

US EPA ARCHIVE DOCUMENT



GREAT·LAKES

IN THE BALANCE

PROTECTING OUR ECOSYSTEM'S RICH NATURAL LEGACY



INTRODUCTION

From evergreen forests in the north to tallgrass prairies in the south, from granite bluffs in the west to undulating sand dunes in the east, the Great Lakes basin is a unique ecosystem. Its vast inland waters have molded a rich and varied landscape and given rise to a stunning diversity of plant and animal life, some found nowhere else in the world.

Preserving this biological diversity is important for nature. The richer an ecosystem is, the more resilient it is and the better able to withstand the ravages of a sudden drought or seasonal floods.

Those of us who live in the basin also depend on its vast natural resources. They provide our food, clothing, and shelter; our power, paper, and pharmaceuticals. In fact, many resources we haven't yet tapped. Chubs—deepwater fish—could well offer a clue to surviving extremes of temperature change; the study of mussels may yield a new kind of medical adhesive. And whatever the basin's practical values, we treasure its natural landscape for deeply personal reasons as well. We enjoy reeling in the day's first catch or losing ourselves in the quiet of a wilderness retreat. Yet these same activities that depend on the basin's finely balanced ecosystem also cause alterations that can threaten its very survival.

The pages ahead, then, celebrate the wonderful diversity of life in the Great Lakes basin and the many efforts to protect its lands and waters. These efforts, though far from complete, seek to balance the needs of nature with the needs of people who call the Great Lakes home. For as conservation enriches the environment, it enriches our own lives as well.

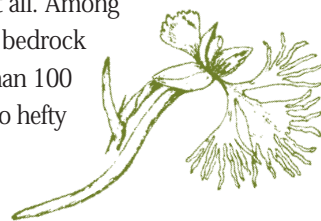






TREASURING NATURE'S DIVERSITY

Covering 200,000 square miles, the vast Great Lakes ecosystem is a trove of biological diversity—and the inventory is not complete. According to a study conducted by The Nature Conservancy, a private conservation organization, over 30 of the basin's natural communities are seldom found anywhere else in the world, if at all. Among them are the unusual mixes of flora and fauna that inhabit the basin's bedrock expanses and remote northern shorelines. The basin also claims more than 100 species of globally rare plants and animals, from delicate prairie flowers to hefty lake sturgeon; many of them face extinction.



*Eastern prairie
white-fringed
orchid*

The richness of the Great Lakes basin is inextricably tied to the integrity of its individual components, for no part of this ecosystem survives alone. Indeed, disturbances in one area can have unintended consequences elsewhere. When shipping canals are built, for example, they open up routes of invasion for non-native fish like the sea lamprey, which preys on the basin's lake trout. When forests are cleared, the soil may erode and wash into streams, smothering spawning beds for fish and the rocky toeholds of mussels.

There are many threats to the health of the Great Lakes region: agricultural development, logging practices, urban expansion, and the destruction of shoreline habitats. Nevertheless, in and around the lakes, places of great beauty and ecological richness remain.



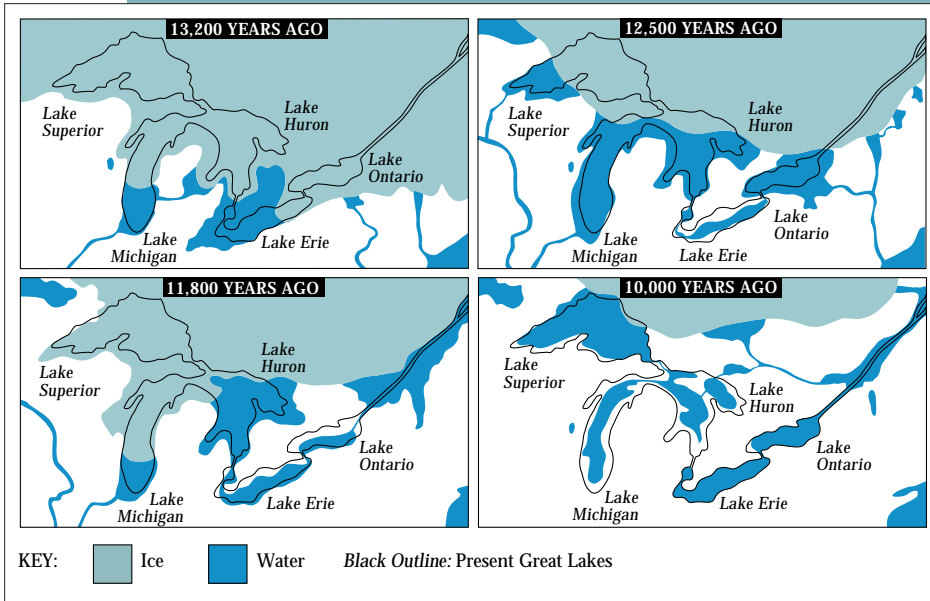
*Left: Occurrences
of rare species and
natural communities
in the Great Lakes
basin, based on
available data*

