin, a Catholic priest and explorer, describing the shorelines of the Detroit and St. Clair Rivers in 1679.

From *The Tallgrass Restoration Handbook* by Stephen Packard and Cornelia F. Mutel. eds. for the Society for Ecological Restoration. Copyright © 1997 by Society for Ecological Restoration. Adapted by permission of Island Press, Washington, D.C.

storical References

1670, the early explorer Galinee ed "grand prairies" along the eastern re of Lake St. Clair and Walpole nd. When European settlers arrived he Corridor in the late-1700s, they cribed mosaics of prairie and k openings." Early land surveys t established the boundary between nroe and Wayne counties in chigan made repeated references extensive open, wet prairie." e of the first botanical descriptions he prairies in southwestern Ontario aracterized a sandy field in the ndsor region as a "garden of rarities."

he land on its banks is about the best I ever saw in any country. or seven feet deep of earth that uld do for a garden, and extensive ss plains stretching for miles into country, without a tree save here d there a small clump like an nd in a plain – the grass, rticularly that called blue joint, nishes excellent pasture and hay."

is description by Robert Stevenson, ioneer settler, of the land along the ames River downstream of Chatham 1843 reflects the attitudes of many settlers who first saw the prairie and discovered its rich soils, which lay beneath the thick growth of grasses and wildflowers. The blue joint grass *(Calamagrostis canadensis)* of which Stevenson wrote was prized by early settlers as "marsh hay."

Upland prairies were the first to succumb to farming cultivation in the early 1800s as farmers used plows pulled by teams of horses to turn the sod. It was said that the sound of ripping roots was akin to the sound of thunder. Drainage of wet prairies came later and required extensive drainage systems to yield highly productive and prized agricultural land. This mass conversion of land from wilderness to agriculture was the first of many dramatic land use changes in the Corridor.

Historical references of prairies originate from: *Baskowsky, Wasyl and John L. Riley. 1992. A Survey of the Prairies and Savannas of Southern Ontario. Proceedings from the 13th Annual North American Prairie Conference. Windsor, Ontario.*

Tallgrass Prairie

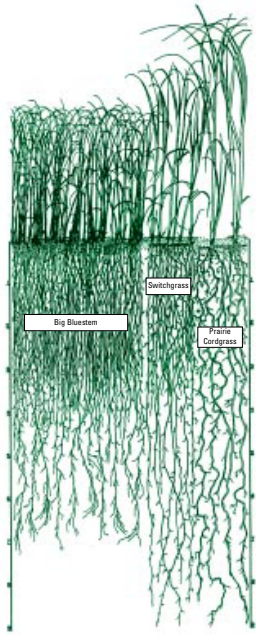
The term "prairie" is the French word for meadow. Prairies are grasslands dominated by grasses, sedges and wildflowers. They are nearly treeless and are defined by an incredible diversity of herbaceous plants that provide an excellent habitat and food source for many creatures. Prairies in North America support more biodiversity than any other type of terrestrial ecosystem.

Stretching from Texas to Canada, the prairie biome once covered vast expanses of land in the middle of the North American continent. Within this great stretch of grassland there are variations in plant communities, distinguished by three main types of prairie: short, mixed and tallgrass. Each supports distinct plant and animal communities. Short-grass prairies occur in the western, drier regions of the biome. As precipitation increases toward the east, mixed-grass prairie gives way to the high, lush vegetation of the tallgrass prairie. Southern Michigan and Ontario are home to tallgrass prairies.

Tallgrass prairies in southern Michigan and Ontario are on the northeastern edge of a "prairie peninsula," first described by botanist Edgar Walter Transeau in 1935. The "prairie peninsula" is an extension of the tallgrass prairie of the eastern Great Plains. Prairie vegetation spread into Michigan and Ontario about 5,000 to 8,000 years ago during a relatively warm, dry period, known as a hypsithermal period, which followed the Wisconsin glacial retreat. As the climate gradually became cooler and wetter, forests re-invaded the prairie, resulting in the mosaic of prairie, savanna and woodlands that the first European explorers encountered.

Warm-Season Prairie Grasses

Tallgrass prairies are named after their dominant plants, the tall grasses, which can reach heights of 3m (nine ft) or more. Many of the native warm-season grasses, such as big bluestem *(Andropogon gerardii)* and Indian grass (*Sorghastrum nutans*), are excellent forage for grazing animals. When the grasses bloom in late-summer, their bold, arching, flowering stalks dominate the prairie landscape. Warm-season grasses break dormancy in early summer and produce much of their growth during the heat of the summer. Cool-season grasses begin growth in early spring and go dormant during summertime. Canada wild rye (*Elymus canadensis*) and Pennsylvania sedge (*Carex pennsylvanica*) are native cool-season grasses. Kentucky blue grass (*Poa pratensis*) is a cool-season grass introduced from Europe that has invaded prairies and is also the dominant plant of the millions of acres of lawn planted in the U.S. and Canada. Kentucky blue grass requires extensive and expensive watering and fertilization that contrasts sharply to the adaptability of the native warm-season grasses.



