

THE RESTORATION REVOLUTION IN NORTHWEST INDIANA

Paradoxically the region that includes the three shoreline counties of Indiana at the south end of Lake Michigan is known both for its concentration of heavy industry and the birthplace of the science of ecology in North America. This document reports results of an inventory of restoration activities to restore and protect natural areas in the area known collectively as Northwest Indiana. It does not include every restoration activity in the region and the mail survey to identify restoration projects did not obtain as much detailed information as was sought. Still the results show that a growing number of restoration and conservation projects are being carried out in this region by means of partnerships between public agencies, industry and private nongovernmental organizations.

PURPOSE OF THE INVENTORY

The immediate purpose of the project was to identify recent, ongoing and planned projects to restore natural areas in Lake, Porter and LaPorte counties as of 2006. A longer term purpose is to inform residents of the region and others where and why restoration is occurring and how it is being achieved. The ultimate goal is to encourage ongoing restoration by demonstrating how pollution from the past can be cleaned up and natural areas restored to improve the quality of life today and preserve natural resources for future generations.

The survey began as a project of the Quality of Life Council, an agenda-setting not for profit organization that provides a forum for considering how to achieve sustainability in the region covered by the survey. The council considers topics related to economic development, environmental quality and social equity in quarterly meetings that are open to the public. Additional sponsors include regional planning and economic development agencies, public resource management agencies and private conservation and land trust organizations. The sponsors are listed in Appendix I. Funding for the project was provided by the Center for Regional Excellence of Indiana University Northwest.

METHODOLOGY

For the purposes of this project, restoration is broadly defined as activities that are intended to restore all or some of the natural characteristics of a site, including indigenous species of vegetation for land sites and improved habitat on land or in waterways. Restoration is assumed to be coupled with protection of existing natural features. The project site may be as small as part of an acre or be part of a large area totaling hundreds of acres with numerous separate but linked restoration efforts.

Information was collected principally by means of a survey form distributed by mail followed by direct contact. The survey form as shown in Appendix II was created in consultation with the sponsoring agencies and organizations. The form was sent to 66 resource management agencies, conservation organizations, corporations and local governments with an explanatory cover letter requesting that it be completed and returned. Every recipient was contacted at least once by a follow up telephone call, most repeatedly, or in person. A second reminder letter was also sent.

Obtaining completed survey forms with all the detailed information requested for every site proved too difficult with the limited resources available for this project. Eventually at least partial

information was obtained through the survey for the 166 projects listed in Appendix III. Information about some major and complex restoration efforts was also obtained from published materials, agency Web sites and inquiry to staffs.

All the projects identified were also mapped using Geographic Information System technology. The map was compiled by the Northwest Center for Data and Analysis at Indiana University Northwest. In addition to showing where restoration is taking place, the purpose of the mapping is to make location of the restoration projects available for land use planning and for future development decisions.

FINDINGS AND RESULTS

The 166 projects included in the inventory are located throughout the three counties. The majority of restoration efforts related to industrial usage are in the Calumet area, including the urban centers of Hammond, East Chicago, Whiting and Gary and the industrial area of Porter County around the Port of Indiana. This part of the region includes the watersheds of the Grand Calumet and Little Calumet rivers and is generally considered to be north of Highway 30 and west of Highway 149. Significant natural areas, such as small dune and swale fragments, nevertheless survive amidst the concentration of industry and urban development. The survey confirmed that appreciation for the value of such areas is growing for public agencies as well as industry.

Restoration projects on already publicly owned land are mainly in the Indiana Dunes State Park and the Indiana Dunes National Lakeshore or on county or municipal park land. The state park has the most land that was never used for any other purpose but still struggles to control invasions of non-native plants. Projects in the national park include re-introduction of native species on former home sites and roads and some areas, such as West Beach, where there was extensive sand mining in the past. Past research showed that approximately 25 percent of the vegetative biomass in the park was non-native species.

Former land use on most restoration sites was mixed, because few areas in the three counties were never drained or cultivated for agriculture, logged, used for industry or served as home sites. Restoration almost everywhere requires dealing with invasive exotic species because they become established most readily on disturbed land. Consequently, even though the ideal intention is to preserve natural areas in pristine condition, most projects must include restoration of land that had other uses in the past and ongoing management for exotic species.

NUMBER OF SITES AND THEIR SPONSORS

The total of 166 projects identified include sites where restoration is ongoing, has been carried out within the past 10 years or so or is planned to begin in the near future. About half the projects have public agency sponsors and half have private sponsors, including not for profit organizations, corporations, and private property owners including associations of homeowners. An encouraging number of new restoration efforts are being made by municipal governments. Some sponsoring organizations or agencies are involved with more than one site. Appendix III lists all the projects reported in the survey.

Except for the National Park Service, federal government agencies seldom carry out restoration projects themselves but federal grants are an important source of funding either in connection with regulatory enforcement actions or for implementation of conservation policies and

programs. Generally the survey results indicate increased initiative by state and local governments and private organizations to obtain federal funding in order to carry out restoration projects.

The Indiana Department of Environmental Management (IDEM) and the Indiana Department of Natural Resources (IDNR) are the two state agencies most involved with restoration, either as sponsors or owners of sites or in administration of funding. IDNR manages some sites, designates official state nature preserves and assists Shirley Heinze Land Trust, for example, to manage the five preserves for which it is responsible. IDEM is a trustee for management of Natural Resource Damage Assessment (NRDA) funds paid by industry sources under settlements for enforcement of federal environmental laws. The agency also has regulatory authority in cleanup of so-called Superfund sites under the federal Comprehensive, Environmental Response, Compensation and Liability Act (CERCLA) and with the U.S. Environmental Protection Agency (USEPA) under the federal Resource Conservation and Recovery Act (RCRA).

Local government sponsors that returned survey forms include all three county park departments, 10 towns and cities and several school corporations. Park departments most frequently have the lead role in restoration of municipal sites but the sanitary districts in Michigan City and Gary both sponsor restoration projects. Hammond and Gary both have environmental management agencies that participate in restoration.

