Southern Lake Michigan Environmental Issues Workshop May 21-22, 1996

Proceedings

Sea Grant
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1941-1997

The contributions of Professor William L. Wood toward improving environmental conditions in the Lake Michigan ecosystem are gratefully acknowledged. His co-authored paper, "Management of Toxic Chemicals and Sediments " appears within this publication.

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Proceedings Editor
Edward S. Pierson
Purdue University Calumet

Sponsors

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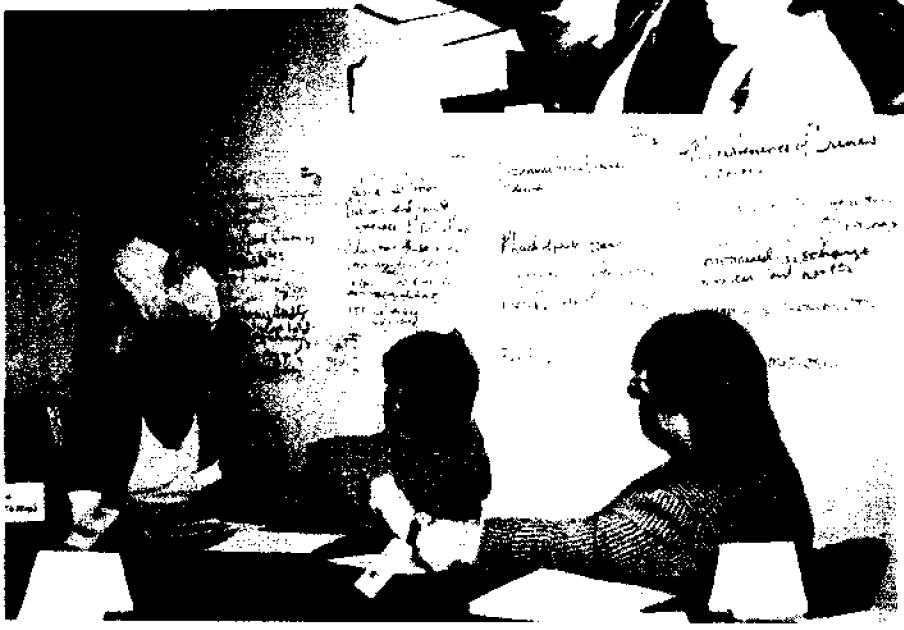
Phillip Pope, Sea Grant director, discusses coastal environmental concerns with James Yackel, Purdue University Calumet chancellor and Hilda Richards, Indiana University Northwest chancellor

Workshop participants listen to presentations on environmental issues



Workshop participants discuss issues in facilitated session

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I. INTRODUCTION

Edward S. Pierson
Special Assistant to the Chancellor for Environmental Programs
Purdue University Calumet

This workshop was sponsored by the Illinois-Indiana Sea Grant Program in cooperation with Purdue University Calumet, Indiana University Northwest, and City Innovation to develop a bi-state focus on the environmental issues which impact Southern Lake Michigan. The workshop was structured to encourage each participant to become fully involved in the interactions and discussions, as well as to develop working groups to address the most significant issues raised in the workshop.

The planning process for the workshop began with a one-day planning meeting on October 3, 1995 attended by approximately 46 invited representatives from environmental groups, industry, universities, and local, regional, state, and federal agencies. These representatives engaged in a facilitated process to identify the "top environmental issues, opportunities, or concerns that need to be addressed along the southern Lake Michigan coastline" in priority order. The group then divided into five committees, one for each of the five top-rated issues or concerns, to choose a chair, identify potential speakers, and provide input on items the speaker(s) should address. The chairs became members of the Steering Committee (listed below). The five chairs also invited the authors for the five background papers presented at the beginning of the workshop, and gave the authors guidance based on the discussions at the planning meeting. The results of the planning meeting are in themselves significant, and are included in Appendix IV by means of a letter summarizing the meeting results that was sent to all participants. Attached to the letter is a list of the participants who took part in the five committees.

The purposes of the meeting, as announced by Phillip E. Pope, Director of the Illinois-Indiana Sea Grant in his welcoming remarks, were:

- Identify key environmental issues, opportunities, and concerns that we all have in common along Southern Lake Michigan. (Regardless of jurisdiction, we share the same coastline.)
- Share information on ongoing activities and initiatives on key environmental issues.
- Collectively identify additional needed research, management, and outreach activities to move these issues forward.
- Provide a forum, and opportunities for collaboration and partnership on environmental issues of highest priority.

Furthermore, Professor Pope stated that "This workshop will prioritize research, management, and outreach activities needed along the Southern Lake Michigan shoreline to address current needs on key environmental issues. Outcomes could include:

A. Prioritized activities that may be used by Sea Grant and others to guide future research and outreach to ensure that limited resources are used most efficiently.

B. Shared information that may be used to develop large collaborative proposals or to attract a larger funding base because targeted activities will prevent duplication and will focus on most critical actions needed by all parties in region.

C. Work groups whose future direction and activities may be guided by the action strategies identified.

Your thoughtful participation and input will help focus and direct research and management activities on critical environmental issues along the southern Lake Michigan coastline."

The workshop opened with the five background papers on the issues chosen by the planning committee, as mentioned above, to ensure that the participants started with the same base knowledge. These papers are in Section II. These papers were followed by a series of three facilitated sessions run by five trained facilitators from D.J. Case and Associates (see the workshop agenda in Appendix I). Before the facilitated sessions began, Brian Miller explained the procedure and introduced the facilitators, see Section III.

For the first and second facilitated sessions, participants were assigned to one of five groups by the facilitators. The goals of the sessions were to answer the following two questions:

1. What major issues or concerns need to be addressed in regard to environmental problems along southern Lake Michigan?
2. What key things need to happen to address environmental issues along southern Lake Michigan?

The results from the facilitated sessions are summarized for each group in these proceedings in three ways:

1. The wall charts used by the facilitators have been transcribed and are reproduced in Section IV.
2. Minutes of each session taken by a participant/observer are also in Section IV.
3. Each group chose a spokesperson to report to the assembled participants at the beginning of the second day. The transparencies used by the spokespersons are transcribed in Section V.

The first day concluded with a reception for all participants to meet and mingle; booths were provided to advertise the various organizations participating in the workshop.

In the evening between the two days the facilitators and Purdue/Sea Grant staff met and chose the four most-prevalent issues emerging from the facilitated sessions. These were Water Quality, Breaking Down Barriers across Political Boundaries, Habitat and Biodiversity Conservation, and An Informed Public.

The second day began with the summary reports from facilitated sessions I and II. Following this, the participants signed up for one of the four topics, and engaged in a third facilitated session. The results from this third set of sessions are presented in the same fashion -- wall charts and minutes in Section VI, and transparencies used by spokespersons in Section VII.

The workshop concluded with a very stimulating talk by Mark Reshkin, Section VIII, and a session where participants were encouraged to sign up for work groups to continue the activities. At present (January 1997) two work groups (Creating an Informed Public,

with committees on Education and Media, and Habitat/Biodiversity) are in progress under the general leadership of Leslie Dorworth, Illinois-Indiana Sea Grant Aquatic Ecology Specialist located at Purdue University Calumet.

The workshop agenda, participants, and the planning committee results are included in Appendices. I, II, and IV, respectively.

Acknowledgment: The original concept for and structure of this workshop was proposed by Phillip E. Pope and Brian K. Miller of the Illinois-Indiana sea Grant, Purdue University. Without their support and encouragement the workshop would not have occurred, and the proceedings would not have been completed. The success of the workshop was due to the contributions of the participants, the planning committee members, and in particular the Steering Committee:

Young Choi, Purdue University Calumet
Adriane Esparza, Indiana Department of Environmental Management
Dan Injerd, Illinois Department of Natural Resources
Brian K. Miller, Purdue University
Christine Pennisi, Illinois-Indiana Sea Grant
Edward S. Pierson, Purdue University Calumet
Phillip E. Pope, Purdue University
Mark Reshkin, Indiana University Northwest
Anthony Rodriguez, City of Hammond
Anne Spacie, Purdue University

Arrangements for the workshop were handled by William R. Wright, Director of Conference Operations, Purdue University Calumet. Financial support was provided by the Illinois-Indiana Sea Grant, Purdue University Calumet, and City Innovation,

II. BACKGROUND PAPERS

EXOTIC FISH IN LAKE MICHIGAN

Clifford Kraft
UW Sea Grant Institute
University of Wisconsin-Green Bay

The prominent role of exotic species in the recent environmental history of Lake Michigan is not surprising to those who have observed the history of Lake Michigan fisheries during the past century. This history is one of repeated invasions by non-native organisms that have dramatically altered the Lake Michigan food web. Although the notion of "a delicate balance" appears frequently in popular accounts of natural ecosystems, little evidence is available to suggest whether that balance ever existed in Lake Michigan or, if so, what it looked like. Instead, we have available a human record of repeated perturbations to the native fish communities of this lake. Most significant of these major disruptions have been repeated introductions of non-native fish -- species that did not inhabit Lake Michigan prior to the 1850s. The changes are indicated schematically by comparing Figures 1 and 2.

The history of exotic fish introductions began with the common carp -- one of the most widely recognized fish in North America. What is less commonly known is that this notoriously unpopular fish was deliberately introduced throughout North America as part of one of the first fishery management efforts undertaken by federal and state fishery scientists. The fact that this effort was "successful" (judging by the fact that carp are present in abundance throughout North America), yet unpopular (judging by the fact that carp are almost synonymous in popular jargon with degraded aquatic environments), poses a dilemma raised by many introductions of exotic species.

The favorable attention that greeted the introduction of carp into North America was acknowledged in a report published by the U.S. Commission of Fish and Fisheries in 1884":

> "the progeny of the three hundred and forty-five young Carp brought over from Germany in May, 1877, have been distributed to all parts of the United States, and the Carp is almost as familiar to our people as is any other kind of domesticated animal."

Yet within two decades public attitudes towards carp had begun to change. According to the report of the U.S. Commissioner of Fish and Fisheries for 1896, carp distribution was being discontinued in that year.

Carp are not nearly as abundant and have had less impact on the Lake Michigan ecosystem than many subsequently introduced non-native fishes. Yet the fact that they inhabit shallow waters in nearshore and harbor areas -- areas that are easily accessible to shoreline users and anglers -- has made them readily visible. These waters are also often of poor water quality, placing carp in the role of "poster child" for degraded Lake Michigan waters.

Rainbow smelt was the first exotic fish that became widely abundant throughout Lake Michigan, and it has a very different history than the carp. Reportedly, attempts to

introduce this species into the upper Great Lakes occurred earlier, but it is generally accepted that rainbow smelt took hold in Lake Michigan following the deliberate introduction of this species into Crystal Lake, Michigan in 1912. Smelt were first reported from Lake Michigan when captured a few miles from Crystal Lake in offshore waters near Frankfort, Michigan. By 1936 they occupied the entire lake and, unlike carp, quickly began to favorably enter the culture of shoreline communities.

Commercial harvests of smelt increased from 86,000 pounds in 1931 (the first year of record) to 4.8 million pounds in 1941. Since the 1950s commercial production has not been sustained at that level, but they remain a valuable commercial species to this day. Sport harvest of smelt became an important part of the shoreline culture in the 1930s, when newspaper accounts reported that 20 to 30 thousand people visited Oconto and Marinette, Wisconsin, to attend dances, banquets, and parades associated with the spring harvest of smelt. One account reported:

> "There was the smestling match which was held in a ring covered with 2 tons of smelt; the wrestlers fought to see who could stuff the most smelt in his opponent's trunks. The event got newsreel coverage from all of the news services of the day; newspapers all over the United States carried stories on Wisconsin's phenomenal smelt run; radio stations told their listeners about the run; and part of the fun for thousands of people was lining up elbow to elbow, vying with one another for a share of the silvery fish."

Despite these positive attributes, rainbow smelt have been associated with declines in native lake herring, a formerly abundant Lake Michigan forage fish that is now rare. Smelt are a major diet item for lake trout and non-native Pacific salmon, both of which are the focus of popular sport fisheries.

The sea lamprey was the first invading species that had a dramatic negative impact on native fishes in Lake Michigan. The sea lamprey is one of a number of anadromous fishes (that is, species that live in lakes or oceans and make annual or periodic migrations into tributary streams to spawn) that have successfully colonized the Great Lakes from the eastern U.S. coast. Atlantic Ocean sea lampreys migrate each spring into major freshwater streams along the coastal tributaries.

Sea lampreys were first noted in Lake Michigan in 1936, and within a decade were abundant throughout the lake. Sea lampreys are notorious for their method of killing -- they attach to a prey fish, rasp a hole in the side of their prey, then feed upon the blood of their victim. Their blood-sucking reputation and unusual appearance (that derives from the fact that, in place of a mouth, they have a sucker-like disk) brought a great deal of notoriety to these primitive fish. Sea lampreys match these unfamiliar habits with an ability to efficiently feed on most large native Lake Michigan fish. Lake trout, once the most prominent commercial species in the lake, was the most prominent victim, followed by other native fishes such as whitefish, suckers, walleyes, burbot, and deepwater ciscoes. Sea lampreys had a dramatic impact on the Lake Michigan fish community by reducing populations of these large native fishes.

Unlike most other exotic fish, a control program was successfully implemented to control sea lampreys. One of the reasons for this program's success is that lampreys lifestyles are very different from most other fishes, and this allowed the implementation of a control program involving chemical controls and barriers. This program has kept sea lamprey populations at relatively low levels for over 30 years, despite concerns about funding, chemical treatment of Lake Michigan tributaries, and potential changes in sea lamprey habits that might eventually render these treatments ineffective. Some

of the lamprey's prey rebounded in numbers after initiation of this control program, but introductions of other non-native fishes continued to alter the Lake Michigan fish community.

The next major exotic fish species that appeared in Lake Michigan -- the alewife -- was able to take hold due to reduced populations of predatory fish brought about by the earlier invasion of the sea lamprey. The alewife is another anadromous fish from the Atlantic coast that worked its way into the upper Great Lakes after its inadvertent introduction into Lake Ontario in the mid-1800s. A member of the herring family, alewives are very abundant in Atlantic coastal waters, and have frequently dominated the Lake Michigan fish community since their introduction.

First recorded from Lake Michigan in 1949, alewife populations increased rapidly under conditions of almost no predation -- large predatory fish had been decimated by the sea lamprey. They quickly became a nuisance due to their tremendous abundance, and commercial production increased from 220,000 pounds in 1957 to a peak of 41.9 million pounds in 1967. In the mid-1960s alewife populations soared and most Lake Michigan beaches were covered with millions of dead alewives in late spring and early summer. As a teenager growing up along the southern shore of Lake Michigan at this time, I clearly remember the disgust with which we regarded dead alewives on the beach.

These dieoffs also resurrected an idea that had long attracted fishery managers: introducing Pacific salmon into the Great Lakes. Early efforts to stock chinook salmon in Wisconsin had been given up as a failure by 1879, but the abundance of alewives as potential food for predatory salmon rekindled hopes of success in the 1960s. By the late 1960s it was clear that chinook salmon, coho salmon, brown trout, and steelhead -- all non-native members of the salmon family -- would thrive and sustain a valuable Lake Michigan sport fishery. Yet these non-native salmon failed to reproduce in large numbers in their new home, which meant that this "put-and-take" sport fishery could only be sustained by hatchery production and stocking of these fish. What did not become obvious until the early 1980s was that continually increased stocking rates of these predators would eventually drive the alewife population to low levels. By that time memories and smells of alewife-covered beaches had faded into the past and a substantial economic infrastructure had been established in Lake Michigan shoreline communities that was dependent on catching non-native salmon.

What followed was the beginning of a management debate focusing on how to maintain a large-enough population of alewives to sustain a substantial salmon fishery, yet minimize beach dieoffs and the negative impact of alewives on popular native Lake Michigan fishes such as yellow perch. Alewives had been transformed from a trash fish into a treasure, and became the regular focus of a great deal of controversy.

Yet the fish introductions continued. The 1980s brought the first sightings of an obscure Lake Michigan invader, the three-spine stickleback. White perch made their first appearance in Green Bay in the late 1980s, and within five years became one of the most abundant fish throughout the shallow southern bay. In 1993 round gobies appeared at Calumet Harbor near the Illinois/Indiana border at the southern end of Lake Michigan and quickly became very abundant. This fish arrived from the same area of the world as the zebra mussel -- around the Black and Caspian Seas -- and thrived by feeding on these non-native mussels. Presumably, round gobies also arrived the same way as zebra mussels -- in ballast water discharged by transoceanic vessels.

The history of Lake Michigan fish populations is a story of dramatic changes during the past 125 years. Unlike many inland fisheries, a partial record of historical changes in Lake Michigan populations is available from commercial fisheries data collected as early as the 1870s. This history is one of the replacement and elimination of key components of a native fish assemblage -- common to many other inland lakes located on the Laurentian shield of North America -- by a community of exotic species assembled from anadromous residents of the Atlantic and Pacific Oceans. During this century Lake Michigan has experienced the decline or extirpation of emerald shiners, lake herring, a series of closely-related cisco species, and lake trout, plus dramatic fluctuations in commercially valuable native fishes such as whitefish and yellow perch.

Prior to the Second World War rainbow smelt became the first dominant exotic species in the lake. Within two decades non-native sea lamprey and alewife completely changed the lake fish community through predation and competition with native fishes, setting the stage for the intentional introduction of Pacific salmon during the 1960s. The commercial success of introduced salmonines irrevocably changed human perceptions and usage of Great Lakes fisheries, intensifying interest in stable management strategies. However, a new wave of introduced organisms in the late 1980s and 1990s -- including white perch, round gobies and zebra mussels -- threatened to disrupt this newly "established" fish community. What looked like a stable and favorable fish community when viewed from the short-term perspective of the mid-1970s to mid-1980s now appears to be as vulnerable as that of the early 1900s.

The history of Lake Michigan fisheries is important to all lake users for two reasons: (1) It provides an unusually complete history of dramatic changes induced by human activities, particularly non-native introductions, and (2) This lake will forever serve as a vast source of nuisance exotic species poised to invade inland North American lakes and rivers.

What Did the Native Lake Michigan Fish Community Look Like?

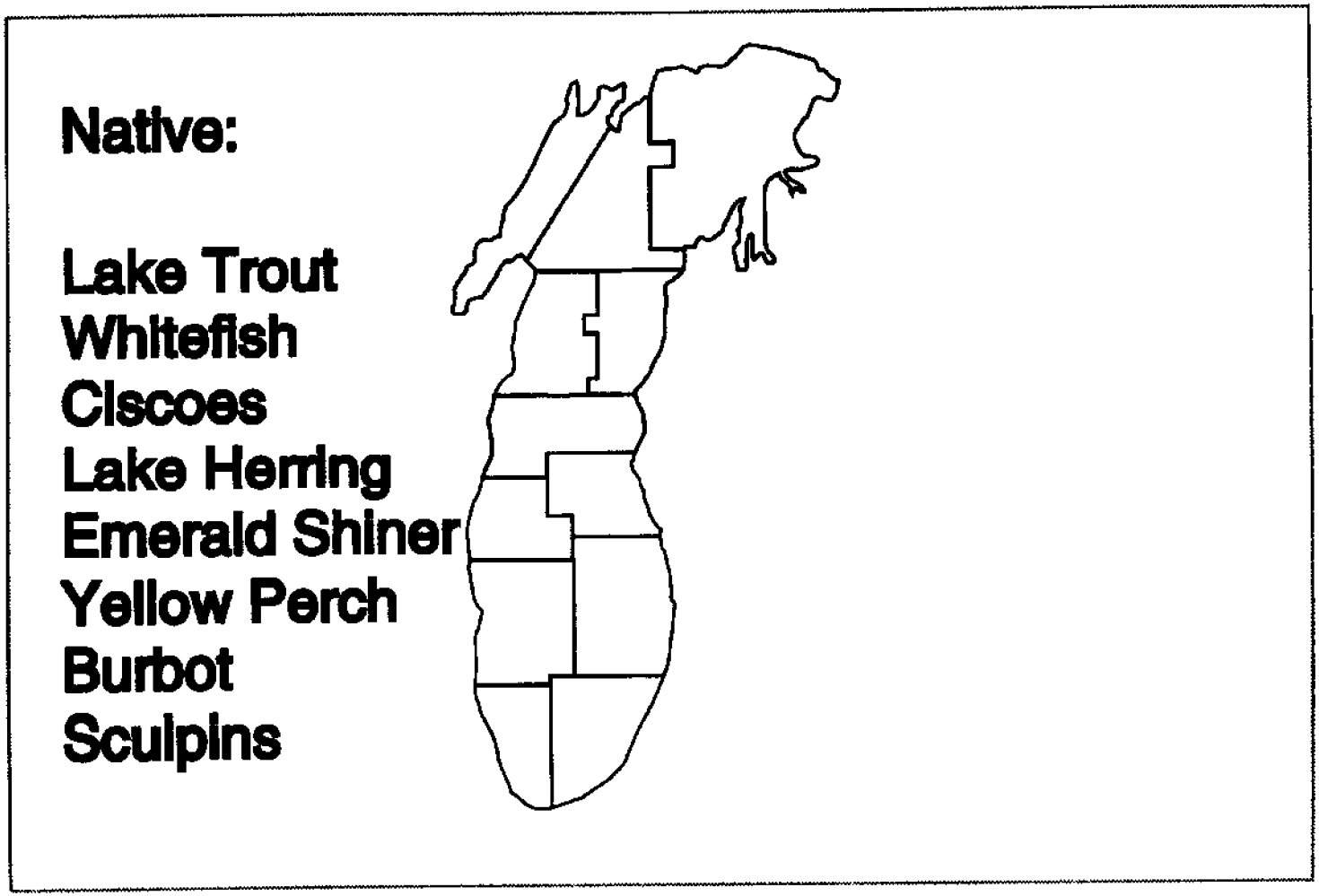


Figure 1. What did the native Lake Michigan fish community look like?

What Does the Lake Michigan Fish Community Currently Look Like?

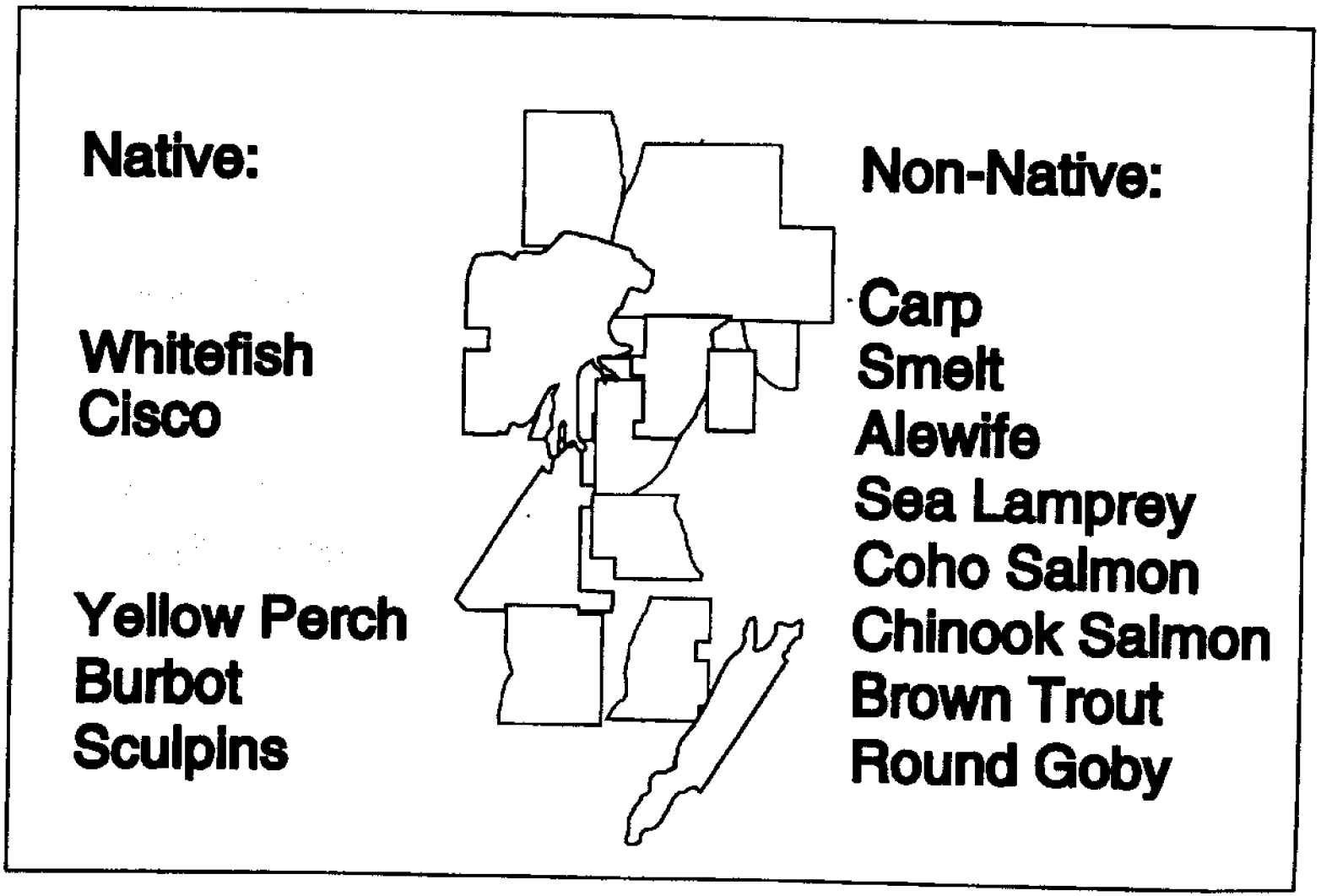


Figure 2. What does the Lake Michigan fish community currently look like?

BROWNFIELD RESTORATION

James K. Van der Kloot
Special Assistant Commissioner
Chicago Department of Environment*,
Anthony Rodriguez
Director of Economic Development
City of Hammond**,
and
Edward S. Pierson
Special Assistant to the Chancellor for Environmental Programs
Purdue University Calumet

This presentation consisted of three independent pieces. First E. Pierson presented a general overview of brownfields, and introduced the other speakers. The overview included

The definition of brownfields as 'old' industrial or commercial sites, unused or underused, possibly abandoned, possibly unclear ownership and liability, and with real or perceived contamination and liability. Brownfields are not superfund sites. Reusing brownfields puts sites to use that have utilities and transportation, and are located in populated areas, often with available public transportation. This is in contrast to 'greenfields' which contribute to urban sprawl and lack many of the facilities so convenient to reused brownfields. Help is needed to put such sites to beneficial use because of questions of ownership and, especially, liability.

A discussion of key issues of brownfield restoration -- inner-city revitalization versus greenfields, the impact on existing neighborhoods, possible contamination (what, extent, remediation), possible liability (legal, financial), marketability of sites (ability to sell/buy, obtaining financing), stakeholders (who, input mechanisms), environmental site assessments, environmental regulations (voluntary versus forced compliance, how clean is clean), voluntary cleanup programs (regulatory agreement, release from future liability), the Common Sense Initiative, and the relevance to sustainable development (recycle land as well as waste).

The General Accounting Office estimates that as many as 450,000 brownfields exist in the United States, representing a total market value of approximately $650 billion. Many properties are located in prime urban areas and near freeways.

Then J. Van der Kloot described the Chicago brownfields program; an established, ongoing program. His presentation is summarized by the following, the Executive Summary of the Final Report and Action Plan, November 1995. Finally A. Rodriguez presented the status of the Northwest Indiana Brownfield Redevelopment Project, an activity that was just beginning. The third section of this paper briefly summarizes the current (January 1997) status of that project.

* Currently with U.S. EPA - Region V
* Currently Director of the Michigan City Economic Development Corporation

BROWNFIELDS FORUM

Recycling Land for Chicago's Future

FINAL REPORT AND ACTION PLAN

EXECUTIVE SUMMARY

NOVEMBER, 1995

City of Chicago, Richard M. Daley, Mayor
Department of Environment, Henry L. Henderson, Commissioner
Department of Planning and Development, J. F. Boyle, Jr., Commissioner

Contents

Acknowledgments

The Chicago Brownfields Forum was conceived as a broad-based policy dialogue by Henry L. Henderson, Chicago Commissioner of Environment, and Valerie B. Jarrett, former Chicago Commissioner of Planning and Development. The Forum was convened and facilitated by the Midwest Regional Office of Clean Sites; funded by the John D. and Catherine T. MacArthur Foundation; and managed by an Oversight Committee consisting of Henry Henderson, Donna Ducharme, Jim Van der Kloot, Jean Franczyk, Rebecca Riley, Helen Taylor, and Tim Brown.

The Oversight Committee thanks Valjean McLenighan for writing this report; Kenneth O'Hare for his contributions as a consultant to the project; interns Joel Sternstein, Jessica Rio, and Dennis Rhodes for their insights and support; Lillian Lebron for managing the fax network; Ellen Carpenter for compiling briefing materials; and Nancy Pinzke for her design work. Most of all, the Oversight Committee thanks the participants of the Chicago Brownfields Forum for their time, energy, and commitment to the project, and for their constructive and innovative ideas.

Copies of the *Final Report and Action Plan of the Chicago Brownfields Forum* can be obtained by calling the Brownfields Forum Clearinghouse: 312.744.8900.

1. The Chicago Brownfields Initiative

"Brownfields are more accurately viewed as complex real estate transactions than as prohibitively costly environmental quagmires."

In Chicago and its older suburbs, abandoned industrial properties, or brownfields, are no longer viewed solely as blights on the urban landscape. They are also recognized as resources for widespread industrial redevelopment, with tremendous potential for creating jobs in disadvantaged neighborhoods and increasing industrial capacity.

Abandoned industrial properties are known as "brownfields" to distinguish them from undeveloped "greenfields" in outlying areas. Brownfields are a real estate, business, banking and community problem and can also be an environmental and health concern.

By the early 1990s, conditions were right in Chicago for a historic attempt at cooperative problem-solving. What to do about brownfields had become one of the city's most pressing challenges. The Illinois EPA had begun a voluntary cleanup program in 1988; by the early 1990s, the agency was actively seeking feedback from local government on how to improve the program's usefulness for brownfields redevelopment. Brownfields were receiving increased federal attention, too. U.S.EPA Region V, which oversees a six-state area, including Illinois, had sharpened its focus on the issue. Public officials and community-based groups alike were developing a deeper understanding of the economic and environmental links between cities and their metropolitan regions. Chicago's application for federal Empowerment Zone designation created a new opportunity to attract resources for brownfield cleanup and redevelopment.

In November, 1993, the Chicago departments of Environment, Planning and Development, Law, Buildings, and the Mayor's Office formed an interdepartmental working group on brownfields. The working group launched a three-pronged initiative to identify and overcome barriers to reuse of abandoned industrial property: 1) **The Brownfields Forum** to devise more responsive environmental and economic development policies; 2) a **Brownfields Pilot Program** to clean up and redevelop demonstration sites in distressed neighborhoods; and 3) **Brownfields Economic Analysis** to develop economic models that account more accurately for environmental and social costs and benefits of development decisions.

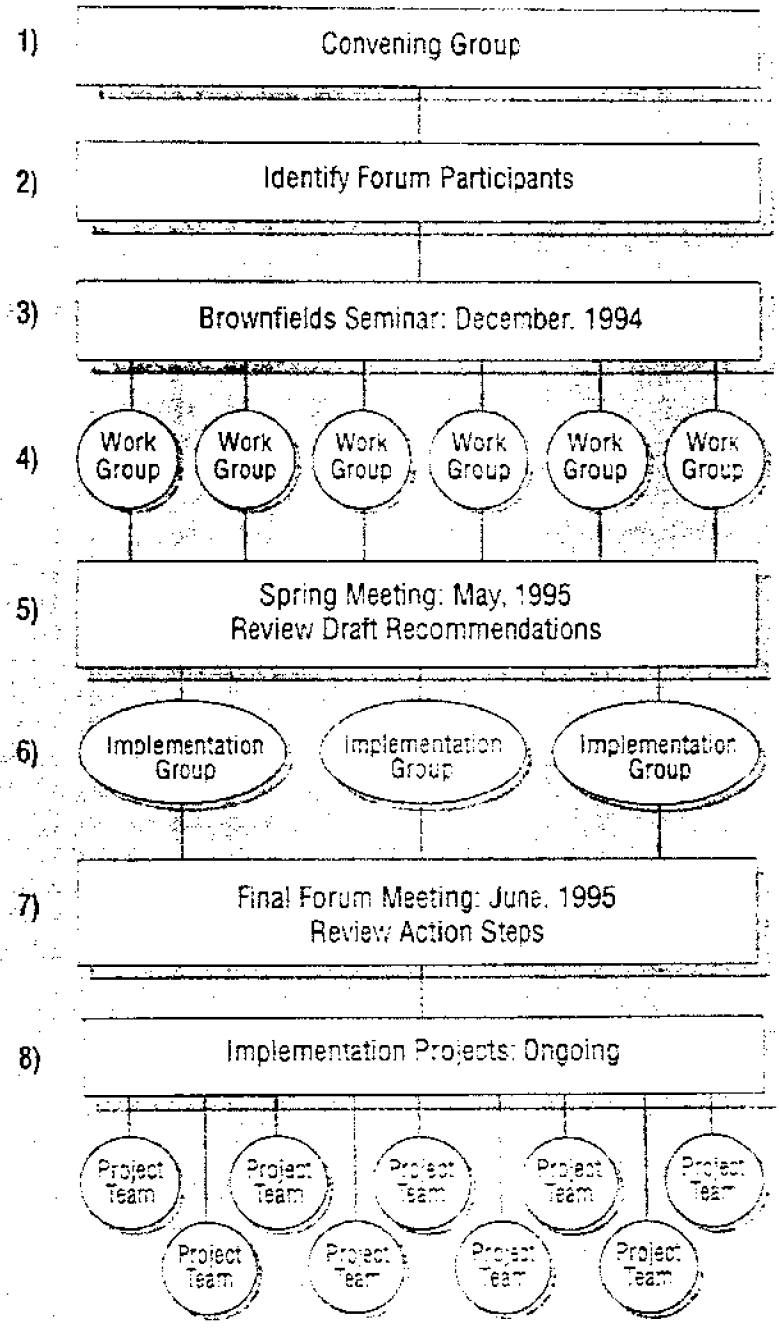
1) THE BROWNFIELDS FORUM

With support from the John D. and Catherine T. MacArthur Foundation, the city invited representatives from government, business, finance, environmental, community, and civic organizations to identify a diverse group of participants in what came to be known as the Brownfields Forum. The Forum was conceived as a broad-based, interdisciplinary task force to inform public policy. Its purpose was not only to analyze barriers to brownfield reuse but also to change the way brownfield business is done in Chicago.