*Facing page:
Lake Superior cliffs
at Pictured Rocks
National Lakeshore,
Michigan*

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EVOLUTION OF THE GREAT LAKES

The Great Lakes began to form more than 1 million years ago, during the Great Ice Age, when continental glaciers repeatedly advanced over the region. Four major periods of glaciation occurred as the sheets of ice, in some places two miles thick, inched forward. With boulders and particles of sand, silt, and clay picked up along the way, the advancing glaciers scoured the underlying bedrock, gouged out river valleys, and leveled hills.



SOURCE: THE GREAT LAKES: AN ENVIRONMENTAL ATLAS AND RESOURCE BOOK, 1995

About 14,000 years ago, as the climate warmed, the last of these Ice Age glaciers began to retreat, forming a series of transitory, or proglacial, lakes—the much larger ancestors of today's Great Lakes. As the glaciers paused in their retreat, ridges, or terminal moraines, formed at the boundaries of the ice front where soil, rocks, and other debris were left behind. In these curious landforms geologists today can trace the history of the glaciers' withdrawal. Large chunks of ice also broke off, were buried in the moraines, and later melted, forming depressions in the landscape that now are small lakes and marshes.

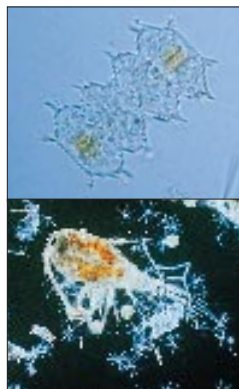
As the last blocks of ice left the region about 3,000 years ago, the land began to rise, released from the oppressive weight. This process, called crustal uplift, was at times relatively rapid, causing dramatic changes in the depth, size, and drainage patterns of the lakes. Although the uplift has now slowed, it is still occurring in the northern parts of the basin—evidence that the region is still evolving.



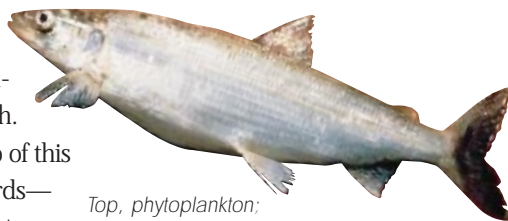
• IN THE LAKES THEMSELVES •

The lakes are the most mysterious of the basin's environments, their deepest waters virtually unexplored. They contain one-fifth of the world's freshwater supply. And together, they exert a profound effect on the region's climate. They cool its summers, take the edge off its winters, increase its rain and snowfall—creating in this northern zone places where even the grapes of Mediterranean climes can thrive.

With sunlight unable to reach the lakes' dark depths, rooted vegetation is limited to the shallows. The flora of the open waters consists largely of tiny free-floating algae called phytoplankton. Microscopic creatures called zooplankton feed on the phytoplankton and themselves serve as food for herring and other small fish. These in turn are the prey of still larger fish. At the top of this food chain are the large lake trout and numerous birds—terns, cormorants, and osprey—that come to nest on islands or feed along the shore.



© THE ACADEMY OF NATURAL SCIENCES
J. REIMER (TOP); ALAN TESSIER (BOTTOM)

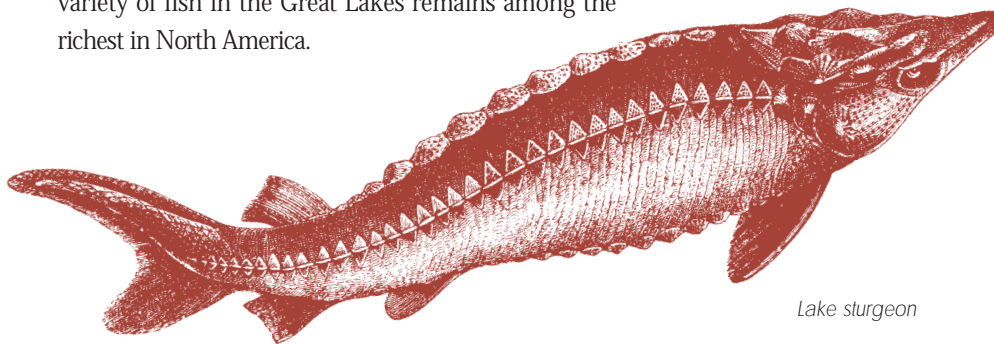


© LEE EMORY

Top, phytoplankton;
center, zooplankton;
bottom, shortjaw cisco

Changes in the lakes' environment—caused by deforestation, pollution, commercial fishing, and the invasion of foreign species like the zebra mussel—have devastated local aquatic populations. Several species of unique deepwater fish called ciscoes are now extinct.

