2003 Governor's Conference on the Management of the Illinois River System

Ninth Biennial Conference
October 7-9, 2003
Holiday Inn City Centre
Peoria, Illinois

2003 Proceedings

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The Illinois River: Sharing the Visions

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Proceedings

Editor
Illinois Water Resources Center
University of Illinois at Urbana-Champaign

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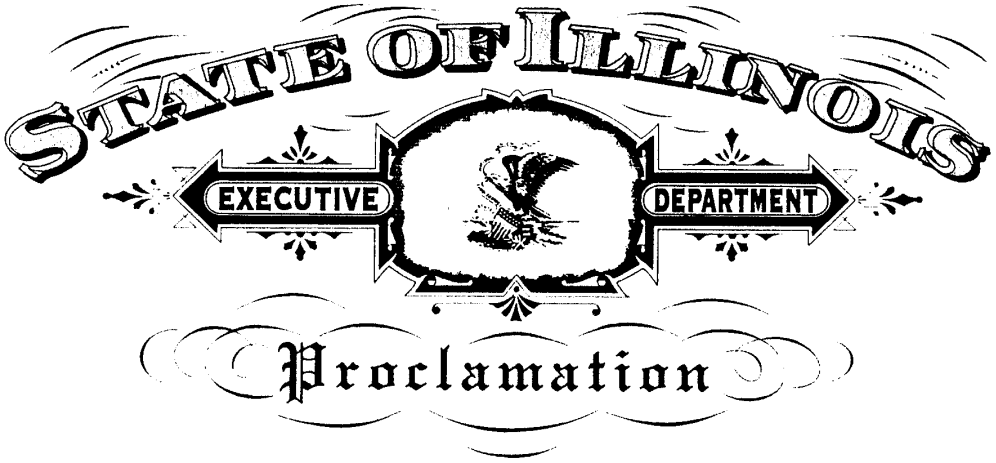

WHEREAS, *the Illinois River System is a critical component of our state's geography, history, economy and ecology; and*

WHEREAS, *many attributes are threatened as a result of the cumulative effects of human activities that have significantly altered the Illinois River system; and*

WHEREAS, *the implementation of the Illinois River Coordinating Council, the Conservation Reserve Enhancement Program, the Illinois Conservation 2000 Program, Illinois Rivers 2020, and the Open Lands Trust Fund are important milestones in efforts to protect the resources of the Illinois River; and*

WHEREAS, *the 2003 Conference on the Management of the Illinois River System will be held on October 7-9 at the Holiday Inn City Centre in Peoria; and*

WHEREAS, *the theme of the conference is "The Illinois River: Sharing the Visions;" and*

WHEREAS, *citizens may take this opportunity to recognize the economic, recreational, social, and environmental benefits of properly utilizing the resources of the Illinois River basin:*

THEREFORE, I, Rod R. Blagojevich, Governor of the State of Illinois, do hereby proclaim October 2003 as ***ILLINOIS RIVER SYSTEM MANAGEMENT MONTH*** *in Illinois.*

In Witness Whereof, *I have hereunto set my hand and caused the Great Seal of the State of Illinois to be affixed.*

Done at the Capitol, in the City of Springfield, this SECOND *day of* JULY*, in the Year of Our Lord two thousand and* THREE*, and of the State of Illinois the one hundred and* EIGHTY-FIFTH

Jesse White

SECRETARY OF STATE

Rod Blagojevich

GOVERNOR

ILLINOIS RIVER COORDINATING COUNCIL

Minutes of Tuesday, October 7, 2001
Holiday City Centre, Peoria

Call to Order: Lieutenant Governor Pat Quinn, Chair, called the meeting to order at 6:30 p.m. Harmony Dean, Office of the Lieutenant Governor, called the roll.

Roll Call:
Citizen Member
Richard Worthen, Dr. Wendell Shauman (Illinois Farm Bureau), Brad McMillan (Office of Congressman Ray LaHood), Michael Reuter (The Nature Conservancy of Illinois)

State Agency Members

Debbie Bruce for Director Joel Brunsvold (Illinois Department of Natural Resources), Marcia Willhite for Director Renee Cipriano (Illinois Environmental Protection Agency), Michael Hine for Secretary Tim Martin (Illinois Department of Transportation), Mike Beaty for Director Charles Hartke (Illinois Department of Agriculture).

Ex-Officio Members

Christine Urban for Tim Henry (US EPA Region V), Robert Holmes (U.S. Geological Survey), William Gradle (USDA Natural Resources Conservation Service, Lisa Scott for William Graff (USDA Farm Service Agency), Gary Rolfe for Dean Robert Easter (University of Illinois – College of ACES), Gary Loss for Colonel Duane P. Gapinski (U.S. Army Corps of Engineers), Ross Adams (U.S. Fish and Wildlife Service).

Members Absent

Laurene von Klan (Friends of the Chicago River), Lee Bunting (Illinois Association of Soil and Water Conservation Districts), Daphne Mitchell, Director Jack Lavin (Department of Commerce and Economic Opportunity), John Rogner (U.S. Fish and Wildlife Service), Captain Terrence Carter (U.S. Coast Guard), Doug Wilson (USDA – Rural Development).

Approval of Minutes of the September 12, 2003 Meeting: Lt. Gov. Quinn thanked Rep. Karen May and Ricca Slone, and also Sen. Terry Link for participating in the previous meeting and speaking on the topics of the Illinois River and wetlands protection, and made a motion to approve the minutes. A motion to approve the minutes was seconded by Willhite and unanimously approved.

Lt. Governor Quinn

Lt. Gov. Quinn began his remarks by mentioning the "Mud-to-Parks" Initiative and expressed his hope that the commencement of dredging in Peoria Lake will occur soon. He explained the goal of this program: the excessive amount of sediment that has accumulated through years in the Illinois River in Peoria area would be removed wherever possible and transported by barges to Chicago for the purpose of remediation of a former industrial site. This will allow a former slag field located on the banks of Lake Michigan to be converted into a lakefront park. The quality of the sediment was by IEPA and found acceptable for topsoil use at the site. Lt. Gov. Quinn noted John Marlin, Illinois Waste Management Research Center, began working on the concept of sediment transportation 31 years ago. He expressed

hope that the first barges loaded with dredged sediment will be in the water next month since funding for the project has been obtained by DCEO, and all necessary testing of the material has been completed.

This project will create a precedent that can work on the upper as well as lower parts of the Illinois River wherever brownfields exist. It would be a great achievement if the project could be done this year. Lt. Gov. Quinn thanked everyone involved in the project for his/her hard work. Specifically, Lt. Gov. Quinn noted Harmony Dean's hard work in coordinating this project. The "Mud-to-Parks" project is an action item on the IRCC agenda, and he would like the Council to be known for and focus its efforts on this and other "action" type projects.

Another project was bought to the IRCC's attention in June: the development of Plum Island located right below Starved Rock, which is the most visited state park in Illinois (attended by more than 2 million visitors annually). Plum Island is a small island in the Illinois River that is home to bald eagles in the winter. Lt. Gov. Quinn referred to an upcoming presentation on eco-tourism and noted watching nature and participating in the nature-related activities is a great way to encourage tourism in Illinois. From December to February, thousands of people visit Starved Rock to watch the eagles flying over the Illinois River and Plum Island. During cold winter months, Illinois has the largest eagle population of all other states in the continental U.S. He noted it is quite an honor for Illinois and thanked all who have been working to protect the eagle population in Illinois. Plum Island is under an attack from a group of developers, so-called "predators with bulldozers" seeking to develop the island and build about 50 condos and a marina. However, the U.S. Army Corps, IDNR and the Illinois Historic Preservation Agency all have a stake in preserving the wilderness and pristine nature of Plum Island. Since the June IRCC meeting and the successful on-line petition www.saveoureagles.org, thousands of Illinois citizens have registered their opinion: save Plum Island, save the eagles.

The goal is for Plum Island to belong to the people of Illinois, their children and grandchildren – to all generations to come, so eagles are welcome at Plum Island and our State. Saving Plum Island is another important effort where we are making progress and expressed his hope that at the next IRCC meeting Plum Island will be in public hands. To support his point, Lt. Gov. Quinn referred to a copy of a letter he received from the U.S. Army Corps addressed to the developers of Plum Island stating non-negotiable easement rights cover the entire area of Plum Island - it belongs to the United States of America. If citizens from all over the State want to be involved in an environmental cause that means something, whether it's protecting our great waterfront and dredging the river when sediment becomes a serious problem; whether it is protecting the eagles habitat that is near the river; or improving water quality throughout the State while implementing pilot projects funded by the potential $35 million Clean Water Trust Fund, we need to get them involved and invested in these great environmental opportunities.

Lt. Gov. Quinn called on attendees to come up with innovative ideas that can become pilot projects and good models and will result in improving the water quality throughout the State. The IRCC has to be dedicated to this type of work on the Illinois River and all watersheds, and the Clean Water Initiative was designed to give citizens an opportunity to see what we could do when we work together.

Next, Lt. Gov. Quinn acknowledged the extremely fine work of the hundreds of volunteers across Illinois who participated in Illinois River Sweep 2003; a citizen volunteer effort coordinated by an outstanding group - Friends of the Illinois River. On September 20, thousands of volunteers came to the river to help clean it up in their own way. Lt. Gov. Quinn mentioned he participated in the Lemont River Sweep and it was quite inspiring to see hundreds of volunteers cleaning the Illinois River at that location. From the U.S. Coast Guard, several representatives from various state and federal agencies, the local mayor – everybody was participating in the event not for profit, but for causes they truly believe in. He thanked the Friends of the Illinois River, and all participants of the Illinois River Sweep.

To conclude his remarks, Lt. Gov. Quinn assured all that he would work hard to address environmental issues during both the spring legislative session and the fall veto session. The Isolated Wetlands Bill (HB422) discussed in great detail at the September IRCC meeting, would be voted on in the Senate and he would like to see it passed into a law. Lt. Gov. Quinn referred to wetlands as "kidneys of our rivers" that purify and clean the water, and mentioned that Rep. Karen May was the bill sponsor in the House and Sen. Terry Link is the sponsor in the Senate. It will be a hard fight to pass this bill, and Lt. Gov. Quinn asked attendees to e-mail their senators and support that bill.

Illinois River Coordinating Council Distinguished Service Award

Claudia Emken – Emken appreciated recognition by the IRCC and felt it was an honor to serve as an IRCC citizen member. She joined the Nature Conservancy in 1997 as Director of Government Relations, and the first bill she worked on - together with Rep. Ricca Slone - was the bill that established the Illinois River Coordinating Council. It is very satisfying to her to see how far it had gone. She asked Lt. Gov. Quinn to continue to lend his interest and support to the IRCC and to provide leadership and guidance for the IRCC.

Dr. David Pfeifer – *Pfeifer had the privilege of being on the Illinois River Strategy team, the predecessor of the IRCC for 10 years. He views the IRCC as a model at how government should work: citizens, grassroots organizations, state agencies and federal agencies – all working cooperatively and collaboratively to create synergy in order to do good work. He expects to see more and more good work from the IRCC.*

Lt. Governor Quinn

Lt. Gov. Quinn thanked two more outgoing members for their outstanding commitment to the IRCC, Bud Davis and Mary Alice Erickson, and announced the next presentation by Michael Reuter of The Nature Conservancy's Frank Bellrose Illinois River Valley Conservation Award.

Michael Reuter

Reuter thanked Lt. Gov. Quinn for the opportunity to present this award as recognition of volunteerism and grassroots leadership in the Illinois River Valley. The award is given by The Nature Conservancy every year or two since 1995 to recognize the outstanding leaderships in the Illinois River Valley, in particular, grassroots leadership sustained over a long period of time (favors to recognize individuals as opposed to organizations). He noted the adherence to the guiding principles of the IRCC and adherence to the mission and the values of The Nature Conservancy are two major principles among several criteria used for the award. Next, he turned the microphone to Doug Blodgett, the Illinois River Project Director for The Nature Conservancy.

Doug Blodgett

Blodgett thanked Lt. Gov. Quinn, members of the IRCC, and attendees for the time to make this presentation of a true friend of the Illinois River. Mr. Blodgett noted that since the Clean Water Act, significant strides have been made in restoring and protecting the Illinois River, and while there was certainly more to do, it was encouraging to see the dedication, enthusiasm and resulting programs on the Illinois River as evidenced by the agenda for the Governor's Conference on Management of the Illinois River.

However, as with a majority of our natural resources, the long-term future of the Illinois River is not only dependent on our conservation efforts today, but also equally as important, upon our ability to prepare and inspire tomorrow's scientists, stewards and decision-makers. Robert Williams, "Dr. Bob," has been instrumental in providing tens of thousands of youth opportunities to connect with the river as they learn about its history, culture, art and science. Such activities helped create informed and dedicated constituents who are able to develop and employ future technologies and provide the momentum necessary for restoring and conserving this remarkable natural resource - the Illinois River. Blodgett indicated through both his direct and indirect interactions with students and teachers, developing and implementing programs such as the Rivers Project in thousands of schools in 48 states and 10 countries, and significant special events such as the Clean Water Celebration, now in its 14th year here in Peoria with a cumulative total of over 30,000 participants, Dr. Bob has helped students develop an appreciation for nature in general and our aquatic resources in particular, enhancing their lives and instilling in them a genuine sense of responsibility for protecting their river and their natural resources.

If one is fortunate to observe Dr. Bob at work or better yet to work with him, it is his enthusiasm, "can-do" attitude and dedication, flowing like water from Dr. Bob through colleagues, teachers and students, which ensures success in whatever the task might be - from getting a water sample from a steep-banked stream to organizing a multi-state conference for junior high and high school students. Early in his career, a young Dr. Bob was looking for a cause, and as individuals and organizations concerned about the future of the Illinois River, we all benefit from the cause he found and embraced. Working with teachers and students to protect what he emphasizes to them as "Our Rivers" - the Illinois River and countless other rivers and streams benefit from his efforts, from the seeds he had helped plant and cultivate in the minds of tomorrow's citizens and leaders.

On behalf of The Nature Conservancy and other river lovers, The Conservancy's Frank Bellrose Illinois River Valley Conservation Award was presented to Robert Williams (Dr. Bob), a true and dedicated friend of the Illinois River.

Dr. Bob

Dr. Bob noted for many years, the Clean Water celebration and the River Congress have been held at this location in Peoria, and the 2004 meeting will be on March 21 and 22 at the Civic Center. More than 3,000 people attend the annual event and this year, high school students will be taken down to the river to give them more of a feel of "Our River." Dr. Bob has always worked with enthusiasm while teaching students about the river. He mentioned just returning from a trip where he canoed 277 miles in 11 days along the Illinois River for the third time. The Illinois River should be referred to as "Our River" since it flows only through Illinois, starts in Chicago and outside Kankakee, and never leaves the State until dumps it into the Mississippi. "If we cannot make this river, THE FINEST RIVER IN AMERICA, then we should be ashamed."

Lt. Governor Quinn

Lt. Gov. Quinn thanked Dr. Bob for his inspirational speech and noted they met in Alton earlier this year and had a discussion about the river and eagles. Lt. Gov. Quinn said the two issues merge together and stressed his belief in electronic democracy, which provides citizens with an opportunity to get involved in a movement to make sure that it is "Our River". Email is a very efficient way for citizens to communicate in order to make sure their voices are heard on these important policy issues. Next, he suggested hearing a Science Advisory Committee (SAC) update, and since Dr. Nani Bhowmik was not able to attend the meeting, Dr. John Marlin presented an update of behalf of SAC.

Science Advisory Committee - Dr. John Marlin

Marlin said the Science Advisory Committee (SAC) met recently to address questions posed by Lt. Gov.

Quinn. The SAC reviewed a report written by the Aquatic Invasive Species Advisory Panel regarding two species of Asian carp moving up the Illinois Waterway toward Chicago. Dr. Marlin said that if they get into the Great Lakes, based on what they had done in other places, it would be an immense ecological disaster because they are prolific breeders and consume large amounts of food. There is a small temporary electronic barrier in place in the Cal-Sag Channel, to keep Asian carp from Lake Michigan by repealing them with electric currents. This temporary barrier is subject to breakdowns, and will be replaced by a more permanent barrier in 2004. The SAC recommended as a stopgap measure, the State be prepared to put toxicant into approx. a 5 mile stretch of the canal near Lemont, where the river channel is very narrow (it's a dug channel). The plan would be to use either Rotenone or Antimycin to eradicate the fish in this section of the stream. Marlin suggested it would be a rather serious step to take; however, both of these toxicants can be detoxified in place. The SAC reviewed these recommendations and concurred as a last gap measure, this would be a good thing to do in order to keep Asian carp out of Lake Michigan. Other affected fish would be quickly re-colonized. The proposed measure would not permanently solve the problem, but would slow down the expansion of the Asian carp.

Next, Marlin mentioned the Illinois River Decision Support System (ILDRSS), a computerized, publicly accessible database supported during the last several years at the Illinois State Water Survey with funds coming from the State of Illinois' Environmental Protection Trust Fund. The fund was set up to provide temporary funding, since this fund was not designed to be an ongoing source (although, some funding for this year is available). ILRDSS is on-line and accessible via the World Wide Web. It consists of numerous databases containing data on the Illinois River, and there are plans to include working models so users can input parameters to basic models and get some idea of how the river and the ecosystem would respond. It also has a wide variety of maps of the system and video animations. While using the system, it is possible to see Lake Peoria or the Kankakee River as they appeared in 1903, and then, switch to the present. Marlin noted that the Illinois Natural History Survey provided some data on fisheries and macro-invertebrates; the SAC concluded ILRDSS is a very good resource that needs to be funded. The original plan was to fund it through the Illinois River Ecosystem Study, and then as an ongoing part of the monitoring and assessment that goes with the project. He suggested the IRCC make recommendations to the project managers of the "2020" and "Ecosystem" projects that the Decision Support System be funded or look for other sources of funding in order to provide $295,000 annually.

Finally, for the last five years, they had been trying to get the oldest aerial photographs of the State of Illinois (late 1930s) preserved and digitized. Three or four sets of photographs exist: one at the University of Illinois library (heavily marked by researchers over the years); another at the Southern Illinois University; and the best, but not totally complete copy, can be found at the Illinois Office of Water Resources. Mainly through the efforts of the Geological Survey, they digitized in high quality the six-county metropolitan Chicago area and five or six other counties in Illinois. Marlin also indicated the National Leadership Grant for Libraries under the subheading of Preservation and Digitization will provide funding for the rest. Marlin stated these he uses aerial photographs for his own research and these photos would provide a tremendous base for learning how the rivers, streams and lakes had changed over time.

Additionally, Dr. Marlin noted that the SAC also has been working on recommendations for the IRCC about an expert panel for outside overview.

Lt. Gov. Quinn
He asked John Marlin to give an update on the sediment project.

Dr. Marlin

Marlin thinks the project is going very well and thanked Lt. Gov. Quinn's for his efforts in pulling together all interested governmental and other parties. He said a lot of progress has been made during last the six months. Since the first meeting in June, the City of Chicago Department of Planning and Development has become very active. With the intention to redevelop the former USX site, they contributed $45,000 to do a risk assessment overseen by the City Department of Environment with a private contractor, which determined from the public health point of view, that Illinois River sediment from Peoria is suitable for use on this type of site. Marlin said the City of Chicago had filed a grant application for $5 million to develop the site through "Illinois First". He noted that $2 million could be re-targeted to the movement of sediment and site planning. By paying for the risk assessment from its own funds in order to move this project forward, the City of Chicago had shown a good example of cooperation.

Next, Dr. Marlin thought what remained to be done to get $1.4 million for actual sediment movement was DCEO approving and finalizing the grant. Currently, he believes the Comptroller is reviewing the grant, and, as soon as the Comptroller approves it, DCEO approval would follow. Next, he said the Chicago City Council would have to approve giving money to IDNR, so IDNR would be able to arrange with the contractors to ship sediment to Chicago. He noted that Mayor Daley is about to meet with the (Chicago) Park District on this topic. Dr. Marlin mentioned, finally, IDNR had to put a stamp of approval on a draft of the Comprehensive Environmental Review of this project. He concluded that there are a lot of agencies involved, but despite difficulties in coordinating this type of project, much progress had been made. Dr. Marlin said that it would be great to have at least part of the project done by winter. The U.S. Army Corps, Rock Island District, expedited the dredging permit through the federal and state process. Previously, they provided money from the Illinois River Ecosystem Study for the two demonstration projects (moving one partial barge load of sediment from Peoria to Chicago and testing of a variety of handling equipment).

Additionally, he said that the U.S. Army Corps, Chicago District, which has equipment on that site, helped the contractors get a better understanding of the logistics involved. Illinois Marine Towing was a big help with logistics, and, locally, ARTCO Fleeting and Midwest Foundation in conjunction with Arrow Terminal in Chicago – all went way out of their way to help set up the logistics. The Chicago Park District had been very helpful, and IEPA, both Bureau of Land and Bureau of Water, provided a lot of insights how the sediment project had to be implemented from a regulatory standpoint. The Fon Du Lac Park District at East Peoria, which has the recreational boat channel from Spindler Marina to the main channel where the sediment came from, offered to use their permit to remove sediment from their channel for the project.

Lt. Gov. Quinn

Lt. Gov. Quinn said he would really like to start the project this fall, if it at all possible, since few more governmental agencies had to be moved. Lt. Gov. Quinn said he was optimistic that this initiative would be successful and asked John Marlin where else the sediment from the Illinois River could be applicable.

Dr. Marlin

Marlin noted numerous areas in desperate need of the decent soil, including the St. Louis Metropolitan Area, including American Bottoms on the Alton side; the Gary, Indiana crescent, which is accessible by barge; thousands of acres in Chicago; the Rice Lake Banner Marsh area - just south of Pekin – as well as other old strip mines.

Lt. Gov. Quinn

Lt. Gov. Quinn thanked John Marlin for his hard work. He noted there are many places in Illinois and outside of Illinois that need to be reclaimed and all need topsoil. Next, he gave a microphone to Brad McMillan, District Chief of Staff for Congressman Ray LaHood, a great friend of the Illinois River and IRCC.

Brad McMillan

McMillan thanked Lt. Gov. Quinn for bringing the IRCC meeting to Peoria. He stressed the significance of the project: $1.4 million of state money was set aside in order to send 24 barge loads of Peoria Lake sediment to Chicago. He said Lt. Gov. Quinn and his staff are engaged in this project and committed to make things happen. He suggested recognizing Lt. Gov. Quinn and his staff for their commitment to the project and Sen. Risinger from the Peoria area. Next, he introduced Ted Eubanks, the foremost eco-tourism expert in the country, who takes areas with environmental wildlife significance and turns them into popular tourist destinations with great economic benefits. His study on birding trails in Texas resulted in $30 million investment made by the Texas legislature. McMillan said that Mr. Eubanks, in collaboration with The Nature Conservancy and Peoria Area Conventions and Visitors Bureau, was conducting a study of the Illinois River Valley - wildlife, bird watching and cultural and history opportunities can make the Illinois River Valley a great tourist destination.

Special Presentation: Ted Eubanks, President of FERMATA, Inc.

The Business of Nature in Illinois

Eubanks noted the ever-changing demographic landscape in the U.S., dominated by the decades-long flood of rural residents into a relative handful of cities, had captured many Midwest and Great Plains communities in a social and economic vice grip. Yet that which hurts can help as well. Many of these urbanites, isolated from the natural and cultural resources that are still contained in rural America, are vacationing out of the cities in an effort to reconnect with their roots. As a result, experiential travel is among the most significant travel sectors in the U.S., and one that continues to prodigiously expand.

Consider these examples. According to the Travel Industry Association (TIA), "81 percent of U.S. adults who traveled in the past year, or 118 million, are considered historic/cultural travelers." In fact, "for 30 percent of historic/cultural travelers, their destination choice was influenced by a specific historic or cultural event or activity." Outdoor recreation and/or visiting national or state parks are also one of the top activities for U.S. travelers taking leisure trips within the U.S. One in four (27 percent) leisure person-trips includes some form of outdoor recreation and/or a visit to a national or state park.

These travel sectors represent significant economic drivers for many rural communities. From Walhalla (North Dakota) to Great Bend (Kansas), from Canadian (Texas) to Damascus (Virginia), experiential tourism is contributing to the economic vitality of rural America. Tourism does indeed “work for America.”

In addition to the traditional economic impacts from tourism (direct, indirect, induced), there are two additional benefits that are critically important to Illinois. First, there are environmental impacts that should be recognized. Yes, there are negative effects that occasionally are attributed to tourism (such as the draining of a marsh to build a golf course). But ecologically (and culturally) sensitive tourism development undoubtedly benefits the environmental health of a region. Tourism revenues allow communities to invest in green spaces, hike-and-bike trails, interpretative centers, and a variety of amenities that are enjoyed by travelers and residents alike. In fact, Illinois Nature Conservancy’s Emiquon project is a perfect example of how tourism, economic development and conservation efforts can work in concert.

Second, there are "enabling" benefits that flow from tourism. Experiential tourism development in Illinois River communities such as Havana or Canton will directly lead to an enhanced quality of life in the region. As stated above, amenities demanded by tourists also benefit residents. A diverse offering of restaurants, theaters, retail shopping and cultural centers represent an amenity base upon which future economic development efforts may be constructed.

The U.S. is comprised of 50 states vying to be the next economic growth engine. Most have realized that the future of high-end industry in this country depends on human resources. There are countless communities in the U.S. that want to attract a biomedical research lab or a nanotechnology center. All are able to extend tax abatements, offer new shell buildings, and pipe in the next generation of Internet services. The few communities that will succeed will be those who recognize that the human resource will be the critical deciding factor. In the end, the next nanotechnology center will be dependent on researchers deciding where they want to live and raise their families.

Experiential tourism allows Illinois to utilize existing resources (nature, culture, history) to attract additional travelers. These travelers will invest in a variety of amenities that are valued by residents as well. As the amenity base (or quality of life) improves, Illinois and the Illinois River region will be better positioned to attract high-end industries that would have fled elsewhere. Combined with specific efforts to develop a diversity of local products and services for this travel market (such as value-added agricultural products and experiences), Illinois River residents have much to gain from the business of nature.

Lt. Gov. Quinn

Lt. Gov. Quinn thanked Ted Eubanks for his outstanding presentation, and identified Plum Island with its bald eagles as an example of one of the best ecological tourism destinations in Illinois. Next, he asked Dr. Gary Rolfe to speak about the National Great Rivers Research and Education Center.

Dr. Gary Rolfe

Dr. Rolfe was pleased to present the National Great Rivers Research and Education Center activities to the IRCC and stressed the Center's practical location in the confluence area of the Illinois, Mississippi and Missouri Rivers and described its establishment as a partnership between Lewis and Clark Community College, the Illinois Natural History Survey and the University of Illinois College of Agricultural, Consumer and Environmental Sciences.

The purpose of the Center is to provide field support for the development of sound watershed and river management strategies in order to protect valuable natural resources and maintain their viability for public use in an ecologically conscientious manner. He noted the Center combined the study of social, biological and physical aspects of water issues; promoted multidisciplinary research; provided natural resource information; sponsored conferences and workshops; and addressed critical water issues. Rolfe described how the Center's programs serve the objectives of the IRCC and proposed the Center serve as the research and education "arm" of the IRCC.

He suggested meeting with Lt. Gov. Quinn and staff and the Center's Executive Committee to discuss the activities of the Center and how the work of the IRCC and the Center would be enhanced through a collaborative relationship. He noted the starting area for discussion was the Center's internship program. He proposed that the Center and the Office of Lt. Gov. Pat Quinn commit to providing one intern each, to work out of Lt. Gov. Quinn's office and focus on work of importance to the IRCC. The intern announcement will to be sent in early in 2004 and the IRCC work could be featured for student consideration.

The Natural History Survey involvement on the Illinois River goes back to the late 1800's, when Steven Forbes began his studies on the river, so they do have a long history of data. The large river was perceived as a new frontier in many ways. Now, there is certainly renewed interest in learning more about

our rivers. The confluence of the Illinois, Mississippi and Missouri Rivers makes Illinois a prime location in North America for a large river station. Presently, two stations there are involved in the USGS long-term resource-monitoring program: at Havana and Alton. These stations are rental facilities and a permanent place is needed. There is hope that staff who had been doing the monitoring studies on the Mississippi River in that area will have a new permanent home. The field station is designed for visitors and other researches, so researchers from the Midwest and from all over the world can come to this part of the country to conduct their research.

Lt. Gov. Quinn

Lt. Gov. Quinn noted that it was a great place in Southern Illinois where three great rivers come together creating indigenous resources. He pledged his support of the creation of the Education and Research Center, to be one of the greatest centers in the world where people would be able to come and study the rivers. He said it is important that people from Illinois and other states know where the Illinois River is. Next, Lt. Gov. Quinn introduced Brad Thompson, US ACE, and asked him to give an update in the Illinois River 2020 Program.

Brad Thompson

Thompson thanked Lt. Gov. Quinn for the opportunity to present to IRCC members the Illinois River 2020 Executive Summary Report. First, as Project Manager, he acknowledged the other team members who have been involved in a study produced by a large partnership; Jim Mick, IDNR, represented the State's participation in the project. Thompson noted the project started two years ago, and with funding in place, and a comprehensive plan put together. They are ready to start more detailed work on specific restoration sites. They are very close to having an action plan completed regarding the Illinois River Basin restoration efforts, and are evaluating the level of effort it might entail and identify specific projects. He mentioned some of these projects were in design and nearing contract awards right now; and they were satisfied with the progress.

US ACE relied on non-federal sponsors, and in this case, the study is conducted for benefit of the State and the local communities along the Illinois River. He stressed the Illinois River Basin Restoration plan came out of the State's initiative, a proposal of the 20-year effort and commitment of $2.5 billion - a big initial concept linking all federal, state and local resources to accomplish the goal of river restoration. The idea is to use existing programs and resources across the number of agencies and legislative efforts, such as the Farm Bill, the Clean Water Act and Water Resources Development Act (US ACE appropriations). The State was partnering with the US ACE in a number of ways: working with IDOA and IDNR, IEPA, Office of Lt. Gov. Quinn, as well as federal and local agencies, and also, private sector and the public. He named projects focused on the Illinois River itself, and other related projects, such as Peoria Riverfront Development project, and other projects throughout the basin. There are a lot of things being studied that are near completion. Things are ready to start happening now.

In 2000 legislation, Section 519 of the Water Resources Development Act, called for the US ACE in partnership with the agencies to put together a comprehensive plan in order to address several things:

- Program for restoration
- Long-term resource monitoring program
- Computerized inventory and analysis system
- Program of sediment removal and use

Thompson said these programs would be presented for public review in the near future. In the meantime, the US ACE was authorized to use $100 million for critical river restoration projects, the six sites started two years ago.

Thompson briefly reviewed an organization of the study and a regional team approach. People can bring project ideas, which will be evaluated, organized and considered for moving forward from the system prospective – with the input from IRCC, SAC and potential co-sponsoring agencies. It will be decided between the U.S. ACE and other agencies which items will be implemented by each member of the partnership for each particular project.

US ACE will have a public meeting in about a month, and now, they are sharing a vision for restoration of the Illinois River Basin, the goals, objectives and alternatives related to the restoration efforts. In the next month, U.S. ACE has to come to an agreement with the State regarding what level of the restoration efforts was required and would be recommended. This needs to be determined before going to the public meetings-workshops in order to obtain public input.

Next, Thompson referred to a diagram illustrating the sediment problem and noted about 6.7 million tons was the average amount of sediment deposited annually in the basin. He stressed the importance of restoration and protection of backwaters and side channels as the most vulnerable elements of the whole river system. The US ACE needs to study water level fluctuations caused by a number of factors, and develop potential for the improved floodplain management and environmental restoration. Next, he referred to work that has already been done: the Integrated Management Plan provided vision for sustainable eco-system and the economic activities that go with it (a balanced vision for the Basin). In this context, he stressed the following system goals identified in the six-step planning process:

- Maintain and restore diversity and sustainable populations of native species
- Reduce sediment delivery
- Restore side channels and backwaters, impacted by sedimentation
- Restore floodplain and riparian habitat and function
- Increase longitudinal connectivity
- Naturalize hydrologic regimes

Presently, they are evaluating alternatives in order to develop appropriate recommendations.
The U.S. ACE is working with resource managers on the river to identify the desired restoration needs in terms of 50-year planning:

- Reduce sediment delivery to the Illinois River by 20 percent (still about 20-30 percent of what had historically been there)
- Increase depth diversity for 19,000 of backwater
- Restore 75,000 acres of floodplain and 75,000 acres riparian habitat
- 500 miles stream restoration and stabilization
- Increase connectivity
- Reduce water level fluctuations

To illustrate the scope of work to be done, Thompson compared Illinois and Louisiana restoration efforts: in Louisiana, the Everglades project cost was $7.8 billion (3,480 sq. miles) and the Coastal Louisiana - restoration of the cost line that had been lost - $14 billion (20,000 sq. miles); in Illinois, the Illinois River Basin restoration involves 30,000 sq. miles and will cost significant amount of money and will take a lot of time and resources.

Next, he presented a matrix illustrating different restoration goal categories and alternatives to be evaluated, selected and implemented in order to achieve these goals. He discussed various levels of efforts (in dollar amounts) for sediment reduction (up to 20 percent for the system), backwaters restoration (up to 19,000) and floodplain restoration. The proposed annual total cost varied from $15 million (Alternative 1) to $270 million (Alternative 9), and the funding come from approximately 33 percent state and 70 percent federal sources. In the following months, they will evaluate what it takes - in terms of money - to maintain ecosystem health at the current level, without losing its existing hydrology

and natural habitat.

Next, he stressed the implementation framework for the projects as follows:

- Assessments: pool/reach or watershed (which practices will need to be put in place)
- Prioritization: project identification, criteria, framework (way to get project submitted)
- Restoration measures templates

Prioritization matrix would include selection from biological, goal specific, geographic and local interest projects as it applies to a particular watershed or reach.

The process starts with submitting of un-funded ecosystem restoration projects or ideas by local groups to the regional teams. Then, in partnership with existing local groups, local government, counties, federal and state agencies, the proposed projects get evaluated and matched with corresponding funding programs (not everything has to go through U.S. ACE). There will be a process when they decide first on a regional level, then on the system level and, finally, decide on funding; also, all projects have to be done with willing landowners or state owned land. In terms of geographic focus, it is good to start with upstream reaches first and move downstream throughout the basin.

Mr. Thompson presented the following schedule of evaluation of alternatives:

Comprehensive Plan:

- Evaluation of alternatives – Jun-Oct 2003
- State administrative review – Oct 2003
- Public review of alternatives – Nov 2003
- Final comprehensive plan – Aug 2004

Critical Restoration Projects:

- State administrative review – Oct 2003
- Complete study, plans and specifications – FY04
- Construction - 2005

Additionally, he outlined several critical restoration projects: Blackberry Creek and Waubonsie Creek (The Fox River tributaries – fish passage); Kankakee and Iroquois River (sediment issue); Pekin Lake (backwaters heavily impacted with sedimentation that results in key habitat loss), McKee Creek (sediment and stability issues).

Project status FY04:

- Pekin Lake (North) – Design just started (a six month effort; a small real estate issue)
- Pekin Lake (South) – Complete feasibility, design – ready for public review
- Waubonsie Creek – Complete feasibility, design – ready for public review
- McKee Creek – Sediment gage
- Blackberry Creek – On hold
- Iroquois River – On hold
- Kankakee river – On hold (due to funding problems)

To conclude, he referred to a three-island project in the low Peoria Lakes and reported the feasibility phase is complete. The project consists of 200 acres of dredging and 75 acres of islands, and the cost of this project will be $15 million. Currently, design of the first of three islands is complete.

Lt. Gov. Quinn

Lt. Gov. Quinn stated the whole idea of the IRCC was to work together with US ACE and IDNR and other agencies to restore the Illinois River Basin. He expressed his hope in order to accomplish this ambitious plan, they had to move forward aggressively in the next couple of years. Lt. Gov. Quinn called on attendees to be progressive and aggressive in order to continue ongoing movement forward.

Public Comments

Jack Shepler (Member: Friends of the Illinois River, Tricounty Riverfront Action Forum, The Nature Conservancy, Sierra Club)

Shepler noted that in 1939, 4,000 sportsmen from the Pekin area signed a petition to replace the dam at the south inlet to Pekin Lake. The dam was installed in the 1800s and removed in 1938 by opponents of the Pekin Rod and Gun Club. In 1997, he brought the dam replacement project up under Congressman Ray LaHood's Heritage River program. In 1998 Jim VonBoeckman and Mr. Shepler met with Mike Smith and George Shadid to enlist their support for the project. They got $150,000 to start the project. In 1999, Ducks Unlimited moved their representative into the area from Michigan. Pekin Mayor Dave Tebben, and Jack Shepler went over the project with Ducks Unlimited and enlisted their support. Shepler said that Ducks Unlimited and the IDNR decreed that the project would not work in a floodplain because "you cannot farm in a floodplain."

Shepler said they wanted the ecosystem of the lake restored, and not a become a "duck farm". Next, Shepler stated the $150,000 was pulled off the table and they stopped their project. With a new IDNR director in Springfield, he hoped that the director would listen to their request for the dam replacement and the re-establishment of the original ecosystem of the lake complex.

Lt. Gov. Quinn

He referred to Havana as the "Imperial Valley of the Midwest", a hidden-away place to go and wanted to encourage people to take the 100-150 mile journey to the Illinois River to have this experience and to see 6,000 acres of wetlands near Havana. He mentioned two other things about Havana – its excellent riverfront and watermelons. Next, Lt. Gov. Quinn noted that Tom Tincher (and the Heartland Water Resource Council) had done a wonderful job on Peoria River waterfront.

Judd Hulting

Hulting mentioned this is his first IRCC meeting and appreciated the opportunity to speak. He noted the economic development and improving the waterways as part of the mission of IRCC. The U.S. ACE is about to complete a study on navigation on the Upper Mississippi and Illinois River Systems; the public hearings would be held in October - St. Louis, Quincy, Peoria, Quad Cities and Dubuque. He farms with his parents along interstate I-80, and all their corn and soybeans travel via the Illinois River. Hulting just came back from a trip to Brazil where he saw some infrastructure improvement on the Amazon River, and what they were doing for eco-tourism as part of economic development.

The U.S. ACE has developed two proposals: on navigation and on eco-system restoration, and he believes there is a balance between the two. Hulting strongly believes 1200 ft. locks are needed; the existing locks were built in the 1930-s and are 600 ft long. Hulting would like to have bigger locks on the Illinois River

in Peoria and in LaGrange. He asked the IRCC to come to the hearing and make a positive statement regarding this subject; he said that they have been working with some other State agencies and the General Assembly had passed a resolution in support of the 1,200 ft locks.

Bob Frazee

On behalf of the Conference Planning Committee, Frazee welcomed attendees to the 2003 Governor's Conference on Management of the Illinois River System. He expressed his pleasure that the IRCC had its meeting in Peoria. He commended the new administration, Lt. Gov. Pat Quinn and Harmony Dean for their excellent work. Frazee wished attendees a productive time in Peoria, and mentioned the Conservation Tour was one of the important parts of the Conference's agenda. Frazee referred to the Conservation Tour as a showcase for many important visions of many landowners, farmers, municipalities, organizations and agencies demonstrating positive proactive things could be done on this landscape to help protect the Illinois River Basin, but also the river itself.

Lt. Gov. Quinn

Lt. Gov. Quinn thanked Bob Frazee and suggested that everyone take advantage of the Internet to e-mail and exchange ideas: the more we communicate, the more we can accomplish together.

Adjournment

Lt. Gov. Quinn adjourned the meeting at 8:39 p.m.

CALL TO ORDER

Robert W. Frazee

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Good Morning and Welcome! At this time I would like to convene the Opening Session of the 2003 Governor's Conference on the Management of the Illinois River System. I am Bob Frazee, Natural Resources Educator with University of Illinois Extension and am serving as Co-Chair for this conference. This morning as I mingled with people in the hallways, it was exciting to be a part of the interest and enthusiasm that is being generated by holding this ninth biennial conference on the Illinois River System. I am very pleased to report, that as of a few minutes ago, we now have over 225 individuals registered.

What a journey each of you have made to arrive here at this 2003 Governor's Conference on the Management of the Illinois River System. This is *your* conference and we want to do all *we* can to make this an enjoyable experience.

This conference provides a true indication of the growing interest that is concerned about protecting our Illinois River System for the future! In looking over the registration list, we have a very diverse group of participants in terms of their backgrounds and the groups and agencies they represent. This is tremendous!

With this diversity in mind, I would like to encourage each of you, throughout this conference, to actively seek out individuals with *different* opinions and viewpoints on river management. Share your thoughts and concerns with each other, open your minds to new perspectives, and explore the opportunity for compromise. A tremendous opportunity for networking will occur this evening during our barbecue and Volunteer Session on the Peoria Riverfront.

The theme for this year's conference is "The Illinois River: Sharing the Visions." During the next two days, our conference speakers will be focusing not only on significant restoration and preservation accomplishments that have occurred during the past two years, but will be looking through the crystal ball to explore a future vision for the Illinois River System.

Our State Planning Committee envisions this conference to be more than just a gathering to hear speakers, eat some good food, and visit in the hallways (although these are always important components of any good conference). Instead, we hope this conference will educate, enthuse, and empower you, so that on Thursday, you will leave being motivated to aggressively work to protect and enhance our state's most important inland water resource – the Illinois River. In other words, you will be an Illinois River Activist, one who will utilize your knowledge and expertise to truly work to make things happen for the betterment of the entire Illinois River System.

The Governor of Illinois, Mr. Rod Blagojevich, recognizes the tremendous importance of the Illinois River System to our state and further realizes that it also provides Illinois with a key environmental challenge. Consequently, the 2003 Conference on the Management of the Illinois River System has been designated a Governor's Conference. A special Governor's proclamation has been issued to emphasize our state's commitment to conscientiously manage this important natural resource for the benefit of future generations. This Proclamation reads as follows:

> WHEREAS, the Illinois River System is a critical component of our state's geography, history, economy, and ecology; and
>
> WHEREAS, many attributes are threatened as a result of the cumulative effects of human activities that have significantly altered the Illinois River system; and
>
> WHEREAS, the implementation of the Illinois River Coordinating Council, the Conservation Reserve Enhancement Program, the Illinois Conservation 2000 Program, Illinois Rivers 2020, and the Open Lands Trust Fund are important milestones in efforts to protect the resources of the Illinois River; and

WHEREAS, the 2003 Conference on the Management of the Illinois River System is October 7 – 9 at the Holiday Inn City Centre in Peoria; and

WHEREAS, the theme of the conference is "The Illinois River: Sharing the Visions;" and

WHEREAS, citizens may take this opportunity to recognize the economic, recreational, social, and environmental benefits of properly utilizing the resources of the Illinois River basin;

Therefore, I, Rod R. Blagojevich, Governor of the State of Illinois, do hereby proclaim October 2003 as ILLINOIS RIVER SYSTEM MANAGEMENT MONTH in Illinois.