More than 100 participants gathered in December, 1994, for a two-day seminar aimed at achieving a common understanding of brownfield complexities. Following the seminar, participants broke into six smaller groups to work on targeted issues, such as regulatory barriers, redevelopment financing, and brownfield prevention.

Forum members brought a diversity of opinions and expertise to the process. Over the next four months, each of the work groups met four to six times to draft their recommendations. Early in May, 1995, the entire Forum gathered for a second time to share their reports, then reconfigured into implementation groups to formulate an action plan. By the end of June, when the Brownfields Forum officially concluded, participants had produced 63 recommendations for overcoming barriers to brownfields reuse. These have been consolidated and will be carried forward by nine project teams headed by public, private, and nonprofit entities.

THE FORUM PROCESS



1) A **convening group** of about 25 people identified significant barriers to brownfield cleanup and redevelopment that would be discussed by the Forum. The convening group, consisting of diverse stakeholders from government, industry, environmental groups, civic and community groups, nominated a wider circle of participants.

2) A final list of more than 100 **Forum participants** was developed. Interviews with each assessed their interest in the project and further explored issues to discuss in the Forum.

3) A **brownfields seminar** convened all the participants to establish a common understanding of brownfield complexities. Presentations and group discussion took place over two days. Each participant received a detailed briefing book.

4) After the seminar, six **work groups** met over four months to examine barriers to brownfield reuse and develop recommendations to overcome those barriers. The workgroups addressed six topics: legal and regulatory impediments; environmental risk assessment methods and communication; financial incentives and barriers; cooperative approaches to redeveloping brownfields; economic impact of brownfield redevelopment versus greenfield development; and brownfield prevention.

5) Each workgroup produced an interim report summarizing its recommendations and distributed it for comment to all Forum participants and other interested parties. The recommendations were discussed in a **spring meeting** of all Forum members in May, 1995.

6) Forum members were then assigned to an **implementation group** to identify action steps for the recommendations. Since many of the recommendations were related, the six work groups were consolidated into three implementation groups: streamlining regulatory approaches and creating sound regional policy; enhancing participation, communication, and information resources; and increasing availability of financial resources.

7) Action steps identified by the implementation groups were reviewed by all the Forum participants at the **final Forum meeting** held in June, 1995.

8) The action steps were combined and assigned to **9 implementation project teams** to carry out the Forum's recommendations. Lead organizations were designated for each of the project teams.

The Forum was convened and facilitated by Clean Sites, a non-profit public interest organization, and was managed by an oversight committee of representatives from the City of Chicago Department of Environment, Department of Planning and Development, Mayor's Office, and Budget Office; the John D. and Catherine T. MacArthur Foundation; and Clean Sites.

"Returning brownfields to productive use retains and creates jobs—jobs that are especially valuable to the distressed communities where brownfields are commonly located."

2) BROWNFIELDS PILOT PROGRAM

To gain first-hand experience with cleanup and redevelopment of brownfield sites, the city interdepartmental working group funded a pilot project with $2 million in general obligation bonds. The group consulted business and community industrial development organizations to identify likely properties. Ultimately, five sites were chosen to be tested and, if possible, remediated for private redevelopment. All the sites were either abandoned or city-owned. To get the most from public dollars, the city focused on properties with the best combination of environmental factors and redevelopment potential.

Site visits and records searches revealed that one of the five properties was relatively clean and needed no further testing. The remaining four locations were processed through the state's voluntary cleanup program, currently known as the Illinois EPA Pre-Notice Site Cleanup Program, or through the state's Underground Storage Tank Program. At this writing, work is finished on three sites and nearing completion on two others. (See box.) Total environmental cleanup and predevelopment costs amounted to approximately $850,000, significantly under budget. The city plans to continue and expand this program with additional funding.

CITY OF CHICAGO BROWNFIELD PILOT SITES

Chicago's $2 million budget for pilot brownfield sites was intended to finance environmental testing on five properties and remediation of two. In fact, the city will be able to return all five sites to productive use for a total of about $850,000. The program has generated a great deal of useful information, helped to retain or create hundreds of jobs, and catalyzed private investment in the target neighborhoods. With the remaining funds, the city has initiated testing on five additional sites and identified several more for testing and possibly for remediation. The city is seeking funding to continue and expand this pilot program.

4532 W. Adams: Scott Peterson Meats wanted to expand its operations but was deterred by a major eyesore—a former bus barn across the street that was full of garbage, tires, drums, scrap metal, and other debris. The city removed the waste and tore down the building. The site is now a flat, open lot to be used for secured parking. Scott Peterson, assured of expansion space, has invested $5.2 million in new facilities and added 81 employees. A city-funded social service agency is screening neighborhood job applicants, and the company is establishing a program to hire the developmentally disabled.

3114 W. Carroll Street: This abandoned industrial building was a neighborhood blight; scavengers had stolen most of the wiring and plumbing. Madison Equipment, across the street, needed expansion space but feared environmental liability. The city investigated and found no significant contamination. Though a nuisance lawsuit delayed transfer through Chicago's Abandoned Property Program by ten months, today Madison Equipment is stabilizing and repairing the building for use as a warehouse. The building was saved from further decay, which would have rendered it worthless. Seven new jobs will result from the redevelopment, which will help to anchor an industrial corridor.

92nd and Kimbark: The city removed more than 200 truckloads of debris and 5 barrels of hazardous waste, eliminating a neighborhood blight and helping to retain 350 jobs at the neighboring Verson Corporation plant. After the city has completed additional subsurface remediation, the site will be marketed for private reuse, with the help of a local industrial retention group.

14th and Union: This city-owned site was a former catch basin sludge drying area. A buyer expressed interest but feared environmental liability. The city performed a limited Phase II environmental investigation, which Illinois EPA reviewed quickly. The agency determined that no cleanup was needed, and the city is now negotiating a job-generating redevelopment agreement through which property transfer will take place.

4601 W. Van Buren: This city-owned site, vacant since 1982, was a favorite target for illegal waste dumpers. Concern about environmental contamination stalled purchase by Blackstone Manufacturing for use as secure parking. The city's Phase I and Phase II environmental audits detected some underground storage tanks. The site will be processed through the state voluntary cleanup program; remediation is expected to take about a month. Cleanup will be coupled with landscaping and viaduct closure, creating a campus-like setting for the company and beautifying the neighborhood.

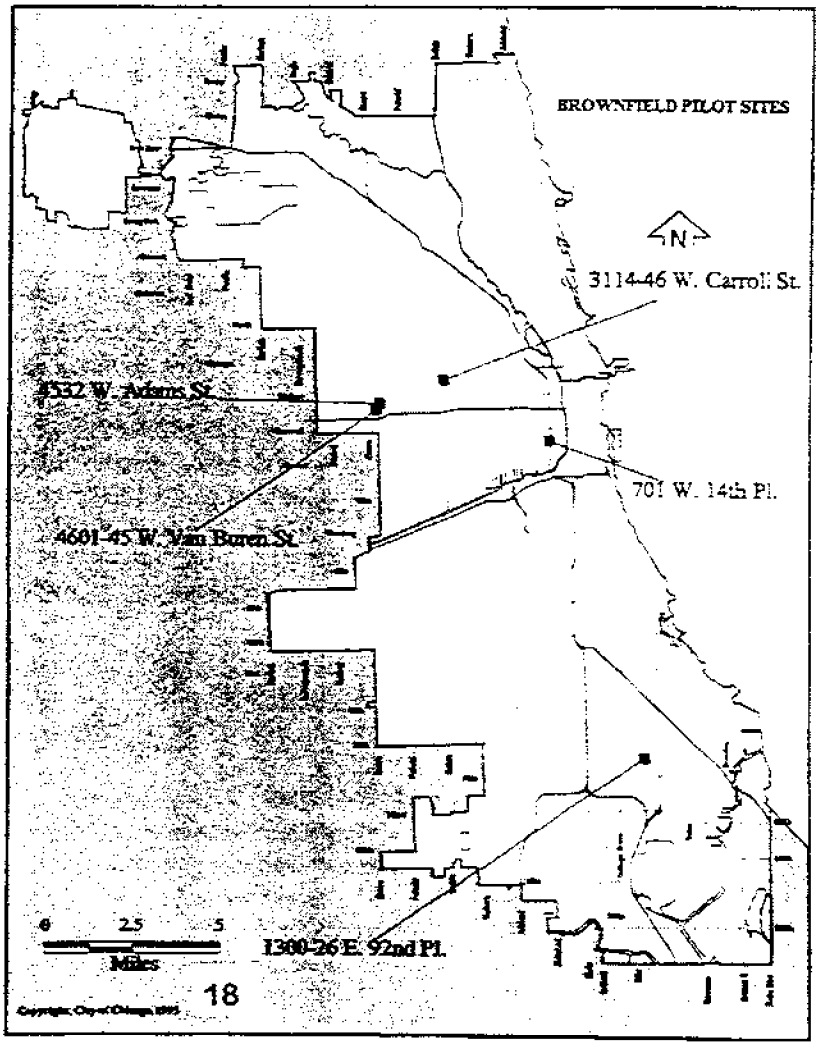
3) BROWNFIELDS ECONOMIC ANALYSIS

When it comes to analyzing costs and benefits of brownfields redevelopment, there are still many unknowns. The Brownfields Forum connected economists from city government and academia with bankers, developers, and others who have first-hand market knowledge to help design and execute two parallel research projects. One will create a decision-making tool to help city government assess the redevelopment potential of various sites that are candidates for public investment in environmental testing and cleanup. A second project will identify and compare hidden environmental and social costs of brownfield versus greenfield development. The Great Cities Institute of the University of Illinois at Chicago is conducting this research, supported by the John D. and Catherine T. MacArthur Foundation.

A NEW CIVIC PROCESS

The Brownfields Forum has forged new working relationships among the public, private and nonprofit sectors, defined the role of each with respect to brownfields, and begun to craft new tools for jump-starting private redevelopment. The Forum created new opportunities for public participation in policy-making and greatly expanded resources available to meet the challenges of brownfield reuse in a climate of dwindling public revenues.

The *process itself* has proved as important an end-product as the Forum's recommendations and action projects. For example, the Brownfields Bill (HB 544/SB 46) passed in May, 1995, by the Illinois General Assembly shows a strong Forum influence. (The governor signed an amendatory veto in August, and the legislation's final form will be determined in November, 1995.) Although the Forum did not take an official position on the Brownfields Bill, the Forum alerted participants to the legislative initiative and informed their contributions to the bill as individuals. Elsewhere, on Chicago's Southeast Side, membership in the Forum helped to transform a potentially adversarial relationship between environmentalists and a local industrial developer into a mutually respectful search for common ground.



LESSONS LEARNED

Demand for industrial space in Chicago greatly exceeds the supply. While hundreds of abandoned industrial properties await redevelopment within the city limits, most of them are not competitive with greenfield sites, for a variety of reasons. Environmental contamination is a significant barrier to reuse, but it is by no means the only one.

The *fear* of environmental costs and liabilities can obscure the reality: of Chicago's five pilot brownfield sites, one was found to be clean, and another had only minor contamination. This was a significant lesson. At the Forum's inception, many participants assumed that brownfield properties are roughly equivalent to federal "Superfund" sites. They are not. The typical brownfield is much smaller and less hazardous than a federal site. Whereas a Superfund site may cost tens of millions to remediate, the city's pilot program addressed five properties for approximately $850,000. Brownfields are more accurately viewed as complex real estate transactions than as prohibitively costly environmental quagmires.

A related lesson is that lenders and investors who lack expertise in evaluating brownfield risks often avoid them altogether—even though the risks may be quite manageable. Other barriers to reuse include tax and transportation policies that prejudice the market against brownfield redevelopment; legal obstacles to the city's efforts to gain control of abandoned sites; and inadequate public- and private-sector financing.

Besides clarifying impediments to brownfields redevelopment, the Forum and Chicago's pilot program produced other valuable insights. The most important is that returning brownfields to productive use retains and creates jobs—jobs that are especially valuable to the distressed communities where brownfields are commonly located. Brownfield redevelopment can produce a "halo" effect, attracting additional investment in local businesses, public infrastructure, and employment training.

For communities to reap the full benefit of brownfield cleanups, multiple city resources need to cooperate to "close the loop" that links environmental remediation, predevelopment, and redevelopment activities. If environmental cleanup is not coordinated with economic redevelopment, a newly remediated empty lot will soon attract illegal waste dumpers, who can recontaminate the property overnight.

If there is one overarching theme to the Chicago experience, it is the need for a coordinated, comprehensive effort involving all key stakeholders. No one group can solve this problem alone. City, state and federal agencies have an integral role to play. So do banking, business and manufacturing, legal, insurance and real estate professionals, community industrial and economic development groups, trade associations, environmental and public interest groups, environmental justice representatives, organized labor, and community health organizations.

Chicago has learned that brownfield redevelopment can work when government, community groups, and the private sector cooperate. Brownfields can be returned to productive use in other cities, too.

Brownfields Forum Clearinghouse: 312.744.8900

Work on the action projects described in this report will move forward under the leadership of various Forum members over the next year and beyond. The city of Chicago's interdepartmental working group committed to bring the entire Forum back together in 1996 to take stock of accomplishments and consider next steps. Meanwhile, the Chicago Department of Environment will serve as a clearinghouse for Forum-related information and updates. Telephone Jim Van der Kloot at 312.744.8900; fax 312.744.6451. Questions related to redevelopment should be directed to Andrew Norman at the Chicago Department of Planning and Development: telephone 312.744.3025; fax 312.744.5826.

2. Framing the Issue: The Problem with Brownfields

"Brownfields are a market response to federal, state, and local public policies that make it more profitable to build on undeveloped land than to recycle developed sites."

Throughout the United States, the problems associated with recycling older, mostly industrial, properties are fueling urban sprawl, luring investment and job development ever farther from city centers and inner suburbs. What to do about brownfields is a critical issue for the future of cities and the survival of healthy urban economies.

WHAT IS PREVENTING INDUSTRIAL REDEVELOPMENT?

From a market perspective, anything that makes a brownfield noncompetitive with a greenfield property can be considered a barrier to redevelopment. In general, that means anything that adds cost, time, or uncertainty to a project. If three or four obsolete buildings have to be demolished before a property can be redeveloped, the demolition costs are an impediment. Time is an equally critical factor. Buyers tend to be interested in sites that are available now—not in sites that can be cleaned up and ready in two years. Following are some of the major issues in brownfield redevelopment.

Environmental regulations

Superfund and other federal environmental laws were intended to clean up the most serious environmental problems—the mountains, not the molehills. Simple transfers of property that may be only mildly contaminated can require cumbersome testing and documentation to ensure that no potential environmental liabilities exist. A single industrial site may fall under the jurisdiction of city, state, and federal authorities. The array of enforcement agencies and environmental regulations can be confusing and may place inconsistent or unreasonable demands on developers. In recent years the federal and state governments have recognized this problem and taken action to coordinate and streamline their oversight procedures. The Illinois EPA, for example, has established a voluntary cleanup program to encourage brownfield remediations. Through a recently negotiated agreement with the U.S.EPA, cleanups that obtain state approval will generally not be subject to federal enforcement. While these efforts are praiseworthy, more can be done.

Additional policy barriers

Brownfields are a market response to federal, state, and local public policies that make it more profitable to build on undeveloped land than to recycle developed sites. Current incentives for building in greenfields far outweigh government support for environmentally sound, mixed use, urban communities. Environmental policy—as well as land use, growth management, tax, and transportation policy—ignores the very real connections among the economy, the environment, and population density. A new, *urban* environmentalism is needed to explore approaches to environmental remediation that are unique to densely populated areas. Better transportation and land use policies are necessary to inhibit urban sprawl.

WHY RECYCLE INDUSTRIAL PROPERTY?

"Older infrastructure could potentially be upgraded for less than the cost of new construction; when older infrastructure is abandoned or underused, tax dollars are wasted."

Industrial redevelopment encourages environmental cleanup, brings jobs to underemployed communities, recycles infrastructure, revitalizes deteriorating neighborhoods, and counteracts suburban sprawl. The region cannot sustain the pattern of land use, abuse, and abandonment that has developed over the past few decades. According to the Northeastern Illinois Planning Commission, between 1970 and 1990 the Chicago metropolitan regional population increased only 4 percent, while the urban land area mushroomed by 46 percent. The development of open space and farm land has a serious adverse impact on farming, natural habitat, air quality, energy consumption and congestion. Total vehicle miles traveled almost doubled between 1970 and 1990, largely because sprawling land use patterns mandate dependence on cars. Despite the fact that today's vehicles are twice as fuel efficient as they were in 1970, the northeastern Illinois area is now in severe noncompliance with federal air quality standards for ozone.

When farm land is taken out of production for development, new infrastructure must be built, and new units of government created to levy the taxes to pay for it. Older infrastructure could potentially be upgraded for less than the cost of new construction; when older infrastructure is abandoned or underused, tax dollars are wasted. Greenfield development can waste human resources, too. Concentrating job growth in outlying areas forces skilled workers in inner communities to spend time and energy on long commutes. Those who can't commute lose employment opportunities. Personal income drops—income needed to revitalize aging homes. Property values decline, depleting the tax base. Communities cannot afford as much for education and other social services, and the cycle of deterioration continues.

Admittedly, greenfields development may produce spectacular short-term growth for a few lucky beneficiaries. But in the long run, the growth may be illusory. Urban sprawl merely shifts resources from older communities; eventually, the greenfields turn brown as well. Inner suburbs such as Stickney and Schiller Park in Illinois are already suffering many of the same brownfield problems that plague the inner city. Schaumburg, an outlying suburb, is now running out of expansion space; census statistics show that home values there rose less than 1 percent, adjusted for inflation, between 1980 and 1990. Other communities in collar counties are showing similar patterns.

Recycling isn't just about cans and bottles. It's a concept that applies equally well to land. Strategies for redeveloping industrial properties and older communities are crucial to prevent further environmental degradation and the spread of urban blight. The challenge is not to stop development but rather to harness its power. Development in the right location and form is the key to healing the regional environment and enhancing the welfare of the region's people.

Uncertain costs and timelines

A simple environmental audit can range anywhere from $1,000 to $10,000, and the price tag for in-depth site testing can easily reach $70,000 or more, according to the Chicago Department of Environment. A soil sample taken from one place on a property may test clean, yet another corner might be contaminated. Cleanup costs can range from next to nothing up into the millions, depending on the extent and nature of the problem and the cleanup standards established. Buyers, lenders and investors need to quantify their risks and costs and pin down project timelines in order to evaluate proposals and to make projects succeed. The environmental variables associated with brownfields complicate this task.

Site control

Many brownfield sites are abandoned; there is no responsible owner with whom a would-be redeveloper can negotiate. In these cases, much of the burden of redevelopment falls upon local government. Local government's tools to gain legal control of sites include tax reactivation, demolition lien foreclosure, and condemnation—all legal processes that can take many months and even years. Often the city's tools for spurring redevelopment cannot be employed quickly enough to meet private-market needs; they were created at a time when environmental complexities could not have been foreseen. As a result, the public sector's degree of risk and potential expense in redeveloping abandoned brownfields often exceed local government's resources.

Liability concerns

Owners of contaminated properties can be held responsible for cleaning them up, whether or not they caused the pollution. The Illinois Responsible Property Transfer Act provides some protection for buyers by requiring sellers to disclose information about a property's potential environmental problems. But other liability concerns remain—for example, if pollution migrates onto cleaned-up property from a neighboring plant, or if pollution migrating from an abandoned property puts nearby residents at risk. Municipal liability is also a major question. How can benefits to the city from redevelopment be compared with the risk of liability if a municipal government takes title to an abandoned site, especially when cleanup costs may be uncertain? How can the state recoup the costs of remediating migrating pollution when no responsible owner can be identified?

Access to capital

Banks are required to satisfy federal regulators that their loan portfolios fall within a reasonable range of risk. Financial institutions are reluctant to make loans associated with potentially contaminated properties for three reasons. First, lenders fear that unexpected cleanup liability could bankrupt borrowers and thus jeopardize the loan. Second, these properties make undesirable collateral. In the event of a borrower's failure to pay back a loan, the bank could end up taking title to contaminated property. Third, the law is unclear as to the circumstances under which lenders that engage in workouts with borrowers to help them avoid default can themselves be sued as operators of a hazardous waste site. All this has had a chilling effect on the availability of capital for redevelopment. Though some would argue that the perceived financial risk to banks is less than the actual risk of brownfield loans, it remains difficult to find private redevelopment financing unless the bank can be satisfied that a property is clean.

As for public financing, federal funding for economic development has been seriously cut in recent years. Illinois' Superfund program i bankrupt, which affects more than 100 sites throughout the state. Some tools remain available to help local government and private companies clean up and redevelop blighted sites, such as loan programs. More are needed.

Community concerns

The people who live next door to a brownfield are concerned about its effects on their health, as well as on their livelihood. They need assurance that a new owner will be a positive force in the community. If environmental risks are not clearly communicated, or community concerns are not adequately addressed, a redevelopment project will not be supported. Where partnerships have formed between communities and developers, both sides have benefited. Care must be taken to address community interests within the context of the city's current planning and redevelopment processes and to avoid adding new layers of requirements that will discourage development.

Inadequate data and channels of communication

Because brownfield reuse projects require close coordination among government, business, and communities, inadequate information and channels of communication can be a serious impediment. Numerous private developers have expressed frustration with the difficulty of obtaining comprehensive, site-specific environmental and redevelopment information needed to design and evaluate brownfield projects. Government entities and community groups, too, have been hampered by information systems and procedures that are poorly suited to brownfield complexities.

THE BROWNFIELDS CONTINUUM

In the broadest sense, a brownfield is a previously used site where factors including abandonment, contamination, and the fear of contamination impede redevelopment. All brownfields are not alike; instead, they fall on a continuum. At one end are properties for which the market is strong enough to overcome environmental or other liabilities—for example, where assessment and cleanup costs amount to $300,000, but the property commands a sale price of $1 million or more. Sophisticated investors and lenders are taking on some of these sites, but many redevelopers are deterred by regulatory barriers and other impediments. If these impediments can be removed, the market should take care of properties at this end of the continuum.

Next come marginally viable properties—those for which the market is weaker, either because environmental liabilities are unknown, or because testing and cleanup costs exceed the property's value. The brownfields and potential brownfields of most concern to the city are located in distressed neighborhoods, where property values are low and poverty, high crime rates and other social problems contribute to a cycle of decline. These sites will not be redeveloped privately without some sort of government intervention. Sometimes all that is needed is a simple property inspection and records search to clarify and resolve environmental uncertainties, so that private developers and lenders can predict their risks and project costs.

At the far end are seriously contaminated properties, where redevelopment would not occur without major government investment. Superfund sites are in this category, although the federal Superfund program deals with sites that are far more hazardous than the typical brownfield. While the average federal Superfund site costs tens of millions to remediate, Chicago's experience with its pilot sites has shown that cleanup costs on many brownfields are an order of magnitude less. Still, brownfields with remediation costs far in excess of property value require some public subsidy. For these sites, redevelopment potential is a key consideration in determining where to invest public funds. Community impacts can be equally important if a brownfield site or cluster is contributing to neighborhood blight, illegal dumping, or social inequities.

EVOLUTION OF A BROWNFIELD

According to the Chicago Department of Environment, potential brownfields are sites where a business has been operating, perhaps for decades, but where fear of environmental liability deters lenders and investors. Owners who want to expand cannot refinance; owners who want to retire cannot sell their business. An owner may determine that it is cheaper to pay taxes on a property and let it sit idle than to risk learning the true extent of contamination. Many banks won't consider a mortgage or expansion loan for industrial property without an environmental audit, and an audit exposes the owner or purchaser to the risk of liability for remediating whatever contamination might be discovered, regardless of who put it there. The contamination may be minor, but some owners prefer not to take the risk or accept responsibility for their own or others' past business practices. Owners may be willing to remediate but unable to finance environmental cleanup. Of course, the contamination may also prove more expensive to remediate than the owner can afford.

The upshot is that a potential brownfield becomes a mothballed site: the owner shutters the plant and sells off the fixtures. Eventually, the owner may quit paying taxes and abandon contaminated or potentially contaminated property altogether. The site then becomes a neighborhood blight, a potential health hazard—and even more difficult to redevelop.

3. Toward a Comprehensive Solution: Recommendations and Action Projects

"A streamlined state voluntary cleanup program should be the primary channel for government certification of brownfield cleanups . . . . Sites that successfully complete the program should be released from further liability."

The Brownfields Forum produced numerous recommendations for overcoming specific barriers to brownfield reuse, as well as a set of general principles for guiding brownfield cleanup and redevelopment (see Section 4). The recommendations were crafted independently by six working groups and do not necessarily reflect the consensus of the entire Forum membership. Some participants expressed reservations about certain recommendations. Issues discussion will continue through the Forum's ongoing projects.

The Forum's recommendations can be grouped into three categories. The first lays the foundation for large-scale brownfield cleanup and redevelopment; the second contains proposals for promoting brownfield reuse, from streamlining regulations to expanding financial resources; the third looks to the long term.

Nine teams have been organized to implement the Forum's recommendations, each led by one or more government, business, or nonprofit entities, named below. The following discussion summarizes the Forum's recommendations and briefly describes implementation projects planned or underway. A bullet-pointed list of the Forum's recommendations can be found at the end of this section. For a detailed discussion of the Forum's recommendations and implementation projects, please refer to the *Final Report and Action Plan of the Chicago Brownfields Forum*.

Laying the Foundation

IMPROVING COMMUNICATIONS

An intensive public communications strategy is needed to change the psychology of the marketplace, including a variety of how-to materials and points of contact for stakeholders. A range of brownfield databases should provide government, business, and communities with accurate, up-to-date site information. An Internet hookup should offer instant access to county, state, and federal site information; and a network information system should combine data on brownfields activities from the Chicago departments of Buildings, Environment, Law, and Planning and Development. U.S.EPA and local governments should coordinate more closely. Because fear of federal enforcement against brownfield sites is often stronger than actual federal interest, U.S.EPA should publicize its enforcement priorities more widely and initiate a dialogue with local businesses and CEOs.

Action

Work has begun on the databases, information network and communications strategy. U.S.EPA Region V, in cooperation with the six states in its area, has already held a roundtable for local government leaders from 50 cities and plans to expand dialogues with CEOs, community groups, and local governments. Region V is also taking steps to clarify and publish its enforcement priorities.

Project leader:
Chicago Department of Environment

"The state should adopt a more flexible, tiered approach to setting site-specific cleanup objectives keyed to a property's future use."

STRENGTHENING NONPROFIT CAPACITY

Community-based groups have played key roles in Chicago's Empowerment Zone, Model Industrial Corridor, and Brownfield Pilot programs. These and other working models for community participation should be analyzed and shared. One new role for nonprofits might be a one-stop service center to provide small manufacturers, developers, and community organizations with technical and financial assistance. Community development organizations could help prevent brownfields by identifying at-risk firms in need of business assistance. One or more nonprofits or a public redevelopment authority could catalyze redevelopment of economically or environmentally handicapped sites that have good reuse potential. A "redevelopment ombudsman" should assist developers and communities; this role could be filled by either nonprofits or the public sector. Cooperative links among schools, job training providers, and industry are desirable. Because nonprofits are generally unable to undertake major commitments without project-specific financial support, foundations and other donors need education on brownfields issues and encouragement to fund Forum projects.

Action

The team will share working models for community participation with new or less experienced community groups. Feasibility studies will define potential new roles for nonprofits in brownfield redevelopment. The MacArthur Foundation has taken the lead in encouraging the donor community to consider funding brownfield implementation projects.

Project leader:
Chicago Association of Neighborhood Development Organizations

BUILDING CITY GOVERNMENT CAPACITY

Municipal government needs new legal tools to provide it with clear authority to acquire and recycle abandoned brownfield properties. These tools include environmental liens to recoup expenditures for environmental cleanups; enhanced statutory authority to conduct environmental testing on properties with suspected contamination; and other alternatives for relieving municipal liability concerns. Assessors and the courts should consider environmental impairment when determining property values, whether the city acquires title through eminent domain or some other mechanism. Because government efforts to obtain control of abandoned brownfield property can be obstructed by tax buyers who have no intention of redeveloping the property, the state statute on annual tax and scavenger sales must be amended. To make industrial zoning of property more reliable, city zoning and land use mechanisms should be more predictable and stable. The city's relationship to the state's voluntary cleanup program should be clarified. One option is a memorandum of agreement between the city and state; another is for the state to delegate its authority to a city-run program. The city needs additional funding and staff to support an expanded brownfields program.

Action

Legislation establishing the variety of new tools suggested by the Forum is in development. A bill proposing amendments to the state statute on tax and scavenger sales was introduced into the Illinois General Assembly while the Forum was in

session, but the intiative failed. An options paper will examine methods for formalizing the city's relationship to the state's voluntary cleanup program. The city is taking steps to identify internal and external funding sources for an expanded brownfield program. Private- and nonprofit-sector Forum participants will submit a letter supporting increased funding for additional city brownfields staff.

Project leader:
Chicago Department of Environment

Promoting Reuse

STREAMLINING REGULATIONS

A streamlined state voluntary cleanup program should be the primary channel for government certification of brownfield cleanups. The state should adopt a more flexible, tiered approach to setting site-specific cleanup objectives keyed to a property's future use. Sites that successfully complete the voluntary cleanup program should be released from further liability for remediation. In Chicago and other locales where contamination of groundwater is not a major concern (Chicago gets its drinking water from Lake Michigan), the Illinois EPA should consider eliminating or modifying standards keyed to groundwater. Under certain conditions, the state should explore the use of engineered controls to limit the potential for human exposure (for example, by placing a barrier over contaminated soil rather than removing it). Remediations based on less stringent industrial standards should be recorded in the chain of title or on the deed to protect communities and future buyers who may want to alter the property's use. Proposed legislation to address liability for contamination should also address the assessment of contamination that migrates off-site and the problem of how to pay for cleaning up "orphan sites" that have no responsible party to whom costs can be assigned. To allay fears of federal enforcement against brownfield sites, the Superfund Memorandum of Agreement between Illinois EPA and U.S.EPA should be amended. Use of prospective purchaser agreements between buyers and federal regulators should be expanded.

Action

The U.S.EPA and Illinois EPA were in the process of amending the Superfund Memorandum of Agreement before the Forum began its work. The revised agreement has since been signed. U.S.EPA has revised its criteria for prospective purchaser agreements to encourage more widespread use of them, although these agreements apply only to the few brownfields in which U.S.EPA has an enforcement interest. Many of the Forum's recommendations found their way into HB 544/SB 46, the Brownfields Bill passed by the Illinois General Assembly in May, 1995. The governor signed an amendatory veto in August, and the bill's final status will be determined in November, 1995. A Forum-sponsored Brownfields Regulatory Roundtable will evaluate the legislation and monitor the rulemaking process for HB 544/SB 46 if and when the bill becomes law. The roundtable will then continue to meet periodically to work on regulatory issues of concern.

Project leader: Clean Sites

ENCOURAGING PRIVATE-SECTOR INVESTMENT

Because brownfields carry more risks than other real estate, they are harder to finance. In older areas with depressed property values, it is especially difficult to find money for environmental testing and remediation. Two public-private partnerships could help to expand financial resources: a state insurance pool to protect against undiscovered contamination and regulatory changes; and a lending pool to fund the assessment, cleanup and redevelopment of brownfields in older urban areas. A model loan package and brownfield development guidelines could help private-sector investors and lenders quantify their financial risk. As things stand now, many lenders who lack the environmental expertise to evaluate brownfield risks simply avoid industrial projects altogether. With proper training in the use of a model loan package, it is hoped that lenders and developers will come to view environmental impairment as just another risk factor to be assessed and managed.

Action

The project team has developed a model package of brownfields lending policies, procedures and documents. A conceptual plan has been drafted for a private shared-risk pool for financing the interim costs of brownfields development. Another project will assemble a state insurance pool.

Project leaders:
Chapman & Cutler,
Bank of America,
American National Bank

IMPROVING PUBLIC FINANCING

New public development financing tools are needed for use with brownfields. These should include a local pooled loan fund; federal capital attraction incentives and an "environmental pension fund," which would allow firms to set aside tax-deferred savings to fund site remediation at the end of a plant's useful life. Income, sales, and property tax credit options provided by Illinois law should be explored, as well as pollution prevention tax credits. The U.S. Department of Housing and Urban Development and the U.S. Commerce Department's Economic Development Administration could play key roles by funding local remediation and redevelopment projects. Public redevelopment funding programs should be repackaged for brownfields.

Public disincentives to brownfield reuse should also be addressed. For example, outlying jurisdictions compete with one another and older communities to attract greenfields development with tax breaks in order to boost short-term revenue. Local governments should become less reliant on property taxes, perhaps by regional tax base sharing. Because tax increment financing (TIF) has sometimes provided an incentive for outlying development, TIF reform should restrict the use of this mechanism to truly blighted areas.

Action

This team will explore means to improve public financing. One proposal is a statewide, competitive brownfields cleanup and redevelopment fund to make recoverable grant-loans in two categories: 1) site assessment, cleanup and pre-development costs; 2) development cost subsidies, where necessary. A second project will explore new federal and state incentives supporting brownfields redevelopment. A third will determine a strategy for obtaining federal and state tax incentives for brownfield sites and will host U.S. Congressional field hearings in Chicago. A fourth will repackage public development finance programs for use with brownfields sites. The final project will propose changes to tax and TIF laws, regulations and practices.

Project leader: Chicago Department of Planning and Development

INVOLVING COMMUNITIES

If communities participate early and actively in long-range planning for their neighborhoods, there is little need for groups to micro-manage small redevelopment projects. Large-scale, complex projects, especially those where contamination may pose a public health risk, warrant public scrutiny. Care must be taken to give communities a meaningful voice in private-sector redevelopments, yet to avoid burdensome new public-participation requirements that might drive development out to greenfields. The city should test a variety of models for involving communities in the brownfield redevelopment process.

Action

The team will publicize opportunities for community participation in city planning, evaluate public participation, identify effective models, and develop a pilot program for community participation in private-sector redevelopments.

Project leader: Chicago Department of Planning and Development

Looking Ahead

ADVOCATING POLLUTION PREVENTION

To contain the spread of brownfields, the environmental regulation and enforcement system should place greater emphasis than it currently does on preventing pollution. Pollution prevention can help to ensure that new industries built on brownfield sites employ environmentally sound operations. It can also help keep at-risk companies from becoming full-blown brownfields. Pollution prevention could be linked to eligibility for public funding. Organized labor and communities should participate in pollution prevention initiatives.

Action

The team will inventory pollution prevention efforts and resources, review state and federal guidance on pollution prevention, develop options for tying pollution prevention to regulatory and public funding efforts, identify technology transfer opportunities and ways to encourage labor and community involvement.