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Many prairie plants have deep or thick root systems and other adaptations that sustain them through dry summer months. Most of the biomass of prairie grasses is below the ground in their extensive root systems. As old roots die and new roots form, organic matter builds up, creating the rich soils for which prairies are known. Carbon dioxide is caught by this significant soil carbon buildup, which reduces the level of greenhouse gases in the atmosphere.

A view of the restored Dow Prairie during wintertime at the University of Michigan's Nichols Arboretum in Ann Arbor, Michigan. Unlike non-native cool-season grasses, prairie grasses do not flatten under the weight of snow. Their stiff stems provide cover and protection for small animals during winter.

EVAN LARSON

Big bluestem* (Andropogon gerardii) *is easy to identify when it blooms during the fall. Its distinctive flower head looks like a turkey's foot.

Types of Tallgrass Prairie

lgrass prairies in the Lake Huron Lake Erie Corridor occur mostly on dy portions of the lakeplain, but y also have a patchy distribution well-drained, sandy- gravelly kames, raines and glacial outwash landforms. and, many wet prairies occur along margins of river systems on outwash posits, such as the Huron River. fferent landforms support distinct irie plant communities; their species mposition varies greatly, depending on isture, soils and topography.

ologists define tallgrass prairie types their soil and moisture content, using ms wet, mesic (moderate), and xeric y.) These factors dictate the species grasses and associated wildflowers that grow in any given locale. Blue joint grass, big bluestem, prairie cord grass (*Spartina pectinata*) and many different sedge species are dominant grasses in a wet prairie. Dry prairies support little bluestem (*Schizachyrium scoparius*), switch grass (*Panicum virgatum*) and Indian grass. , because changes in topography and s are often subtle, different types of etation may grow next to each other. d some species, such as big bluestem, y be found in most prairies regardless moisture content.

ove) Early historical accounts reveal t bouquets of the eastern prairie fringed id* (Platanthera leucophaea) *were gathered bundance around the bathhouses of e Isle Park, Detroit. Today, this unique stunning orchid of the prairie is an emely rare plant globally. Only a few, isturbed natural areas in the Lake Huron ake Erie Corridor still support it.

JESSICA PITELKA OPPER

Prairie remnants thrive along railroad tracks such as this one along the Clinton River Trail in Rochester, Michigan. Sparks from passing trains frequently cause fires in the surrounding landscape. Supported by the fires, many of the region's best remaining prairie communities can be found beside railroad lines.

JOHN SCHAFER

The marsh blazing star* (Liatris spicata) *blooms profusely in a wet lakeplain prairie on Harsens Island in the St. Clair River Delta.

Although tallgrass prairie has a scattered distribution throughout southeastern Michigan and southwestern Ontario, the prairies that occur on the lakeplain are special because of the unique plant and animal species which they support.

Some plant species that thrive in a lakeplain prairie community are restricted to the southern Great Lakes region. Their continued presence is important to maintaining biodiversity on a global scale.

Fire and Soil Type

Prairies are fire-dependent communities. Fire prevents trees and shrubs from invading a prairie and converting it into a forest.

Warm-season grasses and prairie wildflowers are uniquely adapted to fire. Their growth tips, or meristems, are below the soil's surface and are not damaged from hot flames. In contrast, the growing tips of trees and shrubs and non-prairie weedy species are damaged by fire. The predominance of warm-season grasses in a prairie helps to carry fire. Once ignited, the grasses carry a surface fire that is hot enough to knock back competing shrubs, saplings and other non-prairie herbaceous plants.

In a normal prairie fire there is very little soil temperature change. Under these natural circumstances fire does not scorch the earth. Measurements taken by scientists indicate that for only a very brief time is there any significant change in temperature. Even then it is usually in the top centimeter of the soil. Slow-moving fires that have a lot of woody material to burn, such as in a degraded prairie invaded by trees and shrubs, can get hotter and cause localized sterilization of soil. Fires that occur more frequently, such as every two to four years, will not have the fuel of litter build-up to create the hotter conditions that might severely damage or kill mature oak trees. The most valuable result of a prairie fire is the blackened soil, which warms quickly under the heat of the sun. This warming favors the growth of prairie grasses that do not break dormancy until a certain soil temperature is reached. This helps them get a head start over weedy, cool-season competitors that could eventually shade them out.

TRISH BECKJORD

Today, land managers use prescribed (controlled) burns to maintain and improve the health and diversity of tallgrass prairies and oak savannas.

A combination of built-up organic matter and seasonal drought makes prairies naturally prone to wildfires during the summer growing season. In pre-settlement times, these fires could have been caused by either lightning strikes or by native people, who may have set fires to drive game and to maintain the plant and animal communities that sustained them with food, medicines and clothing.

Lakeplain prairies also have persisted because of the unique hydrology of the lakeplain. The soils in which the prairies grow are characterized by 3-9 ft (1-3 m) of highly permeable sand over clay, which results in very wet conditions during spring floods and a very dry environment during the summer. Such extreme variations in the availability of water are better suited to wildflowers and grasses than trees and shrubs.

Prairie or Meadow?