Signed, Governor Rod Blagojevich

This Proclamation will be on display in the foyer throughout the conference and will also be printed in the Conference Proceedings. Unfortunately, Governor Rod Blagojevich is unable to attend this Illinois River conference, as he conducting other official state business.

At this time, it is my pleasure to recognize my co-chair for this conference, Steve Havera. Steve is an Animal Ecologist with the Illinois Natural History Survey and serves as Director of the Forbes Biological Station and the Frank C. Bellrose Waterfowl Research Center at Havana. Steve will be chairing the conference sessions tomorrow. Steve, thank you for the excellent leadership you have provided to this conference.

Two years ago, following the 2001 Illinois River Conference, a State Planning Committee was formed to begin making plans for the conference convening here today. These committee members are listed on the last page of your Abstracts and Speaker Information Booklet. They have done an outstanding job of developing the program and making the necessary arrangements. Would the planning committee members please stand and be recognized.

This year, we are especially indebted to a number of agencies and organizations for providing significant financial contributions to enhance the quality of this conference. Platinum, Gold, Silver and Bronze Financially Supporting Sponsors are listed on page 38 of the Abstracts and Speaker Information Booklet. These contributions have enabled our Conference Planning Committee to waive the registration fees for our speakers and moderators - a gesture that I'm sure is greatly appreciated. Following our conference, each registered participant will receive a copy of the Conference Proceedings through the mail in approximately 3 months.

I am also pleased to announce that we have over 60 co-sponsoring agencies and organizations that have assisted in promoting this conference and are committed to protecting and preserving the Illinois River System. They are also listed on page 38 of the Abstracts and Speaker Information Booklet. We welcome each of you and thank you for helping to make this conference a success!

At this time, I would like to recognize the efforts of several individuals who have made significant contributions to the organization of this conference.

The Heartland Water Resources Council of Central Illinois has been serving as the local administrative entity for handling the many arrangements necessary to make this a successful conference. Tom Tincher is their Executive Director and Pashion Gaworski is the Assistant Director. Please join me in thanking Tom and Pashion for their efforts in organizing this conference.

I am pleased to recognize Kim St. John, Executive Director for the Prairie Rivers Resource Conservation and Development Area and Jon Hubbert, Peoria County District Conservationist for the Natural Resources Conservation Service, who were responsible for organizing yesterday's very successful Conference Conservation Tour. This Illinois River Watershed Conservation Tour viewed farmland converted from rowcrop agriculture to prairie, woodland, wetlands and riparian corridors; forestry management; municipal waste treatment; commercial navigation at the Peoria Lock and Dam; brownfields; and backwater lake restoration. Thank you, Kim and Jon, for an outstanding Conservation Tour!

Yesterday, for the first time, our conference was very pleased to host the Quarterly Meeting of the Illinois River Coordinating Council. Lieutenant Governor Pat Quinn and the members of the Coordinating Council shared their vision of what the Illinois River could be in the future. It is my pleasure to introduce Harmony Dean, Policy Assistant for Lt. Governor Pat Quinn and Staff Coordinator for the Illinois River

Coordinating Council. Harmony was responsible for organizing and conducting yesterday's evening meeting of the Illinois River Coordinating Council and the Open Public Forum & Discussion.

Lisa Merrifield, Program Specialist with the Illinois Water Resources Center, compiled our Conference Abstracts and Speaker Information Booklet and is also our Conference Proceedings Editor. Lisa will be here throughout our conference, so speakers, please be sure to make a point to see her and leave with her a CD or diskette of the paper that you are presenting.

Another individual I would like to recognize is Melissa Eaton, who chaired our Exhibits Committee. This year, through Melissa's leadership, we have 30 educational exhibits. Thank you, Melissa for your help in organizing the exhibits.

The next two individuals are truly unsung heroes in my mind. They include Jay Solomon and Somjad Puangngern with University of Illinois Extension. Jay and Somjad are the technology wizards who have worked behind the scenes to ensure that the speaker's presentations, whether they are PowerPoint, slides, video, or overheads, work properly and the conference is kept on schedule. Thanks Jay & Somjad for a great job!

Throughout our two-day conference, please refer to the Abstracts and Speaker Information Booklet for the agenda and for more complete information regarding the speaker's topic and personal background. On behalf of the State Planning Committee, I hope that you will find this conference to be exciting, informative, stimulating, and enjoyable.

At this time, it is my pleasure to introduce to you Mr. David Ransburg, Mayor for the City of Peoria. Mayor Ransburg will officially welcome you to the friendly City of Peoria, situated midway on the Illinois River between Chicago and Grafton.

The Opening Session of our ninth biennial Illinois River Conference examines the Illinois River System in 2020 by providing a State Focus and Vision. The Moderator for this session is George Shadid. George is State Senator for the 46th Senatorial District, serves as the Majority Caucus Whip, and is very active in legislative matters involved with the Illinois River Watershed. George will introduce the speakers for our Opening Session.

This year, our Conference Planning Committee felt it was important to also hear from our federal partners. For the second half of our morning session we will learn about the Federal Focus and Vision for the Illinois River System in 2020. It is now my pleasure to introduce the Moderator for this next session, Dennis Campion. Denny is not only the Associate Dean, for the College of Agricultural, Consumer and Environmental Sciences with the University of Illinois but he is also my boss. I would to thank Denny for providing me with the opportunity to serve as the Conference Co-chair for the past 8 conferences and for being very supportive of my Extension programming in the Illinois River Basin. Thanks Denny and thank you for serving as our Session Moderator.

THE ILLINOIS RIVER SYSTEM IN 2020: STATE FOCUS AND VISION

Joel Brunsvold

Director, Illinois Department of Natural Resources
One Natural Resources Way, Springfield, IL 62702-1271

I. Vital Economic Resource:

A. Crucial Navigation System
B. More than 60 million tons of commodities, including about 20 millions tons of farm products shipped.
C. 90% of Illinois' population live within the Illinois River Basin
D. Watershed includes more than 10 million acres of the most productive farmland in the world.
E. Nearly 900,000 people in the state of Illinois rely on the Illinois River Basin as their source of drinking water.

II. Vital Natural Resource, But it Has Problems:

A. We know this because the Illinois River is one of the best studied rivers in the world.
B. The natural resources of the Illinois River have been studied by the Illinois Natural History Survey and Illinois Water Survey for over 150 years.
C. Since 19000, 18 fish species have been lost from the Illinois River Valley and Waterfowl populations had significantly decreased, some by as much as 90%
D. Most of the backwater lakes have lost more than 70% of their volume
E. Every day, the equivalent of 17,808 truckloads of sediment enter the basin.
F. So the river is still threatened by sedimentation and siltation as well as urban sprawl, flooding and loss of critical habitat.
G. But, it still is home to more than 100 species of fish and is a critical flyway for hundreds of species of waterfowl, shore birds and other migratory birds.

III. There Is A Lot Of Work To Be Done, But We Are Making Progress

A. Significant improvements have been made since the Clean Water Act, and programs to reduce soil erosion from fields have been implemented.
B. Important partnerships have been forged and continue to grow between business, agriculture, and conservation interests.
C. Those interests helped put together the integrated management plan for the Illinois River Watershed.
D. Lt. Governor Pat Quinn is helping to drive restoration efforts through the Illinois River Coordinating Council.
E. Illinois Rivers 2020 continues, the governor endorsed the program while he was still in congress.

F. During the last few years more than $425 million of state, federal, and local money has been spent on projects to restore and enhance the Illinois River Basin.
G. More than $300 million more state and federal dollars have been spent on the Crep Program. 111,000 acres have been restored and 67,000 of those acres have been placed in permanent easements.
H. While the budget outlooks isn't good, interest by landowners remains high. There are another 34,000 acres waiting to be enrolled when the program opens again.
I. The Vision continues for a voluntary-incentive-based program to restore, enhance and preserve the Illinois River Basin for generations.
J. We need to continue to build new partnerships, develop new technologies and innovative approaches to transportation, water quality, economic development, recreation and land and habitat conservation issues.

THE ILLINOIS RIVER SYSTEM IN 2020: STATE FOCUS AND VISION

Marcia Willhite

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Before relaying the vision for the future, let's examine what has been accomplished.

Water quality in the Illinois River has improved significantly since the implementation of the federal Clean Water Act. Billions of dollars have been invested in sewage systems and treatment works. Uncontrolled industrial pollution has been virtually eliminated. Citizen planning groups are working throughout the watershed, through planning and implementation, to protect local rivers, streams, lakes and groundwater.

The citizens of Illinois today are enjoying the benefits of the Clean Water Act, passed in 1972. For 31 years this landmark legislation has been central to our states endeavors to improve the quality of our water. Under this law, all levels of government – federal, state, and local – and the private sector have worked together to curb pollution problems caused by untreated wastewater and industrial effluents and to tackle the difficult problems presented by runoff from city streets, farmlands, and other nonpoint sources. State and federal programs such as the Conservation Reserve Enhancement Program and the most recent Farm Bill provide incentive to landowners to implement a wide range of best management practices that have tremendous water quality benefits. But yet, there is still much to do.

Of those stream miles monitored, over 87 stream miles are considered non-support for aquatic life within the Illinois River Watershed. Many more miles are considered partially impaired for aquatic life, swimming, fish consumption, and drinking water. Better water quality assessments are needed. Nutrients have been identified as a water quality problem. We need to move aggressively toward protective science-based standards.

The mission of the Illinois Environmental Protection Agency is to safeguard environmental quality, consistent with the social and economic needs of the State, so as to protect health, welfare, property and the quality of life.

IEPA cannot accomplish this mission without addressing the Illinois River, its tributaries and it's watershed. The river and its watershed are an integral and essential part of Illinois' social and economic landscape.

Our goal is to improve and protect water quality in the entire river basin. Not just for humans, but for plants and wildlife as well. Our vision is that the tributaries to the Illinois River support all water uses. Our vision for the Illinois River is:

- A clean up plan (TMDL) will be developed and implemented.
- Locally lead watershed management planning efforts to improve water quality, and where possible restore the healthy river system, covers the entire Illinois River watershed.
- The monitoring network is expanded to cover much more of the total watershed.
- One hundred percent of the communities within the Illinois River watershed have implemented plans to control stormwater runoff from within their communities.
- One hundred percent of the counties covering the Illinois River watershed have adopted and are implementing county zoning and ordinances to control nonpoint source pollution.
- One hundred percent of the un-sewered communities and wildcat sewers are addressed.
- Nonpoint source pollution is vastly reduced through voluntary programs implemented in the urban and rural landscape. (e.g. T by 2000 – "T" reduced from the "productive" rate to a rate that reduces soil erosion for water quality.)

With just over sixteen years till 2020, we need to take another step closer to the grassroots organizations and the citizens of Illinois. Nonpoint source pollution, the greatest threat to water quality in Illinois begins at home, work and play. The day to day actions that people choose are the key to reducing nonpoint source pollution and improving water quality in the Illinois River and its tributaries.

I believe that Illinois EPA will play a major role in this next step to improve the Illinois River. Our mission supports voluntary programs that allow IEPA to work in concert with a wide variety of partners to protect our water resources. Regulatory programs have yielded great results for point source pollution control but the tools for nonpoint source pollution control are incentives and education. IEPA can assist with cost share programs and monitoring to help local planning groups focus their resources to the problem areas not yet addressed.

We at IEPA see a bright future for the Illinois River Watershed. With continued cooperation from the grass roots to the federal level I think we can and are indeed making a difference in this watershed.

THE ILLINOIS RIVER IN 2020: STATE FOCUS AND VISION

Charles Hartke

Director, Illinois Department of Agriculture
State Fairgrouds, P.O. Box 19281, Springfiled, IL 62794

- For nearly 20 years we have been making efforts to buildup the Illinois River System and find ways to keep it healthy for the future.

- We rely heavily on our river system in Illinois…example, cheapest way to haul grain…need to keep barge system strong.

- We're here today to "share the visions" for the future of our River System but I think it's important to share our accomplishments as well. These accomplishments serve as building blocks for current and future efforts.

- Over the past 18 years the State of Illinois has allocated $65 million to Soil and Water Conservation Districts through the Department of Agriculture to assist landowners with putting conservation on the land. In some years better than half of the allocations went to districts in the Illinois River Basin.

- Through the Conservation 2000, Conservation Project Practices, soil erosion has been reduced by about 2.4 million tons over the past five years.

- Stream bank stabilization is a relatively new effort. It is estimated that 30 to as much as 70 percent of the sediment load in the streams originates from stream bank erosion. Since this program was established in 1996, 562 projects have stabilized a total of 64 miles of eroding streambanks throughout the state, saving over 123,000 tons of soil. These projects are successful as a result of the team effort put forth by the 98 Soil and Water Conservation Districts, the Natural Resources (NRCS) and the Department of Agriculture.

- Through the Erosion and Sediment Control Program we've established tolerable soil loss guidelines for maintaining long-term agricultural productivity and protecting water quality from sedimentation. Again with the help of SWCDs we collected data that shows only 15 percent of the fields surveyed in the state now exceed tolerable soil loss levels compared with approximately 40 percent just 25 years ago.

- We now have a Nutrient Management Plan that provides incentives to producers to evaluate the fertility of their fields and adjust application rates to efficient agronomic standards. The program has the potential to be a win/win for the environment and producers. By reducing the amount of nutrients producers apply, crop production cost could potentially be lowered and water quality improved.

- We have a lot of work to do but the rewards will be tremendous.
  I'm proud to say the future of the Illinois River has never been brighter.

THE ILLINOIS RIVER IN 2020: FEDERAL FOCUS AND VISION

Colonel Duane P. Gapinski

Commander, Rock Island District, US Army Corps of Engineers
P.O. Box 2004
Rock Island, IL 61204

I want to thank you for inviting me here today. I'm happy to have this opportunity to meet and talk with you.

As we look toward the future of the Illinois River, one of the key tools being used to maintain the viability of the Illinois River is watershed management. Watershed management is a topic that has gained momentum and interest in recent years. Especially in the current environment of government cutbacks, it is imperative that agencies work together for the common good of the environment.

Water resource challenges continue to face the Illinois River, and it is important that we work in partnership to address these issues. We see a vision of an Illinois River with restored ecosystems that sustain biodiversity and populations of native species while maintaining economic opportunity; however, this vision can only be reached through watershed management partnerships … partnerships with government and non-government organizations that also care about our river. Partners like you.

Through watershed management partnerships, we can work together to create a brighter future for the Illinois River. The Corps' Illinois River Basin Restoration Project, the Environmental Management Program, and the Upper Mississippi River—Illinois Waterway System Navigation Study illustrate this concept.

I will give you a quick update on where we stand with the Illinois River Basin Restoration Project and the Navigation Study. Section 519 of WRDA 2000 authorized $100 million for the Illinois River Basin Restoration for the purpose of comprehensive planning, evaluating new technologies and innovative approaches, and implementing long-term resource monitoring and critical restoration projects on the Illinois River. Our sponsor on this effort is the Illinois Department of Natural Resources. We understand this project to be integral to the state's Illinois Rivers 2020 initiative.

To date, we have completed an Interim Report on the Illinois River Basin Restoration and developed system alternatives. We have also initiated final design of the Pekin (PEE-KIN) Lake Critical Restoration Project. In the next year, we will complete the Comprehensive Plan and continue evaluation and design of three to four Critical Restoration Projects.

In addition, we have completed the related Peoria Lake study. We are now preparing to initiate design on the first of three islands as part of our efforts to restore deep water habitats in lower Peoria Lake.

Another study with an emphasis on collaboration is the Upper Mississippi – Illinois Waterway System Navigation Study. We have worked with many government and non-government partners to finalize our evaluation of future navigation requirements and ecosystem restoration alternatives for the Upper Mississippi and Illinois Rivers.

Preliminary economic information was coordinated with all stakeholders in July. This month, public meetings will be held at seven locations to present the complete evaluation of alternative plans. This is a time where we would like to hear the public's views on this study. I encourage you to attend either of the public meetings in Illinois. One will be on October 21 at the River's Edge Hall in Quincy, Illinois, and the other will be on October 22 at the Holiday Inn Peoria I-74 at Northwoods Mall in Peoria, Illinois. There will be open houses from 3 to 5 p.m., and the opening presentations will be at 6:30 p.m. at both locations.

We plan to release the draft report for public review in April 2004, followed by a Chief of Engineers report in November 2004.

Our goal is to recommend to Congress a balanced plan that will ensure that the waterway system continues to be a nationally treasured ecological resource, as well as an efficient national transportation system.

Both the Illinois River Basin Restoration Project and the Navigation Study illustrate the importance of watershed management partnerships.

So when reflecting on a vision for the future of the Illinois River, we see a river with a healthier ecosystem, while still supporting its multi-facetted role. In order to achieve this vision, we want to work with partners who have years of committed public service and dedication to the Illinois River and its surrounding communities. Partners like you. Through your assistance, we can turn this vision of a healthier Illinois River into a reality

THE ILLINOIS RIVER IN 2020: STATE FOCUS AND VISION

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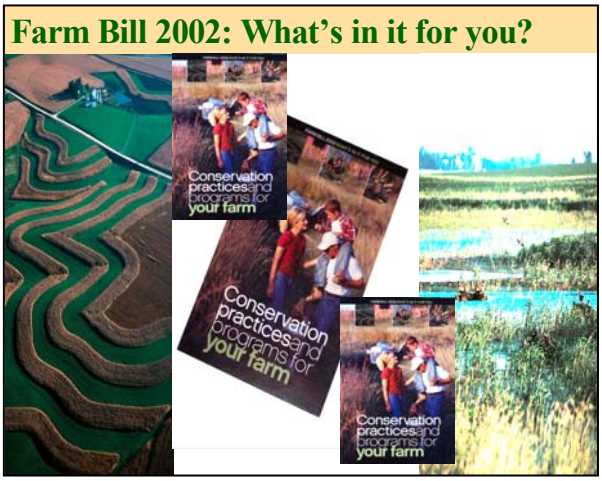
(1) The new Farm Bill offers an 80% increase in conservation funding. It is a great opportunity for progress along the Illinois River and all land here in Illinois.



(2) These are the brochures we provide to our offices and our clients across the state. It's a quick-read and a good overview of options that private landowners need to make decisions about their land.

(3) The 2002 Farm Bill may be over 1,000 pages long, but the mission of it from a conservation perspective is simple: programs and assistance to help landowners address soil, water, and wildlife issues. It is completely in alignment with the mission of NRCS.

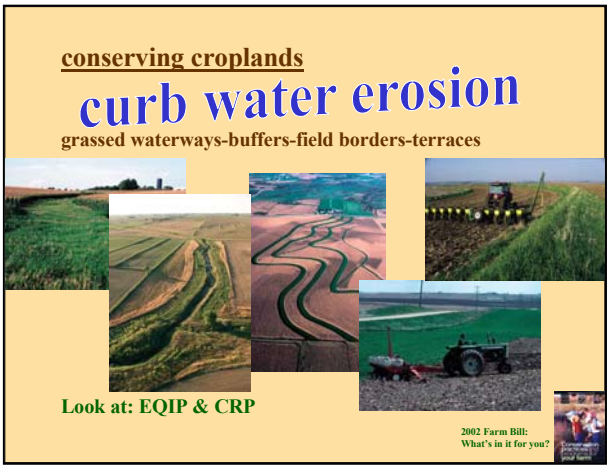
(4) At NRCS, our process is pretty simple. We work with landowners to identify resource issues on their land. We develop a conservation plan with them. Then we match up the practices they need with the programs that are available. These are just a few of the practices we commonly work with. Our technical specialists are there to make recommendations and help find solutions.

(5) These are the programs available to take those plans and put them on the land. Since 1935, our agency has worked one-on-one with landowners to explain the practices, the programs, the financial assistance and long-term requirements. Federal funds are available for landowners who want to make conservation a priority. Our job is to show them how to do it & to help them do it right. Most of these are more known by their acronym than by their full program name. The one program everyone is most interested in--CSP, or the Conservation Security Program--is the program we still know the least about.

(7) We will see a chart showing individual programs in minute, but in general, NRCS conservation programs offer financial payments either as annual payments for the length of the contract, or one time, up-front payments.

(6) NRCS' procedure for conservation is simple. We identify resource concerns, select a practice that offers a solution, then find a program that can help financially. For example, if there is an identified an erosion problem on cropland, the next step is to look at conservation practices that might take care of that problem. There are many practices-- both agronomic and structural-- that can be used in an erosion control system. Conservationists can help suggest the practices that will solve your particular resource problem; they can help private landowners look at all the resource concerns and suggest practices that best address them. The next step then is to look at which programs of USDA can offer financial assistance. In the case of sheet and rill erosion on cropland, the Conservation Reserve Program could provide payments for seeding down parts or all of an eroding hillside for a period of years. Or, the Environmental Quality Incentives Program could be used to build terraces. The Conservation Security Program might be used as well once rules and policies are final. Landowners in Illinois can get help looking at a combination of both practices and programs for their farm.

(8) Private landowners can get the expertise they need to plan and apply the practices from the Natural Resources Conservation Service. NRCS is the nation's premier land care agency, with an office in most counties across the country. The new farm bill also authorized use of Technical Service Providers (TSPs), who can be hired to help apply certain practices to the land. There are also many private organizations as well as state and local agencies that can and do help with technical or financial needs. These groups vary from wildlife organizations to farm organizations, state conservation agencies, and local conservation districts.



(9) I'm going to quickly go through a few of the problems we need to address in the Illinois River Basin. We'll identify some of the conservation practices that might help address them, and then see which programs might help financially. Water Erosion--With soil erosion from water, consider terraces, contour buffer strips, grassed waterways or field borders. EQIP is designed to keep working croplands productive. It offers cost-share funds to build the terraces, for instance. Another option is CRP--planting soil protecting grasses or trees on steeply sloping cropland. Another possibility is the Conservation Security Program, which I will talk about later. Bottom Line: There are lots of options & programs to help with erosion.

(10) Improving Soil & Water--Cropland problems may be just as critical for water quality reasons as they are for soil protection. So it may be nutrient management techniques, or pest management techniques that are needed. Consider cover crops and conservation buffers, and the workhorse program here could be the Environmental Quality Incentives Program again, as well as the Conservation Reserve Program. Also the Conservation Security Program. I hope you're getting the idea by now that it is a combination of practices and a combination of programs that help us do the best job of caring for natural resources for Illinois.

(11) Stream Stabilization--Any activities that occur closest to a body of water have the most effect on the water-- good or bad. So planting trees, shrubs and grasses along streams or around other waterways can be very effective for good water quality. And since livestock can be a problem if they are left in water supplies indefinitely, there are financial incentives and practices that make it workable to fence livestock from streams and still get water to them with less impact on water quality. And several programs can apply. Federal programs as well as the State Streambank program through IDA.

(13) Managing Grasslands--There are a number of practices designed to assist with pastureland, rangeland or other grasslands. By looking at the big picture, we can get high production, better water quality, and help wildlife. There are several programs designed to develop management plans that include prescribed or rotational grazing, pest management, fencing, and other practices.

(12) Managing Manure--For producers in the livestock business, it would be a good idea to become familiar with the Environmental Quality Incentives Program. Here in Illinois, 60% of EQIP funds go to livestock solutions. It is used for the expensive manure storage and handling aspects that come with livestock operations.

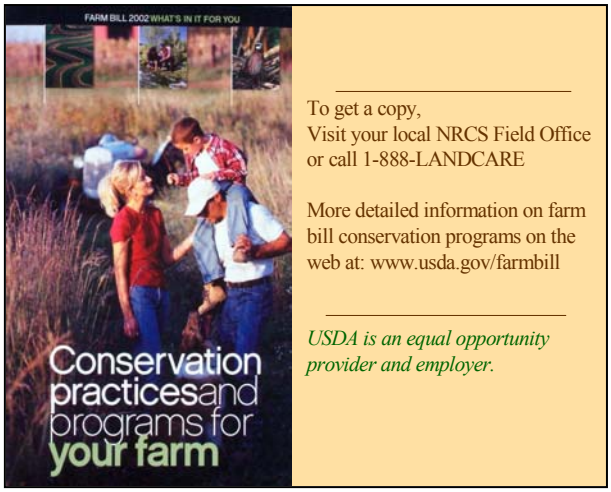
(14) Wildlife Habitat--There are lots of ways to look at wildlife habitat areas-- but one good way is to think about how everything we do affects wildlife-- in either a good or a bad way. By simply modifying most conservation practices--using the type of grasses or other plants that help wildlife most-- benefits to wildlife can be maximized. Landowners can dedicate specific plantings for wildlife as part of a number of USDA programs. For instance, the Wetlands Reserve Program is intended to restore wetlands that have many benefits, including the establishment of habitat for waterfowl and more than 300 other species of wildlife. It's easy to make all conservation practices benefit wildlife—it's a natural thing.

(15) Managing Forest Lands--USDA programs have already made a difference in the acreage of forestland in the United States, and will continue to add to more, higher quality woodlands. Several of the programs can help plant trees, or to manage forest stands for better tree growth or to maximize wildlife habitat. There are cost-share funds available to help manage forestlands just as there are for croplands and pasturelands.

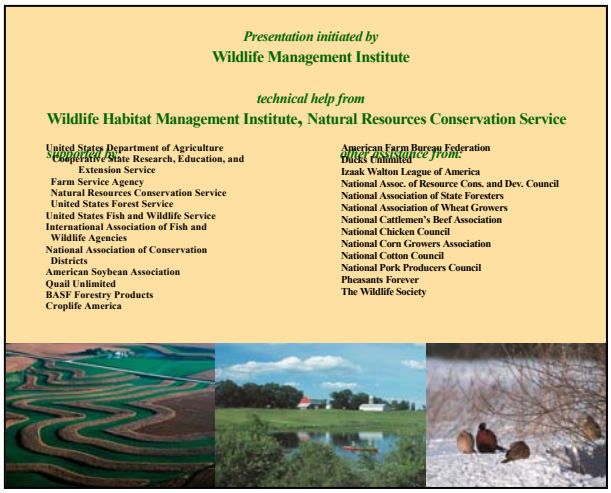
Program	Eligible land	Agreement length	Rental payment	Easements	Cost-share
Conservation Reserve Program (CRP)	Cropland with EI rating of 8 or more; planted 4 of last 6 years	10- 15 years	$$ Annual, based on agreement length		$$ 50%
Wetlands Reserve Program (WRP)	Private wetlands converted to agricultural use before 1985-- must be restorable, suitable for wildlife benefits	10 or 30 years; permanent		$$ One-time, up front payment	$$ Up to 100%
Grassland Reserve Program (GRP)	Private grassland, shrubland, land with forbs-- and land that historically contained those features	10, 15, 20 or 30 years; permanent	$$ Annual, based on agreement length	$$ One-time, up front payment	$$ Up to 90%
Wildlife Habitat Incentives Program (WHIP)	All private land that is not currently enrolled in CRP,WRP or similar USDA program	5- 15 years			$$ Up to 100%
Environmental Quality Incentives Program (EQIP)	All private land in ag production-- includes cropland, grassland, pastureland, non-industrial private forestland	2- 10 years	$$ Annual, based on agreement length		$$ Up to 75% w/ special incentives
Conservation Security Program (CSP)	All private land in agriculture and forest that is an incidental part of an agricultural operation	5- 10 years	$$ Annual, based on agreement length		$$ Up to 75%

(16) Here's a summary chart of the primary conservation programs of USDA, with the eligibility requirements in brief, as well as the type of payments and the length of agreements for program participants. I'm not going to go into detail on it right now--we can come back to it if you have questions on it. For now, just notice that we are talking about privately owned land in almost all cases. We are usually talking about a multi-year agreement, and producers get an annual payment or an upfront payment as well as cost-share to apply the

(17) There are conditions to receiving the financial assistance-- probably the most important three things the landowner agrees to in most cases is:
1) to follow a conservation plan that helps achieve the goals of the landowner and the practices and program
2) to furnish his or her share of the cost of establishing conservation practices in most cases, and
3) the landowner agrees to maintain the practices for a specified time period.



(18) In a nutshell, that's the look at "Conservation practices and programs for your farm," the brochure that gives a quick overview of the 2002 Farm Bill's conservation programs. You can get a copy of the brochure at your local USDA Service Center or NRCS County office. Thank you for your time and attention and for your continued commitment to conservation here in Illinois.



(19) There were many organizations that pitched in to help guide the content of the brochure, and to help publish and distribute it. They are listed here.

THE ILLINOIS RIVER: CONNECTIONS TO THE NEXT GENERATION

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The Illinois River basin is unusually rich, not only for its natural resource base, but for the record of how internal and external forces have shaped economic and ecological factors in the region. Examples of internal and external forces that have profoundly influenced the basin during the historic era are presented.

Since World War II, external forces have become increasingly important to the region. Several external forces of growing importance are described, including:

(1) The global economy. The health of local economies and pressures on the natural resource base are now directly tied to global factors. For example, developing countries are competing in the agricultural marketplace, in part by profoundly degrading natural resources in ways that cannot be sustained over the long term. In the short term, downward pressure on farm prices has exasperated the tendency to intensively produce row crops, including the use of marginal lands in the Illinois River watershed.

(2) Federal programs. Farm programs targeting natural resource conservation in recent decades have tended to be top-down, with a "one size fits all" approach. While these initiatives provide critical incentives to address resource conservation needs, little attention has been given to optimizing soil, water, and wildlife conservation by recognizing appropriate spatial, temporal, and other management considerations. For example, these programs have tended to emphasize the land-water interface, while doing little to address conditions on the uplands.

(3)The urban citizen. About half of the citizens in the United States inhabit coastal settings. The urbanized, coastal population tends to be disconnected from agricultural and other factors that shape the rural Midwestern setting. Nonetheless, they are beginning to carefully track issues that affect the coasts, including the health of rivers and streams in the Midwest. It is inevitable that the emerging generation of urbanized citizens will become increasingly engaged in issues that directly affect the Illinois River Valley. Ways are presented to elevate the Illinois River Valley as a model for an adaptive management approach could bring balance to external and internal forces that will shape the use of natural resources and, ultimately, our society.

ECOSYSTEM RESTORATION OBJECTIVES FOR THE ILLINOIS RIVER: THE UPPER MISSISSIPI RIVER-ILLINOIS WATERWAY SYSTEM NAVIGATION FEASIBILITY STUDY AND OTHER CORPS INITIATIVES

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ABSTRACT

The Illinois River-Floodplain Ecosystem has been developed for human needs for more than 150 years, and that development has come at the expense of natural systems. A conservation movement has been evident throughout the period, but the incentives to develop typically superceded conservation initiatives. That is until human health risks increased and people recognized the threats posed to natural systems. Habitat restoration is an important conservation effort recently, with restoration actions occurring throughout the basin to affect mainstem resources. Future visions for the Illinois River commonly include improved habitat quantity, quality, and diversity. The U.S. Army Corps of Engineers is working with State, Federal and non-governmental partners to ensure that this vision becomes a reality.

Planning for future ecosystem needs should be conducted in the context of a set of clear goals and objectives for the condition of the UMR-IWW. There are currently three significant Corps of Engineers programs planning for these ecosystem needs, or objectives, on the Illinois River. Each of the programs and their individual objectives are discussed. The overarching implementation framework for all of the programs should be an Active Adaptive Management framework that views management actions as purposeful and scientific experimental manipulations of the system to increase understanding of system behavior in the short-term and as a result, achieve management goals and objectives in the long term

INTRODUCTION

The Illinois River-Floodplain Ecosystem has been developed for commerce for more than 150 years, and that development has come at the expense of natural systems. Waterway development was the first important action, opening the region for mining, export oriented agriculture, market hunting, and other economic initiatives during the mid-1800s. With reliable transportation, agricultural development continued to expand in the floodplain and uplands. Levee construction, to improve farming success, provided further incentive to expand floodplain development and investment. Later as the Chicago area grew in size and population, municipal and industrial waste disposal was the primary focus of development; first with the Illinois & Michigan Canal and later with the reversal of the Chicago River through the Chicago sanitary and Ship Canal. Waterway development culminated around 1940 with the completion of the Illinois Waterway Project; a series of canals, rivers, and eight locks and/or dams connecting Lake Michigan to the Mississippi River. These civil works developments helped the region to develop as one of the most important agricultural and urban centers in the world.

Civil works development and the economic development that followed had far reaching negative impacts on natural systems, however. The basin landscape was transformed to row crops and cities, altering the timing, magnitude, and constituents of materials delivered to the river. The floodplain was "reclaimed" for agricultural development, severing the connections between the mainstem river and its floodplain. The river's hydrology was regulated to provide reliable waterborne transportation year-round

at the expense of the low flow signal of the hydrograph. All of this development occurred in the context of a developing nation seeking to control and prosper from the bounties that nature provided.

A conservation movement has been evident throughout, but the incentives to develop typically superceded conservation initiatives. That is until human health risks increased and people recognized the threats posed to natural systems. State and Federal natural resource agencies established hunting and fishing regulations, refuges, conservation areas, and management plans to preserve the region's fish and wildlife resources. Recognition of water pollution problems nation-wide led to the Clean Water Act, which may be the single most important conservation effort to affect the river. Billions of dollars were (and continue to be) invested in municipal and industrial waste water treatment infrastructure, with substantial environmental success. Areas of the river that had been killed-out of almost all aquatic life now flourish with plants and animals that recolonized degraded habitats. Non-point pollution in the form of excessive nutrients and sediment is a continuing problem that may be addressed by the Environmental Protection Agency and others through the enforcement of watershed-based total maximum daily loads (TMDLs). Habitat restoration is another important conservation effort recently, with restoration actions occurring throughout the basin to affect mainstem resources.

THE UPPER MISSISSIPPI RIVER-ILLINOIS WATERWAY SYSTEM NAVIGATION FEASIBILITY STUDY AND OTHER CORPS ENVIRONMENTAL RESTORATION PROGRAMS

The Upper Mississippi River-Illinois Waterway (UMR-IWW) System Navigation Study is assessing the need for and benefits of expanded lock capacity for the navigation system. The Study was restructured in 2001 to also consider ecosystem restoration as part of a more comprehensive investigation of river system management in the context of achieving ecological and economic sustainability. The study has evaluated the problems, existing and likely future conditions, and developed alternative plans that have recently been introduced to stakeholders and the public. Navigation and environmental plans will be evaluated and compared, then the plans offering the greatest economic and environmental output will be combined into a single plan that will be recommended during Spring 2004.

The Illinois River Ecosystem Restoration Feasibility Study (IRER) is a basin-wide assessment of environmental problems and restoration opportunities for the Illinois River that also has authority to construct critical restoration projects. The study team has identified a number of critical restoration projects that will be initiated as demonstrations of the types of restoration measures that may be widespread. They are also developing a Comprehensive Plan for a larger long-term ecosystem restoration partnership with the State of Illinois. The IRER has updated knowledge of existing conditions and initiated modeling efforts that will inform the development of the Comprehensive Plan. They have established ecosystem goals and framed a number of restoration alternatives around them. The IRER is also scheduled to recommend a plan during Spring 2004.

The Environmental Management Program (EMP) is another significant environmental restoration program authorized for the UMR-IWW. The EMP has invested almost $250 million in ecosystem monitoring and restoration since 1986. EMP Habitat Rehabilitation and Enhancement Projects (HREPs) have influenced almost 150,000 acres, or about 7 percent of the UMR-IWW. Project planning and prioritization is an ongoing process for Natural Resource coordinating committees. The EMP completed a Habitat Needs Assessment in 2000 (see below; USACE 2000) to help establish restoration targets, and a new planning and sequencing process has been established to address those targets in a system context.

The Corps of Engineers sponsors a number of other environmental restoration authorities that can be accessed by non-federal cost share sponsors. There are a number of environmental Continuing Authority Programs (CAP) that can be leveraged for the beneficial use of dredged material (Section 204), aquatic

habitat restoration (Section 206), to restore aquatic habitat on existing projects (Section 1135), and several others. Sometimes the cost of restoration needs exceeds the limits of these programs and General Investigation studies that lead to individual project authorities such as Peoria Lake Riverfront Development Project (i.e., Peoria Islands) are required.

ESTABLISHING ENVIRONEMNTAL OBJECTIVES

Environmental Management Program – Habitat Needs Assessment

The EMP Habitat Needs Assessment (HNA) was a directive from Congress in the 1999 Water Resources Development Act. The HNA undertaken by the EMP partners was meant to:

- achieve a collaborative planning process that produces technically sound and consensus based results;
- address a variety of habitat requirements including physical, chemical, and biological parameters;
- address the unique habitat needs of distinct river reaches and pools;
- describe historical, existing, and projected future habitat conditions, and identify objectives for future habitat conditions;
- define habitat needs at system, reach, and pool scales;
- provide additional tools for planning future habitat protection and restoration projects.

The first version of the HNA was a comprehensive effort to document broad habitat protection and restoration needs to assist planning future EMP habitat projects. The HNA results, as described in the report, were presented as a "first approximation" of habitat restoration needs (Theiling et al. 2000). While quantitative and qualitative expressions (Table 1) of habitat need were very important, other important aspects of the HNA included a comprehensive summary of historic, existing, and future projected habitat conditions in the UMR-IWW, and a documentation of the habitat forming processes the created and maintain the ecosystem. The results are being used in a revised HREP planning and sequencing process to be sure that regional habitat needs are considered. The HNA process also initiated local led Pool Planning efforts to refine site-specific habitat objectives.

Navigation Study

U.S. Army Corps of Engineers planners conceptualized environmental change in the Upper Mississippi River-Illinois Waterway System Navigational Feasibility Study (Nav. Study; Figure 1; USACE 2002). Without trying to assess proportional responsibility to the numerous factors affecting the river basin, the Nav. Study displayed a decrease in ecological integrity stemming from the cumulative impacts from all of those factors.

After recognizing and documenting the types and extent of environmental degradation, the Corps convened stakeholders to help establish goals and objectives for environmental restoration. Interagency coordinating committees, both economic and environmental, were brought together to help define these goals. They established an overarching vision for the system which was: *"To seek long-term sustainability of the economic uses and ecological integrity of the Upper Mississippi River System."* The Navigation Environmental Coordinating Committee (NECC) then refined the vision to four broad environmental goals for the system. These were to:

1. Maintain viable populations of native species in situ,
2. Represent all native ecosystem types across their natural range of variation,
3. Restore and maintain evolutionary and ecological processes (i.e., disturbance regimes, hydrological processes, nutrient cycles, etc.),

4. Integrate human use and occupancy within these constraints.

These goals were important, but site-specific objectives to achieve System sustainability were also required to estimate the cost of restoration and ecosystem management. A series of workshops with a broad range of stakeholders was convened to establish these objectives (Figure 2; DeHaan et al. 2003). There were also pool-wide or regional objectives established at each workshop. Reach-wide objectives on the Illinois River were:

- Maintain 50% of currently isolated backwaters for exclusion of exotics and protection of high quality habitat,
- Increase connectivity to 25% of currently isolated backwaters,
- Protect, maintain, and enhance threatened and endangered species habitat and other natural areas,
- Recreate the natural hydrograph,
- Reduce incidence of summer water level "bumps" to less than 1 year in 3,
- Restore aquatic vegetation in backwater areas,
- Reduce sedimentation throughout each pool,
- Control all exotic species
- Increase bottomland hardwood forest acreage by 10% and improve diversity.

When completed, these objectives were used to form a desired future condition (Fig. 1; DeHaan et al. 2003) or Virtual Reference (Lubinski and Barko, in press) that served as a basis for developing and evaluating the ecosystem restoration alternatives. The various alternative are more or less effective at addressing the ecosystem objectives, but none of them achieve the desired future condition because there are problems affecting the ecosystem that are beyond the authority of the Nav. Study or Corps to address.

Illinois River Ecosystem Restoration

The Illinois River Ecosystem Restoration Feasibility Study project team also established goals for their system, which included the entire basin. The study team composed of the Corps and the Illinois Department of Natural Resources developed goals that were adopted by the entire IRER Steering Committee. Their vision was: "*A naturally diverse and productive Illinois River Basin that is sustainable by natural ecological processes and managed to provide for compatible social and economic activities.*" Their goals were to:

1. Maintain and restore biodiversity and sustainable populations of native species,
2. Reduce sediment delivery to the Illinois River,
3. Restore aquatic habitat diversity of side channels and backwaters,
4. Improve floodplain, riparian, and aquatic habitats and functions,
5. Restore and maintain longitudinal connectivity on the Illinois River and its tributaries,
6. Naturalize Illinois River and tributary hydrologic regimes, and
7. Improve water and sediment quality in the Illinois River and its watershed.

The IRER did not establish site-specific objectives, but rather established quantitative targets for each goal among a range of alternative plans.

Other Corps Programs

The CAP programs referenced above do not work in a programmatic framework amenable to establishing regional goals and objectives. They are implemented on a case-by-case basis, with prioritization among competing projects done on a regional or national basis.

ACHIEVING ENVIRONMENTAL OBJECTIVES

There were about 400 individual actions described in a summary of environmental restoration and river management tools (Lubinski and Barko, in press). They are implemented by a variety of agencies, at a variety of locations, and a variety of scales, both temporal and spatial. The list is unwieldy and was parsed down to a few major categories of restoration measures for large-scale programmatic planning. The categories of measures carried through the Nav. Study were:

- Island Construction,
- Fish Passage,
- Floodplain Restoration,
- Water Level Management – Pool Scale,
- Water Level Management – Backwater,
- Backwater Dredging,
- Side Channel Restoration,
- Dike Alteration,
- Island Protection,
- Creating Topographic Diversity.

These are the types of actions that have been completed through the EMP and would be implemented in any large river ecosystem restoration initiative, and are thus applicable to all of the restoration authorities discussed here. The scale and applicability of the measures may differ regionally and site specific applications must be considered at the project scale.

There are many environmental objectives that the Corps cannot achieve on their own and require partnerships to achieve. One of the biggest unmet needs is a desire for more land restored to native habitats subject to more natural disturbance regimes. The Corps cannot readily acquire large land parcels for ecosystem restoration, but other federal, state and non-governmental agencies or organizations can. Those lands can be used as the non-federal cost share in a project cost-sharing agreement so that project partners can work together to achieve specific habitat objectives.