The principal private sponsors are major industries and not for profit land trust and conservation organizations. Others are property owner associations or corporations such as residential developers who sponsor mitigation projects, usually to restore a wetland as a condition for obtaining a permit under federal and state rules to drain or fill an area to make way for construction. Only four projects were identified as being carried out by private property owners. Still, results of annual plant sales sponsored by the local chapter of the Wild Ones (a national organization that promotes growing of native species) at Gibson Woods in Hammond and by the Friends of the Dunes in Porter County suggest growing interest in planting native species by regional gardeners.

Major industries such as the United States Steel Corporation, the British Petroleum Refinery at Whiting and many more are involved in restoration in order to comply with federal or state environmental laws but the number who are also supporting voluntary ongoing restoration activities is growing. Companies also frequently join as partners with local government agencies or organizations such as The Nature Conservancy or schools. The DuPont Company, for example, cooperated with The Nature Conservancy to evaluate a natural area on its property along the Grand Calumet River and then to assure its permanent protection. U.S. Steel is involved with several cooperative projects with the city and with schools in Gary.

It did not happen 50 or 100 years ago, but now companies at times are willing to adapt their own activities to respect a conservation need. In the 1990s, for example, a pipeline was voluntarily re-routed in order to avoid damaging vegetation at the Hoosier Prairie near Highland. The Bethlehem Steel Company (now owned by Arcelor-Mittal Steel) sought help from its Community Advisory Committee to protect a heron rookery that developed when the birds began nesting in trees that were killed when beavers dammed an old drainage ditch and flooded its land near Highway 12 and Highway 249.

Northwest Indiana has two principal land trust organizations whose main mission is to acquire and protect natural areas, the field office of the Indiana Chapter of Nature Conservancy and

the locally based Shirley Heinze Land Trust. The Save the Dunes Conservation Fund, which is separate from the Save the Dunes Council, also engages in land acquisition, restoration and protection. Both Save the Dunes and the Heinze Trust have contributed land and both work closely with the Indiana Dunes National Lakeshore and the Indiana Dunes State Park to share knowledge and resources in carrying out restoration. The Trust for Public Land is a national organization with a regional office in Chicago that works with the local groups for land acquisition and played a major role in acquisition of land for the Hobart Marsh project.

THE SCOPE OF RESTORATION

A wide range of restoration projects was identified by the survey, from small to large. Some projects begin with extensive technical and scientific studies in advance of intensive long term management with monitoring and may aim to restore conditions to as near pre-settlement conditions as possible. At the other extreme, some projects are one-time efforts to correct a specific condition, such as engaging volunteers to plant a single native species like marram grass to reduce foredune erosion.

Precise mathematical analysis and comparison for the list of projects as a whole is not possible because most of the survey forms were not filled out in detail. The following discussion is based on a tally of the incomplete information that was provided and supplementary information obtained by follow-up contact.

Specific conservation goals were reported for 86 projects and 87 were designed to meet ongoing restoration management needs. For 24 sites the stated reasons for restoration included protection of plant communities in order to promote biodiversity. Biodiversity is an inherent goal in all the 87 projects that aim to restore or protect wildlife habitat and the 58 that specified protection of rare and native plants as an objective.

Increasing public access or providing open space was listed for 48 projects as well as education in 36 and research in 62. The survey did not ask how research would be carried out, but perhaps the inventory can provide a basis for future research by faculty and students at the region's six academic campuses.

METHODOLOGIES

Removal of trash and debris is taken for granted as the first step toward cleanup and restoration but was reported as a major need in only 37 projects. Help in debris removal is one kind of help donated by companies. The MonoSol Company makes environmentally degradable plastic film next door to the Coulter Prairie Preserve owned by the Heinze Land Trust near Highway 12 and County Line Road in Porter County. The company spent thousands of dollars to remove abandoned railroad equipment, a dilapidated industrial building and the concrete pad that had been left behind by a sand mining operation to assist restoration of the site where at least one plant grows that is not known to grow anywhere else in the region.

The four methodologies used most often are management of invasive species (72 sites), removal of trees and understory vegetation (52), prescribed burns (52) and introduction of native species (61). All may be carried out by paid labor, agency staff or volunteers, including company employees for some industry projects. The pervasive struggle with invasive, mostly non-native species, has led the Save the Dunes Council to joint forces with the National Park Service to organize the Northwest Indiana Invasive Plant Network (NIIPN). Staff of both public and private groups meet

to exchange information on methodologies and consider how to share resources, for example, to carry out prescribed burns that are essential for managing restorations involving prairie plants.

Volunteers, including school children, help collect seeds from native plants and even to grow them in addition to planting seeds or plants. Adult volunteers also help introduce such species as native wild lupine (*Lupine perennis*), pull garlic mustard (*Alliana petiolata*), and remove unwanted understory shrubs such as honeysuckle (*Lonicera japonica*) or gray dogwood (*Cornus racemosa*). Most volunteers are recruited from the membership of land trust and conservation organizations, including some such as members of the Dunes Calumet Chapter of the National Audubon Society, that do not own sites but work on restoration because of personal commitment and values.

Stewardship, or helping to restore and maintain natural areas, is a principal activity of the high school program of the Indiana Dunes Environmental Learning Center. Sandy O'Brien is a local biologist who has assisted many restoration efforts and is chair of the Duneland Chapter of the Sierra Club. She provides the leadership for maintenance entirely by volunteers of the Stewart Mattix Prairie that is owned by the School City of Hobart and the Fred Rose Park owned by the city itself.

Perhaps the most unusual source of volunteer help is the growing of certain beetles (*Galerucella californiensis* and *G. pusilla*) by inmates of the State of Indiana Westville Correctional Center near Michigan City. The beetles are introduced into natural areas by the Save the Dunes Conservation Fund to act as predators for eliminating the invasive purple loosestrife plant (*Lythrum salicaria*), one of the greatest threats to wetlands in the region.

COSTS OF RESTORATION

The survey identified paid labor, staff costs, materials and equipment and land acquisition as expenses for restoration of natural areas. Paid labor was employed for only 40 projects, but major costs for 72 were staff expenses of public resource management agencies, not for profit organizations or corporations. Materials and equipment used for 90 projects seemed mainly to be for tools and plant materials. A few surveys mentioned costs for herbicides to eliminate invasive species. Contractual consultants, such as the J.F. New Company of Walkerton, Indiana, were hired for 29 projects. The cost of restoration to mitigate for loss of wetlands such as the Hobart Marsh may be as great as the cost of land acquisition. The nonprofit organizations rely heavily on volunteers to reduce costs. Only 30 survey forms listed use of volunteers, a number almost certainly too small because of the growing efforts by land trust and conservation groups to recruit and train volunteers.