Not every meadow or field is a prairie. Although meadows are open, treeless areas with grasses, they usually form as a result of a disturbance, such as logging or land clearing, and are often early signs of forest regeneration. Fallow farm fields also have grasses and wildflowers. But most fallow fields tend to be dominated by Eurasian grasses and invasive plants, such as Queen Anne's lace (*Daucus carota*) or spotted knapweed (*Centaurea maculosa*), that thrive in disturbed areas. Meadows usually are dominated by asters and goldenrods, which do not carry fire as well as the warm-season grasses of a prairie ecosystem.

ROBERT STEWART

Prairies and oak savannas remain in the Lake Huron to Lake Erie Corridor because they are able to withstand stressed environments where trees cannot. The combination of periodic wildfires, drought, spring floods and a warm climate have all contributed to their persistence in the region. Prairies thrive where these effects are most severe, while oak savanna grows where these stresses are less pronounced.

US EPA ARCHIVE DOCUMENT

TALLGRASS PRAIRIE


JOHN TIEDJE

Yellow star-grass
Hypoxis hirsuta


JOHN TIEDJE

Wood betony
Pedicularis canadensis


ALLEN WOODLIFFE

Hoary puccoon
Lithospermum canescens


JOHN TIEDJE

Blue-eyed grass
Sisyrinchium albidum

SPRING

In early May, the first wildflowers of the prairie emerge from the ground.


ALLEN WOODLIFFE

Small white lady's-slippers
Cypripedium candidum


ALLEN WOODLIFFE

Bird's foot violet
Viola pedata


JOHN TIEDJE

Golden Alexanders
Zizia aurea

Some prairie remnants have as many as 200 distinct plant species growing in them. Given this diversity, the prairie is constantly changing, with different plants blooming from spring until fall.

These plants are a mere sampling of the beauty that can be found in a tallgrass prairie throughout the seasons.

Each wildflower displays its unique color and scent in hopes of attracting one of the many insects that inhabit a prairie ecosystem.

Very specialized relationships have developed between some insects and the prairie plants that host their larva. For example, rare insects such as Culver's root and blazing star borer moths feed among the many different prairie wildflowers, but require their namesake species (Culver's root and marsh blazing star) to host their larvae.

Prairie grasses support wildlife in many ways. Several varieties of skipper butterflies–dusted, Indian, crossline and Leonard–feed on the leaf blades of little bluestem. Indian grass hosts the larvae of the wood satyr and common wood nymph butterflies.


DAVID L. CUTHRELL

The blazing star borer moth lives in harmony with the prairie ecosystem that supports its larval host plant, the marsh blazing star. This species at risk has been identified in the lakeplain prairies of Algonac State Park, Michigan.


JOHN TIEDJE

Big bluestem
Andropogon gerardii


JOHN TIEDJE

Indian grass
Sorghastrum nutans


ALLEN WOODLIFFE

Little bluestem
Schizachyrium scoparius


RANDY HOLLAND

The common milkweed (Asclepias syriaca) has distinctive seed pods filled with downy hairs, which aid in seed dispersal by wind. These downy hairs, or floss, were used to stuff life preserver jackets in World War II. Today, milkweeds are a raw material for commercial purposes such as rubber, fiber and even fuel production.


CAROLINE BIRBALER

Prairie cord grass
Spartina pectinata

FALL

In autumn, warm-season prairie grasses have reached their full grandeur, topping out at heights of six feet (1.8 m) or more.


JOHN TIEDJE

Switch grass
Panicum virgatum


GERRY CLEMENTS

Tall sunflower
Helianthus giganteus


Smooth Aster
Aster laevis


ALLEN WOODLIFFE

Culver's root
Veronicastrum virginicum


MARY LAFRANCE

Michigan lily
Lilium michiganense


MARY LAFRANCE

Mountain mint
Pycnanthemum virginianum


JOHN SCHAFER

Marsh Blazing Star
Liatris spicata


JOHN SCHAFER

Sullivant's Milkweed
Asclepias sullivantii

SUMMER

Spring is merely the beginning for the color show in a prairie. By mid- to late-July, the wildflower show is in full swing, with a profusion of prairie flowers displaying a riotous combination of colors well into late summer and fall.


MARY LAFRANCE

Fringed gentian
Gentiana crinita


JOHN TIEDJE

Bergamot
Monarda fistulosa


MARY LAFRANCE

Canada tick trefoil
Desmodium canadense


TRISH BECKFORD

Butterfly Milkweed
Asclepias incarnata


GERRY CLEMENTS

Black-eyed susan
Rudbeckia hirta


ALLEN WOODLIFFE

Ohio Spiderwort
Tradescantia ohiensis


MICHAEL P. ROSENBROCK

Yellow coneflower
Ratibida pinnata


GERRY CLEMENTS

Ironweed
Vernonia fasciculata


CAROLINE BIRBALER

Joe-pye weed
Eupatorium maculatum

Birds Dependent on Grassland Habitat are in Decline

Grassland birds are declining at an alarming rate in North America. One largely-unnoticed son is loss and fragmentation he birds' grassland habitat – orted prairie types, wet meadows, tureland and fallow farm fields. assland birds also are threatened high rates of predation, nest asitism by cowbirds, and earlier more frequent mowing and vesting of fields, resulting in roductive failure.

storically, grassland ecosystems h as tallgrass prairies depended periodic fires and animal grazing maintain their character and ersity. The decrease or extirpation grazing animals, fire suppression, introduction of non-native or asive plant species and changing icultural practices have dramati- y altered grasslands. Birds that on grasslands are becoming pendent on humans to create manage suitable ecosystems. determining how to manage sslands for birds can be difficult ause each species may have ferent requirements. Some minent examples include Henslow's sparrow, eastern adowlark, bobolink, and gerhead shrike.