Past experience with large scale habitat restoration on the UMR-IWW has led to many innovations and improvements in project design and construction. The experience amounted to an Evolutionary Adaptive Management model which is defined as a management approach that attempts to achieve desired conditions through educated guesses and accumulated knowledge of system response to previous management activities. Future ecosystem restoration must be implemented in an Active Adaptive Management framework that views management actions as purposeful and scientific experimental manipulations of the system to increase understanding of system behavior in the short-term and as a result, achieve management goals and objectives in the long term (Lubinski and Barko, in press). Strong public-private partnerships and regional support for the sustainability of the Upper Mississippi and Illinois Rivers provide the organization and vision required to implement a comprehensive adaptive management approach to the operation, maintenance, and restoration of the Upper Mississippi and Illinois Rivers.

REFERENCES

DeHaan, H.C., N.M. McVay, C.H. Theiling, and R.S. Soileau. 2003. Upper Mississippi River-Illinois Waterway System Environmental Objectives Planning workshops. U.S. Army Corps of Engineers, Rock Island, Illinois. 37pp.

Lubinski, K.S and J.W. Barko. In press. Upper Mississippi River-Illinois Waterway System Navigational Feasibility Study: Environmental Science Panel Report. U.S. Army Corps of Engineers, Rock Island, Illinois. 89 pp.

Theiling, C.H., C. Korschgen, H. DeHaan, T. Fox, J. Rohweder, and L. Robinson. 2000. Habitat Needs Assessment for the Upper Mississippi River System: Technical Report. U.S. Geological Survey, Upper Midwest Environmental Science Center, La Crosse, Wisconsin. Contract report prepared for the U.S. Army Corps of Engineers, St. Louis District, St. Louis, Missouri. 248 pp. + Appendices A to AA. www.umesc.usgs.gov/habitat_needs_assessment/emp_hna.html

U.S. Army Corps of Engineers. 2002. Interim report for the restructured Upper Mississippi – Illinois Waterway Navigation Study. Rock Island District, Rock Island, Illinois. 255 pp.

Table 1. Upper Mississippi River System Habitat Needs Assessment results.

System-wide Quantitative Habitat Needs

Create or restore:

- 1,700 acres of main channel habitat
- 27,000 acres of secondary channel habitat
- 55,500 acres of contiguous backwater
- 24,000 acres of isolated backwater habitat
- 24,000 acres of island habitat

System-wide Qualitative Habitat Needs (Resource Managers)

- Improved habitat quality
- Improved habitat diversity
- A closer approximation of pre-development hydrologic variability

System-wide Qualitative Habitat Needs (Public)

- More fish and wildlife in general (habitat diversity, species diversity, and abundance)
- Clean and abundant water
- Reduced sediment and siltation
- Balance between the competing uses and users of the river
- Restoration of backwaters, side channels, and associated wetlands

System-wide Qualitative Habitat Needs (Focus Group)

- A "multi-use" river
- More naturally variable conditions
- Stabilization of existing conditions
- Sustainable, natural river ecosystem
- Increased biodiversity

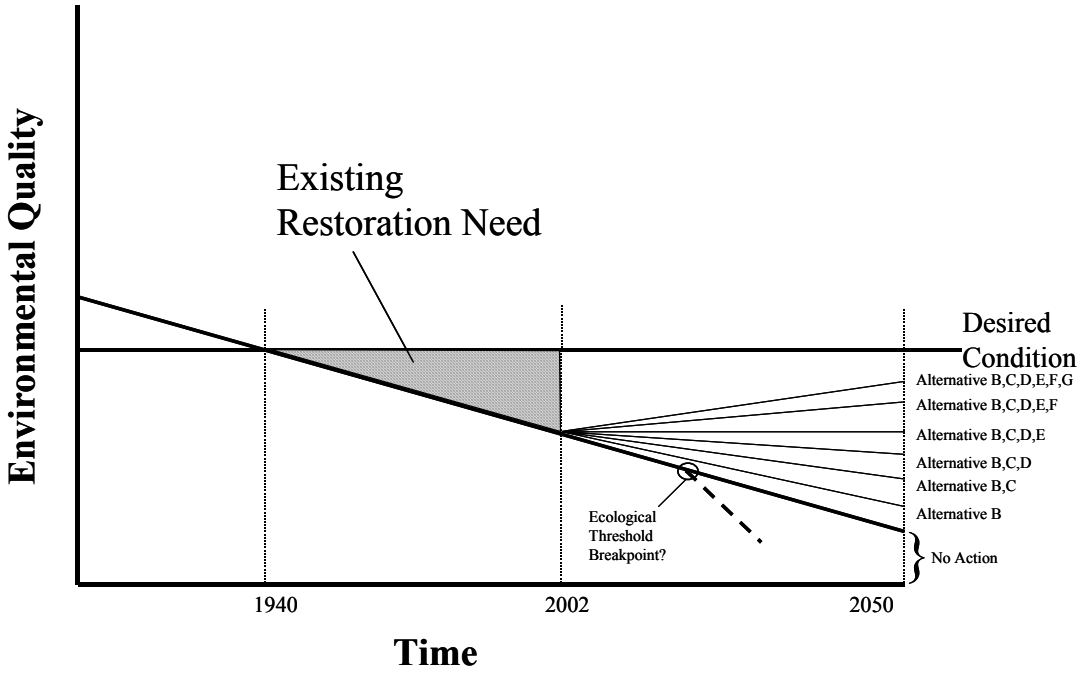


Figure 1. Schematic representation of how various environmental alternatives help achieve desired ecosystem conditions (no scale implied; source USACE 2002). There are elements outside the river floodplain system that cannot be addressed by the Corps of Engineers, so the desired condition will not likely be achieved by any single program discussed here.

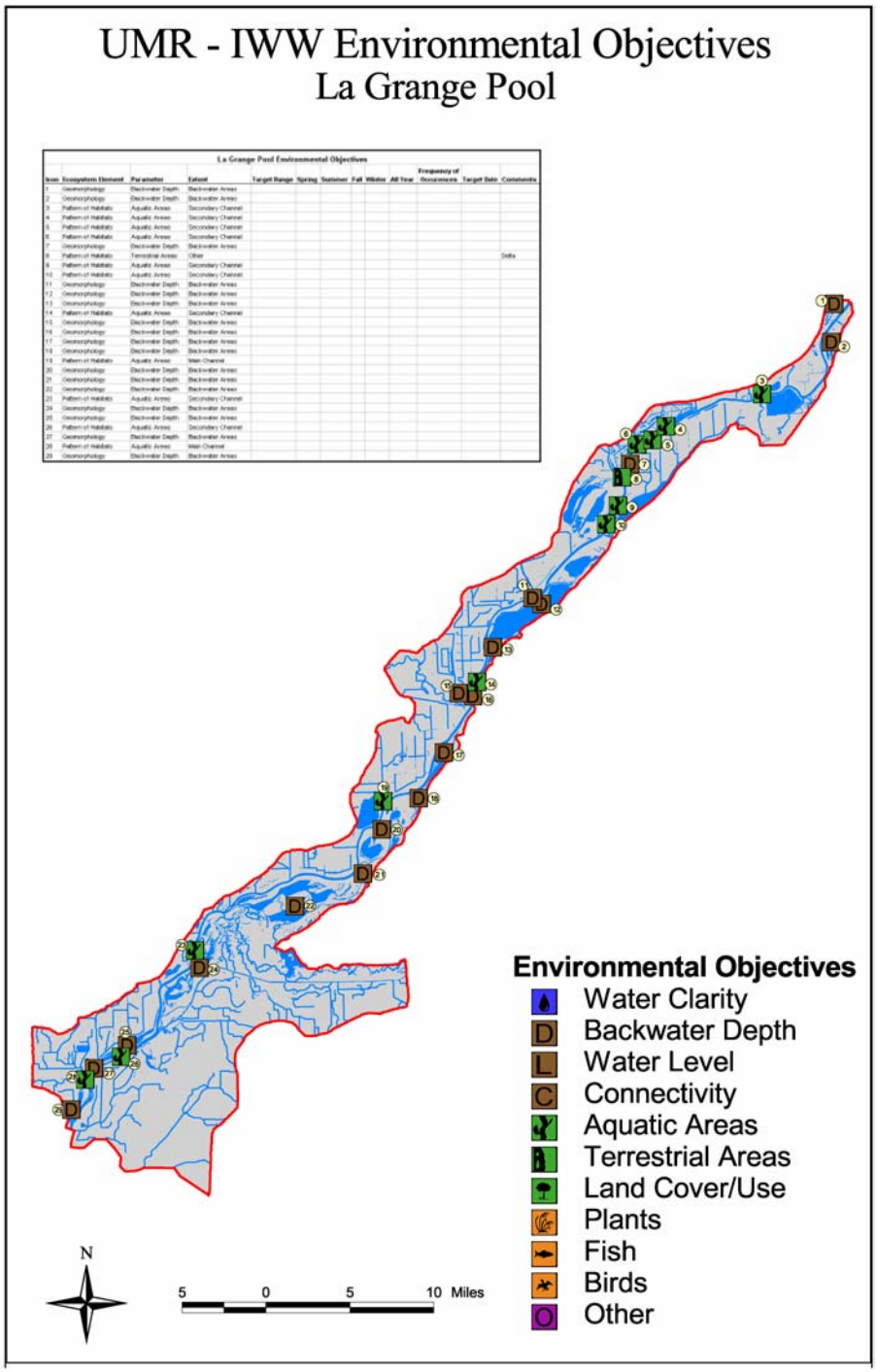
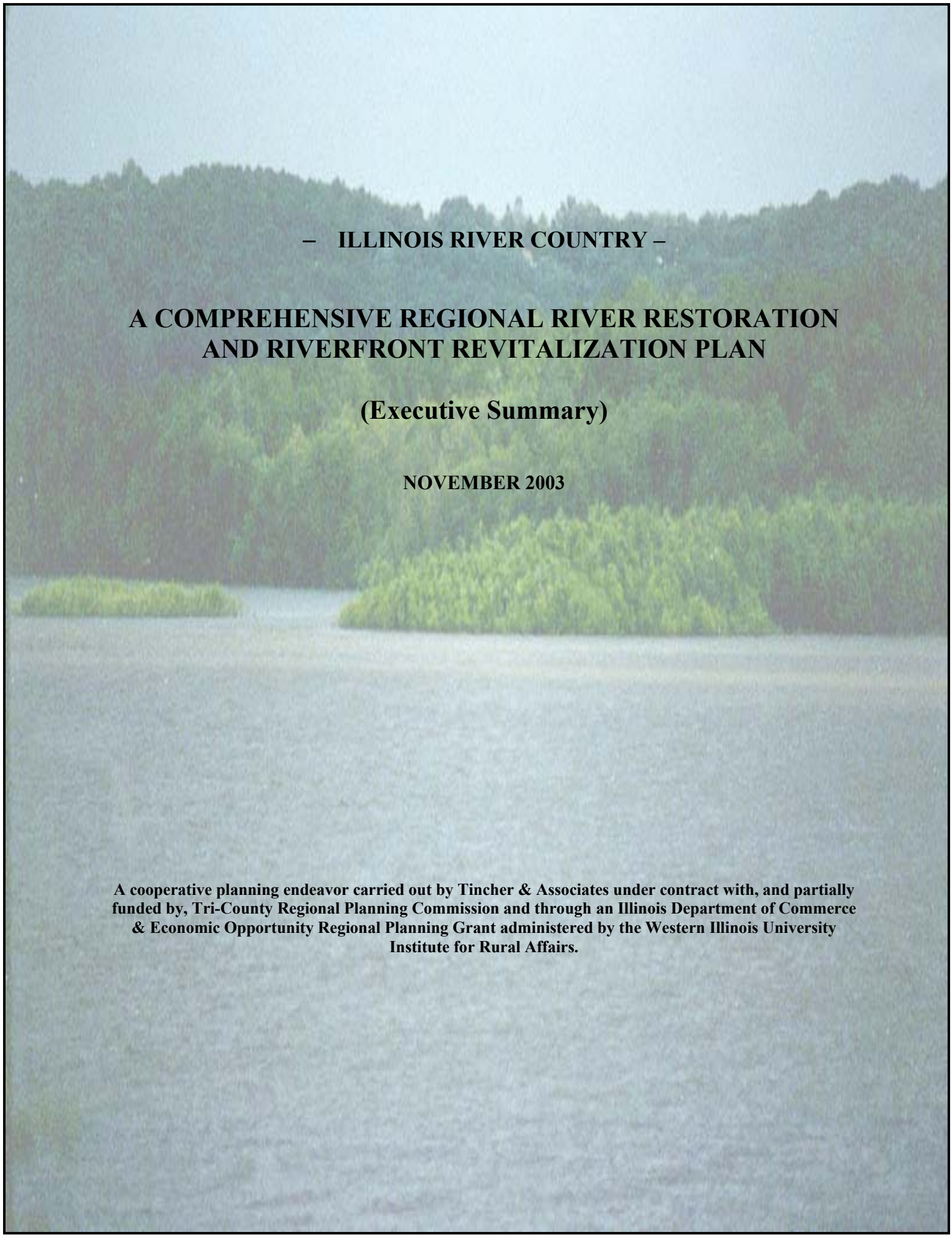


Figure 2. UMR-IWW System Navigational Feasibility Study environmental objectives for La Grange Pool, Illinois River (DeHaan at al. 2003). These objectives were established for the entire UMR-IWW in a series of workshops with stakeholders.



– ILLINOIS RIVER COUNTRY –

A COMPREHENSIVE REGIONAL RIVER RESTORATION AND RIVERFRONT REVITALIZATION PLAN

(Executive Summary)

NOVEMBER 2003

A cooperative planning endeavor carried out by Tincher & Associates under contract with, and partially funded by, Tri-County Regional Planning Commission and through an Illinois Department of Commerce & Economic Opportunity Regional Planning Grant administered by the Western Illinois University Institute for Rural Affairs.

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A COMPREHENSIVE REGIONAL RIVER RESTORATION AND RIVERFRONT REVITALIZATION PLAN

EXECUTIVE SUMMARY

I. INTRODUCTION & OVERVIEW

Under a grant provided by the Illinois Department of Commerce and Economic Opportunity and administered through Western Illinois University's Institute for Rural Affairs, Tri-County Regional Planning Commission retained the services of Tincher & Associates to prepare a regional riverfront development plan. As the planning evolved, it became clear that there was a direct tie between the revitalization of riverfronts and the ongoing river restoration initiatives. Thus, the planning endeavor was expanded to include a river restoration, as well as, a riverfront development/community revitalization focus. It was at that time that the Heartland Water Resources Council, in cooperation with the other Peoria Lakes Basin Alliance members, became involved in the overall planning endeavor. In addition, key staff members from the Illinois Department of Natural Resources, the State Water Survey, and the U.S. Army Corps of Engineers have offered advice and provided direction as this cooperative planning effort moved forward. And, perhaps most importantly, many staff representatives and elected officials from the cities, counties, and State and federal entities involved have participated in the planning process.

Thus, this has truly been a cooperative planning endeavor with broad-based participation that has attempted to bring some focus on the importance of the Illinois River to Central Illinois. The basic conclusion reached is that we have a tremendous opportunity to benefit further from the river by being committed to effectively addressing the multifaceted river restoration and community revitalization challenge involved.

II. SEDIMENT IS A COMMON PROBLEM

One of the greatest obstacles to realizing the full potential of the river is sediment accumulation in the river and its backwater areas.

Sediment accumulation now chokes the barge channel to the point that only 30% of its length along the entire Illinois River meets minimum standards for effective barge operations. Only the channel provides enough depth to accommodate recreational boating and related activities. Access channels must be dredged to connect the main channel to adjacent marinas and many riverfront activity areas. Backwater lakes that once were flourishing wildlife areas are now nearly filled with sediment and their ecological and recreational values have been significantly reduced. Natural "sediment filtering" wetland areas have been eliminated by the establishment of levee districts and the conversion of these areas to industrial and agricultural purposes.

III. PEORIA LAKES RESTORATION PROJECT

No area along the length of the river has been impacted more severely by the accumulation of sediment than Peoria Lakes. The combined area of the upper and lower lakes is roughly 14,000 acres, averaging one mile wide by 20 miles long, with an average depth of 16.7 feet in the navigation channel and less than 2 feet in the off-channel areas. It is the longest bottomland lake in the Illinois

River Valley. The Illinois State Water Survey estimates that nearly 14 million tons of sediment is transported from the watershed each year. Of this, more than one-half, 8.2 million tons, remains in the Illinois River Valley. They further estimate that the Peoria Lakes traps roughly 2 million tons of sediment per year.

Since 1903, the volume of Peoria Lakes below elevation 440 MSL has decreased by approximately 61%. Off-channel areas have experienced the most rapid sedimentation. According to a 1993 State Water Survey report, this is one of the highest sedimentation rates among all the large lakes and reservoirs in Illinois.

Figure 1 shows a comparison of the water depth within the upper and lower lakes from 1903 to 1985. The shaded areas depicted are 5 feet of water depth or more.

Small tributary streams contribute significant sediment loads into Peoria Lakes. Deltas have formed where these and other streams enter the Illinois River and have grown quite large over the years. In an average year, 50% of the sediment delivered to Peoria Lakes comes from the local tributaries. The U.S. Army Corps of Engineers reported in their May, 2002 Peoria Riverfront Development Study that in a wet year, sediment transport flow from local tributaries to the lake would probably exceed 50% of the total being deposited. In its 1986 report on Peoria Lakes sedimentation factors, the State Water Survey reported that primary sources of sediment flow from its tributaries are:

1. watershed erosion,
2. streambank erosion, and
3. gully erosion.

The report further noted that streambank, gully, and hillside erosion sources are significant along the bluffs which surround the lakes. In the same report the State Water Survey recommended that the sediment problem be addressed through three means:

1. control sediment input,
2. manage in-lake sediment, and
3. hydraulically manipulate the Illinois River through Peoria Lakes.

All of these means are being pursued as part of a comprehensive restoration strategy. Artificial islands are being constructed to manage the water flow through the Peoria Lakes and to serve as wind breaks. Dredging priorities and sediment placement plans are being established. Watershed management plans are being drafted and priority projects are being identified.

Several recommendations contained in the 1986 report which have specific significance to this planning initiative are the following:

1. In reducing sediment flow from the tributaries, the highest priority should be assigned to the marginal lands with steep slopes, construction sites, and excessive streambank erosion areas. It was noted that these would be areas where the best results in reducing soil erosion could be attained for the least amount of effort and money. It was also noted that: “Furthermore, it should be realized that reducing soil erosion in the areas within close proximity to the lake will result in the greatest reduction of sediment delivered to the lake”.
2. Establish marshy areas which can serve to filter out sediment and nutrients from field runoff before they can reach the lake. This concept has more recently been reinforced by both the Wetlands Initiative and The Nature Conservancy in their respective projects to reclaim former floodplain properties and re-establish them for river restoration and conservation purposes.
3. Build sedimentation basins on the tributary streams to trap sedimentation before it reaches the lake and increase dredging of sand and gravel within tributary stream channels.

Figure 2 depicts the location of the major tributary streams which are delivering a significant portion of the total amount of sediment reaching the Peoria Lakes. Many of these locations will be priority areas involving both restoration, as well as, riverfront revitalization cooperative endeavors.

IV. TOURISM EXPANSION OPPORTUNITIES

The Wetlands Initiative's Hennepin & Hopper Lakes Project and The Nature Conservancy's Emiquon Project have generated increased awareness of nature-based tourism opportunities within the Illinois River Basin. Combining these two projects with the Peoria Area Convention & Visitors Bureau's expanded regional marketing initiative called "Illinois River County", and this regional riverfront revitalization endeavor, will make the Peoria area the focal point for establishing tourism opportunities along the entire length of the river.

This study has focused not only on nature-based tourism opportunities but also has assessed other regional, as well as, locally significant endeavors. The areas which have been examined are:

1. Nature-Based Tourism
2. River Recreation
3. Family Fun & Entertainment
4. Historic Sites & Centers
5. Conference & Convention Facilities

Figure 3 depicts the overall geographic area that has been established for planning, assessment, project development, coordinated programming and marketing purposes. It is felt that this endeavor can result in the segment of the Illinois River running from Havana to LaSalle-Peru becoming one of the significant tourism destinations in the entire state and nation. For example, through coordinated programming, Dickson Mounds, Peoria's new regional museum, and Starved Rock all can become elements of a regional initiative to communicate the significance of Native American history within the River Heritage & Nature-Based Tourism Corridor. Persons visiting one location are going to want to travel to the next to get the full story. Likewise, people visiting Hennepin & Hopper Lakes or Emiquon are going to want to travel to the Peoria area to experience the proposed Nature Center at the "Illinois River Heritage Park" in Pekin, the proposed LaMarsh Creek Conservation Area, and the Illinois River exhibit at Peoria's museum.

Not only can these unique resources be linked through coordinated programming and marketing, they can also be brought together as significant tourism experiences through the "Illinois River Road" highway loop, connecting railroad possibilities and riverboat programming. Plans are being pursued which could take advantage of all of these possibilities.

V. COMMUNITY REVITALIZATION

Communities up and down the river are rediscovering their riverfronts as antiquated industries shut down and tourism and recreation replacement opportunities are identified. This planning effort is intended to assist communities within the river corridor in identifying the evolving possibilities for revitalization of their riverfronts. Riverfront Revitalization Plans & Recommendations have already been prepared for the cities of Havana, Pekin, Peoria and East Peoria with planning now underway for Bartonville, North Pekin, Creve Coeur, Peoria Heights, Spring Bay and Chillicothe. It is hoped that follow up funding will be secured which will provide for the planning to be extended to other River Corridor communities, as well as, to expand upon what is already being carried out.

The list shown in Figure 4 reflects communities that are adjacent to the river and should be included as the planning effort proceeds. It is also important to note that a number of additional communities that are within the overall corridor but not directly on the river should be included. Recent discussions with a number of the currently involved cities have led to a recognition that it may be beneficial to form a working association of river communities to help facilitate the focus on areas of common interest including coordinated programming and marketing opportunities. In addition, such an association can be used to broaden the awareness of river restoration challenges and increase political support for this critical element of river planning, conservation and riverfront development.

VI. INTEGRATED RIVER RESTORATION & RIVERFRONT DEVELOPMENT PROJECTS

The most important result of this cooperative planning effort is the identification of numerous potential integrated river restoration and riverfront development projects which have important benefits for each area of focus. Many of these combined projects are located at the mouths of key tributaries which are contributing significant amounts of sediment flow into the river.

Following are two examples of these integrated projects which offer considerable opportunity for more effectively controlling sediment flow into the river, and at the same time pursuing other community goals, such as economic development, recreation, and tourism expansion. It is extremely interesting and important to note that many of these projects have the potential to generate significant economic resources from a number of sources which can help make these projects self-supporting.

LAMARSH CREEK RESTORATION AREA

This multi-purpose project (shown in Figure 5) would have significant river restoration benefits and result in substantial economic development. LaMarsh Creek would be “re-meandered” and a natural detention area constructed. The water level would be controlled by a weir in the river levee. A significant part of the flooded area will be managed as a wetlands. It is anticipated that the area west of the wetlands could accommodate camping and other recreation activities.

Dirt excavated to build the detention area could be used to construct a setback levee so that a significant area could be removed from the floodplain and thus would become developable for a variety of purposes as listed on the drawing.

This newly leveed area could also serve as a sediment placement site which could be the means to elevate all or portions of the site.

It is proposed that the site along Rt. 9, adjacent to the river, be raised above the 100-year floodplain elevation and be developed as a commercial center and marina.

The outdoor recreation area would remain at its current elevation and would be floodable under a near 100-year event and above.

It is believed that the value of the property reclaimed for economic development purposes could be a significant means to help cover the property acquisition and levee construction costs. There will be tremendous river restoration, as well as, recreation benefits derived from this development.

The potential to consolidate the overall site is currently being assessed and cooperative property owners identified. Further design studies are required to test the validity of the overall concept.

FARM CREEK RESTORATION AREA

This plan (shown in Figure 6) envisions the development of a levee which would connect Riverfront Park to an area north of the Par-A-Dice complex. The levee would establish a detention basin for Farm Creek which would be diverted into the wetlands area behind the levee. The existing delta could be the source of materials needed to build the levee.

The levee could also serve as a link in the regional bicycle trail and enclose an area which could support a marina development, as well as, a possible river sports center. Several adjacent development sites would be enhanced by this endeavor.

Removal of the delta and rerouting Farm Creek would reduce the amount of dredging required to maintain the adjacent navigation channel.

The levee would accommodate the regional bicycle trail and establish defined recreation areas. The detention area could double as a functional wetlands and the overall site would be a natural location for some type of conservation education facility.

Of greatest economic significance is the fact that this important riverfront area could be tied together physically as an integrated riverfront development project. As such, it could be one of the most exciting riverfront development opportunities along the entire length of the Illinois River.

However, additional studies need to be carried out to determine the overall viability of this endeavor. It is proposed that Heartland Water Resources Council and Tri-County Regional Planning Commission immediately identify study requirements and pursue efforts to carry such out.

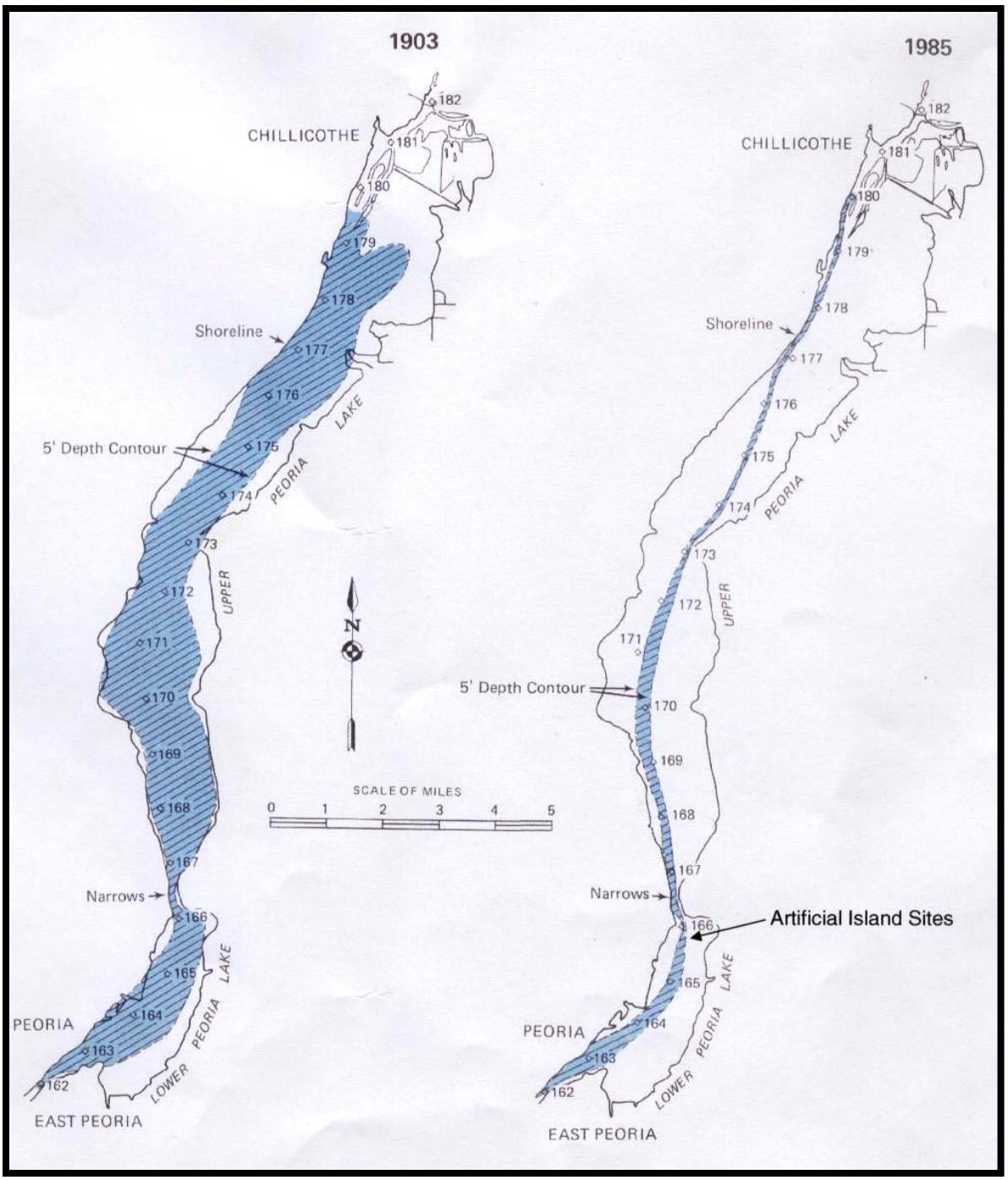
1903
1985
CHILLICOTHE
Shoreline
5' Depth Contour
PEORIA LAKE
UPPER PEORIA LAKE
LOWER PEORIA LAKE
Narrows
PEORIA
EAST PEORIA
N
SCALE OF MILES
0 1 2 3 4 5
Artificial Island Sites
182
181
180
179
178
177
176
175
174
173
172
171
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Figure 1

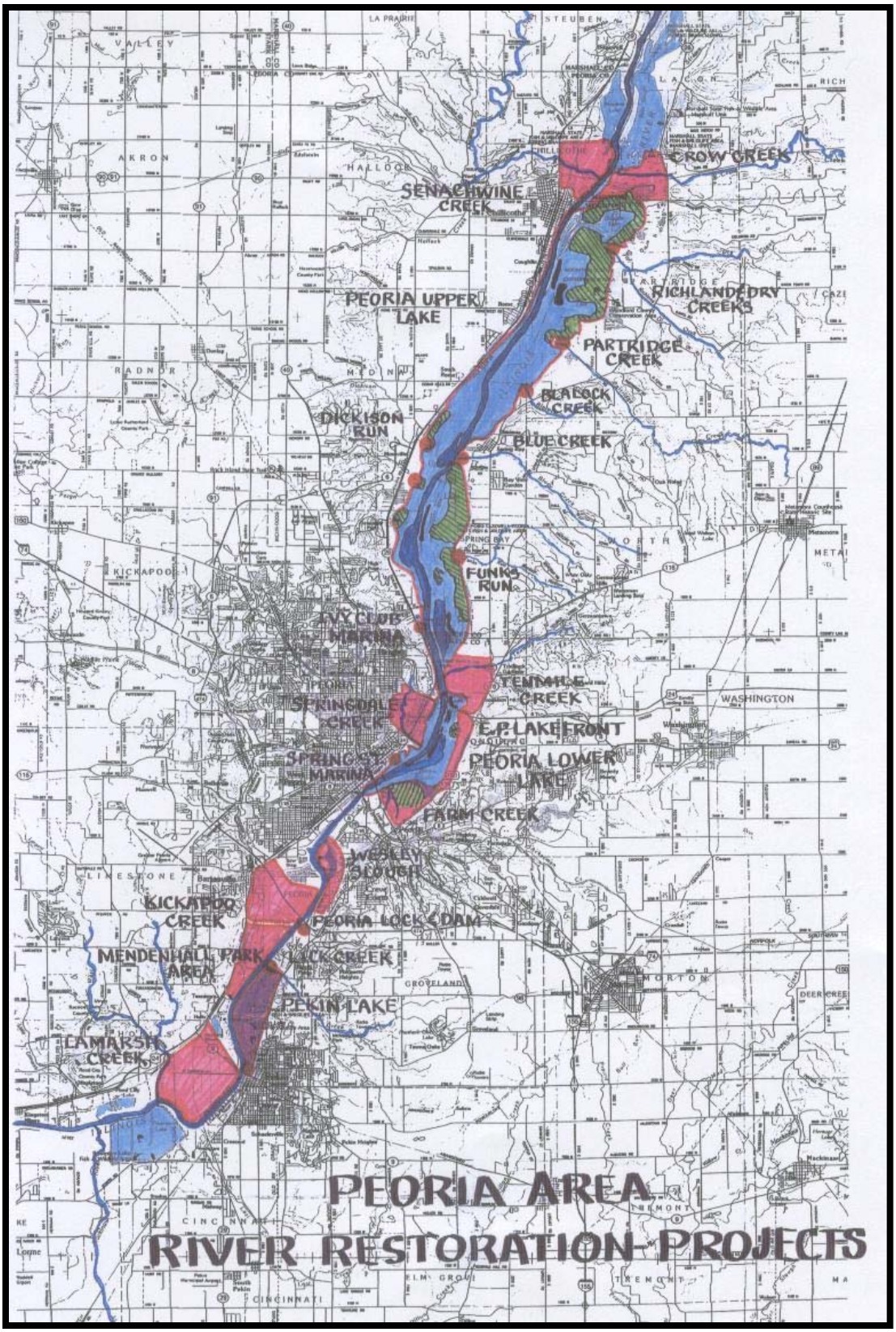
CROW CREEK
SENACHWINE CREEK
PEORIA UPPER LAKE
RICHLAND DRY CREEKS
PARTRIDGE CREEK
BLALOCK CREEK
DICKISON RUN
BLUE CREEK
FUNKS RUN
IVY CLUB MARINA
SPRINGDALE CREEK
TENMILE CREEK
E.P. LAKE FRONT
SPRING ST. MARINA
PEORIA LOWER LAKE
FARM CREEK
WESLEY SLOUGH
KICKAPOO CREEK
PEORIA LOCK & DAM
MENDENHALL PARK AREA
LACKCREEK
PEKIN LAKE
LAMARSH CREEK
PEORIA AREA
RIVER RESTORATION PROJECTS

Figure 2

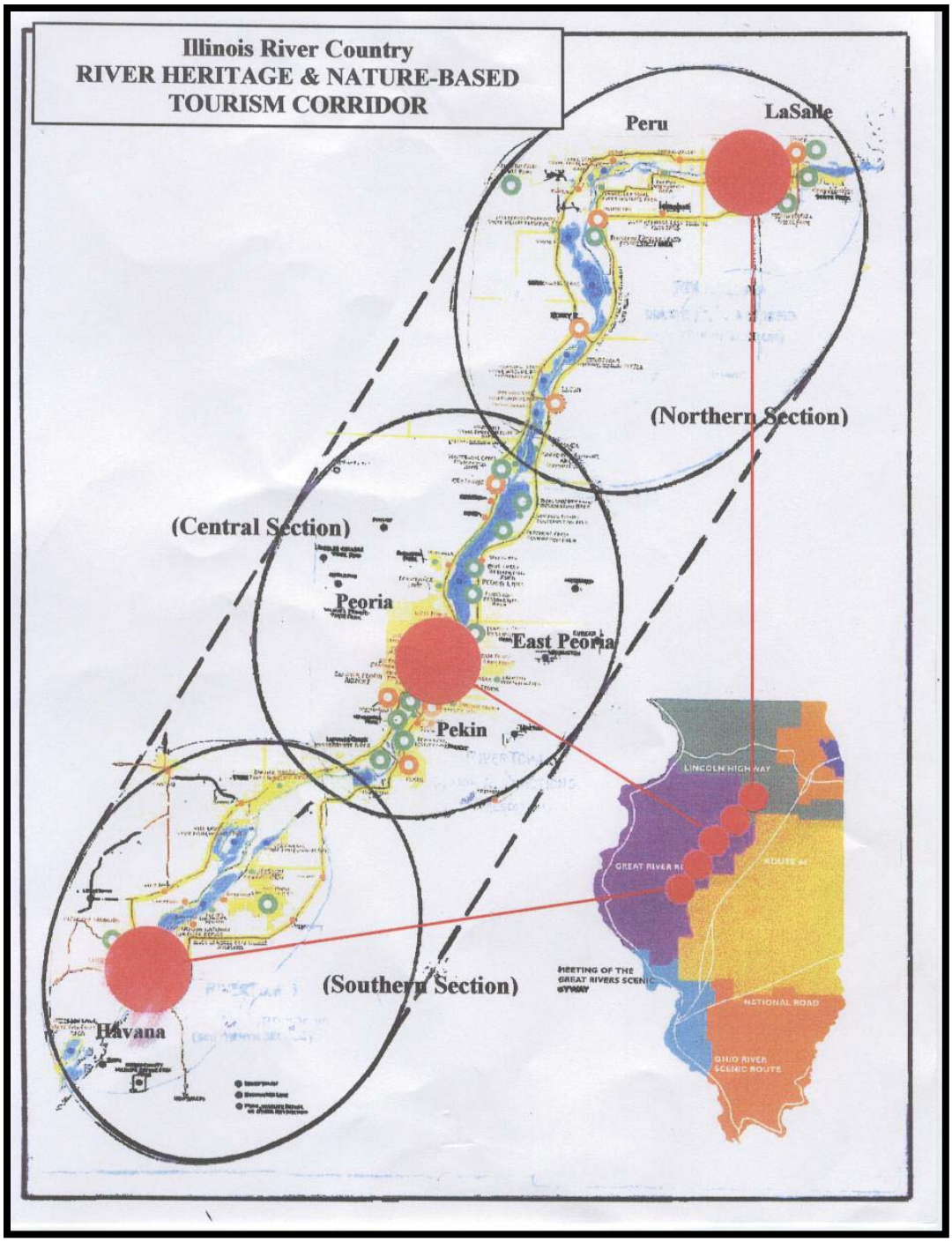
Illinois River Country
RIVER HERITAGE & NATURE-BASED
TOURISM CORRIDOR
Peru
LaSalle
(Northern Section)
(Central Section)
Peoria
East Peoria
Pekin
(Southern Section)
Havana
LINCOLN HIGHWAY
NATIONAL ROAD
OHIO RIVER
SCENIC ROUTE

Figure 3

RIVERFRONT COMMUNITIES

Central Section
Chillicothe
Coughlin
Rome
Spring Bay
Mossville
Peoria Heights
Peoria
East Peoria
Creve Coeur
Bartonville
North Pekin
Pekin

Northern Section
LaSalle
Peru
Spring Valley
Depue
Bureau
Hennepin
Lacon

Southern Section
Kingston Mines
Liverpool
Goofy Ridge
Buzzville
Havana

Figure 4

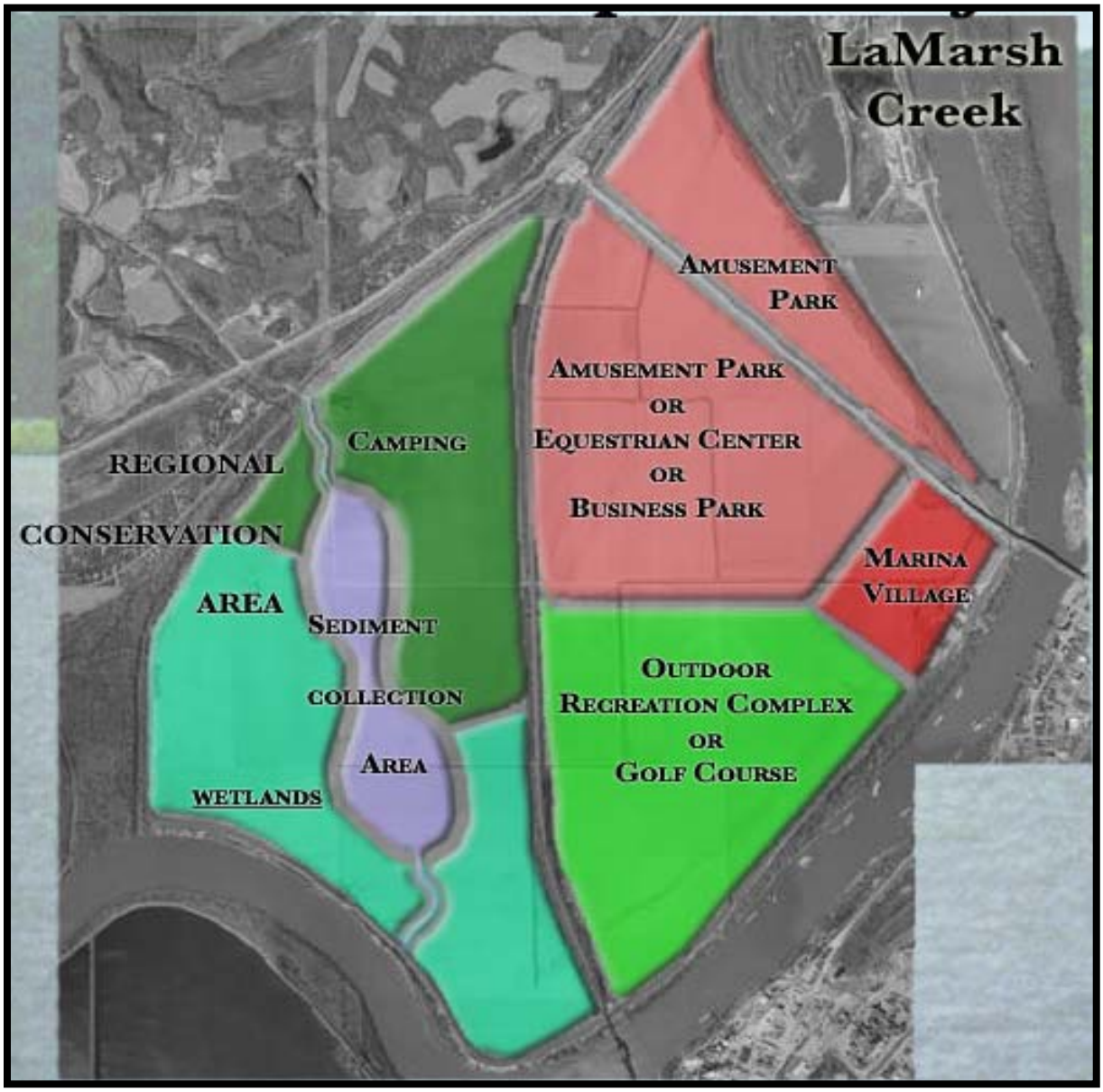
LaMarsh
Creek
AMUSEMENT
PARK
AMUSEMENT PARK
OR
EQUESTRIAN CENTER
OR
BUSINESS PARK
CAMPING
REGIONAL
CONSERVATION
AREA
SEDIMENT
COLLECTION
AREA
WETLANDS
MARINA
VILLAGE
OUTDOOR
RECREATION COMPLEX
OR
GOLF COURSE

Figure 5

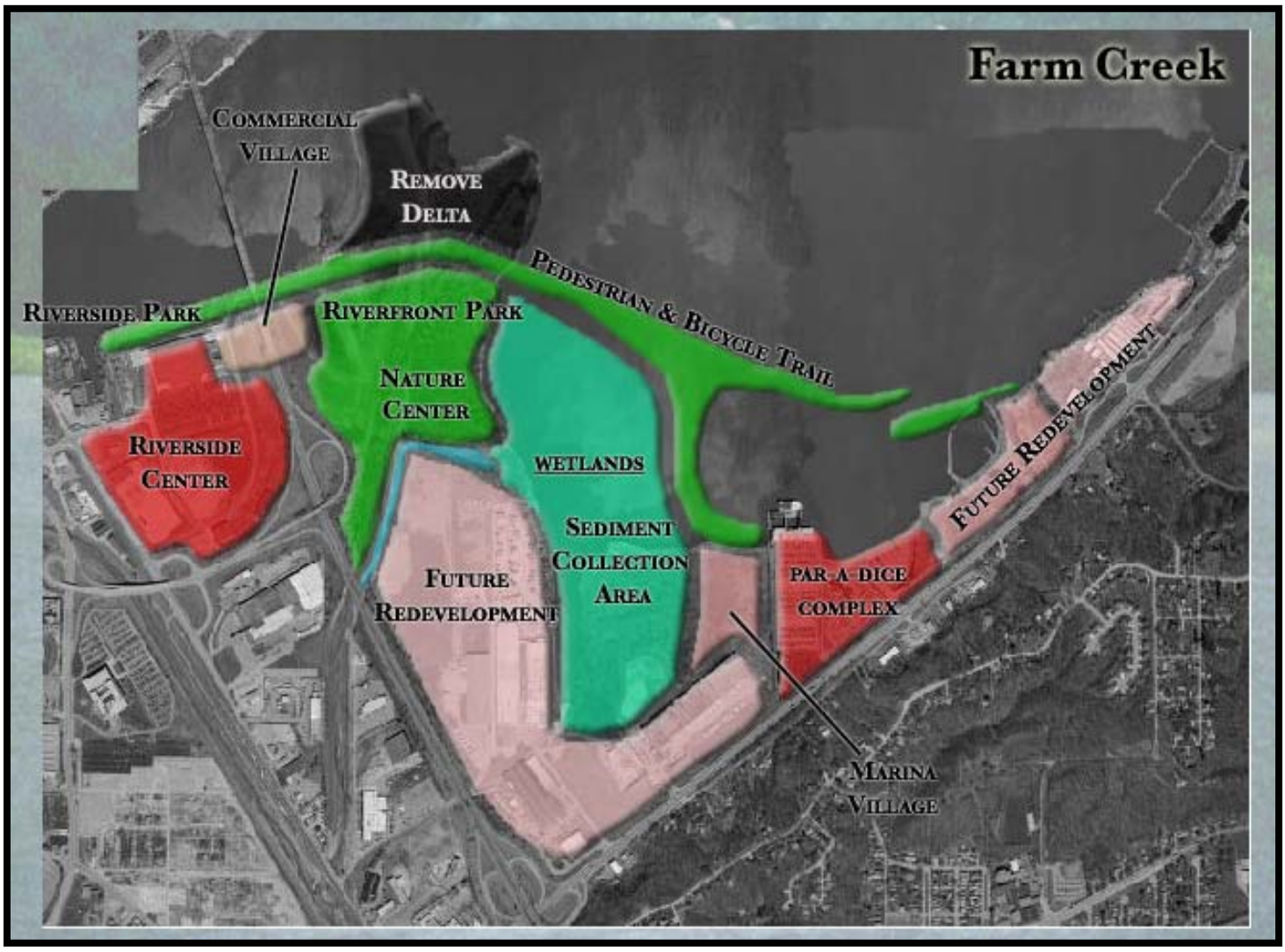
Farm Creek
Commercial Village
Remove Delta
Pedestrian & Bicycle Trail
Riverside Park
Riverfront Park
Nature Center
Riverside Center
Wetlands
Sediment Collection Area
Future Redevelopment
Par-A-Dice Complex
Future Redevelopment
Marina Village

Figure 6

THE ILLINOIS RIVERS DECISION SUPPORT SYSTEM

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ABSTRACT

The Illinois River connects the Great Lakes with the Mississippi River through the Illinois Waterway consisting of eight lock and dams along the river. The Illinois River has become the focus of state and federal agencies interested in integrated watershed management. As a result, issues related to habitat restoration, floodplain management, navigation, erosion and sedimentation, and water quality are all being discussed at the watershed level. In support of this effort, the Illinois Scientific Surveys have initiated development of the Illinois Rivers Decision Support System (ILRDSS) for use in assessing and evaluating the effectiveness of different restoration projects. The ILRDSS will integrate and expand existing databases and models for segments of the Illinois River into an integrated decision support system for the entire watershed. New databases and models are also being developed for the watershed, as well as a comprehensive ILRDSS web portal to all available data and information on the Illinois River and its watershed.