Project leaders:
Illinois Hazardous Waste Research and Information Center, North Business and Industrial Council

INFLUENCING REGIONAL PLANNING

Transportation and other government policies help create market conditions that make it worthwhile to mothball or abandon urban plants and site new industrial development ever farther from older communities. A coalition of regional organizations should educate businesses, the public, and local governments on links between public policy and brownfield creation, the regional benefits of brownfields reuse, and the regional costs of sprawl. Members should get involved in transportation planning and other regional policy issues as they emerge.

Action

A public-nonprofit partnership is beginning the work of regional coalition-building and public education to influence long-range planning. A subgroup of the Brownfields Forum has convened to help set land use goals and objectives for the 2020 Regional Transportation Plan being developed by the Northeastern Illinois Planning Commission and the Chicago Area Transportation Study.

Project leaders:
Business and Professional People for the Public Interest, Metropolitan Planning Council, Northeastern Illinois Planning Commission

(Top) Sarnside Steel, 82nd and Kimbark, one of the city's five pilot brownfield sites, before cleanup. (Bottom) Sarnside Steel after removal of more than 250 truckloads of debris.

BROWNFIELDS FORUM RECOMMENDATIONS AT A GLANCE

1. Improving communications

- Prepare and deliver an intensive public communications strategy on brownfields that includes a range of written materials and several points of contact to communicate with stakeholders about environmental assessment and cleanup.
- Improve coordination between U.S.EPA, Illinois EPA, and local government.
- Initiate a dialogue between U.S.EPA and CEOs on brownfields issues.
- Publicize U.S.EPA's enforcement process.
- Create a database of publicly available brownfield site information.
- Develop a network information system linking the Chicago departments of Buildings, Environment, Law, and Planning and Development, so that data on brownfield properties can be shared readily.
- Develop an Internet hookup for instant access to county, state, and federal site information.

2. Strengthening nonprofit capacity

- Explore the use of nonprofits or a public authority to promote brownfield redevelopment.
- Use intermediary organizations to identify at-risk firms in need of business assistance.
- Establish a "one-stop" service center to provide small manufacturers, business developers, and community development groups with technical and financial assistance to clean up and redevelop sites.
- Build more cooperative links among schools, job training providers, and industry.
- Encourage community groups to initiate redevelopment projects.

3. Building city government capacity

- Demonstrate the city's support of Illinois EPA's voluntary cleanup program.
- Examine current mechanisms for acquiring title to brownfield sites.
- Identify additional legal tools to enhance the city's ability to address brownfields.
- Ensure that the city's appraisal process considers environmental impairment, and propose amendments to the eminent domain statute requiring judges to account for environmental conditions in valuing properties taken by condemnation.
- Clarify the city's authority to conduct Phase II evaluations on sites with suspected contamination.
- Change the state statute on annual tax sales and scavenger sales.
- Stabilize zoning and land use mechanisms to make industrial uses more reliable.
- Build staff capacity within the city government to work on brownfields redevelopment initiatives.

4. Streamlining regulations

- Streamline Illinois' voluntary cleanup program.
- Use a tiered approach to establishing cleanup objectives that consider future land use.
- Reconsider the role of groundwater in setting cleanup objectives.
- In consultation with various stakeholders, Illinois EPA should explore engineered controls as a means of reducing risk to human health and the environment.
- Record future land use decisions that determine cleanup levels.
- Expand the availability of state letters of release.
- U.S.EPA should recognize the Illinois EPA's voluntary cleanup program through the Superfund Memorandum of Agreement.
- Expand the use of prospective purchaser agreements.
- Pursue legislative limits on liability.
- Proposed legislation to address joint and several liability for contamination should also address the assessment of off-site contamination.

5. Encouraging private-sector investment

- Create a state insurance pool for undiscovered contamination and future changes in regulatory attitude.
- The city should encourage private shared-risk pools.
- Prepare and distribute a detailed, model package of brownfield development lending policies, procedures and documents.

6. Improving public financing

- Repackage public funding sources.
- The U.S. Commerce Department's Economic Development Administration programs could fund brownfield remediation and development.
- The U.S. Department of Housing and Urban Development (HUD) could fund brownfield redevelopment.
- Promote federal capital attraction incentives.
- Promote federal and state government assistance through other financial tools.
- Explore funding options for the assessment, cleanup, and redevelopment of brownfield sites in older industrial areas.
- Establish a local pool of resources for brownfield development loans.
- Create new public development finance tools: promote federal and state tax incentives.
- Examine tax credit options provided by Illinois law.
- Create an "environmental pension fund" provision in federal tax law.
- To reduce competition among local jurisdictions, make local governments less reliant on property taxes.
- Reform tax increment financing (TIF) practices.

7. Involving communities

- Communities should be encouraged to participate in the city's planning processes.
- The city should test several models for community participation in the brownfield redevelopment process.
- Communities should participate in redevelopments initiated by the private sector.

8. Preventing pollution

- Foster a regulation and enforcement system that encourages pollution prevention.
- Link pollution prevention to eligibility for public funding.
- Encourage organized labor and community participation in pollution prevention.

9. Influencing regional planning

- Consider major new highway construction in outer suburban areas in light of the construction's impact on brownfields.
- Incorporate brownfield concerns into long-range regional transportation planning.
- Increase public involvement in transportation planning.
- Educate the public on the links between regional transportation policy and brownfields.
- Challenge a coalition of regional organizations to educate the public on policies that promote the creation and spread of brownfields, the impact of brownfields and the costs of sprawl, and local and regional options for solving the problem.

4. *Brownfield Redevelopment Principles*

"It is hoped the principles will provide a useful context for other cities and regions as they shape their own strategies for returning brownfields to productive use."

It is easy to become absorbed in the details of site-specific cleanup and redevelopment and to lose sight of the overall goal: to revitalize older communities. Given the diversity of interests that converge around brownfields, the Forum saw a need to establish a framework for allocating resources and setting priorities for brownfield reuse. A work group articulated the following principles to guide brownfield redevelopment. It is hoped the principles will provide a useful context for other cities and regions as they shape their own strategies for returning brownfields to productive use.

1) Brownfield redevelopment should foster healthy communities throughout the city and region. This can best be achieved by devising and following effective participatory planning processes that identify redevelopment priorities, build local capacity, and stimulate leadership in all sectors.

2) Public incentives for greenfield development should not outweigh incentives for recycling brownfields. Redevelopment of brownfield areas will reduce the need for new infrastructure in outlying areas, conserve environmentally sensitive areas, and otherwise save the costs of sprawl.

3) Engaging the private sector and expanding market resources are critical to brownfield redevelopment.

4) Effective strategies require strong partnerships among government, communities, and the private sector. Cooperation is the only way serious progress will be made.

5) Public brownfield expenditures should:

- Address sites that would not be redeveloped without government participation;
- Redevelop disadvantaged areas, especially where environmental justice is a concern;
- Focus on areas where brownfield reuse is likely to catalyze additional development;
- Create and retain jobs;
- Maximize public benefit.

6) To prevent the spread of brownfields and to foster sustainable communities, redevelopment efforts should seek to attract environmentally sound industries.

7) Brownfield redevelopment cannot solve all the city's environmental, economic development, and social problems. Brownfield initiatives should be viewed as one important component of a comprehensive strategy for revitalizing urban communities and coordinated with other local, state, and federal planning and policy development efforts.

8) In areas where contamination is widespread, brownfield redevelopment should seek to leverage broader, integrated strategies for promoting viable, long-term, area-wide development.

9) Environmental cleanup standards must be clarified to accommodate a full range of land use options. Cleanup and land use decisions must consider community-wide issues.

10) A large-scale brownfield redevelopment program should be based on knowledge and experience gained through pilot efforts and tests of innovative approaches and tools.

11) While industrial redevelopment should be the top priority of the city's brownfield redevelopment pilot program, the city and other interests should explore other reuse options that meet community development goals.

5. Conclusion

"A more coherent, regional perspective is needed to solve the problem of brownfields—one that accounts for the impact of public investments on the private development market."

Returning brownfield properties to productive use presents government, business, and communities with new challenges. Brownfields are both an environmental and an economic development problem. Cleanup of sites is only half the goal; cleanup must be pursued in tandem with redevelopment to realize maximum public and private gain.

To stimulate redevelopment, incentives are needed to attract private-sector interest in brownfield sites, and barriers to financing must be removed. Federal and state liability and regulatory reform is crucial. So is federal and state support for local brownfield initiatives.

On the local level, municipal government can play a constructive role if the proper tools are in place to help it gain control of abandoned properties and stimulate industrial redevelopment. Participatory planning processes can help to ensure that reuse projects support the goal of neighborhood revitalization. Community development corporations and other local groups have an important role to play in identifying redevelopment priorities and opportunities and becoming involved in planning and cleanup efforts. As industrial redevelopment moves forward, government, businesses and communities alike must promote pollution prevention to minimize the likelihood that new brownfield sites will emerge.

To make it all happen, cooperation is key. Communications must articulate new opportunities for brownfield redevelopment in Chicago, highlighting the policy, regulatory, and financing changes that are underway to make it easier to clean up and recycle abandoned industrial properties. Through the Brownfields Forum, diverse stakeholders who may not typically work together have learned the value of cooperation. Government, industry, organized labor, community groups, developers, environmentalists and financiers realize that when their efforts are aligned, progress is easier.

While the initial goal of the Forum was to examine brownfield issues in Chicago, it quickly became evident that Chicago is not alone. Dozens of other municipalities in the metropolitan region are grappling with brownfields. Awareness is growing of the cumulative negative impact of isolated policy-making. A more coherent, regional perspective is needed to solve the problem of brownfields—one that accounts for the impact of public investments on the private development market.

While the Forum's recommendations address these ideas, change will take time. Bringing together key stakeholders in Chicago-area brownfield cleanup and redevelopment was a necessary first step. This collaboration has formed the basis for a broad-based, carefully considered strategy for promoting brownfield reuse. The Forum's recommendations represent the current best ideas for contending with the forces that gave rise to brownfields in the first place and thwart their redevelopment today.

Forum participants expressed a desire not only to publish their ideas but to translate them into action, as evidenced by the projects described in Section 3. The best indicators of success will be continued collaboration among diverse interests—and steady growth in the cleanup and redevelopment of brownfield properties in Chicago and surrounding communities.

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THE NORTHWEST INDIANA BROWNFIELD REDEVELOPMENT PROJECT

The Northwest Indiana Brownfield Redevelopment Project is a cooperative effort of the cities of East Chicago, Gary, and Hammond. Its mission statement is:

> The Northwest Indiana Brownfield Redevelopment Project is dedicated to restoration of economic and environmental health in the cities of East Chicago, Hammond and Gary through wide community effort. Public and private resources will be mobilized to achieve three goals:
>
> - to identify and remove threats to the health and safety of residents from environmental degradation on brownfield sites;
> - to restore brownfields to productive use by appropriate cleanup; and
> - to create sustainable economic opportunity with new jobs and protect the environment.

To illustrate the local scope of the brownfields problem, the estimated abandoned property is 675 acres in Hammond, 2,000 acres in Gary, and 1,200 acres in East Chicago. Because of actual or perceived problems, industry and lenders avoid these areas. Consequently, in the urban centers existing infrastructure goes unused or underused, neighborhoods decay, and local and regional economies stagnate.

According to P. Wilbur, Executive Director, the goal is to allay the fears companies have about brownfields and show them how to obtain, clean up, and reuse property, but not to do all the work for them. "There are certain linkages between the public and private sector out there that aren't being made, and we're trying to bridge those gaps."

The Project actively involves all stakeholders in decision-making -- community groups, labor, neighborhood residents, environmental organizations, business people, and local and state public officials. Widely-advertised public meetings are held to solicit community input and participation, and to make decisions on site choice and development conditions. A series of 'town meetings' were held in 1995 to introduce the Project to the public, and a second series in 1996 chose the first pilot sites described below.

The Project is run by a steering committee made up of four community-elected representatives (one each from East Chicago, Gary, and Hammond, and one at-large), three city representatives appointed by their respective mayors (from East Chicago, Gary, and Hammond), a non-voting representative from the Indiana Department of Environmental Management (IDEM), and the chairmen of the standing committees. The committees are Community Participation, Finance, Regulatory and Legislative, Strategic Planning, Technical (non-voting on the steering committee), and Youth (to be established).

History. In 1994, a core group of civic and environmental leaders applied for designation of the Gary, Hammond, and East Chicago region as an Empowerment Zone. While unsuccessful, the group nurtured the concept over the next year. In 1995, they applied to the U.S. EPA for a grant to establish a "Brownfield Pilot Project" and were ultimately successful. The proposal was funded under the Common Sense Initiative, Iron and Steel Sector Brownfields Work Group. In early 1996 the Project became a 501(c)(3) non-profit corporation, and in July Patricia A. Wilbur was hired as Executive Director.

Funding. The project is funded by a $200,000 two-year grant from the U.S. EPA Common Sense Initiative, Iron and Steel Sector and a matching $200,000 grant from the Indiana Department of Environmental Management. The funds can be used for environmental testing and marketing, but not for cleanup. By the end if this two-year period, the Project aims to be an ongoing, self-sustaining concern.

Sites. As of January 1997 one pilot site has been chosen in each city for economic and environmental assessment, and ultimately for redevelopment. The sites were chosen at open meetings, one in each city, by community participants. The sites and their current status are:

- West Point Industrial Park, Hammond, 72 acres bounded by Columbia Avenue on the west, Gostlin Street on the south, White Oak Avenue on the east, and 141st Street on the north. It was chosen in July based largely on its large size, low contamination level, job creation potential, and because a publicly-owned site would afford the community more control. The site is zoned for heavy industry, and companies that do labor-intensive manufacturing with wages that can support a family would be sought.
  The site was once a slag dump, but otherwise was mostly undeveloped. It is adjacent to the former Industrial Fuels and Asphalt plant, an EPA Superfund site that has been (mostly) cleaned. The Indiana Department of Environmental Management took surface soil samples, and these indicated that the site is basically clean.
- A 20-acre grassy former American Steel site at 3761 Canal Street, East Chicago, chosen in August from a field of five sites rated by the Project and city as having viable redevelopment potential. It was formerly used for the manufacture, assembly, and distribution of steel products. In contrast to the Hammond site, it is privately owned, providing the Project an opportunity to work with a private owner.
- The former Gary Machine plant, constructed in 1912 under the name Gary Screw and Bolt, sold and renamed in 1990, and folded in 1992. The 38-acre site, located at 700 Alabama Street in an Urban Enterprise zone in Gary, was chosen at a December community meeting based on its large size, proximity to residential neighborhoods, access to transportation, and job-creation potential. A number of questions regarding cleanup and financial solvency, including more than $1 million tax delinquency, remain to be answered.

Voluntary Remediation Program. The Indiana Department of Environmental Management (IDEM) implemented on July 1, 1993 a voluntary program to expedite the reuse of brownfields. It requires a Phase I Environmental Site Assessment or similar site assessment, signing a Voluntary Remediation Agreement if site cleanup is necessary, completion of the remediation, and issuance by the Governor's Office of a Covenant not to Sue. This process is simpler, provides more flexibility, and ensures that a majority of the costs are directly related to the actual cleanup of the contaminated property. It is limited in applying only to those toxics or contaminants that have specifically been identified and tested for.

Plans. The three sites will be redeveloped as pilot projects. The experience obtained and the cost recovery is intended to provide a basis for future site choice and redevelopment. This is intended as an ongoing, self-sustaining program.

TRENDS - FEDERAL, STATE, REGIONAL, LOCAL*

Michael J. Donahue, Ph.D.
Executive Director
Great Lakes Commission

I have a rather daunting task before me; I've accepted the challenge of characterizing what I define as a "new era" in regional water resources management. With the Great Lakes as a case study, I'll provide an historical context on the evolution of regional governance; I'll document trends over the last two decades; I'll explore their current and future implications for Great Lakes governance; and I will identify a series of challenges and opportunities we must embrace if this "new era" is to move us forward in pursuit of sound management and a sustainable resource.

I'd like to preface my remarks with a bit of philosophy. I find the study and practice of regional water resources management to be a fascinating topic. The basis for my fascination is threefold.

First, consider the inherent properties of water and their pervasive impact on our environmental health, socio-economic well-being, and our quality of life. Henry David Thoreau once observed that "A lake is the landscape's most beautiful and expressive feature. It is earth' eye looking into which the beholder measures the depth of his own nature." He also suggested that a lake "is a mirror which no stone can crack, whose quicksilver will never wear off, whose gilding nature continually repairs." Our Great Lakes most assuredly provide us with a mirror. Like a mirror, they offer an opportunity to reflect on past successes and failures; to assess our present countenance; and to speculate on the future. Like a mirror, the Lakes are fragile and demand careful use and protection to preserve their integrity.

Second, I find this topic fascinating because it is an intriguing mix of scientific inquiry, legal interpretation, institutional experimentation, the give-and-take of diverse interests, and the art of compromise. The Great Lakes have often been described as the largest freshwater laboratory for scientific experimentation on the face of the earth. They might also be described as the largest freshwater laboratory for institutional experimentation on the face of the earth. This grand experiment began more than a century ago, and we continue to be challenged by a need to reconcile our geo-political boundaries with our hydrologic boundaries. And, indeed, that's what regional water resources management is all about.

Third, and finally, I find this topic fascinating because we, as water resources professionals and residents of this region, have an awesome stewardship responsibility. The Great Lakes are pervasive in physical, geographic, and socio-economic terms. They constitute the largest system of fresh surface water on the face of the earth -- 95,000 square miles of surface water, 200,000 square miles of drainage, and 65 trillion gallons of water[1]. Its component parts -- the five Great Lakes -- are among the fifteen largest freshwater lakes in the world. As both an international border and shared resource, the system extends some 2,400 miles

* This presentation provided the basis for the author's 1996 Wayne S. Nichols Memorial Lecture at the Ohio State University on November 14, 1996. Title: "A New Era for Regional Water Resources Management: A Great Lakes Case Study."

from it's westernmost shores to the Atlantic, comparable to the distance between Columbus, Ohio and Los Angeles, California.

Amazingly, 95% of the nation's fresh surface water is found right here in the Great Lakes, as is one of every five gallons of fresh surface water the world over. Many of you have heard these figures many times over, but it is critical that we fully appreciate their significance.

Within the Basin resides 20% of the entire U.S. population and 60% of the Canadian population. Two-thirds of these 40 million residents rely on the lakes themselves for their drinking water. Daily, more than one trillion gallons of this water is consumed or used in-stream to sustain life and economy. Water-dependent industry -- such as heavy manufacturing, agriculture, recreation and tourism, and sport and commercial fishing -- are all multi-billion dollar a year industries[2].

This volley of facts and figures speaks to the awesome stewardship responsibility entrusted to those of us who develop -- or otherwise influence the development of -- water resources policy.

My point here is a simple one. This region's economy is only as strong as the quantity and quality of its precious water resources. And the region's environment is only as secure as the stewardship provided by those who live and work in it.

The Great Lakes region is a composite -- a microcosm -- of the vast array of socio-economic, political, and environmental characteristics and issues that one might find in any water-based region of North America[3]. What we learn -- from both our successes and failures in governance -- has and will continue to be applicable elsewhere. We are stewards of a precious, finite resource, and participants in a grand institutional experiment with global applications and implications. And that's why I find the study and practice of regional water resources management so fascinating.

The Evolution of Regional Governance

Speculating on the future of water resources management is an exercise in futility if we choose to ignore the past. And, indeed, this nation has a long and storied history of institutional experimentation with regard to regional water resources management.

This "grand experiment" began, literally, before the ink was dry on the Articles of Confederation, which established the limits of state sovereignty and outlined federal/state relations in our fledgling nation. Our founding fathers quickly discovered three realities of the new frontier: 1) waterways were a vital transportation route; 2) access to abundant quantities of high quality water was a prerequisite to settling the interior of the new nation; and 3) geo-political boundaries were more of a hindrance than help in developing and managing the nation's water resources. In fact, this nation's first bi-state commission was established in 1784 and was chaired by George Washington himself. The still-developing bureaucracies of Maryland and Virginia weren't suited for the joint development of the Potomac River for navigation purposes. The Bi-State Commission was formed and quickly concluded that a private company should be established to develop the Potomac. Even 200 years ago, privatization was held in high regard. We do, indeed, need to revisit the past to gain a perspective on the present and the future.

As a student of regional governance, I've traced the evolution of water resources management over the course of U.S. history. In my view, the evolution can be characterized by five eras, and we can learn from each of them.

The "Resource Development" Era

The first might be termed the Resource Development Era, and its spans the years from the formation of the United States through the middle of the 19th century. The aforementioned Bi-State Commission was the first in a series of interstate arrangements established on an ad hoc, issue-specific basis. Typically, these water resource management initiatives were development oriented, with transportation as a major emphasis. Virtually all were the outcome of management decisions designed to broaden the limitations of the physical system.

This era of water resources management – or manipulation – helped change the course--both literally and figuratively--of the Great Lakes both literally and figuratively. It saw the 1797 construction of a rudimentary lock at what is now Sault Ste. Marie, Michigan. It saw the opening of the Erie Canal in 1825; the Welland Canal in 1828; the initial construction of the Chicago River locks in 1848; and widespread port and channel dredging[4]. Such actions were observed in many regions of the United States during the first half of the 19th century. Comprehensive planning was the exception to the rule during this era, when single objective, structural development was the order of the day.

The "Transition" Era

The pressures and consequences of a rapidly expanding and developing nation led to a second era of water resources management. Spanning the latter half of the 19th century, this period might be termed the Transition Era.

Ad hoc, issue-specific commissions gradually gave way to permanent, multi-jurisdictional institutions with expanded water resources development responsibilities. History identifies the Mississippi River Commission – established in 1879 – as the first federal commission with multiple objectives: navigation improvements, bank stabilization, and flood control. The federal Rivers and Harbors Act, which created that commission, was amended numerous times to create other such regional institutions, including a Missouri River Commission in 1884 and a California Debris Commission in 1893. These seemingly trivial examples are highly significant because they demonstrate the pronounced difference between the early notion of regionalism and the notion we embrace today.

The majority of this era was characterized by a growing infrastructure of legislatively-driven, federally-mandated institutions with either a single or a modest set of objectives oriented toward structural alteration of the physical system.

The predominant focus on development did begin to shift – ever so subtly – as resource management challenges increased, as the environmental consequences of development pressures began to arise, and as visionaries of the day began to influence the policy process. In 1874, naturalist George Marsh introduced the notion of watershed management, and four years later John Powell – a land-use planner – proposed the organization of water management by drainage basin, linking water and land allocations.

The Great Lakes once again offer a case study of this evolution of thought. The historian William Dreisziger explains that, during the closing days of the 19th century, the need for a new management paradigm was evident[5].

> "By that time," he states, "new problems were emerging in connection with the development of common water resources, problems that required solutions through the establishment of rules of water use, as well as an international agency to apply them. Unfortunately, this need was recognized only gradually, and the implementation of a general settlement of the issue was even slower due partly to the cumbersome nature of Canadian-American diplomatic intercourse at the time, and partly to the caution and downright reluctance of statesman on both sides of the boundary."

Health crises and economic opportunities in the Great Lakes region accelerated the glacial movement toward this new paradigm. For example, outbreaks of typhoid and cholera in the late 1890s in Chicago prompted the reversal of the Chicago River, and prompted a federal examination of water quality and human health issues. That same decade saw the formation of an International Deep Waterways Association, dedicated to a scheme that would improve Lake Erie harbor facilities by damming its outlet and raising water levels. Interestingly enough, that body -- following several transformations -- provided the basis for the International Joint Commission, now celebrating its 85th year of existence.

The "Federal Leadership" Era

A third era in water resources management takes us from the beginning through the midpoint of the 20th century. Termed the Federal Leadership Era, it is unquestionably the most complex and fascinating era to date. It was characterized by landmark federal legislation, an explosion of federally-established and federally-dominated water management institutions, an acceptance of comprehensive planning, and heated debate on the role of regional governance in the U.S. system of federalism.

It all began with one man who championed the cause for what we might term the "modern concept" of comprehensive basin planning. That man was President Theodore Roosevelt. His Inland Waterways Commission, established in 1907, declared that, "Each system from its headwaters in the forest to its mouth on the coast is a unit and should be treated as such." A year later, his commission offered three recommendations that are now ingrained in our management philosophy: 1) comprehensive planning as a precursor to water resources development; 2) intergovernmental and public/private sector cooperation as a foundation for water resources development; and 3) an institutional structure that formalizes cooperation among principal federal agencies.

In the ensuing decades, this marriage of comprehensive planning and regional governance forged quickly ahead. It featured bold new initiatives that challenged the age-old tradition of a hierarchical federal system characterized by multiple federal agencies with separate and distinct authorities. Senator Newlands of Nevada engineered the passage of a 1917 bill with the phenomenally broad and ultimately abandoned goal of producing a comprehensive plan for the nation's waterways that addressed not only navigation but, in his words, "every useful purpose" of the resource.

The 1920s and 1930s saw the federal government -- through various legislation -- embrace and dominate the practice of comprehensive basin planning. The Federal River Act of 1920, the Rivers and Harbors Act of 1927, and the Flood Control Act of

1938 among others, provided for that federal dominance. The "alphabet agencies" of the New Deal era, such as the Public Works Administration and Civilian Conservation Corps, reflected that dominance as well. The Tennessee Valley Authority Act of 1933 created what continues to be the single most powerful and autonomous regional planning and development agency in the nation.

The nation's willingness to embrace this emerging notion of regionalism and the attendant proliferation of regional governance forms was cause for alarm in some sectors[6]. The federal Bureau of the Budget, for example, feared that such institutions would upset the federalism tradition and burden the federal budget. Regional institutions were described in such terms as "excrescences of the constitutional system," "unusual cases, deviant new growth in a government landscape," and "a constitutional anomaly to be treated with caution."

The "excrescences," however, were here to stay. The decade of the 1940s was characterized by a series of institutional experiments to ensure communication and coordination among the increasing number of federal agencies and instrumentalities involved in regional water resources management.

The Great Lakes region made notable contributions during the Federal Leadership Era. The International Boundary Waters Treaty of 1909 and its implementing body, the International Joint Commission, reflected the multi-objective, multi-jurisdictional emphasis of the day. The Miami Conservancy District, located in southwest Ohio, was formed in 1914. It is regarded as one of the earliest and most successful intrastate water resource management arrangements in the nation.

The "River Basin" Era

A fourth era in regional water resources management might be termed the River Basin Era. Extending from 1950 through the mid-1980s, it was characterized by unprecedented institution building at the river basin level; an assertion of state stewardship responsibility; emerging federal/state partnerships; and a decided emphasis on environmental protection and resource management, as opposed to development.

President Truman's Water Resources Policy Commission (1950s) and, subsequently, President Eisenhower's Advisory Committee on Water Resources Policy (1955), called for a national system of river basin commissions.

There were, however, vocal detractors that seemed to echo some of the concerns that the federal Bureau of the Budget had articulated in the 1930s[7].

For example, Representative Harris Elsworth of Oregon spoke against the establishment of a Columbia Valley Administration that would, in his words, "bind most of the five states in the Pacific Northwest in the chains of a regional agency."

Representative Ben Jensen of Iowa described the program of regional valley authorities as "the recommendation and hope of the Communist Party of America."

And, by resolution, the National Wildlife Federation stated that it was unalterably opposed to the creation of any additional federal, regional, or valley authorities as being "unjustified, unnecessary and a dangerous departure from our American form of government."

These concerns notwithstanding, the River Basin Era gave us the Water Resources Planning Act of 1965 and, with it, the U.S. Water Resources Council, a series of river basin commissions, and a program providing financial assistance to states for comprehensive river basin planning. Significantly, these entities, like the Great Lakes Basin Commission, featured a horizontal rather than vertical hierarchy vis-à-vis federal/state relations. This feature was also incorporated into other emerging arrangements, such as the Delaware and Susquehanna River Basin Commissions, established in 1961 and 1963, respectively.

Developments in the Great Lakes region illustrate the River Basin Era's gradual shift from federal dominance to state empowerment. It saw the 1954 creation of the Great Lakes Fishery Commission, a binational agency with strong state and provincial involvement, and the 1955 creation of the Great Lakes Commission, an interstate compact agency founded in both state law and Congressional consent legislation.

The 1981 dismantling of Water Resources Planning Act institutions, by Executive Order of the president, signaled the beginning of the end of the River Basin Era. Soon thereafter, many states took it upon themselves to "resurrect" the Title II river basin commissions (minus the federal participation). The formation of the Council of Great Lakes Governors in 1982 offered further evidence of a diminishing federal dominance and the emergence of a new state stewardship ethic.

The "New" Era

The present era of regional water resources management has its roots in the early to mid-1980s, but is only now coming into its own[8]. Thus, I feel justified in describing it as a "new" era.

In the parlance of policy practitioners, I speak of the movement from a top-down, command and control, government-dominated approach to a bottom-up, partnership-based, inclusive approach.

Our evolution to this new era was not the product of a single, orderly, calculated strategy. Rather, it was the outcome of multiple -- and not necessarily mutually-compatible -- developments. It reflects, for example:

- The "new federalism" philosophy of the Reagan Administration which viewed water resources issues largely as concerns of the states either singly or collectively;
- The current downsizing and "re-invention" of the federal government, prompted by efficiency concerns and budgetary constraints;
- A "kinder and gentler" federal government that has tempered its regulatory emphasis with voluntary compliance and partnership characteristics;
- A rising ethic of self determination, stewardship, and collaboration among states; and
- The relentless efforts of "grass-roots" non-governmental organizations to empower communities and individuals.

Collectively, these influences have had a profound impact on regional water resources management. The evolution in governance can be characterized as follows:

•	"top-down" mandates	⇒ "bottom-up" initiatives
•	vertical management hierarchy	⇒ horizontal management hierarchy
•	command-and control regulatory emphasis	⇒ partnership-oriented, voluntary compliance emphasis
•	federal funding driving programs	⇒ creative financing
•	developing a legal/institutional infrastructure	⇒ enhancing efficiency of the legal/institutional infrastructure
•	balancing economic and environmental issues	⇒ integrating economic and environmental issues
•	non-governmental organizations as "reactors" to public policy	⇒ non-governmental organizations as partners in developing public policy
•	federal agency leadership and oversight	⇒ federal/state partnership, with a strong community role
•	acknowledgment of socio-economic considerations and differing value systems in planning efforts and assessments	⇒ inclusion of socio-economic considerations and differing value systems in planning efforts and assessments
•	geo-political boundaries as the basis for planning/assessment efforts	⇒ hydrologic boundaries as the basis for planning/assessment efforts
•	single-media emphasis	⇒ multi-media ecosystem approach
•	environmental ethic	⇒ environmental/conservation/ sustainability ethic

There are, of course, many other trends that one might reference as evidence of this transformation.

Implications for Water Resources Management

The obvious question, of course, is whether this transformation into the New Era is a positive one. Will it help or hinder us in our collective efforts to achieve a desired state of environmental quality and sustainable use?

The pessimist would find the transformation a hindrance, arguing that it's nothing more than the consequences of government downsizing and passing the burden of

responsibility from one level to the next. The pessimist would also view this era as one of fiscal constraints, a compromised regulatory framework, a research infrastructure at risk, prospective management inconsistencies among basin jurisdictions, and over-reliance on local governments and community organizations that are largely ill-prepared to accept new responsibilities.

The optimist, on the other hand, would view the transformation in an entirely different light. It moves management responsibilities to the level of government closest to the resource and the people, it encourages state stewardship, it empowers community groups and individuals, and it tempers a burdensome and overly-prescriptive regulatory framework with voluntary compliance.

As a practitioner in the Great Lakes and an observer of national trends, I suspect that both schools of thought have legitimate arguments. Irrespective of our views, however, we must contend with reality. By design or accident -- or a combination thereof -- we're headed down a path in a new era of water resources management. We are well advised, therefore, to understand both the implications for management in the New Era, as well as the opportunities we must seize to maximize its potential. Allow me to focus exclusively on Great Lakes governance for this analysis.

The transition to date has been protracted and difficult. At the federal level, the New Era has been characterized by government downsizing and "reinvention." Many of our federally-funded research facilities and programs have been on the Congressional equivalent of "death row" for a number of years. In current dollars, we're struggling to regain the research capacity we had in 1980. Federal grants, pass-through moneys, and cooperative agreements -- the lifeblood of many state agencies, programs, and local initiatives -- are a threatened, if not endangered, species. I'm pleased to say that the outlook today is considerably more optimistic than it was six months ago, but we're still treading water. We at the Great Lakes Commission, for example, invested a great amount of energy in an advocacy strategy that brought FY 1997 federal appropriations back on par with FY 1996 funding levels. The status quo was maintained; we fought hard just to avoid falling behind. Yet, we were pleased with the outcome. That's one indication of just how challenging the New Era is.

I suspect that concerns over deregulation may be somewhat overstated, but I do have pronounced concerns relating to program implementation, enforcement, and consistency. Oversight and accountability have long been the foundation of our system of federalism and must be preserved; a strong federal presence is essential in setting broad goals and ensuring that they are addressed. Reducing that presence, as suggested by the New Era, compromises an ecosystem approach and increases the likelihood of inconsistencies from one jurisdiction to the next as policies, regulations, and programs are applied to a single, shared resource. That is why the Areas of Concern program, the Coastal Zone Management Program, and the Great Lakes Water Quality Initiative, to name a few, have merit. Technical details and process issues can be challenged, but the underlying motivation is above reproach -- ensuring a base level of consistency as individual political jurisdictions manage a single, shared resource.

I'm also concerned about the "trickle down" effect -- or perhaps more appropriately, the "cascading" effect -- that this has as one moves down the "food chain" in our institutional ecosystem. The Remedial Action Plan process is an excellent case in point. For years, local public advisory councils have demanded a greater role in decisionmaking, and in the design and implementation of remedial actions. As the adage goes, "Be careful what you wish for -- you may get it!" Fiscal and staffing constraints at the federal and state levels have -- almost by default -- empowered these

groups. But do they have the necessary tools and resources to assume a leadership role? Empowerment means little without them.

In other areas, I am genuinely encouraged. The fiscal realities of the New Era have resulted in an unprecedented level of intergovernmental and public/private sector cooperation and collaboration. The recent "State of the Lakes Ecosystem Conference" in Windsor, Ontario is a child of the New Era. Six hundred water resources professionals -- from government, industry, academia, and citizen organizations -- removed their organizational hats and engaged in collegial discourse on shared problems and opportunities.