Other species, like the lake sturgeon, are seriously threatened. These unusual fish resemble their giant fossil ancestors, which lived 70 million years ago. Early fishermen used to burn them in piles on the beach because they tore holes in fishing nets. Dams now block the mouths of most rivers, preventing sturgeon from reaching their spawning grounds and reproducing. Though scarce today, the species survives, and the variety of fish in the Great Lakes remains among the richest in North America.



Lake sturgeon

• ALONG THE SHORELINE •

Biologically, the richest areas in the basin lie along the lakes' 11,000 miles of shoreline, shaped by the strong winds and waves and the fluctuations in water levels. These coastal areas teem with plant and animal life. Some of the species found here exist nowhere else in the world.

The lakes' shoreline habitats include remarkable sand dunes, the most extensive freshwater dunes in the world. They range from forested dunes standing hundreds of feet high, to low, linear ridges bordering sandy beaches, to open, undulating dune fields covering thousands of acres.

Several unusual species inhabit the Great Lakes dunes. One is the piping plover, known for its melodious song. In 1996, its population in Michigan con-

sisted of only 23 known nesting pairs. Houghton's goldenrod, an extremely rare plant, exists along the northern shores of lakes Michigan and Huron. The dwarf lake iris, with its gorgeous blue flower, grows on wooded beach ridges, while the Lake Huron locust frequents open dunes.



Left, Rock Harbor Shore, Isle Royale; right, Grand Sable Banks and Dunes, Pictured Rocks National Lakeshore, Michigan



Left, piping plover on eggs; center, Houghton's goldenrod; right, dwarf lake iris

LEFT, © U.S. FISH AND WILDLIFE SERVICE/JOHN H. GAVIN;
CENTER, © S. CRISPIN;
RIGHT, © JOHN & ANN MAHAN

The dunes serve an important function. They shelter neighboring coastal marshes and enable plants and wildlife in these wetlands to survive close to the powerful forces of the Great Lakes.

Coastal marshes range from small water-soaked lands nestled in scattered bays to vast wetlands in the Kakagon Sloughs of northern Wisconsin and Long Point, Ontario. Whatever their size, they are the biological engines that fuel the entire aquatic ecosystem. They absorb and cycle nutrients and organic material, feeding vast populations of

*Lake Huron locust*

fish and preventing pollutants like nitrogen and phosphorus from washing into the lakes. They also provide a habitat for an enormous variety of plants and animals: migratory birds, for instance, which congregate around the calm waters to feast on the abundant supply of food, and many species of Great Lakes fish, which use the marshes as spawning and nursery areas.

Bedrock expanses along the basin's shoreline offer their own unusual landscapes. Across Michigan and Ontario, sections of bare limestone alternate with calcium-rich wetlands and host a variety of species: from the threatened eastern Massasauga rattlesnake to rare wildflowers, grasses, and sedges like beaked spikerush and tuberous Indian plantain. Lake Superior's rocky shore is home to wildflowers, mosses, and lichens usually found much farther north.

• ON THE LAKEPLAINS •

The effects of the Great Lakes on climate and geological features extend beyond the shores to the neighboring lakeplains. Here are the fertile lands where the beds of the older glacial lakes once lay. Here, too, are old dunes alternating with low-lying, waterlogged swales.

A variety of natural communities remain in the lakeplains. Especially important are the prairies and the grasslands with scattered trees, called savannas. These are two of the most imperiled communities in North America today. To survive, they depend on seasonal flooding and a regular cycle of fire to keep woody plants in check and release nutrients from dead plant material.

The Great Lakes' tallgrass prairies, in particular, are among the rarest landscapes in North America. They were part of the grasslands that once extended across the heart of the continent. Because their fertile soil is ideal for cultivating crops, these prairies now exist



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Top, Gensburg Prairie, Illinois; bottom, oak savanna, Ojibway Prairie Provincial Nature Reserve, Ontario

only in pockets. One of many rare species that depend on this habitat is the delicate eastern prairie white-fringed orchid.