INTRODUCTION

The Illinois River Watershed is important to the state of Illinois. The watershed has a drainage area of 75,156 square kilometers (28,906 square miles) of which approximately 64,000 square kilometers (25,000 square miles) are located in Illinois with the remainder in Indiana and Wisconsin as shown in Figure 1. The Illinois River Watershed is generally flat and covered with fine soil, making it one of the best agricultural regions in the United States. Over 80 percent of the Illinois River basin is presently used for agricultural purposes; the remnant contains 95 percent of Illinois' urban areas (Demissie et al, 1999). Ninety percent of Illinois' population resides within the watershed. The Illinois River is also one of the few remaining rivers with a functioning ecosystem critical to a vast array of fish and wildlife. The Illinois River, a major tributary of the Mississippi River, is part of the only inland waterway linking the Great Lakes to the Gulf of Mexico. As such, the Illinois Waterway is a nationally important commercial waterway with more than sixty million tons of commodities shipped annually, ranking Illinois third among the fifty states in domestic waterborne commerce.

Over the last one hundred years, there have been numerous attempts to control and manage low water levels along the Illinois River for the purposes of providing river navigation between the Great Lakes and the Gulf of Mexico. The initial effort was in the late 1800s when four low-head dams were first constructed to provide a 2.13-meter (7-foot) navigation channel in the lower Illinois River. These low-head dams provided adequate navigation depth during

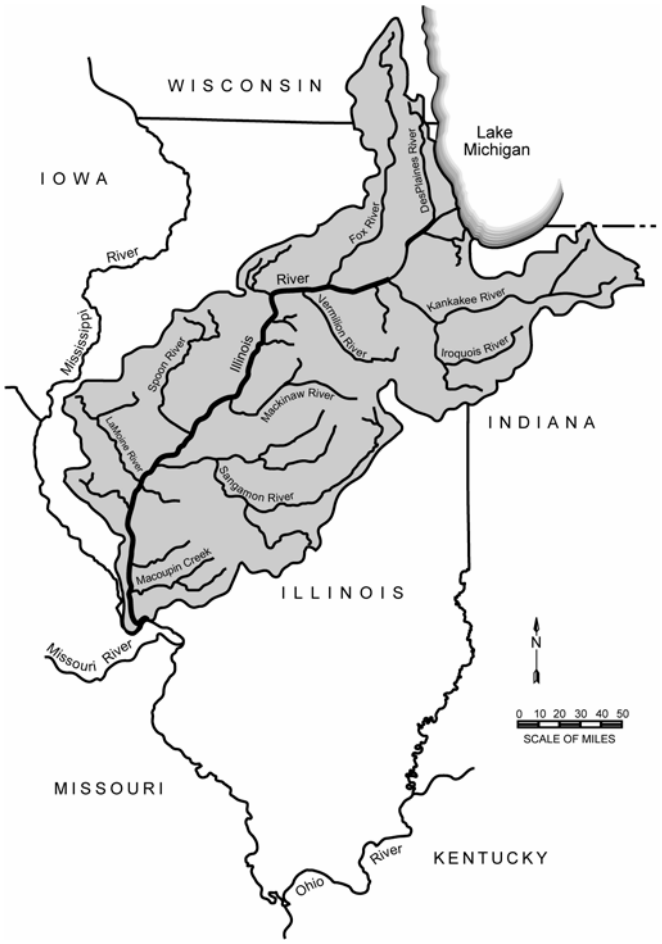

Figure 1. Location of the Illinois River Watershed

periods of low water in the lower Illinois River for some time. However, they were soon outdated and were not sufficient to support modern navigation that required more depth. Plans were then developed and finally authorized by Congress for a 2.74-meter (9-foot) navigation channel along the Illinois River in 1927. In the 1930s, seven modern locks and dams were completed on the Illinois, Mississippi, and Des Plaines Rivers to create the Illinois Waterway as we know it today. The Illinois Waterway consists of the Illinois River, Des Plaines River, and the Chicago Sanitary & Ship Canal System and is made navigable by a series of eight locks and dams along the Illinois River and its tributaries, as shown in Figure 2. The waterway ends at Grafton, about 56 kilometers upstream of St. Louis, Missouri, where the Illinois River joins the Mississippi River.

Another major factor that has significant influence on water levels along the Illinois River is the diversion of water from Lake Michigan to the Illinois River. The Lake Michigan diversion started in 1900 when the construction of the Chicago Sanitary and Ship Canal was completed primarily for the purposes of diverting diluted sewage from Lake Michigan to the Illinois River following the typhoid and cholera epidemic in Chicago in the late 1800s (Vonnahme, 1996). The annual diversion from Lake Michigan to the Illinois River varied from approximately 85 to 283 cubic meters per second (3,000 to 10,000 cubic feet per second) for the

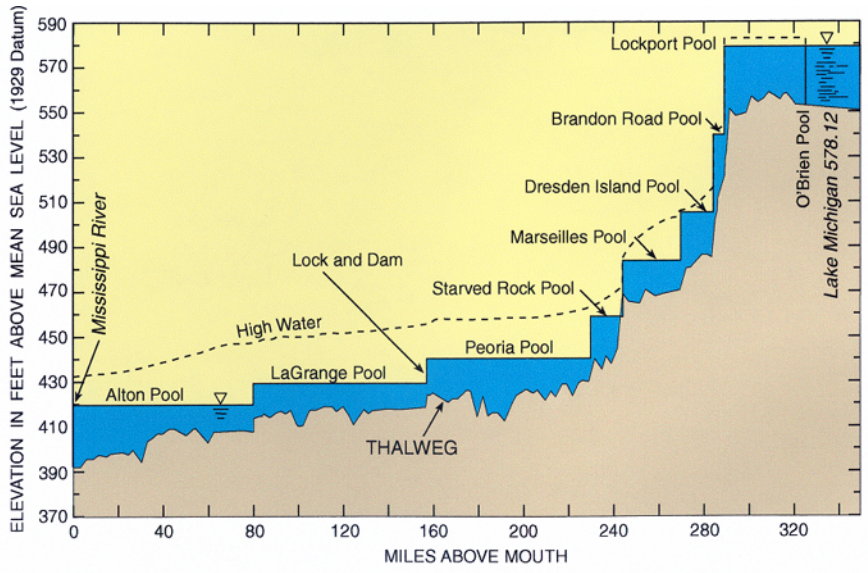

Figure 2. Profile of the Illinois River Waterway

period from 1900 to 1939. After 1939, the total diversion was limited to an average of 90.6 m^3/s (3,200 cfs) by the Supreme Court. Approximately 42.5 m^3/s (1500 cfs) of the diverted water was allocated for dilution and the remaining 48.1 m^3/s (1,700 cfs) for domestic water supply.

ILLINOIS RIVER ISSUES

The Illinois River has experienced significant changes in hydrology and water quality over the years because of its downstream location from the Chicago metropolitan area and significant land use changes in the watershed. The most significant influences have been related to commercial navigation, municipal and industrial waste discharges, and agricultural practices in the watershed. Over time these changes have resulted in environmental and ecological degradation along the river. Issues related to habitat restoration, floodplain management, navigation, erosion and sedimentation, water quality, and point and nonpoint source pollution are all being discussed at the watershed level by state and federal agencies.

A result of these discussions is the Integrated Management Plan for the Illinois RiverWatershed (Kustra, 1997). The plan includes thirty-four recommendations that are in the process of being implemented by different agencies at different pace and intensity. The Illinois State Water Survey played a major role in the development of the Integrated Management Plan (IMP) and is actively participating in its implementation. To this end, the Water Survey initiated development of the Illinois Rivers Decision Support System (ILRDSS) in 1999, and this work is summarized in Demissie et al (1999).

In late October 1999, development started on a new long-range, comprehensive effort to restore and protect the Illinois River and its tributaries. The result of these efforts was *Illinois Rivers 2020* (IR2020), a voluntary, incentive-based approach to address threats to the economic and environmental sustainability of Illinois' waterways. Since implementation of this federal-state initiative will require substantial scientific support and access to high-quality information, the ILRDSS was included as the restoration program's primary support system for dissemination of scientific tools and information. With inclusion in this initiative, ILRDSS activity concentrated on developing the conceptual design of the

support system for inclusion in IR2020 legislative drafts, increasing outreach efforts to inform potential collaborators on proposed system capabilities and garner their support, and coordinating communication and development efforts among the involved agencies (Demissie and Tidrick, 2001).

NEED FOR A DECISION SUPPORT SYSTEM

Major restoration efforts are underway to improve the hydrology, water quality, and habitats along the river and its watershed. A major challenge in these restoration efforts is the proper understanding of the watershed hydrology and river hydraulics so that watersheds and rivers are managed in such a way to promote and sustain ecological restoration while maintaining the economical functions of the river.

Also the issues that need to be examined on a watershed basis for the Illinois River are not limited to hydrology and hydraulics, but also include a whole gamut of issues related to water quality, sediment transport, ground-water/surface water interaction, impact of climate change or fluctuation, ecosystem restoration, and economic and societal impacts. Without basin-wide analysis, conclusions and recommendations will be limited to selected sites, and broad application of results will be impractical. There is a need for the development of an integrated system that can help decision-makers address these issues on a watershed basis. Currently, however, no formal basis for integrated watershed management exists.

A comprehensive support system is needed that will provide state and federal agencies, non-governmental organizations, local agencies, and stakeholders a better means for organizing, accessing, and evaluating a wide range of information and alternative strategies, and to establish informed and factual positions regarding the major issues. Benefits from such a support system include better access to information, tools, improved communication, and better project management.

ILLINOIS RIVER DECISION SUPPORT SYSTEM FRAMEWORK

The Illinois Rivers Decision Support System (ILRDSS) will provide scientific support and access to high-quality information for restoration of the Illinois River and its watershed. Once fully developed and tested, the ILRDSS will enable decision-makers to assess and evaluate the effectiveness of different restoration projects, and the consequences of other natural or human induced changes in the watershed. The decision support system also will improve dissemination of scientific tools and information by using the Internet as primary access to inventories of current and historical projects, data, simulations, and involved agencies/participants within the Illinois River Watershed. The ILRDSS website provides this information at a lower cost, in a more usable form, and in a much more timely manner than methods.

This technology and communication framework will include information resources, modular databases, and simulation models to evaluate the impact of water resources development, land-use changes, economic development, and climate variability on sedimentation, water quality, ecology, hydrology, and hydraulics in terms of long-term restoration and sustainability for the Illinois River.

Figure 3 displays in bold text the conceptual relationships between the four main components of the Illinois Rivers Decision Support System: (1) the information system containing data products; (2) simulation and assessment models in the analytical tools

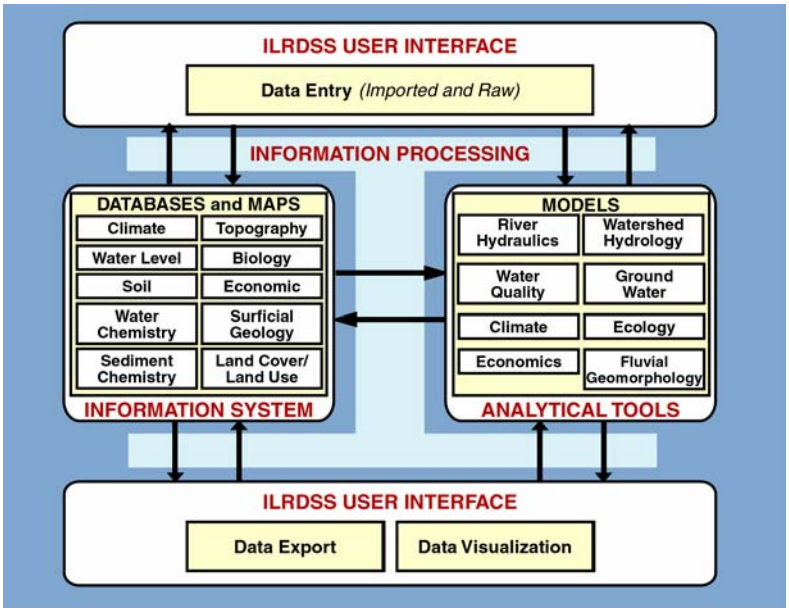

Figure 3. Simplified Conceptual Framework for the Illinois Rivers Decision Support System

component; (3) users of the system; and (4) information processing system, or communication pathways, that underpins the ILRDSS and allows information transfer among all the components. The diagram also details the data and modeling sub-components for inclusion in the information system and analytical tool modules. Early versions of the ILRDSS provides basic information exchange between the user and individual data and tool components via direct database access and web-based interfaces. Ongoing work will add web-based interactive modeling and simulation features and direct linkages between ILRDSS databases and models.

Expected users in the early years will be scientists and professionals within state and federal agencies. As the ILRDSS matures and more components are added to aid in decision processes, system users will expand to include a broader range of decision-makers.

At present, the ILRDSS consists of a prototype website containing water resource databases, reports, project description, and graphic animations. For the analytical tool sections, hydraulic and hydrologic models are being developed and tested.

INITIAL DEVEOPMENTS AND APPLICATIONS

Activities to date have focused on developing the ILRDSS conceptual design, garnering support of potential collaborators, and coordinating communication and development efforts among agencies involved. These efforts have resulted in the creation of a prototype website populated with water resource data, modeling products, and information generated by scientists at the five Illinois State Scientific Surveys: the Illinois State Geologic Survey, the Illinois State Museum, the Illinois State Natural History Survey, the Waste Management Research Center, and the Illinois State Water Survey.

WEB DEVELOPMENT

In December 2000, the Illinois State Water Survey created a web development team with the purpose to construct a comprehensive web portal to all available information and data on the Illinois River and its watershed. The team has five core members: a project coordinator who generates site content and acts as liaison between content donors and ILRDSS team members; a web designer/programmer who creates the graphic layout and coding for the ILRDSS web pages; and a GIS manager, a database administrator, and a web programmer who all work partial percentage-time on the ILRDSS project. To date the team has created a prototype website (http://ilrdss.sws.uiuc.edu) that is dynamically generated from a web-link database currently containing over a thousand links to data, information, and graphical resources concerned with the Illinois River and watershed. By making the website dynamically generated, the team can update the ILRDSS site quickly and efficiently through new database entries. Database access also provides website users increased search capabilities, which are greatly needed with the expected volume of data and information within the ILRDSS website.

ILRDSS website navigation centers around four primary groupings as shown in Figure 4: products, watersheds, site resources, and tabbed search features. A user can browse using graphic maps to find data and information related to a specific site or region, or else search from a list for particular products related to the subcategory, such as online data, maps and GIS data sets, models and modeling information, publications, and research and program listings. If users initially desired a specific product, they can directly search for matching items using the products section, located in the middle left-hand side of the homepage, instead of searching via the categories section. The products grouping not only contains all products included on subcategory pages, but also includes an inventory (currently in progress) of all research and programmatic activities within the Illinois River watershed and all agencies and organizations related with these efforts. Website users wishing to browse by keywords or who are unsure of where to find specific information can instead utilize the primary search feature located in the tabbed section at the center of the site homepage.

HYDRAULIC AND HYDROLOGIC MODELING

An ongoing effort by the Watershed Science Section of the State Water Survey is to develop hydrologic and hydraulic models for the entire Illinois River Watershed. In 2000 Water Survey scientists developed an initial version, uncalibrated hydrologic model of the Illinois River Watershed based on BASINS 3.0 beta version. The BASINS model was selected for the Illinois River Basin because it offered the best-integrated modeling framework for examining management alternatives within Illinois River watersheds and can be developed within the shortest time frame as compared to other models. Water Survey scientists tested the Illinois River BASINS model utilizing only coarse data sets. Overall, the initial tests have shown that the BASINS model has the capability for large-scale hydrologic modeling of the Illinois River Basin.

Water Survey scientists also developed one- and two-dimensional hydraulic models for selected segments of the Illinois River. They have begun investigating the interaction of the Illinois River with its floodplain to better understand the influence of potential restoration efforts on river hydraulics. Presently one of the major restoration concepts is the reconnection of the Illinois River with its floodplain, and several levee and drainage districts have been purchased by state, federal, and non-governmental organization for such purposes. There is no consensus on

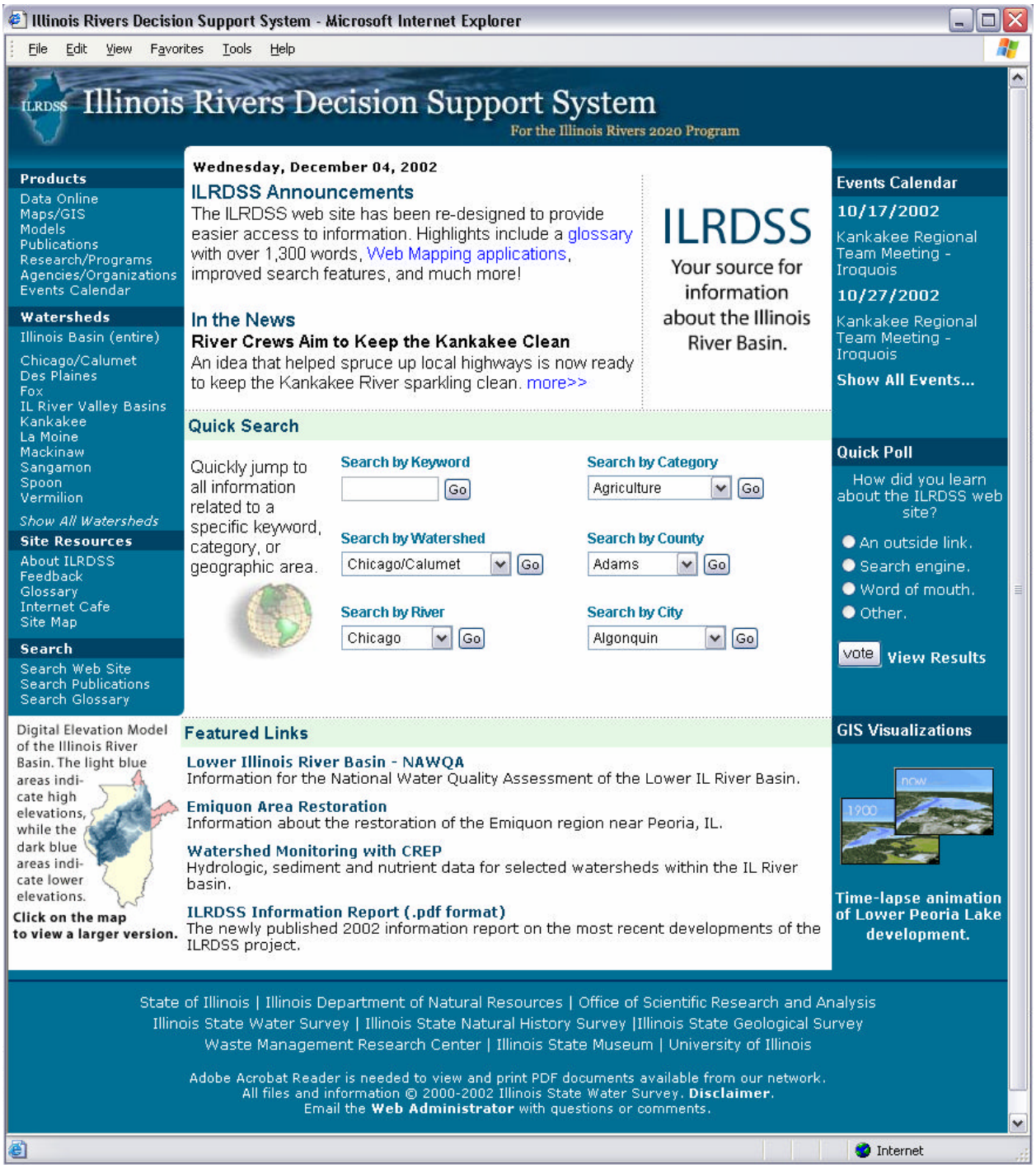

Figure 4. ILRDSS website homepage

how to reconnect the floodplain to the river or what the impacts of flooding in newly restored floodplains could be if reconnected.

The initial hydraulic model used for evaluating different floodplain management alternatives for the Illinois River is based on the UNET, a one-dimensional unsteady flow model supported by HEC (HEC, 1995). The output from the UNET model includes time-series stage and discharge values at selected locations and water surface profiles along the study reach. These values can

then be used to evaluate changes in flood elevations and discharges for different floodplain management alternatives. For example, the UNET model for the Illinois River has been used to evaluate the impacts of using the Thompson Lake LDD in LaGrange Pool as temporal flood storage to reduce flood peaks. The model simulated the impacts of a 1,000-ft (305-m) wide spillway placed 2 ft (0.61 m), 4 ft (1.22 m), and 6 ft (1.83 m) below the Thompson Lake levee crest to allow floodwater to flow into the drainage district. Figure 5 shows the change in flood elevation at the levee district, while Figure 5 shows the change in flood elevations at Havana seven miles (11.3 km) downstream of the spillway. As shown in Figure 5, placing the spillway 2 ft (0.61 m) below the levee crest results in maximum reduction of flood peak for the flood analyzed.

A second hydraulic model was developed using RMA2, a two-dimensional hydrodynamic model developed by the U.S. Army Corps of Engineers (1996). The model was developed for the segment of the Illinois River that included the Thompson Levee and Drainage District (LDD) and the Lake Chautauqua Fish and Wildlife Refuge. The model was used to evaluate changes in flow patterns under different management alternatives such as placing a single spillway or two spillways on the Thompson LDD levee. Results show that two spillways along the levee allow flood conveyance through the drainage district while a single spillway permits only floodwater inflow into the LDD. Two-dimensional animations of these options are available for download in avi format at the ILRDSS website.

GRAPHIC VISUALIZATION TOOLS

Using *World Construction Set 5* (a professional photorealistic terrain visualization, modeling, rendering and animation software package from 3D Nature), the GIS staff at the Illinois State Water Survey has created three-dimensional "fly-through" animations depicting current and historical conditions along segments of the Illinois River that include portions of the LaGrange Pool and Peoria Lake. Proposed dredging and island construction proposals have also been animated. These stunningly realistic landscape images will aid decision makers to visualize or demonstrate impacts of resource management options. The animations files are available for download in avi format at the ILRDSS website.

Utilizing linkages with the Illinois Natural Resources Geospatial Data Clearinghouse and other unique resources, ILRDSS staff has created within the ILRDSS website a portal to GIS data and imagery for Illinois River Basin hydrology, geology, biology, ecology, conservation, environment, land use, infrastructure, and more. Complex data can be displayed in two- or three-dimensional graphical formats to aid decision makers in organizing, accessing and evaluating a wide range of information on the Illinois River Watershed via the Internet.

DATA AND TEXTURAL REPORT

The Illinois State Scientific Surveys have a long history of research and data collection within the Illinois River Watershed. As a starting point, ILRDSS staff has focused on populating the ILRDSS website and databases with ‘in-house’ data, graphics, and information.

For example, ILRDSS staff has begun conversion of Critical Trends Assessment Project (CTAP) reports into Adobe Acrobat portable document format (pdf) for inclusion into the ILRDSS website. CTAP conducts statewide and regional assessments throughout Illinois to systematically monitor ecological conditions and provide information for ecosystem-based management. Since the Illinois State Scientific Surveys are major contributors to CTAP reports,

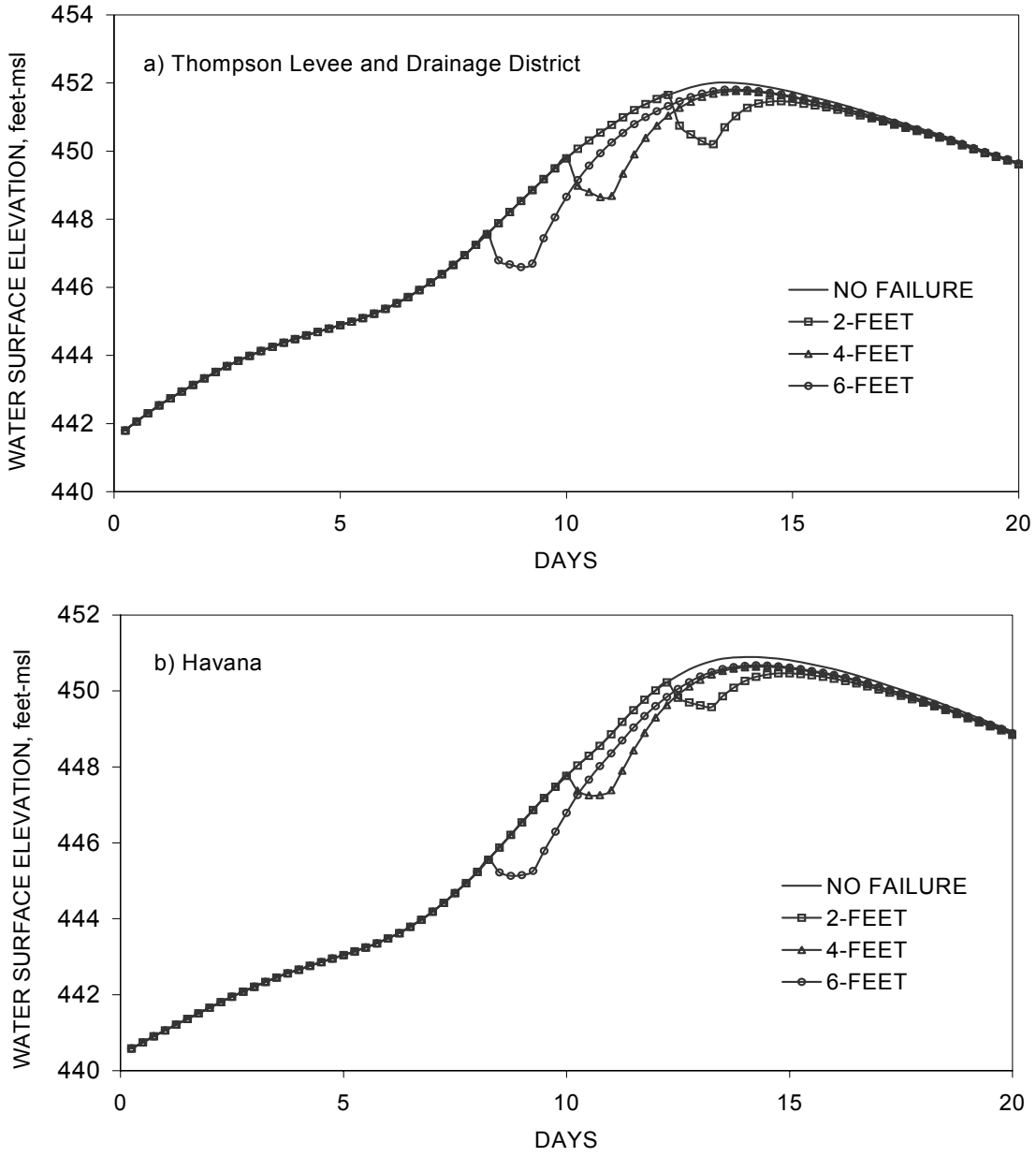

Figure 5. Impacts of using the Thompson Lake Levee and Drainage District as temporal flood storage to reduce flood peaks. The UNET model was used to simulated a 1,000-foot (305-meter) spillway placed 2 feet (0.61 meters), 4 feet (1.22 meters), and 6 feet (1.83 meters) below the Thompson levee crest to allow floodwater to flow into the drainage district. Figure 6a shows the change in flood elevation at the levee district. Figure 6b shows the change in flood elevations at Havana seven miles (11.3 kilometers) downstream of the modeled spillway.

ILRDSS staff has direct access to original text and graphics for individual reports covering geology, water resources, living resources, socio-economic profiles, environmental quality, archaeological resources, and historical accounts within the Illinois River Watershed. Currently public access to this data is restricted primarily to paper reports. Inclusion into the ILRDSS will greatly increase usability and access.

Another example is the collection of historical stage data available on the ILRDSS website. Raw, process, and frequency stage data for several locations on the Illinois River can be directly accessed by website users in graphical or tabular form and downloaded for use with analytical or modeling programs.

FUTURE DEVELOPMENTS AND APPLICATIONS

ILRDSS developments in the future will include continuing design, development, and maintenance for the comprehensive website as well as continued hydraulic and hydrologic model development. Web efforts will focus on expanding access to reports, databases, and simulations from sources outside the Illinois State Water Survey, including developing and maintaining a comprehensive, statewide inventory of activities, organizations, and data resources pertaining to the Illinois River and its watershed. ILRDSS modeling efforts will include linking the hydrologic model output into the hydraulic model to allow better investigation of flow routing along the Illinois River mainstem. GIS staff will continue to expand 2-D and 3-D animation efforts by incorporating additional projects and visualizing the scientists' work.

ACKNOWLEDGEMENTS

This project is supported in part by funds provided by the Illinois Department of Natural Resources from the Environmental Protection Trust Fund with David Baker as project manager. The following ISWS staff provided valuable technical support during the development of the ILRDSS: Nani Bhowmik, H. Vernon Knapp, Yanqing Lian, Paminder Parmar, Kingsley Allan, Kevin Merrifield.

REFERENCES

Demissie, D., G. Guo, H.V. Knapp, and N.G. Bhowmik, 1999. The Illinois River Decision Support System (ILRDSS). Illinois State Water Survey Contract Report 648, Champaign, Illinois.

Demissie, D., and M. Tidrick, 2001. The Illinois Rivers Decision Support System (ILRDSS). Proceedings of the American Water Resources Association and Universities Council on Water Resources Summer Specialty Conference: Decision Support Systems for Water Resources Management. Snowbird, Utah. June 27-30, 2001. (In press)

HEC, 1995. UNET: One-Dimensional Unsteady Flow through a Full Network of Open Channels; User's Manual. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, CA.

Kustra, B., 1997. The Integrated Management Plan for the Illinois River Watershed. Illinois Valley Partnership, Springfield, Illinois.

U.S. Army Corps of Engineers, 1996. Users Guide to RMA2 Version 4.3. Waterways Experimental Station, Hydraulics Laboratory.

Vonnahme, D.R., 1996. Navigation on the Illinois. Proceedings of the 1995 Governor's Conference on the Management of the Illinois River System. Special Report No. 22, Water Resources Center. Institute for Environmental Studies, University of Illinois at Urbana-Champaign, Urbana, Illinois.

SEDIMENT BUDGET OF THE ILLINOIS RIVER

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ABSTRACT

The Illinois River, the most significant river in Illinois, drains nearly half of the state and most of the major streams in Illinois drain into it. The Illinois Waterway with its system of locks and dams links Chicago and the Great Lakes to the Mississippi River, and thus the Gulf of Mexico. This linkage has a significant transportation and commercial value for the state and the nation. In addition, with its numerous backwater lakes, wetlands, and floodplain forests, the Illinois River valley provides a significant habitat for fish, waterfowl, birds, and other animals, making it an important ecological resource.

The Illinois River's environment has been subjected to many of the impacts associated with developments in the watershed, including waste discharges from urban areas, water-level control for navigation, and sediment and chemical inflow from agricultural lands. The quality of the river was severely degraded for several decades prior to the 1970s when environmental regulations were enacted to control pollutant discharges. Since then the quality of the river gradually has been improving. However, problems associated with erosion and sedimentation have not been improving and are recognized as the number-one environmental problem in the Illinois River valley. The main sources of sediment to the Illinois River valley are watershed erosion, streambank erosion, and bluff erosion. The contribution of watershed erosion to the sedimentation problem in the Illinois River valley has been quantified by analyzing the sediment yields of tributary streams that drain into the valley. Annual sediment yield equations were developed for the major tributaries and then used to construct an approximate sediment budget for the Illinois River valley.

BACKROUND

The Illinois River is the most significant river in the state of Illinois. The river drains nearly half of the state and has a drainage area of 28,906 square miles (74,867 sq km). Except for about a 4,000 square-mile (10,360 sq km) area in Indiana and Wisconsin, the watershed is located in Illinois (see Figure 1). The watershed contains the drainage basins of several of the state's significant rivers such as the Sangamon, LaMoine, Spoon, Mackinaw, Vermilion, Fox, Kankakee, and Des Plaines Rivers. Historically, the Illinois River has played a significant role in the development of the state, in terms of both commerce and transportation. It is the only waterway that links the Great Lakes to the Mississippi River, and thus the Gulf of Mexico. In addition, with its numerous backwater lakes, wetlands, and floodplain forests, the Illinois River valley provides a significant habitat for fish, waterfowl, birds, and other animals, making it an important ecological resource.

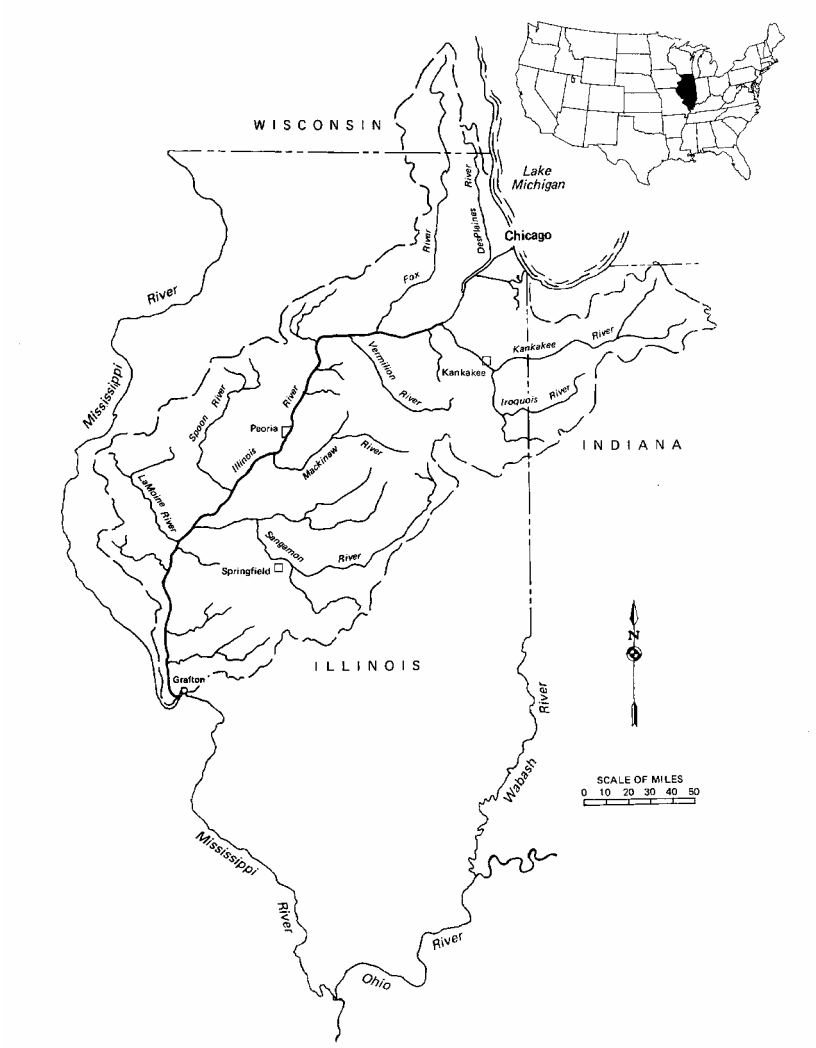

Figure 1. Location of the Illinois River basin

The Illinois River's environment has been subjected to many of the impacts associated with the developments in the watershed, including waste discharges from urban areas, water-level control for navigation, and sediment and chemical inflow from agricultural lands. The quality of the river was severely degraded for several decades prior to the 1970s when environmental regulations were enacted to control pollutant discharges. Since then the quality of the river gradually has been improving.

The most persistent and still unmanaged problem facing the Illinois River is sedimentation in the river channel and the backwater lakes. Based on sedimentation data for Peoria Lake, which is located along the Illinois River, it is very clear that the rate of sedimentation in the Illinois River valley from 1965 to the present is significantly higher than the sedimentation rate from 1903 to 1965 (Demissie and Bhowmik, 1986; Demissie, 1997). Of special concern are the main channel and the backwater lakes along the Illinois River.

Erosion and sedimentation have long been recognized as the principal causes for most of the environmental and ecological problems in the Illinois River valley. The Illinois River Action Plan of the Illinois State Water Plan Task Force (1987) ranks soil erosion and siltation as the number-one-priority problem. Many bottomland lakes along the river valley have already lost a large part of their capacity to sediment accumulation, and still continue to do so at a very high rate. Several lakes in the valley have

completely filled in with sediment, and others will follow in the near future. The impact of sedimentation in the Illinois River valley is illustrated in Figure 2, where the 5-foot (1.5 m) water depth contour for Peoria Lake is compared for 1903 and 1985. Because of continuous sedimentation, the area in the lake where the water depth would have been over 5 feet (1.5 m) when the water elevation in the lake is at 440 ft msl, has been drastically reduced from 1903 to 1985. At the present, the only area of the lake with water depth greater than 5 feet (1.5 m) at 440 ft msl is the navigation channel.