I would also observe that regional, multi-jurisdictional institutions at the substate, interstate and binational levels are being re-energized by the New Era. They transcend the parochialism of traditional government jurisdictions and geo-political boundaries. In so doing, they offer innovative approaches to management with an efficiency and cost effectiveness that can far exceed independent yet parallel initiatives of multiple jurisdictions within the same basin or watershed.

Challenges and Opportunities in the New Era of Water Resources Management

I will conclude my review with a series of actions that must be taken, in my opinion, if the New Era in water resources management is to move us closer to our collective vision for the Great Lakes:

1. **We must build an adequate institutional infrastructure at the watershed level.** Unlike Ontario, which is blanketed with conservation authorities drawn on hydrologic boundaries, the Great Lakes Basin features very few watershed councils and associations. The "trickle-down" or "cascading" effect of New Era governance will be disastrous if there are no effective substate or local entities on the receiving end. Great Lakes states would be well advised to ensure that local governments and other partners can coalesce around watershed specific issues.
2. **We must take full advantage of our multi-jurisdictional Basin organizations.** Our premier organizations, the International Joint Commission and Great Lakes Fishery Commission at the binational level, and the Great Lakes Commission and Council of Great Lakes Governors at the domestic level, are tailor-made for the New Era of water resources management. Their contributions have been many, but our traditional political jurisdictions of federal, state, and provincial governments have yet to tap their full potential. A primary motivation for this must be the imperative need for a fundamental level of Basinwide consistency in water resources management efforts.
3. **Our age-old process for financing water resource planning and management programs must give way to creative financing arrangements.** Historically, state programs have been highly dependent on the federal government for their financing. Counties and municipalities looked to both the federal and state governments. And watershed organizations, where they existed, looked to all of the above.

   The rules have changed dramatically, and creative financing is now the order of the day. Private foundations, corporate giving programs, trust funds, endowments, legal settlements, and intergovernmental agreements must all be considered as part of a larger "patchwork quilt" of financial resources. This is

true of federal and state agencies as well as regional and non-governmental organizations.

4. **We must accelerate our gradual movement toward "place-based" management.** Local and community-based empowerment means little if leadership and motivation are absent. These traits can be cultivated, however, by programs that relate to the community; by programs that can yield visible, timely, and measurable results that affect residents individually. Remedial Action Plan implementation -- at least in theory -- can do this. The growing number of urban waterfront regeneration programs, which feature brownfields redevelopment, are another example of "place-based" initiatives.

5. **We need to bring our advocacy-oriented citizen organizations into the New Era of water resources management.** Far too many are trapped in a previous era when, by definition, industry motivations were always suspect, elected officials were always unresponsive, and government programs were always too few and too late. The New Era recognizes that, indeed, environmentalists can be found in business, industry, and government. The New Era recognizes that partnerships, inclusiveness, and conflict management are preferable to verbal skirmishes played out through the media and endless, expensive, and often inconclusive litigation. And the New Era recognizes that -- irrespective of our individual constituencies, priorities, and motivations -- most of us do share a common vision for the Great Lakes Basin ecosystem. This is a vision of sustainable communities characterized by a clean environment, a strong economy, and a high quality of life.

6. **We must preserve our research infrastructure at all costs.** Without it, resource management has no direction; it becomes a rudderless ship tossed by the changing winds of political expediency and social preferences. And research cannot be turned on and off like tap water in our homes. We cannot walk away from research for five years and, upon our return, pick up where we left off. This is a critical role for the federal government, and the New Era demands that we relentlessly and aggressively remind Congress of this historical obligation.

7. **We need to do far more than simply acknowledge the cause-effect relationship between land use and water quality.** Our water resources management institutions at every level need to participate in -- or at least substantively influence -- land use decisions. I characterize this as a premier issue of the New Era. We're ill-equipped to address it, however, in most watersheds in the Great Lakes Basin and beyond. Water is held in trust by the government on behalf of its people, and most decisions are made at the state and federal levels. Land is a matter of individual ownership, and decisionmaking is more of a local concern. Historically, management approaches to these resources have been mutually exclusive and often incompatible. This is a legal, institutional, and socio-economic issue that must be reconciled during the New Era.

8) **Finally, we need benchmarks; we need better indicators of ecosystem health, and mechanisms to evaluate progress in water resources management.** This is a program efficiency/cost effectiveness issue that responds to the financial and other resource constraints of the New Era. It's a means to ensure a high rate of return on our investment of time, resources, and management expertise.

This list of recommended actions is not necessarily a comprehensive one. It's one practitioner's perspective on how we can make the New Era in water resources management an incremental improvement over the last one. And, hopefully, my list will stimulate some additional thought, discussion, and debate.

I leave you with a quote from Loren Eisely, drawn from an essay in his 1957 book titled The Immense Journey: "If there is magic on this planet, it is contained in water."

References

1. Great Lakes Basin Commission, 1975. Great Lakes Basin Framework Study, Report, Environmental Impact Statement and 25 Appendices. Great Lakes Basin Commission, Ann Arbor, Michigan.

2. Donahue, Michael J., 1991. "Water Resources and Policy," Chapter Six in The Great Lakes Economy: Looking North and South. Federal Reserve Bank of Chicago, Chicago, Illinois and Great Lakes Basin Commission, Ann Arbor, Michigan.

3. Donahue, Michael J., 1987. Institutional Arrangements for Great Lakes Management: Past Practices and Future Alternatives. Michigan Sea Grant, Ann Arbor, Michigan.

4. Heilmann, Ronald L., N. M. Mayer, and E. Schenker, 1986. Great Lakes Transportation in the Eighties. University of Wisconsin Sea Grant Institute, Madison, Wisconsin.

5. Dreisziger, W. F., 1983. "International Water Management in Canadian-American Relations, 1894-1907," Canadian Water Resources Journal, Vol. 8, No. 3.

6. Derthick, Martha, 1974. Between States and Nation: Regional Organizations of the United States. The Brookings Institution, Washington, D.C.

7. Supra Note 6.

8. Donahue, Michael J., 1995. "The Bioregional Assessment Process: Evidence of a Transformation to a New Era of Governance," Conference Proceedings: At the Crossroads of Science and Policy, November 6-8, 1996, Portland, Oregon.

TERRESTRIAL BIODIVERSITY IN THE SOUTHERN LAKE MICHIGAN ECOSYSTEM: ISSUES, THREATS AND SOLUTIONS

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Along the southern shore of Lake Michigan, a region well known to much of the World for its myriad of economic and social problems, lies an obscure but unique ecosystem harboring one of the richest assemblages of species in all of North America. While many biologists and local residents are unaware of the existence and significance of this ecosystem, northwest Indiana's Lake Plain has a historical hold on the very foundations of modern ecological paradigms. It was here, in studying the geological origins of the over 150 small dunes and their intervening wetlands (swales), that Henry Chandler Cowles and his students literally formulated the dynamic concepts of plant succession that underlie our understanding of natural patch and community dynamics. Further, the rich but odd mix of plants that occurs here, including many species that are more at home along the Atlantic Seaboard, stimulated Peattie's pioneering ideas concerning post-glacial biogeography that today still dominate most discussions about how ecosystems re-invaded following retreat of the last glaciers.

The creation of the entire Lakeshore ecosystem is a fairly recent event. The glaciers of the Wisconsinan Period acted to both scoop out Lake Michigan as well as to dam it with glacial moraines at its southern end. As the glaciers were receding, Lake Michigan (officially known as Lake Chicago during this stage) was 60 feet higher than the current lake, and drained to the south. During this stage it created the level lake bed upon which Hammond, Gary, and most of Chicago now sit, as well as the beginnings of the large inland dune fields further east. As the Lake level dropped to its current level, sand deposition and erosion created the system as we know it today. Thus, most of the topography we see today was created within the last 10,000 years, much of it more recently.

The eastern Lakeshore region is characterized by its large sand dunes, many towering 100 feet above the Lake - some of them almost 200 feet. These dunes include active blowout areas which provide critical habitats for species such as the Federally-endangered Pitcher's thistle. But mostly these big dune fields support dry oak woodlands and more open oak barrens, with northern swamp forests, wet prairies, and wetlands in the intervening depressions. As you move west through the Lakeshore region, the dunes fan out gradually and become lower until they eventually dissipate at the Illinois-Indiana border. In west Gary, these low dunes average less than 10 feet above their intervening wetlands (swales). This dune and swale topography originally extended almost six miles inland, in a series of over 150 low dune ridges - today most of the dune and swale has been leveled and developed. But even today, cyclical water-level fluctuations in the Lake continue to create and destroy these low dunes while summer storms and their churning breakers add to the big eastern dunes. The dune and swale supports a complex mixture of communities, including interdunal ponds, wetlands, wet prairies, and the dry oak barrens which line the low dune ridges. The dune and swale dissipates westward in Illinois into the nearly level Lake Plain,

upon which most of Chicago now rests. The Lake Plain originally supported a complex mixture of lake plain prairie and mesic savanna habitats.

What makes the ecology of the Lakeshore region so interesting is that it supports a unique biogeographic mix of species. The region has long been known to botanists as a system where the tall-grass prairie collides with the eastern deciduous forest. The Grand Prairie that once dominated much of Illinois juts full-force into the deciduous forests of northwest Indiana, and this is an area of ecological tension between these two dominating ecosystems. The spacial distribution of the various habitat types was originally very dynamic, and depended in large part on recent fire history. Areas that were frequently burned supported open prairie, savanna, and wetland habitats; while areas that escaped fire for prolonged periods shifted towards woodland- and shrub-dominated habitats. This created a landscape where the plants and animals of these two ecosystems were intermingled in ever-changing habitat patches. Adding to this east/west-forest/prairie mix, a multitude of northern boreal species survive along the lakeshore at their regional southern limits, likely because of the moderating lake-effect weather.

This history created an incredible tightly-packed, species-rich system. For example, one small 30-acre dune and swale remnant in Gary supports about 300 species of native plants. On a National scale, Indiana Dunes National Lakeshore supports the third-highest number of native plants in the national park system, exceed only by the Grand Canyon and Smoky Mountains National Park, both of which are huge by comparison. Who would guess that a small, 14,000-acre park in northern Indiana would support more native plants species than a wilderness like the Everglades? Over 15% of Indiana's vascular plant species are limited to this region (Bowles 1989), as well as the largest number of state threatened and endangered species (Figure 1, Table 1).

Today, what remains of Southern Lake Michigan's lakeshore ecosystems is in critical danger. The bulk of the Lake Plain is occupied by a dense concentration of heavy industry and associated urban superstructure. The high dunes are under increasing pressure from extractive use as well as home-site development. With the exception of portions of the Indiana Dunes National Lakeshore, these pressures have reduced the ecosystems to a series of isolated fragments. These urbanized natural-land fragments are stressed by airborne and ground water pollution, dumping, off-road vehicular use, exotic species invasion, and the cumulative effect of fire suppression which has encouraged tree growth at the expense of open grasslands. In addition, many of the critical remnants are privately owned, and are in danger of development or perhaps, more importantly, are not managed to maintain their natural attributes.

Threats to Terrestrial Ecological Integrity and Biodiversity in Today's Landscape

Fragmentation / Natural Land Conversion. The density of industrial and urban development associated with the lakeshore has eliminated most natural lands. Those that remain are often highly fragmented and/or subject to edge effect. Ecosystem fragmentation has several negative effects. Perhaps the best recognized is the loss of species richness over time on small, isolated habitat fragments. Small habitat fragments support smaller populations which are more likely to become locally extinct. And as distance between habitat patches increases, recolonization following local extinction becomes less and less likely, which can ultimately lead to the regional collapse and extirpation of highly sensitive species. Fragmentation may also disrupt the life cycles of species with complex habitat requirements, such as species that may require wetlands for reproduction, but uplands for foraging.

Urban and agricultural encroachment, in addition to simply eliminating habitat, fragment oak barrens/savanna communities by inserting non/less-flammable landuses into a highly flammable ecosystem (Givnish *et al* 1988). These barriers limit the occasional wildfire to small land tracts, reducing the potential for naturally-spreading wildfire to maintain the ecosystem in an early successional state. In addition, urban encroachment increases the difficulty of using controlled burns to manage oak barrens/savanna communities because of the liability and perceived danger/nuisance to residents.

Edge effects from fragmentation are also severe. For example, proximity to seed sources is often a determining factor in the presence/absence of exotic problem species. Severe fragmentation increases exotic species access to core natural areas, decreasing the integrity of these sites. Preserves/natural areas with high edge to area ratios are also subject to higher levels of unnatural predation from feral animals, raccoons, and cow birds than are larger preserves. As a result, successful nesting is not the norm for waterfowl in many of the wetlands in the region.

Exotic Species can and have completely overrun native habitats, eliminating entire communities. High levels of disturbance, air-born nutrient enrichment, and contaminant stress generally favor selected exotic species over native plants. Hence, southern Lake Michigan is prime ground for exotic problems, and one of the critical tasks in protecting biodiversity involves controlling exotic species. In Indiana, entire natural area remnants have been overrun by phragmites. Broadleaf cattail and purple loosestrife dominate vast wetlands in the National Lakeshore that were once sedge meadows and fens. Other exotic species which pose severe or potentially severe threats to biodiversity in the region include sweet clover, glossy buckthorn, phragmites, crown vetch, flowering spurge, canada thistle, bush honeysuckle, black locust, garlic mustard, autumn olive, multiflora rose, day-lilly, and reed canary-grass (exotic genotype).

Disruption of Ecological Processes. Closely related to the impact of habitat loss is the elimination of ecosystem level processes. The lakeshore communities were among the most dynamic in the Midwest, and were maintained and created by processes such as wildfire, hydrologic fluctuations, and longshore transport of sediments. All of these landscape-scale processes have been significantly altered by the development of the region.

Wildfire originally played a critical role in maintaining the more open habitats in the region. Habitats such as oak barrens and sedge meadows were maintained by a steady procession of wildfires, which killed woody invasive plants while favoring fire-adapted dune, savanna, and wetland communities. Without fire disturbance, shade tolerant and fire sensitive species increase in density, and species which characterize more open habitats decline.

For example, functional oak barrens/savanna communities are in a constant but dynamic flux. Succession pushes the community towards an association characterized by fire-intolerant woody and shade-tolerant herbaceous species, while fire disturbance realigns the community towards one of fire-tolerant and shade-intolerant species. The original patch dynamics of these communities was in constant flux, and individual sites supported communities that reflected recent disturbance history. Although fire may have been a yearly occurrence within oak barrens/savanna ecosystems, the spacial distribution of the fire was probably less predictable. For example, in the Albany Pine Barrens (new York) the point fire frequency may have ranged between 6 to 18 years, with a likely average frequency of once every 10 years (Givnish *et al* 1988). Thus,

these communities were composed of a constantly changing patch-work of habitats, reflecting the hit or miss nature of recent wildfires.

Unfortunately, modern culture has traditionally abhorred wildfires because of the perceived destructive nature of fire. This viewpoint was promoted to 'cultural truth' by our own government through propaganda programs aimed at both children and adults. Thus, oak barrens/savanna ecosystems which are adjacent to urbanized areas are subject to routine/reflexive fire suppression. Similarly, state and national forests routinely suppress wildfires occurring on their lands. With few positive attributes to associate with wildfire, active ecosystem management still remains controversial to the general public in many areas. Thus, society generally deprives these ecosystems of the very force that created them, a predictable and frequent fire disturbance regime.

Without the influence of a disturbance regime, open habitats such as oak barrens/savanna communities have succumbed to other community types. The impact of fire suppression on these communities has been as great or greater than outright habitat destruction in most areas. Many, if not most, of the natural land remnants in the region are fire suppressed today. The bulk of the rare species that inhabit the region (Table 1) require open, fire-maintained habitats. Thus, the few fragments of natural communities that persist today need to have fire restored as an ecological process if the biodiversity of the region is to be maintained.

In addition to fire, **fluctuation of the local water table** plays a critical role in maintaining lakeplain prairie and marsh communities. Periodic episodes of elevated water tables re-set succession and maintain the highly productive herb-dominated systems (Keddy 1990). Many characteristic and rare species of lakeplain ponds are tiny annual plants that remain in the seed bank from year to year, until favorable moisture condition stimulate germination. When this happens, they quickly reach maturity and set seed before drought or inundation ensues. Manipulation of the ground water regime has disrupted this delicate cycle at several sites.

Almost the entire lakeshore system owes its very existence to **longshore deposition of sediments** into various patterns. Dunes and beaches are both critical to and dependent on the transport of sediments along the Great Lakes shores. Sandy sediments from eroding banks and tributary mouths are carried by longshore currents and accrete to form dunes, as well as bars and spits that shelter highly-productive marshes. Lake level fluctuations are also important in this cycle of erosion, sediment transport, and dune maintenance. Shoreline systems absorb the brunt of wind and wave energy from the Lake, buffering inland systems from those disruptive forces.

Today, the urbanization of the region has disrupted much of the sediment deposition and movement along the southern Lake Michigan shore. This has disrupted the creation of additional dunes in the dune and swale of Lake County, Indiana, as well as accretion to the high dunes further east. The longshore processes that created the system still persist, but in highly altered form. Lake level fluctuations persist, and continue to influence nearshore habitats.

Restoring Ecosystem Function

Protecting and preserving entire ecologically functional communities should be the true goal of conservation. Cost effective conservation suggests that high-quality or species-rich communities would be better conservation targets. The lakeshore, with its globally significant ecosystems and biodiversity, offers one of the foremost conservation

challenges in North America. Perhaps nowhere else is there a chance to save an ecosystem of such significance in the context of such a challenging setting.

Restoring ecological integrity requires that stresses from all sources be adequately addressed simultaneously. Thus, connectivity of open lands is not enough if threats from exotics are not addressed. Likewise, habitat re-creation alone as mitigation is not an adequate solution - re-creation must be placed into the context of existing natural lands, and re-creations should be designed to enhance particular aspects of ecosystem function, be they ecological processes such as restoring natural hydrological fluctuations, or reducing habitat fragmentation.

Natural lands restoration - As used here, this means to return habitat to its original or normal condition. This concept implies that remnant natural vegetation persists, but in a degraded condition. Of all the activities that can enhance biodiversity preservation and ecological integrity in the lakeshore region, this has the greatest positive impact. Degraded natural area remnants still support a rich array of native species, usually including imperiled species. Restoring these remnants, in light of native community structure and the natural processes which originally created and maintained them, restores natural vigor. For example, the end result of fire suppression is canopy closure in oak barrens, which favors fire-intolerant, shade-loving species. By mechanically opening the canopy and using prescribed fire, we favor the fire-tolerant, sun-loving community that originally may have occurred here. Removing exotic species such as phragmites and purple loosestrife that often dominate sites and exclude native species, creates additional available habitat into which rare native species can expand. Because many of the rarest species survive as small, localized populations, any action which expands their population size is likely to improve species and community viability.

Natural lands restoration also plays an important role in reducing fragmentation and re-establishing habitat connectivity. High-quality natural areas are generally widely dispersed over the landscape. Degraded natural areas are often located between higher-quality areas, but do not support vigorous populations of imperiled species. Restoring these areas can significantly decrease the distance separating high-quality habitats, and may add significantly to the regional viability of many rare species, especially those that are prone to local population extinctions and which depend upon re-colonization from nearby populations.

Habitat re-creation - As used here, to create habitat from scratch, such as the re-vegetation of brownfields. This concept implies that no or very little natural vegetation persists at the re-creation site. Re-created habitats are generally poor cousins of the real thing. While native seed mixes can be used to approximate native communities, re-created habitats are native species poor relative to natural areas.

But, this is not to say the re-creations cannot play a significant role in maintaining and restoring ecosystem integrity and viability. Species-poor, but native habitats are better than vast fields of exotic species. They provide habitat for many common and uncommon species, and provide buffering for higher-quality sites. Perhaps most importantly, re-creations can be strategically placed to enhance natural areas. Many of our most important biodiversity sites are surrounded by an essentially hostile matrix. By creating more natural lands adjacent to or nearby important biodiversity sites, direct negative impacts are decreased, and at least the opportunity for habitat expansion exists.

CASE STUDY: The Dune and Swale. The dune and swale system of northwestern Lake County, Indiana, presents one of the ultimate conservation challenges in North America. This dune and alkaline swale system is perhaps unique and supports a diverse assemblage of native communities and species, including a number that are state or Federally imperiled. It survives as a series of isolated fragments (Figs. 2-3), ranging from a few to approximately 150 acres in size, most of which are suffering from inappropriate land use, fire suppression, and exotic species. These primary problems require interrelated but somewhat separate strategies to correct.

Fragmentation is the most complex of these problem. Re-establishing a contiguous viable ecosystem of even 1,000 acres is clearly out of the question in the dune and swale. The intervening lands between existing natural areas remnants simply cannot be restored to anything approaching their original condition, forcing us to work creatively with ecosystem fragments. To date, protection of the dune and swale has followed a "nature preserve" model. A few of the largest and highest-quality sites have been identified and protected. Smaller, lower-quality remnants have generally been ignored. This approach does address ecosystem fragmentation, but the ongoing management and restoration activities on these preserves have greatly enhanced site quality and viability. In order to conceptually address connectivity of these dune and swale fragments, we have adopted the "integrator species" approach. Integrator species are those that have complex habitat requirements, often moving between discrete habitat types during their life cycles or having other attributes which make them sensitive to habitat structure and/or quality. Integrator species may or may not be imperiled on a regional basis, but should be vulnerable to local population extinction. In this regard, they can serve as conservative proxies for the many other species which might be similarly sensitive, but for which we have an inadequate understanding of ecological requirements.

Our integrator for the dune and swale is the Karner blue butterfly (*Lycaeides melissa samuelis* Nabokov), which happens to be state and Federally endangered. The Karner blue uses open, early successional habitats. The outright anthropogenic conversion of habitat combined with our more subtle suppression of wildfire has produced an ecological system where early successional habitat patches are small and over-dispersed in the dune and swale landscape. And as time passes, the loss of habitat through secession continues unabated. This combination of reduced optimal habitat patch size combined with increased distance between optimal habitat patches will eventually result in the extirpation of insects like the Karner blue that are structured as true metapopulations. For example, suitable but unoccupied habitat may not have a nearby source population from which colonization is possible. Likewise, if fire produces extinction of localized demes, then occupied habitats themselves must be recolonized following fires; recolonization has become less and less likely as the distance separating occupied habitats increases. In effect, the rate of localized population extinction for the Karner blue has been accelerated by declining habitat suitability and size, while the odds of new colonization events have declined as optimal habitats become increasingly fragmented due to succession and alteration. This disruption of metapopulation dynamics is capable of causing the downward spiral of the entire early successional invertebrate community (Thomas and Harrison 1992, Kindvall and Ahlén 1992).

The Karner blue has fairly limited dispersal capabilities, and most estimates of likely maximum distances range between 0.25 and 1 mile. In the highly urbanized landscape surrounding the dune and swale remnants, we choose 0.5 mile as a likely maximum dispersal distance that will sustain Karner blue metapopulations. Using this approach, Karner blue habitats should be located within 0.5 mile of one another. Figure 4

demonstrates that Karner blue metapopulations are not likely to be stable on currently protected areas alone. The distance separating the eastern and western protected habitats are too great to conservatively expect regular immigration between these areas. Figure 5 illustrates that protecting all surviving dune and swale remnants substantially improves connectivity for several, but not all, of the dune and swale remnants. A more-refined analysis of this spacial data will guide our strategy for decreasing the impact of fragmentation in the dune and swale.

Once the critical dune and swale remnants are identified, we will develop strategies to address the remaining threats to the system. Inappropriate landuse is relatively straightforward to correct. If possible, fee simple acquisition will be used to acquire and protect critical dune and swale remnants. However, the political realities of northwest Indiana rule out acquisition for all critical lands, and require innovative solutions to difficult problems. The remnant dune and swale are most threatened by off-road vehicle (ORV) use and dumping. Landowners are often unaware of these problems, and are generally receptive to implementing low-cost solutions to control these unauthorized activities. Generally, a low-cost solution from a landowner's perspective translates as a moderate- to high-cost solution to The Conservancy or our partners. For critical private lands, the gains to ecosystem health and endangered species protection easily out-weigh the costs.

The cumulative impacts of fire suppression are often difficult to reverse. Re-introducing prescribed fires alone can not reverse decades of tree growth in the dune and swale. At Ivanhoe Preserve, we are aggressively restoring about 20 acres of very overgrown habitat by removing up to 60% of the black oaks which form the canopy. By quickly recreating the "savanna-like" structure of the overstory, we hope to see a quick and positive response in the herbaceous community. Prescribed fire will be used aggressively during the first few years to favor fire-adapted dune and swale species at the expense of fire-intolerant shrubs and woodland species. And, of course, once restoration targets are met, we must continue to use fire as a tool to maintain the successional dynamic required to maintain most of the imperiled species of the system.

Exotic species, especially sweet-clover, glossy buckthorn, phragmites, and purple loosestrife, are a continual threat to the system. Intensive labor is the only real solution to controlling these species. Prescribed fire helps control some of these species, but hand cutting, pulling, and herbiciding produces the most lasting results. Because the exotics, which threaten to overrun native ecosystem remnants are so pervasive on most of the disturbed lands of Lake County, eradication is not a realistic goal. Implicit in the concept of natural lands management in the dune and swale is a long-term commitment to exotic species monitoring and control.

Taken together, these strategies can produce a cluster of viable ecosystem remnants in the dune and swale. Obviously, not all the original plants and animals of this system have survived, nor are we likely to re-introduce large mammals back to the system. But what remains is a critical piece of the region's natural heritage, and preventing the loss of additional species will require that all of the above strategies be maintained into the foreseeable future. A lapse in stewardship at some point in the future would likely result in a new cycle of habitat degradation.

Tools for Restoration

The challenge of protecting and restoring ecological integrity of the region is clearly beyond the capabilities of any single organization. Needs range from natural lands

protection/acquisition to endangered species/communities restoration research, brownfield habitat re-creation, exotics suppression, and habitat/natural areas management. The magnitude of several of these tasks is overwhelming, yet the institutions and interest exist to accomplish the goal. The key to success is two-fold -- coordinated planning and implementation of conservation actions is critical; and maximizing the productivity and the conservation impact of each partner is essential. Saving the unique diversity and restoring the ecological integrity of the region is no small task, and progress towards those ends will require a long-term sustained effort. But, by making steady and measurable progress towards a defined goal, I have no doubt that this unique biological treasure can be saved. The key players and the roles that must be filled include:

Federal and State agencies with regulatory authority - Regulatory authority abounds in the region. What is lacking is consistency in goals between agencies. Regulatory agencies need to coordinate such that individual actions allow forward progress towards restoring regional ecological integrity. Interagency cooperation and communication is the key.

State and local agencies with land holdings - Publicly owned lands should be managed to enhance ecological integrity and biodiversity. While nature preserves are generally well managed in light of these goals, all publicly owned lands should be managed in light of potential ecological benefits. The significance and rarity of the biological resource demands conscientious care. Maintaining biodiversity does not exclude multiple recreational use of parks and open space, but poorly planned landuse changes often result in irreversible loss of biodiversity.

Private conservation organizations with land holdings - The are a number of land trusts active in the region. These groups are generally well organized and focused when it comes to protecting lands, but land management is often an overwhelming task in the region. Natural lands management needs to become as high a priority as is acquisition.

Private land owners - Many of the most-significant natural land remnants are privately owned, often by regional, national, and international businesses. These lands can, and often do, play a critical role in biodiversity maintenance, and many of these lands are managed in light of these values. This practice can and should be expanded to maximize the positive impact that private lands play.

Private citizens - Because the problems facing many of the natural lands in the region require labor intensive efforts to correct, adequate stewardship is often beyond the financial capabilities of the land owner. For example, reclaiming a single natural area remnant that is overgrown with exotic species can require hundreds of hours of labor over several years. Private citizens can and should help restore the ecological systems that are so critical for enhancing the regional quality of life. Citizens who participate through volunteer programs can directly enhance ecological function and protect biodiversity.

AN EXAMPLE: Southern Lake Michigan Conservation Initiative (SLMCI). This project provides an instructive overview of how coordination between federal, state, county, industry, and private organizations can produce an effective program addressing many of the land management needs of the region. Part of the Indiana Office of The Nature Conservancy, SLMCI was initiated with start-up funding from US-EPA Great Lakes Program Office. SLMCI was organized to increase volunteer participation and encourage cooperation from public agencies, corporations, and

individuals to protect and restore the biodiversity of the Southern Lake Michigan watershed in Illinois, Indiana, and Michigan. To date, SLMCI is using three primary strategies to accomplish this mission. SLMCI serves as a catalyst to energize and coordinate volunteer stewards at significant natural areas. Ownership of these sites includes private and industrial lands, State Nature Preserves, county parks, and private conservation organizations, including TNC preserves. Volunteers have provided thousands of hours of hard labor, removing trash piles, exotic species, and brush, and many other tasks that improve the integrity of natural areas. SLMCI also provides internships to local college students. These internships are primarily targeted at local residents interested in potential careers in environmental studies. Interns have provided the sustained efforts needed to successfully combat exotic species problems at several TNC preserves. SLMCI also works to provide educational opportunities to the local community. By providing nature hikes to resident who live near or adjacent to natural areas, we hope to instill a sense of pride and ownership in these resources. Targeting local schools and universities, we tailor volunteer workdays to provide educational experiences and accomplish vital work. Likewise, we develop specific workdays for local industries targeting their own lands. We hope that by restoring these parcels using volunteers that already have "ownership," we not only enhance the habitat today but also institutionalize concern for native habitats within the very organizations that can ensure the integrity of the lands into the foreseeable future.

Literature

Bowles, M., 1989. Evaluation of Clark and Pine, Tolleston Ridges, and Gibson Woods, Lake County Indiana, as potential National Natural Landmarks. Unpublished report submitted to the Division of Natural Landmarks, National Park Service, US Department of the Interior.

Givnish, T. J., E. S. Menges and D. Schweitzer, 1988. Minimum area requirements for long-term conservation of the Albany Pine Bush and the Karner Blue butterfly: an assessment. Report submitted to the City of Albany, New York.

Keddy, P. A., 1990. Water level fluctuations and wetland conservation. Wetlands of the Great Lakes Proceedings, Association of State Wetlands Managers, pp. 79-91.

Thomas, C. D. and S. Harrison, 1992. Spacial dynamics of a patchily distributed butterfly species, J. Animal Ecol., 61, pp. 437-446.