Bobolinks (*Dolichonyx oryzivorus*) make one of the longest migrations of any songbird, up to 6,200 mi (9,920 km) from nesting areas in the northern U.S. and southern Canada to wintering grounds in South America. Historically, bobolinks nested in the prairies of the Midwestern U.S. and south-central Canada. They were considered abundant in the Lake Huron to Lake Erie Corridor in 1900. As agriculture spread eastward, so did bobolinks. They were most abundant when they could nest in the extensive hayfields required to support the widespread use of horses for transportation and farming.

Today, populations are declining due to habitat loss, changing agricultural practices and cowbird parasitism. Like meadowlarks, bobolinks prefer mixed grasslands and older fields, but can nest in smaller patches of habitat. Breeding

JIM SIMEK, NATURE'S IMAGES

success has been lowered by the introduction of cool-season grasses, which are mowed earlier (during the nesting period) and more frequently than native, warm-season grasses. Since bobolinks exhibit strong fidelity to nesting areas, returning to a successful nesting place in subsequent years, this change in agricultural practices can be especially detrimental.

The Henslow's sparrow *(Ammodramus henslowii)* is a small, inconspicuous bird that requires large, often damp, grasslands usually greater than 250 ac (100 ha). It prefers tall, dense grasses with much standing decaying vegetation and a thick layer of litter. As grasslands mature and these distinctive elements diminish, Henslow's sparrows move to a new location. They make their nests on the ground, often in loose colonies of between two and 50 pairs of birds. Around 1900, they were found sporadically in the Lake Huron to Lake Erie Corridor region, but were known to nest regularly on Grosse Ile. Today, they are threatened in Michigan and endangered in Canada.

WALPOLE ISLAND HERITAGE CENTRE

Loggerhead shrikes *(Lanius ludovicianus)* are unique among songbirds because they prey upon vertebrates, including ents and other birds. The shrikes lack strong talons of predatory raptors, so y often impale their prey on thorns, bed wire or sharp twigs, earning them nickname "butcherbird." Loggerhead ikes are birds of open country, such as sslands that have short vegetation and cattering of short trees and shrubs from which they hunt. They live year-round in much of their broad North American range, but northern populations are migratory.

Loggerhead shrikes once were fairly common nesters in the region. Now they are nearly extirpated and are considered endangered in Michigan and Ontario, mainly due to habitat loss. Other reasons have yet to be discovered but may include being hit by vehicles as they feed along roadsides, and reduction or contamination of insects, a substantial part of their diet, by pesticides.

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IAN BOST

The bottle gentian* (Gentiana andrewsii) *grows in the wet soils of lakeplain prairies and wet meadows. Its intense blue flowers bloom in the late-summer at Sibley Prairie.

The Greater Sibley Road Prairie Complex in Brownstown Township, Michigan, is an ecological treasure of the largest and highest-quality lakeplain prairie remnants in Michigan. Prior to European settlement, native buffalo roamed the 16,000-ac (6,400-ha) Sibley Prairie. Only 350-acres (140 ha) are left today. The complex is home to at least 170 rare grasses, sedges, rushes and wildflowers including 14 endangered, threatened and special concern plant species in Michigan. Birds such as the American kestrel and bluebird find habitat in its grassy meadows. Duke's skipper, a threatened species in Michigan, has been identified at the site. The prairie remnants are scattered among a mosaic of oak savanna and oak woodlands. Its vast wetlands are significant groundwater recharge areas that flow into Brownstown Creek, the Bakely Drain and Marsh Creek, which connect to the Detroit River south of Gibraltar.

DENNIS ALBERT

The colorful wildflowers of Sibley Prairie

The Michigan Natural Features Inventory has identified the Sibley Prairie as representing "our greatest hope for preserving a functional lakeplain prairie ecosystem." The Nature Conservancy, Southeast Michigan Land Conservancy, and Michigan Nature Association are protecting very small parcels of this natural area. But more protection is needed to ensure the survival of this unique ecosystem and the many rare species that it supports.

Sibley Prairie

Buffalo

"But 15 leagues from Detroit, at the entrance to Lake Erie, inclining to the south to southwest, are boundless prairies which stretch away for 100 leagues. It is there that these mighty oxen (bison), which are covered with wool, find food in abundance."

– Antoine de la Mothe Cadillac, founder of Detroit, describing the landscape of southeastern Michigan in 1702

ILLUSTRATION BY HOLLY JENSEN

The buffalo* (Bison bison) *was generally known as a plains creature. But it also had lived in woodlands well into Alaska in the northwest and in most of the eastern United States, except for New England. Early settlers hunted this shaggy mammal in such places as forest glades in what is now Pennsylvania. Authorities agree that it was extirpated on the Atlantic side of the Alleghenies by 1730 and east of the Mississippi by about 1810. This husky creature was no match for hungry settlers with guns. The bison that frequented prairies in southeastern Michigan and described by Cadillac were killed off by about 1800.