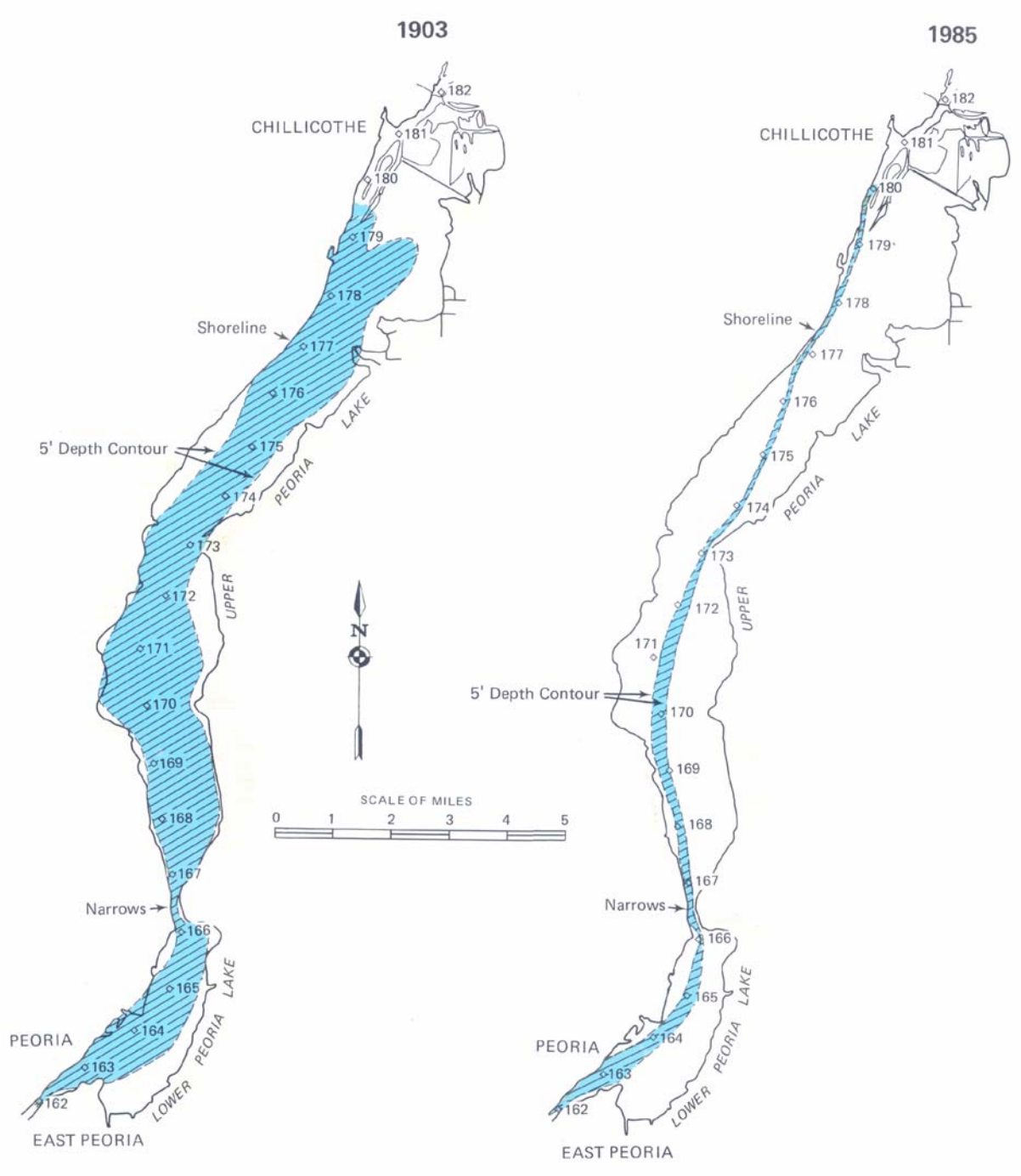

Figure 2. Impact of Sedimentation in Peoria Lake, located along the Illinois River

One study for the Peoria Lake segment of the Illinois River, completed by the Illinois State Water Survey (Demissie and Bhowmik, 1986), has resulted in tremendous public interest and a call for action to remedy the problems associated with erosion and sedimentation in the Illinois River valley. For the first time, the attention and efforts of local, state, and federal agencies have been focused on attainable erosion control and lake restoration projects. Report findings and recommendations have formed the basis for most of the projects and proposals for managing the sedimentation problem in Peoria Lake.

A follow-up study that analyzed the erosion and sedimentation problem for the entire Illinois River was completed in 1992 (Demissie et al., 1992). The report provided important facts and numbers on erosion and sedimentation that could be used for developing management alternatives in the Illinois River watershed and along the river valley. The analysis for the report was based on sediment data collected from 1981-1990. An updated report was prepared in 2002 by including additional data collected since 1990 (Demissie et al., 2003).

SEDIMENT YIELD

The amount of sediment that eventually leaves a watershed and is available for deposition at other locations is defined as the sediment yield of that watershed. In terms of sedimentation studies, sediment yield is one of the most important parameters that needs to be determined to calculate the rate of sediment accumulation. Sediment yield is generally a small fraction of the total gross erosion in the watershed, which includes sheet, rill, gully, streambank, and streambed erosion. All the soils eroded in a watershed are not transported and delivered to streams that drain out of the watershed. Depending on many physical factors, a certain percentage of the eroded soils will be removed from one location in the watershed and deposited at another location within the same watershed. The percentage of soils eroded in the watershed and transported out of it is the sediment yield of that watershed.

In the case of the Illinois River valley, it is important to determine how much sediment is delivered into the valley from different tributary streams in order to evaluate the magnitude and pattern of sedimentation in the river and backwater lakes. Therefore, procedures needed to be developed to calculate the sediment yields of all tributary streams to the Illinois River. Generally, there are four different methods for determining sediment yield (Glymph, 1975; Holeman, 1975). These methods are based on 1) suspended sediment data at gaging stations, 2) gross erosion and sediment delivery ratio, 3) reservoir sedimentation data, and 4) sediment transport or predictive equations.

SEDIMENT YIELD CALCULATIONS FOR THE ILLINOIS RIVER BASIN

After evaluating the availability of different types of sediment data in the Illinois River watershed, it was decided that sediment yield calculations based on suspended sediment load data would provide the most reliable values. Even though each station's data are for a short period, suspended sediment data are available for about 44 stations within the watershed. Out of the 44 stations with suspended sediment data only 17 stations had mean daily suspended sediment data while the rest had instantaneous suspended sediment data. Attempts to combine both sets into a uniform data set has not been successful yet. The stations names, numbers, drainage areas, and the period of record for sediment data are provided in table 1 for the 17 stations used in the analyses. It should be noted that one of the stations is on the main stem Illinois River and thus was not used for developing rating curves or regional equations. Thus, 16 stations with a total of 89 years of suspended sediment data ranging in duration from 1 to 15 years were used in the analysis. Therefore a procedure based on these data should provide more reliable values than other procedures that rely on empirical equations.

The first task for this procedure is to evaluate the available suspended sediment data and develop the best sediment rating curves that relate sediment load and streamflow for each of the sediment monitoring stations. Once sediment rating curves are developed, sediment yields over selected periods of time can be calculated based on streamflow records that are generally for much longer periods than

Table 1. Suspended Sediment Monitoring Stations and the Period of Record Used in Developing Equations 4-7. Shown in Figure 4

ISWS station code	*USGS station number*	*USGS station name*	*Drainage area (sq mi)*	*Period of record*
109	05532500	Des Plaines River at Riverside	630.0	1979-82
122	05555300	Vermilion River near Lenore	1251.0	1981, 84-2000
124	05527500	Kankakee River near Wilmington	5150.0	1978-81, 93-95
125	05520500	Kankakee River at Momence	2294.0	1978-81, 93-95
126	05568800	Indian Creek near Wyoming	62.7	1981
232	05526000	Iroquois River near Chebanse	2091.0	1978-81, 93-95
233	05525000	Iroquois River at Iroquois	686.0	1978-80, 93-95
236	05567510	Mackinaw River below Congerville	776.0	1981-86
238	05570350	Big Creek at St. David	28.0	1972-80
239	05570370	Big Creek near Bryant	41.2	1972-86
240	05570380	Slug Run near Bryant	7.1	1975-80
241	05570000	Spoon River at Seville	1636.0	1981, 94-97
244	05584685	Grindstone Creek near Birmingham	45.4	1981
245	05585000	LaMoine River at Ripley	1293.0	1981, 94-97
246	05583000	Sangamon River near Oakford	5093.0	1981, 83-86, 94-97
253	05586100	Illinois River at Valley City	26743.0	1980-2000
444	05584680	Grindstone Creek near Industry	35.5	1981

records for sediment load data. The most frequently used sediment rating curve is the power curve, which can be written as follows:

$$Q_s = a_1 Q_w^{b_1} \tag{1}$$

where Q_s = the suspended sediment load

Q_w = the water discharge

a_1, b_1 = regression coefficients

Eq. 1 is generally transformed into a logarithmic form resulting in a linear equation given in Eq. 2.

$$\log Q_s = a + b \log Q_w \tag{2}$$

where a and b are regression coefficients equivalent to $\log a_1$ and $\log b_1$, respectively. Several researchers have shown that linear rating equations based on logarithmic transformed values generally underestimate sediment loads (Ferguson, 1986; Walling and Webb, 1988; Koch and Smillie, 1986). Ferguson (1986) argued that the major reason for the underestimation is a statistical bias that is introduced when the power law (Eq. 1) is transformed into a linear regression equation (Eq. 2) after logarithmic transformation. He proposed a bias correction factor that varied with the mean square error of the linear regression.

After testing the linear regression method and applying Ferguson's correction factor for estimating annual sediment loads for several rivers in the Illinois River basin, it was concluded that there were still significant underestimations and in some cases overestimations of the annual sediment load (Demissie et al 1992, 2003). It was then decided to develop and test a non-linear regression equation given in Eq. 3 that fits the observed data much better than the linear regression equation that is generally

used for this type of analysis. An example is shown in figure 3 where both the linear and non-linear equations are compared with the observed data for the Mackinaw River at Congerville.

$$\log Q_s = a + b\ (\log Q_w)^c \tag{3}$$

All the terms are as defined before except for *c* which is the third regression coefficient. As shown in figure 3, the non-linear regression equation fits the data much better especially for the higher flows that are extremely important in calculating annual sediment loads. The annual sediment loads calculated by using the non-linear regression method were found to be significantly better than the other methods. The comparison of the results from the non-linear regression method with that of the linear regression before and after applying Ferguson correction can be found in Demissie et al. (2003).

For the purposes of long-term sediment budget analysis, the sediment load equations derived from the period of record data rather than a single year's data were used. Therefore similar equations were developed for all tributary stations using all the available data.

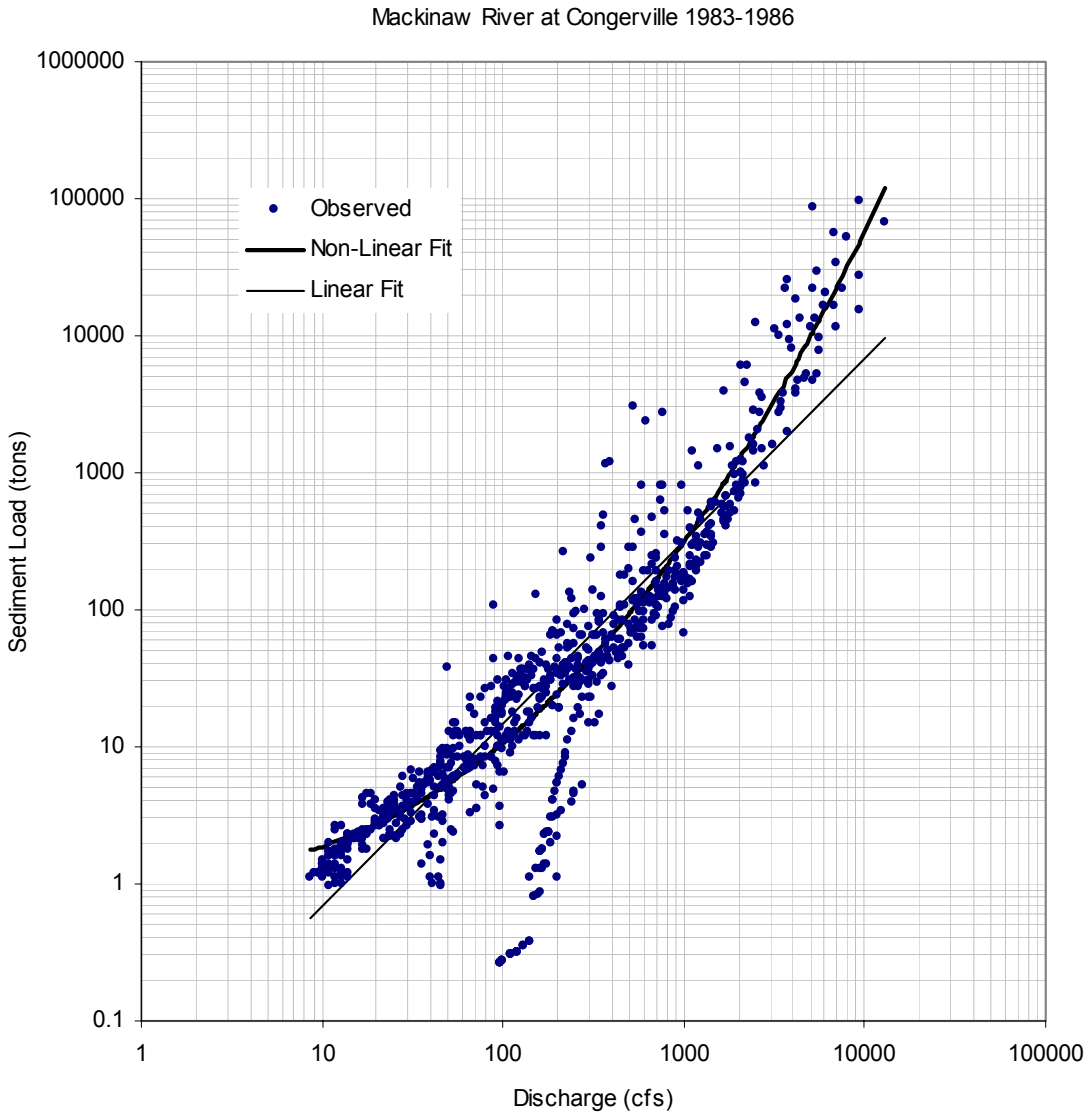

Figure 3. Comparison of the non-linear rating curve (Eq. 3) and the linear rating curve (Eq. 2) with observed data for the Mackinaw River at Congerville, IL

After developing the sediment load equations that relate the daily suspended sediment load to the daily mean discharge, it is possible to calculate annual sediment loads on the basis of water discharge records. This was done for all the sediment monitoring stations within the watershed for a 20-year period (1981-2000). Then regional relations were developed between the annual suspended sediment load and the annual water discharge for application to watersheds without sediment monitoring stations. Figure 4 shows the results of the analysis. The regional relations were grouped into four groups represented by the following equations:

$$\log (Q_S{}^A) = -2.82 + 1.80 \log (Q_W{}^A) \quad (4)$$

$$\log (Q_S{}^A) = -3.38 + 1.64 \log (Q_W{}^A) \quad (5)$$

$$\log (Q_S{}^A) = -4.77 + 1.75 \log (Q_W{}^A) \quad (6)$$

$$\log (Q_S{}^A) = -5.55 + 1.79 \log (Q_W{}^A) \quad (7)$$

where $Q_S{}^A$ and $Q_W{}^A$ are the annual sediment load and water discharge, respectively.

The first group with the highest annual suspended sediment yield rate represented by Eq. 4 includes mainly tributary streams in the Spoon and LaMoine River watersheds. The second group with the second highest annual suspended sediment yield rate represented by Eq. 5 includes the main stem of the Spoon, LaMoine, and Vermilion Rivers. The third group with the third highest annual suspended sediment yield rate represented by Eq. 6 includes the Sangamon, Iroquois, and Des Plaines Rivers. The fourth group with the least annual suspended sediment yield rate represented by Eq. 7 includes stations on the Kankakee River. These four equations were then used to calculate annual suspended sediment yields for tributary streams to the Illinois River.

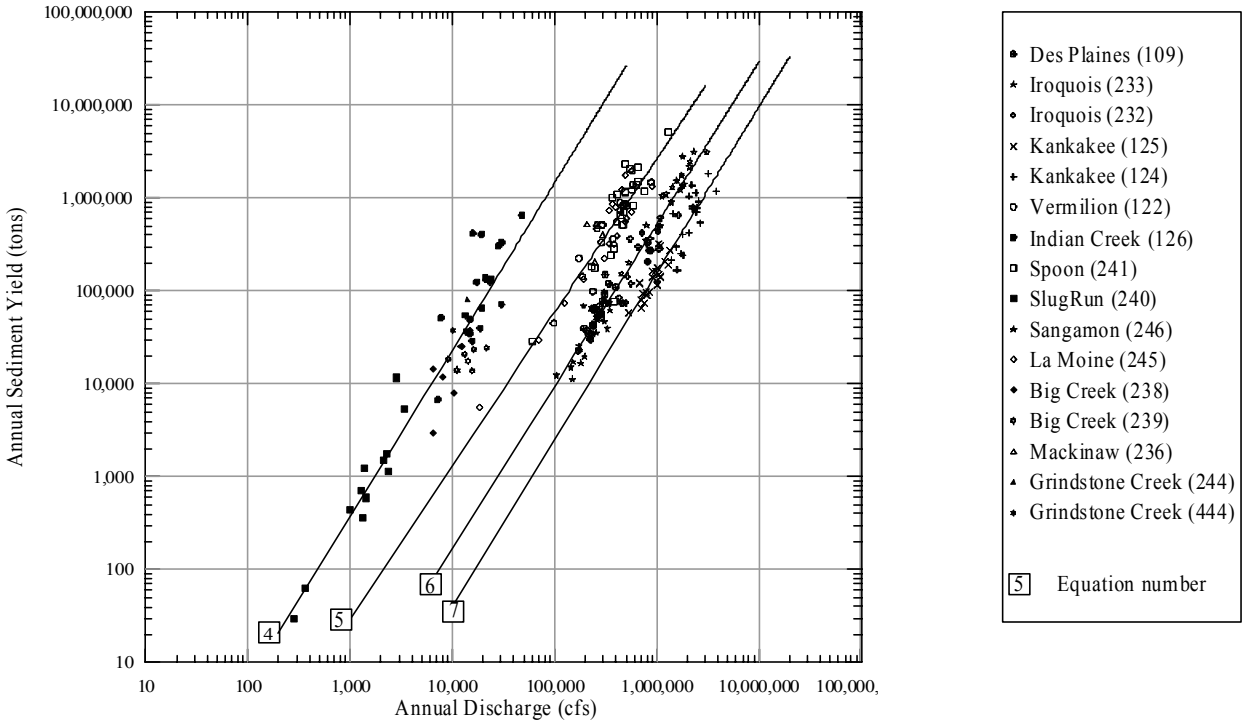

Figure 4. Annual sediment yield equations for tributary streams in the Illinois River Basin

SEDIMENT BUDGET FOR THE ILLINOIS RIVER VALLEY

The main purpose of collecting and analyzing all the sediment load data for the tributary streams is to develop a realistic sediment budget for the Illinois River valley. By calculating the difference between the amount of sediment that flows into and out of the valley, it is possible to estimate the amount of sediment deposited in the valley. Since the sediment inflow/outflow varies significantly from year to year, it is necessary to select a reasonable period of time that might be assumed to represent long-term records of the Illinois River. After evaluating the flow records of the Illinois River and the period during which most of the sediment data were collected, a 20-year period of analysis (1981-2000) was used. Most of the sediment data were collected during this period, which includes below-normal, near-normal, and above-normal flow years. Therefore it should provide a representative period for understanding the sediment inflow, outflow, and deposition pattern in the Illinois River valley. After the analysis period was selected, the sediment inflow from all tributary streams and the sediment outflow from the Illinois River were determined for the duration of the period.

The annual suspended sediment loads were determined either from the measured data or by applying Eqs. 4-7. To compute the total sediment yield that consists of suspended and bed load, it is necessary to estimate the bed load that has to be added to the suspended load. Bed load is not generally measured at sediment monitoring stations because of the uncertainty of the measurements and the time required to collect it. Graf used a bed load sampler developed by the USGS to measure bed load for nine streams in Illinois and identified many of the difficulties in measuring bed load (Graf, 1983). There are varying estimates of bed load for different stream types and regions. Nakato estimated that bed load of tributary streams in the Rock Island District's reach of the Mississippi River ranged from 6 to 26 percent with an average of 11 percent of the total suspended load (Nakato, 1981). Simon and Senturk (1977) estimate that bed load ranges from 5 to 25 percent of the suspended sediment load. The Illinois State Water Survey has generally used the 5 to 25 percent guidelines to adjust suspended sediment load estimates to total sediment load estimates. The same procedure was used for this analysis (Demissie, 2003).

The sediment budget analysis for the Illinois River valley shows that on the average tributary streams deliver 12.1 million tons of sediment to the Illinois River valley per year (Demissie et al., 2002). At Valley City, 61.3 miles (98.1 km) upstream of the junction of the Illinois with the Mississippi River, the Illinois River on the average discharges 5.4 million tons of sediment every year. This leaves on the average about 6.7 million tons of the sediment delivered from tributary streams for deposition within the valley every year. Thus 55 percent of the sediment delivered by tributary streams is deposited within the valley. It should be noted, however, that this might not be the total amount of sediment deposited in the valley. Additional sediment from bank and bluff erosion along the Illinois River is also deposited in the valley. The data presently available are not sufficient, however, to make a reasonable estimate of the amount of sediment generated from bank and bluff erosion along the Illinois River.

Figure 5 schematically represent the sediment budget of the Illinois River (Demissie et al., 2003). The inflow of sediment from tributary streams is shown at the inlet points, and the width of the core represents sediment load. The sediment load in the Illinois River drastically increases both in the Peoria and LaGrange Pools. The largest sediment load flows into the LaGrange Pool, with the Spoon, Sangamon, LaMoine, and Mackinaw Rivers being the main contributors. The Vermilion and Kankakee Rivers contribute significant sediment into the Peoria and the Dresden Pools, respectively. In general, the lower Illinois River receives much more sediment than the upper Illinois River. It should also be noted that the figure for the sediment budget (Figure 5) is a cumulative sediment budget for the whole Illinois River valley. Sediment entrapment and thus deposition within each pool could not be calculated with available data. Therefore, sediment deposition within each pool is not quantified; instead the total sediment deposition within the valley is shown at Valley City.

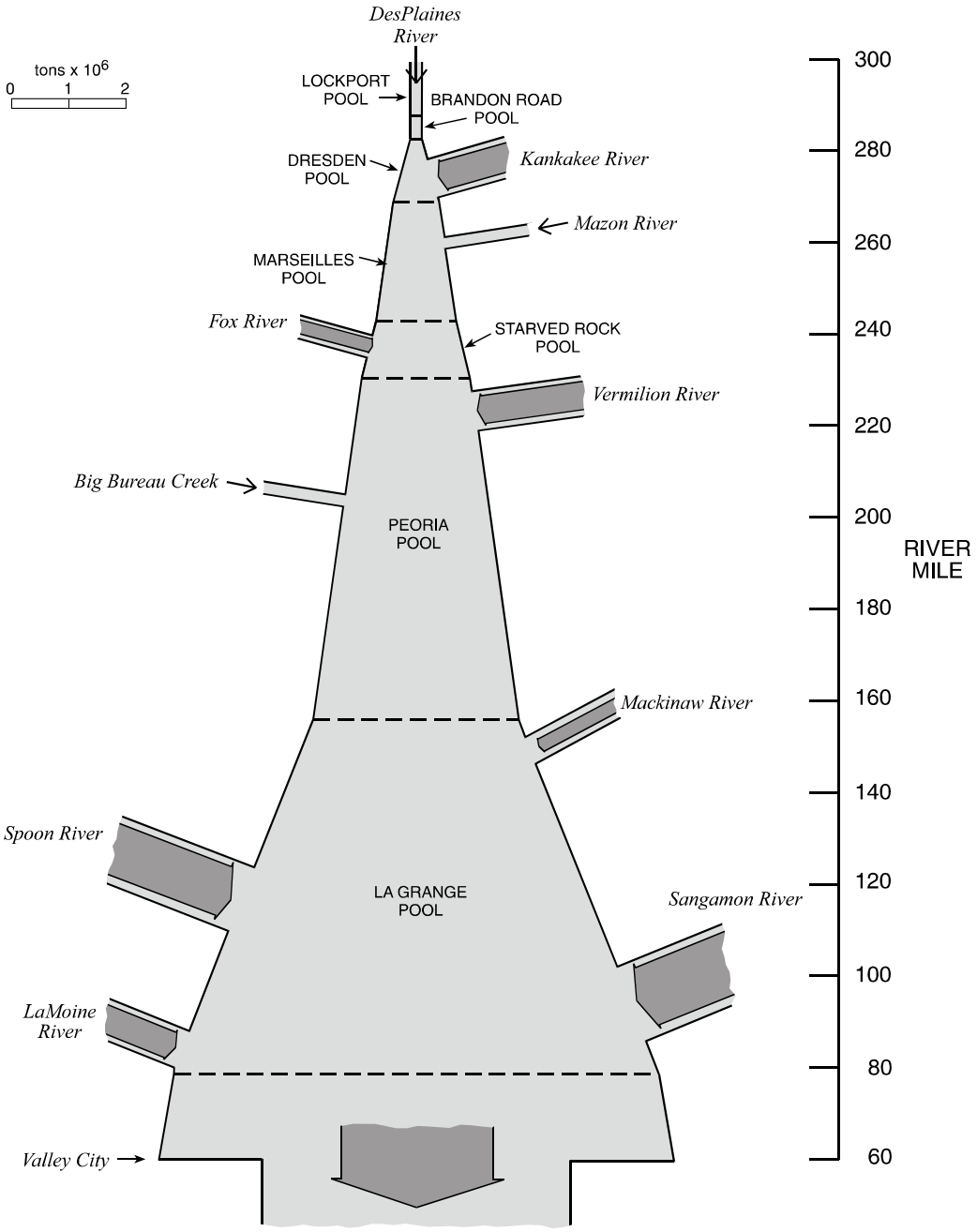

Figure Sediment budget for the Illinois River

REFERENCES

Demissie, M. 1997. Patterns of Erosion and Sedimentation in the Illinois River Basin. *Proceedings of the 1997 Governor's Conference on the Management of the Illinois River System*. Peoria, IL, October 7-9, 1997, pp. 69-78.

Demissie, M., and N.G. Bhowmik. 1986. *Peoria Lake Sediment Investigation*. Illinois State Water Survey Contract Report 371, Champaign, IL.

Demissie, M., L. Keefer, and R. Xia. 1992. *Erosion and Sedimentation in the Illinois River Basin*. Illinois Department of Energy and Natural Resources Report ILENR/RE-WR-92/04, Springfield, IL.

Demissie M., L. Keefer, R. Xia, and N.G. Bhowmik. 2003. *Sediment Budget of the Illinois River*. (Draft Report) Illinois State Water Survey, Champaign, IL.

Ferguson, R.I. 1986. River Loads Underestimated by Rating Curves. *Water Resources Research* **22**(1).

Glymph, L.M. 1975. "Evolving Emphases in Sediment-Yield Predictions." *Proceedings of the Sediment-Yield Workshop: Present and Prospective Technology for Predicting Sediment Yields and Sources*. USDA Sedimentation Laboratory, Oxford, MS, November 28-30, 1972. Agriculture Research Service, U.S. Department of Agriculture, pp. 1-4.

Graf, Julia B. 1983. *Measurement of Bedload Discharge in Nine Illinois Streams with the Helley-Smith Sampler*. U.S. Geological Survey, Water Resources Investigations Report 83-4136, Urbana, IL.

Holeman, J.N. 1975. "Procedures Used in the Soil Conservation Service to Estimate Sediment Yield." *Proceedings of the Sediment-Yield Workshop: Present and Prospective Technology for Predicting Sediment Yields and Sources*. USDA Sedimentation Laboratory, Oxford, MS, November 28-30, 1972. Agriculture Research Service, U.S. Department of Agriculture, pp. 5-9.

Illinois State Water Plan Task Force. 1987. *Illinois River Basin Action Plan*. Special Report No. 11. Illinois Division of Water Resources, Department of Transportation, Springfield, IL.

Koch, R.W. and Smillie, G.M. 1986. Bias in Hydrologic Prediction Using Log-transformed Regression Models. *Water Resources Bulletin*, 22, 717-723.

Nakato, Tatsuaki. 1981. *Sediment-Budget Study for the Upper Mississippi River, GREAT-II Reach*. Iowa Institute of Hydraulic Research Report 227, Iowa City, IA

Simons, Daryl B., and Fuat Senturk. 1977. *Sediment Transport Technology*. Water and Sediment Dynamics, Water Resources Publication, Fort Collins, CO.

Walling, D.E., and B.W. Webb. 1988. "The Reliability of Rating Curve Estimates of Suspended Sediment Yield: Some Further Comments." *Sediment Budgets*, M.P. Bordas and D.E. Walling, editors, IAHS Publication No. 174, IAHS Press, Institute of Hydrology, Wallingford, Oxfordshire, UK, pp. 337-350.

THE ILLINOIS RIVER BASIN HYDROLOGIC MODEL

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ABSTRACT

The Illinois State Water Survey has completed the initial phase of a project to develop a continuous hydrologic simulation model of the Illinois River Basin for conducting analyses in support of the Restoration Needs Assessment for the Illinois River Ecosystem Restoration Project. The GIS capabilities of the BASINS modeling system of the USEPA were used in creating the model and the Hydrological Simulation Program – FORTRAN (HSPF) was used to simulate daily streamflows in the basin. Daily precipitation data at 86 stations from the Midwestern Regional Climate Center were processed to estimate hourly precipitation data, which were added to the climate database of BASINS. Initially, hydrologic simulations were developed for three tributary watersheds of the Illinois River (the Upper-Kankakee, Iroquois, and Spoon River watersheds). Observed streamflow and climate data from a nine year period (1987-1995) were used to calibrate the hydrologic component (flow quantity) of these models, and the calibrated models were then validated using data from a different fifteen year period (1972-1986). Simulated streamflow data satisfactorily matched the observed data at respective USGS gages. To develop a preliminary model of the entire Illinois River Basin, the calibrated parameters for the Spoon River watershed were adopted for use in the remaining regions/tributary watersheds and no further model calibration was done. Agreement between streamflows observed at the USGS gage at Kingston Mines (on the Illinois River) and model simulated streamflows for 1985-1995 period showed that performance of this preliminary basin-scale model is promising given the level of calibration, and this model provides strong framework for additional development and more detailed modeling within the basin. Additional model improvements are continuing to be addressed in on-going efforts, including importing the latest detailed topographic, land use, and soils datasets for the Illinois River Basin into BASINS, and developing more detailed parameterization based on land use and soil characteristics for portions of the watershed. It is also envisioned that more tributary watersheds will be calibrated, regionally-based parameter sets will be developed for evaluating ungaged areas in the basin, and an unsteady flow routing model will be coupled to the basin-scale hydrologic simulation model for detailed analysis of the hydraulics in the Illinois River. Sediment and water quality simulation capabilities will also be developed in the future. This paper provides salient details of completed work in terms of BASINS and HSPF description, input data used, streamflow modeling approach, and results obtained.

INTRODUCTION

The Illinois River is the single most important river in the State of Illinois. It serves as a commercial waterway that links the Great Lakes to the Mississippi River. Its basin contains approximately 95% of the urban areas and 50% of the agricultural lands in the state. With its numerous backwater lakes, wetlands, and floodplain forests, the Illinois River valley provides significant habitat for fisheries, waterfowl, birds, and other animals. Many other significant rivers in the state such as the Des Plaines, Fox, Kankakee, Spoon, and Sangamon drain into the Illinois River. Due to its strategic location, the Illinois River has experienced significant human influences due to navigation, municipal and industrial discharge, and agricultural activities. Sedimentation in the river

and its backwater lakes is one of the most persistent problems (Demissie et al., 1992). Other critical issues include water quality degradation, impacts of climate change, and watershed and stream restoration. The Illinois Environmental Protection Agency (IEPA) has declared significant portions of several major tributaries of the Illinois River as critically impaired (IEPA, 2002). Some of the potential causes of impairment include nutrients, pesticides, suspended solids, pathogens, organic enrichment, and metals resulting from industrial and municipal point sources, and non-point sources such as agriculture and urban runoff. Continued urbanization in the Illinois River Basin (IRB), particularly around the Chicago metropolitan area, is expected to increase runoff and nonpoint source pollutant loads (Sullivan, 2000).

The Integrated Management Plan for the Illinois River watershed (Kustra, 1997) recommended sediment management, runoff reduction, and wetland development for water retention in rural and urban areas throughout the IRB, as well as studies that identify the unnatural and natural causes of water-level fluctuations in the Illinois River. Implementation of these recommendations will require thorough understanding of the IRB hydrology in identifying the causes of these problems and designing and evaluating alternative solutions. In support of a state and federally funded watershed management program, a decision support system (Illinois Rivers Decision Support System or ILRDSS) has been initiated by the Illinois Scientific Surveys (Demissie et al., 1999). The ILRDSS will provide high quality database and scientific support for development and evaluation of potential watershed restoration tools for the major river basins in Illinois. The present modeling effort is one element of the scientific support proposed for the ILRDSS.

A detailed understanding of the impacts of land use changes, agricultural activities, and best management practices on the hydrology, soil erosion, fate and transport of chemical constituents, and ecology in the basin is imperative for developing an effective restoration scheme for the IRB. Estimates of surface and sub-surface loading of water, sediments and other pollutants into these rivers, provided through a well calibrated and validated watershed scale loading model, are essential to simulate dynamic in-stream water quantity and quality. Computer models are cost-effective tools for investigating the complex nature of processes that affect surface and sub-surface hydrology and water quality in large areas, and for finding solutions through alternate land uses and best management practices to prevent degradation of water resources. The first step in modeling these various processes is the simulation of streamflow hydrology (quantity) in the watershed.

Here we describe the initial development of a hydrologic simulation model for the entire IRB to characterize its hydrology and compute streamflows into the Illinois River and its tributaries. The BASINS (Better Assessment Science Integrating Point and Nonpoint Sources, version 3.0, USEPA, 2001) modeling system developed by the United States Environmental Protection Agency (USEPA) and its embedded model, Hydrological Simulation Program-FORTRAN (HSPF, version 12.0, Bicknell et al., 2001), are being used for this model development. HSPF has been widely used for characterizing watershed hydrology (Dunker and Melching, 1998) and for watershed scale modeling for assessing the effects of land-use changes on hydrology and water quality (Laroche, 1996;, Srinivasan et al., 1998; Jones and Winterstein, 1999). An exhaustive bibliography of HSPF applications has been compiled by Donigian (1999).

ILLINOIS RIVER BASIN

The Illinois River, one of the major tributaries to the Mississippi River in the central United States, has a drainage area of 28,906 square miles. Except for about 4000 square miles of drainage in Indiana and Wisconsin, the IRB is located entirely in Illinois (Figure 1). The Illinois River begins at the confluence of the Des Plaines and the Kankakee Rivers and has a total length of 270 miles to its outlet to the Mississippi River near Grafton, IL. Most of the IRB is relatively flat and covered with fine loess soil, making it one of the best agricultural regions in North America. The Illinois River in its present form is made of a series of pools created by the eight locks and dams. The nine major

tributaries of the Illinois River include Des Plaines, Fox, Kankakee, Vermilion, Mackinaw, Spoon, Sangamon, and La Moine Rivers and Macoupin Creek. Total drainage area of these tributary watersheds is nearly 22,000 square miles, with the Sangamon River being the largest tributary watershed (5436 square miles). The remaining basin area drains directly to the mainstem of the Illinois River. More than 80% of the land use in the basin is agricultural. The largest urban land use (Chicago area) is in the Des Plaines River watershed.

BASINS MODELING SYSTEM

The framework for the IRB model was created using the BASINS (version 3.0) modeling system. BASINS enables users to prepare watershed scale hydrologic and water quality simulation models using a GIS (Geographic Information System), a vast inventory of watershed and meteorological data, and a set of modeling tools. BASINS is comprised of:

- nationally derived inventory of meteorological data, GIS data layers required for the modeling analysis, including watershed boundaries, land use, soils, elevation, hydrography, and pollutant sources, etc.;
- tools for model preparation, including watershed delineation, data management, and re-classification of elevation (DEM), landuse, soils, and water quality data;
- two popular watershed loading and transport models, HSPF and SWAT, and a receiving water-quality model QUAL2E; and
- a data post-processor and several graphing/reporting formats for presenting results.

HSPF MODEL

In this study, the continuous hydrologic response of the IRB to input meteorological forcing was simulated by HSPF (Bicknell et al., 2001). HSPF is a conceptual, comprehensive, long term continuous simulation watershed scale model which simulates non-point source hydrology and water quality, combines it with point source contributions, and performs flow and water quality routing in the watershed and its streams. Hydrology is simulated in the model by a network of interconnected linear/nonlinear storages that represent components of the natural system. For detailed hydrologic simulation HSPF has routines that model a complete land-side water budget, including processes for simulating snow accumulation and melt, interception, evapotranspiration (ET), surface runoff, interflow, baseflow, surface detention and subsurface storages, soil moisture accounting, and overland and stream routing of the storm flows. Its ability to approximate antecedent conditions, simulate snow accumulation and snowmelt, and simulate low-flow periods between storms enables HSPF to provide continuous simulation of streamflow for all hydrologic conditions.

Through a GIS interface within BASINS, HSPF can easily access data pertaining to watershed boundaries, land use, elevation, and hydrography. Unique model elements can be developed for hydrologically-similar land segments which are linked together to represent the watershed. The model can be run on a single watershed and stream system, or on a set of hydrologically connected sub-watersheds and representative streams. Model elements can represent one of three types of land segments – pervious land segments, impervious land segments, or streams/reservoirs. For hydrologic simulation purpose, each land segment is treated as a lumped catchment by the model. This means that all of the land use types defined within a sub-watershed are grouped together and the associated runoff of both flow and water quality are loaded at the upstream end of the stream reach within that sub-watershed.

INPUT DATA

HSPF requires spatial information about watershed topography, hydrography, and land use for creating hydrologically connected sub-watersheds and their stream reaches, and land segments based on land uses within each sub-watershed. This data was extracted for the IRB from the GIS database provided by USEPA with the BASINS. While hourly precipitation and potential ET are the primary weather inputs for performing hydrologic simulations in HSPF, hourly air temperature, dew point temperature, solar radiation, wind speed, evaporation, and cloud cover data is used to model snow accumulation and snowmelt runoff. Data for these weather variables have been included in the BASINS database for a limited number of NOAA-NCDC (National Oceanic and Atmospheric Administration - National Climatic Data Centers) weather stations for the contiguous United States, generally for January 1, 1970 to December 31, 1995. Only 17 such stations were available either within or close to the IRB. Since rainfall is the driving force for hydrologic simulations and is generally spatially variable over large watersheds, additional hourly-precipitation data were needed to more accurately reflect the spatial variability of rainfall over the large area of the modeled basin. Thus, daily precipitation data from an additional 86 stations maintained by the Midwestern Regional Climate Center (MRCC) were disaggregated using hourly precipitation from the nearest NOAA-NCDC station to produce estimates of hourly data. By adding this synthesized, disaggregated hourly data to the climate database of BASINS, the total number of weather stations with hourly-precipitation data in the IRB was increased from 17 to 103.

WATERSHED SUBDELINEATION

Subdelineation is a procedure for representing spatially variable physical and other characteristics of the watershed in the model. Based on topographic and hydrographic data, large watersheds in this study were subdivided into smaller hydrologically-connected sub-watersheds and stream reaches, and respective outlets. This process assigns a reach of acceptable uniformity to each sub-watershed. Since the modeling process only assigns one weather station to each watershed, sub-delineation also enables all of the precipitation data to be used in hydrologic simulation. Each sub-watershed was further partitioned into five different land-cover segments based on the following land uses: agriculture, urban areas, forests, wetland/water, and barren land. The urban areas were simulated as impervious land segments, whereas, the other four land-covers segments were simulated as pervious land segments. Since BASINS-HSPF did not automatically create segments based on soils, the dominant soil type (hydrologic soil group B) was considered as representative soil type for initial preparation of the model. Such an approach has been used in some previous HSPF studies (Donigian et al., 1983; Jones and Winterstein, 2000). All pervious land segments in the model are assigned the same hydrologic parameters. On-going and future model improvements will include more detailed parameterization based on individual land use and soil characteristics, as well as incorporation of the latest topographic, land use, and soils datasets for the IRB.

HYDROLOGIC SIMULATION APPROACH

The hydrologic simulation model of the Illinois River Basin was developed in separate phases. First, three separate watersheds were modeled: the Upper-Kankakee River watershed upstream of the USGS streamflow gaging station at Momence (USGS gage number 05520500), the Iroquois River watershed upstream of the gaging station at Chebanse (05526000), and the Spoon River watershed upstream of the gaging station at Seville (05570000). Twenty four years (1972-1995) of observed streamflow data were used to calibrate and validate the hydrologic models. This 24-year period included years with wet, average, and dry climatic conditions enabling stringent testing of model performance during calibration and validation. Nine years (1987-1995) of data were used for model calibration. During calibration values of several sensitive model parameters were varied within a reasonable range to obtain optimal agreement between the observed and simulated streamflow data.

To validate the predictive capability of each calibrated model, its performance was evaluated for hydrologic conditions other than those used for calibration i.e. using fifteen years (1972-1986) of weather and streamflow data from the respective watersheds. Graphical as well as statistical measures were used to evaluate the model performance in simulating the streamflow at watershed outlet during calibration and validation. Observed and simulated daily flows were compared graphically to determine any trends due to seasonality and to identify any discrepancies in long-term data values. Statistical measures included calculation of objective functions such as Nash-Sutcliffe model efficiency (NSE), and coefficient of determination (r^2), intercept and slope of linear regression fit between observed and simulated daily, monthly and annual streamflow data. For annual and long-term flow comparisons, percentage of the prediction error was also computed.

In the next phase of this study, hydrologic simulations were performed using HSPF for the entire IRB, however no further model calibration was done. Instead, calibrated model parameters from the three previously calibrated tributary watersheds were tested on the remaining major tributaries of the IRB. Since better model performance was obtained using calibrated parameters of Spoon River watershed for all remaining tributaries, only these parameters were used in the final model. The portion of the IRB not included in the remaining major tributaries was lumped together as part of the mainstem Illinois River (MIR) watershed. The MIR watershed was subdelineated into sixty subwatersheds and climate data from 26 stations was assigned to them based on proximity to these stations. The simulated daily streamflows at the watershed outlet from the major tributary watershed models were used as inputs to the model of the MIR. Spoon River watershed model parameters were applied to the MIR as they were to the other uncalibrated tributary watersheds. It is worth mentioning here that many of the minor tributaries that drain directly into the Illinois River are "bluff" streams that have high vertical relief and steep channel slopes. Because of the unique character of these tributaries, it would be beneficial in future work to calibrate a separate set of hydrologic parameters bluff watersheds.

Daily streamflow input from the Des Plaines River and Chicago Sanitary and Ship Canal was represented by observed flows instead of simulated flows. This was done since the Chicago area is highly urbanized and the watershed characteristics are totally different from the three calibrated watersheds, thus it would not be appropriate to use any one of the three calibrated sets of the parameters developed in this study directly for the Chicago area. In the future, detailed HSPF modeling of the Des Plaines River watershed and Chicago-Calumet drainage areas could potentially be linked with the model of the IRB. Since observed streamflow data for the Des Plaines River was available only for June 1984 to December 1995, the MIR model could only be run for this time period and streamflow data from 1985-1995 was used during analysis of modeling results.

The hydraulic function table (FTABLE) in the model for a section of the Illinois River, which represents the Peoria Lake reach, was modified using measured channel geometry data from the USACE to account for the storage effects of that reach. However detailed flow routing characteristics for other reaches of the Illinois River and unsteady flow dynamics were not simulated. Simulated streamflow from this basin-scale model was compared with observed streamflow data from the USGS gaging station at Kingston Mines (05568500) on the Illinois River. Model performance was evaluated using the same method as used during calibration of three tributary watersheds.