Table 1. A listing of S1 and S2 plants and animals known from the Dune and Swail of Lake County, Indiana. S1 species are known from 5 or few station in Indiana. S2 species are known from between 6 and 20 occurrences statewide. (Data derived from the Indiana Natural Heritage Data Center)

	SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK
Birds				
	Botaurus lentiginosus	American bittern	G4	S2
	Chlidonias niger	black tern	G4	S1
	Rallus elegans	king rail	G4Q	S1
	Rallus limicola	Virginia rail	G5	S2
Mammal				
	Spermophilus franklinii	Franklin's ground squirrel	G5	S2
Amphibians and Reptiles				
	Ambystoma laterale	blue-spotted salamander	G5	S2
	Emydoidea blandingii	blanding's turtle	G4	S2
	Ophisaurus attenuatus	slender glass lizard	G5	S2
	Sistrurus catenatus catenatus	eastern massasauga	G3G4T3T4	S2
Insects				
	Atrytonopsis hianna	dusted skipper	G4	S2
	Hesperia ottoe	ottoe skipper	G3?	S1
	Hesperia leonardus	Leonardus skipper	G4	S2
	Lycaeides melissa samuelis	Karner blue butterfly	G5T2	S1
	Lycaena xanthoides	great copper	G5	S?
	Problema byssus	bunchgrass skipper	G3G4	S2
	Schinia gloriosa	glorius flower moth	G4	SU
Plants				
	Amelanchier humilis	running serviceberry	G5	S1
	Arctostaphylos uva-ursi	bearberry	G5	S2
	Arenaria stricta	Michaux's stitchwort	G5	S2
	Aristida intermedia	slim-spike three-awn grass	G?	S2
	Buchnera americana	bluehearts	G3G4	S1
	Carex crawei	Crawe sedge	G5	S2
	Carex richardsonii	Richardson sedge	G4	S1
	Carex brunnescens	brownish sedge	G5	S1
	Carex aurea	golden-fruited sedge	G5	S2
	Carex eburnea	ebony sedge	G5	S2
	Carex garberi	elk sedge	G3?	S2
	Ceanothus herbaceus	prairie redroot	G5	SX
	Cirsium hillii	Hill's thistle	G3	S1
	Coeloglossum viride var *virescens*	long-bract green orchis	G5T5	S2
	Cornus rugosa	roundleaf dogwood	G5	S2
	Cornus canadensis	bunchberry	G5	S1
	Cypripedium calceolus var *parviflorum*	small yellow lady's-slipper	G5Q	S2
	Cypripedium x andrewsii	Andrew's lady's-slipper	HYB	S1
	Cypripedium candidum	small white lady's-slipper	G4	S2
	Diervilla lonicera	northern bush-honeysuckle	G5	S2
	Eleocharis geniculata	capitate spike-rush	G5	S2
	Eriophorum angustifolium	narrow-leaved cotton-grass	G5	S2
	Eriophorum gracile	slender cotton-grass	G5	S2
	Euphorbia polygonifolia	seaside spurge	G5?	S3
	Gerardia skinneriana	pale false foxglove	G3	S1
	Juncus scirpoides	scirpus-like rush	G5	S2
	Juncus balticus var *littoralis*	Baltic rush	G5T5	S2
	Linnaea borealis	twinflower	G5	SX
	Ludwigia sphaerocarpa	globe-fruited false-loosestrife	G5	S1
	Melampyrum lineare	American cow-wheat	G5?	S2
	Pinus banksiana	jack pine	G5	S2
	Platanthera clavellata	small green woodland orchis	G5	S2
	Platanthera hyperborea	leafy northern green orchis	G5	S2
	Prunus pensylvanica	fire cherry	G5	S2
	Rhus aromatica var *arenaria*	beach sumac	G5TUQ	S2
	Salix cordata	heartleaf willow	G5	S2
	Satureja glabella var *angustifolia*	calamint	G5	S1
	Scirpus subterminalis	water bulrush	G4G5	S2
	Shepherdia canadensis	Canada buffalo-berry	G5	SX
	Sisyrinchium montanum	strict blue-eyed-grass	G5	S1
	Solidago simplex var *gillmanii*	sticky goldenrod	G5T?	S2
	Solidago ptarmicoides	prairie goldenrod	G5	S2
	Spiranthes lucida	shining ladies'-tresses	G5	S2
	Spiranthes magnicamporum	great plains ladies'-tresses	G5	S1
	Thuja occidentalis	northern white cedar	G5	S1
	Tofieldia glutinosa	false asphodel	G5	S2
	Triglochin palustre	marsh arrow-grass	G5	S2
	Utricularia purpurea	purple bladderwort	G5	S2
	Utricularia cornuta	horned bladderwort	G5	S2
	Utricularia minor	lesser bladderwort	G5	S1

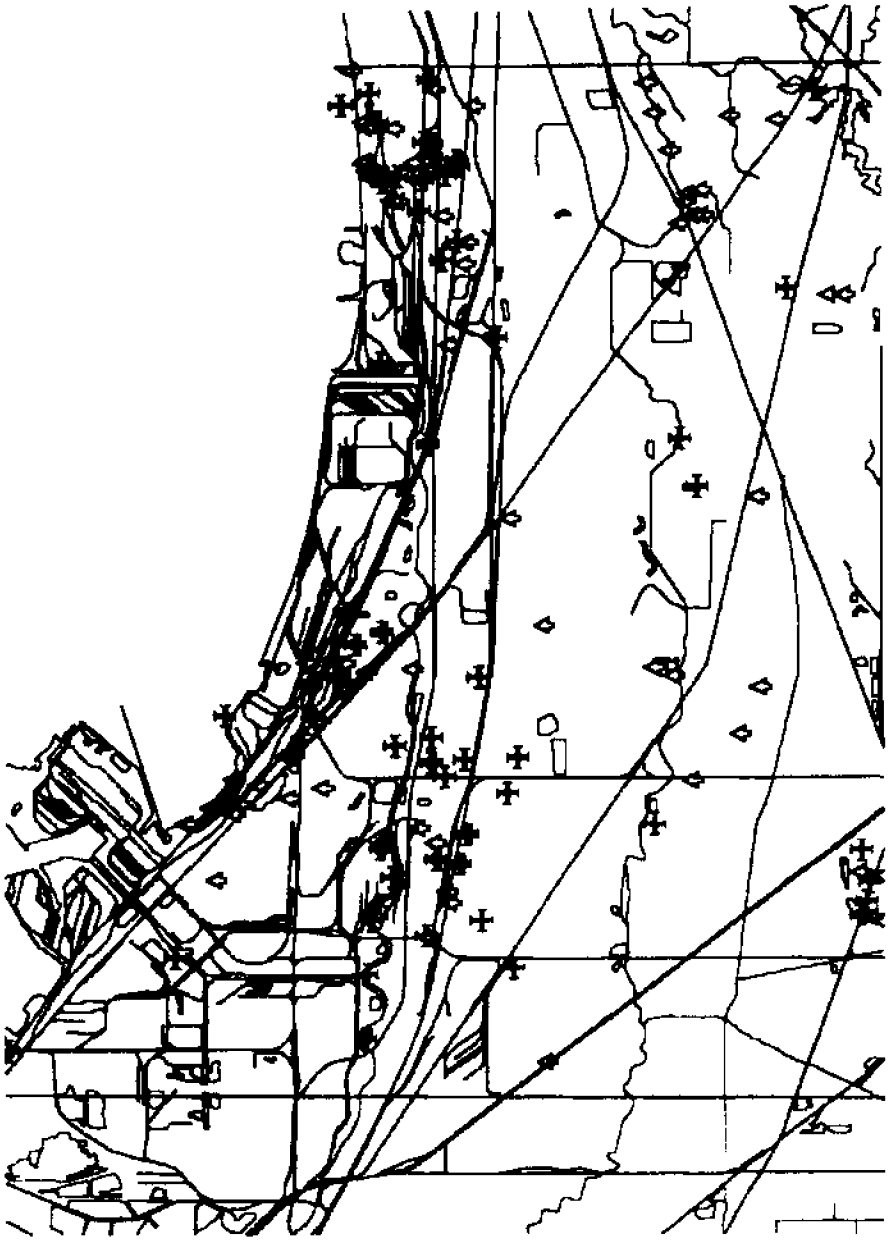
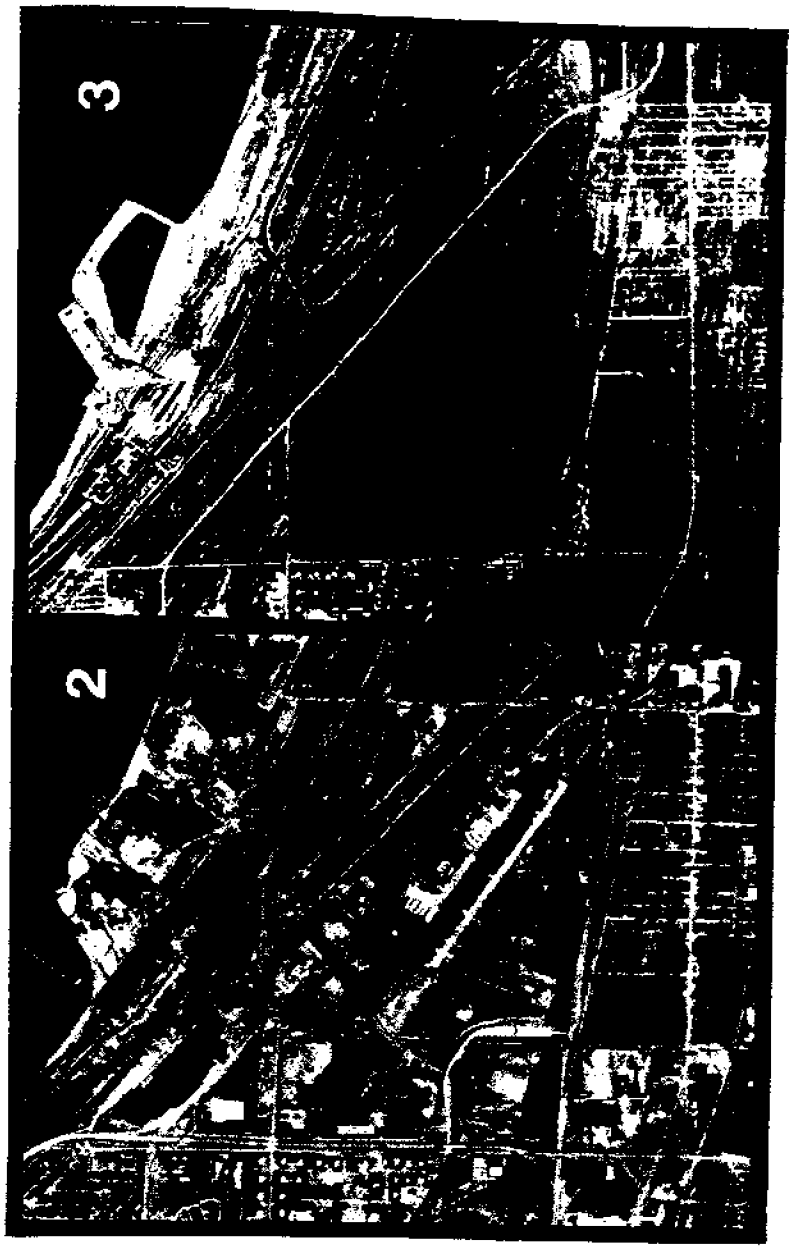


Figure 1. The distribution of imperiled plants (tree symbol) and animals (cross) in northern Lake County, Indiana. The density of imperiled species in this county is typical of the situation throughout the region.



Figures 2 and 3. Aerial photographs of the dune and swale ecosystem of Lake County, Indiana. These figures demonstrate the fragmentation of ecosystems throughout the region. Figure 2 was photographed in 1994, Figure 3 in 1938.

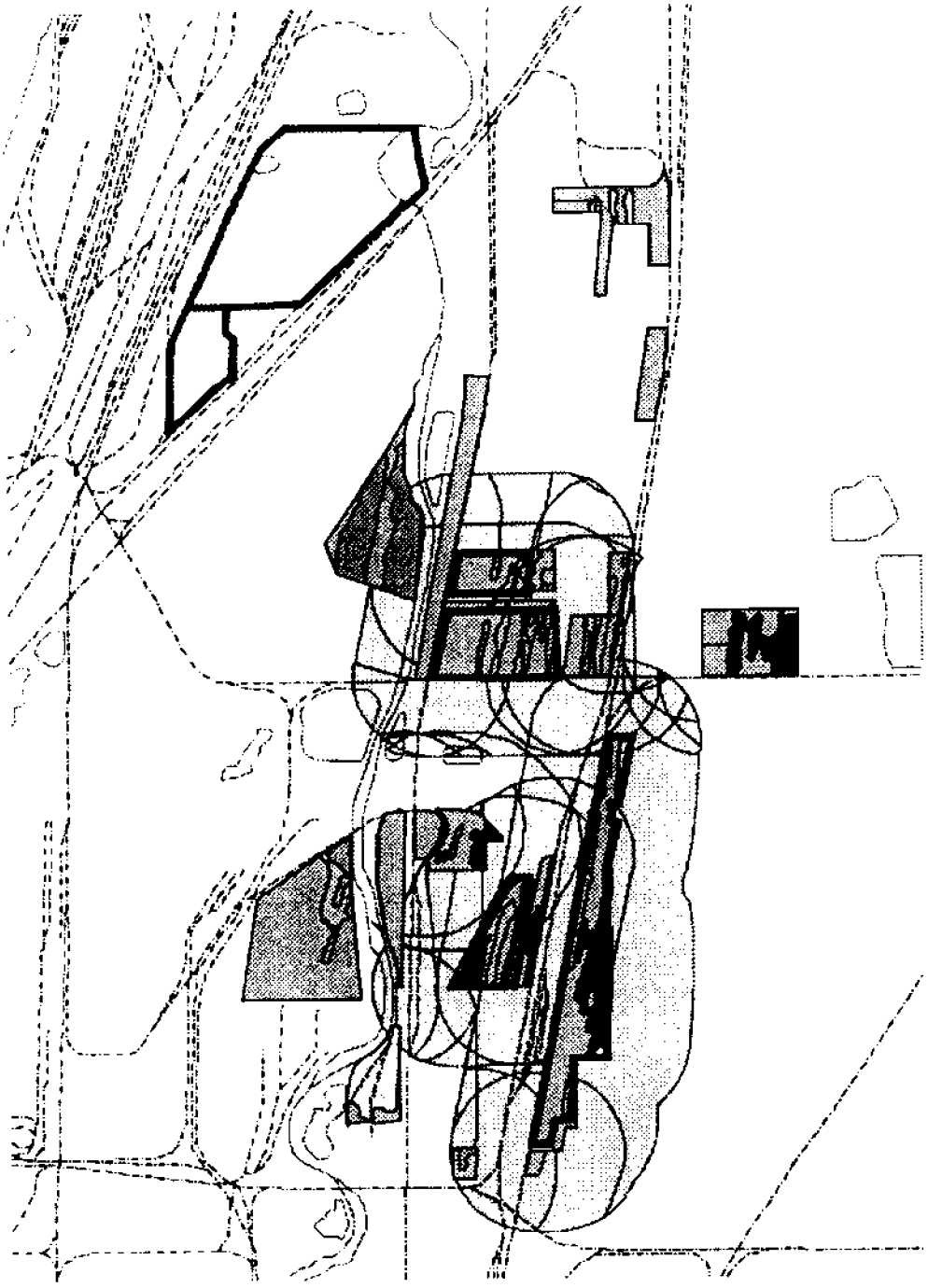


Figure 4. Connectivity between existing preserves in the southern portion of the dune and swale ecosystem of Lake County, Indiana. If natural lands are reduced to existing preserves, species such as the Karner blue are likely to become locally extinct.

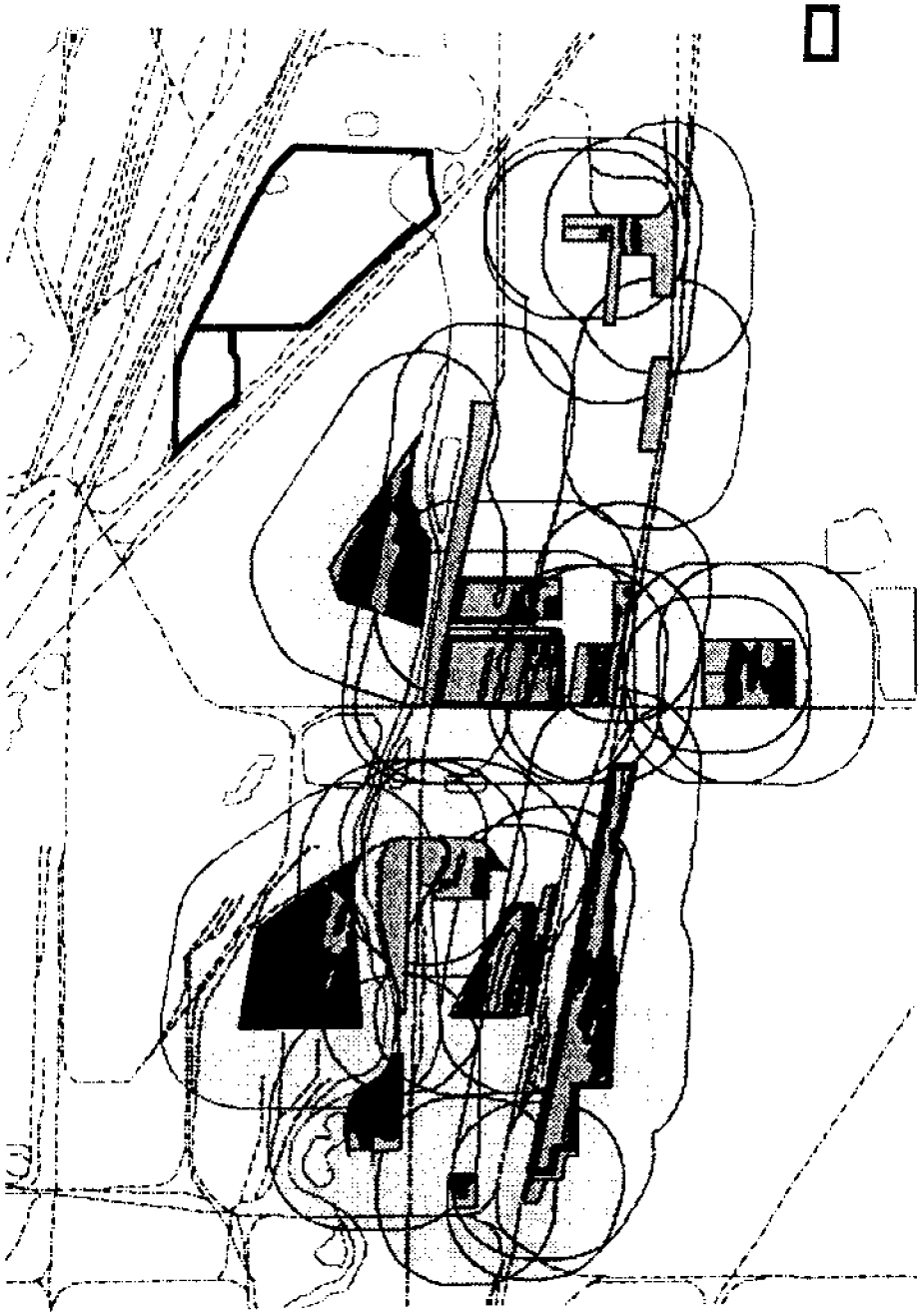


Figure 5. Connectivity in the southern portion of the dune and swale ecosystem of Lake County, Indiana if all natural lands were restored and protected. Connectivity between ecosystem remnants is enhanced to the point that species such as the Karner blue are likely to persist into the foreseeable future.

CONCERNS FOR THE MANAGEMENT OF TOXIC SEDIMENTS AND CHEMICALS

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Introduction

Point and non-point source discharges from industrial and municipal facilities, urban and agricultural runoff, and air deposition have introduced large amounts of toxic substances to the Great Lakes and their tributary system. The International Joint Commission (IJC) has identified 42 Great Lakes tributaries as Areas of Concern (AOCs), 41 of which have a major problem with toxic contamination. In 1987, the IJC's Great Lakes Water Quality Report listed 362 toxic substances that had been positively identified in the lakes, their estuaries, bays, harbors, and rivers. For many of these toxic substances; the major pathway for removal from the water column is sorption to suspended sediments followed by bottom deposition. Important classes of hazardous compounds which display this behavior include

- Heavy Metals (e.g., lead, arsenic, mercury),
- Pesticides (e.g., chlordane, DDT, toxaphene), and
- Hydrophobic Organic Compounds (e.g., PCBs, PAHs, DCB)

Contaminated sediments have been identified as a serious environmental problem in all 26 United States and the 5 joint US/Canadian AOC's (EPA 1994). The persistent high concentration of contaminants in the bottom sediments of these AOC's raises considerable concern for direct impact on aquatic organisms and wildlife such as the development of cancerous tumors; loss of suitable habitat through toxicity to fish and benthic organisms; and risk to human health through bioaccumulation of these toxic substances in the food chain.

The United States and Canadian binational Great Lakes Water Quality Agreement, established in 1972, revised in 1978, and amended in 1987, was developed with a stated purpose "to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystems." To this end, the 1978 revisions introduced the philosophy of "virtually eliminating" the discharge of any or all persistent toxic substances. Likewise, the U.S. Clean Water Act adopts the national policy that discharge of toxic pollutants in toxic amounts be prohibited. However, the Clean Water Act was directed primarily at toxics in the water column and, with the exception of the Section 404 dredge permit requirements, did not focus regulatory attention on contaminated sediments. In the 1980's EPA and the States began efforts to remediate sediments using the Clean Water, Superfund, and other regulatory approaches. The Assessment and Remediation of Contaminated Sediments (ARCS) program was

authorized by the 1987 amendments to the Water Quality Agreement. This action authorized the Great Lakes National Program Office of the U.S. Environmental Protection Agency (USEPA) to "carry out a five-year study and demonstration projects relating to the control and removal of toxic pollutants in the Great Lakes, with emphasis on the removal of toxic pollutants from bottom sediments." In 1990, EPA also began developing a contaminated sediment management strategy to address this nationwide environmental and economic problem.

This effort resulted in the USEPA Contaminated Sediments Management Strategy released in 1994 as a comprehensive, multimedia document dealing with all of the contaminated sediment programs that EPA manages. The document does not propose regulations, but rather describes how existing statutory and regulatory authorities will be used by EPA to deal with contaminated sediment problems. The specific approaches include:

Assessment -- develop test methods, develop sediment criteria, inventory sites and sources, and improve monitoring.

Prevention and Source Control -- keep existing and future sources of toxic contamination from making existing sediment deposits worse or from creating new zones of contamination.

Remediation Activity -- clean up zones of contamination that are causing adverse effects.

Sediment Dredging and Dredged Material Management -- develop and maintain environmentally sound dredging and disposal activities.

Research and Demonstration -- support efforts to accomplish the above objectives.

Outreach -- assure adequate communication and coordination with other state and federal agencies, industry, and the public.

USEPA's *National Water Quality Inventory: 1992 Report to Congress*, identified five pollution sources for the Great Lakes shores -- atmospheric deposition, contaminated sediments, land disposal, urban runoff/storm sewers, and combined sewer overflows. While atmospheric deposition affects the largest percentage of Great Lakes shore miles, contaminated sediments were the largest major (compared to moderate or minor) source of pollution, affecting nearly ten times as many shore miles as major atmospheric deposition.

The second section of this paper presents a conceptual model to illustrate the chemical, physical, and biological concerns for contaminated sediments, specifically as they occur in AOC type bays, lakes, harbors, and estuaries (hereafter referred to as estuaries). The third section presents a summary of regulatory and partnership approaches available for obtaining sediment remediation. The forth section provides some illustrative case histories from southern Lake Michigan. The fifth and final section of this paper provides a summary and conclusions.

Conceptual Model for Toxic Sediments and Chemicals

The intent of the following section is to provide a context within which to consider the problem of contaminated sediments. This conceptual model was selected to illustrate the multitude of potential sources of toxic pollution; the physical and chemical factors responsible for their presence, distribution, and transport within a Great Lakes estuary; and the physical and chemical factors responsible for their potential bioavailability both

within the estuary and the connecting Great Lake. Understanding these physical and chemical concepts will, hopefully, provide for a better understanding of the regulatory and remedial problems associated with toxic sediments and chemicals in the Great Lakes environment.

Toxic substances reach lacustrine estuary AOC's through a variety of pathways. Figure 1 is a sketch representing a generic AOC lacustrine estuary (bay, lake, or harbor) type system connected to a Great Lake through a natural or engineered channel. Many of these estuaries are contaminated directly by industrial, chemical, and wastewater discharges, as well as municipal wastewater discharges. Important non-point pollution sources include runoff and leachates from agricultural and other land uses, combined sewer overflows, deposition of wind-borne volatile organic chemicals and heavy metals, groundwater inflow, and tributary inflows to the estuary. The primary route for removal of many toxic substances from the water column is through sorption to suspended sediment followed by bottom deposition. Both heavy metals and hydrophobic organic compounds are removed and concentrated in this manner. In addition, flushing processes in lacustrine estuaries are usually slow, allowing contaminants in the water column to settle out and accumulate in the bottom sediments. Bedford (1992) and Appleton et al. (1993) have shown that estuarine hydrodynamic mechanisms (such as seiches) tend to redistribute point source contaminants rather widely throughout the estuary. As a result, contaminated sediments within the estuary tend to be distributed more like non-point source pollutants. The combined effect of these processes is that the bottom sediments of AOC's become a repository for "persistent high concentrations of contaminants." (EPA 1994)

For a large portion of the year, lacustrine estuaries are quiescent basins that tend to accumulate toxic chemicals in the sediments and their pore water. Seasonal changes in weather produce changes in the major hydrologic factors affecting flow into and out of an estuary system. Most water flushed from an estuary by tributary flows and runoff results from precipitation and snow melt. Therefore, tributary flow strength is not consistent during the year. Most of the precipitation in the winter months comes in the form of snow, and cold temperatures tend to freeze the tributary surfaces, thus reducing flows into the estuary. Spring usually brings the largest amounts of flow owing to increased precipitation and snow melt runoff. In summer months evaporation tends to equal or exceed precipitation, thus flows decrease significantly. Fall tends to have lower precipitation, and as a result decreased flow volumes. It is expected, therefore, that spring months will produce the largest flows into the estuarine system. However, the estuary represents a large area over which the various inflows are distributed, and the resulting discharge to the Great Lakes may be significantly reduced. It is anticipated that only extremely strong inflows would result in significant discharges to the coastal waters of the Great Lakes.

Recent studies have shown that a dominant way in which water is flushed from lacustrine estuary type systems is from the difference in head along the length of the connecting channel brought about by severe Great Lakes storms (Bedford 1992, Appleton et al. 1993, Riley and Wood 1995). Wind stress and pressure change during Great Lakes storm events are known to generate substantial lake level set-up at the coast. When this set-up occurs at the lakeward opening to a lacustrine estuary, a hydrostatic head is developed which generates a substantial flow into the estuary (Wood et. al. 1995; Riley and Wood 1995). This flow continues until hydrostatic equilibrium is achieved between the lake and the estuary. As the storm wanes, set-up at the lakeward entrance decreases and lake level returns to equilibrium. This produces a condition of excess hydrostatic head in the estuary and a resulting

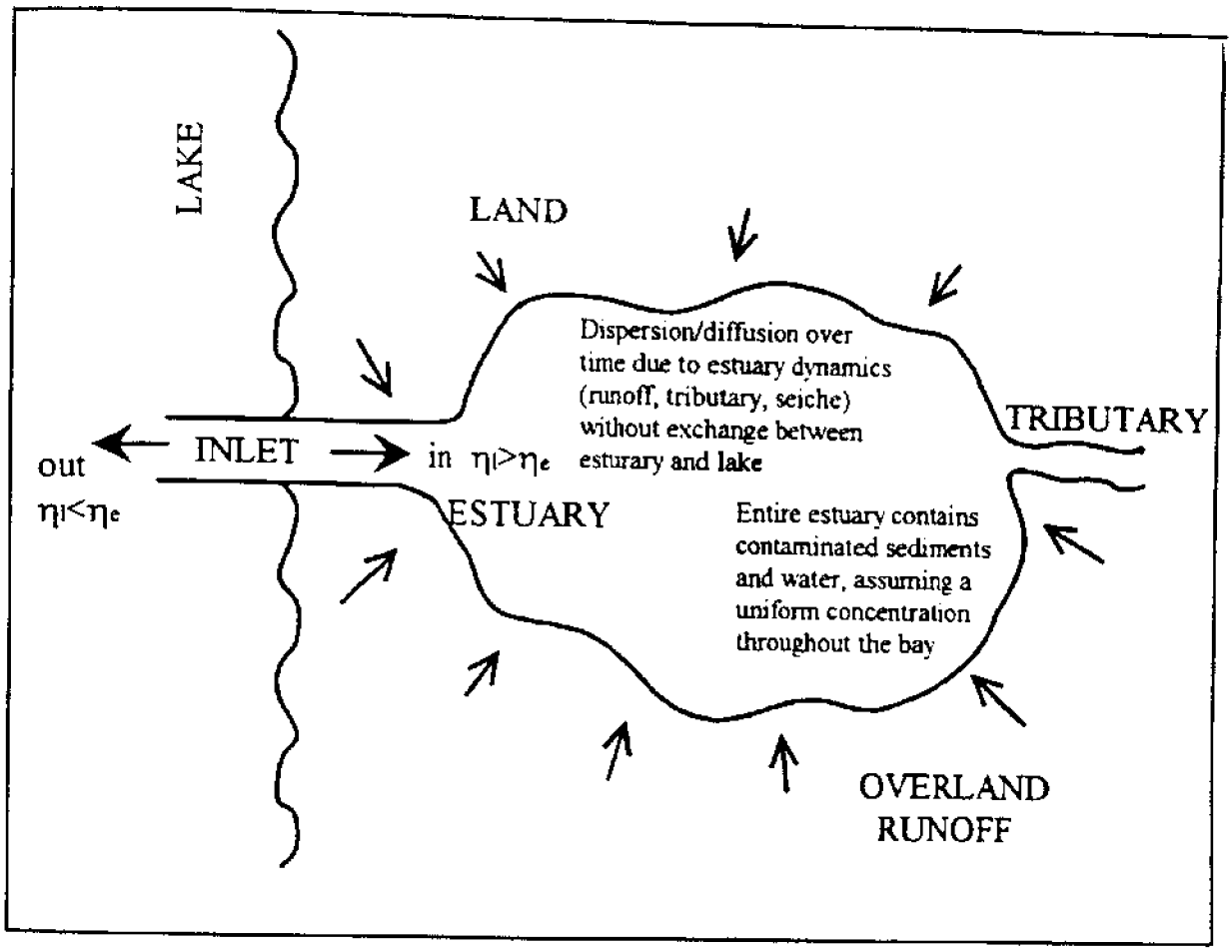

Figure 1. A sketch of a generic lacustrine estuary (bay, lake, or harbor) connected to a Great Lake through a natural or engineered channel.

discharge flow from the estuary to the Great Lakes. Modeled flow velocities for the connecting channel during these conditions range from 40 to 120 cm/s (Riley and Wood 1995). These flow velocities are capable of transporting substantial amounts of resuspended contaminated sediment to the Great Lakes.

This storm-driven flushing mechanism for contaminated sediments is enhanced by another storm-driven mechanism within the estuary itself. Figure 2 shows a schematic illustration of storm-induced resuspension of contaminated sediment by long and short waves in a lacustrine estuary. While surface gravity waves cause some resuspension in shallow water, seiche waves with fundamental periods governed by the lacustrine estuary basin geometry have recently been shown to be potentially responsible for significant resuspension and redistribution of contaminated sediments (Appleton et al. 1993; Appleton 1994). During these resuspension events, Binkley (1993) has shown that desorption of toxic chemicals causes release to the water column, making the toxics available for uptake in fish or for direct discharge to the Great Lakes. Riley and Wood (1995) have shown that these combined mechanisms may cause discharges of contaminated sediments for periods from 12 to 17 hours for typical fall storms on the Great Lakes.

Sediments and water do not act as merely inert contaminant reservoirs within contaminated lacustrine estuary systems. A number of chemical transformation processes are known to be potentially important in governing the fate of sediment associated contaminants. For example, microbially-mediated reductive dehalogenation has been shown to produce toxic byproducts more soluble in water and more carcinogenic than the parent compound (Nyman et al. 1996). In addition, solar ultraviolet radiation can cause photochemical transformations during sediment resuspension events such as described above.

Resuspension of contaminated sediments is suspected to be a primary source, through the process of desorption, for releasing contaminants to otherwise uncontaminated waters, and potentially to fish and other aquatic organisms. Thus the transport, fate, and environmental effect of these substances are dependent on the physical and chemical processes which occur at the bottom boundary layer/sediment boundary layer interface. Physical processes at the bottom boundary layer are related to wave dominated and current dominated motions. Chemical kinetics at the bottom boundary layer are determined by sediment characteristics, concentration gradients, and the physico/chemical characteristics of the toxic substance. Bioturbation and related natural processes also influence these boundary layer processes. As illustrated in Figure 2, a high-energy storm event, resulting in re-suspension of bottom sediments, may make these interactions important throughout the water column. The potential for pollutant transport during these events, primarily as a result of mobilization of fine sediments and desorption, thus becomes extremely high.

Regulatory and Partnership Approaches to Sediment Remediation

EPA and States may take action directed at remediation of contaminated sediments through multiple statutes, applied either individually or in concert, or through partnership approaches involving various stakeholders. Applicable authorities include the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) or Superfund; Resource Conservation and Recovery Act (RCRA); Clean Water Act (CWA); Rivers and Harbors Act (RHA); Toxic Substances and Control Act (TSCA); and Oil Pollution Act of 1990 (OPA). Partnership approaches can involve voluntary efforts by industry and government co-funding.

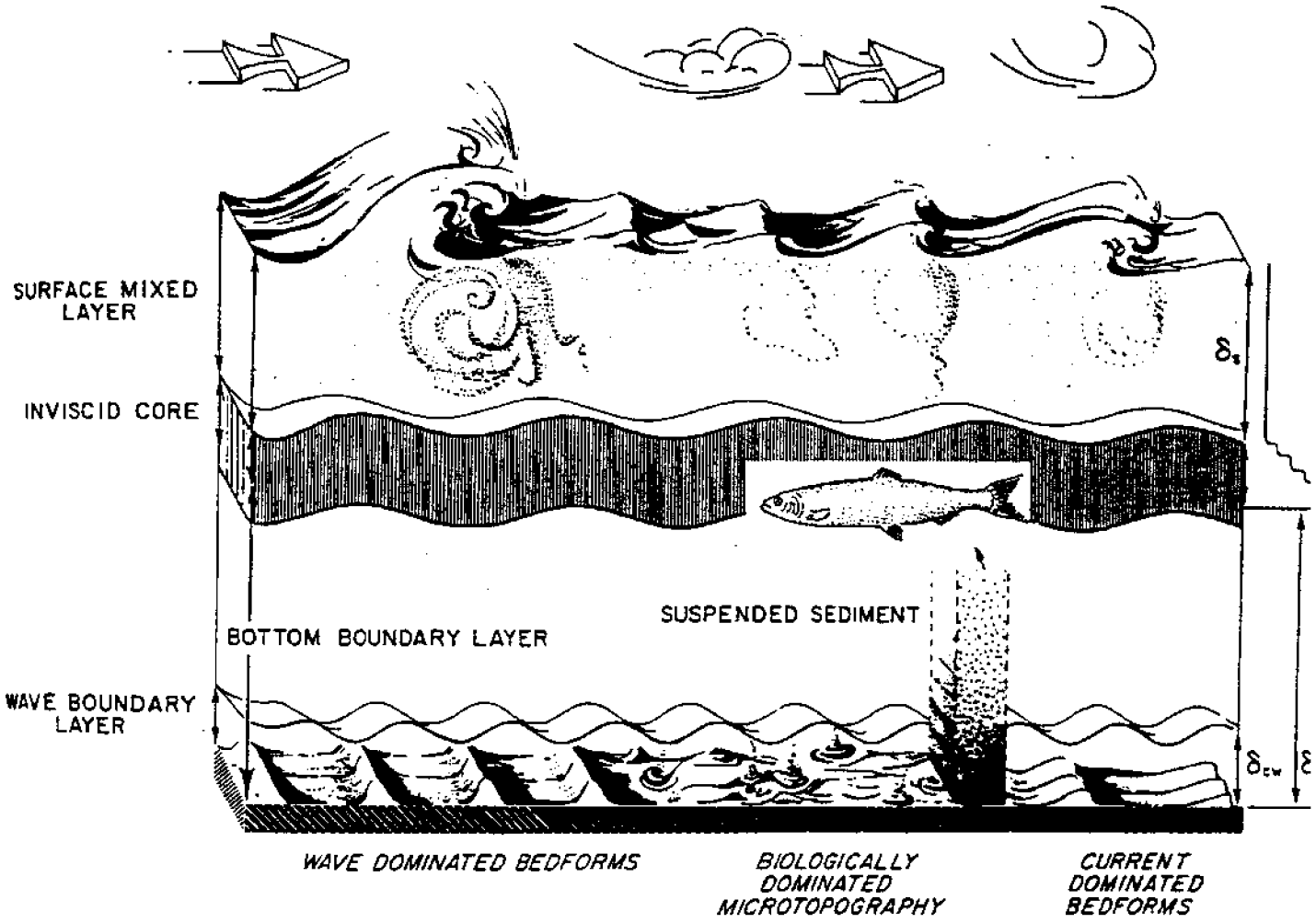

Figure 2. Schematic illustration of storm induced resuspension of contaminated sediments by long and short waves in a lacustrine estuary.

The authorities can (1) compel parties to clean up the sites that they have contaminated, (2) recover costs from responsible parties for EPA-performed cleanups, and (3) coordinate with natural resource trustees to seek restitution from responsible parties for natural resource damages. The ability to obtain sediment remediation within a reasonable time frame may be greatly enhanced through partnership efforts among responsible government agencies, including the Corps of Engineers and local governments; affected industries; and the coordinated use of federal, state and local laws and regulations.

Available authorities and approaches include:

CERCLA or Superfund: provides one of the most comprehensive authorities available to EPA to obtain sediment cleanup, reimbursement of EPA cleanup costs, and compensation to natural resource trustees for damages to natural resources affected by contaminated sediments. Liability is strict, meaning responsible parties are liable without fault, and "joint and several," meaning that they are collectively responsible for the entire cost of the cleanup.

RCRA: Subtitle C or RCRA provides EPA with the authority to assess whether releases from a hazardous waste treatment, storage, or disposal facility have contaminated sediments and to require "corrective action," which could include sediment remediation. RCRA corrective action provisions address releases of hazardous waste or constituents to all environmental media, including sediments.

CWA: Section 309 of CWA authorizes EPA to take civil action for discharges in violation of permit limits and seek appropriate relief, including environmental remediation. If environmental harm is demonstrated, EPA can seek sediment remediation as part of injunctive provisions of the administrative or judicial order. Enforcement actions for permit violations can also encourage sediment cleanups in lieu of civil penalties.