FINANCING RESTORATION

Most restoration projects carried out by public agencies or not for profit organizations are financed by funding from a combination of sources. Grants from government resource management agencies and programs are the most frequent source. Major federal sources include the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Forest Service that is in the Department of Agriculture and the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce that provides funding to the Indiana Lake Michigan Coastal Program. The U.S. Army Corps of Engineers most frequently becomes involved in restoration issues in connection with the wetlands permit program that it administers under the federal Clean Water Act. The increase in restoration activity financed by federal funding is the result both of increased regulatory enforcement and of the initiative of both local governments and private project sponsors.

The IDNR is the principal state source because it administers the Lake Michigan Coastal Program and the Indiana Heritage Fund that is generated by sale of "environmental" license plates. Before this source of funding was established in the early 1990s, the Dunes States Park was the only state owned natural area in the shoreline counties. Since then, the trust fund has financed purchase of some sites entirely, such as the Bongi property, also known as the Clark and Pine Nature Preserve, but contributed part of the cost for many others, such as the Ivanhoe Nature Preserve site. IDNR staff also often provides technical expertise, especially for nature preserves that it certifies but are managed by land trust organizations such as the Shirley Heinze Land Trust or The Nature Conservancy. IDEM also administers restoration funding that results from enforcement actions such as NRDA settlements that are paid by industries.

Few projects are financed by funding from a single source. The mix of sources generally includes grants from public agencies and may include grants from private sources and contributions of money, materials and equipment or volunteer time. Private companies and corporations pay all the costs of restoration that is required to meet regulatory requirements such as Superfund cleanups or NRDA settlements. Northwest Indiana has a field office of the Wildlife Habitat Council, a national organization that works with corporations who want to go beyond what laws require for what are called Supplementary Environmental Projects (SEPs). In East Chicago U.S. Gypsum is seeking approval as a SEP for a shoreline restoration project on 1.5 acres it owns by the Grand Calumet River but has decided to proceed with the project in any case.

Most restoration projects appear to be carried out on land already owned or donated, since land acquisition was checked as a restoration cost on only 26 forms. The land trust organizations purchase land with funds contributed by their membership and other donors including individuals and small and large businesses. Almost all land is acquired or managed through partnerships except for donations of land by private property owners who want to assure conservation of the land, the plants and woodlands that grow there or wetlands and streams.

Some property owners establish an endowment or trust fund to finance restoration or long term management of lands that they donate in order to protect their natural features from future development. The Taltree Arboretum and Gardens near Valparaiso was established on 360 acres donated by Damien and Rita Gabis. They then established a foundation to manage the project and education programs both as place to display collected plants and in order to promote more appreciation for the importance of conservation of native species.

The NiSource Environmental Challenge Fund is a major corporate source of direct funding of restoration in Northwest Indiana. Established first for the area served by the Northern Indiana Public Service Company (NIPSCO), the fund was extended into all the states served by NiSource when the company expanded in the 1990s. Only projects with tangible conservation or restoration results are eligible in the NiSource small grants program. Since inception of the fund in 1995, the company has contributed a total of \$275,741 for 140 restoration projects in Lake, Porter and LaPorte counties.

The Great Lakes Aquatic Habitat Fund, a not for profit organization based in northern Michigan, is another source of small grants to not for profit organizations that work for restoration of wetlands throughout the Great Lakes watershed, though the funds are not given for on the ground restoration work. The Save the Dunes Council serves as the Indiana agent for distribution of small grants from funds provided by the Charles Stewart Mott Foundation of Flint, Michigan, and other donors.

Much help for restoration is donated to sponsors from many sources within the restoration community of Northwest Indiana. Both government agencies and the private land trust organizations often provide technical assistance or sometimes loan equipment. The National Park Service, for example, often assists prescribed burns, especially on sites adjacent to the Indiana Dunes National Lakeshore. Local fire departments often stand by to be available if needed, although this seldom happens. Individuals with knowledge of native species that often provide their expertise to nearly anyone who asks include Tom Post of the regional office of IDNR, Paul Labus of The Nature Conservancy, Barbara Plampin and Myrna Newgent of the Heinze Land Trust, and Noel Pavlovic of the U.S. Geologic Survey as well as Sandy O'Brien. Private businesses contribute services and materials in many ways, both directly for restoration purposes and indirectly for fundraising activities.

DISCUSSION

In his pioneering description of United States history from an ecological perspective, William Cronon (*Changes in the Land*, 1983) described the heedless settlement and development that began in New England and ultimately reached the Pacific Ocean without appreciation for the environmental consequences. The prevailing view was that the woodland, prairies and other natural resources were inexhaustible and their exploitation the greatest benefit for society. Later Cronon gave a new perspective on how natural resources caused the Chicago metropolitan region to become so important economically not just for the United States but globally (*Nature's Metropolis: Chicago and the Great West*, 1991). In a sense, he also explained the roots of the concept of restoring natural landscapes around the south end of Lake Michigan because the industrialization of the region inspired appreciation for the need to preserve natural areas.

The idea of conservation of natural areas emerged in the late 19th century as the United States established the first national parks to preserve resources for future generations. Yellowstone, Yosemite and other great parks in the West were created by changing the use of already publicly owned land. In Chicago the Prairie Club was organized by people who loved to explore natural areas, especially the Indiana dunelands. Jane Addams, a Prairie Club member and pioneer social service leader, urged creation of city parks so that poor people could enjoy the out of doors. Creation of a Sand Dunes National Park on the Indiana shoreline was officially proposed in 1915 when Stephen Mather, a Chicago businessman and also a Prairie Club member, became the first director of the National Park Service (*Sacred Sands*, J. Ronald Engle, 1983). Aldo Leopold fostered a movement toward attempting actual restoration of natural landscape and habitat in Wisconsin in the mid-20th century and first articulated what we now call a land ethic in his 1949 book, *The Sand County Almanac*.