RESULTS

Detailed results of the hydrologic simulation approaches described above are presented in Singh et al., 2003. Salient results of model performance of the Spoon River watershed model and the model of the entire IRB are presented here.

Spoon River Watershed Model

The Spoon River HSPF model was calibrated using daily flow data from the USGS gage at Seville (05570000). Figure 2a shows the comparison of the simulated and observed flow data for 1992-1995. The objective functions (NSE and r^2) for daily, average monthly and average annual streamflows, shown in Table 1, indicate that the calibrated model provides a satisfactory match between simulated and observed flows. The objective measures in Table 1 also show that the calibration process produced a substantial improvement in model performance over the uncalibrated parameters that are provided with BASINS. A reasonable fit was also obtained between observed and model simulated streamflows during the 15 year validation period as indicated by NSE values shown in Table 1. Figures 2b compares the daily simulated and observed flows in a scatter diagram, and Figure 2c compares the monthly simulated and observed flows. Discrepancies between the observed and simulated streamflows may be attributed to factors such as the spatial variability in rainfall over the large area of the watershed, lack of detailed channel flow routing in the modeling process, and inadequate representation of the watershed processes by the model algorithms.

Modular Simulation Model of the Illinois River Basin

Individual models were created for the watersheds of the remaining major Illinois River tributaries using calibrated parameters from the Spoon River watershed model. Performance evaluation results on daily, monthly and annual time scale basis for five of these models based on observed and simulated flow comparison for 1972-1995 are presented in Table 2. Even though most of these tributary models are not calibrated yet, analysis has shown a reasonable but coarse representation of simulated flows for most tributaries can be made using the Spoon River watershed model parameters and climatic inputs database created in this study. The Fox River watershed model simulated the streamflows poorly based on the Spoon parameters, particularly for daily flows. This may be due to a combination of the diverse physiographic and soil characteristics of the Fox watershed, inadequate representation in the uncalibrated model of lake storage and wetlands, and incomplete modeling of the rapidly urbanizing areas of the Fox watershed. More accurate and detailed future modeling of the Fox watershed in future work should take these sources of improvement into account.

Performance of the preliminary model for the entire IRB was evaluated on daily, monthly, and annual basis by comparing simulated and observed streamflows at the USGS streamflow gaging stations at Kingston Mines on the Illinois River. The comparison between streamflows observed at this USGS gage and model simulated streamflows for 1985-1995 period (Table 3 and Figure 3) showed that performance of this preliminary basin-scale model is promising considering that the models of several tributary streams are not fully developed yet, and detailed information on flow routing characteristics associated with lakes and pooled areas were not included for the entire length of the Illinois River in this preliminary model. These additional factors will be addressed in future work.

CONCLUSION

The preliminary IRB model developed in this study is a major improvement in our ability to simulate the hydrology of the basin for analyses of large scale planning issues. In addition to providing a useful tool for analyzing broad-scale restoration issues in support of the Illinois River Ecosystem Restoration Project, the current Illinois River BASINS-HSPF model provides a solid framework for continued modeling efforts leading to more detailed applications and refinement of modeling approach in the major tributaries and sub-watersheds, such as may be needed for the evaluation of watershed management practices and other applications. The following tasks need to be undertaken to further prepare the model for application to various management issues in the IRB: a) calibration of more tributary watersheds using a greater number of gages within each rather than for

one gage at the outlet, b) more detailed landscape classification in the model using the latest GIS data layers for watershed characteristics such as land use, soil type, topography, and stream network, c) development of regional parameter sets for modeling ungaged portions of the basin, d) coupling of the basin-scale hydrologic simulation model with a hydraulic model such as UNET for simulating the dynamic characteristics of flows in the Illinois River, and e) addition of watershed scale sediment and water quality simulation capabilities.

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REFERENCES

Bicknell, B.R., J. C. Imhoff, J. L. Kittle, Jr., T. H. Jobes, and A. S. Donigian, Jr., 2001. Hydrological Simulation Program – FORTRAN (HSPF), User's Manual for version 12.0, USEPA, Athens, GA, 30605.

Demissie, M., L. Keefer, and R. Xia. 1992. Erosion and sedimentation in the Illinois River Basin. Final report ILENR/RE-WR-92/04 of the IDENR, Springfield, IL.

Demissie, M., Y. Guo, H.V. Knapp, and N. G. Bhowmik. 1999. The Illinois Rivers Decision Support System (ILRDSS). ISWS Contract Report 648, Champaign, IL.

Donigian, A.S., Jr., 1999. Bibliography for HSPF and related references. *AQUA TERRA Consultants, Mountain View, CA,* http://hspf.com/hspfbib.html

Donigian, A. S., Jr., J. C. Imhoff, and B. R. Bicknell, 1983. Predicting water quality resulting from agricultural nonpoint source pollution via simulation – HSPF. In Agricultural management and water quality, eds. F. W. Schaller and G.W. Bailey, Iowa State University Press, Ames, Iowa, 200-249.

Donigian, A. S., Jr., J. C. Imhoff, B. R. Bicknell, and J. L. Kittle, Jr., 1984. Application guide for Hydrological Simulation Program – FORTRAN (HSPF): EPA-600/3-84-065, ERL, Athens, GA.

Duncker, J.J. and S.C. Melching. 1998. Regional rainfall runoff relation for simulating streamflow for watersheds in Du Page County, IL. USGS WRI Report 98-4035.

IEPA, 2002. Illinois Water Quality Report – 2002. Bureau of Water, Illinois Environmental Protection Agency Report IEPA/BOW/02-006, Springfield, IL.

Jones, P. M. and T.A. Winterstein. 2000. Characterization of rainfall-runoff response and estimation of the effect of wetland restoration on runoff: Heron lake Basin, South-western Minnesota, 91-97. USGS *Water Resources Investigation Report 00-4095.*

Kustra, R. 1997. The integrated management plan for the Illinois River Watershed. Illinois Valley Partnership, Springfield, Illinois.

Laroche, A.-M., J. Gallichand, R. Lagace, and A. Pesant, 1996. Simulating Atrazine Transport with HSPF in an Agricultural Watershed. J. Environmental Eng., 122(7):622.

Singh, J., H. V. Knapp, P. Saco, M. Demissie, and Y. Lian, 2003. Hydrologic Model Development for Illinois River Basin using BASINS 3.0. Final Project Report (in review), Illinois State Water Survey, Champaign, IL, 176 pages.

Srinivasan, M. S., J. M. Hamlett, R. L. Day, J. I. Sams, and G. W. Petersen, 1998. Hydrologic modeling of two glaciated watersheds in northeast Pennsylvania. J. Am. Water Resources Assoc. 34(4):963-978.

Sullivan, D. J., 2000. Nutrients and suspended solids in surface waters of the Upper Illinois River Basin in Illinois, Indiana, and Wisconsin, 1978-97. U. S. Geological Survey Water-Resources Investigation Report 99-4275, Wisconsin.

USEPA, 2001. Better Assessment Science Integrating Point and Nonpoint Sources –BASINS, version 3.0, User's Manual, EPA-823-B-01-001.

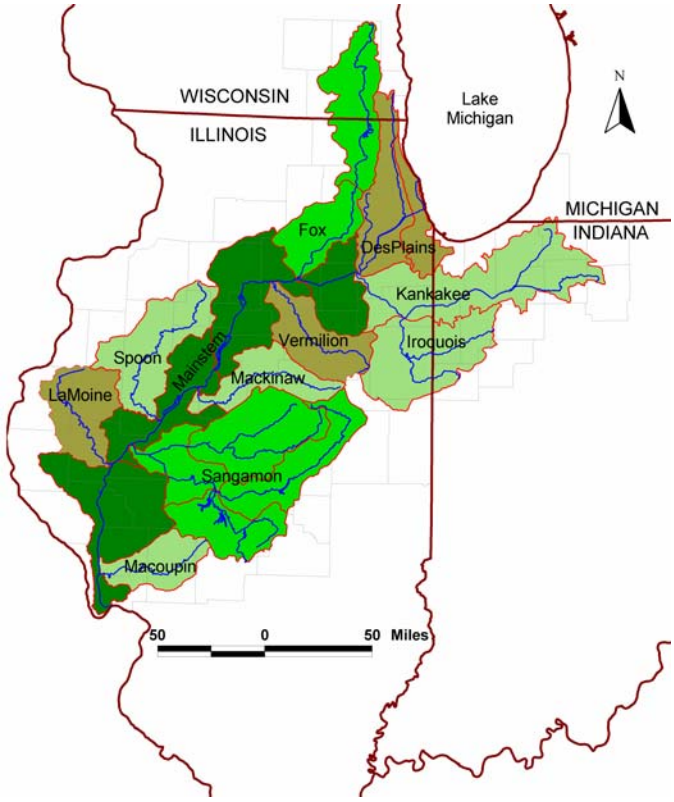

Figure 1. Location of the major tributary watersheds of the Illinois River Basin and the watershed of the mainstem Illinois River (MIR).

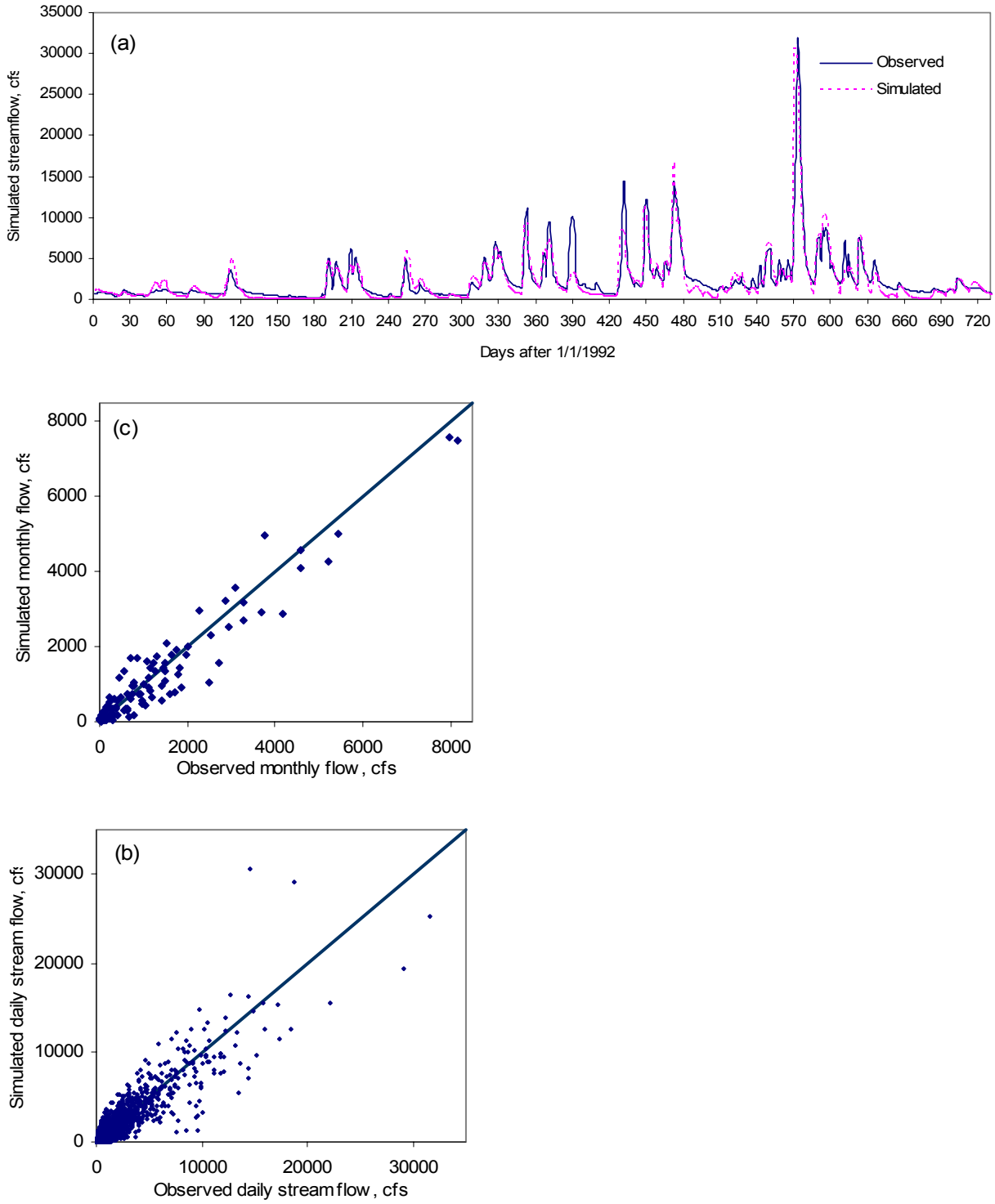

Figure 2. Results for the Spoon River watershed model calibration – (a) daily time series for 1992-1993, and (b) daily and (c) monthly scatter plots for 1987-1995.

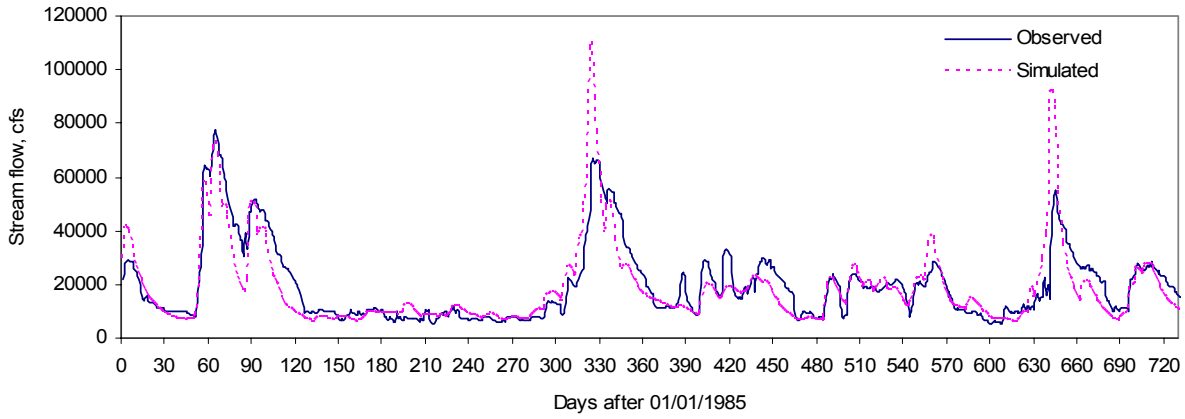

Figure 3. Comparison of simulated and observed daily flows for the Illinois River at Kingston Mines, 1985-1986, with incomplete representation of storage routing along the Illinois River.

Table 1. Model performance statistics before and after Calibration (1987-1995) and, from Validation Period (1972-1986) for the Spoon River watershed model.

	NSE	*r^2*	*Slope*	*Intercept*
	Uncalibrated Model (1987-1995)			
Daily	0.41	0.43	0.49	884
	Model Calibration (1987-1995)			
Daily	0.80	0.81	0.88	69
Mean monthly	0.91	0.92	0.90	38
Mean annual	0.93	0.98	0.77	169
	Model Validation (1972-1986)			
Daily	0.71	0.75	0.92	79
Mean monthly	0.87	0.88	0.95	27
Mean annual	0.93	0.94	0.94	42

Table 2. Model performance statistics for uncalibrated tributary watersheds of the Illinois River. Simulated streamflow was generated using parameters from the Spoon River watershed model.

Watershed	*NSE*	*r^2*	*Slope*	*Intercept*
		Daily (1972-1995)		
Vermilion	0.74	0.76	0.67	186
Mackinaw	0.70	0.71	0.65	178
Sangamon	0.52	0.68	1.10	29
LaMoine	0.72	0.72	0.79	198
Fox	0.32	0.63	1.10	-334
		Mean Monthly (1972-1995)		
Vermilion	0.84	0.89	0.74	115
Mackinaw	0.82	0.84	0.73	123
Sangamon	0.87	0.88	0.97	236
LaMoine	0.89	0.89	0.86	120
Fox	0.73	0.78	0.95	-65

		Mean Annual (1972-1995)		
Vermilion	0.69	0.87	0.69	162
Mackinaw	0.84	0.90	0.72	131
Sangamon	0.93	0.94	0.96	274
LaMoine	0.92	0.92	0.88	101
Fox	0.80	0.89	0.82	245

Table 3. Model performance statistics for the Illinois River Basin model based on simulated and observed streamflow data at the USGS gage at the Kingston Mines (05568500).

NSE	r^2	*Slope*	*Intercept*
	Daily (1985-1995)		
0.69	0.72	0.85	1778
	Mean Monthly (1985-1995)		
0.83	0.84	0.83	2123
	Mean Annual (1985-1995)		
0.90	0.99	0.74	3780

HIGH-SOLIDS SEDIMENT HANDLING AND PLACEMENT DEMOSTRATION

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ABSTRACT

The Illinois Department of Natural Resources, in conjunction with the US Army Corps of Engineers and other partners, is investigating methods of restoring the Illinois River watershed. A major focus is the removal of sediment that has reduced the volume of backwaters by over 70 percent and threatens to eliminate much of the remaining aquatic habitat. Restoration will include removing large quantities of sediment and placing it where it can be used beneficially and not contribute to future environmental problems.
A number of high solids sediment removal techniques are under investigation for use in areas where conventional hydraulic dredges are not feasible. The handling and long distance transport of sediment is also being studied. Equipment demonstrations to date include displacement and slurry pumps, mechanical dewatering, clamshell buckets, conveyors and various excavators. Barge transport from Peoria to Chicago and material placement for use as topsoil is discussed.

INTRODUCTION

Restoration of the Illinois River will require removing sediment from selected backwaters and side channels. The appropriate equipment and placement of dredged material will be determined by a number of factors including water and sediment depth, amount of material to be removed, distance to suitable placement sites, and sediment quality. Hydraulic dredges that mix sediment with water are efficient for moving large quantities of sediment to containment and dewatering areas. In situations where the placement site or planned use precludes hydraulic dredging, high solids equipment such as clamshell buckets or excavators can be used. Prior work on this project has focused on characterizing Illinois River sediment, the potential use of sediment as soil, and dredging and handling options. (Darmody and Marlin, 2002; Marlin, 1999; Marlin, 2001; Marlin 2002). Most of these papers, a variety of video clips and fact sheets are available at www.wmrc.uiuc.edu, under the Illinois River heading. Tests of fertility and plant growth show the sediment in the Peoria area to be generally equivalent to native topsoil. Studies of potential contaminants are ongoing. The chemical quality of sediment varies with distance from discharge sources, making site specific sampling desirable prior to dredging for beneficial use. Sediment from a portion of Lower Peoria Lake was subjected to a human health risk assessment and found suitable for use on a park.

ECONOMIC AND SOCIAL CONSIDERATIONS

The Illinois River contains millions of cubic yards of sediment. Given the limitations on public budgets, socially and economically viable beneficial uses for large quantities of sediment are more likely to move forward than options that merely pile it up in out of the way places. Old industrial sites in urban areas frequently need soil for landscaping. Sites that are strategically located may be able to use sediment as topsoil. An example is the 570-acre US Steel Southworks site in Chicago where a mixture of commercial, residential and parkland developments are planned (Figure 1). Other potential uses for large quantities of sediment include mine land reclamation, amending poor agricultural soil, and landscaping soil.

Figure 1. The US Steel Southworks site in Chicago is a prime candidate for using Illinois River sediment as topsoil. The Calumet Channel at the lower right connects to the Illinois Waterway. Barges can carry sediment directly from Peoria Lake to the site of the proposed Lakefront Park South East. This will preclude thousands of trucks hauling soil from suburban development sites over crowded highways and through neighborhoods.

There are several advantages to using clean sediment as topsoil. Aquatic habitat and recreational values are restored as unwanted sediment is removed and needed soil is provided for the receiving site. When barges can deliver the sediment to a placement site, the movement of thousands of truckloads of soil from suburbs over crowded highways and through neighborhoods will be avoided. Additionally, it will not be necessary to remove topsoil for restoring old industrial sites from farm fields and developments.

As with many bulk commodities, minimizing handling is a key to providing sediment at low cost. Each time material is loaded or unloaded; labor and equipment costs are incurred.

Because bulk shipping cost is sensitive to weight, it is desirable to ship material as dry as possible to avoid transporting water. There are tradeoffs between handling and moisture content.

Where river sediment is deep, it can be loaded directly into a barge and moved to an unloading facility where it can be placed in trucks. The trucks can then dump it on the site in need of soil. The sediment will have a toothpaste-like consistency (Figure 2) and depending upon weather and other conditions can take 3 to 12 months to dry and develop soil structure. It can then be sculpted to the desired depth and contours.

Figure 2. Excavated sediment retains toothpaste like consistency for days when transported by barge or truck. It forms piles when dumped and must dry and weather before developing soil structure.

Figure 3. Sediment stockpiles at East Peoria after weathering in a field. It was originally spread 18 inches deep and was later piled for use in a park.

An alternative is to dredge sediment and move it to a drying and stockpiling area prior to shipping it to a final destination. Movement to the stockpile can include one or more handlings depending upon distance and type of equipment. Once the material is dry and develops soil structure, it can be loaded into trucks, trains, or barges for transport to a site. This option increases handling, but the material will arrive at a site with established soil structure (Figure 3).

DEMONSTRATIONS

Two demonstrations of high solids handling and movement were conducted in the fall of 2002. The first involved removing sediment from a backwater with a clamshell bucket and loading it into conventional concrete handling trucks. During the second demonstration, sediment was taken from Lower Peoria Lake to Chicago and placed at a brownfield site. The demonstrations were funded by the Rock Island District of the US Army Corps of Engineers as part of the Illinois River Ecosystem restoration study. Detailed reports (Marlin 2003a and 2003b) are available at the previously cited WMRC web site.

Sediment from a backwater near Lacon was placed on a deck barge and then clamshelled into trucks and placed on a field (Figure 4). The next morning a skidder was used to load it into

concrete handling trucks. A truck equipped with a concrete pump and 32 meter articulated placing boom readily handled the sediment (Figure 5). Sediment was also placed in the hopper of a concrete conveyor truck with a 105 foot telescoping boom. The sediment stayed on the conveyor even at a 30-degree incline. It went through a transfer point without difficulty (Figure 6). The belt cleaners had no trouble scraping the belt.

Figure 4. The site layout for the sediment handling demonstration at Lacon in September 2002, included a sediment stockpile in the foreground that was loaded to the pump truck on the left with a skidder. The material was pumped through a 32-meter boom shown here feeding the truck hopper. A feeder conveyor then carried material to the top of the conveyor truck where it passed through a transfer point onto the 105-foot telescoping main belt that placed the sediment on the field.

Figure 5. Sediment from both the concrete pump truck shown here and conveyor truck formed piles about two feet high. The equipment can be used to precisely place

Figure 6. Excavated sediment had no difficulty on the conveyor belts. It rode inclines, passed through transfer points, and was readily cleaned by belt scrapers.

excavated sediment.	

Both trucks were able to place sediment at specific locations and at various depths. Sediment from the booms reached a height in excess of two feet. The conveyor was used to establish two 20 by 60 foot sediment plots, one 6 inches deep and the other 12 inches (Figure 7).
In the transport demonstration, 900 tons of sediment excavated from Lower Peoria Lake were placed in a hopper barge and towed 163 miles to Chicago. It was unloaded into semi trucks with a three cubic yard excavator bucket (Figure 8). It was taken to the Paxton 1 landfill site near Calumet Lake that is being lined and covered with soil as part of a remediation effort (Figure 9).

Figure 7. The conveyor boom placed two 20 x 60 foot plots, demonstrating the ability to place sediment at specific depths over a field.

Figure 8. An excavator bucket removing sediment from a barge in Chicago 163 miles from its origin at East Peoria. The sediment was in the barge about a week.

Figure 9. The vegetated triangle in this photo is the Peoria Lake sediment plot at the Paxton 1 landfill site in Chicago. A variety of commercial grasses, prairie plants and weeds grew on the site during 2003. The bare ground on the edges is a clay liner. In the

background is the Paxton 2 landfill.

The sediment was readily handled at each step of the process. The sediment maintained its consistency in the barge, although a thin crust formed at the surface. It readily poured from the buckets and trucks. Cleaning equipment and the barge was not a problem. Sediment dumped from stationary trucks formed cohesive piles about 32 inches high. Material dumped from moving trucks attained shallower depths. After a winter of freezing and thawing, the top of the sediment had a granular structure. Grass seed sown in late March grew rapidly without fertilizer or watering. By fall the first foot had well developed soil structure, roots had penetrated the sediment layer and soil insects were established (Figure 10). In the fall of 2003 an endloader and trucks were used to move some of the sediment to another location. It handled like typical topsoil.

Figure 10. The sediment at the Paxton site rapidly developed granular soil structure and supported healthy vegetation. The pictured grass was planted in March and had no water or fertilizer prior to this photo being taken 4.5 months later.

CONCLUSION

These demonstrations show that excavated river sediment can be handled and placed by

conventional equipment, including conveyors and displacement pumps. Potential field applications include placing sediment on highway or landfill slopes, on fields, and into tree lines on islands. Pumps or conveyors could be used to move excavated sediment hundreds of yards over shallow water to barges or shore. Sediment can also be transported long distances and placed directly on fields needing topsoil or stockpiled until it dries and develops soil structure.

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REFERENCES

Darmondy, Robert G. and Marlin, John C., 2002. "Sediments and Sediment-Derived Soils in Illinois: Pedological and Agronomic Assessment 1" Environmental Monitoring and Assessment, 77(2), 209-227.

Marlin, John. 1999. Potential Use of Innovative Dredge Technology and Beneficial Use of Sediment for River Restoration. In Proceedings of the Seventh Governor's Conference, on the Management of Illinois River System. Special Report No. 25, Illinois Water Resources Center, University of Illinois at Urbana-Champaign. pp. 137-147.

Marlin, John. 2001. Backwater Restoration Opportunities: Illinois River. In Proceedings of the Eighth Governor's Conference on the Management of the Illinois River System. Special Report No. 27, Illinois Water Resources Center, University of Illinois at Urbana-Champaign. pp. 224-232

Marlin, John C. 2002. "Evaluation of Sediment Removal Options and beneficial Use of Dredged Material for Illinois River Restoration: Preliminary Report. Proceedings of the Western Dredging Association Twenty-Second Technical Conference and Thirty-Fourth Texas A&M Dredging Seminar, June 12-15 2002.

Marlin, J.C. 2003a "Sediment Handling Demonstration at Lacon, Illinois, Using Concrete Pump and Conveyor Trucks." Illinois Water Management and Research Center, TR-36. Champaign, IL.

Marlin, J.C. 2003b. Barge Transport of Illinois River Sediment from Peoria to Chicago." Illinois Waste Management and Research Center, TR-37. Champaign, IL.

FISHING, HUNTING, BOATING AND OTHER RECREATIONAL OPPORTUNITIES WITHIN THE ILLINOIS RIVER CORRIDOR

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INTRODUCTION

The Illinois River is either 270 or 327 miles long, and it may or may not be considered to lie entirely within the boundaries of our state. These discrepancies arise because the river has had several incarnations. Geographically, it begins at the point where the Des Plaines, DuPage, and Kankakee Rivers converge near the Will and Grundy County lines; that river flows for a distance of 270 miles, ultimately entering the Mississippi at Grafton, about 40 miles north of St. Louis.

The banks along this stretch of the Illinois are lined with dozens of lakes and backwaters that were originally carved out of the land by sediments contained in the river waters. When the river overflowed, its sediment-laden waters cut crevices through the riverbanks. As the waters escaped through these crevices, they created side channels, sloughs, swamps, and other backwater wetlands, so that the river valley resembled a boundless marsh. When dams were built in the river in the nineteenth century, many of these backwaters and wetlands were filled and formed as many as 300 long, narrow backwater or bottomland lakes.

In our century, the natural sedimentation processes that formed the backwater wetlands have been altered and accelerated by human activities such as agriculture, levee building, and urbanization. These activities have set the stage for the very extinction of the wetlands and lakes along the middle river, which are now being filled with sediment. As of 1975, sedimentation had reduced their average depth to only 2 feet.

The lower river, extending from Beardstown to Grafton, was once rich with backwaters, but levees erected early in our century destroyed almost all of the lakes and wetlands along this stretch. Thus only about 53 backwater lakes now survive along the full length of the river, and the floodplain of the Illinois River is now little more than 200,000 acres, about half its size 100 years ago. Although the Illinois River Valley was once almost entirely wetlands, actual water surfaces now account for only 60 to 100 square miles (40,000 to 70,000 acres).

The Illinois River Valley (which is also known as a "basin" or 'Watershed" or "drainage area") encompasses some 30,000 square miles, covering 44 percent of the land area of the state and including more than a dozen tributaries of the main river. About 1,000 square mile of the watershed extend into Wisconsin with the upper portions of the Fox and Des Plaines Rivers, and another 3,200 square miles extend into Indiana with the Kankakee and Iroquois Rivers. The Illinois River Basin includes 46 percent of the state's agricultural land, 28 percent of its forests, 37 percent of its surface waters and streams, and 95 percent of its urban areas.

RIVER FLOODPLAIN SYSTEM

Despite alterations, the Illinois River is one of a handful of world-class river-floodplain ecosystems. The river-floodplain system is much more complex and contributes much more biological diversity and abundance than smaller stream systems, including representatives from some of the most ancient lineages of fishes, such as gars, sturgeons (including the federally-endangered pallid sturgeon), and the paddlefish. Paddlefish feed on plankton and can grow to weights of 150 pounds and lengths up to seven feet.

The entire flora and fauna of the Illinois River are unusually rich for a temperate river; partly because its north-south orientation and connection to the Lower Mississippi River provided a retreat for species during the glacial epochs. The Illinois River's long flood pulse, however, has contributed to a biological productivity that overshadows even the Upper Mississippi River. Just as the prairie is sustained by natural fires, the river-floodplain system and associated plants and animals depend upon the periodic advance and recession of floods. The federally-endangered false decurrent aster (Boitonia decurrens), for instance, relies on the exposure of freshly deposited mud flats for regeneration. The cottonwood, favored for perching by eagles and for nesting by herons and egrets, seems to have similar requirements. The river-floodplain also functions as a corridor for long-distance migrants, mostly birds (raptors, neo-tropical songbirds, shorebirds, ducks, geese, swans and others) but also one species of fish, the American eel, that spawns off the coast of Cuba in the Sargasso Sea. Most aquatic animals, however, use the Illinois river-floodplain system as a permanent home, undertaking short migrations within the system to spawning, rearing or feeding areas in rapids, tributaries, backwaters, or on the floodplain.

HABITAT AND RESOURCE DISTURBANCE FACTORS

Little more than 150 years ago, the Illinois River basin was the haven of one of the most diverse, abundant, and valuable river systems found anywhere in the United States. The wealth of natural resources within its basin; its fertile soils, timbered lands, and flowing waters teeming with a myriad of waterfowl, furbearers, fish and mussels, contributed immeasurably to the early development and welfare of the state and nation.

Since that time the basin and its resources have been subjected to a number of stresses and decimating factors which have severely impacted both the living natural resources (fish, wildlife, etc.) and the physical systems on which these resources depend for their survival.

A discussion of the important decimating and/or stress factors which have affected the basin's natural resources, including the quality of the terrestrial and aquatic habitats, is required for the long-term viability of resident plants and animals. Recreational resources have been impacted as natural resources and require action for future generations to enjoy the outdoor opportunities provided by the Illinois River basin.

AQUATIC RESOURCES: FISH

Many changes have occurred within the Illinois River basin which have had a significant impact upon the river and its fish population. During the 1850-1965 period, the number of people living in the basin increased from 500,000 to over 10,500,000. This rapid growth, resulted in vast quantities of industrial wastes and human sewage being produced. Communities along the Illinois River poured their untreated sewage directly into the river.

By 1908 fish production of the Illinois River began to decline sharply as its water could no longer assimilate the tremendous volume of sewage it received. As increased quantities of sewage entered the Illinois River, the effect was devastating. Upper stretches of the river were depleted of oxygen and became toxic.

Mayflies, which are indicators of clean water and are an important food of many species of fish and fingernail clams, virtually disappeared from the river above Beardstown after 1950. The loss

of the river's important fish food organisms was undoubtedly one of the major factors contributing to the declining fish populations.

Pollution was only one of the stress factors that lead to the degradation of the river. Primarily during the 1905-1920 period, some 200,000 acres of the river's rich bottomlands, sloughs and shallow lakes and ponds (wetlands) were ditched, drained and diked. Levees were also erected to isolate 200,000 acres of flood plain from the river and by 1930, 50% of the "overflowed land" between LaSalle and Grafton was "protected". These levied-off areas, which were vital to the river basin's high fish productivity in terms of providing essential spawning, nursery and feeding areas, became cropland.

Another event that has altered the aquatic habitat and water quality of the Illinois River, influencing its production of fish, has been the development of navigation. Although a series of low level dams were built across the Illinois River before 1900, it was the construction of the high navigation dams during the 1930's that had the greater impact on the river. The pooling effect of the dams slowed its flow, which increased the rate of sedimentation because its capacity to carry its silt loads was altered. The heavy barge traffic that followed has resulted in wave turbulences that have increased the turbidity of the water and caused erosive scouring of the river bottom and shoreline, directly affecting the ability of some fishes to feed and reproduce.

The deposition of sediments into the basin's rivers has resulted in loss of flow capacity, the filling of adjacent bottomland lakes and associated wetlands which are essential fish production areas, and has caused the smothering of valuable bottom-dwelling organisms and plants thus degrading quality habitat areas. The loss of depth and increased turbidity from the sedimentation most threatens the present aquatic habitat and fisheries resources.

In addition, the increased production of row crops and the practice of monoculture have resulted in a greater use of herbicides, insecticides and fertilizers. Many of the agricultural chemicals used are persistent in nature and extremely toxic to fish. Over the past 30 years, numerous agricultural chemical-caused fish kills have been documented within the Illinois River basin and its tributary streams. Fish kills have also been caused by numerous discharges from industrial and manufacturing operations, which discharge toxic heavy metals, inorganic and organic chemicals, and oxygen demanding organic waste such as wood pulp fibers, canning, dairy and food processing wastes.

Oxygen depletion has become a problem in the backwater areas of the lower river as wind generated waves resuspend materials from the shallow lake bottoms, exerting an oxygen demand and removing dissolved oxygen from the water. The turbidity caused by sediment inflow coupled with wind and towboat generated sediment resuspension has eliminated most aquatic vegetation by reducing the water clarity needed for photosynthesis and keeping bottom material too stirred ("soft") for plant roots to hold. Peoria Lake, the largest and deepest bottomland lake in the Illinois River valley, has lost 68% of its original volume due to sedimentation, has an average depth of only 2.6 feet, and has an estimated life expectancy of only 15 years. Loss of other existing bottomland lakes in the basin is also expected.

The major decimating and stress factors in the aquatic environment are the pollution of basin waters and sediments, depletion of oxygen levels and bottom vegetative food supplies, the modification of the river to accommodate navigation altering its flow and physical characteristics, urban and agricultural development removing vast acreage of forest and aquatic habitats, and the accelerating rates of sedimentation which have destroyed many highly productive bottomland areas of the Illinois River floodplain. The total sum of these many physical, chemical, biological modifications of the basin has resulted in a general decline in the aquatic ecosystem viability.

AQUATIC RESOURCES: MUSSELS

Prior to 1900, at least 38 species of mussels were found within the basin of the Illinois River, in varying degrees of abundance. Over-exploitation of mussel beds and the rapid progression of pollution on that portion of the river upstream of the Peoria-Pekin metropolitan area were probably

the major factors causing the decline in mussels after 1915. Since 1915, virtually all mussel species upstream of Chillicothe have disappeared because of pollution.

Individuals, who were engaged in mussel harvest on the Illinois River prior to 1940 and are once again active in the same effort, have described that the majority of the river's mussel beds they once harvested upstream of Meredosia are now covered with two to five feet of deposited sediments. Basin mussel resources have both been seriously degraded by over-harvest, increased sedimentation and agricultural, industrial and domestic pollution.

WILDLIFE RESOURCES

Historically, the Illinois River valley provided a diversity, quality, and quantity of wildlife habitats of uncommon value. In 1673, Pere Marquette wrote 'We have seen nothing like this river that we enter, as regards its fertility of soil, its prairies and woods, its cattle, elk, deer, wildcats, bustards, swans, ducks, and even beaver." In response to luxurious aquatic plantbeds, seasonally exposed mudflats, expanses of bottom-land forests, and the waters of the river and backwater lakes, wildlife flourished.

Significant changes have occurred over time within the Illinois River basin which have had a significant impact upon its wildlife resources. During the 1905-1920 period, some 200,000 acres of the river's rich bottomlands, sloughs and shallow lakes and ponds were ditched, drained and diked. Levees were also erected to safely isolate additional thousands of acres of flood plain from the river. These levied-off areas, which were vital to the river basin's wildlife productivity became cropland.

Today, much of the basin's valuable wildlife habitat is gone-having succumbed to a series of events tied to settlement and progress. Aside from the loss of vast acreage of bottomland hardwood forest, little is more dramatic an example of a decaying resource than the disappearance and decline of wildlife in the river system. The once prolific number of waterfowl, furbearers, shorebirds, wading birds and other animals have been chronicled and-finally-grieved.

Probably the most familiar and well documented of these has been the fall of waterfowl numbers, particularly the mallard, in the Illinois River valley. From the 1950-59 ten-year average of almost 1,200,000 peak mallard numbers on the river, the number dropped to slightly over 366,000 for the 1980-86 period. Further declines have been recorded since 1986 and in 1992 only 246,605 mallards were counted, the lowest numbers since surveys began in 1948 and about 80% less than the peak count. Today the numbers of mallards using the Illinois River Valley continue to decline.

A shift of mallards to the Mississippi River has also been observed, leading to the explanation that this shift is a function of reduced habitat. The toxic Illinois river bottom sediments have also severely reduced the food supply for diving ducks. Man's continuing struggle to "Improve" the basin over the past 50 years have resulted in many deleterious impacts to the basin's wildlife species and their habitats. The destruction of timberlands for conversion to croplands, the cropping of steep sloped once forested lands, and the intensified production of row crops has resulted in an alarming decrease in terrestrial habitats. The filling of adjacent bottomland lakes which are essential wildlife production areas, and the smothering of valuable plants by sedimentation has degraded quality habitat areas and contributed to the decline of wildlife in the basin.

NON-NATIVE SPECIES THREATS

In addition to the man-induced or naturally occurring changes and/or stresses to the ecosystem, there is a growing threat to fish, wildlife and other living resources from the introduction of nonnative animal or plant species into the basin by well-meaning, but uniformed, persons or by unintentional releases.

Zebra mussels are one of the prolific invaders from Europe that have proven to be remarkably at home in U.S. and Canadian waters since their arrival in the Great Lakes. Their practice of attaching to hard substrates threatens native mussels.

Zebra's were first collected in the Illinois Waterway in 1989. Since then, both confirmed and unconfirmed sightings have made at numerous locations on the Illinois & Mississippi Rivers.

The most immediate biological impact will be to native mussels and clams (including the fingernail clams) as many of the first zebra's collected were attached to native mussels. The weight of so many hitchhikers prevents the native mussels from opening their valves and siphoning, which ultimately results in starvation and suffocation.

According to the National Park Service and the U.S. Fish and Wildlife Service, "zebra mussels have caused nearly complete extirpation of native mussels where they have invaded the Lake Erie Basin." Resource managers believe that the same risk exists in the Upper Mississippi River Basin.

Exotic weeds are also a rapidly growing threat to the natural ecology of the Illinois River basin. The most serious wildland weeds are replacing diverse native vegetation of wetlands and forests with a near monoculture of aggressive alien plants.

Purple loosestrife is the principal problem in open sunny wetlands like fens and marshes, while tall hedge leads the problem list in bogs and other wooded wetlands. The most serious and rapidly spreading problem weed now is garlic mustard which is invading all types of forests and replacing our beautiful and diverse woodland wildflowers.

Garlic mustard is especially bad along the Des Plaines, Illinois, Mackinaw and Sangamon Rivers. It is found throughout the basin but is just now invading the Kankakee-Iroquois system. The full effect of loss of vegetation diversity on our wildlife is as yet unknown. However, the loss to insects, many of which depend on specific native host plants for survival, is surely great.

While nature preserve and park managers may be able to save small remnants of native terrestrial vegetation by intensive management the outlook for most wildlands in the basin is bleak. Unless private lands are managed for nature conservation, the basin may one day soon be a giant weed patch with only a scattering of parks and preserves to remind us of the natural beauty and diversity that once abounded here.

Exotic weeds are severe problems because they have been introduced into America without the diseases and insect pests that control their numbers in the land of their origin.

Exotic aquatic weeds are not as severe a problem in the streams and natural lakes of the basin because most of their waters are so turbid that few aquatic plants can grow there. The glacial lakes of the upper Fox River and the relatively clear waters of the Kankakee River are exceptions.

The biggest problem in the glacial lakes is spike water milfoil while curly pondweed and others can be a problem there as well as in some of the quieter waters of the Kankakee and other streams.

RECREATIONAL RESOURCES

Illinois' rivers and valleys are becoming increasingly important as recreation resources. River areas display scenic overlooks and geologic formations, harbor rich archaeological sites, and historic river towns. The rivers, backwater lakes, and forested bottomlands provide excellent opportunity for a variety of recreation activities.

Recreation today is seen as a major segment of the economy. Diverse, high quality recreation opportunities are attractive to Illinois' citizens, prospective businesses, and tourists. The "2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation," conducted by the US Department of the Interior and the US Department of Commerce discovered. Illinois residents spent over $2.3 billion in 2001 on fishing ($1,145,764,000 annually), hunting ($527,368,000 annually), and wildlife watching ($689,456,000 annually). The recreation industry in Illinois employs large numbers of people. Contributions to the Illinois economy from Illinois' Park, Forest Preserve and Conservation districts alone in 1991 were more than $3.1 billion.

Recreation also enhances the quality of life. The Illinois River basin provides recreation in both quality and quantity, and the people of Illinois recognize it as a significant recreational resource.

Recreation in the basin includes water-dependent activities such as fishing, waterfowl hunting, boating, and swimming. Recreation also includes activities which are enhanced by proximity to water such as hiking, picnicking, and camping.

In the basin, many recreational sites and facilities are focused on the water - rivers or lakes - for recreation. In addition, wildlife habitat and forests are concentrated along the rivers and lakes of the basin. Although there are many recreation providers and many recreation sites in the basin, the largest percentage of land adjacent to rivers and lakes is in private ownership, and generally not accessible to the public. Levees have converted bottomlands to agricultural and urban development. About 20 percent of the bottomlands are publicly owned or used for public recreation, the remaining bottomlands are now in urban and industrial use.