TSCA: TSCA does not explicitly require cleanup of regulated substances other than PCBs. PCB spills that occurred after the effective date of the TSCA regulations (April, 1978) are subject to the TSCA disposal rules.

RHA: The Rivers and Harbors Act includes provisions which may be used to address sediment contamination. The injunctive relief available under the Act includes the ability to order the removal of obstructions to navigation and the removal of refuse.

NRDA: Several federal statutes (i.e. CERCLA, CWA, and OPA) and State laws authorize natural resource trustees to conduct Natural Resource Damage Assessments (NRDAs) and collect damages for injuries to natural resources. Natural resource trustees include Federal, State, and Tribal organizations which manage or control natural resources (e.g. fish, wildlife, land, air, water, and sediments).

Partnership Approaches: In several areas -- Ashtabula, OH, the Fox River system in Wisconsin, and in Northwest Indiana -- government agencies at various levels are also trying partnership approaches to achieve sediment remediation, to augment regulatory tools. Government is providing seed money in some areas in an effort to speed remediation.

Binational Strategy: The proposed "Canada/Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes" will provide a framework for actions to reduce or eliminate persistent toxic substances from the Great Lakes, including those from sediments. Emphasis will be placed on voluntary and prevention approaches. A draft was the subject of a public stakeholders meeting in

August of last year. A new draft is expected to be offered for public comment this summer.

Contaminated Sediment Remediation Case Histories

Considerable efforts are being made to clean up contaminated sediments using the aforementioned regulatory tools and partnership efforts among affected parties. Some case histories of remediation efforts in southern Lake Michigan are presented below. These efforts provide concrete evidence of the directions in which government is heading in dealing with contaminated sediments.

Waukegan Harbor, IL.

When the PCB problem at Waukegan Harbor, IL was discovered in 1976, the CWA was successful in stopping the active discharge of PCBs, but was ineffective in dealing with the existing sediment contamination problem. The Waukegan site was one of the first to make the National Priorities List after the passage of CERCLA in 1980, but it was only after CERCLA was amended in 1986 that USEPA was able to compel any action directed at sediment cleanup.

Waukegan Harbor is an estuary type AOC basin that experienced active flushing of these PCB-contaminated sediments both before and after the active discharge was stopped. Consequently, active transport of resuspended sediments from Waukegan Harbor to Lake Michigan resulted in significant levels of PCB-contaminated sediments being distributed along the southwestern coastal region of Lake Michigan during the intervening time. Finally, a 1988 CERCLA consent decree resulted in an effective dredging, treatment, and disposal program for the PCB-contaminated sediments. This sediment remediation program was completed in 1993. Over one million pounds of contaminated sediments were removed or contained at the Waukegan Harbor site, making it one of the world's largest PCB cleanups to date.

Northwest Indiana

The Indiana Harbor Canal and Grand Calumet River in Indiana is an area that is severely contaminated with heavy metals, PCBs, PAHs volatiles, oil, and grease. These sediments are among the worst found anywhere in the Great Lakes, and possibly the U.S. The sediments are highly toxic, have pore spaces filled with as much oil as water, have caused major fish contamination, and are losing contaminants at a significant rate to Lake Michigan.

Indiana Harbor is an AOC type basin that responds to hydrologic and meteorologic forcing in the same manner as described in the "conceptual model" section of this paper. Sediment resuspension and transport, coupled with desorption and photoactivated transformations contribute to significant flushing of toxic chemicals into Lake Michigan. In addition, commercial ship "propeller wash" resuspends sediments, creating another potential source for release and transport of toxic sediments and chemicals.

Due to these impacts and others, the area is the subject of a cooperative geographically-targeted "Northwest Indiana Environmental Initiative" being conducted by EPA and the Indiana Department of Environmental Management. Enforcement actions have been taken in the course of this initiative which have resulted in a number of necessary studies and remedial actions, as indicated in Figure 3. Currently, USX

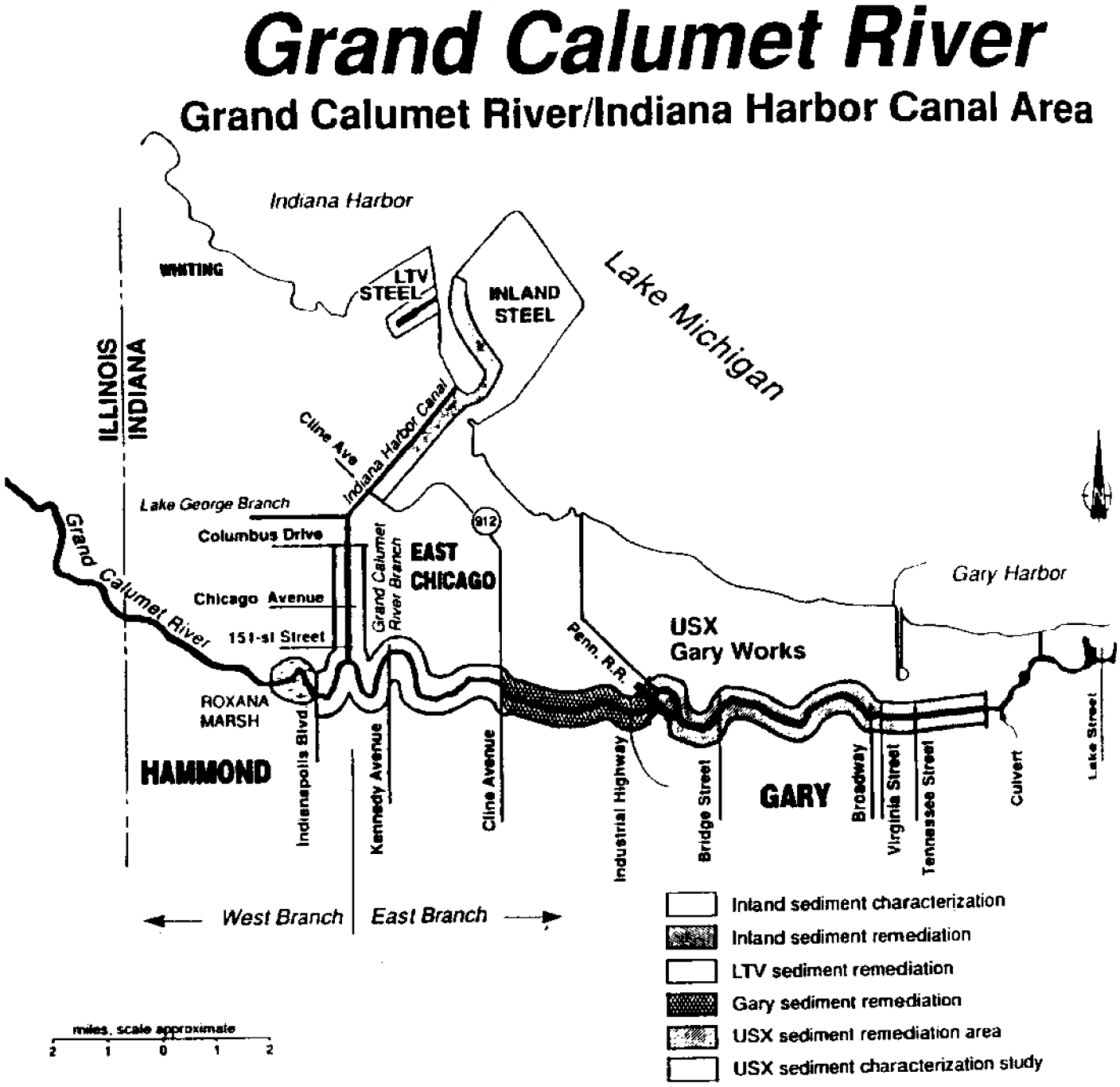

Figure 3. Sites of studies and remedial actions in the Grand Calumet River/Indiana Harbor Canal area.

Gary is required, by a consent decree under the CWA, to remediate five miles of the Grand Calumet River's East Branch. A characterization study of the East Branch, also required by the consent decree, has been completed. Under judicial consent decrees, the Gary Sanitary District is required to remediate four miles of the East Branch, and LTV Steel is remediating an intake flume to Indiana Harbor. Inland Steel, under a multimedia consent decree (CWA, RCRA, and Safe Drinking Water Act), is required to remediate sections of the Indiana Harbor Canal. The City of Hammond is the subject of a 1993 complaint under CWA and RHA related to the West Branch of the Grand Calumet River.

Much of the contamination of the Indiana Harbor Canal is in an area that has been intended for navigational dredging by the U.S. Army Corps of Engineers (USACE) for some years. The sediments in this area are close to Lake Michigan and subject to the effects of ship movements, making them a high priority for remedial action. Unfortunately, concerns about contamination levels have made it difficult for USACE to find suitable disposal locations. EPA and USACE began working on this problem jointly, together with the State and other stakeholders. A draft EIS has been issued in which a disposal site has been selected. Cooperative efforts at Indiana Harbor Canal illustrate the opportunities available for obtaining cleanups through dredged material management in cooperation with USACE, as well as states, port authorities, local governments, and other parties.

Another cooperative activity in Northwest Indiana is the Sediment Cleanup and Restoration Alternatives Project. The U.S. Army Corps, IDEM, and EPA are jointly developing strategies for staging the forgoing remedial efforts, and for further remedial efforts emphasizing partnerships.

Conclusion

The management of toxic sediments and chemicals is a daunting problem from both a technical and regulatory standpoint. Removal of the source of toxic contamination does not usually eliminate the problem of contaminated sediments, although it is an essential first step. Many of the chemicals residing in contaminated sediments have long chemically active life times. Resuspension of these sediments by natural forces, as well as by human activity, provides the opportunity for re-release of toxic chemicals and/or their transformed chemical products, which can be more toxic than the parent compounds.

Recent research studies have brought to light new concerns for the potential of toxic loading of the Great Lakes from the flushing of AOCs through connecting channels. These studies are also revealing new sources of chemical activation in the environment, as well as alternative pathways for biological uptake. Further technical studies are needed to improve our understanding of the fate and transport of toxic sediments and chemicals in Great Lakes waters.

Agencies at various levels, working together with industries and the public, have made progress in developing improved regulatory and technical approaches to clean up the most contaminated sites and to identify sites that require the most rapid action. Progress has also been made in developing cooperative approaches among government and industry. No single approach will work in all situations. However, with the variety of resources and new approaches that are being applied on all fronts, we appear to be on the way to reducing the problem of contaminated sediments in southern Lake Michigan, the Great Lakes, and across the United States.

References

Appleton, W.S., 1994. An Energy Based Model for Coastal Bays and Lakes, M.S. Thesis, School of Civil Engineering, Purdue University, p. 82.

Appleton, W.S., W.L. Wood and Y.S. Chang, 1993. An Energy Based Model for Coastal Bays and Lakes, Proc. 3rd Int. Conf. Estuarine and Coastal Modeling, pp. 140-151.

Bedford, K.W., 1992. The Physical Effects of the Great Lakes on Tributaries and Wetlands, Jour. Great Lakes Research, 18, 4, pp. 571-589.

Binkley, B.J., 1993. Partitioning of 3,3'-Dichlorobenzidine Between Sediment, Water and Lipid Phases, M.S. Thesis, School of Civil Engineering, Purdue University, p. 116.

Nyman, M., J. Perez, A.K. Nyman, E.R. Blatchley, H. Kenttamaa, 1996. 3,3''-Dichlorobenzidine in Contaminated Lake Sediment by a Small Low-Field FT/ICR MS, Analytic Chemistry (submitted).

Riley, J.H. and W.L. Wood, 1995. Prediction of Storm Induced Flows in Great Lakes Estuarine Inlets, Proc. 4th Int. Conf. Estuarine and Coastal Modeling, pp. 309-323.

Wood, W.L., W.S. Appleton and J.R. Riley, 1995. A Model for Predicting Contaminated Sediment Transport Loading from Coastal Bays and Lakes to the Great Lakes, IAGLR 95, Programs and Abstracts, p. 64.

III. PROCEDURES FOR FACILITATED SESSIONS

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The purpose of the facilitated sessions was to engage stakeholders interested in environmental issues along Southern Lake Michigan in a systematic process which identified key environmental issues, the actions needed to address these issues, and a strategy to accomplish the actions identified. Through this process, participants were able to share information on ongoing projects, accomplishments, and unique needs from a wide array of perspectives.

White papers were prepared and presented on the top five critical environmental issues (as identified by a planning group composed of approximately 46 stakeholders in the Southern Lake Michigan area) by regional experts. The purpose of these papers was to give an overview of the issue, summarize activities and players currently working on this issue in the Indiana-Illinois area, give an assessment of the current status of this issue at the present time (what we know and/or what has been accomplished), and identify trends and opportunities for the future (what do we need to learn and/or what needs to be accomplished). These papers were instrumental in bringing all conference participants up to a common knowledge base on five of the highest priority topics in the southern Lake Michigan area. This background not only stimulated discussion, but also reduced the need for rudimentary information exchange in the facilitated sessions.

The facilitated process was conducted through a series of three one and a half to two hour sessions. For the first and second sessions, participants were divided into five groups by the professional facilitators (D.J. Case and Associates), who attempted to place participants into groups with others from similar perspectives (industry, municipalities, non -government organizations, landowners, and government agencies based on employment. Some mixing occurred to obtain groups of approximately the same size. These groups worked together for the first two sessions, and objectives were accomplished using the Nominal Group Technique.

The charge for the first session was to identify "What major environmental issues, concerns, or opportunities need to be addressed along southern Lake Michigan." The facilitators allowed each participant to list their top issues one at a time. After all issues were listed, the group began a discussion which explained in more detail the issues listed and why they were of importance. Participants shared information about ongoing projects and discussed reasons for listing these issues, giving examples from their unique perspectives. After the discussion closed, participants grouped similar listed issues together and the list was clarified and consolidated. The facilitators then led the group through a voting process which prioritized these issues and identified the top two or three issues, concerns, or opportunities identified by the group.

In the second session, a similar process was followed to identify "What key things need to happen to address environmental issues along southern Lake Michigan." The facilitators began with the highest priority item, and led a brainstorming session that listed major actions which must be accomplished to make progress toward addressing the key issue, concern, or opportunity identified in the first session. Discussions

among participants continued as these needs were explained and clarified, and further sharing of past and ongoing projects occurred as well as explanations of limitations and barriers encountered. After discussions closed, the facilitators led a voting process which prioritized the top two or three needs for this issue; then the group repeated the process for their next priority issue.

At the conclusion of the second session, the facilitators and conference organizers met and examined the accomplishments of each group. The top three issues, concerns, or opportunities identified by each group in session one were listed. Of the fifteen issues listed, four emerged as critical issues and were identified by at least two groups. These four issues (An Informed Public, Water Quality, Breaking Down Barriers Across Political Boundaries, and Habitat and Biodiversity Conservation) were selected as the topics for Session III. A facilitator was assigned to each topic, and the facilitator compiled the list of "key things that have to happen" (or needs) that were identified by the group discussing each of these topics in Session II. These lists formed the bases for developing the action strategies in Session III.

On the second day, participants were given the opportunity to select the topic of greatest interest to them. Therefore, groups in Session III were composed of participates from all interest groups. Together, they examined their issue, selected the top needs they wanted to address, and began developing action strategies to actually accomplish the needs identified. Two of the four groups (An Informed Public, and Habitat/Biodiversity Conservation) made a lot of progress in developing action strategies and expressed sufficient interest to form working groups. These working groups have begun meeting regularly, taking the needed steps to accomplish the action strategies identified ,and continuing to refine and expand their efforts as needed. Participants felt that in order to successfully follow the action strategies identified, other stakeholders would have to be invited to participate in the work groups. Work groups are being facilitated by Leslie Dorworth, Illinois-Indiana Sea Grant Aquatic Ecology Specialist located at Purdue University Calumet. Meetings have been announced and others have been invited to participate.

IV. FACILITATED SESSIONS I AND II

INTRODUCTION

For the first and second facilitated sessions the participants were divided into five groups, arbitrarily named River Otters, Lake Trout, Piping Plovers, Great Blue Herons, and Karner Blue Butterflies. An impartial facilitator was assigned to each group to record ideas on wall (flip) charts for all to see and to provide a permanent record, and to keep the discussions focused. The participants in each group are listed in Appendix III.

Each group was given the following two questions -- the first for Session I, the second for Session II:

1. What major issues or concerns need to be addressed in regard to environmental problems along southern Lake Michigan?
2. What key things need to happen to address environmental issues along southern Lake Michigan?

The following material is a summary of Facilitated Sessions I and II. The summary is presented in three ways for each group:

1. The material from the wall charts used by the facilitators to record suggestions by the participants. The wall charts were transcribed by D.J. Case and Associates.
2. Summaries based on notes taken by a participant/observer in each group.
3. The transparencies used to present the significant results from each group to the assembled participants; these are in Section V.

To the extent possible, the format is the same for all groups. However, there are small, unavoidable differences.

RIVER OTTERS

SESSION I WALL CHARTS: ISSUES AND CONCERNS

A. ISSUES

1. Comprehensive/coordinated clean-up of contaminated sites; brownfields
2. Introduction and spread of non-indigenous species (e.g. zebra mussels)
3. Repetitiveness/doubling of effort in environmental field; lack of effective networking.
4. Control and clean-up of offshore pollution
5. Sustainable development; lack of public transport
6. Problems land/water interface (considered 2 distinct parts)
7. Lack of effective public education; educating those who work/reside in contaminated areas; media dissemination of information skewed
8. Continued degradation of air quality
9. Air/surface and groundwater/sediment -- continuing discharge; toxicity and cleanup
10. Preservation of biodiversity
11. Citizen participation
12. Funding
13. Maintenance of dunes ecology; preservation/restoration of natural areas (drainage water/wetland loss)
14. Epidemiology
15. Northwest Indiana "Wasteshed" (importation of waste)
16. Changing politics

B. VOTE

No. points	Issue(s)
20	9, 13
12	7
10	5
9	11
5	3, 4
4	2, 8, 10, 12
3	1, 14
0	6, 15, 16

SESSION II WALL CHARTS: NEEDS IDENTIFICATION

Priority 1: Maintenance of Dunes ecology; Preservation/restoration of natural areas (Drainage water/wetland loss)

Funding (very $)
Improved pollution prevention
Assessment/prioritization
Cooperation/partnership: industry, government, private sector, academic
Research better technology
Public education, involvement
Identification of disposal sites of contaminated sediment
Tolerable limits?

Priority 2: Air/surface and groundwater/sediment -- Continuing discharge; Toxicity and cleanup

Public education/involvement
Funding
Identify and prioritize area(s) to be restored/preserved
Cooperation/partnerships
Trained professionals
Continued involvement/dedication of citizen advocacy groups
Research
Political lobbying

Priority 3: Lack of effective public education; Educating those who work/reside in contaminated areas; Media dissemination of information skewed

Funding
Education of children (elementary curriculum on to all levels)
More creative approach to educating/outreach for high-risk populations
    * risks and options (*remove sensationalism*)
Updated teacher training
Improved media strategy (*remove sensationalism*)
    * e.g., Citizen's Environmental Academy, Web Sites
More positive media portrayal of environmentalists
Environmental Watch Dog group to reply to negative/inaccurate
Assessment of available materials
Development of creative educational TV programming
Computerized interactive games

Priority 4: Sustainable development; Lack of public transport

Support Northwest Indiana Sustainable Development Task Force
Funding
Lobbying
Begin to shift priorities in transportation dollars
Encourage alternatives to auto use
Education
Utilize "Bubble Approach"
Incorporate sustainable concepts into public and private decision-making
Public input
Environmental technology into job market
Environmental equity
Increased intermodalism

Priority 5: Citizen participation

Listen to/respond to citizen concerns and ideas (incorporate them)
Conduct fully accessible meetings (time of day, location, etc.)
Be more creative about seeking involvement
Empower community organizations
Reduced apathy
Education
Make government more user-friendly (delete acronyms)
Media involvement -- present full range of options
Public debate among politicians

Common threads identified for most or all of the major issues or concerns:

- Funding
- Public Education
- Partnerships
- Research and Assessment
- Lobbying

MINUTES BY HARVEY ABRAMOWITZ

Session I. The sessions were facilitated by Gary Eldridge. The group was a mix from academia (4), Sea Grant (1), U.S. Environmental Protection Agency (1), and environmental organizations (3). Gary Eldridge first gave an introduction about how the sessions were to operate and provided the ground rules: (1) no personal attacks,

(2) no interruptions, (3) raise hand to gain the floor, and (4) probing inquiries allowed, but must be limited. With these rules in mind, each participant gave his/her issues and concerns for listing on the wall charts, see above. Five wall (flip) chart sheets were filled. These issues were then discussed and resulted in final consolidation of the issues/concerns list and the vote (see above). While this consolidation was taking place, there was much discussion concerning whether each issue/concern was too general or too specific, and whether or not a topic was truly a subset of another, overlapped another, was complementary to another, or was truly independent of the others.

The following discussion will comment on the issues, listed in order of vote prioritization. One of the two top priority issues was called air/surface and ground water/sediment -- continuing discharge; toxicity and cleanup. This topic is actually an amalgam of water table contamination, spills past and present, and cleanup of sediments from the Little and Grand Calumet Rivers. Thus, this issue is concerned with the water quality of the water table and the water byways. The other top priority issue is maintenance of dunes ecology; preservation/restoration of natural areas (drainage water/wetland loss). This issue was an agglomeration of wetlands ecology/restoration and dunes ecology/maintenance. The issue was then expanded to include all natural areas. The third priority issue -- lack of effective public education; educating those who work/reside in contaminated areas; and media dissemination of information skewed -- combined three closely related topics. It was felt that public environmental education was lacking, thus leading to an under- or even ill-informed public. This ultimately would have an impact on the making of public policies. Thus a well-informed general public would also include those people who work or reside in contaminated areas. This population, at one point in the discussion, was included under a separate heading. The converse side of a well-informed public is that the information it receives via the media should be as even handed and as unbiased as possible. It was felt that often the information disseminated by the media is skewed. This concern was initially listed as a separate issue of public education. The next issue is sustainable development; lack of public transport. This again is a synthesis of two individual listings. Providing high-quality public transportation was seen as a necessity for sustainable development. The fifth-highest-rated concern was citizen participation. One might think that public education could be a subset of this concern, but in the end it was seen rather as a complimentary issue. These five were the top issues for further development in the second session, needs identification.

The remaining concerns also warranted discussion and clarification. There was concern that there is duplication of efforts within the environmental field, with various groups not being aware of actions made by the total environmental community. The control and clean-up of offshore pollution seems self explanatory. However, the question of how far offshore arose, with no definitive agreement on the distance limit. The issue of zebra mussels was considered a subset of the more-generalized introduction and spread of non-indigenous species. Air quality in the region continues to be a topic of focus. This issue is related to sustainable development. The preservation of biodiversity is a part of preservation/restoration of natural area ecology.

It would also be a consideration in maintaining the dunes ecology. The very broad topic of funding environmental projects was also raised. Brownfield restorations accomplished by comprehensive and coordinated cleanups was also listed as a concern. The area's cancer/illness rate was discussed as being on the minds' of the region's residents. An epidemiological study was thought to be important in discerning any environmental impact on the health of the citizenry. The issue of how land use affects the water environment and vice versa was raised. Land and water usage are really intertwined, since one can impact the other. When issues are reported in the public, the intertwinement is not necessarily shown. It is desired by all that Northwest Indiana be environmentally restored with allowance for sustainable development. On the other hand, there is much concern that Northwest Indiana has or will become a "wasteshed," where waste is imported for final treatment, such as landfilling. Lastly, the solution to environmental issues can be changed by a shift of political winds. How will a change in political personnel impact environmental issues in the region?

Session II. In the needs identification session, the group was to select its top two priorities. However, no decision could be reached on which issues were the top two out of the five initially mentioned. It was decided that the group would consider all five concerns and find the common threads. The needs for each of the five issues are listed above and should be self explanatory. The common threads, in no particular order, were found to be funding; public education; cooperation/partnerships among industry, government, non-industrial private sector and academics; research and assessment in order to develop effective solutions; and lobbying politicians.

LAKE TROUT

SESSION I WALL CHARTS: ISSUES AND CONCERNS

A. ISSUES

1. Opportunities for regional cooperation on brownfields.
2. Put natural areas in context of landscape (connectivity).
3. Public and agency credibility (agency and company credibility)
4. Remediation
5. Future direction of brownfields.
6. Breaking down barriers to addressing environmental problems regionally and locally.
7. Overcoming misperceptions -- there are both steel mills and diverse ecosystems.
8. Wetlands/habitat interaction with industry
10. Habitat re-creation, Grand Calumet - aquatic and surrounding habitats.
11. Sustainable development
12. Public education on brownfields.
13. Municipal solid waste disposal
15. Community involvement (residents)
16. Watershed management
17. Meeting Great Lakes initiative
19. Nonattainment of air quality
20. Urban sprawl -- transportation, air quality
21. Compartmentalization of environmental programs.
22. Brownfield redevelopment -- community involvement, environmental justice, attracting responsible industry

Note: Missing numbers above were combined with other, similar issues by the group.

B. VOTE

No. points	Issue(s)
19	6
18	22
8	20
6	7
5	1, 3, 5, 11
4	13

3 8, 10, 21
2 2, 16
1 4, 15
0 9, 12, 14, 17, 18, 19

SESSION II WALL CHARTS: NEEDS IDENTIFICATION

Priority 1: Breaking down barriers to addressing environmental problems regionally and locally

Need to establish framework and guidelines within which a bioregion can function across political boundaries supported by an authority and incentives.

Identify elements of the region-define boundaries of the bioregion.

Important -- Put together groups for sharing experiences. Forums with varied backgrounds.

Regional and local buy-in to the concept.

Identify what are regional concerns and what should be kept local.

Equivalent monetary contributions.

Public education

Bring all players in early

Establish goals and mission

Priority 2: Brownfield redevelopment -- community involvement, environmental justice, attracting responsible industry
(not necessarily in order of importance)

Develop positive public relations with other entities

Install mechanisms to educate and empower the public.

Market the region as a good place to live, visit, or start a business -- to attract responsible industry.

Promote incentives to encourage responsible redevelopment through creative solutions from both a social and environmental perspective.

Case studies on successes and failures.

Involve local citizen action groups (especially target young people) in planning, implementation, and labor.

MINUTES BY EMILY STEADMAN

Session I. The question for the first session, issues and concerns, was "What major issues or concerns need to be addressed relating to environmental problems along southern Lake Michigan?" After the initial listing of issues and concerns, some

clarification was necessary. Through this process, some items were joined into more concise statements and some were made more specific.

One significant discussion stemmed from the issue of addressing bi-state (Illinois and Indiana) issues. Mark Reshkin (Indiana University Northwest) voiced serious concern over the feasibility of such a broad idea. Similarly, Paul Nelson (Baker Environmental) wondered how it could work when localities have specific, unique needs. Wendy Zelencik (Baker Environmental) suggested that one unifying element could be the identification of a southern Lake Michigan bi-state "bioregion," uniting the bi-state area across political boundaries according to certain unique ecological similarities. The discussion led to further qualifiers on the bi-state approach, and a statement was finally agreed upon. (This is discussed further in Session II notes).

Voting to determine the most critical issues and concerns identified two that were far ahead -- breaking down barriers when addressing environmental issues (with attached clarifications), and brownfield/redevelopment issues encompassing environmental and social responsibility. These two issues became the focus of Session II, and it was decided that the facilitator would include the other top vote-getters in the proceedings.

The group as a whole decided its general goal was to identify blanket issues without losing important details. Since two group members (Mark Reshkin and Jim Van der Kloot, Chicago Department of Environment) would not be present for Session II, Anne Ogren (U.S. Steel) was chosen to be the group spokesperson for the following morning's group presentations.

Session II. The question for the second session, needs identification, was "What key things need to happen to address environmental issues along southern Lake Michigan?"

The first issue considered was breaking down barriers to addressing environmental problems regionally and locally. In determining needs, the discussion revolved mainly around disagreements about strategy. Wendy suggested a governmental approach that would involve a "federal land-use planning initiative." Chris Newell Bourn (NIPSCO), concerned about bureaucratic overloads, opposed federal involvement.

From this initial debate, discussion ensued in two related directions: (1) What will stimulate involvement and willing collaboration in a cooperative approach from varied stakeholders in the bi-state area?, and (2) By what authority will this approach operate and go forward with whatever plans or hopes that come out of it?

It was agreed that a formal study would be needed to identify ecological boundaries in order to designate the "bioregion." This would provide an initial unifying element for the bi-state area, and fulfill a dual need to spawn interest and involvement across varied sectors while at the same time pinpointing issues not shared by the whole region that should therefore be dealt with at a more localized level.

From there, a framework and guidelines would need to be established within which a bi-state, cooperative planning and problem-identifying process can function. It would

need to be supported by or be instilled with some sort of power and authority to follow through with successful implementation of planning outcomes. Wendy modified her earlier suggestion to a less mandative legislation more in the form of a model initiative instigated at the federal level that could give the states a mutual starting point for coming together. Emily Steadman (City Innovation) suggested the formation of a commission initiated consensually at the local (state and municipal) level that would operate inclusively, above existing legislation and bureaucracy.

We realized that for the process and outcomes to have some clout, key players would have to be identified and brought into the process from the beginning. This would include representatives from many social and political sectors -- state and municipal governments, citizenry, businesses and industry, academic institutions, and community and environmental groups. These players would work together to establish shared goals, which could then foster the formation of work groups or forums to more deeply explore the most significant issues. This process would ensure that all had a fair voice in planning, and would lessen blockages to eventual implementation.

The second issue was brownfield/redevelopment. Discussion mainly revolved around issues of responsibility. This blanket term was subdivided into social needs for community involvement and siting issues, and environmental needs for cleanup of sites and long-term sustainability.

Needs for community involvement included installing mechanisms to educate and empower the public, and to encourage involvement. Chris suggested one way of doing this could be through looking to local citizenry for volunteer help in planning and implementation of brownfield identification and cleanup. This process would include both young and old, possibly through church organizations, citizen action groups, and high school and college students. Her main point was that even with plenty of money and support from government and private interests, labor and enthusiasm from the community is still needed.

Developing positive public relations was another factor in maintaining public enthusiasm and involvement in brownfield redevelopment. An adjunct to this was the need for a marketing campaign to advertise the region as an attractive, accessible industrial area. This would have the dual role of helping to empower and instill pride in the citizenry while attracting new industry.

Under the heading of environmental responsibility was a discussion of what type of industry should be desired for the region. An emphasis was put on the need for "responsible" industry that would hire locally; maintain healthy, sustainable environmental standards of operation; and invest in the community in other positive ways. It was agreed that these types of actions would help to ensure long-term sustainability of the region's overall quality of life, its economy, and its ecology.

Finally, it was agreed that it would be helpful to conduct research to identify and analyze successful and failed case studies from other places in order to best set up redevelopment programs in this region.

PIPING PLOVERS

SESSION I WALL CHARTS: ISSUES AND CONCERNS

A. ISSUES

1. Loss of and change in natural communities
2. Brownfield redevelopment
3. Defining watersheds and forming groups based on that definition
4. Non-point source pollution (homeowner runoff, lawn runoff)
   Point source pollution: factory and cooling water, include temperature
5. Resource allocation (financial)
6. Persistent toxic emissions across media, not confined to the zone. Toxic only. Worldwide.
7. Exotic and non-exotic species introduced accidentally or intentionally
8. Management of commercial and sport fisheries for sustainability
9. Fragmentation leading to losses of biodiversity
10. Ecosystem disruption
11. Techniques for cleaning and disposal of contaminated sediments, and the risks involved
12. Water quality; drinkable and swimmable
13. Community involvement for priority setting
14. Optimize partnership approach vs. regulatory approach
15. Complete loss of habitat communities
16. Shoreline erosion
17. Loss or impairment of natural processes (fire and water level)
18. Community awareness
19. Manmade shoreline modification
20. Safety of fish and animals that live in the lake. Health throughout the food chain (algae - fish - man)
21. Habitat protection, setting end product or very long-term goals. Strategic plan
22. Impact of contaminants in sediments
23. Sea lampreys and other exotics control: fisheries at risk due to lack of funds. Managed response
24. Lack of long-term trend analysis of fish (all biota) and water quality changes.

25. Siltation as a non-point source or point source contaminant
26. Human land use. How many and what they are doing (urban sprawl)
27. Impacts on special human populations (for example, fish eaten by poor people, etc.)
28. Government instability, loss of programs and funding for technology, science. Lack of continuity
29. Reef construction (a current fad) for fish attraction
30 Environmental justice

B. VOTE

In the next part of the meeting, the issues, concerns, and opportunities were discussed, combined, and prioritized. The following is the result of this process -- both combinations and votes.

No. points	Issue(s)
39	Combination of 1, 9, 15, 21
18	Combination of 12, 20, 24, 27
17	Combination of 11, 22
11	Combination of 2, 3, 26
	6
8	23
7	Combination of 10,17
6	14
	Combination of 13, 18
4	30
3	5
1	Combination of 4, 25
	Combination of 8, 29
	28
0	7
	Combination of 16, 19

SESSION II WALL CHARTS: NEEDS IDENTIFICATION

In this session, actions were listed that are needed to implement the first three issues.

Priority 1: Loss of and change in natural communities. Fragmentation leading to losses of biodiversity. Complete loss of habitat communities. Habitat protection, setting end product or very long-term goals. Strategic plan.

1 Habitat mapping; support and long-term map improvement

2 Education and outreach in communities -- importance of habitat, solicit involvement

3 Involve planning and zoning authorities -- explain importance of habitat

4 Identify conservation goals and complete strategic planning

5 Return natural processes; e.g., fire and water level fluctuations

6 Control of aquatic and terrestrial exotics, and native species that are out of control

7 Leadership in community

8 Financial support needed for land acquisition, restoration, implementation of 1-7

9 Financial incentives and disincentives

VOTE

No. points	Need(s)
12	4
11	6
6	8
5	5
4	1, 3
3	2, 9
0	7

Priority 2: Water quality; drinkable and swimmable. Safety of fish and animals that live in the lake. Health throughout the food chain (algae - fish - man). Lack of long-term trend analysis of fish (all biota) and water quality changes. Impacts on special human populations (for example, fish eaten by poor people, etc.).