© THE NATURE CONSERVANCY

Above, Karner blue butterfly; left, wild lupine



The lakeplains also contain remnants of sandy barrens and savannas—areas found on old dunes and glacial outwash plains. The Karner blue butterfly lives in these barrens, where wild lupine plants thrive, the Karner blue caterpillar's only food.

With much of this habitat lost to urban development—the sandy soils have been filled in and fire suppressed—the brilliantly colored butterfly is now in danger of extinction.

Special habitats in the lakeplains include alvar communities, nature's own rock gardens. Here, astonishingly, arctic and prairie plants thrive side by side in a harsh environment where searing heat alternates with bitter cold, periodic drought with prolonged flooding. Never widespread in the Great Lakes basin, these communities are now intact in only a few areas in Ontario, Michigan, New York, and Ohio. They mainly occur along an unusual geological formation called the Niagara escarpment.

This bedrock is made of ancient limestone formed from coral reefs when the area was still buried under a saltwater sea. The lakeside daisy occurs in alvar communities and nowhere else.



© S. CRISPIN

Eastern prairie white-fringed orchid



PHOTOS: © S. CRISPIN

Alvar, Manitoulin Island, Ontario; inset, lakeside daisy

• FARTHER INLAND •



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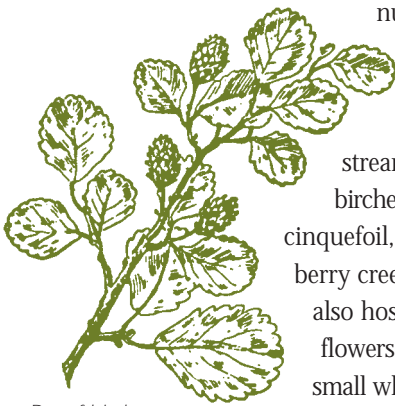
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Pigeon River Fens, Indiana; inset, Mitchell's satyr

Among the diverse natural communities beyond the lake-plains are fens. Fens are similar to bogs but are far richer in nutrients, which come

from the mineral-laden soil and seeping groundwater

streams. They are filled with dwarf birches, white cedar, and shrubby cinquefoil, not the heaths and cranberry creepers of bogs. Fens also host a profusion of wildflowers, like the blue gentian, the small white lady's slipper, and a multitude of orchids. Rare reptiles include



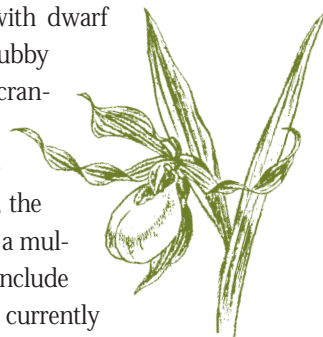
Dwarf birch

Kirtland's snake. Mitchell's satyr, an imperiled butterfly, is currently known to occur in fewer than 20 sites in the world, all of them in the basin's southern fens.

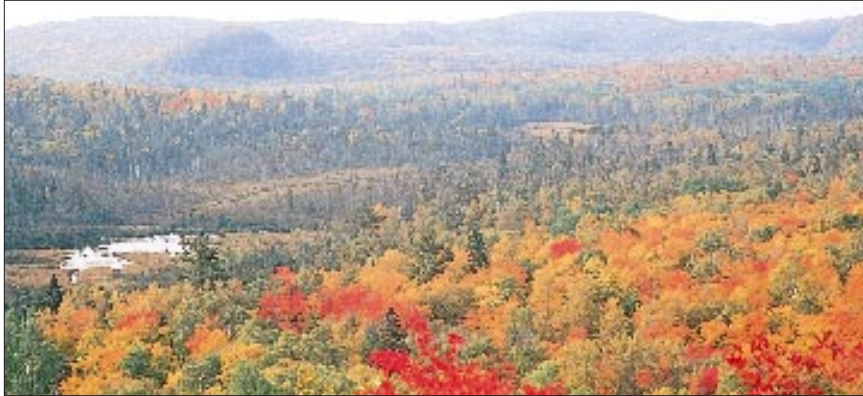


© R.W.V.

Kirtland's snake



Small white lady's slipper



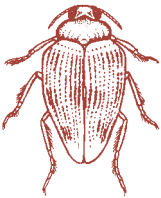
© HAROLD MALDE

Farther to the north, the Great Lakes' unusual climate gives rise to distinctive forests that stretch from Minnesota across Ontario. One of the finest is the old-growth forest of the Algoma Highlands on Lake Superior's eastern shore. The precipitation here is extreme—snow piles as high as 13 feet, and rainfall averages 30 inches annually. As a consequence, the forest is one of the most biologically diverse in all of Canada.