These water-related recreation sites are directly affected by the quality of the natural resource in and surrounding them-the rivers, lakes, backwater areas, forests, and geologic formations. Degradation of this resource is occurring at an alarming rate and directly affects the quality and quantity of recreation available in the basin. All of the water-related recreation activities in the basin in fact, are impacted, as is quality of life, as the basin degradation continues.

ILLINOIS RIVER BASIN RESTORATION PROJECT

The State of Illinois also recognizes the important resource that the Illinois River Basin represents. The Offices of the Governor and Lt. Governor have led efforts to focus attention on the Illinois River, including completing an *Integrated Management Plan for the Illinois River Watershed* and proposing "Illinois Rivers 2020" a $2.5 billion, 20-year State and Federal initiative to restore the Illinois River. The State of Illinois has committed itself to restoration activities in the basin by leading planning efforts and enacting legislation aimed at basin restoration. The State has supported restoration efforts through the most successful Conservation Reserve Enhancement Program in the Nation and numerous locally led watershed-planning initiatives. In addition, local groups strongly support and have been active in pursuing restoration in the basin.

Development of a comprehensive plan and critical restoration projects described in this Project Management Plan (PMP) were called for in Section 519 of WRDA 2000. These efforts will be developed using information from the complementary Illinois River Ecosystem Restoration Feasibility Study and additional Illinois River Basin Restoration Section 519 efforts.

The purpose of the comprehensive plan is to identify restoration needs within the basin in a manner consistent with Federal planning requirements and Congressional authority. The ongoing Illinois River Ecosystem Restoration Feasibility Study effort will identify problems and opportunities, define existing and future without conditions in the Basin, develop a consensus based desired future condition and evaluate the need for restoration, document resource significance, formulate alternatives at the system level to determine Federal interest and level of effort required, and develop a restoration program and prioritization process.

Section 519 funding will be used to conduct the activities described in this document including addressing comprehensive plan requirements from that legislation including: (1) the development and implementation of a program for sediment removal technology, sediment characterization, sediment transport, and beneficial uses of sediment; (2) the development and implementation of a program for the planning, conservation, evaluation, and construction of measures for fish and wildlife habitat conservation and rehabilitation, and stabilization and enhancement of land and water resources in the basin; (3) the development and implementation of a long-term resource monitoring program; (4) the development and implementation of a computerized inventory and analysis system; (5) summarization of Illinois River transportation and economic information; and (6) improvement in planning tools for watershed assessments, characterizing ecosystem project benefits restoration techniques.

IN 2003 , MAJOR PROJECT ACTIVITIES FOR THE CORPS AND IDNR INCLUDE:

CRITICAL RESTORATION PROJECTS

The six critical restoration projects identified through the Illinois River Ecosystem Restoration Study will be the first critical restoration projects investigated under Section 519 in 2003. These efforts (Waubonnse Creek, Blackberry Creek, Kankakee and Iroquois Rivers, McKee Creek, and Pekin Lake were identified by the Illinois Department of Natural Resources through a basin-wide evaluation process, represent a range of project types addressing the major system problems, and have local interest and support. Each Critical Restoration Project will be evaluated through a separate decision document (similar to the Environmental Management Program's Definite Project Reports). The evaluations will define benefits such as habitat units created, stream miles of connectivity, tons of sediment reduced, and other measures. Cost Effective and Incremental Cost Analysis will be used to evaluate the benefits and costs of various project alternatives and to identify a recommended plan. For any recommended plan, the evaluations must show that the outputs of each project outweigh its respective costs.

WATER LEVEL MANAGEMENT STUDY

One of the major concerns to resource managers on the Illinois River is the increase in water level fluctuations over historic conditions. These fluctuations can negatively effect aquatic plants, fish, and wildlife. This task focuses on the potential for improvements in water level management. This effort includes a focus on two primary areas: improving water level management to reduce rapid fluctuations and assessing the potential for further management, such as draw down of pools, to produce environmental benefits. Specific tasks include evaluation of historic fluctuations, changes to the waterway, and modeling of potential options. A hydrologic model will be utilized to determine if changes to the operation of the Illinois Waterway could result in improved environmental conditions. In addition, the potential for pool draw downs will be evaluated for selected pools. Completion of this study is expected in 2003.

COMPREHENSIVE PLAN FOR RESTORATION OF THE ILLINOIS RIVER BASIN

RESTORATION NEEDS ASSESSMENT

The Restoration Needs Assessment (RNA) will provide a practical and scientific basis for assessing the Illinois River Basin identifying potential restoration project types and locations. The RNA will define those critical assumptions controlling the ability to determine habitat needs and focus the study, planning, and construction efforts on the areas of critical need. Specifically the goals of the RNA include building off of the large volume of existing work to bring together different disciplines and interests to:

A. Demonstrate Federal, State, and local interest in restoration.
B. Provide an organizing framework and understanding of the state and function of the Illinois River Basin as a whole and its sub-basins (Historic, Existing, and Predicted Future Conditions).
C. Develop Consensus regarding desired future conditions.
D. Provide information to allow prioritization of restoration alternatives.
E. Review existing planning and prioritization efforts, existing agency programs, and develop a list of potential
F. Best Management Practices (B M P)/restoration alternatives

The restoration needs of the Illinois River Basin will be determined by comparing the difference between the historic, existing, predicted future, and desired future conditions of the Illinois River Basin. Biological, geomorphic, land use/land cover, and hydrologic information will be gathered, developed, analyzed, and used. The analysis will consider the historic context, present conditions, likely future conditions without a project, and the desired future condition of the watershed in terms of habitat types and quantities, watershed stability, etc. The difference between the likely future conditions and desired future conditions will define the habitat/restoration needs. In addition to identifying the needs, the analysis will identify types of restoration projects and a number (approximately 10-100) of potential specific projects through out the watershed that would meet the desired criteria. Completion of the RNA is expected in late 2003.

RESTORATION GOALS AND OBJECTIVES: DESIRED FUTURE CONDITIONS

The objective of ecosystem restoration is to restore degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. Restoration as defined under Section 519 in its broadest usage encompasses the following concepts: conservation, enhancement, naturalization, preservation, protection, rehabilitation, restoration, and stabilization.

The principal habitat problems in the Illinois River Basin are the result of sedimentation of backwaters and side channels, degradation of tributary streams, water level fluctuations, loss of floodplain and tributary connectivity, and other adverse impacts caused by human activities. A restoration vision was developed for the Illinois River as part of the development of the State of Illinois Lt. Governor's *Integrated Management Plan for the Illinois River Watershed*. This plan was prepared by the Illinois River Strategy Team with input from nearly 150 participants.

The vision of this plan was for:

> *"A naturally diverse and productive Illinois River Basin that is sustainable by natural ecological processes and managed to provide for compatible social and economic activities"*.

With the *Integrated Management Plan* providing context, the following list of ecosystem restoration goals were developed during the Illinois River Ecosystem Restoration Study:

1. Reduce sediment delivery from upland areas and tributaries to the Illinois River,
2. Selectively remove sediment, reduce sediment deposition, and improve sediment characteristics in backwaters and side channels,
3. Restore floodplain habitat and function,
4. Increase connectivity of aquatic and terrestrial habitats,
5. Naturalize hydrologic regimes in tributaries and the mainstem Illinois River,
6. Restore natural disturbance regimes,
7. Protect high quality and restore degraded native ecosystems and habitats,
8. Maintain viable populations of native species, and

9. Improve water quality.

These nine goals are consistent with and expand on the four primary focus areas originally identified by the IDNR for the Illinois River Ecosystem Restoration Feasibility Study:

1. Watershed Stabilization - Address tributary alterations and land uses, conservation easements, wetlands, water retention, riparian filter strips, and stream restoration.
2. Side Channel and Backwater Modification - Consider opportunities to restore habits in these areas, including off-channel deep water habitat, backwater lakes, side channels, constructing islands, etc.
3. Water Level Management - Evaluate options to reduce rapid fluctuations and naturalize flows.
4. Floodplain Restoration and Protection - Evaluate floodplain use, potential restoration of floodplain function, and value/potential for acquisition or conservation easements of some floodplain lands.

Completion of the draft Comprehensive Plan for the Restoration of the Illinois River Basin is expected in late 2003 or early 2004. Final review and comments to the Corps should be completed in the Spring 2004. Submission to the US Congress follows.

PEORIA: A GOLD MEDAL PARK DISTRICT

Bonnie Noble

Peoria Park District
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In the very near future, the Peoria area must become an attractive area for future business investment if we are to stay competitive with the new economy. Park districts in this area have a tremendous role to play in making this happen. Steven Roulac, futurist, Roulac Group, projects that " … cities are characterized by a sense of place, … beauty in the natural environment, a mixed-use transportation system and a 24-hour lifestyle. These are the characteristics that will attract the creativity and brainpower that undergird the new economy.

There are those who do not understand the benefits derived from healthy park systems and that they are so much more than an amenity. Rather, parks are fundamental to many aspects of community prosperity, including tourism, in addition helping address urban challenges. Perhaps the vision of park districts and what they bring to a community has not been touted by we as the professionals and the focus of park districts has too readily been relegated to games, arts and crafts, soccer moms and sports in general … not to say soccer moms and sports are not also important.

We need to understand, though, that "parks", and specifically what we have tried to accomplish through the Peoria Park District, provide intrinsic environmental, esthetic and recreation benefits to the Peoria region. We are a source of positive economic benefits, enhancing property values (such as the new Northtrail subdivision area, the new Becker park school site in the Pleasant Valley School District). Parks increase municipal revenues, bringing in homebuyers, workers, visitors, tourists and attracting retirees.

The bottom line … parks are a good financial investment for a community. Understanding the economic impacts of "Parks" can help us better evaluate the creation and maintenance of our urban parks and programs.

A significant change ha occurred in the American economy. Although we still have some smokestacks, industry today is composed of smokeless industries, high technology and service sector businesses, collectively referred to as the "New Economy". The workers in the New Economy are selling their knowledge, as opposed to physical labor as the main source of wealth, creation and economic growth. These employees referred to in studies as "knowledge workers" or "talent". They work in a "footloose" sector – companies are not tied to a certain location in order to achieve a competitive advantage. In Peoria, a group called Peoria Next is aggressively competing for this sector with some early successes … and guess what … studies indicate that these workers prefer locations with a diverse range of outdoor recreational activities, everything from walking trails and cycling opportunities to diverse terrain. Peoria, with its natural resources, the beautiful bluffs, its oak/hickory forests, and its crown jewel -- the Illinois River, fit the bill. In fact, KPMG in 1998 found in a survey of 1200 high technology workers that quality of life in a community increases the attractiveness of a job by 33 percent.

"Water, acres of woodland, bike paths and parks" are the top selling points of US real estate brokers and homebuilders. People desire to live near these park-like areas which translates into real dollars. A 2001 survey by the National Association of Realtors (NAR) revealed that 57 percent of voters would choose a home close to parks and open space over one that was not.

NAR also found that 50 percent of voters would be willing to pay 10 percent more for a house located near a park or protected open space. The National Association of Homes Builders found that 65 percent of home shoppers surveyed felt that parks would seriously influence them to

move to a community. Across the nation, studies indicate that proximity to a park setting increases property values; and increased property values go hand-in-hand with increased municipal revenues. By creating a positive climate for increased property values, the tax rolls will benefit in turn. That in itself should convince the decision makers that they need to invest and continue to invest in our natural resources.

Additionally, there is an important new, clean growth industry in America today. The industry is retirement migration which former Mayor Jim Maloof advocated a number of years ago. By the year 2050, according to the US Census Bureau, approximately one in every four Americans will be 65 years of age or older, creating an affluent group of retirees with financial benefits, including social security, military benefits and pension plans. With an average life expectancy of between 75and 83 years, this is a significant population group both in size and affluence.

They are also mobile, moving to various locations across the country. So, why not Peoria. This mobile group is termed "GRAMPIES" (Growing [number of] Retired Active Monied People in Excellent Shape). GRAMPIES want communities that provide leisure and recreation amenities. In a study by Miller et al (1994), a retiree sample was asked to review 14 features and indicate their importance in the decision to move. The first three in rank order were scenic beauty, recreational opportunities and mild climate. So, I ask again … why not Peoria?

Retirees bring expendable income into their communities. If 100 retired households come to a community in a year, each with a retirement income of $40,000, their impact is similar to that of a new business spending $4 million annually in the community (Crompton, John L., November 2001, Parks and Economic Development, PAS Report No. 502, Chicago, APA, p. 65). They increase the tax base and are "positive" taxpayers. Retirees transfer significant assets into local investment and banking institutions, expanding the local deposit base that can be used for commercial and industrial financing

This morning I have tried to talk about the big picture and importance of bringing new people to the community and the associated benefits. The Peoria Park District has moved in this direction, and I would like to present our efforts to make our community and area more attractive and livable to all kinds of diverse populations. Tourists are great, but not only should we want tourists to come and play in Peoria, we need them to make Peoria their home. We have all the ingredients … we just need to tweak our marketing to also emphasize our natural resources and beauty.

NATURE-BASED TOURISM

Bonnie Koop

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ABSTRACT

Birding and nature trails and festivals have sprung up like wildfire across the country. Some cover large expanses while others focus specifically on a local community's surrounding area. These birding trails and festivals offer local citizens and travelers excellent opportunities to learn about and explore diverse habitats near home or in far away places.

A major benefit of birding trails and festivals include that they promote a low-impact, and a non-consumptive form of recreation, often referred to as "non-game wildlife tourism." When state Departments of Natural Resources, state tourism agencies and local communities recognize the value of their natural resources for wildlife tourism and begin to work together, a strong dynamic of cooperative involvement and commitment to preserving local natural resources can begin to emerge for the benefit of both the environment as well as the local economy. In addition, birding trails and festivals benefit conservation efforts, acting as a window for nature enthusiasts of all ages and levels of ability to experience greater environmental awareness and adventure. Birding trails and festivals have the flexibility to appeal to "hard core" birders as well as to the family who is out just recreating locally.

Bonnie Koop will share her success in the development in the production, dissemination and publicity of the Audubon - Great River Birding Trail, a trail that highlights the best birdwatching sites along the Mississippi River. The spine of the trail follows the federally designated scenic drive called the Great River Road, which runs from Canada to the Gulf of Mexico. She will also share her experiences in the development of two new birding festivals along the Upper Mississippi River, both that depend on strong involvement and coordination from local community members as well as state and federal agencies. In both projects, she will share information on challenges and "lessons learned" from project development and building commitment and local "ownership" with local communities to sustain these efforts.

NATURE BASED TOURISM

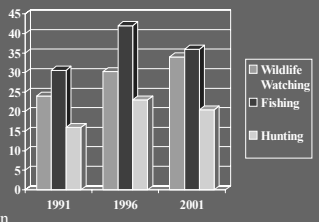
Audubon

Bonnie Koop, Coordinator
Audubon - Upper Mississippi River Campaign
Great River Birding Trail
& Birding Festivals

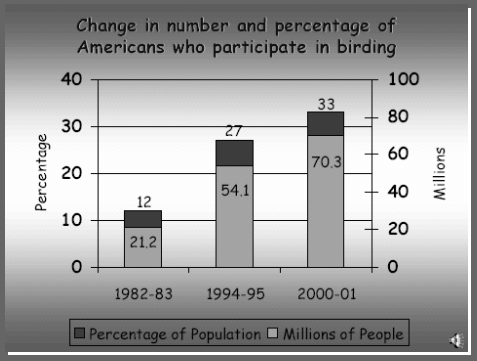
What is Nature Based Tourism?

- Providing visitors with a recreational experience focusing on natural area highlights or seasonal occurrences in nature
- Providing interpretation to tell a "story" of an area
- Shoulder Season Support

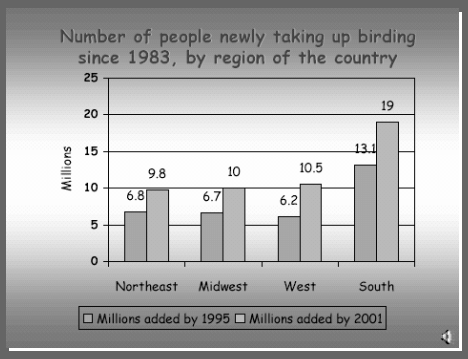
Wildlife Spending in the United States



Source: 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation, U.S. Fish and Wildlife Service



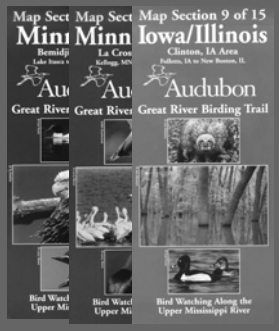
Source: Cordell, K. "Birding and Birders: Keys to the Future of Natural Lands in the United States." U.S. Forest Service Research Center, Athens, Ga. 2002.



Source: Cordell, K. "Birding and Birders: Keys to the Future of Natural Lands in the United States." U.S. Forest Service Research Center, Athens, Ga. 2002.

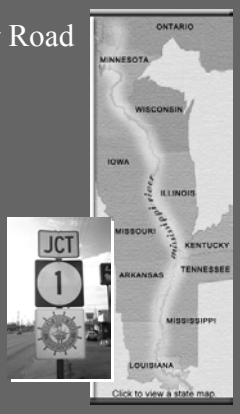
Audubon - Great River Birding Trail

- Series of Maps that highlight public lands along the river with great birding
- Provide options for year-round birding
- Developed with help of local birders and natural resource agencies
- Free to the public and distributed in bulk to tourism outlets



Follow the Great River Road to Great Birding

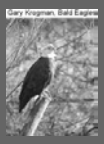
- Stretches nearly 3,000 miles from Canada to the Gulf of Mexico; both sides of the river
- Scenic drive linking communities, historic sites, and other places of interest
- The 10-state Mississippi River Parkway Commission promotes, preserves and enhances the resources along the Great River Road
- Many state sections now designated a National Scenic Byway



Great River Birding Festival

- Partnership between Audubon & the Mississippi Valley Partners
- "85 Miles of Friends"
- Conservation Education & Nature Tourism

Audubon



Mississippi Valley Partners
85 Miles of Friends

1st Annual ~ Mississippi Flyway Birding Festival

Wisconsin Department of Natural Resources
Search | Feedback | What's New

U.S. FISH & WILDLIFE SERVICE

Audubon

HOME
WISCONSIN
Stay just a little bit longer.

USGS
science for a changing world

Mississippi Valley CONSERVANCY

Tools for Conservation

- Supports citizen science
- Promotes strong partnerships with shared goals
- "Conservation through Recreation"
- Connecting people with the birds wildlife and habitats of the Upper Mississippi River
- Promoting environmental awareness, recreation and non-game wildlife tourism
- Develops network of local advocates

Tools for Non-Game Wildlife Tourism

- "Magic of the Shoulder Season"
- Trails & Festivals: A tool for local growth
- Involving local people in conservation

Tips for Success:
~ Natural Resource Assessment ~

- ***IDENTIFY***… where the potential areas in which wildlife opportunities exist
- ***INVENTORY***… the primary featured species or natural features around which wildlife tourism can be featured (i.e. Eagles in Winter, Tundra Swans in the fall, warblers in spring)
- ***DETERMINE***… what opportunities may exist to promote wildlife tourism during that time

Tips for Success:
~ Networking Assessment ~

- ***IDENTIFY***… key partnerships and what shared goals exist
- ***DETERMINE***…what specific individuals, groups, businesses you can partner with
- ***SEARCH***… for ways to share opportunities, responsibilities and share credit for success

Example Partnerships

- Chamber of Commerce / CVB
- Local Audubon Chapter or Birding Groups
- Teachers / Students
- Local Environmental Groups
- State Office of Tourism
- State Department of Natural Resources
- U.S.F.W.S. / NPS

Working Towards Sustainable Nature Based Tourism

- Develop strong partnerships
- Promote community ownership and pride
- Incorporate a mix of educational, environmental & economic goals
- Share the work and successes

~ Helpful Resources ~

- Watchable Wildlife Incorporated
- 2003 Watchable Wildlife Conference
- U.S. Fish & Wildlife Service National Survey of Fishing, Hunting, and Wildlife-Associated Recreation
- National Scenic Byway Program
- State DNR – Nongame Wildlife Programs
- State offices of Tourism

NITROGEN: OPTIMIZING, UTILIZING AND IMPROVING ENVIRONMENTAL STEWARDSHIP

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Nitrogen (N) is all around us. It makes up more than 80% of the air that we breathe. You can also find a significant amount of it is soil. Approximately five percent of the soil organic matter is N. You can find it in soil in plant available or inorganic forms as well as unavailable organic forms. It can be released by microbial mineralization or it can be tied-up by microbial immobilization. It can be held by the soil exchange capacity or it can be lost with soil water movement or by conversion into gaseous forms in waterlogged soils. The rate of these processes is driven by the growing environment. How many different growing environments are there? We keep adding a new one each year.

It is important then to study how the growing environment can change how much supplemental N farmers need to apply to achieve optimum yields. You would think that over so many years a pattern would appear that would help us do a better job of managing supplemental N applications to corn, but data does not support any obvious pattern over time.

Nitrogen rate research at the University of Illinois Monmouth Research Center between 1983 and 2001 demonstrates just how unpredictable the relationship between N rate and optimum yield can be. Continuous corn was grown on this long-term N rate study. The yields confirm that the only predictable fact about predicting the optimum N rate is that it is unpredictable. However, the Illinois N recommendation system, "1.2 is the most you should use" (…1.2 pounds N per expected yield less any credits) underestimated optimum N rates in only 2 of the 19 years that are represented. This shows the value of the present recommendation system (90% recommends at least optimum rate). Commonly underestimating the optimum N rate would cause economic hardships for the farmer. Work is ongoing to limit the amount of excessive N applied, but the answer continues to be elusive.

Midwest universities have evaluated several N tests in a serious search to find a better N recommendation system. Soil nitrate samples have been collected before planting, after the corn is 6" tall. The lower 6" of stalks after maturity have been evaluated as a way to improve N utilization. All, so far, have proven only as consistent as our present "Proven Yield" system.

Richard Mulvaney and his research team have developed a new N test that measures a readily available organic N fraction, called amino sugars. Dr. Mulvaney's work with an amino Sugar N test surfaced a relationship between a soil's responsiveness to supplemental N applications and the concentration of amino sugar-N. Soils with amino sugar levels greater than 230 ppm showed no response to supplemental N applications. Consider the value of having a test that could predict N response. Only the imagination would be limiting.

However, reality provides the "exceptions to the rule", which are usually quite frequent in the applied sciences, such as agronomy. Recent work with a version of the original test, the new Illinois N Test, still did a good job of predict non-responsive sites, but a few sites, even with high levels of amino sugars, responded to supplemental N. Further work is needed to fully understand the relationships between what the test is measuring and the growing environment. A comfortable understanding of

how to interpret the test is essential to minimize the risk accepted by growers who adopt the N recommendation system. Further research, and funding of such research, is critical to help develop this N recommendation tool.

Questions remain unanswered. What is the origin of the N that makes it into our water bodies? There is usually an assumption that it is N fertilizers, but in actuality, the most significant source of N in our soils is found in organic matter. Ninety-five percent of the N in our Illinois soils is in an organic form.

Learning more about the relationship between soil release of N, fertilizer N applications, and movement in the profile is the purpose of a research effort at the University of Illinois. Understanding the significant contributors to the nitrate loading issue is essential for us to take any action toward mitigation.

Research is helping us have a better understanding of how N fertilizer applications affect the rate of soil release, and how water flow in tile lines plays an important role in determining nitrate loading. Continued research is essential to understand the mechanisms involved with nitrate loading so management practices can be suggested to help minimize the problem. The key component of mitigating N loading is having a good understanding of what is driving the problem, something that research is trying to uncover.

The Illinois Fertilizer and Chemical Association (IFCA) has been a strong supporter of adoption of BMPs within the fertilizer and crop protection industries. IFCA has initiated several projects that support the use of BMPs.

1. Distributing 10,000 soil thermometers with the state to help farmers know when the soil temperature reaches the appropriate temperature for fall applications.
2. Providing materials to teachers throughout the state that helps children have a better understanding of Illinois agriculture.
3. BMP campaigns that promote the use of BMPs
   a. “1.2 is the most you should do”
   b. “Stabilize at 60 or wait until 50
   c. “If the temperature is too high, don’t apply”

The Fertilizer and Education Council was established in the 1990s to serve as a guaranteed source of research funding for applied agricultural research. It was established as a voluntary check-off by the fertilizer retailers of Illinois. Funding comes solely from the fertilizer industry. So far, FREC has made possible much of the applied research in Illinois. A good example is with the development of the New N Test. To-date, FREC has provided all the research funding needed to develop the test. No other source of funding has helped with the test development.

Government agencies provide several opportunities to promote good N stewardship. A Natural Resource and Conservation Service’s program offered cash incentive to producers in selected priority watersheds to follow fertilizer recommendations as described by the Illinois Agronomy Handbook. This program was very successful in the participating watersheds. It provided a program model for the Illinois Department of Agriculture that expanded nutrient best management practice incentives to 18 watersheds in 21 counties in Illinois in 2003. The program continues into 2004, with a base-level of financial support provided to each county to promote nutrient best management practices.

The Illinois Environmental Protection Agency worked with the Illinois Department of Agriculture and matched the amount of money placed into the program to expand its adoption. Two government agencies, working together by offering a “seamless” program has elevated the recognition of this

program throughout the state. The amount of funding available for this program has allowed producers across a selected watershed to receive incentive payments as they work toward minimizing the potential for off-target movement of phosphorus and/or N.

The Illinois Department of Agriculture, in conjunction with the Natural Resource and Conservation Service has organized and implemented an applied research program throughout the state that is providing an evaluation of reduced tillage (**S**ave **O**ur **I**llinois **S**oils) and N rates (**W**hat **A**re **T**he **E**ffective **R**ates) effects on optimum corn yields. The information is reviewed by research scientists with the University of Illinois and the results are shared with Illinois producers at a series of winter meetings held throughout the state.

The willingness of producers to follow N best management practices continues to be evident each fall. Even with the risk of rising N prices between fall and spring seasons, nearly all farmers wait for the appropriate time in the fall to start their applications. Programs that support the use of nutrient best management practices are limited by funding support, and not producer participation. The growing willingness of producers to set up their own on-farm research projects in search of applied answers to N management is also evident.

Improving utilization and environmental stewardship of N in Illinois continues to be the focus of industry, governmental agencies, the universities, and the producers. Working together is critical for movement forward with improving N management. It won't always be easy. Although the definition of teamwork is: "the ability to work together toward a common vision. It is the fuel that allows common people to attain uncommon results". The real challenge is working together as a "seamless" group that believes in a common mission of better N management. It will take a joint effort of industries, government agencies, universities, and producers to move to the next level with N management. It was best said by Casey Sengel: "Gettin' good players is easy. Gettin'em to play together is the hard part."

URBAN STORMWATER ISSUES IN THE ILLINOIS RIVER BASIN

Marcia Willhite

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ABSTRACT

Runoff of stormwater from urban areas can be a significant contributor to water quality impairment. It is particularly important in the Illinois River Basin considering the highly-urbanized, heavily-populated (7.5 million) Upper Illinois River Basin. A little over half of the population contributes their stormwater, mostly untreated, to the Upper Illinois. The rest contribute their excess stormwater to the river directly via combined sewer overflows during rain events exceeding 0.33 inches. Pollution associated with urban stormwater includes soil sediment, total dissolved solids, chlorides, animal and human pathogens and settleable sewage solids sediment. Approximately 10 percent of the total stream miles of the Illinois River Basin assessed for aquatic life use show impairments potentially attributed to urban runoff. The percentage is much higher for the most urbanized subbasins (Calumet and Des Plaines).

Various tools are being employed or are becoming available to reduce urban stormwater impacts. An ongoing tool has been funding through Illinois EPA under Section 319 of the Clean Water Act (CWA) for reducing non-point source pollution caused by urban stormwater. Projects include outreach/education, streambank stabilization and monitoring/evaluation. A tool that has just emerged is a suite of CWA requirements under the National Pollutant Discharge Elimination System (NPDES) Phase II program for stormwater. These include permitting, planning and mitigation requirements for construction sites and municipalities with separate storm sewer systems (MS4). Most of the MS4s that are subject to Phase II requirements are in the Illinois Basin. Implementation of these requirements and increasing the use of urban non-point source pollution controls are expected to have significant water quality benefits.

Urban Stormwater Issues in the Illinois Basin

Marcia T. Willhite
Chief
Bureau of Water
October 8, 2003

Scope of the Problem

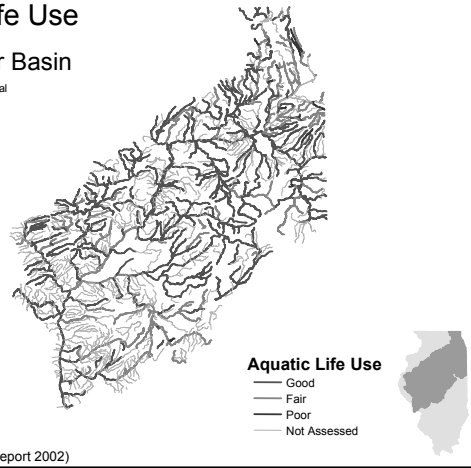
- Runoff of Stormwater from urban areas can impact water quality
- Illinois River Basin – highly urbanized
  - heavily populated (7.5 million)
- Half the population contributes untreated stormwater to upper Illinois
- Other half-excess stormwater (above 0.33 in.) goes to river through combined sewer overflow

Scope of the Problem, cont'd

- Pollution associated with urban stormwater
  - soil sediment
  - total dissolved solids
  - chlorides
  - animal and human pathogens
  - settleable sewage solids
- Approximately 10% of total stream miles in the Illinois Basin assessed for aquatic life are impaired potentially due to urban runoff

Aquatic Life Use for the Illinois River Basin

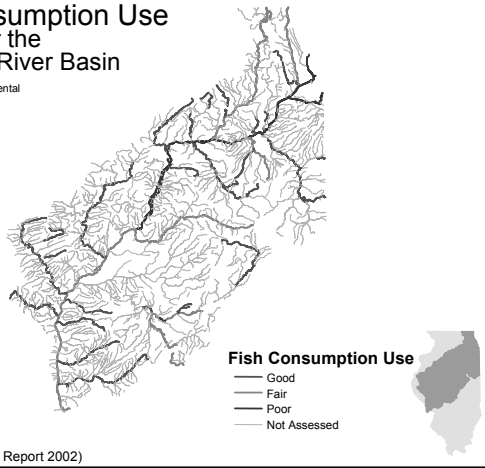
Illinois Environmental Protection Agency



(Illinois Water Quality Report 2002)

Fish Consumption Use for the Illinois River Basin

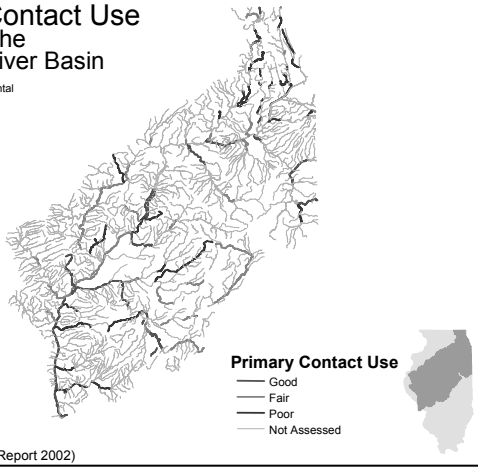
Illinois Environmental Protection Agency



(Illinois Water Quality Report 2002)

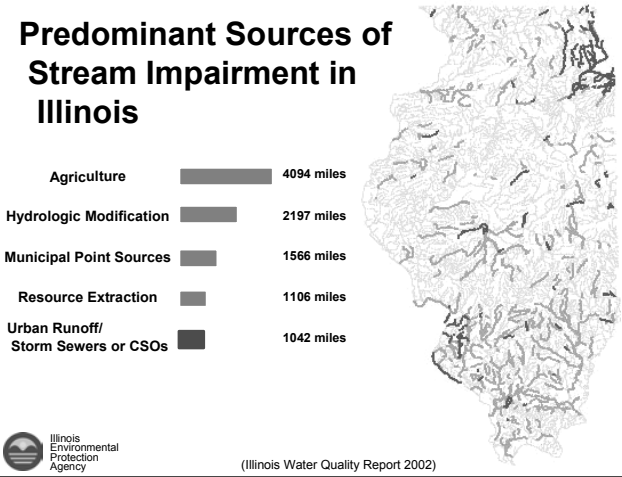
Primary Contact Use for the Illinois River Basin

Illinois Environmental Protection Agency



(Illinois Water Quality Report 2002)

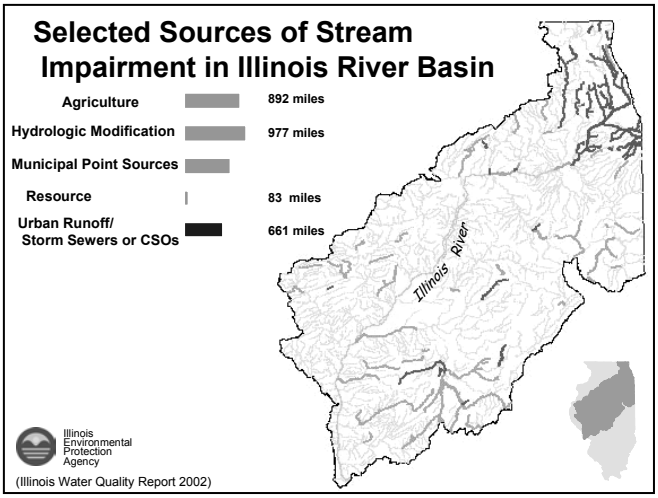
Predominant Sources of Stream Impairment in Illinois



Illinois Environmental Protection Agency

(Illinois Water Quality Report 2002)

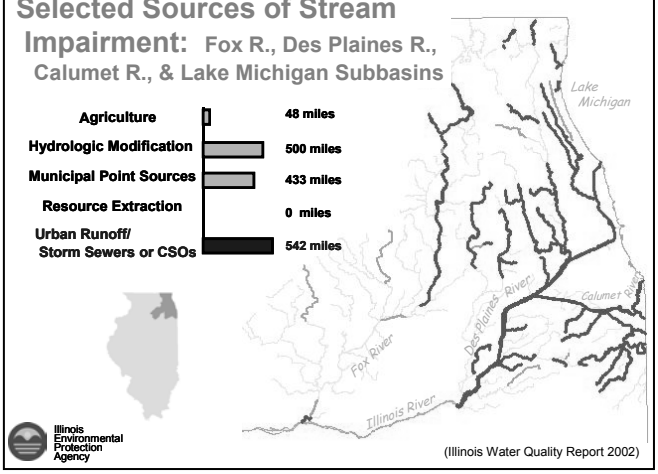
Selected Sources of Stream Impairment in Illinois River Basin



Illinois Environmental Protection Agency

(Illinois Water Quality Report 2002)

Selected Sources of Stream Impairment: Fox R., Des Plaines R., Calumet R., & Lake Michigan Subbasins



Illinois Environmental Protection Agency

(Illinois Water Quality Report 2002)

Phase II for Small Municipalities

- Municipalities under 100,000 population are no longer exempt from having construction stormwater permits
- Small Municipalities are no longer exempt from permit requirements for their industrial activities
- Permit applications were due by March 10, 2003

Phase II Small Construction

- Phase I required permit coverage for construction activities disturbing five acres or more
- Phase II reduces that project size to one acre or more
- Permits are required for sites between one and five acres after March 10, 2003

Phase II Small MS4 Coverage

- A Phase II - regulated small MS4 is any small MS4:
  - Located in an "urbanized area" as defined by the latest Bureau of Census
  - Designated by the IEPA

MS4 - Broader Application

- Not only municipally owned separate storm sewer systems, but also:
  - Highway Departments
  - Universities
  - local sewer districts,
  - hospitals,
  - military bases
  - prisons
  - can include roads with drainage systems, gutters and ditches

Urbanized Area Definition

A central place (or places) -- *core* -- and the adjacent densely settled surrounding territory -- *fringe* -- that <u>together</u> have a minimum residential population of 50,000 people and a minimum average density of 1000 people/sq mi

(2000 Census revised - 500 people/sq mi)

II. Notice of Intent Requirements

- NOI's were due March 10, 2003
- BMPs and measurable goals for the six minimum control measures must be included
- Timetable for implementation
- Person or persons responsible for implementation
- Identify your own program and any partnering programs

III. Special Conditions

- Discharge cannot cause water quality violations
- Must comply with any approved Total Maximum Daily Load (TMDL) for the waterbody or waterbodies to which you discharge
- Allows 18 months to comply with any TMDL

Six Minimum Control Measures

- Public education on stormwater impacts
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site runoff control
- Post construction controls on new development and redevelopment
- Pollution prevention/good housekeeping for municipal operations

IV. A. Stormwater Management Program

For each of the 6 minimum control measures you must:

- Develop, implement and enforce a program—reduce discharge of pollutants to the Maximum Extent Practicable (MEP)
- Allows five years for implementation

Public Education and Outreach BMPs

1 Distribute paper materials
2 Speaking engagement
3 Public service announcement
4 Community event
5 Classroom education material
6 Other public education

Public Participation/Involvement BMPs

1 Public panel
2 Educational volunteer
3 Stakeholder meeting
4 Public hearing
5 Volunteering monitoring
6 Program coordination
7 Other public involvement

Illicit Discharge Detection and Elimination – BMPs

1 Storm sewer map preparation (required)
2 Regulatory control program
3 Detection/elimination prioritization plan
4 Illicit discharge tracing procedures
5 Illicit source removal procedures
6 Program evaluation and assessment
7 Visual dry weather screening
8 Pollutant field testing
9 Public notification
10 Other illicit discharge controls

Construction Site Runoff Control BMPs

1 Regulatory control program
2 Erosion and sediment control BMPS
3 Other waste control program
4 Site plan review procedures
5 Public information handling procedures
6 Site inspection/enforcement procedures
7 Other construction site runoff controls

Post-construction Runoff Control BMPs

1 Community control strategy
2 Regulatory control program
3 Long term O&M procedures
4 Pre-construction review of BMP designs
5 Site inspections during construction
6 Post-construction inspections
7 Other post-construction runoff controls

Pollution Prevention/Good Housekeeping – BMPs

1 Employee training program
2 Inspection and maintenance program
3 Municipal operations stormwater control
4 Municipal operations waste disposal
5 Flood management/assessment guidelines
6 Other municipal operation controls

Internet Address for Phase II Information

- http://www.epa.state.il.us
- http://cfpub1.epa.gov/npdes
  Click on "Stormwater"

Or call IEPA at (217) 782 - 0610

319 Project 97-08 Langendorf Pond Retrofit to Reduce NPS Pollution in the Flint Creek Watershed BMP-Wetland Restoration

319 Project 97-08 Langendorf Pond Retrofit to Reduce NPS Pollution in the Flint Creek Watershed BMP-Stream Channel Restoration

319 Project 98-03 Skokie River Restoration Project BMP-Streambank/Shoreline Protection. A prairie restoration is used here to stabilize and protect the streambank.

319 Project 93-05 Skokie River Restoration Project BMP-Streambank/Shoreline Protection. A fiber roll stabilization technique is used in this picture to protect the streambank.

319 Project 99-08 East Branch DuPage River, Implementation of Phase I BMP-Streambank/Shoreline Protection

319 Project 94-1 Englewood Environmental Protection Lot Reclamation Project.

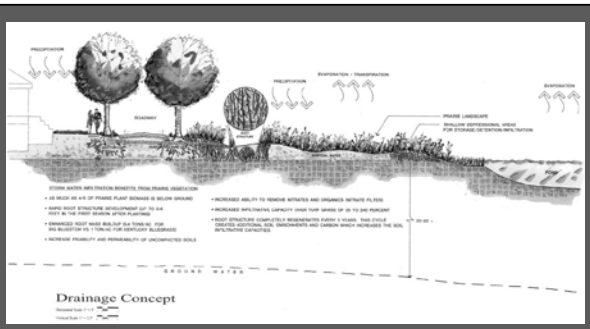
BMP-Recreation Area Improvement

Local youth are seen storm drain stenciling.

319 Project 94-24 Nonpoint Source Pollution Awareness Through Advertisements. BMP-Information and Education. This project heightened the awareness of urban stormwater runoff through pollution prevention advertisements on billboards.

Washdown areas are specifically designed to prevent construction vehicles from transporting sediment from a construction site to roads and surface waters.

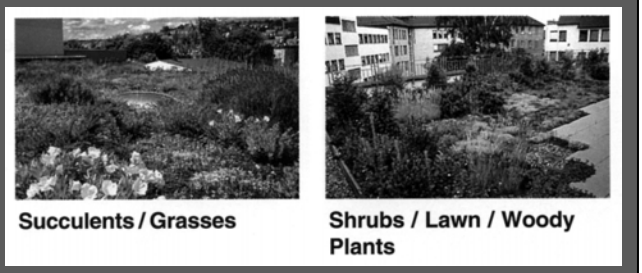
Constructed wetlands and multiple-pond systems remove pollutants by impounding runoff to control runoff rates and settle and retain suspended solids and associated pollutants.



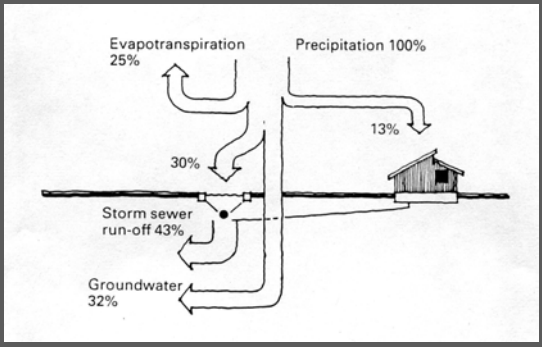
Urban drainage design, house to settling pond

Bioswale in parking lot, acts to slow and infiltrate stormwater as it leaves the parking lot

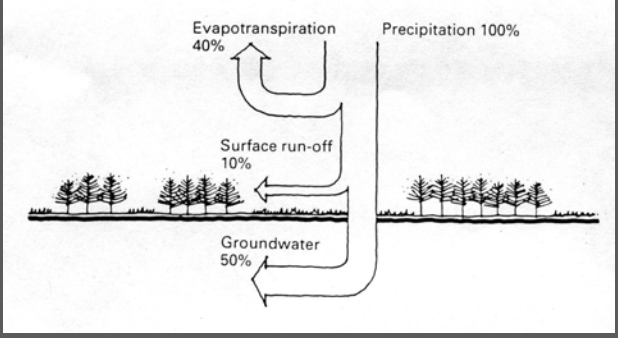
Rain garden, used to filter and treat stormwater from a residence



Greenroof concept, infiltrate and slow stormwater runoff from rooftops before the stormwater can enter the storm sewer system



Urban water cycle



Natural water cycle

NUTRIENT MANAGEMENT IN TMDL WATERSHED

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ABSTRACT

Proper nutrient management by agricultural landowners is key to reducing excessive nitrogen and phosphorus loads in lakes, rivers and streams. Plans developed by professionals and implemented by agricultural producers are a means of addressing problems associated with excessive nitrogen and phosphorus contributions to these waters. The nitrogen-related Gulf Hypoxia issue and the recognition of phosphorus as a major contributor to impaired surface waters in Illinois created a need for positive action. The Illinois Department of Agriculture's Nutrient Management Plan Practice is a positive step toward addressing these problems.