Ojibway Prairie Complex

e Ojibway Prairie Complex
tains 550 ac (220 ha)
some of the highest-quality
grass prairie and oak savanna left
southern Ontario. It is composed
five natural areas within minutes
downtown Windsor, Ontario.
bway Park, Tallgrass Heritage
k, Black Oak Heritage Park and
ing Garden Prairie are owned in
t by the City of Windsor Parks
l Recreation Department. The
bway Prairie Provincial Nature
serve is owned by the Ontario
nistry of Natural Resources.
maining lands are owned by
vate landowners.

the Ojibway Nature Centre at
bway Park, many walking trails
ite visitors to experience and learn
out rare tallgrass prairie and oak
anna ecosystems. In addition to
eastern massasauga, the eastern
snake (*Elaphe vulpina gloydii*) and
tler's garter snake (*Thamnophis
leri*) are rare reptiles that find a
me in the complex.

EVAN LARSON

BRUCE KINGSBURY

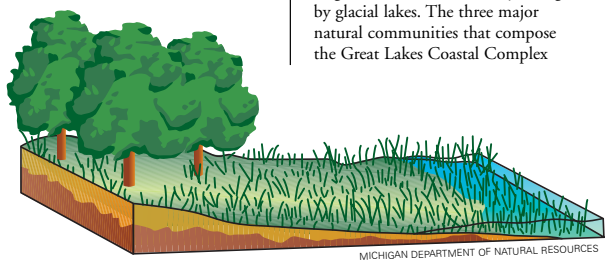
(Above) Ojibway Park in Windsor, Ontario. (Right) The eastern massasauga rattlesnake* (Sistrurus catenatus catenatus) *is found, over much of the year, in wetlands, such as sedge marshes, bogs, fens, and shrub swamps. They may move into adjacent grassland habitats in summer. Wet soils are important to this rattlesnake, as the high water tables found in wet prairies, meadows, and fens prevent the ground from freezing deeply. These snakes often hibernate in the tunnels created by crayfish or small mammals.

The Eastern Massasauga is the only venomous snake native to the region. Despite its reputation, this rattlesnake is normally docile unless provoked. Its distribution is restricted to the southern Great Lakes region of Lower Michigan and Ontario along with northern Indiana and Illinois. Michigan now has the highest remaining populations of the Eastern Massasauga. Because of habitat loss and persecution by humans, this snake is a rare and a protected species throughout its range.

e Great Lakes Coastal Complex

the St. Clair River Delta at Algonac
te Park and Walpole Island, along
h locations in Saginaw Bay and Lake
e, there is a very special association
natural communities called the
Great Lakes Coastal Complex.
The vegetation ranges from
submersed plants rooted in water
about 6 ft (2 m) deep to tall,
wide-spreading white oaks (*Quercus
alba*) that grow on the sandy beach
ridges formed thousands of years ago
by glacial lakes. The three major
natural communities that compose
the Great Lakes Coastal Complex
are defined by water fluctuations
and lakeplain geology: oak savanna,
lakeplain prairie, and Great Lakes
marsh. All are rare and globally
imperiled.

The Great Lakes marsh extends
into the nearshore waters, but also
includes saturated sand. The prairie
borders the inland portion of the
marsh on sandy deposits. Oak
savanna is scattered throughout the
prairie on narrow, sandy beach
ridges. Historically, all three of
these communities were tied
together by fluctuating water
levels, which could alter their sizes
and boundaries both seasonally
and annually.



MICHIGAN DEPARTMENT OF NATURAL RESOURCES

Oak Savanna

"A sandy ridge producing nothing but a few scattering of trees of white oak."

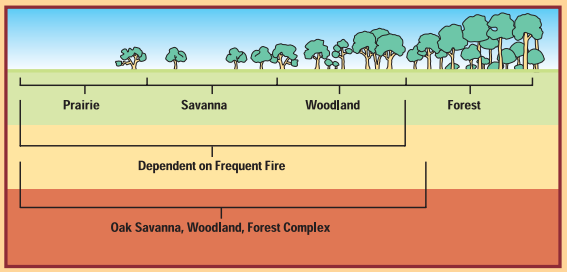
– Survey map for a ridge west of Leamington, Ontario

Oak savannas are characterized by widely spaced trees with shrubs, grasses, sedges, ferns and wildflowers occupying the understory, which means they are on the ground under the canopy of tree branches. The oak savanna ecosystem is a transition community between a prairie and a true woodland ecosystem.

The grassy understory of an oak savanna is filled with many plants species associated both with tallgrass prairie and forest communities. The groundcover is a mosaic of plant species, each with a varying sun and shade tolerance. The open canopy of the savanna, which allows sunlight to reach the groundcover layer, can support prairie plant species in sunnier areas, such as butterfly weed (*Asclepias tuberosa*) and flowering spurge (*Euphorbia corollata*). In shadier areas, fire-tolerant forest shrubs like blueberries (*Vaccinium spp.*) and huckleberry (*Gaylussacia baccata*) grow.