© GARY & JOANIE MCGUFFIN

The tributaries of the Great Lakes connect the lakes to the surrounding lands, transporting nutrients across the watershed. These rivers and streams provide spawning habitats for Great Lakes fish and migration corridors for songbirds and waterfowl.



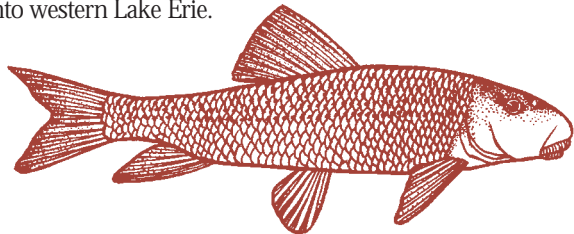
Top, Palisade Valley at Tettegouche State Park, Minnesota: above, 350 to 400 year old white pine, Algoma Highlands, Ontario

Fish and insect life in the tributaries

is well documented. Several unique species exist here, including the copper redhorse and Hungerford's crawling water beetle. The world's last known population of the white cat's paw pearly mussel is found in Fish Creek, a small tributary that feeds into the Maumee River in Indiana and Ohio and eventually drains into western Lake Erie.



Top, Hungerford's crawling water beetle; center, white cat's paw pearly mussel; right, copper redhorse



ILLUSTRATIONS BY EVELYN MISAKI WALTHERS

PRESERVING VALUABLE HABITATS

With all its natural riches—indeed, because of them—the Great Lakes region has seen tremendous economic growth. Yet over the years, the Great Lakes ecosystem has been damaged by this human activity: the dredging and filling of wetlands, the conversion of natural vegetation to cultivated crops, the overharvesting of deep-water fisheries, the razing of vast forests. Urban expansion and development on pristine shores have also taken their ecological toll.

Still, across the region lie precious natural areas. Many are intact but need to be protected from encroaching development. Others are damaged but not extensively; by restoring natural processes, like the flow of water, the self-healing powers of the ecosystem can be reengaged.

Cordoning off these ecologically rich landscapes to protect them from further threats is often impractical, for these areas exist where people live and work. The challenge, then, is to create a new land ethic whereby we respect our natural surroundings even as we build our homes and expand our businesses.

In rural, urban, and shoreline communities all across the basin, people are doing just this. Private, public, and corporate interests are joining to find new ways to protect the basin's resources, mindful that economic development and ecological health can exist side by side—that, in fact, the two are closely linked.



Pin oak



© JOHN & ANN MAHAN

Above, terns at a High Island sand spit, Beaver Island Archipelago, Michigan; following pages, satellite image of the Great Lakes





•PROTECTING NATURE'S HERITAGE ALONG THE SHORELINE•

A stunning stretch of sand dunes lines the eastern shores of Lake Ontario in New York state. This 17-mile coastal barrier shelters freshwater bays and wetlands that are critical habitats for fish and migrating birds. Each spring, more than 40,000 hawks and eagles funnel through the area, en route to nesting sites in Canada. Many fish spawn here, including yellow perch and walleye. Three species of terns, the northern harrier, and a variety of waterfowl and marsh birds feed in the waters or along the shore.



Black tern nest



Bald eagle

For the most part, the land and water resources of eastern Lake Ontario have been spared the development pressures that have hurt other coastal regions. As a consequence, this remarkable ecosystem remains relatively intact. But new pressures are mounting. A prime area for recreation, the eastern shoreline hosts summer visitors who crowd the beaches to swim, sun, and fish. Vacation homes, cottages, and marinas are multiplying, their construction fueled by the growing tourist industry.

Crucial to the area's economy, tourism nevertheless affects the ecosystem. Human traffic on the shoreline disrupts the cycle of erosion and rebuilding so important to maintaining the integrity of the dunes and the wetlands they shelter. Visitors trample



The Nature Conservancy's El Dorado Nature Preserve, Jefferson County, New York

the beachgrass that anchors the sand in place and protects the dunes from unnatural erosion. Visitors may also scare away migrating shorebirds, which are often sensitive to human intrusion.