The idea of restoration began to be applied to tallgrass prairies and rare wetlands such as bogs and fens in the Chicago area in the 1960s by the Openlands Project, which was organized as a project of the Welfare Council of social service agencies that Jane Addams had helped to inspire. The concept was championed by scientists that included Charles Olmsted, one of Cowles' successors as head of the Department of Botany at the University of Chicago, Dr. Robert Betz of Northern Illinois University, Floyd Swink of the Morton Arboretum and others. The national trail movement began after May Theilgard Watts proposed building nature trails along abandoned railroads and wrote a small book that still inspires people to become involved in natural restoration (*Reading the Landscape*, 1957).

In the following decades Steve Packard of the Illinois chapter of The Nature Conservancy expanded the recruitment and training of volunteer stewards for prairies that is now such a fundamental concept for the Chicago Wilderness consortium in protecting natural areas throughout the greater Chicago metropolitan area. The experience with current efforts in Northwest Indiana also confirms the importance of public/private partnerships for restoration.

Northwest Indiana may be a proving ground for the newest motivation for restoration of natural areas by corporations under consent decrees and negotiated agreements that are part of compliance with regulatory environmental laws. This kind of activity is now being carried out by individual companies and increasingly is part of cooperative efforts that may include working with local governments, conservation organizations and community organizations. Yet projects such as the cleanup of the Grand Calumet River are so huge and complex and take so long that there is little understanding of their significance by the communities that will benefit most.

EVOLUTION OF THE LANDSCAPE

Physically the Indiana shoreline region was shaped by proximity to Lake Michigan and the advance and withdrawal of glaciers up to about 14,000 years ago, as described by Kenneth Schoon in his book *Calumet Beginnings*. Its historic settlement and development and the economy today are tied to Chicago more than to the rest of the State of Indiana. The approximately 45 mile long shoreline of Lake Michigan is the north boundary of all three counties, while the Kankakee River is the common boundary on the south. The Illinois/Indiana state line is the political boundary on the west, as are the Michigan state line and the boundary of St. Joseph County to the east.

REGIONAL DEMOGRAPHICS

The total current population is slightly less than 750,000, with about 491,000 residents in Lake County about 158,000 in Porter County and the remainder of about 92,000 in more rural LaPorte. The region is racially and economically segregated, with the principal concentrations of black and Hispanic minorities and poor people in the urban industrial cities of Hammond, East Chicago, Whiting and Gary.

The steel mills, refineries and chemical companies that provided the most jobs historically were concentrated in Lake County until construction of two new steel mills in Porter County in the 1960s. Since about 1965 the number of manufacturing jobs has declined by about 70 percent, from 130,000 to about 40,000. (Coffin, *Indiana Business Review*, 2005). Two major social trends today are the need for more education than was required for the blue collar jobs of the past and the increasing number of residents from all three counties who commute to Chicago for employment in white collar and professional work.

PRE-SETTLEMENT NATURAL FEATURES

The boundary between the narrow Lake Michigan watershed and the drainage area of the Kankakee River dips south in the City of Crown point but fluctuates roughly between Highway 6 and Highway 30 and is defined by the Valparaiso moraine. The moraine consists of debris pushed up and left behind as rolling hills by the last glacier. The highest places in the flat coastal plain within the Lake Michigan drainage area are sand dunes along former shorelines. Remnants of the dunes and shorelines were left behind as successive glaciers retreated and melted to form its predecessors and finally Lake Michigan. All the five Great Lakes as they are today have existed for only a few thousand years, a short time in geologic terms.

Smaller sand ridges left behind on what the Indiana Geologic Survey calls ancient shorelines were separated by swales with ponds behind the higher shoreline dunes. These dune and swale formations contributed to the great diversity of vegetation and habitat that characterizes the region. The surviving remnants of this dune and swale topography are considered globally significant because of their rarity.

Water was the chief feature of the coastal plain on the north, with slow-moving tributary streams to Lake Michigan, many smaller streams and wetlands, lakes and interdunal ponds. To the south the Kankakee River meandered 250 miles through one of the largest wetland complexes in North America, covering up to an estimated 750,000 to a million acres. As the wetlands were drained to promote agricultural use, the river was straightened in order to increase the rate of flow which was thought would reduce flooding.

The great variety of vegetation throughout the region was the result of the diversity of the landscape and the geographic location that made the region at the south end of Lake Michigan a crossroads for plant life before it became a crossroads for people and transportation of crops and manmade goods. Plants from the north and south, east and west limits of their natural ranges still co-exist in Northwest Indiana. Thus geography, climate and the physical landscape together created the biodiversity that intrigued pioneer ecologists as the region was being settled and industrial development proceeded late in the 19th century.

CONSEQUENCES OF SETTLEMENT AND DEVELOPMENT

The Calumet region was described as Indiana's last frontier in the title to Powell Moore's comprehensive history of its settlement and development (*The Calumet Region: Indiana's Last Frontier, 1957*). Except for Joseph Bailly's fur trading post by the Little Calumet River, the early settlement of persons of European ancestry was mainly in the woodlands and prairies between the coastal plain of Lake Michigan and the Kankakee Grand Marsh. Towns began to form closer to the lake along the railroads that headed to Chicago starting in the 1850s. Industrial development along the lake near the Illinois state line began after the Civil War.

As settlement proceeded, nearly all of the original waterways were drained, filled or moved for industrial or agricultural purposes. Only about 5 percent of the original extensive wetlands still existed by 1979. In Lake County Deep River is the only stream that still flows in its original channel and several lakes have disappeared. New manmade waterways include the canal now called Burns Waterway in Porter County and the Indiana Ship Canal in Lake County, plus major drainage ditches in the Kankakee watershed. The Kankakee River channel is now only 90 miles long between its origin east of South Bend and the Indiana/Illinois line. The dunes that survived sand mining along Lake Michigan are still considered among the most beautiful in the world.

The claim to being the birthplace to ecology is based on the research of Dr. Henry Chandler Cowles who formulated fundamental concepts of the relationship between plant communities and the place where they exist by research for his University of Chicago doctoral thesis in the 1890s. The official policy of the State of Indiana stressed industrialization as the best use of the shoreline until the 1990s but conservation efforts that continue today began in the Progressive era during the administration of Theodore Roosevelt. Ironically, many of the natural areas that were included in the Indiana Dunes National Lakeshore when it was authorized by Congress in 1966 survived because they had been bought up and held by industry for future expansion.