An oak savanna on Walpole Island

Because there are so few quality remnants left, it is hard to fully understand the ecology of oak savannas. However it is thought that the true plant species of savannas are able to thrive in a blend of shade and sun; examples include wild lupine (*Lupinus perennis*) and purple milkweed (*Asclepias purpurescens*).



Prairie: A fire-maintained natural community dominated by grasses with few or no trees

Savanna: a fire-maintained natural community dominated by grasses or sedges but with scattered, fire-tolerant species of trees.

Woodland: a fire-maintained natural community with a grassy turf dominated by trees

Forest: a closed-canopy, wooded natural community that is not dependent on frequent fire.

pes of Oak Savanna

k savannas occupy a variety of soils, ging from wet to dry. In the glacial eplains of Michigan and Ontario, savannas occur on sand ridges, el sandplains and wet swales between ges. Further inland, oak savanna l oak barrens grow on well-drained wash plains, moraines and kames. all cases, oaks are the dominant trees ile grasses and sedges make up most he groundcover.

o types of oak savanna are prominent he lakeplain: dry to mesic, and mesic wet. Dry oak savannas exist on the sandy beach ridges of the lakeplain, ere black oak (*Quercus velutina*), white and pignut hickory (*Carya glabra*) minate the tree canopy, and shrubs h as New Jersey tea (*Ceanothus ericanus*), American hazelnut *rylus americana*), wild plum *unus americana*) and blueberry etate the understory. Very dry annas also may have evergreen trees h as white pine (*Pinus strobus*), red e (*Pinus resinosa*) or eastern redcedar (*Juniperus virginiana*). The ground cover of this dry savanna type is diverse. Little bluestem and Pennsylvania sedge are dominant grass species. Wildflowers adapted to drought conditions such as tickseed (*Coreopsis lanceolata*), wild lupine (*Lupinus perennis*),

RANDY HOLLAND

The eastern prickly pear cactus* (Opuntia humifusa), *found in the dry black oak savannas of Ontario's Point Pelee National Park, is the only native cactus in this region.

rough blazing star (*Liatris aspera*) and wild bergamot (*Monarda fistulosa*) populate sunnier areas.

Wetter savannas occupy flat, poorly-drained soils of the lakeplain. The flora of this wetter savanna type is able to withstand springtime flooding. Bur oak (*Quercus macrocarpa*), pin oak (*Quercus palustris*) and swamp white oak (*Quercus bicolor*) dominate the tree canopy. Shrubs such as winterberry (*Ilex verticillata*), dogwoods (*Cornus spp.*) and chokeberry (*Aronia melanocarpa*) frequent the understory. Many of the grasses and wildflowers in the ground layer are the same as in the adjacent wet prairies. Big bluestem, blue joint grass and sedges are dominant grasses. Forbs that prefer wetter conditions such as common mountain mint (*Pycnanthemum virginianum*), Riddell's goldenrod (*Solidago riddellii*), and ironweed (*Vernonia fasciculata*) are indicators of this savanna type.

Oak Savannas are Maintained by Fire

DENNIS ALBERT

DENNIS ALBERT

Prescribed burns are being used to restore wet oak savannas at Algonac State Park, Michigan. At left is a highly degraded oak savanna, which has been invaded by thick brush, during a controlled burn. At right is the same oak savanna the following spring after a prescribed burn, which opened the tree canopy, cleared away saplings and shrubby growth, and permitted the sun to reach the forest floor. Often, more than one prescribed burn is needed to fully restore the health of a degraded oak savanna.

Like tallgrass prairie, oak savanna is a fire-dependent community. Frequent wildfires have historically played a major role in maintaining oak savanna's open structure and grassy understory.

Grazing animals such as the buffalo, as well as drought on the sandy ridges and the lakeplain's unique hydrology, also have contributed to maintenance of oak savanna in the Corridor. Ecologists have discovered that the seasonally high water table of the lakeplain has helped maintain wet savanna communities.

Oak trees, which define savanna in this region, have a thick, fire-resistant bark. Oaks are not killed by low-intensity fire, although often the lower branches are burned off. Trees and shrubs that are more common in woodlands with dense canopies, such as black cherry (*Prunus serotina*), are killed or severely stunted by fire. By removing fire-sensitive woody species and the lower branches of oaks, fire creates the characteristic open canopy of the savanna. Fire also fostered the growth of warm-season prairie grasses such as little bluestem, and other plants that are adapted to periodic fires.

Wildfire suppression by humans has greatly altered the distribution and extent of oak savannas throughout North America. Compared with pre-settlement distribution, oak savannas are nearly extinct. Without periodic fire, woody species invade a savanna. Their shade eventually smothers the prairie vegetation and blocks the open sunlight that oak seedlings need to thrive. Without fire, oak savanna gradually transforms into oak woodlands. This trend is especially apparent in the lakeplain of Michigan, where many of the historical oak savannas have become closed-canopy oak forests.

Usually considered destructive, fire actually has preserved a rich natural heritage. Without fire's regenerative effects, oak savannas and tallgrass prairies, along with the myriad of rare species living in them, could be lost forever.

The Karner Blue Butterfly

The Karner blue butterfly (*Lycaeides melissa samuelis*) lives in oak savanna and pine barren ecosystems where its larval host plant, wild lupine, thrives. Wild lupine is known to be the only plant on which the Karner blue's caterpillar feeds. Without this plant, the butterfly can't reproduce. The adult butterfly feeds on a wide variety of wildflowers, such as wild bergamot and butterfly weed.