© D. LEOPOLD

Residential development along Rainbow Shores Bog, Eastern Lake Ontario, New York

New York's Ontario Dune Coalition—an alliance of landowners' associations, non-profit organizations, local governments, and state agencies—has worked for 10 years to protect the area in keeping with private ownership. Member organizations have mounted educational efforts—erecting signs explaining the beachgrass ecology, for example—and built walkovers so that visitors can enjoy the dunes without damaging them. Members have also supported research on local plant and wildlife populations and the dynamics of the habitats that support them. By freely exchanging such scientific data, the coalition helps inform the debate over future development. It thus ensures that the tourist industry finds a way to thrive in eastern Lake Ontario by preserving the vital landscape on which it depends.



© S. BONANNINO

Dune walkover construction, Sandy Pond Beach, New York

CONSERVATION PROJECTS

In Other Shoreline Communities

DOOR COUNTY: The natural beauty of Wisconsin's Door County peninsula has attracted visitors and seasonal residents for many decades. The scenic value here owes a great deal both to the highly fissured bedrock of the Niagara escarpment on which the peninsula sits and to the biological richness of the area. Ridges Sanctuary, for example, shelters one of the Midwest's greatest concentrations of rare plants. More than 475 plant species, including 25 kinds of orchids, have been recorded on its property. Another park holds one of the best remaining examples of boreal forest in Wisconsin.

As residential and commercial development threatens the natural landscape, the people of Door County are beginning to explore ways to protect the pristine areas that remain. Town and village boards, local land trusts, and citizen organizations now acknowledge that unplanned growth can hurt the peninsula's economic health as well as its environment. As a consequence, ecological data, largely overlooked in land-use planning in the past, will be a key consideration in the future.

KAKAGON SLOUGHS: The Kakagon Sloughs in northern Wisconsin comprise a 16,000-acre wetland, the largest and healthiest freshwater estuary in the Great Lakes basin. Open and expansive, this water-soaked land is often called the Everglades of the North. It serves as spawning ground for the lake sturgeon and represents Wisconsin's last nesting site for the piping plover. Other rare species abound. The area is also the ancestral home and cultural base of the Bad River Band of the Lake Superior Tribe of Chippewa Indians. They depend on the marshes for subsistence hunting and fishing and for traditional wild rice harvests.



Cave Point, Door County, Wisconsin

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Kakagon Sloughs, Wisconsin

© S. CRISPIN

To protect this still-pristine area, the Bad River Band, in partnership with regional, state, and federal entities, is building a data base that maps the area's soils, topography, and hydrology and catalogs the local aquatic life, water quality, and vegetation. Using this data, the band plans to develop an integrated resource management plan to ensure the integrity of the Kakagon Sloughs for many years to come.

NORTHERN LAKE HURON: The ragged shoreline of northern Lake Huron is still wild, with rocky shores, ancient glacial moraines, and old forests. They provide habitat for 60 species considered rare or endangered in Michigan and include excellent examples of nine globally rare natural communities. Millions of migrating songbirds alight on these shores each spring to feast on small water-borne insects called midges before flying to breeding grounds farther north.



© S. CRISPIN

Bush Bay, Northern Lake Huron, Michigan

As in other shoreline areas, the local economy is built on seasonal tourism, boating, and sport fishing—all of which place their own pressures on the landscape yet vitally depend on it. There are forestry businesses and limestone quarries as well.

To protect critical habitat, private conservation organizations like The Nature Conservancy have acquired and manage a network of nature preserves where marshes, sand dunes, cobble beaches, northern forests, fens, and other important natural communities survive. A local sports club has granted funds for marsh research, and residents have offered conservation easements on their properties to a local land trust.

LAKE SUPERIOR HIGHLANDS: Lying between Duluth, Minnesota, and the Canadian border and following the shoreline, the Lake Superior Highlands claim unusual rockshore communities and rare old-growth forests filled with



© HAROLD MAUDE

northern hardwoods and conifers, from yellow maples to red pines. Migrating raptors, including bald eagles and peregrine falcons, pass in great numbers along the high ridges near Duluth. Gray wolves, lynxes, and black bears roam the area, their survival dependent on the large tracts of wild, undisturbed land. In all, biologists have counted 38 distinct natural communities and about 320 different plants and animals. The state considers many of these species threatened or endangered because of their disjunct status—neighboring populations are hundreds of miles away.



© THE NATURE CONSERVANCY

Lake Superior Highlands, Minnesota. Top, Tetlegouche State Park; bottom, black bears

But urban expansion is now threatening the region and fragmenting the forested lands. To conserve the remaining unbroken expanses, local residents, forest products and tourism industries, natural resources agencies, and nonprofit groups like The Nature Conservancy are working together to balance the needs of residents with the needs of nature.