The Nutrient Management Plan (NMP) Practice is designed to provide an incentive to agricultural landowners to evaluate the fertility of their fields and to modify their fertility program to apply only what is needed to produce target yields. The practice was added to the Illinois Department of Agriculture's Conservation Practices Program (CPP) docket of cost-sharable practices at the beginning of fiscal year 2003 to address IEPA's concerns that Agriculture was not doing enough to help improve impaired waters in the TMDL Watersheds.

The Illinois Department of Agriculture allocated $500,000 of CPP funds to 24 Soil and Water Conservation Districts in eleven designated TMDL watersheds. This program is being monitored closely to determine its effectiveness. The Department plans to extend the NMP practice to the next round of designated TMDL watersheds as well as making it available to all Soil and Water Conservation Districts as a normal practice under the CPP umbrella.

The nitrogen-related Gulf Hypoxia issue and the recognition of phosphorus as a major contributor to impaired surface waters in Illinois have created a need for positive action. Total Maximum Daily Load criteria developed for the Illinois Environmental Protection Agency (IEPA), have identified proper nutrient management by agricultural producers as key to reducing excessive nitrogen and phosphorus loads in lakes, rivers and streams.

IEPA's 303d list of impaired surface waters shows that these segments tend to be more predominant in East-Central and Southern Illinois and Chicago Metro area. There are, however, a number of identified segments in the Illinois River drainage basin outside the greater Chicago Metropolitan area that will need to be addressed as time passes.

The latest round of identified priority areas for TMDL development include Evergreen Lake in McLean County, Mauvaise Terre Creek in Morgan County and Macoupin Creek and Otter, Hettick and Palmyra Lakes in Macoupin County. In addition to these, there are many other segments in the Illinois basin as well as additional identified impaired surface waters throughout the state that are subject to eventual inclusion in a TMDL.

Considering that many of the identified impairments are associated with agricultural production activities, the Illinois Department of Agriculture felt that positive preliminary action could provide potentially significant benefits as well as showcasing farmers' concern for water quality improvement. The Department's Nutrient Management Plan Practice is a positive step toward addressing these problems. The Department believes that plans developed by professionals and implemented by agricultural producers are a means of addressing problems associated with excessive

nitrogen and phosphorus contributions to these waters. The Nutrient Management Plan (NMP) Practice is based on current soil test information and is designed to provide agricultural producers with a means to evaluate the fertility of their fields and to modify their fertility program to apply only what is needed to produce target yields.

As a means of providing incentives to producers to utilize NMPs, the Department added the Nutrient Management Plan practice to the Conservation Practices Program (CPP) docket of cost-share practices at the beginning of fiscal year 2003.

To address IEPA's concerns that Agriculture was not doing enough to help improve impaired waters in the TMDL Watersheds the Department allocated $500,000 in CPP funds to 24 Soil and Water Conservation Districts in eleven designated TMDL watersheds.

This program is being monitored closely to determine its effectiveness. For the period ending September 30, 2003, Soil and Water Conservation Districts had submitted requests for payment for a total of 24,842 planned acres and 10,617 implemented acres.

While it may be a little early to draw conclusions regarding the success of the practice, it appears that it is accomplishing the intended purpose. Overall reductions total 185,115 pounds for N, 436,908 pounds for P and 234,593 pounds for K. The average reduction per acre implemented is 17.44 lbs. for N, 41.15 lbs for P and 22.1 lbs. for K.

The early success in nutrient application rate reduction encouraged the Department to designate $294,000 in fiscal year 2004 for a statewide program in addition to retaining the Nutrient Management Plan practice on the CPP docket.

The first year's experience with an untried practice demonstrated the need to provide several training workshops for Planners and SWCD personnel. The Department is looking at a variety of ways to streamline the process and has developed a database that is expected to provide easier, more efficient tracking of plan development and implementation activities. It is expected that the Nutrient Management Plan practice will become a valuable tool in helping to optimize economic nutrient application rates for producers as well as addressing nutrient loads to impaired waters. The Department will continue to provide funding to the original 24 TMDL watersheds as well as the 15 TMDL areas designated is the latest round.

IMPACTS OF CHICAGO METROPOLITAN AREA POINT SOURCES ON WATER QUALITY IN THE UPPER ILLINOIS WATERWAY

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WATERWAY HISTORY

Since 1900, the additional flows and wastewater loadings from the Chicago metropolitan area have had a profound impact in the Illinois River. The Des Plaines River and the Illinois River suffered through the early part of the 20th Century so that Lake Michigan could be spared from the adverse effects of wastewater if Chicago's wastewater were to go back to the lake. The additional flows and waste loads imposed on the Illinois River caused increased flooding and water quality degradation. Even though it was scientifically demonstrated that bacterial contamination did not effect the Illinois River at Peoria and down-river reaches, the organic demand and increased solids took their toll. From 1900 to 1930, the Sanitary District of Chicago (now the Metropolitan Water Reclamation District of Greater Chicago, or MWRD) was able to follow the statutory requirement for dilution, 3.33 cubic feet per second (cfs) per 1,000 population, often violating the limits in federal permits issued by the Secretary of War. This large increase in flow swept downstream, increasing the capacity of the Illinois River to assimilate the wastewater load. However, the industrial load did not figure into the dilution rate, so its impact was not compensated for.

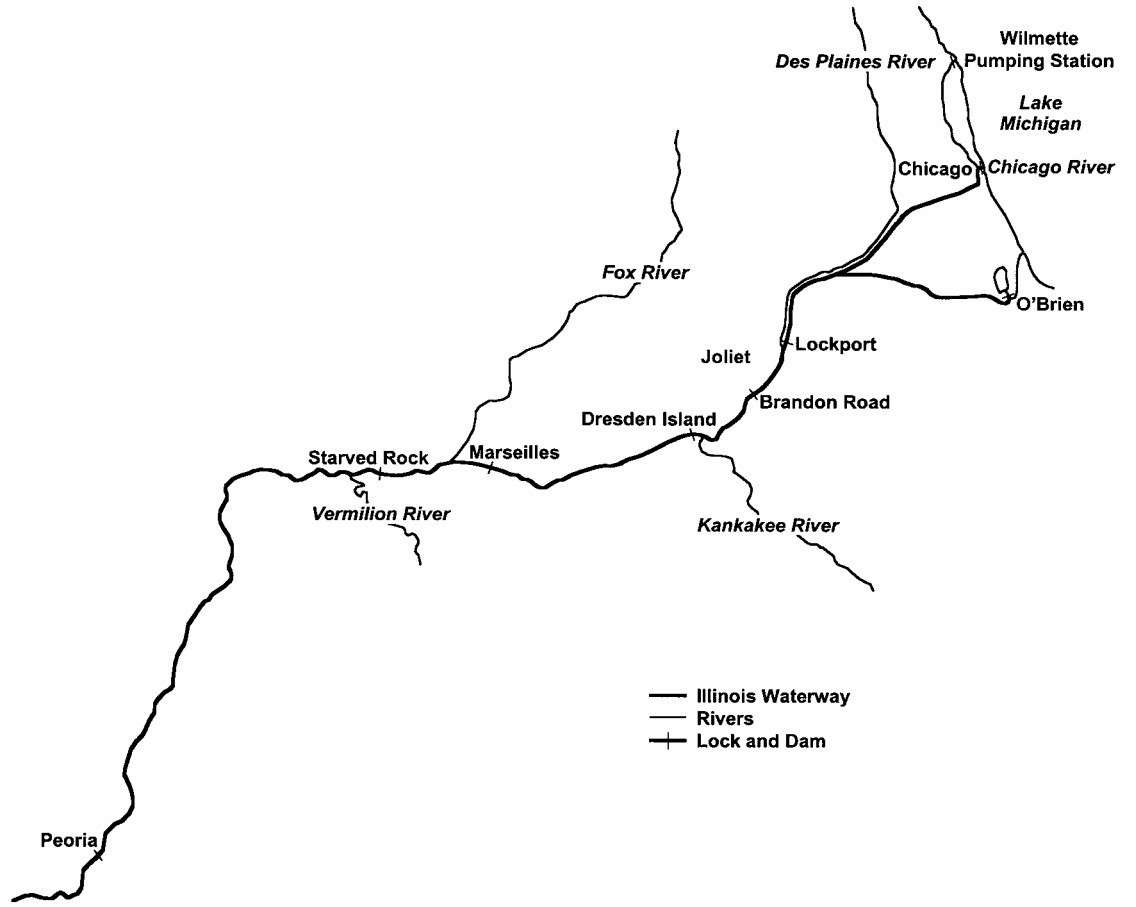
In 1930, the U.S. Supreme Court Decree went into effect, gradually reducing the amount of dilution over the 1930 through 1939 period. While this reduction was being accomplished, MWRD was supposed to be building intercepting sewers and sewage treatment facilities to compensate for the loss in dilution. These were somewhat delayed due to the Great Depression, but, remarkably, were completed by the early 1940s, despite the shift to a wartime economy. However, sewage treatment being what it was in those years, much of the wastewater load was not removed, but simply passed downstream. With the loss of dilution, flows in the Illinois River became sluggish. Another development during the 1930s also adversely impacted the Illinois River. The long-sought state of Illinois dream of a navigable waterway was completed with the U.S. Army Corps of Engineers given a congressional mandate to take over and complete a state project. Illinois had simply run out of funds and could not afford to complete the construction of lock and dam structures, channel walls and channel dredging. Channelizing the Des Plaines and Illinois Rivers and creating several impoundments changed the hydraulic characteristics and adversely affected aquatic habitat conditions. These two rivers, now imposed with wastewater flows from the Chicago area and converted to a series of navigation pools, became the federalized Illinois Waterway (IW). The middle of the century was probably the bleakest period for water quality in the Illinois River.

In the 1970s, with the Clean Water Act construction grants program, the MWRD made great strides in expansion and improvement of its treatment plants and the construction of the Tunnel and Reservoir Plan (TARP) to reduce combined sewer overflows. The first to benefit were the Calumet and Chicago River systems. More gradually, the benefit has reached downstream. About this same time, MWRD began to monitor improvements in water quality in local and down-river waters. The first Lockport to Peoria sampling run by boat was conducted in 1977. Since the mid-1980s, these sample collection runs have occurred each year, except in 1998.

WATERWAY DESCRIPTION

The 327-mile IW extends from the mouth of the Illinois River at Grafton, Illinois, to Lake Michigan at Chicago following the course of the Illinois River, Des Plaines River and Chicago Sanitary and Ship Canal (CSSC). Near Chicago the IW branches, with one branch following the CSSC, South Branch and Chicago River to Chicago Harbor and the other branch following the Calumet-Sag Channel, Little Calumet River and Calumet River to Calumet Harbor. Most commercial navigation traffic follows the latter branch. The IW consists of eight navigation pools formed by lock and dam (L&D) structures that lower the water level 156.2 feet from Lake Michigan to the Mississippi River.

Upper Illinois Waterway Chicago to Peoria



There are three distinctly different river regimes along the IW. The three downstream pools (Peoria, La Grange and Alton) follow a north to south course and cover a distance of 231 miles, dropping 22 feet. Near the upstream end of the Peoria Pool, the Illinois River executes a sharp bend, marking the division between two regimes. Downstream of the bend near Hennepin, Illinois, the valley of the river is broad and the gradient is flat. The three intermediate pools (Dresden Island, Marseilles and Starved Rock) follow an east to west course and cover a distance of 55 miles, dropping 65 feet. The valley of the Illinois River is narrow and the gradient is mild. The two upstream pools (Lockport and Brandon Road) generally follow a northeast to southwest course and cover a distance of 40 miles, dropping 71.2 feet. Over part of this distance, the valley of the Des

Plaines River is narrow as it drops steeply over the face of the Niagran escarpment between Willow Springs and Joliet, Illinois. Upstream of the escarpment, the Chicago River, South Branch, CSSC and Des Plaines River flow across the flat Chicago Lake Plain. The following table illustrates these regimes.

Regime	Length miles	Drop feet	Gradient feet per mile
Downstream	231	22	0.095
Intermediate	55	65	1.18
Upstream	40	71.2	1.78

The conversion of the Illinois and Des Plaines Rivers into the channelized and navigable IW has significantly altered the hydraulic behavior of these rivers. Without floodplains, flood peaks are not attenuated and the navigation channel confines the flow in a deeper and narrower channel than what it would be under natural conditions. Except for flood periods, the water level in each pool is held constant for navigable depths, depriving the river channel and aquatic habitat of the annual low-water season. It is likely that the gradients imposed by the IW L&D structures conveys flow and constituents through the upstream and intermediate regime pools and allows more deposition in the downstream regime pools.

PRINCIPAL POINT SOURCES

Treated wastewater effluent from the Chicago metropolitan area is a significant source of flow and constituent loads to the IW. Principal among these are the three large water reclamation plants (WRPs) owned and operated by the MWRD, namely the Calumet, North Side and Stickney WRPs. The combined design capacity of the WRPs is nearly 1,900 million gallons per day (mgd) and the average flow for 2002 is 1,170 mgd, or 1,800 cfs. In addition to the WRPs, the MWRD operates the Tunnel and Reservoir Plan project to capture and treat combined sewer overflows (CSOs) from the 360 square-mile area of combined sewers in the metropolitan area. Captured CSO is treated at the Calumet and Stickney WRPs, both of which discharge directly to the branches of the IW in the Chicago area. The North Side WRP discharges to the North Shore Channel, which is tributary to the IW in downtown Chicago. Reduction of the frequency and volume of CSO has improved water quality in the CSSC and the IW.

The MWRD has installed several supplemental aeration stations in the receiving waterways downstream of the WRPs. This has helped to meet the dissolved oxygen water quality standard. In 1984, the IPCB eliminated the bacterial standard from the Secondary Contact standards and the requirement for point sources to practice effluent disinfection. The three WRPs mentioned above were able to discontinue disinfection and although the concentration of fecal coliform in the CSSC and the Calumet-Sag Channel increased significantly, little increase was noted in the CSSC at Lockport because of the die-off of these organisms in the waterway. The removal of residual chlorine resulted in a resurgent fish population.

Although the CSSC is the principal tributary of the Des Plaines River, there are numerous municipal treatment plants throughout the watershed in Cook, DuPage, Lake and Will Counties. This accounts for treated effluents being the dominant flow at the mouth of the Des Plaines River where it joins with the Kankakee River to form the Illinois River. Proceeding in the downstream direction, other rivers, such as the Fox, Mazon and Vermillion, yield significant quantities of agricultural nonpoint drainage and stormwater flow that lessen the impact of pollutants from Chicago area point sources on water quality in the IW near Peoria.

WATER AND SEDIMENT QUALITY MONITORING

The IW has been the subject of numerous investigations by several federal and state agencies. Of recent note are the two National Water Quality Assessment Program study unit investigations conducted by the U.S. Geological Survey for the Upper Illinois River Basin (UIRB) and the Lower IRB (LIRB). These comprehensive and intensive investigations are of short-term duration, but are repeated on a nine-year cycle. Despite these and investigations by others, the MWRD has conducted its own on-going monitoring program of the IW upstream of Peoria to gather information on the impact of MWRD point sources on the downstream reaches of the Des Plaines and Illinois Rivers.

The MWRD began a regular program of monitoring the 133-mile reach of the Upper IW between Lockport and Peoria in 1983 and, with the exception of 1998, has continued the program through to the present. There are 49 sampling stations distributed as shown in the following table:

Navigation Pool	Number of Sampling Locations in Pool for	
	Water Quality	Sediment Quality
Lockport	1[1]	1[1]
Brandon Road	3	1
Dresden Island	7	2
Marseilles	9	2
Starved Rock	7	1
Peoria	22	7

1. The single sampling location is located immediately upstream of the Lockport Lock & Dam.

Samples are collected by boat during the months of May, August and October. In each month the MWRD's boat and crew collect samples on the downstream run, beginning at Lockport on Monday and finishing in Peoria on Thursday. In the following week, samples are collected on the upstream run, beginning on Monday in Peoria and finishing in Lockport on Thursday. Each location is sampled for water column quality for a total of six times per year. For sediment quality, 14 of the locations are sampled once per year in October on the downstream boat run. Water quality samples are collected 3 feet below the surface in the center of the navigation channel using a submersible pump. The sampling locations were carefully chosen where the river channel is well mixed so that a single sample could be considered representative.

All water samples were filtered in the field, properly preserved and packed in ice in insulated chests. The samples for each day's collection were transported back to the MWRD laboratory in Chicago where analysis began the following day. Bacterial samples were collected and packed separately and transported to a contract laboratory in Peoria at the end of each day so that analysis could begin within the required time. Sediment samples were collected with a 6x6 inch Ponar grab sampler from the bottom of the center of the navigation channel, transferred to a wide-mouth bottle, properly preserved and prepared for transport the same as the water samples. All analyses were performed according to protocols in *Standard Methods for the Examination of Water and Wastewater* in laboratories that are either accredited for wastewater chemical analysis by the IEPA or certified for drinking water analysis by the IDPH. Water quality samples were analyzed for 15 constituents, including nutrients and oxygen-demanding substances, and for 11 dissolved metals and total metals. Sediment samples were analyzed for most of the same constituents, but only the total metals.

WATER QUALITY TRENDS

Downstream of the I-55 Bridge southwest of Joliet, the IW is designated as General Use Waters by the IPCB. Upstream of this Bridge, the designation is for Secondary Contact and Indigenous Aquatic Life Species. However, for purposes of comparison, only the General Use

standards will be used. Also for purposes of comparison, the Peoria Pool is divided into Upper and Lower portions, where the Lower portion is the reach downstream of Chillicothe where the pool widens into Lake Peoria. Spatial trends in water quality in 2002 are shown in the following table, using the mean concentration of all samples collected in each pool. Due to space limitations, only five constituents are shown, four of which have water quality standards. It is noted that water quality standards are generally met for all constituents, including those that are not shown.

Navigation Pool	Temperature Degrees Centigrade	Dissolved Oxygen mg/L	pH Units	Fecal Coliform[1] cfu/100 ml	Total Suspended Solids mg/L
Lockport	24.4	4.7	7.2	39	21
Brandon Road	23.5	5.6	7.2	82	22
Dresden Island	23.5	7.9	7.5	59	27
Marseilles	22.0	8.5	7.8	18	41
Starved Rock	21.0	9.1	8.0	16	46
Upper Peoria	20.2	9.0	8.1	21	53
Lower Peoria	19.6	8.2	8.2	19	60
General Use Standards	32/16	6.0/5.0	6.5-9.0	400/200	Ns[2]

1. Geometric mean.
2. No standard.

Nutrients are of particular interest because the IEPA is currently developing proposed standards for submittal to the IPCB. The following table shows the two nutrients, two response variables and total suspended solid together with the criteria published by the USEPA in January 2001. As can be seen, both total nitrogen and total phosphorus decrease in the downstream direction, but are significantly above the criteria. Groschen, 2000, corroborates the decrease of total nitrogen and total phosphorus concentrations in the downstream direction.

Navigation Pool	Total Nitrogen mg/L	Total Phosphorus mg/L	Turbidity NTU	Chlorophyl a µg/L
Lockport	6.58	1.05	18.0	6.00
Brandon Road	5.95	0.87	22.0	9.00
Dresden Island	5.81	0.90	33.7	13.3
Marseilles	5.62	0.75	60.0	18.2
Starved Rock	5.40	0.66	70.0	44.2
Upper Peoria	5.50	0.62	77.0	40.9
Lower Peoria	5.28	0.54	82.0	55.6
EPA Criteria	2.2	0.076	9.9	7.3

This report found that substantial differences among nutrient concentrations in small agricultural basins and lower nutrient concentrations in large rivers indicate that hydrological and biochemical processes reduce the nutrient concentrations as nutrients moves through the LIRB.

Both turbidity and chlorophyll a increase significantly in the downstream direction. Although the response variables, turbidity and chlorophyll a, are regarded by USEPA to be indicators of eutrophication, the relationship between these two constituents and total nitrogen and total phosphorus is not well understood. Ammonia is not shown in the table because this toxic pollutant has been effectively controlled for the last decade through nitrification at municipal wastewater treatment plants.

In the two tables above it is noted that both total suspended solids and turbidity increase in the downstream direction. Sullivan, 2000, corroborates this trend wherein it is found that suspended solids were higher from agricultural areas in the Iroquois River Basin, a tributary of the Kankakee River, and the Fox River Basin. The increase in total suspended solids and turbidity to Peoria is probably due to the influx of other tributaries from agricultural areas in central Illinois. Sullivan also makes these observations regarding nutrients in the UIRB:

- Nutrient concentrations, with the exception of nitrate, were highest in urban area streams in the Des Plaines River Basin.
- Nitrate concentrations were higher in streams in agricultural areas.
- Nutrient concentrations in streams in agricultural areas show strong seasonal variability, whereas in urban areas, seasonal variations are less pronounced.
- Industrial and municipal sources were responsible for the higher concentrations of ammonia and phosphorus in the Des Plaines River Basin.
- Suspended solids concentrations were highest in the summer and lowest in the winter, reflecting higher stream flow in summer from stormwater runoff and increased phytoplankton growth.
- The CSSC was the major contributor of ammonia, total nitrogen and total phosphorus in the Des Plaines River Basin.
- Significant downward trends in ammonia concentrations and correlative upward trends in nitrate concentrations occur in the period, most likely the result of nitrification at municipal wastewater treatment plants.

Since 1984, constituent concentrations have varied somewhat, but are similar to the concentrations shown in the above tables for 2002. Temporal trends in water quality are not apparent in the monitoring conducted by the MWRD since 1984, but other researchers have tracked water quality trends over longer periods. Larson, 2001, compiled water quality records from a number of sources from the early 1970s through 1995 at several locations between Chicago and Peoria. In the CSSC near Lockport, upward trends were found for dissolved oxygen, nitrate plus nitrite, total phosphorus and sulfate. Downward trends were found for ammonia and total Kjeldahl nitrogen. In the Illinois River at Marseilles, downward trends were found for ammonia, total phosphorus and total suspended solids. At Peoria, the Illinois River showed upward trends for dissolved oxygen and turbidity and downward trends for ammonia, phosphate and total suspended solids. It was noted that the Illinois River at Peoria now consistently meets the water quality standard of 5.0 mg/L. A summary of these findings is shown in the following table.

Water Quality Parameter	**CSSC Lockport**	**Illinois River**	
		Marseilles	**Peoria**
Dissolved Oxygen	↑	--	↑
Total Suspended Solids	--	↓	↓
Turbidity	--	--	↑
Total Kjeldahl Nitrogen	↓	--	--
Ammonia	↓	↓	↓

$Nitrate_3$ + $Nitrite_2$	↑	--	--
Total P	↑	↓	--
Phosphate	--	--	↓

↑ Upward trend.
↓ Downward trend.
-- No significant trend.

SEDIMENT QUALITY

Sediment quality in rivers can have a significant effect on the overlying water quality and other elements of freshwater ecosystems. However, sediment quality can vary significantly across the river cross-section and will change more slowly over time in response to temporal changes in water quality and other environmental influences.

Sediment quality at 11 locations between Lockport and Peoria showed considerable variations in 2002. Generally, sediment quality concentrations decreased in the downstream direction with some constituent concentrations increasing in the Upper and Lower Peoria Pools. Representative general chemistry concentrations are shown in the following table.

	Dry Weight Concentration in mg/kg			
Navigation Pool and Station Number	**Ammonia Nitrogen**	**Total Kjeldahl Nitrogen**	**Total Phosphorus**	**Total Volatile Solids percent**
Lockport				
1	254	2,690	4,510	13
Brandon Road				
2	2	33	190	15
Dresden Island				
5	17	3,320	5,680	6
8	2	100	530	10
Marseilles				
12	5	400	1,460	5
18	2	95	88	1
Starved Rock				
23	27	1,120	1,670	3
Upper Peoria				
32	2	36	153	2
38	35	1,510	1,170	7
Lower Peoria				
44	27	1,900	1,280	9
48	19	1,200	751	6

Representative concentrations of metals in the sediment are shown in the following table.

	Dry Weight Concentration in mg/kg			
Navigation Pool and Station Number	**Chromium**	**Copper**	**Lead**	**Zinc**
Lockport				
1	173	157	225	820
Brandon Road				

2	180	161	214	719
Dresden Island				
5	27	10	99	86
8	50	38	47	219
Marseilles				
12	18	6	15	68
18	17	4	8	34
Starved Rock				
23	16	6	27	48
Upper Peoria				
32	15	3	6	56
38	28	21	27	134
Lower Peoria				
44	48	37	37	198
48	37	21	20	105

Based on a comparison of 2002 concentrations with results in earlier years, there does not appear to be any significant changes in sediment quality over the past two decades.

LOADS

Loads of total suspended solids and nutrients for the UIRB were reported in Sullivan, 2000, for the 1978 through 1997 period. The CSSC was the major contributor of total nitrogen and total phosphorus in the Des Plaines River Basin, resulting from the effluent discharge of the three large MWRD WRPs. The Kankakee River was the major contributor of total suspended solids. Total nitrogen, total phosphorus and total suspended solids loads at Ottawa, the outlet of the UIRB, were 91,800, 5,400 and 1,290,000 tons per year (tpy), respectively for the 1978 through 1997 period. However, recent results from the 1999 through 2001 UIRB NAWQA study unit investigation indicates somewhat less loadings for these three parameters than the above. Further, according to Sullivan, 2000, loads in the CSSC at Lockport are approximately 43, 80 and 10 percent of the loads at Ottawa for total nitrogen, total phosphorus and total suspended solids, respectively. Thus, total nitrogen and total phosphorus in the CSSC at Lockport constitute a large part of the nutrient load leaving the UIRB at Ottawa, whereas, total suspended solids in the CSSC at Lockport is a small part of the total suspended solids load at Ottawa.

Groschen, 2000, found that the UIRB contributes roughly the same amount of nutrients as does the LIRB. From this it can be concluded that the total nitrogen and total phosphorus loads in the CSSC at Lockport are approximately 22 and 40 percent of the total nitrogen and total phosphorus load being discharged from the LIRB to the Mississippi River. The total suspended solids load in the CSSC is again a small portion of the total suspended solids load reaching the Mississippi River.

Loads for total nitrogen, total phosphorus and total suspended solids from the three large MWRD WRPs and for the CSSC at Lockport have been determined by the MWRD for the years 1985, 1989, 1993, 1999 and 2002. The average loads at Lockport for these five years varies from the average loads in Sullivan, 2000, as follows:

Constituent	Source	Ottawa tpy	Lockport tpy	Three WRPs tpy
Total Nitrogen	Sullivan, 2000	91,800	38,500	--
	MWRD	--	22,300	15,000

Total Phosphorus	Sullivan, 2000	5,400	4,300	--
	MWRD	--	3,000	2,600
Total Suspended Solids	Sullivan, 2000	1,290,000	132,000	--
	MWRD	--	67,000	14,800

The differences at Lockport are significant and may be partly due to the different periods. It is noted that the MWRD loads are for five increments over an 18-year period, whereas the average loads in Sullivan, 2000, is based on annual determinations over a slightly earlier 20-year period. Regardless of the differences, this shows that total nitrogen and total phosphorus in the effluent of the three MWRD WRPs are a major part of the load of these constituents in the CSSC at Lockport. Total suspended solids in the effluent are a much smaller part of the CSSC load.

CONCLUSION

Through expanded treatment capacity and improved process performance at the MWRD WRPs and the capture and treatment of CSOs, most pollutant concentrations and loadings in the Upper IW have been reduced. The large load of total suspended solids in the Illinois River at Ottawa and at Peoria derive mostly from agricultural areas in the watershed and not from municipal wastewater treatment plants. However, the MWRD along with other municipal wastewater treatment authorities operate facilities that are significant sources of nutrients and nutrients will continue to be a matter of concern until the IEPA can complete its work on the development of nutrient standards. Until then, it will not be known with certainty if nutrients are serious impairments in Illinois rivers and streams.

However, nitrogen is also known to contribute to the condition of hypoxia in the Gulf of Mexico. A federal task force has yet to define the limits that will be imposed on states in the Mississippi River Basin to reduce nitrogen. If it comes to the need for standards, sources of nutrients, both point and nonpoint will have to find affordable and effective means to remove the nutrient loads. Municipal wastewater authorities have treatment technologies that can be employed for point sources and these can be regulated through the NPDES permit program. There is no comparable regulatory program for the discharge of nutrients and total suspended solids from agricultural nonpoint sources and effective control technologies are yet to be found. The management of nutrients and total suspended solids must be addressed on a watershed scale to effectively address both point and nonpoint sources.

REFERENCES

Groschen, George E., Mitchell A. Harris, Robin B. King, Paul J. Terrio, and Kelly L. Warner. 2000. Water Quality in the Lower Illinois River Basin, Illinois, 1995-98. U.S. Geological Survey.

Groschen, George E., Terri L. Arnold, Mitchell A. Harris, David H. Dupré, Faith A. Fitzpatrick, Barbara S. Scudder, William S. Morrow, Jr., Kelly L. Warner, and Elizabeth A. Murphy. 2003 in publication. Water Quality in the Upper Illinois River Basin, Illinois, Indiana, and Wisconsin, 1999-2001. U.S. Geological Survey.

Larson, Robert S. February 2001. Water Quality Trends of the Illinois Waterway System Upstream of Peoria Including the Chicago Metropolitan Area. Illinois State Water Survey.

Polls, I., S.J. Sedita, D.R. Zenz, and C. Lue-Hing. June 1985. Illinois Waterway Water Quality Survey from the Lockport Lock and Dam to the Peoria Lock and Dam - 1977 and 1983. The Metropolitan Sanitary District of Greater Chicago, Department of Research and Development.

Sullivan, Daniel J. 2000. Nutrients and Suspended Solids in Surface Waters of the Upper Illinois River Basin in Illinois, Indiana, and Wisconsin, 1978-97. U.S. Geological Survey.

Wasik, Jennifer L., and Irwin Polls. September 2003. Report No. 03-17 - Water and Sediment Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock During 2002. Metropolitan Water Reclamation District of Greater Chicago, Research and Development Department.

THE FUTURE OF THE NATION'S WATERWAYS

Lieutenant General Robert B. Flowers

Commander and Chief of Engineers,
US Army Corps of Engineers

Distinguished guests, ladies and gentlemen, good afternoon. As you know, almost 200 years ago, the great state of Illinois was a launching pad for the Lewis and Clark voyage. It was an odyssey of discovery that has continues to capture the hearts and minds of people throughout this nation. Through water, much was learned about the continent. And water continues to teach us today.

I greatly appreciate the chance to talk to you for a few minutes about what the U.S. Army Corps of Engineers has learned from water, and how we view the future of the nation's waterways. Water, and its ability to bring economy and environment to life, cannot be overestimated.

It's a lesson the Corps has learned from serving the nation in multiple ways for more than two hundred years.

Early engineers helped to defend our coasts, mapped the frontier and developed a navigation system to help both Army movements and the nation's economic development. Today, we have a presence in 91 countries and continue our dual role in supporting military and civil works missions. And for good reason

The experience Corps employees gain from working on civil works projects allows us to quickly respond to our nation's wartime needs.

Most recently, Corps employees were working on water resources projects here in the U.S., and just days later were in Afghanistan and Iraq, supporting our military commanders with their engineering expertise.

We are proud that the practical blending of civil works and military experience that began two centuries ago continues to provide value to the nation and the Armed Forces.

Any organization that has been around as long as the Corps gains many lessons learned. We've learned that a truly great nation will create environmentally sustainable solutions. The science is good enough so that we can have both a strong economy *and* thriving environment, so that our waterways can be continue to be a form of highway as well as habitat. .

We've also learned that to meet our nation's needs, we must take a multipurpose, watershed approach to solving water challenges. We learned that a single focus, geographically limited project can solve a problem, but it can also inadvertently cause other problems.

And, we've learned that to find the best solutions we must develop dynamic partnerships with true dialogue.

Those lessons, I believe, represent the future of our nation's waterways. The state of Illinois, and the Illinois River Coordinating Council that met as part of this conference, have learned those lessons well. I salute all of you who are working to maintain the health of the Illinois River System.

You developed a vision and you are pursuing it. You seek out sustainable solutions and you are accomplishing it. You believe in partnerships, and you are living it.

Recently, the Corps has taken three major steps to facilitate better support and service so our partners can reach their vision.

First, we are developing a Civil Works Strategic Plan that sets our direction. The plan is centered on a sustainable ethic, one that considers the environment, economy and social well-being.

The plan also addresses the need to approach water resources management through a watershed perspective. We developed the plan from a series of listening sessions around the country, in various forums, over the last three years. We heard from, state and local leaders, national and regional interest groups and individuals about their priorities.

The concept of watershed planning is not new to the Corps. The approach goes back to the Corps' roots. In fact, the Corps' divisions and districts are still largely organized on a watershed basis. With your help we are becoming better stewards of our nations watersheds. And together, we continue to improve our approach to balance the needs of our great nation.

As an example, the Corps requested funding in our 2004 fiscal year budget to monitor five relatively small watersheds as pilot projects. One of these, the Anacostia Watershed in Washington D-C, is also a pilot project in E-P-A's Urban Rivers Initiative. There about 25 agencies and groups involved in working on the watershed's future.

Our second step is the Corps' transformation. When I became the 50th Chief of Engineers three years ago, I set forth a number of business improvement goals for our organization.

We are improving our planning capability, we are leveraging our research and development to improve our economic models, and we are seeking independent review of some projects. We also developed seven environmental operating principles that serve as our commitment to work in environmentally sustainable ways.

And this week, we released a reorganization plan to improve our efficiency and effectiveness. The plan formalizes a direction we have been pursuing for some time now.

We are restructuring our organization to tear away stovepipes and the sequential layers of review that cause project delays. Our new structure, with integrated teams, will save time on reviews without compromising the thoroughness of studies.

Further, our new structure – our team of teams—will be more open and collaborative. Project partners are full members of the team. These changes will result in much better solutions and improved service to the American people.

That leads me to our third step. We have increased our partnerships to help address water related challenges.

As a nation there are many water related questions we must answer. What is the future of our water based infrastructure? How difficult will it be to balance infrastructure and environment? Will there be enough clean water to drink? Where do we place our priority when it comes to water?

No one agency or group has an answer. No Federal or State agency, Tribal government, or non-governmental organization can deal with these issues alone.

As those of you here know, public policies, priorities and procedures are best reached by ensuring different interests are at the table. I know water can bring people together and become a catalyst for finding solutions. The people of Illinois and this conference are living examples of that belief.

And we know there isn't one recipe to address a watershed or water challenges, but there are fundamental ingredients. Collaboration, communication and commitment are essential to reach comprehensive solutions.

I've seen that collaborating to address multiple objectives, and considering all interests and viewpoints, spurs creative solutions and creates synergy -- solutions far better than anything a person or group can think of alone.

Currently, we are proud partners in several great national efforts. The Corps is one of numerous agencies working together to create long range, large-scale ecosystem restoration strategies to restore the Everglades and Louisiana's shrinking coastal wetlands.

With Ducks Unlimited, we are working together on wetland restoration activities. With the Nature Conservancy, we are collaborating on a sustainable rivers initiative to restore and protect the health of rivers and surrounding areas. And we are enormously proud to play a role in helping with the Illinois River System, by partnering with the Department of Natural Resources on many projects and studies. There's a lot going on.

Over the next year, I'll be receiving recommendations on the Upper Mississippi River Illinois Waterway System Navigation Study and the Upper Mississippi River System Environmental Management Program.

I'm enormously pleased with the management program, which has restored thousands of acres of Illinois River Habitat.

I will also receive recommendations on the Illinois Restoration Study, a study of the Illinois watershed.

In the last few months, I signed a Chief's Report to recommend to Congress the Peoria Riverfront Development project. This project, along with others developed as part of the Illinois Restoration effort, will help restore Illinois ecosystems.

Each of these efforts has used a multi-agency, multi-partner approach. I've personally been working with Congressman Ray LaHood on these issues. And I appreciate the relationship we've developed as we work to help meet the region's needs.

It's with that spirit of collaboration that we can solve our nation's water questions and challenges. And I believe new and creative partnerships with governmental and non-governmental agencies, the private sector and academia, will result in rich new opportunities.
Creative partnerships may result in private-public funding or sharing resources. Or it may mean the Corps will not be a lead on a project, but will contribute models and expertise. There are many possibilities. With creative thinking, the possibilities are as immense as they are infinite.

In summary… the future of our waterways depends on our ability to find comprehensive solutions through collaborative approaches. From what I've seen, especially through the work of you in this room, we as a nation are equal to the task. And the U.S. Army Corps of Engineers is proud to be with you on the journey.

Thank you for the privilege of speaking with you today. I'll close with our 200-year old motto that means let us try… Essayons!

CLOSING ADDRESS

Stephen P. Havera

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We would like to thank all of you for attending the ninth Governor's Conference on the Management of the Illinois River System. The first conference was held in 1987 and we are now in our third decade of hosting conferences. Although much has been accomplished, there remains a lot to do. Your interest in the welfare of the river, as demonstrated by your participation in this conference, is critical if we are going to progress in this fledgling century with a biologically and economically sound river system. The twentieth century witnessed many changes to the Illinois River system, ranging from the significant diversion of Lake Michigan water into the waterway in 1900 to the excessive sedimentation and unnaturally fluctuating water levels with which we are dealing today. What the twenty-first century will bring to the Illinois River system, and correspondingly, what benefits the river will provide, can be greatly influenced by us. We have more than a century of knowledge to build upon. We need to draw upon that foundation of knowledge, integrate new methodologies, techniques, and information as they emerge, and incorporate these aspects into our desires to extend the longevity, biological productivity and economical benefits of the Illinois River system.

We must work together toward these goals, and here too, we already have vehicles to do so, including the Lt. Governor's Integrated Management Plan for the Illinois River Watershed, the Conservation Reserve Enhancement Program, the Wetland Reserve Program, the Illinois River Ecosystem Restoration Program, the Illinois Rivers 2020 Program, Conservation 2000 and watershed programs, and others. The Illinois River system directly or indirectly affects almost everyone in our state. The river is one of our most important natural resources and it is our responsibility to ensure its continued livelihood.

We want t thank you for your participation in this conference; we want to acknowledge our more than 60 co-sponsors for their support and financial contributions; we offer our very special thanks to Co-Chair Bob Frazee, Tom Tincher and Pashion Gaworski of the Hearland Water Resources Council, and our exceptional multi-agency steering committee, all of whom devote many hours towards the success of this conference. We are grateful for the addresses and insights offered by our featured speakers- Dr. Richard Warner and Lieutenant General Flowers-the comments by the state and federal agency directors and their representatives, and the comments by many presenters. It is now time for each of us to integrate the knowledge acquired at this conference into our respective disciplines in order to further our abilities to enhance the Illinois River system.

Our 2003 conference stand adjourned.

Appendix A: Photographs

Conservation Tour, Jon Hubbert, Ted Gilles

Governor's Proclamation, Lt. Gov. Pat Quinn, Harmony Dean, Bob Frazee, Steve Havera

IL River Coordinating Council

Lt. Governor Pat Quinn, Featured Speaker

Participants attending Public Forum of IRCC

Registration – Pashion Gorowski, Katie, Linda

Bob Frazee, Conference Co-chair, Opening Comments

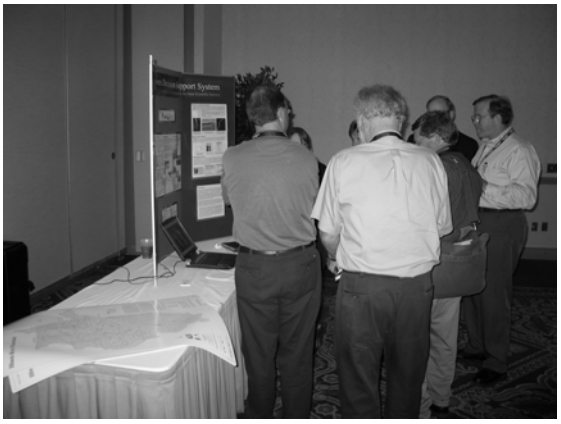
Peoria Mayor, David Ransburg

Senator George Shadid, Moderator, State Panel

Conference Participants

Richard Warner, Featured Speaker

Tom Tincher, HWRC Executive Director



Exhibits

Wednesday Evening Barbeque, Gateway Bldg.

What You Can Do to Help the IL River: Volunteer Session

Sedimentation Panel

Bob Frazee, Steve Havera, Teresa Kinkade, Colonel Gapinski, General Flowers

General Flowers, Featured Speaker

Steve Havera, Conference Co-Chair, Closing Comments

Appendix B: Exhibitors

Prairie Rivers Resource Conservation & Development
Ducks Unlimited
Peoria Park District
Soil & Water Conservation Society IL Chapter
Tri-County Riverfront Action Forum
U.S. Fish & Wildlife Service - Havana
US Army Corps of Engineers - Rock Island District
Illinois Department of Agriculture
Illinois-Indiana Sea Grant
Illinois American Water Company
Illinois Farm Bureau
Illinois Department of Natural Resources
Illinois Environmental Protection Agency
USDA Natural Resources Conservation Service - NRCS
University of Illinois Extension & Outreach
Illinois State Water Survey
Trees Forever - Illinois Buffer Partnership
Department of Commerce and Economic Opportunity
Hach Company
Heart of Illinois Sierra Club
Illinois State Geological Survey
National Great Rivers Research and Education Center
Office of the Lieutenant Governor
Pizzo & Associates
Tri-County Regional Planning Commission
Tri-County Regional Planning Commission
U.S. Geological Survey
University of Illinois - Stewardship
Williams Forestry and Associates

Appendix C: Participants

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Ayers, Ken, Corps of Engineers
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Baldwin, Lou, Springdale Cemetery
Bartlow, Cathy, East Peoria High School
Beaty, Mike, Illinois Department of Agriculture
Becker, Carl, The Nature Conservancy
Behary, Michael, McLean
Berg, Robbie, Earth Partners
Bersin, Stanley, Daily & Associates Engineering
Beverlin, Jason, Rock Island Trail
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