The loss of oak savannas has brought this little butterfly close to extinction. It is now extirpated from southeastern Michigan and all of Ontario. It is listed as federally endangered in the U.S. and is the subject of recovery efforts that span its native range of New York, New Hampshire, Ontario, Michigan, Ohio, Indiana, Wisconsin and Minnesota.

In Lambton County, Ontario, efforts are being made to restore the butterfly's habitat at Pinery Provincial Park and adjacent nature preserves managed by Lambton Wildlife Inc. in Lambton County, Ontario. It is hoped that the work of a multi-disciplinary recovery team, with cooperation from the U.S. Fish and Wildlife Service, will enable Karner blue butterflies to flourish once again in Ontario.

U.S. FISH AND WILDLIFE SERVICE NATIONAL IMAGE LIBRARY HTTP://IMAGES.FWS.GOV/

(Above) The wild lupine* (Lupinus perennis) *thrives at Petersburg State Game Area in western Monroe County, Michigan, where "prescribed burns," or deliberately set and controlled fires, are conducted to help manage this natural area's oak savannas and tallgrass prairies.

(Right) The Karner blue butterfly.

ALLEN WOODLIFFE

(Left) The smooth yellow false foxglove* (Aureolaria flava) *lives in oak savannas and woodlands with sandy soils. It is parasitic to the roots of white oak and is often found in close association with them.

American badger **(Taxidea taxus)** *classic mammal of tallgrass prairie and savanna. It is becoming increasingly rare in thern Ontario and Michigan, areas which ine the easternmost extent of its distribution oss North America. The badger prefers sandy s where it uses its short, powerful legs for zing. In fact, the badger can dig a hole faster n a man with a shovel. This nomadic animal s to travel during darkness and can move e than 10 km (6 mi) in one night.*

imals of Oak Savanna

k savanna provides habitat for many dlife species. Songbirds, such as the tern bluebird, indigo bunting and own thrasher thrive in the open sslands occasionally punctuated by oak es. Oak savanna also supports many all mammal species, such as cottontail bit and fox squirrel, which are hunted raptors, like the sharp-shinned hawk. ger mammals, such as red fox, ite-tailed deer, coyote and badger, d ideal habitat in oak savanna as well.

(Above Right) Oak savanna provides ideal bitat for the eastern bluebird **(Sialia sialis)**, *a ative species that lives in cavities left in dead trees by woodpeckers or other natural causes. The loss of dead trees and competition from exotic birds – house sparrow* **(Passer domesti-)** *and European starling* **(Sturnus vulgaris)** *– ave contributed to the decline of this colorful bird. Efforts to place artificial nest boxes are ontributing to the eastern bluebird's recovery.*

(Below) The American kestrel **(Falco sparverius)** *is the smallest and most iliar hawk in North America. It prefers open country with wooded edges where it can find ching sites and an abundance of large insects h as its favored prey, the grasshopper, as well small animals such as mice and frogs. It also nests in the cavities of trees.*

FERN WILSON

ALLEN CHARTIER

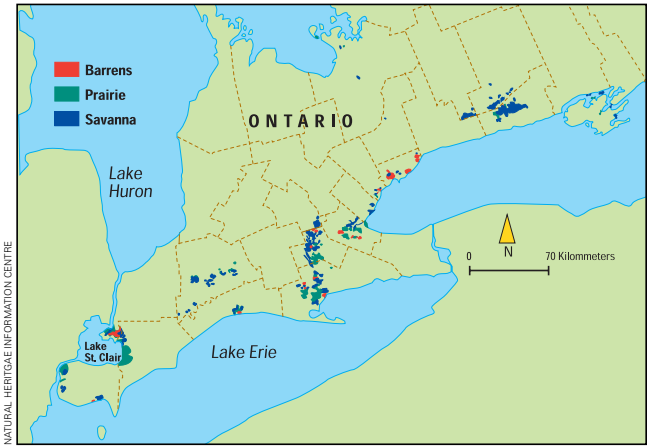
Less than one percent of the original tallgrass prairie and oak savanna vegetation remains in Southern Michigan and Ontario. Because these ecosystems support so many rare plant and animal species, the protection and management of the isolated remnants is critical to preserving our native biodiversity.

The Loss of Tallgrass Prairie and Oak Savanna Habitat in the Region

It isn't known exactly how much original prairie and savanna habitat existed prior to European settlement in Ontario, but it is estimated that 100,000 ac (40,000 ha) once covered the landscape of the southern part of the province. A mere 2,100 ha of prairie and oak savanna remain today. Most of this vegetation is located at Walpole Island First Nation (450 ha), the Windsor Ojibway Prairie Complex (320 ha) and Pinery Provincial Park (1,250 ha).

In Michigan, pre-settlement vegetation is estimated at 122,425 ac (48,970 ha) of lakeplain prairies in St. Clair, Macomb, Oakland, Washtenaw, Wayne and Monroe counties. Unfortunately, less than 800 ac (320 ha) remain today.