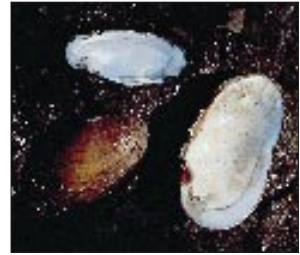
COOTES PARADISE: At the western end of Lake Ontario lies Cootes Paradise, once a 2,000-acre marsh surrounded by forests and sheltered by limestone cliffs rising in the background. Runoff from industrial and residential neighborhoods in nearby Hamilton has ruined the quality of the water and altered water levels. Also, carp introduced into the area have destroyed its vegetation. As a result, much of the marsh has disappeared.

The Royal Botanical Gardens, MacMaster University, the Hamilton Naturalists' Club, and the Bay Area Restoration Council, as well as countless volunteers, are attempting to restore the ecological balance of Cootes Paradise. For example, they are installing barriers to prevent carp from entering the area and replanting native wetland species. Such projects may eventually spur ecotourism and help diversify an economy now tied to the declining steel industry.



•PRESERVING NATURE'S DIVERSITY IN RURAL LANDSCAPES•

Meandering through the cornbelt of Indiana and Ohio, Fish Creek, a tributary of the St. Joseph River, is an oasis of biological diversity in a fertile area long ago converted to agricultural use. Sheltered under the arch of oaks and willows, the cool-water stream is home to more than 70 species of fish and mussels. It is also the last refuge of the white cat's paw pearly mussel, a subspecies found nowhere else in the world.



© 1997 CASEY CRONIN

*Mussels, Fish
Creek, Indiana*

In other tributaries of the St. Joseph River, aquatic populations are dwindling because their habitats have been damaged. Without shade from surrounding trees, the temperature of the water climbs to levels unsuitable for certain fish. And without vegetation to prevent erosion—a problem in all rural lands where forests have

been razed to plant crops—soil and chemical fertilizers wash into the rivers and streams. Mussels, which feed by filtering water, are particularly susceptible to the buildup of sediments that deprive them of oxygen and flowing water.

Fish Creek stands, then, as a kind of Noah's Ark, as yet relatively undisturbed. Farmers, three federal agencies, two states, local agencies, and The Nature Conservancy are working together to prevent sediments from accumulating in the stream. Under a program developed by the area's residents, farmers have been able to purchase tillage equipment that leaves debris from last year's crop in place to anchor, and conserve, the soil. Half of all row crops in the watershed are now planted using this no-till method. In addition, 260 acres along the creek have been reforested. The new farming practices and the increase in local vegetation prevent the erosion of thousands of tons of soil each year. The farmers benefit—valuable topsoil is saved—and so does the ecosystem.



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*Fish Creek, Indiana. Above, upper stream
corridor; below, tree planting*

CONSERVATION PROJECTS

In Other Rural Areas

CARDEN PLAIN: A place where forests give way to farmland and ancient granite outcrops yield to younger limestone plains, the Couchiching-Severn region in Ontario is a mosaic of biologically rich habitats. Among them are the rare alvar communities found on the Carden Plain. While scientific study of alvar areas is in its infancy, quarrying and cattle grazing in the rural landscape threaten their survival.

The Couchiching Conservancy, a nonprofit land trust organization, is conducting biological inventories of Carden's alvar communities to understand their ecological relationships and distribution. It is also educating residents about the biological value of their land and collaborating with local cattle ranchers to identify farming practices that will not harm the unusual bedrock vegetation. In one section declared an "area of natural and scientific interest" by the Ontario Ministry of Natural Resources, landowners implementing conservation measures can receive a property tax rebate.



Carden Plain with prairie smoke and balsam ragwort in flower; inset, close-up of prairie smoke

SOUTHWESTERN ONTARIO: In a region called the Carolinian life zone, expanding cities and farmland have left a patchwork of natural areas with deteriorated streams and lakes and impoverished plant and animal life. Yet because farming is so important to the Canadian economy, ecological imperatives need to be addressed without threatening agricultural productivity.

The Federation of Ontario Naturalists and other private conservation organizations, under a program funded in part by provincial and federal agencies in Canada, have launched projects to revegetate woodlands, wetland edges, and natural corridors along streams and hedgerows. Conservationists and farmers are also meeting to educate each other and explore new ways of resolving conflicts between agricultural expansion and wildlife needs.



• SAVING NATURAL HABITATS IN URBAN AREAS •

On the edge of suburban Toledo, Ohio, lie areas referred to as oak openings. Here, dry oak savannas and sand prairies perched on top of windblown dunes alternate with wet sedge meadows and pin oak swamp forests in low-slung swales. Natural communities like these are as rare as tropical rainforests.