1 Collect and review long-term data availability. $$ needed.

2 Eliminate persistent toxic discharges, local and world wide

3 Incentives and disincentives

4 Enforcement of pollution control laws.

5 Partnership - voluntary approaches to reduce discharges.

6 Identify and educate special populations (fish advisories); resolve disputes on fish advisories.

7 Get Indiana to ante up for Great Lakes protection.

8 Sustain remediation efforts.

VOTE

No. points	Need(s)
24	2
9	3

5	4, 8
2	5, 7
1	6
0	1

Priority 3: Techniques for cleaning and disposal of contaminated sediments, and the risks involved. Impacts of contaminants in sediments

1 Move mud. Remove contaminated sediments, etc.

2 Cost benefit analysis

3 Apply GIS (geographic information systems) to Sea Grant Area.

4 Collect and review long-term data available.

5 Eliminate persistent toxic discharges local and worldwide

6 Partnerships - voluntary discharge reduction

7 Get Indiana to contribute to the Great Lakes Protection Fund

8 Sustain remediation efforts.

VOTE

No. points	Need(s)
11	1
7	2, 8
4	4
2	6, 7
1	5
0	3

MINUTES BY BRIAN MILLER

This group, facilitated by Bob Stum, was composed of ten individuals representing industry, universities, and agencies. In Session I the question posed to participants was "What major issues or concerns (or opportunities) need to be addressed in regard to environmental problems along southern Lake Michigan?"

After some discussion, the group decided that issues, concerns, and opportunities should not/could not be separated, but rather integrated to reflect how they could be addressed through actions. Thirty initial points were identified by participants. After a constructive discussion and information exchange, several points were combined and sixteen issues, concerns, and/or opportunities resulted. The group then prioritized the list and three clear top issues resulted. In Session II, participants were asked to identify key needs for each of the top three issues identified in Session I. The question posed to participants to accomplish this was "What key things need to happen to

address environmental issues along southern Lake Michigan?" A summary of the top three issues and the associated needs for each issue follows.

Issue #1: Loss of and/or change in natural communities was raised as the highest concern. Discussions centered around habitat fragmentation which has resulted from years of development and human impact. This fragmentation has led to the loss of biodiversity and the disappearance of some habitat communities. The discussion highlighted the need for some form of habitat protection which must result from more-comprehensive long-range planning.

The top two needs identified were:

1. Identify conservation goals and a complete strategic plan. The plan referred to is one that crosses political boundaries and focuses on a broader ecosystem scale.
2. Control of aquatic and terrestrial exotics and native species that are out of place or have an absence of natural control or competition.

Issue 2: Quality of surface water was of major concern. Participants were not only concerned about the quality of water for drinking and swimming, but expressed interest in having water quality that was safe for all life forms that depend on surface waters (algae, fish, and humans). The integrity of food webs and general ecosystem health were of high importance.

The four key needs that emerged as high priorities that must be accomplished to address this issue were:

1. Eliminate persistent toxic discharges locally and worldwide.
2. Financial/economic incentives and disincentives.
3. Enforcement of pollution control laws (tied).
3. Sustain remediation efforts (tied).

Issue 3: Contaminated sediments are of high concern and have prolonged negative effects in the ecosystem. One concern is to assess the potential impacts contaminants may have in a given location. It was recognized that sometimes the best approach is to leave sediments undisturbed. The challenge is to determine the best approach at each site. Participants recognized a need for techniques for cleaning and disposal of contaminated sediments and assessing the risks involved.

Three primary needs were identified:

1. Remove contaminated sediments
2. Cost/benefit analysis for proposed clean up strategies - is cost worth return (tied).
2. Sustain redemption efforts (tied).

GREAT BLUE HERONS

SESSION I WALL CHARTS: ISSUES AND CONCERNS

A. ISSUES

1. Air quality
2. Citizens are not as concerned as they should be (particularly young people)
3. Regulatory controls can be overly broader than necessary to provide environmental protection.
4. Drinking water quality
6. Non-point-source pollution
7. Mismatch of resource management to resource boundaries
8. Water pollution--sources of E. coli as it impacts recreation
9. Lack of knowledge/education on air deposition issue
10. Lack of data on resources (historical & current)--native biota
11. Lack of resources for contaminated sediments remediation
13. Legal structure discourages the reuse of degraded areas
14. Too narrow of approach to restoration of beneficial uses
15. Lack of/disagreement over criteria for cleanup and restoration activities. Remediate and "develop" or "habitat"? (No consensus on remediation objectives)
17. Impacts of exotics on native species
18. Continuing/ongoing loss of habitat
19. Expensive to get information/answer questions on resource
20. Lack of comprehensive biodiversity plan
21. Lack of government funding support
22. New development does not contribute equitable share toward infrastructure development (sewers, etc.)
23. Combined sewer overflows (CSOs)
24. Policy implementation does not include monitoring of effectiveness
25. Difficulty of citizens using technical/scientific information in decision-making Lack of cultural context to address issues -- i.e., legal system requires definitive proof, public experts conservative approach (protect) without translating that into support
26. Solution to zebra mussel problem

28. Lack of effective ways to get information to public, stakeholders, and decision-makers

29. Because additional water diversions are precluded from Great Lake Basin, communities along periphery have difficulty with new water supplies

30. Difficulty in determining what issues are problems to whom

31. Plant restoration of razed homesites

32. Lack of uniform fish advisories

Note: Missing numbers above were crossed out and combined with other, similar issues by the group.

B. VOTE

No. points	Issue(s)
13	6
12	1, 7, 10, 15
10	11, 23
9	4, 17
8	9, 25
7	18, 21
6	19
5	2, 8, 30
4	20, 28
3	3
2	13
1	26
0	14, 22, 24, 29, 31, 32

SESSION II WALL CHARTS: NEEDS IDENTIFICATION

NEEDS

Issue 10. Lack of data on resource

1. Coordination meeting between Indiana/Illinois researchers

Education

MINUTES BY CHRISTINE PENNISI

Originally 32 ideas were suggested. The group had a hard time eliminating or combining ideas; after much discussion the list could only be narrowed by a few ideas. The highest-voted item, "non-point source pollution," received thirteen points; the next ten highest ideas received eight or more points each.

There was a heated discussion over the idea, "lack of data on biota resource, both historical and current." The reason is that southern Lake Michigan acts as a critical nursery ground for the rest of the Lake for both perch and lake trout, yet little is known about the nature of this nursery ground habitat. With critical problems of perch and lake trout reproduction, it is essential to understand this habitat to perhaps correct habitat deficiencies. This idea not only emerged as the fourth highest priority, but also a specific action item was suggested:

- Organize a conference for southern Lake Michigan scientists and resource managers on the current understanding of the southern Lake Michigan biota.

Otherwise, there was a problem of how to prioritize the rest of the ideas, since for the top eleven ideas the lowest ranking idea received only five points less than the highest ranking idea. In fact it was agreed that all eleven ideas were important.

However, several other factors could be used to determine which ideas were most suitable for Sea Grant to tackle. First, some ideas were so general that they provide little direction for the effort; these ideas were "non-point source pollution," "air quality," and "drinking water quality." The idea of "combined sewer overflows" was more a "general environmental concern" and Sea Grant may not be the best program to deal with it. A third idea, "lack of resources for contaminated sediments remediation," is really more of a regulatory problem.

As a result of the above reasons, a more manageable number of priority areas for Sea Grant emerge. They are:

1. Mismatch of resource "management" to resource "boundaries."
2. Lack of data on resource (biota) - historical and current;
3. Lack of (disagreement over) criteria for clean-up and restoration activities (remediate and "develop" or [return to natural] "habitat");
4. Impacts of exotics on native species;
5. Lack of knowledge/education on air deposition issues, and;
6. Difficulty of citizens using technical/scientific information in decision-making (lack of cultural context).

KARNER BLUE BUTTERFLIES

SESSION I WALL CHARTS: ISSUES AND CONCERNS

ISSUES

1. Informed public *(Also 6, 24)*
2. Ecosystem fragmentation
3. Absence of regional vision
4. Match of environmental needs with economic needs
5. Health risk
6. ~~Positive & negative information not made public~~ *(Combined with 1)*
7. Groundwater contamination
8. Coastal erosion zone management
9. Management of exotic species *(Also 16)*
10. Biodiversity (loss of)
11. Regional balkanization
12. Remediate for effective use
13. Shrinking financial resources -- private/public *(Also 14)*
14. ~~Higher taxes~~ *(Combined with 13)*
15. Prompt environmental clean up (lack of)
16. ~~Impacts of exotics on rare species~~ *(Combined with 9)*
17. Little money to correct combined sewer overflows.
18. Coastal infrastructure deterioration
19. Coastal zone development
20. Hydrological disturbance
21. Socio-economic transition
22. Extension of research & development
23. Infrastructure deterioration
24. ~~Lack of public access to local environmental information~~ *(Combined with 1)*
25. Lack of interdisciplinary research & development
26. High ozone levels
27. Lake water quality
28. Lack of communication between agencies

29. Public awareness/appreciation/education of science/technology
30. Urban runoff from contaminated areas
31. Contaminated sediment clean up
32. Lack of environmental justice
33. Fish consumption advisories
34. Fisheries management (effective)
35. Open-dumping on natural areas
36. Accommodation of divergent interests (better)
37. High volatile organic compounds and particulate emissions from U.S. Steel
38. Prairie and wetland restoration & preservation (lack of)
39. Lack of public access to real estate

Note: Some issues above are crossed out; they were combined with other, similar issues as indicated.

VOTE

No. points	Issue(s)
18	27
15	1
14	4
11	5
10	36
7	22, 31
5	2, 11, 21, 25, 37
4	3, 7, 9, 10, 13
3	15
2	26, 38
1	20
0	8, 12, 17, 18, 19, 23, 28, 29, 30, 32, 33, 34, 35, 39

SESSION II WALL CHARTS: NEEDS IDENTIFICATION

Priority 1: Lake watershed water quality

1. Assessment of sources of degradation and their importance
2. Extension of monitoring for groundwater quality
3. Further restriction of discharge concentration values
4. Understanding of lake and tributary interaction

5. Need to understand loadings from air depositions
6. Identify remedial actions
7. Remediate contaminated sediments
8. Eliminate dumping
9. Re-establish Lake Michigan as a food resource base
10. Understand effects of hydrologic alterations on water quality
11. Need to secure funding for clean-up
12. Establish financial/legal/jurisdictional responsibility
13. Minimize loadings from urban runoff
14. Determine feasibility of Lake Michigan for use as natural hatchery
15. Understand transport and fate of contaminants
16. Further understand impact of zebra mussels on water quality
17. Need to understand health and ecological effects
18. Disseminate information

VOTE

No. points	Need(s)
20	1
8	7, 12
6	9, 15, 17
4	5
3	4, 6, 11, 13
2	2, 10
1	18
0	3, 8, 14, 16

Priority 2: Informed public

1. Need to bring public into research
2. Incorporate environmental education with public school curriculum at all levels *(Also 7, 9)*
3. Need informal education activities (National Science Foundation model)
4. Address how research will benefit public concerns
5. Spend time educating journalists
6. Need lake health barometers (indicators) that public can understand
7. ~~Extend workshops to schools regarding environmental studies~~ *(Combined with 2)*
8. Issue more press releases

9. ~~Add early education programs~~ *(Combined with 2)*
10. Bring policy makers into scientific research & development
11. Consolidate/cooperation with higher environmental education resources
12. Disseminate audio-visual environmental education information
13. Universities recruit minority students to environmental science programs
14. More multi-disciplinary approaches to education & projects
15. Interpretation outlets
16. More TV commercials

VOTE

No. points	Need(s)
26	2
12	5
10	3, 10
8	13
7	6
5	1
4	11, 16
3	8
1	4
0	12, 15, 15

MINUTES BY LESLIE DORWORTH

Session I. The facilitator for the Karner Blue Butterfly Group was Michael Massone. The group members represented various professions, i.e. from educators to economists. We came up with 39 issues and concerns, as identified above, during the first part of the session. Based on the group's overall approval, we combined several issues:

> The first combination involved the public and their access to information concerning the environment (issue 1). We included in this subject area the potential for public environmental education programs (issues 6 and 24).
>
> The next combination dealt with socioeconomic needs (items 13 and 14). The combined topics involved or considered the loss of resources from both the public and private sectors, and the resulting higher taxes.

Dealing with declining resources, then brought about discussion concerning the deterioration of CSOs (combined sewer overflows) and the overall breakdown of the infrastructure. These ideas led to the lack of concern surrounding the coastal infrastructure deterioration. Again, these ideas circle back on the lack of funding. As a

group, we were asked by our facilitator to rank our top five from the list of 39 concerns. Our top issues were: (1) Lake water quality; (2) Informed public; (3) Match of environmental needs with economic needs; (4) Health risk; and (5) Accommodation of divergent interests.

Session II. The second session dealt with the five top issues and their specific needs. Before we actually began the session, there was brief discussion concerning the heading of the first priority, lake water quality. Since lake water quality deals with several aspects ranging from groundwater quality, the presence of *E. coli*, toxins, and acid deposition, to name a few, it was suggested that the general heading be modified to include "Watershed". It was agreed that the heading should be renamed 'Lake Watershed Water Quality.' We came up with eighteen issues addressing this topic. The two that caused the greatest discussion involved securing funding for cleanup, and establishing financial and legal responsibility for the cleanup. The establishment of financial and legal responsibility for cleanup requires that accountability be determined. This, of course, led to other issues, but from this discussion it was concluded that jurisdictional responsibility should be added. We decided that the top needs that best address lake watershed water quality were: (1) Assessment of sources of degradation and their importance; (2) Remediation of contaminated sediments; (3) Establish financial/legal/jurisdictional responsibilities; (4) Re-establish Lake Michigan as a food resource base; (5) Understand transport and fate of contaminants; and (6) Need to understand health and ecological effects.

The next need examined how to inform the public about their surrounding environment. We discussed sixteen potential ways to educate the public. We were able to combine three topics involving early environmental education. It was recognized that we had to attempt to incorporate an appreciation for the environment into the school curricula, particularly at an early age. Our top need for this session therefore dealt with incorporating environmental educational into all school levels. The second need examined the possibility of somehow educating the media. The third need presented the idea of informal educational activities, the fourth recognized the necessity of including the policy makers in the decisions concerning scientific research and development, and the fifth recognized the importance of recruiting minority students into environmental science programs. The sixth need concerned the use of lake health barometers that would help the public understand how their lake was doing ecologically.

V. REPORTS FROM FACILITATED SESSIONS I AND II

At the beginning of the second day, one representative from each group reported their group's results to the assembled participants. Following are the (unedited except for minor clean-up) contents of the overhead transparencies used by the representatives. These correlate with the results presented in Section IV for the first and second facilitated sessions.

RIVER OTTERS

Tied for #1: Toxicity, continued discharge, and cleanup of surface and groundwater and sediments.

Preservation and restoration of natural areas. Maintenance of Dunes ecology. Drainage and wetland loss.

#3: Lack of effective public education. Educating those who work/reside in contaminated areas. Skewed dissemination of information by media.

#4: Sustainable development. Lack of public transportation.

#5: Citizen participation

Common Threads (not prioritized)

- Funding
- Public education
- Cooperation/partnerships among industry, government., private sector, academics
- Research & assessment (in order to develop effective solutions)
- Lobbying politicians

LAKE TROUT

Breaking down Barriers when Addressing Environmental Issues

- Ignoring Political Barriers
- Taking Bi-State Approach
- Taking a Bioregion Approach
- Planning & Coordinating Regionally
- Think Globally, Act Locally.

Brownfield/Redevelopment Issues

- Community Involvement & Education
- Attracting "Responsible" Industry
- Responsible Redevelopment (Environmentally & Socially)
- Inform Public what Mechanisms are Available to Oppose Industry.
- Environmental Justice

Breaking down barriers . . .

- Identifying Bioregions
- Establish framework & guidelines within which a bioregion can function across political boundaries & is supported by authority & incentives
- Establish work groups or forums with varied backgrounds & experiences but shared goals to focus on environmental issues.
- Identify unifying elements of a bioregion, at the same time pinpointing those issues that can only be dealt with locally.
- Identify all key players ahead of time to get buy-in to goals & mission
- Establish goals & mission of groups.

Brownfield/Redevelopment

- Install mechanisms to educate & empower the public to encourage involvement.
- Provide incentives to encourage responsible redevelopment, through creative solutions, from both a social & environmental perspective.
- Involve local citizens groups in planning, implementation (labor) of redevelopment projects.
- Develop positive public relations.
- Market the region as an attractive industrial area with emphasis on responsible industry.
- Research, identify & analyze successful & failed case studies.

PIPING PLOVERS

ISSUE # 1

Loss of or changes in natural communities. Fragmentation leading to losses of biodiversity. Loss of habitat communities. Habitat protection and setting long-term goals.

Actions Needed:

- Identify conservation goals and complete strategic planning.

- Control of aquatic and terrestrial exotics, and native populations currently out of balance.

ISSUE # 2

Water quality, drinkable and swimmable. Safety of fish and animals that live in the lake. Health throughout the food chain (algae, fish, humans). Need for long-term trend analysis of fish and water quality changes. Impacts on special human populations.

Actions needed:

- Eliminate persistent toxic discharges, locally and worldwide.
- Incentives and disincentives.
- Enforcement of pollution control laws.

ISSUE # 3

Techniques for cleaning and disposal of contaminated sediments. Impact of contaminants in sediment.

Actions needed:

- Remove contaminated sediments
- Do cost benefit analysis
- Sustain remediation efforts

GREAT BLUE HERONS

Issues

1. Non-point source pollution
2. Air quality
3. Mismatch of resource management to resource boundaries
4. Lack of data on resource (biota) -- historical & current
5. Lack of (disagreement over) criteria for cleanup and restoration activities (remediate and "develop" or "habitat"?)

Other Priorities

6. Lack of resources for contaminated sediments remediation
7. Combined sewer overflows (CSOs)

8. Drinking water quality
9. Impacts of exotics on native species
10. Lack of knowledge/education on air deposition issue
11. Difficulty of citizens using technical/scientific information in decision-making (lack of cultural context)

KARNER BLUE BUTTERFLIES

Session 1 Top Issues

- Lake water quality
- An informed public
  - including easy access to negative & positive information
- Proper match of environmental & economic needs
- Health risks
- Accommodation of divergent interests (better)

Session 2 Needs

With Respect to Lake Watershed Water Quality

Top items:

- Assessment of sources of degradation and their relative importance
- Remediate contaminated sediments
- Establish financial/legal/jurisdictional responsibility
- Re-establish lake as a food resource base
- Understand transport & fate of contaminants
- Understand health and ecological effects

With Respect to an Informed Public

- Incorporate environmental education programs with public school curriculum at all levels
- Educate journalists
- Informal educational activities
- Bring policy makers into scientific R & D
- Universities recruit minority students into environmental science programs
- Lake health barometers that public can understand

VI. FACILITATED SESSION III

INTRODUCTION

The topics for the third facilitated session -- water quality, breaking down barriers across political boundaries, habitat and biodiversity conservation, and an informed public -- were chosen in the evening between the two days of the workshop by the conference organizers and facilitators based on the results of sessions I and II. After the summary reports were presented from the facilitated sessions I and II on the morning of the second day, see Section V, each participant chose the topic of most interest. The participants in each group are listed in Appendix III.

Each group was given the following question:

> What key research and management strategies are needed to accomplish the issues identified for this topic?

The following material is a summary of Facilitated Sessions III. The summary is presented in three ways for each group:

1. The material from the wall charts used by the facilitators to record suggestions by the participants. The wall charts were transcribed by D.J. Case and Associates.
2. Summaries based on notes taken by a participant/observer in each group.
3. The transparencies used to present the significant results from each group to the assembled participants, these are in Section VII.

To the extent possible, the format is the same for all groups. However, there are small, unavoidable differences.

WATER QUALITY

SESSION III WALL CHARTS: ACTIONS FOR NEEDS IDENTIFIED

NEED: What key things need to happen to address Water Quality issues along Southern Lake Michigan?

1. Eliminate persistent toxic discharges, locally and worldwide
2. Incentives and disincentives
3. Enforcement of pollution control laws
4. Assessment of sources of degradation and their relative importance *(Also 8, 9)*
5. Remediate contaminated sediment
6. Establish financial/legal/jurisdictional responsibility
7. Re-establish lake as a food resource base
8. ~~Understand transport and fate of contaminants~~ *(Combined with 4)*
9. ~~Understand health and ecological effects~~ *(Combined with 4)*
10. Atmospheric deposition
11. Non-point source pollution
12. CSOs (combined sewer overflows)
13. Groundwater contamination
14. Defining hydrologic boundaries for surface/groundwaters
15. Drinking water quality

VOTE

No. points	Action(s)
18	4
8	2
7	1
6	12, 14
4	5, 11, 15
2	3
1	10
0	6, 7, 13

Priority 1: Assessment of sources of degradation and their relative importance; Understand transport and fate of contaminants; Understand health and ecological effects

Support mass balance (EPA/Great Lakes National Program Office)

Support GIS (geographic information system) database for mass balance and CSOs, groundwater, non-point source

Broaden mass balance to include base flow

Defining hydrologic boundaries

Evaluate long-range transport

Support research on transport/fate of contaminants

Re-evaluate critical pollutants

Support research on health/ecological effects

Priority 2: Incentives and disincentives

Reducing liability for environmental audits

Support states' voluntary mediation programs [including awareness I&E (information and education)]

Link P2 (pollution prevention) efforts with businesses/sources that generate critical pollutants

Maintain the base line of enforcement

Explore market-based approaches/techniques to pollution control

Create incentives for facilities to develop storm water management plans

Promote MOU's (memorandums of understanding) to remediate groundwater contamination

Priority 3: Eliminate persistent toxic discharges locally and worldwide

Enhance pollution prevention efforts

Support the Great Lakes Initiative

Remediate contaminated sediments

Encourage treaties to eliminate manufacture, export, use of persistent toxins

Increased testing of chemicals prior to registration by manufacturers and independent labs

Priority 4A: CSOs (combined sewer overflows)

Explore funding mechanism

Institutionalize BMP's (best management practices) in municipalities

Innovative treatment technology (ultraviolet, etc.)

Manage secondary discharge

User fees -- incentives/disincentives for hook-up and storm water discharge

Require cities to comply with states' CSO strategy

Water conservation and metering

Support congressional efforts to re-authorize/strengthen Clean Water Act/Safe Drinking Water Act

Priority 4B: Defining hydrologic boundaries for surface/groundwaters

Develop more sophisticated models

Funding

Compiling existing research using GIS

More gauging stations and monitoring wells

Compile existing data from monitoring wells using GIS

Priority 5A: Drinking water quality

Support research into pathogens & contaminants

Support research into innovative, non-chemical water treatment

Design institutional framework to guide privatization of water treatment facilities and delivery systems

More sophisticated models for wellhead protection

Address groundwater contamination more comprehensively (e.g. Annex 16 of the Great Lakes Water Quality Agreement)

MINUTES BY LESLIE DORWORTH

The third facilitated session was based on water quality action strategies. Our group was much smaller than the previous day, but we were able to define fifteen issues. We combined two issues concerning the potential sources of degradation and the importance of this degraded material. This topic was inter-related with the understanding of the transport of contaminants and their eventual fate in the system. The two ideas were inter-twined with the health and ecological effects. The next set of issues that were combined involved the eventual elimination of persistent toxic discharges both locally and worldwide. This, which would involve enforcing pollution control laws, led us back to establishing financial/legal/jurisdictional accountability. Our ranking of the action strategies was: (1) assessment of sources of degradation and their relative importance; (2) incentives and disincentives; (3) elimination of persistent toxic discharges, both locally and worldwide; (4) CSOs (combined sewer overflows) and defining hydrologic boundaries for surface/groundwater; and (5) drinking water quality, non-point source pollution, and the remediation of contaminated sediments.

Assessment of the sources of degradation, we decided, needed to start with a good data base of information. This led us to modeling the system and the fact that the EPA is looking at the cumulative effects of various contaminants. Modelers are putting this information together in what is called "Support Mass Balance" (EPA/Great Lakes National Program Office). We realized that the information needed to be put together in some form that the public would understand. This brought us to GIS (geographic information systems) which will support "Mass Balance". We discussed the fact that the state was evaluating groundwater contaminants and CSOs, and that this data would or could go into the GIS database. Also discussed were hydrologic boundaries and

their definition, and the effects the boundaries have on long-range transport into the basin. We concluded that there should be more support for research concerning the transport and fate of contaminants, and on health and ecological effects.

The incentives and dis-incentives issue consisted of a discussion of reducing liability for environmental audits. Also discussed was the possible support of states with voluntary remediation programs such as an awareness program. Examples are the dry cleaners and the move away from toxic substances to less- or non-toxic substances, and the linkage of P2 (pollution prevention) efforts with businesses and the sources that generate the critical pollutants. It seemed as though we came back to money by creating incentives for facilities to develop ways to manage their own toxins, i.e., explore market-based approaches to pollution control. The general agreement was that a baseline enforcement of point/non-point sources should be maintained.

The third issue examined was the elimination of persistent toxic discharges. To do this we began with the overall support of the Great Lakes Initiative. Remediation of contaminated sediments was included in this issue. We discussed the encouragement of treaties to eliminate the manufacturing of persistent toxins. The conclusion for this topic was to have the testing of toxic substances generated by a manufacturer be done by the manufacturer as well as by private labs.

The fourth issue was divided between two items. First we examined what could be done with CSOs. Under this topic we decided that funding mechanisms needed to be explored and BMPs (best management practices) incorporated by municipalities. Other areas included creating innovative treatment techniques, reducing or managing secondary discharge, using fee incentives/disincentives for the hook-up to and for stormwater discharge, requiring cities to comply with state CSO strategies, conserving and metering water, and, finally, supporting congressional efforts to reauthorize and strengthen the Clean Water Act and the Safe Drinking Water Act.

The second issue examined in our fourth topic was hydrologic boundaries. This can be difficult at times due to the altered hydrology of the area, but by compiling existing research and applying models it may not be as difficult as anticipated. It was decided that more gauging stations were required in the area. All information could then be included in the GIS data base. The top issue for this was money.

Our fifth issue was drinking water quality. We decided that there should be more support for research into pathogens and contaminants in the drinking water supply. This led to the support of research exploring innovative and potential non-chemical water treatments. Another matter discussed under this heading was the privatization problem. It was concluded that there should be some sort of design to guide privatization of the water treatment facilities and the delivery systems. The final idea discussed was the potential for more sophisticated models for well head protection, and this then lead us to groundwater contamination. This has been addressed more comprehensively in Annex 16 of the Great Lakes Water Quality Agreement.

BREAKING DOWN BARRIERS ACROSS POLITICAL BOUNDARIES

SESSION III WALL CHARTS: ACTIONS FOR NEEDS IDENTIFIED

Needs (The top three are marked by a *)

1. Indiana should participate in the Great Lakes funding source. (Need to adjust funding formula/barriers.)

*2. Stress diversity that northwest Indiana (Chicago also) offers -- natural and environmental. Marketing. Environmental aspects, quality of life

3. Specific opportunities for cooperation, e.g. brownfields, sites

4. Ask what advantages exist for both sides, and what to avoid

5. Identify all key players ahead of time to get buy in to goals and mission

6. Establish goals and mission of groups.

7. Establish work groups or forums with varied backgrounds and experiences but shared goals to focus on environmental issues

*8. Identify unifying elements of a bioregion at the same time pinpointing those issues that can only be dealt with locally

9. Identify bioregions

*10. Establish framework and guidelines within which a bioregion can function across political boundaries and supported by authority and incentives

11. Ensure that local politicians and all stakeholders recognize economic benefits of helping to pay the cost

Started work on need 10 -- Establish framework and guidelines within which a bioregion can function across political boundaries and supported by authority and incentives. Actions:

Look for existing projects and structures

Bring groups together from both sides

Look for common concerns working for common benefit

Projects with cross-state benefits

Short-term projects lead to long-term relationships (often difficult to find the right people)

Definition of the bioregion: Southern Lake Michigan and watershed

Potential Projects

Brownfields

Grand Calumet

Transportation

Action #1 Focus on Grand Calumet and Little Calumet River corridors as a catalyst for pulling together, including Illinois as a partner

What? Selected:

National parks - Grand Calumet corridor
Little Calumet and Grand Calumet - pull together, need Illinois partner

How?

Check interest in/among Illinois and Indiana state agencies -- common goals? e.g., recreation

Sea Grant define concerns -- study options, recommend actions
- research
- education
- facilitating -- especially Indiana and Illinois DNR (Departments of Natural Resources)
- partnering to identify stakeholders

Action #2 (may follow #1) Use the Calumet River Corridor planning projects as the stimulus for:

Calumet River projects

Northwest Indiana and Northeast Illinois planning to include environmental concerns -
- set of quality of life focus
  * social
  * political
  * environmental

Use other models such as Chesapeake Bay or San Francisco Bay

Other Ideas:

Boating laws, Illinois and Indiana cooperate

Bi-state planning for boating marinas - don't want to waste space

Changing land use opportunities.

Look at coastal development and sediment flow.

MINUTES BY EMILY STEADMAN

After the initial listing of actions and some clarifications, the group's top three priorities were identified. Discussion stared with: "establish a framework and guidelines within which a bioregion can function across political boundaries, supported by authority and incentives." Anne Ogren (U.S. Steel) and Emily Steadman (City Innovation) explained the background of this statement from the Lake Trout's Session II needs identification.

Other priorities were: "stress the diversity that Northwest Indiana and Southeast Chicago offers -- natural and industrial -- in order to overcome negative stereotypes" and "Identify unifying elements and identify what should be kept local."

After a few minutes, it became apparent that the topics being discussed were not mutually exclusive and that the most productive use of time would be to explore them in the context of a specific cooperative project. Potential projects were: brownfields, Grand Calumet River Corridor, transportation, and national parks.

WHAT: The Grand Calumet Corridor became the focus since some group members were already actively involved in this area. Dorreen Carey (Grand Calumet Task Force) mentioned that they have initiated a visioning process for the Grand Calumet Corridor and are looking for an Illinois partner.

WHO AND HOW: The boundaries of the Corridor need to be identified to determine the course of planning, and existing interests would have to be taken into account. An interest noted was the Calumet Ecological Park Association. John Braden (Illinois Water Resource Center) mentioned partnerships that have started to study biological diversity along the Grand Calumet, and a study conducted by the Chicago Department of Environment on the potential for Lake Calumet economic development. All such interested groups and local community stakeholders would have to be sought out and included, and pre-existing groundwork investigated. Cross-state benefits would have to be identified. It was pointed out that recreational interests would be important in the discussion.

Sea Grant's potential role was discussed as defining concerns, studying options, and recommending actions. Phil Pope (Illinois-Indiana Sea Grant Program) confirmed that Sea Grant could help to identify opportunities and attract interest, funding, etc. Daniel Injerd (Illinois Department of Natural Resources) said that they could have interest in water flow, and could possibly provide some assistance in a project. Steve Lucas (Indiana Natural Resource Commission) expressed potential for their involvement in the areas of hydrology and recreation.

Mark Reshkin (Indiana University Northwest) stated that he would like to see more actions in non-traditional research toward policy change. Bill Miller (Northwest Indiana World Trade Council) stressed that beyond purely environmental aspects is the larger picture of overall "quality of life." In response to this, Jerry Long (Indiana University Northwest) suggested expanded planning to set quality of life standards encompassing social, political, economic, and environmental concerns. Phil Pope noted that Sea Grant has proposed a model for this, using examples from Chesapeake Bay and San Francisco Bay as models for sustainable development. Dorreen Carey pointed out that industrial rivers and brownfields are a good focus for this type of planning because they involve both "health and wealth" issues.

At this point, the group decided it could go no further at that point with planning for a collaborative Grand Calumet Project. Names were exchanged and some verbal

commitments were made for future meetings, and many signed up for a bi-state workgroup. Other common issues and potential projects for Illinois/Indiana cooperation were brainstormed. The discussion went toward cooperation with boating laws and competition in marina sitings and expansions. Stressing economic benefits to both sides was suggested as one way to overcome competitive attitudes among developers and local governments. A final issue mentioned that has potential for cooperation was coastal/shoreline management and uses related to sustainable development.

HABITAT AND BIODIVERSITY CONSERVATION

SESSION III WALL CHARTS: ACTIONS FOR NEEDS IDENTIFIED

First we listed the actions needed to achieve habitat and biodiversity conservation. These were lifted from the actions section of the reports from yesterday's sessions.

ACTIONS

1. Identify conservation goals and complete strategic planning - coordinate with existing groups with work in process
2. Control of aquatic and terrestrial exotics and native species that are out of control
3. Lack of data
4. Lack of (or disagreement on) criteria for cleanup
5. Difficulty of citizens using technical data and scientific information in decision making
6. Funding
7. Public education
8. Cooperation and partnership among industry, government, and the private sector
   - different areas of expertise
   - manpower
   - funding
9. Lobbying politicians
10. Recruit minorities to universities' environmental science programs
11. Establish lake as a food resource base (aquatic)
12. Use the bioregion approach. Break down political barriers to addressing environmental issues
13. Coastal resource use planning (brownfields/urban sprawl)
14. Fisheries management, native vs. exotic (includes habitat)
15. Corridors to connect natural areas

VOTE

No. points	Action(s)
13	8 (6) & 12 (7)
12	1
6	13
3	2, 15
2	3
1	6, 10, 14

0	4, 5, 7, 9, 11

The group decided that actions 8 (6 points) and 12 (7 points) were the same, resulting in 13 points total. The group did discuss actions 8 and 12 but, since it is being dealt with by another group, the group did not discuss the implementation steps.

Priority 1: Identify conservation goals and complete strategic planning

Steps to implement:

1. Take a poll to get the desires of the groups involved
2. Identify conservation targets:
   * Targets are scalable
   * Endangered species and systems
   * What you have and how it works
   * Targets are not limited to places. They can be species or ecosystems
3. Coordinate with existing action groups (Indiana Department of Environmental Management, Grand Calumet Task Force) that have established plans and efforts
4. Identify problem areas that hinder Action 2 (polluted, contaminated, or developed areas)
5. Convene a conference like this one strictly for habitat conservation
6. Assess where we are now (successes and failures)
7. Connect natural areas (Action 15) (A strategy)

VOTE

These seven steps were then prioritized. Steps 1 and 5 were combined. The result of the first vote is:

No. points	Step(s)
12	2
4	1
2	3, 4
1	6
0	7

It was felt that step 2 skewed the vote. A second vote was taken:

No. points	Step(s)
7	4
6	3
5	6
3	1
0	2, 0

Top two priorities were steps 2 and 4.