Chicago's decision to keep heavy industry out of the central city while rebuilding following its disastrous fire of 1871 led to location of steel plants first in the Lake Calumet area southeast of the city and then to cheaper land in Indiana. Steel production is still the principal base of the economy, plus oil refining and chemical manufacturing. The region now produces only about 20 to 25 percent of the nation's steel compared to the 40 to 50 percent at its peak during World War II. The state policy to encourage lakefill with industrial wastes, mainly slag leftover from converting iron ore to steel, created nearly 8000 new acres of land along Lake Michigan. Slag was also used to fill many wetlands.

SOCIAL AND ECONOMIC TRENDS IN THE NEW MILLENIUM

Until toward the end of the last century, pollution and environmental degradation were tolerated as a condition of wealth and employment. Today even economists agree that attracting people and businesses requires a better quality of life with less pollution threats to human health and access to open space and natural areas.

Decline in pollution releases to the environment was driven first by new federal laws adopted mainly in the 1970s and 1980s. The number of industrial jobs declined drastically with technological change and globalization. Diversification is now the major economic need as the number of jobs in heavy manufacturing declined with technological change and globalization. The older shoreline communities have become more dependent on gambling casino revenue in recent years.

Until recently the region was widely characterized by what Moore called "Balkanization" in which municipalities and counties all sought mainly to serve their own immediate interests. A growing sense of regionalism is among the changes now underway. First District Congressman Peter Visclosky calls current changes a once in a hundred years opportunity to strengthen the economy and the quality of life in the region for the future as he leads the effort called "the Marquette Plan" to reclaim and restore up to 75 percent of the shoreline for public use and access.

Both pollution control and restoration of natural areas accelerated after the USEPA launched what was called "a geographic initiative" in 1989. The new approach pushed for compliance with air, water and waste management standards but also for more prevention of pollution in the first place and later a policy of "going beyond cleanup." Instead of putting a fence with warning signs around places where hazardous wastes had been removed, the aim became restoration to allow new uses. In the USEPA Region 5 region that includes Minnesota, Wisconsin, Illinois, Indiana, Michigan and Ohio, the initiative began first in the Calumet region because it was considered to have the most environmental degradation. Subsequent similar efforts were also launched in Southeast Michigan and Northern Ohio.

By the early 1990s, the equivalent of 80 full time USEPA staff were seeking integrated enforcement for air, water and waste management standards in the Calumet region. Instead, however, of seeking the small fines that the courts had been willing to impose in the past and the companies had paid as part of the cost of doing business, the agency sought consent decrees that consisted of court-enforced negotiated agreements to reduce the sources of pollution. Each decree spelled out how the corporations would change their operations to prevent pollution and carry out major cleanup operations over a set period of time. In other words, instead of imposing fines that disappeared into the national treasury in Washington, D.C., the penalties were to be spent in solving the pollution problems in the region where they occurred.

As experience demonstrated the increased productivity resulting from preventing pollution instead of having to dispose of wastes, the major shoreline industries began voluntarily to agree to go beyond regulatory requirements. The first major consent decree was for U.S. Steel Gary Works in 1992, with a total cost of \$32.6 million. Several years later, the company signed a second consent decree for more than \$180 million, of which only \$30 million was for regulatory compliance and the balance to go beyond legal requirements. Similar results occurred with many other companies including Inland and Bethlehem Steel and are now being honored by the new owner, Arcelor-Mittal Steel. This experience over all appears to have contributed to the expanding willingness of industries to participate in partnerships for restoration of natural areas.

Through the 1990s, state attention to environmental issues was also stimulated by designation of a Calumet Area of Concern (AOCs) under the Great Lakes Water Quality Agreement between the United States and Canada. The designation called for development of a Remedial Action Plan (RAP) to correct impairment of 14 beneficial uses in local AOCs in order to meet the goals of the agreement. The Calumet AOC is the only one of 43 AOCs throughout the Great Lakes watershed in both countries where all 14 beneficial uses did not meet the criteria set by the agreement. The local RAP lists a multitude of activities that are contributing to cleanup and restoration that may lead eventually to "delisting" by the International Joint Commission of the United States and Canada of the Calumet RAP as an Area of Concern.

Both actions and attitudes toward environmental protection also expanded in this period for local governments and state agencies, the revitalized Northwest Indiana Regional Planning Commission (NIRPC), the Northwest Indiana Forum and the six university and college campuses in the region. Better communication about environmental issues among diverse interests across the region has been facilitated by new forums and institutions, such as the Quality of Life Council, the Shoreline Commission, the Indiana Lake Michigan Coastal Program, the evolution of NIRPC from a transportation planning agency to a Council of Governments and the newly established Regional Development Authority.

NIRPC now has a growing environmental staff. The Northwest Indiana Forum, a privately funded economic development agency, has its own staff position for environmental affairs. The six academic faculties have come together in the Northwest Indiana Coalition for the Environment (NICE). Public/private partnerships are increasingly common in a wide variety of social, educational and economic development initiatives in the region, including the restoration of natural areas that is the focus of the inventory reported on here.

New ties with Chicago include the membership of about a dozen and half Indiana members in Chicago Wilderness, a consortium of nearly 200 public and private institutions, organizations and agencies devoted to restoration and protection of biodiversity in the greater Chicago metropolitan area. Although formal organization to promote the concept of natural area restoration began sooner in Chicago than in Northwest Indiana, the findings of this project suggest that it may be occurring more broadly and in more different ways on this side of the state line because of the many kinds of cooperative partnerships.

THE IMPORTANCE OF PARTNERSHIPS IN RESTORATION OF NATURAL AREAS

Partnerships are important both for funding restoration of natural areas in Northwest Indiana and carrying out the projects. Most of the restoration projects that are sponsored by a single entity are mitigation projects to meet regulatory requirements. Even then, the sponsor, usually a real estate

developer or other landowner, may seek technical assistance from a private organization such as The Nature Conservancy or the Wildlife Habitat Council or a government agency. Following are descriptions of examples of restoration efforts that depend on partnerships.