© THE NATURE CONSERVANCY

Prairie, Oak Openings region, Ohio

Like other biologically rich habitats bordering urban centers, however, the openings are only small, altered remnants scattered throughout their former range. Commercial and residential development pressures have mounted as the city has expanded. Large areas have been drained, and natural fires no longer occur to keep out foreign species and enrich the soil. As a result, some of the openings have given way to aspen forests.

To preserve this treasured landscape, county and state governments have established several parks and preserves with more than 7,500 acres carefully managed for recreation, wildlife, and conservation purposes. The Nature Conservancy has acquired the 400-acre Kitty Todd Preserve, where it is restoring wetlands that harbor nearly 70 rare species of plants and animals. But since much of this ecologically important landscape remains in



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© T. SEIDEL

Top, residential development in the Oak Openings region; bottom, prairie overgrown with aspen thicket



private hands, education and outreach are key to its survival. As residents understand the full impact of changes on the natural communities in their midst, the area may one day see a corridor of oak savannas weaving its way through suburban backyards—residential development in harmony with nature.

Left, controlled burn of overgrown oak savanna; below, high quality oak savanna at the Kitty Todd Preserve, Ohio



CONSERVATION PROJECTS

In Other Urban Centers

SOUTHERN LAKE MICHIGAN: Along the stretch of shoreline between Michigan City, Indiana, and Chicago, Illinois, among the oil refineries, steel mills, chemical factories, commercial developments, and residential neighborhoods, an archipelago of natural areas survives: scattered remnants of rich lakeplain prairies, dunes, savannas, and wetlands. These islands of biological diversity claim more than 1,400 species of plants, 200 birds, and dozens of mammals, fish, butterflies, reptiles, and amphibians. Even threatened species that have lost habitats elsewhere live in this fragmented

landscape: the Karner blue butterfly, the earleaf and pale false foxglove, Hill's thistle, and the peregrine falcon.



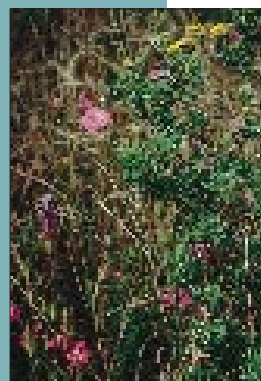
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Ivanhoe Dune and Swale Preserve, Lake County, Indiana

County, state, and federal agencies, as well as park and school districts, have protected the most vulnerable and the most biologically valuable areas by establishing parks and preserves carefully managed for conservation, like the Indiana Dunes National Lakeshore. Local volunteers have logged thousands of hours weeding alien species, surveying frog and toad populations, monitoring butterflies, and conducting controlled burns in natural communities that depend on fire for their survival. Private companies like NIPSCO, DuPont, USX, South Shore Railroad, and Amoco are supporting efforts to restore habitats degraded by industrial pollution, establish wildlife corridors, and develop management plans for natural areas.

CHICAGO WILDERNESS: The sprawling Chicago metropolis may be the manufacturing and industrial center of the Midwest, but the original prairies and open woodlands that once characterized central North America have survived here better than anywhere else in the nation's cornbelt. Hundreds of rare species make their home not far from the city's downtown, including 181 listed as endangered or threatened in Illinois.

Some 34 public and private agencies—including museums, research institutions, and local, state, and federal agencies—have joined in partnership to protect, restore, and manage Chicago's 200,000-acre wilderness.



© STEPHEN PACKARD

*Wildflowers
at Illinois
Beach State
Park*



CONCLUSION

The geological complexities of the vast Great Lakes basin have created a richly inhabited ecosystem—whether in the prairies of the American Midwest, along the shores of Lake Huron, or in the forests of the Canadian north. Preserving this tremendous diversity of life is crucial for nature’s survival and for our own.

It is often assumed that ecological concerns stand in the way of economic growth. Across the region, however, conservation efforts in local communities are proving otherwise: dramatic shorelines can be preserved even as tourism grows; rivers need not be choked by the erosion of soil from surrounding farms; corridors of oak savannas can thrive even in suburban backyards.

These efforts are not isolated. For we are discovering in these communities creative new ways of balancing economic realities with ecological goals—lessons we can apply elsewhere in the Great Lakes region. And we are witnessing, all across the basin, a respect and appreciation for the vast and wonderful biological resources that sustain us all.



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wealth of the Great Lakes ecosystem. The program, with a coordinating office in Chicago,
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