How to implement step 2: Identify conservation targets

1. Look at existing data (heritage data) from both states
2. Mapping - habitat, using GIS, whole Sea Grant Region (some exists)
3. Find out what you don't know (Fill the information gaps.)
4. Filter 1, 2, and 3 above. Find out what is feasible, prioritize and work on what is critical
5. Accomplish 1, 2, 3, 4 above in coordination with other groups

Who will do this

1. Existing organizations
2. Coordinate the existing web. Sea Grant facilitates web integration. Great Lakes Commission complimentary efforts

Priority 2: Coastal resource use planning (brownfields/urban sprawl)

Steps to implement:

1. Use brownfields instead of greenfields for development
2. Find out what is going on -- coastal planning and existing groups
3. Identify ties with other programs (tap resources of overlapping programs), make $ go further
4. Organization to insert environmental plans into development plans (economic) -- Northeastern Illinois Planning Commission and Northwest Indiana Regional Planning Commission
5. Make sure the Lake is addressed

Who will do this

1. Sea Grant
2. Northeastern Illinois Planning Commission
3. Northwest Indiana Regional Planning Commission
4. Department of Natural Resources, Illinois and Indiana
5. National Lake Shore
6. Nature Conservancy
7. Researchers
8. Chambers of Commerce
9. Northwest Indiana Forum
10. Down to individual local governments and public action groups

MINUTES BY CHRISTINE PENNISI

Three top action strategies emerged from this group:

1. Take a bioregional approach involving cooperation/partnerships among industry, government, private sector, and academics;
2. Identify conservation goals and complete strategic planning; and
3. Do coastal resource planning, including brownfields and urban sprawl.

FIRST ACTION STRATEGY: Discussion got bogged down, but since another group was already addressing it we decided not to discuss how that strategy was to be implemented and who it was to be directed towards.

SECOND ACTION STRATEGY: The topic "Identify conservation goals and complete strategic planning," was first fleshed out; what was meant by it is to:

1. Survey stakeholders (written surveys, workshops like this one);
2. Identify conservation target species/habitats (endangered species and systems);
3. Coordinate with existing action groups and their efforts;
4. Identify problem areas that hinder or cause item 2 (pollution, contaminants, degraded areas);
5. Assess where we are now; and
6. Connect natural areas.

Implementing this strategy could include the following steps:

1. Look at existing data - both states (heritage);
2. Mapping this data (coastal) -- use GIS, some of it already exists;
3. Researching what don't know and what gaps to fill;
4. Prioritize, filter, what's feasible;
5. To accomplish "1" to "4", need to coordinate efforts; and
6. Implement critical actions before completing "1" to "5".

"Who" this strategy and implementation steps are directed to is "existing organizations." All the data collected in the effort ought to be on a computer data base that can be accessed by Internet users. Sea Grant can coordinate the linkages on the Internet web sites and can facilitate web integration with the Great Lakes Commission and others.

THIRD ACTION STRATEGY: The topic is: "Coastal resource planning (brownfields, urban sprawl)." Steps for implementation include:

1. Use brownfields instead of greenfields;
2. Find out what's already going on;

3. Identify ties with other programs - (tap resources of overlapping programs);
4. Organization to insert environmental plans into development plans (economic), such as Northeastern Illinois Planning Commission or Northwest Indiana Regional Planning Commission; and
5. Pull Lake into program.

Several potential audiences were discussed, see the wall chart results above.

AN INFORMED PUBLIC

SESSION III WALL CHARTS: ACTIONS FOR NEEDS IDENTIFIED

Need: Incorporate environmental education programs into school curriculum at all levels.

1. Take better advantage of existing programs.
   - web site with all information on existing programs.
   - facilitate discussion between educators in region
   - create environmental education network targeting multi-disciplinary educators for program information exchange.

Existing Programs A = umbrella groups, some coordination
B = special education programs

B	Nature Conservancy
A	Chicagoland Environmental Network
B	Lincoln Park Zoo (Green Team)
A-B	Calumet Environmental Resource Center.
A	Indiana Environmental Education Association
A	Calumet Ecological Park Association
A?	Sand Ridge Nature Center
A	Elementary Science Support Center (at Purdue Calumet)
B	River Watch
B	Neighborhood Assistance Center
A	HASTES Association of Science Teachers
B	Douglas Center for Environmental Education
B	Illinois Geographic Alliance

Who

1. ? City Innovation might coordinate efforts to bring together
2. Calumet Environmental Resource Center (CERC)
3. ? Purdue University Calumet, Indiana University Northwest, Valparaiso University

This **must** be a bi-state or regional effort.

2. Approach education policy makers about including environmental education programs into school curriculum.
   - assess/establish environmental education standards
   - lobby for more environmental education(administrators and teachers)
   - determine additional environmental education needs
   - work for an easy fit (smooth inclusion)

3. Train educators
   - determine training needs
   - provide educational materials
   - teacher workshops
   - establish central resource center -- Purdue, CERC ??

Need: Universities recruit minority students into environmental science programs

1. Publicize job opportunities in environmental field (technical and non-technical)
2. Attract minorities to environmental sciences
   - after school programs
   - weekend programs
   - teaching across the curriculum
   - community activism
   - internships (private/public)
   - urban outreach
   - scholarships
   - cooperative programs
   - mentoring programs between private/education organizations
   - science/environmental fairs
   - Calumet Environmental Fair
     * corporate sponsors
     * school sponsors

Need: Educate Journalists

1. Field day for journalists/media
   ?Sea Grant could sponsor

   Accentuate the positive

   wetlands, Lakeshore, pollution prevention, Big Marsh, Indiana Dunes, prairie, Pullman District, waterfalls (aeration), partnerships for clean up (brownfields)

   Show them what is!

   Stop at environmental community organizations
2. Show both sides of issue

   look at research done by CCUA (Chicago ? urban Action??) to coordinate these issues

   create network of regional experts for interviews.
3. Issues/environmental education workshop (global reporting)
4. Get issues out to non-English-speaking media.

MINUTES BY BRIAN MILLER

This group on the importance of creating an informed public was facilitated by Mike Massone and had six participants representing universities, government agencies, and non-government organizations.

Six needs relevant to an informed public were identified during Day 1, and these must be addressed to create a public more informed on environmental issues. Participants prioritized these needs and developed action strategies to address the top three.

Need 1: Incorporate environmental education programs into school curricula at all levels.

The group felt that we need to take better advantage of existing programs. There are a lot of curricula on environmental topics currently in use. Participants desired a list of what all schools in the region are currently doing.

Creating a WWW site is one approach to compile this information, and would provide an avenue to deliver information on existing curricula to teachers. This site would create an environmental education network which compiles what everyone is doing. Schools could dial up, learn, and add updates.

Participants identified several organizations which either have curricula and/or educational programs, or umbrella groups which represent groups of teachers and may be in a position to communicate these results to their members or provide existing information on curricula. A potential partnership may form as a result of this session. City Innovations and Calumet Environmental Resource Center (CERC) have an interest in working together to develop a proposal and coordinate efforts to compile what curricula currently exist. (This must be a bi-state effort.) This project would facilitate communications between educators at all levels and compile what is being done.

The second action strategy is to approach educational policy makers about including environmental education programs in school curricula. The participants believed that to accomplish this environmental education standards must be established. (For example, in history students at a given grade level may be expected to know who the president is or that we have congressmen and senators.) Likewise, standards should be developed for environmental awareness.

Once standards are developed, the third step is to lobby (administrators and teachers) for more environmental education and to incorporate these standards. After standards are adopted, educators must determine the additional environmental education components needed to fulfill these standards. They must strive for a smooth inclusion into existing programs.

Need 2: Educate Journalists.

Participants believed that an effective way to create an informed public is to reach large numbers of people through the mass media. The group believed that targeting

education of journalists may accomplish this. The first step is to conduct a field tour for journalist and media focused on southeast Cook County and northwest Indiana (everything not covered by the Chicago Wilderness Tour). Participants believed that Sea Grant Marine Advisory Services would be an appropriate organization to lead this activity. This field tour should accentuate the positive natural attributes of the region (e.g. wetlands, Indiana Dunes, and prairie), and show environmentally positive innovations in the region such as the man-made waterfalls along the Calumet River for aeration, various clean-up partnerships and other partner projects, and environmental innovations by industry.

A need was recognized for more objective reporting of environmental issues (less sensationalism and accentuation of negatives). To accomplish this, there is a need to objectively list the pros and cons, and to let the reader decide. Activities are desired to prepare reporters to show both sides of environmental issues. Research was conducted by the Chicago Council for Urban Affairs (CCUA). They worked with the media to identify problems they had and how to overcome these problems. The group suggested that we create a network of regional experts for interviews on environmental topics, and create a list of environmental reporters for professionals. We should encourage large media to have designated environmental reporters.

A third action strategy is to hold workshops for reporters on key environmental issues. (The emphasis should be global reporting which does not cover single issues but looks at the bigger picture and cuts across the issues.) It was felt that this would allow reporters to do more in-depth reporting on environmental issues and be able to sort out facts better. This workshop might also provide a forum for the media to communicate with professionals, and to explain their needs and limitations in environmental reporting so everyone can work together more effectively.

A fourth action strategy is to reach the non-English-speaking media because of the large non-English-speaking public around southern Lake Michigan.

Need 3: Universities recruit minority students into environmental science programs. (This can also be applied to minority residents in general.)

Participants believed that to create an informed public on environmental issues, all demographic groups must be reached. Action strategies included attracting minority students to environmental sciences programs through after-school programs, Internships (private/public), urban outreach, scholarships, and mentoring programs between private/educational organizations to train minority students who would be prepared to transfer environmental messages to their communities.

Remaining Needs: The three remaining needs which the group did not have time to develop action strategies for are:

Informal educational activities

Bring policy makers into scientific research and development

Lake health barometers that public can understand

VII. REPORTS FROM FACILITATED SESSIONS III

After lunch on the second day, one representative from each of the four groups reported their group's results to the assembled participants. Following are the (unedited except for minor clean-up and explanation of abbreviations) contents of the overhead transparencies used by the representatives. These correlate with the results in the above summaries of the third facilitated sessions.

WATER QUALITY

1. **Assessment of sources of degradation and their relative contribution to contamination**

- Support Mass Balance
- Support GIS (geographic information system) database for Mass Balance, CSOs (combined sewer overflows), GW (groundwater) and NPS (non-point source)
- Broaden Mass Balance to include base flow
- Define hydrologic boundaries
- Evaluate long-range transport
- Support research on transport/fate of contaminants
- Reevaluate critical pollutants
- Support research on health effects

2. **Incentives/disincentives**

- Reducing liability for environmental audits
- Support states' VRP (voluntary remediation programs) -- broaden awareness
- Link P2 (pollution prevention) efforts with businesses and sources that generate critical pollutants
- Maintain baseline enforcement
- Explore market-based approaches to pollution control
- Create incentives for facilities to develop SMW (storm water) management plans
- Promote MOUs (memorandum of understanding) to remediate GW (groundwater) contamination

3. **Eliminate persistent toxic discharges, locally and worldwide**

- Enhance P2 efforts
- Support GLI (Great Lakes Initiative)
- Remediate contaminated sediments
- Encourage treaties to eliminate manufacture, export, and use of persistent toxics

- Increase testing of chemicals prior to registration by manufacturers and independent labs

#4a Priority - CSOs

- Explore funding mechanism
- Institutionalize BMPs (best management practices) in municipalities
- Innovative treatment technologies (e.g., U.V. [ultraviolet], etc.)
- Manage secondary discharge
- User fees incentives/disincentives for hook-up and storm water discharge
- Require cities to comply with states' CSO strategy
- Water conservation and metering
- Support congressional efforts to reauthorize/strengthen CWA/SDWA (Clean Water Act/Safe Drinking Water Act)

#4b Priority - Defining hydrologic boundaries for surface/groundwaters

- Develop more sophisticated models
- Funding
- Compiling existing research using GIS
- More gauging stations and monitoring wells
- Compile existing data from monitoring wells using GIS

#5a Priority - Drinking water quality

- Support research into pathogens and contaminants
- Support research into innovative, non-chemical water treatment
- Design institutional framework to guide privatization of water treatment facilities and delivery systems
- More sophisticated models for well head protection
- Address groundwater contamination more comprehensively (e.g. Annex 16 GLWQA [Great Lakes Water Quality Agreement])

Remaining Actions (not discussed due to time)

#5b Remediate contaminated sediment

#5c Non-point source pollution

Enforcement of pollution control laws (2 pts.)

Establish financial/legal/jurisdictional responsibility (0 pts.)

Atmospheric deposition (1 pt.)

Groundwater contamination (0 pts.)

Re-establish lake as food resource base (0 pts.)

BREAKING DOWN BARRIERS ACROSS POLITICAL BOUNDARIES

Needs

- Identify unifying elements of a bioregion -- at the same time pinpointing those issues that can only be dealt with locally
- Establish framework and guidelines for a bioregion to function across political boundaries and supported by authority and incentives
- Stress diversity that NWI (Northwest Indiana) offers such as environmental amenities and quality of life

Specific projects:

1. Focus on Grand Calumet and Little Calumet River corridors as a catalyst for pulling together, including Illinois as a partner
   - Common vision and goals between the partners
   - Define concerns, study options, recommend actions
   - Work with Sea Grant for research, education, facilitating, partnership development with stakeholders
   - Conduct benchmarking studies for useful models -- i.e., Chesapeake Bay, San Francisco Bay
2. Use the Calumet River Corridor planning projects as the stimulus for:
   - Making environmental concerns an integral part of all regional planning efforts
   - Focus on a set of quality-of-life standards
     - Environmental
     - Social
     - Political
     - Economic

Other Projects

- Indiana/Illinois cooperation with boating laws
- Bi-state planning for marina development
- Take advantage of changing land use opportunities
- Coastal development and sediment flow problems

HABITAT/BIODIVERSITY

1a Taking a bioregion approach

1b Cooperation/partnerships among industry, government, private sector, academics

Fleshed out?

1. Survey stakeholders (written surveys, workshops like this one)
2. Identify conservation target species/habitats (endangered species and systems)
3. Coordinate with existing action groups and their efforts
4. Identify problem areas that are under #2 (pollution, contaminants, degraded areas)
5. Assess where we are now
6. Connect natural areas

2. Identify conservation goals and complete strategic planning.

How (implementing steps)

1. Look at existing data - both states (heritage)
2. Mapping this data (coastal) - use GIS - some existing
3. Researching what don't know and what gaps to fill
4. Prioritize, filter, what's feasible
5. To accomplish 1-4 need to coordinate efforts
6. Implement critical actions before 1-5 complete

Who

1. Existing organizations
2. Coordinate existing web
   Sea Grant - facilitate
   web - integration with
   GLC (Great Lakes Commission) coordination, etc.

3. Coastal resource planning (brownfields, urban sprawl)

How

1. Use brownfields instead of greenfields
2. Find out what's already going on
3. Identify ties with other programs - (Tap resources of overlapping programs)
4. Organization to insert environmental plans into development plans (economic), NIPC (Northeast Illinois Planning Commission, NIRPC (Northwest Indiana Regional Planning Commission)
5. Pull Lake into program

Who

1. Sea Grant
2. NIPC, NIRPC (Northeastern Illinois Planning Commission, Northwest Indiana Regional Planning Commission)
3. DNRs (Department of Natural Resources)
4. National Lakeshore
5. Nature Conservancy
6. Researchers
7. Chambers of Commerce
8. Northwest Indiana Forum
9. Individual local governments
10. Public Action Groups

AN INFORMED PUBLIC

A. Incorporate environmental education programs into schools at all levels

1. This must be a bi-state regional effort
2. Take better advantage of existing programs
   a. Create an environmental education network of existing programs and curricula
      - make use of existing umbrella organizations
      - who: ? C.E.R.C. (Calumet Environmental Resource Center), City Innovation, Purdue (Calumet), NW In. (Indiana University Northwest), Valpo (Valparaiso University)?
   b. create a website with information on existing programs
3. Approach education policy makers about including environmental education programs into curricula
   a. assess and establish environmental education standards
   b. lobby for environmental education (e.g., institutionalization of standards)
   c. determine additional environmental education needs
   d. work for an easy fit; a smooth inclusion of environmental education
4. Train educators
   a. determine training needs
   b. provide educational materials
   c. teacher workshops
   d. establish a central resource center (Purdue? CERC?)

B. Recruit minority students into environmental science programs (university)

1. Publicize job opportunities in environmental fields (technical and non-technical)
2. Attract minorities to environmental sciences

a. after-school programs
b. teaching across the curricula
c. weekend programs
d. community activism
e. internships (private/public)
f. urban outreach
g. scholarships
h. mentoring programs
i. Calumet regional environmental fair
   - corporate sponsors
   - school sponsors

C. Educate journalists

1. Field day for journalists/media
   ? Sea Grant sponsor?
   a. Accentuate the positive
      - natural areas, historical areas, brownfields
   b. Show them what is really in the Calumet region
   c. Stop at environmental/community organizations
2. Show all sides of issues
   a. Create network of regional experts for interviews
   b. Look at work already being done to improve media coverage of issues
3. Issues/environmental education workshop
   Global Reporting
4. Get issues out to non-English speaking media

VIII. CONCLUDING REMARKS

Mark Reshkin
title
Indiana University Northwest

Editor's Note: This is the outline followed by Professor Reshkin in his presentation.

I- Physical setting - Landscape Regions

Coastal ancestral Lake Michigan bottomlands, fringing morainal uplands, and a sandy alluvial plain - not coincident with today's political boundaries

A Great Lakes industrial region in what were farm belt states.

II- Settlement History from a natural resource perspective

Early stage (12,000 years) when the environment limited human endeavors.

Later stage when human endeavors changed the environment.

Company towns and Balkanization in Indiana: 1870's -1990's: The Industrial Calumet.

Suburbanization - how far will it extend?

Planet Park, an example of bi-state animosities

III- What defines the Indiana Calumet Region? The Industrial Calumet

Is there a critical need for substate regionalism?

IV- Some of the Area's Environmental Concerns; an introduction

Water quality concerns and water quantity opportunities

Flooding in the river valleys, and now in the morainal area too.

Health and economic aspects of air quality non-attainment.

Solid waste disposal: municipal and industrial.

Toxic and hazardous waste sites: Midco's I and II and more.

Indiana Harbor and the Grand Calumet River, Waukegan Harbor RAPs (Remedial Action Plans).

Shoreline management; erosion and development concerns.

Coastal Zone Management

V- Organizational Structures

Federal, State, Regional, Local - how coordinated must they be for community-based environmental protection?

VI - Opportunities for partnering

Thankfully, they are expanding,

In Indiana: Lake Michigan Marina Development Commission, Northwest Indiana

Brownfields Corporation, NIRPC (Northwest Indiana Regional Planning Commission), Northwest Indiana Forum.

Corridor Planning on the Indiana Harbor/Grand Calumet River corridor.

In the South Lake Michigan Region: O'Hare - Gary airports and other examples - not many yet.

Illinois-Indiana Sea Grant offers such an opportunity.

Let's take the opportunity to address issues on regional bases.

Can We? Of Course. Should We? Of Course.

Written Comments:

Some changes in the approach to Improving Northwest Indiana's Environmental Quality

100 years of economic growth and environmental pollution, 30 years of environmental protection and restoration

This Lake Michigan adjacent area has diverse land and water uses, and challenging environmental and resource management problems. Lake, Porter, and LaPorte Counties include 45 miles of Lake Michigan shoreline and significant national and state park lands, as well as residential and agricultural areas, and steel mills, refineries, electric power generating stations, and other industrial complexes. It contains both one of the world's major industrial centers and areas of renown natural resource.

Why did one of the world's great industrial centers develop here?

Resources - water, iron ore, coal

Location - the industrial heartland - hub of the nation's transport system

Workforce - Eastern European, African-American, Hispanic, all recruited

Why did so much pollution accompany this development?

Much of the early pollution occurred prior to the recognition of its impacts - Whiting refinery - oil in wooden tanks without bottoms - today's floating oil.

Certainly a period of recognition and avoidance of responsibility and action followed - example United States Steel and how they have changed attitudes. There is not yet the universal attitude change that is needed. Floating oil - mediation agreement.

Why such a focus on habitat restoration?

One of the continent's great natural areas- mixing of prairies, forests, bogs, dunes - 14 ecosystems - Nature Conservancy listing - read from it

One million acres of wetlands in Indiana lost - most of it here.

This restoration effort is widespread and diverse:

NIPSCo and the Kankakee Valley and the Migrant Trap

AMOCO in Whiting

USX in Gary, National Steel - Karner Blue in Porter County

Inland sludge project

Indiana Dunes National Lakeshore, State Park, Lake County Parks, the Nature Conservancy's many efforts, and more

Thus, we see a change from confrontation to cooperation, from being adversaries to being allies, and it is exciting. It could become the beginning of sustainable development in northwest Indiana.

The concept of sustainable development is based on the interdependence of economy and environment, and places emphasis on ecosystem management principles and practices. It is becoming increasingly important in northwest Indiana.

This area exhibits the dynamic interaction of increasingly coordinated citizen environmental advocacy, similarly active and coordinated economic development characterized by a changing yet growing industrial and commercial presence, and strong, coordinated environmental regulation enforcement by state and federal governments. A sustainable development vision for the future is needed now. One in which northwest Indiana leaders meet, discuss, and strive for consensus on what best constitutes sustainable development for this region.

A no-growth policy here would be inane.

Further environmental sacrifice here also would be inane.

No vision for the future would also be inane.

There are several sustainable development efforts underway here now.

Coastal Zone Management planning (now coastal coordination)

Northwest Indiana Initiative - IDEM (Indiana Department of Environmental Management) and EPA

Indiana Harbor and Ship Canal, and Grand Calumet River RAP and corridor efforts

Gary-Hammond-East Chicago Brownfields Project - where the action should be.

Brownfield redevelopment can work here to continue to build a prosperous economy while protecting and restoring environmental resources. It is a most practical application of sustainable development. The joint brownfields redevelopment project of Gary, Hammond, and East Chicago is supported by EPA and IDEM, and includes efforts by individuals and organizations from across the broad spectrum of northwest Indiana interests; bankers, realtors, industrialists, environmentalists, neighborhood organizations, and labor leaders. It is a practical example of what sustainable development should be.

The future of northwest Indiana must be decided in northwest Indiana by northwest Indiana interests.

Who are these interests?

Local elected officials - NIRPC needs to be a NEIPC

Industry and Commerce leadership - Northwest Indiana Forum

The Environmental Coalition - 11 groups

Area labor representatives.

What impact will the changes in federal legislation in the "Contract With America" have on sustainable development here?

Property rights and takings - STOP - will the Lakeshore disappear?

Return environmental control to the states - will IDEM protect our resources?

Will the enforced community decide to return to older policies? and finally,

Will we saddle our children and grandchildren with the losses in environmental heath and resources resulting from these policy changes?

I wish I knew the answers. I believe business and industry want stability, not ever-changing policies. I hope we don't lose this best effort at both economic growth and environmental quality that I have witnessed in the past 30 years.

APPENDIX I

AGENDA

SOUTHERN LAKE MICHIGAN ENVIRONMENTAL ISSUES WORKSHOP

May 21 and 22, 1996

Purdue University Calumet, Hammond, Indiana

Sponsored by the Illinois-Indiana Sea Grant Program, the Center for the Environment of Northwest Indiana, a partnership in formation of Indiana University Northwest & Purdue University Calumet, and City Innovation

WORKSHOP AGENDA

Tuesday, May 21, 1996

7:30-8:30	**Registration** **Refreshments**	**O-Lobby** **O-126**
8:30-8:45	**Welcome and Workshop Explanation** James Yackel, Chancellor, Purdue University Calumet Hilda Richards, Chancellor, Indiana University Northwest Phillip E. Pope, Director, Illinois-Indiana Sea Grant Program	**O-131**
8:45-9:45	**Background Papers** *Exotic Species*, Clifford Kraft, Fisheries Specialist, Wisconsin Sea Grant Program, University of Wisconsin-Green Bay *Brownfield Restoration*, Edward S. Pierson, Special Assistant to the Chancellor for Environmental Programs, Purdue University Calumet, Anthony Rodriguez, Director of Economic Development, City of Hammond, and James K. Van der Kloot, Special Assistant Commissioner, Chicago Department of Environment	**O-131**
9:45-10:15	**Break**	**O-126**
10:15-11:45	**Background Papers (Continued)** *Trends - Federal, State, Regional, Local*, Michael J. Donahue, Executive Director, Great Lakes Commission *Ecosystem Restoration*, John Suey, Director of Science and Conservation Biology, Indianapolis Office, The Nature Conservancy	**O-131**

	Management of Toxic Chemicals and Sediments, William L. Wood, Director, Great Lakes Coastal Research Laboratory, Purdue University, and Howard Zar, Regional Team Manager for Toxics Reduction, United States Environmental Protection Agency	
11:45-12:00	**Procedures for Facilitated Sessions,** Brian K. Miller, Coordinator, Marine Advisory Services, Illinois-Indiana Sea Grant Program, and David J. Case, President, D.J. Case and Associates	**O-131**
12:15-1:00	**Lunch**	**Region Room**
1:00-2:30	**Facilitated Session I: Issues and Concerns** Participants will be assigned to groups by interest	*
2:30-3:00	**Break**	**C-317**
3:00-5:00	**Facilitated Session II: Needs Identification** Continue with the same groups	*
5:00-6:30	**Poster Session/Reception**	**Alumni Hall**

Wednesday, May 22, 1996

8:00-9:30	**Reports from Facilitated Sessions I and II**	**O-131**
9:30-10:00	**Break**	**C-317**
10:00-12:00	**Facilitated Session III: Action Strategies** The groups will be reconstituted to mix interests	*
12:00-1:00	**Lunch**	**Region Room**
1:00-2:30	**Reports from Facilitated Session III**	**O-131**
2:30-3:00	**Break** Opportunity to form work groups for future action	**O-126**
3:00-4:00	**Concluding Talks, Course for the Future** Mark Reshkin, Indiana University Northwest Edward S. Pierson, Purdue University Calumet Phillip E. Pope, Illinois-Indiana Sea Grant	**O-131**

* Rooms will be assigned.

Facilitators

David Case, Bob Stum, Mark Burch, Gary Eldridge, and Michael Massonne

Steering Committee

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Adriane Esparza, Indiana Dept. of Envir. Mgmt.
Dan Injerd, Illinois Dept. of Natural Resources
Brian K. Miller, Purdue University
Christine Pennisi, Illinois-Indiana Sea Grant
Edward S. Pierson, Purdue University Calumet
Phillip E. Pope, Purdue University
Mark Reshkin, Indiana University Northwest
Anthony Rodriguez, City of Hammond
Anne Spacie, Purdue University

Arrangements

William R. Wright, Purdue University Calumet

APPENDIX II

SOUTHERN LAKE MICHIGAN ENVIRONMENTAL ISSUES WORKSHOP

MAY 21, & MAY 22, 1996

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APPENDIX III

PARTICIPANTS IN FACILITATED SESSIONS BY GROUP

SESSIONS I and II

RIVER OTTERS
Facilitator: Gary Eldridge
Harvey Abramowitz
Timothy Bell
Patrice Charlebois
Young Choi
Loretta Davies
Carole Lafossas
Jo Patton
Edward Pierson
Sally Swanson

LAKE TROUT
Facilitator: Mark Burch
Peter Beronio
Chris Newell Bourn
Kym Liebler/Amanda Beeler
Paul Nelson
Anne Ogren
Mark Reshkin
Kathryn Rowberg
Emily Steadman
James Van der Kloot
Wendy Zelencik

PIPING PLOVERS
Facilitator: Bob Stum
Lisa Katzman
Clifford Kraft
Brian Miller
Thomas Poulson
Michael Russ
Bambi Sears
John Shuey
Anne Spacie
Tom Trudeau
Howard Zar

GREAT BLUE HERONS
Facilitator: Dave Case
Doug Alley
Judy Beck
Dawn Deady
Terrance Dougherty
Daniel Injerd
Marty Jaffe
John Janssen
Stephen Lucas
Christine Pennisi
Bill Schubert
Ed Strable

KARNER BLUE BUTTERFLIES
Facilitator: Michael Massone
John Braden
Michael Donahue
Leslie Dorworth
Adriane Esparza
Jerry Long
William B. Miller
Lidia Nonn
Nancy Riggs
Anthony Rodriguez
Michael Siola
Richard Whitman
William Wood

SESSION III

WATER QUALITY
Facilitator: Gary Eldridge
Doug Alley
Leslie Dorworth
Adriane Esparza

BREAKING DOWN BARRIERS ACROSS POLITICAL BOUNDARIES
Facilitator: Mark Burch
John Braden
Dorreen Carey
Daniel Injerd
Mardi Klevs
Jerry Long
Stephen Lucas
William B Miller
Anne Ogren
Phillip Pope
Mark Reshkin
Emily Steadman

HABITAT AND BIODIVERSITY CONSERVATION
Facilitator: Bob Stum
Timothy Bell
Chris Newell Bourn
Patrice Charlebois
Lisa Katzman
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Tom Trudeau

AN INFORMED PUBLIC
Facilitator: Michael Massone
Harvey Abramowitz
Dawn Deady
Cathy Hudzik
Brian Miller
Bambi Sears
Michael Siola

APPENDIX IV

PLANNING COMMITTEE MEETING

The following letter, dated November 21, 1995, was sent to all participants in the Planning Committee meeting held at Purdue University Calumet on October 3, 1995. The procedure followed in this meeting was very similar to that in the workshop itself, with facilitated sessions. The results of this meeting were in themselves significant, with approximately 46 participants. Thus, the letter is included as part of these proceedings.

November 21, 1995

Mr. XX
XX

Dear XX:

On October 3 the Illinois-Indiana Sea Grant Program, Purdue University Calumet, and Indiana University Northwest hosted a planning meeting for a Southern Lake Michigan Environmental Issues Conference scheduled for May 21 and 22, 1996. We had outstanding attendance at the planning meeting as approximately 40 of the 53 people invited attended! The purpose of the planning meeting was to:

1. Gain consensus on whether an environmental conference of this type was needed.
2. If so, to identify the five key environmental issues of greatest concern along southern Lake Michigan.

The planning groups agreed that an environmental conference of this type was needed to bring all interested parties together to share information on ongoing activities, to form partnerships, and to plan actions, research, and educational activities that will move the issues of greatest concern forward in an organized and constructive manner. General agreement was also obtained for the proposed format of the meeting that will consist of five invited papers which concentrate on the topics identified by the planning group, facilitated sessions which serve to prioritize key concerns and actions needed, and formation of local work groups in topics of interest.

The planning committee identified the following eight topics as the "Top environmental issues, opportunities, or concerns that need to be addressed along the southern Lake Michigan coastline" in priority order.

1. Exotics
2. Wildlife habitat restoration - Ecosystem restoration, Biodiversity & corridors
3. Brownfields and reclamation of them

4. Management of toxic chemicals and sediments
5. Trends: Federal, state, regional management
6. Non-point source and point source pollution
7. Air quality and non-attainment
8. Educating the public

A committee was formed for each of the five topics. The charge of each committee was to choose a chair, identify potential speakers and contributors for a paper on this topic to be presented at the May 1996 conference, and to identify:

a. specific concerns,
b. work currently being done
c. accomplishments to-date, and
d. future work needed that should be included in each paper.

The purpose of the invited papers on the five key issues identified by planning committee is to:

a. give an overview of the issue
b. summarize activities and players currently working on this issue in the Indiana-Illinois area
c. give an assessment of the current status of this issue at the present time (what we know and/or what has been accomplished)
d. identify trends and opportunities for the future (what do we need to learn and/or what needs to be accomplished).

These papers will set the background for the breakout sessions at the May conference so that all participants are operating from a common knowledge base.

The chairman of each subject matter committee was/is responsible for:

1. leading the discussion at the October 3 meeting
2. helping the organizers with the follow-up and coordination required to obtain a speaker and written paper for the May 1996 conference
3. helping the organizers with additional required correspondences with subject matter committee members and paper contributors
4. serving as one member of a five-person advisory committee to the conference organizers. (The first, and hopefully only, meeting is November 28, 1995.)
5. introducing their topic speaker at the May conference.

Listed below by topic are the issues to be addressed in the invited paper for each topic. The planning meeting participants are listed on the attachment by topic committee. Items listed under "issues to be addressed in paper" were taken from committee work sheets. Further refinement will be led by subject matter chairs.

I. **Exotic Species** Steering Committee Member: Brian Miller

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Issues to be addressed in paper

A. Current status of distribution and numbers
B. Broad impacts of exotics (both economic and ecological)
C. Mechanisms for transport and spread
D. Research currently being conducted (what we know)
E. Solutions for existing species and the prevention of further spread and new introductions
F. Should exotics be introduced as part of restoration?
G. Implications for connecting drainages
H. specific problems that need to be overcome in future

II. **Ecosystem Restoration** Steering Committee Member: Christine Pennisi

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Issues to be addressed in paper

A. Fragmented ecosystems and are they sustainable?
B. public involvement - stewardship, and information
C. Political/ecosystem boundaries
D. Management of exotics - aquatic, and terrestrial
E. Restoration of disturbed areas
F. Zoning - buffer areas - corridors
G. Species interactions

III. Brownfield Restoration

Steering Committee Member: Ed Pierson
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[currently Director of Michigan City Economic Development Corporation, 219/873-1211]

Issues to be addressed in paper

A. Definition and background
B. Intended use -- reuse, restoration, land use
C. Partnerships
D. Liability, regulatory restrictions, and clean-up standards
E. Technical issues
F. Funding and incentives
G. Current activities - Chicago, East Chicago/Gary/Hammond
H. Role of government (all levels), industry/business, affected neighborhood residents, community, finance

IV. Management of Toxic Chemicals and Sediments

Steering Committee Member: Phillip E. Pope
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X - CHAIR

Issues to be addressed in paper

A. Criteria for Evaluating Contaminated Sediments (Guidelines)
B. Bioavailability of Contaminates in/from Sediments
C. Loading of Contaminated Sediments to Lake Michigan
D. Fate of Contaminated Sediments
E. Disposal/Dredging
F. Remediation/Recovery of Contaminated Sediments
G. Human Health Issues

V. **Trends - Federal, State, Regional, Local** Steering Committee Member: Mark Reshkin

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Issues to be addressed in paper

A. Funding opportunities and trends
   - extinction of federal funds
   - intergovernmental agreements
B. Crossing state lines
   - functional relationship (gaps, needs, and opportunities)
   - barriers to cooperation, coordination and communication
C. Consequences of federal fiscal trends for state and local roles, and interstate relationships
   - administrative responsibilities
   - congressional coalitions
   - regional image
D. Success in other areas (models of cooperation)
   - possible mechanisms
   - how to achieve action orientation
E. Activities and players ongoing

Thanks for your assistance with planning for this workshop. We look forward to you joining us in May 1996 at Purdue Calumet.

Sincerely,

Brian K. Miller
Coordinator of Marine Advisory Services
Illinois-Indiana Sea Grant

Ed Pierson
Purdue University Calumet

BM/pel

Attachment

Southern Lake Michigan Environmental Issues Conference May 96

Sub-Groups

Planning Sub-group on: Exotics

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