MARQUETTE PARK LAGOON HABITAT RESTORATION

The Gary Sanitary District is the official sponsor of this project to restore the Marquette Park Lagoons that are the headwaters of the Grand Calumet River. The aims of the project include identification of any water quality problems, shoreline restoration to reduce ongoing erosion and increase public access, and information to surrounding property owners about how their activities can affect the lagoons. The Save the Dunes Conservation Fund surveyed property owners to obtain information on maintenance of septic systems, use of pesticides and herbicides in lawn care and knowledge of how such activities could affect the lagoon through nonpoint source runoff. Testing has confirmed that existing water quality is good, which may be the reason that cooperative existence with beaver is again an issue. Future canoe training programs have been suggested to encourage more recreational use of the lagoons by youth. The site will be part of the future Gary Greenlink plan to link significant natural areas by trails around and within the City of Gary and to the developing regional trail system through all three counties. Funding is from the Sanitary District and the IDNR Lake Michigan Coastal Program.

TRAINING IN RESTORATION METHODOLOGIES

The Save the Dunes Conservation is the organizer and sponsor of the Indiana Coastal Restoration Action Team (ICRAT) project to increase the capacity of volunteers, staffs of agencies and others to use appropriate methodologies for restoration of natural areas. Funded by the IDNR Lake Michigan Coastal Program, the program is possible only because of the assistance of professional staff of federal, state, local resource management agencies and not for profit organizations that conduct the workshops, according to project manager Carol Cook. The series includes 46 hands-on workshops and field training sessions throughout 2005 and 2006. Most of the events take place on the sites of actual restoration projects in the three counties, where participants learn such skills as removing invasive species, planting native species, removing unwanted trees and shrubs or applying herbicides selectively to unwanted vegetation that cannot otherwise be eliminated. As of mid-2006, a total of 210 persons from 25 agencies and organizations have participated in one or more of the workshops.

CALUMET CONTAINER SUPERFUND SITE

The Calumet Container site is an example of how the USEPA "beyond cleanup" policy is being applied to restore ecological uses where hazardous wastes are being removed under the CERCLA, or Superfund, law. The 1.5 acre site located in Hammond is now owned by Lake County. The restoration plan was that the City of Hammond assume ownership once the materials that could threaten human health were removed. The city would then work with IDEM and local residents, organizations and Purdue University Calumet with assistance from USEPA to create a new park. Volunteers, agency staff and contractors have now planted 1600 native plant plugs and all upland areas were seeded with native dry prairie vegetation in 2006. Purdue University students and community residents will be recruited to help monitor rehabilitation of the site and to replace invasive species including the common reed (*Phragmites australis*) with native prairie plants and grasses. The Wildlife Habitat Council, the not for profit organization that works with corporations, and E2, a private company that provides ecological services, are providing technical assistance.

NIPSCO AND INDIANA-AMERICAN HABITAT CONSERVATION PLAN

This project assures that habitat will be maintained for the Karner blue butterfly (*Lycaeides melissa samuelis*) to compensate for incidental damage to habitat that might occur in utility rights-of-way. The butterfly larva depends principally on wild lupine (*Lupine perennis*) for food and the lupine grows only in certain habitats, principally oak savanna. Indiana is one of only seven states where populations of the butterfly survive, mainly in a few places in the shoreline counties. In 1992 it was declared endangered under the U.S. Endangered Species Act. Since discovery of wild lupine and Karner blue butterflies in existing rights of way in Lake and Porter counties, the Northern Indiana Public Service Company and the Indiana-American Water Company have been cooperating with the U.S. Fish and Wildlife Service, The Nature Conservancy, the Indiana Dunes National Lakeshore, and the Indiana Department of Natural Resources to maintain and improve Karner blue habitat on land they own or for which there is a utility-right-of-way easement. Paul Labus, the principal local Nature Conservancy staff, is expert in nurturing both lupine plants, which are difficult to grow and transplant, and Karner blue larva, which he has raised in laboratory space contributed by Calumet College in order to re-introduce them as habitat is restored.

COFFEE CREEK WATERSHED CONSERVANCY

When the Lake Erie Land Company sought advice from local environmental organizations in the early 1990s about how to go about restoring and protecting Coffee Creek, the organizations agreed on condition that permanent legal protection be provided against future residential development of the restored area within the watershed. In 2000, 167 acres were donated to the not for profit Coffee Creek Watershed Conservancy whose board of directors includes representatives of the Chesterton High School S.A.F.E. Club, the Coffee Creek Life Center, the Porter County Chapter of the Izaak Walton League, the Save the Dunes Council, the Northwest Indiana Steelheaders and the Indiana Wildlife Federation. Save the Dunes led development of a watershed management plan with participation by the developer, the Lake Erie Land Company, Chesterton officials and community residents. The site is open to the public and is a major amenity for residential owners in the rest of the new urban design development. Trails wind among restored wetlands and prairie plantings on former farm fields and across bridges on the creek where the natural flow has been restored. The prairies were planned to provide habitat for grassland bird species and big blue herons, ducks and frogs make themselves at home in a large pond and the creek. With oversight from the Army Corps of Engineers and IDEM, the site also provides mitigation for loss of wetlands habitat due to development.

HOBART MARSH

The Hobart Marsh project consists of several parcels of land that together will preserve and restore wetlands, woodlands and prairies on 357 acres of mostly former farm lands in and near the City of Hobart. Another purpose is to provide mitigation for loss of wetlands in connection with the Little Calumet River Flood Control Project. With almost 1000 acres of other protected lands in the same area, the scale of wildlife habitat restoration enhances the ecological value much more than many small separate projects could.

Bringing the whole project together required cooperative action by the Little Calumet River Basin Development Commission, the Army Corps of Engineers, and IDNR which agreed to assume long term responsibility for management. Acquisition of the necessary land was financed by \$2.4 million of state funding authorized by the Indiana General Assembly for the Little Calumet River Basin Development Commission, which then contracted with the Trust for Public Land to negotiate the purchases. The land will be further restored and enhanced at a cost of \$2.5 million by a contractor with funds from the Army Corps of Engineers to mitigate, that is, to restore, wetlands in order to compensate for construction of flood control levees along the Little Calumet River. Local land trust

and conservation organizations are also involved in management of various parcels that are part of the total Hobart Marsh complex.