These natural areas represent the best of the remaining prairie and oak savanna ecosystems left in the Lake Huron to Lake Erie Corridor. Unfortunately, the remnants perform few, if any, of their original landscape and habitat functions to support mammals, birds, reptiles and amphibians. Butterfly populations have declined to the point that some species, such as Karner blue and frosted elfin, are endangered species in the U.S. and have been extirpated from Ontario. In addition, many plants that once were common in tallgrass prairie and oak savanna ecosystems are at risk of being lost to the region, and in some cases, Earth.



NATURAL HERITGAE INFORMATION CENTRE

This map illustrates the Pre-European settlement distribution of tallgrass prairie and oak savanna in Ontario. Today, exisitng prairie communities are remants of this original distribution.

Places to visit and experience tallgrass prairies and oak savannas in the Lake Huron to Lake Erie Corridor are:

United States	Canada
Petersburg State Game Area	Ojibway Prairie Provincial Nature Reserve
Algonac State Park	Ojibway Park
St. Clair Flats State Game Area	Point Pelee National Park
Lower Huron Metropark	Stone Road Alvar on Pelee Island
Indian Springs Metropark	Pinery Provincial Park
Highland State Recreation Area	Howard Watson Nature Trail
Island Lake Recreation Area	Canatara Park Prairie Reconstruction
Nichols Arboretum Dow Prairie Reconstruction	Dennis Rupert Prairie Preserve
Matthaei Botanical Gardens Prairie Reconstruction	
Gallup Park (City of Ann Arbor)	
Furstenburg Park (City of Ann Arbor)	
Barton Park (City of Ann Arbor)	
Bandemer Park (City of Ann Arbor)	
Brighton Recreation Area	
Sterling State Park	

The Great Lakes Marshes, tallgrass prairies and oak savannas of the Lake Huron to Lake Erie Corridor have diminished greatly since the development of the region by European settlers. Parks and nature preserves make up most of the high-quality natural areas remaining today. An extraordinary diversity of plants and animals still call these remarkable ecosystems home in today's environment. Protecting them is critical for their survival.

Walpole Island First Nation Territory "Bkejwanong" Land where the Waters Divide

Walpole Island First Nation lands is a mosaic of wetlands, prairie, and oak savanna habitats without equal in the Great Lakes Basin"

- State of the Lakes Ecosystem Conference, 1998

aerial view of Walpole Island in the St. Clair River Delta

aabshkoki" is the Ojibwa name for marsh and all the life and rich biodiversity contained within it. lpole Island has 42,500 ac (17,000 ha) of coastal marsh. It is one of the largest contiguous portions oastal marsh left in the Great Lakes Basin. Patches of wild rice are purposefully not harvested ustain the many waterfowl that visit each year.

Walpole Island is truly an ecological treasure in the Lake Huron to Lake Erie Corridor. The natural communities found on Walpole Island offer clues to how the region's landscape might have looked prior to European settlement.

Among the many beautiful scenes on Walpole Island is a grove of widely spaced oak trees, with dappled light filtering through the canopy and the ground thickly covered with a multitude of wildflowers and grasses. In the distance, oak trees fade seamlessly into prairie meadows of purple, yellow, pink and white blossoms, as well as grasses that reach beyond shoulder height, seemingly to the sky. The air abounds with the buzz of insects, birds calling to one another, and dewy scents.

On the fringes of Walpole Island, coastal marshes filled with cattails, sedges and rushes spread out in every direction. Turquoise water, like that found in the tropics, extends from the marshes into Lake St. Clair. The marsh area is so expansive that one could easily become lost in its many openings, islands and dikes.

The plant and animal life is amazingly diverse. In fact, Walpole Island has some of the highest concentrations of rare species of any place in Canada. The people of Walpole Island First Nation have successfully managed and lived off their lands for thousands of years. The existence of high-quality tallgrass prairie and oak savanna is most likely due to their use of fire, as well as protection from large-scale agricultural development. The people's traditional values and practices are probably the largest factors responsible for sustaining the different habitats and associated plants and animals in their territory. The ecosystems that are threatened on a global scale remain a vital part of the Walpole Island community's past, present and future.

ALLEN WOODLIFFE

Walpole Island is the only place in Canada where the white prairie gentian (Gentiana alba) *is found. This plant is characteristic of high-quality oak savanna ecosystems.*

Visitors can learn more about Walpole Island's natural heritage at the Walpole Island Heritage Centre.

ERIK ALLEN

G.M.ALLEN

The eastern portion of St. Clair River Delta constitutes the lands of Walpole Island First Nation. There, 24,000 ha of delta islands are a part of the traditional homeland of the Ojibwe, Odawa, and Pottawatomi people who together comprisera political compact known as the Three Fires Confederacy. The Ojibwe language "Anishinaabemowin" is their native language.

"Mushkode" is the Ojibwa name for prairie and savanna. Walpole Island contains the best remnants in the Corridor of the globally imperiled tallgrass prairie and oak savanna communities. Those at Walpole are home to more than 140 rare plant species.

WALPOLE ISLAND HERITAGE CENTRE

"Mtigwaaki" is the Ojibwa name for deciduous forests, or "bush." Walpole Island contains one of the largest continuous tracts of forested area in southern Ontario.