MARRAM GRASS TO SAVE DUNES

Marram grass (*Ammophila breviligulata*) or what is generally called beach grass grows on bare sand around and on dunes along the Lake Michigan shoreline. The long, long roots of marram grass hold sand that is blown inland by the wind to form the dunes. When the grass is disturbed by people, animals or vehicles, the dunes begin to erode. In two recent relatively small restoration projects, volunteers planted plugs of marram to stop erosion of low foredunes closest to the water's edge. In Marquette Park in Gary, the Save the Dunes Council Conservation Fund organized a planting project with funding from the Lake Michigan Coastal Program, and the Friends of the Dunes did likewise in the Indiana Dunes State Park with funding from the NiSource Environmental Challenge Fund.

HOOSIER PRAIRIE

Saving Hoosier Prairie began with Irene Herlocker-Meyer's discovery in the late 1960s that a small area next to a tank farm between Griffith and Highland had never been cultivated or otherwise developed. In 2005 she was honored by the IDNR for persisting in calling for preservation of what is now the more than 500 acre Hoosier Prairie State Nature Preserve. The wet and dry prairie, oak savanna, sand islands and swales are habitat for 574 species of plants, 120 species of birds, plus deer, coyotes, mink, frogs and salamanders, and no one is sure how many other creatures. Creation of the preserve began after local conservation advocates convinced Congress to authorize the Indiana Dunes National Lakeshore to acquire the original parcel in 1976 as a satellite property because of its rarity and importance. Later the ownership and primary responsibility were turned over to IDNR, which has added more than 200 additional acres. Now a source of pride to the neighboring towns, Hoosier Prairie has walking trails open to the public which the original savior still visits with school groups.

PORTAGE LAKEFRONT PARK

The 1966 legislation that authorized creation of the Indiana Dunes National Lakeshore is called the port/park compromise because it also allowed development of the Port of Indiana and the building of two new large steel mills on either side, owned by the Midwest Division of the National Steel Company and Bethlehem Steel. At the time, the small City of Portage was more interested in new jobs for residents than in access to Lake Michigan. Now 40 years later Portage Mayor Douglas Olson has succeeded in gaining direct public access to the lake through a complicated partnership that includes the US Army Corps of Engineers, the Indiana Dunes National Lakeshore, the IDNR Lake Michigan Coastal Program, the new Regional Development Authority, the now-bankrupt National Steel Company and its new owner, US Steel plus the Save the Dunes Council and the City of Portage. The process included regulatory enforcement for removal of hazardous materials from two settling lagoons used by National Steel and the voluntary agreement of the company to go beyond the legal requirements to meet cleanup standards for future public use of the area.

The new park will be developed under an agreement between the City of Portage and the National Park Service. The Save the Dunes Council acts as watchdog for the public on behalf of the National Lakeshore, and the Heinze Trust is assisting identification of the several rare native plants, some of which are not known to be growing elsewhere in the region. Congressman Visclosky helped negotiate difficult issues created by the unique history of the site and by treating the project as a major example for what he is trying to encourage with his Marquette Plan concept.

HEINZE LAND TRUST AND DEDICATED NATURE PRESERVES

Shirley Heinze loved wildflowers and the Indiana dunes but spent her professional life caring for emotionally disturbed children. When she died, friends donated funds to the Save the Dunes Council that were then used to set up the Shirley Heinze Land Trust in her honor. By asking for contributions from members and businesses and holding fundraising events, the Heinze Trust is now taking care of nearly a thousand acres of land with rare or unusual plants that it has been given or purchased. Five of the areas are certified as dedicated nature preserves by the State of Indiana: Ambler Flatwoods and Barker Woods in LaPorte County, John Merle Coulter Prairie in Porter County, and Cressmoor Prairie and the Seidner Dune and Swale site in Lake County. The Heinze Trust participates in various partnerships for restoration, working with both government agencies and private organizations. To help the Indiana Dunes National Lakeshore restore the natural hydrology of the Great Marsh in Beverly Shores, the Heinze Trust tracked down and either bought or obtained donation of lots that the National Park Service could not acquire. Heinze volunteers join with staff of the Indiana Dunes Environmental Learning Center and U.S. Steel to help Ivanhoe School in Gary participate in the Mighty Acorns Outreach Program of Chicago Wilderness. Heinze knowledgeable plant experts help the National Park Service locate rare plants. If a rare plant is found in Northwest Indiana, the Heinze Trust is likely to be involved one way or another.

U.S. STEEL GARY WORKS ECOLOGICAL RESTORATION

At the east end of what is still one of the largest steelmaking complexes of the world, steelworkers, school children, Gary city officials, and environmentalists with help from staffs of state and federal agencies are working together in a long term voluntary project to restore natural black oak savanna habitat on 20 acres next to the Miller Woods unit of the Indiana Dunes National Lakeshore. Project partners include the U.S. Steel Company, which owns the property, Mighty Acorns and the Indiana Dunes Environmental Learning Center, the US Forest Service's Forest Innovation Project, and the Brownfield program of the Gary Environmental Affairs Department. School groups schedule work sessions that may include collecting seed or planting trees while learning about why the plants that are native to the area are important to wildlife and to water quality in the adjacent Grand Calumet River. Nature Conservancy and the Wildlife Habitat Council provide technical assistance. Part of the site was formerly used to store slag and iron ore and restoration is allowing opportunity to research effects on changes in the soil as restoration continues. U.S. Steel has also contributed another 32 acres of black oak savanna nearby that was never used for industry to the National Park Service. The company also has several other cooperative restoration efforts underway with the City of Gary and with the Gary school system.

POLLUTION CONTROL AND TRAIL CREEK RESTORATION

The mouth of Trail Creek on Lake Michigan is flanked by the beach of Michigan City's Washington Park in one direction and the NIPSCO generating station and the beach below Mount Baldy in the Indiana Dunes National Lakeshore in the other direction. In 1983 raw sewage frequently flowed into the creek at 18 places, prompting lawsuits charging violation of the U.S. Clean Water Act. In 1993 a federal enforcement lawsuit was brought against the Michigan Sanitary District by the federal government.

By the beginning of the new millennium the Save the Dunes Council and the city had joined forces to develop a Trail Creek Watershed Management Plan and the Michigan City Sanitary District was working hard to upgrade its sewage treatment capacity and eliminate the sources of combined sewer overflow. Then the city began to link its pollution control efforts to restoration of natural areas and trails along the creek. The result of the linkage is said to be improvement for the entire 50-square-

mile Trail Creek watershed as well as cleaner water for Lake Michigan swimmers and better habitat for wildlife and birds as well as people. On August 9, 2006, the Region 5 office of USEPA and IDEM presented an award to Mayor Chuck Oberlie for Michigan City's having the best sewage treatment facility in the six-state region of Minnesota, Wisconsin, Illinois, Indiana, Michigan and Ohio.

GRAND KANKAKEE MARSH RESTORATION

Private citizens, corporations, governmental agencies and conservation groups joined together in the 1990s to try to make at least parts of the Grand Kankakee Marsh the way it used to be—some of the most and the best waterfowl and wetland habitat in North America. Some people said in the world, with from 750,000 to a million acres and 15 percent of all the wetlands in Indiana. In 1996 the volunteer Kankakee Restoration Committee leading the effort had 30 not for profit organizations, business and government members. This partnership included Ducks Unlimited and other groups that promote both conservation of wildlife habitat and hunting. Funding was obtained under the North American Wetlands Conservation Act and the program to implement the North American Waterfowl Plan. The U.S. Fish and Wildlife Service followed an environmental assessment with a proposal to create a new Grand Kankakee Marsh National Wildlife Refuge. NIPSCO donated 640 acres to the Indiana Department of Natural Resources next to the Shaffer Generating Station in Wheatfield.

Today several smaller restoration projects including Hog Marsh have been carried out in the Indiana watershed of the river, mainly by the Lake County Parks and Recreation Department. Much more effort to restore Kankakee wetlands is, however, being made in Illinois. The disappointment in Indiana is that opposition from agricultural interests forced withdrawal of the wildlife refuge proposal for the time being. Even though the plan was to acquire land only from willing sellers, the land owners could not be convinced that restoring wetlands would reduce periodic flooding and provide more long term economic benefits with restoration of wildlife habitat. Still, many of the partners hope to renew the effort to restore the Kankakee Marsh in Indiana as the results of restoration efforts along the river in Illinois demonstrate valuable results for the present as well as for the future.

RESTORATION FOR THE GRAND CALUMET RIVER AND THE SHIP CANAL

Restoration of a river where 90 percent of the flow is permitted municipal or industrial effluents today but where damage had been caused by unregulated discharges in the past seemed unlikely when the idea was proposed by members of the Grand Cal Task Force in the late 1980s. The Task Force had been organized as a project by the Lake Michigan Federation—now the Alliance for the Great Lakes—in response to request for help from residents of communities along the river. Later the Task Force became an independent advocacy organization whose membership reflected the diverse population of the Calumet region. Ironically today the organization known as Grand Cal no longer exists but multiple projects are underway to restore its river namesake and the Indiana Harbor and Ship through which most of its flow reaches Lake Michigan. The restoration is the result of major regulatory enforcement actions enhanced by the emphasis in negotiated consent decrees on restoration rather than punishment and assorted voluntary corporate commitments.

The major enforcement actions have been taken under the federal Clean Water Act and the Resource Conservation and Recovery Act (RCRA), laws that require new plans for managing wastes and allow state and federal environmental agencies to seek NRDA settlements to pay costs of correction and restoration as the result of past operations. Under the Clean Water Act, U.S. Steel has already removed 780,000 cubic yards of contaminated sediments from five miles in the eastern part of the Grand Calumet River that flows through its Gary Works.

The future of the river will also be improved by the 2004 agreement of eight companies to pay more than \$56 million as a NRDA settlement plus provide permanent protection for 233 acres of wildlife habitat. As trustees for the NRDA funds, IDEM and the U.S. Fish and Wildlife Service are working with local governments to determine how to remove contaminated sediments in the western part of the river and how to restore wildlife habitat along with other restoration to benefit residents of nearby communities. The contributors to the NRDA settlement are:

- Atlantic Richfield Co. and Arco Environmental Remediation
- BP Products North America Inc.
- E.I. Du Pont De Nemours and Co.
- Exxon Mobil Corp.
- GATX Corp.
- Georgia Pacific Corp.
- ISPAT-Inland Inc. (now Arcelor-Mittal Steel)
- United States Steel Corporation

Some of the most important surviving examples of the original biodiversity of Northwest Indiana exist along the river among huge industrial facilities such as the United States Steel Corporation and BP's Whiting Refinery, plus the tank farms of ConocoPhillips in East Chicago and ExxonMobil in Hammond. Still more cleanup will result from the dredging by the U.S. Army Corps of Engineers of the Indiana Harbor and Ship Canal into which the Grand Cal flows.

SUMMARY AND CONCLUSIONS

The inventory of restoration projects and details about how they are being carried out that is reported on here is admittedly incomplete. The examples described suggest only some of the creative partnerships between among industry, governments and not for profit organizations and institutions that are making restoration of natural areas happen virtually throughout Northwest Indiana. Still, the range of projects in size, complexity and distribution through all three counties demonstrates that restoration of natural areas is growing and spreading in Northwest Indiana. The inventory may, however, provide a basis for more intensive study of the means of restoration, monitoring and long term research that will contribute to improved restoration methodology and greater future results.

Perhaps it may also stimulate interest in restoration as a contribution to diversification of economic development. Congressman Visclosky is a vocal advocate for restoration as the means to attract new companies to Northwest Indiana. Meanwhile a local company has apparently answered a need for a new kind of business. The J.F. New Company began to provide professional and technical ecological services for restoration of natural areas from Walkerton, southeast of Michigan City, as a family business only about 15 or so years ago. It now has 130 professional employees and operations in Wisconsin, Illinois, Michigan and Ohio in addition to its home base in Indiana. Its clients include not only companies that need help for regulatory compliance for wetlands protection but increasingly corporations and real estate developers who want help in providing natural areas as a quality of life amenity and/or a contribution to future sustainability for the planet. Perhaps the inventory suggests a need for more competition in the expanding profession of ecological restoration.

New academic programs may be needed to provide the trained professionals needed for successful and more efficient preservation and restoration of ever more valuable natural areas. Perhaps the City of Gary can provide useful information from its pioneer effort to train young workers in restoring brownfields to the U.S. Department of Agriculture that is considering a new

training and employment program to involve older urban youth in ecological restoration. In short, the region that has contributed so much to both industry and science may now be contributing knowledge and experience in restoration of natural areas to future generations.

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