
Illinois River Basin Restoration

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ABSTRACT

The Illinois River, described by early explorers as a “boundless marsh”, has long been characterized by the productivity of its extensive backwater and floodplain complexes. However, over time the ecological health of the system has declined significantly due to the combined effects of sedimentation, altered hydrology, and other modifications to the basin. The Corps of Engineers and Illinois Department of Natural Resources (sponsor) working together in coordination with numerous other state and Federal agencies have developed a draft Comprehensive Plan for the restoration of the Illinois River Basin as authorized in Section 519 of the Water Resources Development Act (WRDA) 2000. The restoration study provides the vision, goals, objectives, desired future, and recommended plan to restore the ecological integrity of the Illinois River Basin System. This plan documents the need for and scope of four components: a restoration program; a long-term resource monitoring program; a computerized inventory and analysis system; and a program to encourage innovative dredging technology and beneficial use of sediments. The current authorization also provides ongoing authority to evaluate and implement Critical Restoration Projects throughout the basin. Several of these projects are nearing construction.

INTRODUCTION

The Corps of Engineers and Illinois Department of Natural Resources are working in partnership to develop and implement the Illinois River Basin Restoration Program, authorized by Section 519 of the Water Resources Development Act of 2000. This effort evolved from the State’s Illinois Rivers 2020 initiative that established a vision for a Federal-State focused ecosystem restoration program in the basin with a goal of eventually implementing \$2.5 billion of restoration over 20 years. The Section 519 program takes a watershed approach to address the entire basin, including all tributaries. The Section 519 legislation calls for the Corps of Engineers to: (1) complete a comprehensive plan and (2) begin the planning, design, and implementation of critical restoration projects. The following paper highlights the work to complete these efforts.

COMPREHENSIVE PLAN

The Comprehensive Plan effort has been an open, collaborative process with participation from Federal and state agencies, local governments, and non-governmental organizations. Throughout the implementation period, the interagency team approach will continue to coordinate the development, review, evaluation and adaptive management of the Comprehensive Plan. These efforts will add to ongoing Federal investments in the watershed such as Farm Bill Programs administered by the U.S. Department of Agriculture, the Section 319 - non-point pollution program of the U.S. Environmental Protection Agency, and habitat incentive programs of the U.S. Fish and Wildlife Service.

While still undergoing policy review at Corps of Engineers Headquarters, when complete, the Comprehensive

Plan will provide the vision, goals, objectives, desired future, and recommended plan to restore the ecological integrity of the Illinois River Basin System. This plan documents the need for and scope of the four components called for in Sec 519 legislation: a restoration program; a long-term resource monitoring program; a computerized inventory and analysis system; and a program to encourage innovative dredging technology and beneficial use of sediments. An implementation framework and prioritization criteria are also presented to guide the identification, selection, study and implementation of restoration projects, monitoring and adaptive management activities, and further system investigations.

Study Area

The study area encompasses the entire Illinois River Basin, defined as the Illinois River, its backwaters and side channels, and all tributaries, including their watersheds. The entire Illinois River Basin includes 30,000 square miles; 44% of Illinois, and includes 1,000 square miles in Wisconsin (upper Fox and Des Plaines Rivers), and 3,200 square miles in Indiana (Kankakee and Iroquois Rivers). In Illinois, the basin includes 46% of the state's agricultural land, 28% of its forests, 37% of its surface waters, and 95% of its urban areas.

Problems and System Limiting Factors

The Illinois River Basin has and continues to experience a loss of ecological integrity due to sedimentation of backwaters and side channels, degradation of tributary streams, increased water level fluctuations, reduction of floodplain and tributary connectivity, and other adverse impacts caused by intensive human development over the last 150 years. While many of the original plant and animal species are still present in the basin, but at reduced levels, the physical habitats (structure) and the processes that create and maintain those habitats (function) have been greatly altered. In total, these alterations have led to declines in ecological health to points where aquatic plants beds have been virtually eliminated from the lower river; macro-invertebrate numbers have declined significantly; the loss of backwaters areas with sufficient depth for spawning, nursery and overwintering habitat is now considered limiting for many native fish; and floodplain, riparian, and aquatic habitat loss and fragmentation is a threat to the population viability of state and Federally listed species in the basin. The following areas have been identified as the physical factors that limit system ecological integrity: excessive sedimentation, loss of productive backwaters, side channels, and channel border areas, loss of floodplain, riparian, and aquatic habitats and functions, loss of longitudinal connectivity (fish passage) on the Illinois River and its tributaries, altered hydrologic regime, water and sediment quality, and invasive species. There are numerous opportunities for restoration. Figure 1 illustrates how projects formulated addressing these system limiting factors, collectively, can improve ecosystem integrity to the point where higher levels of function are restored. Monitoring, at both the system and individual project level, would provide the vital feedback loop needed to ensure success and increase understanding of the Illinois River Basin ecosystem.

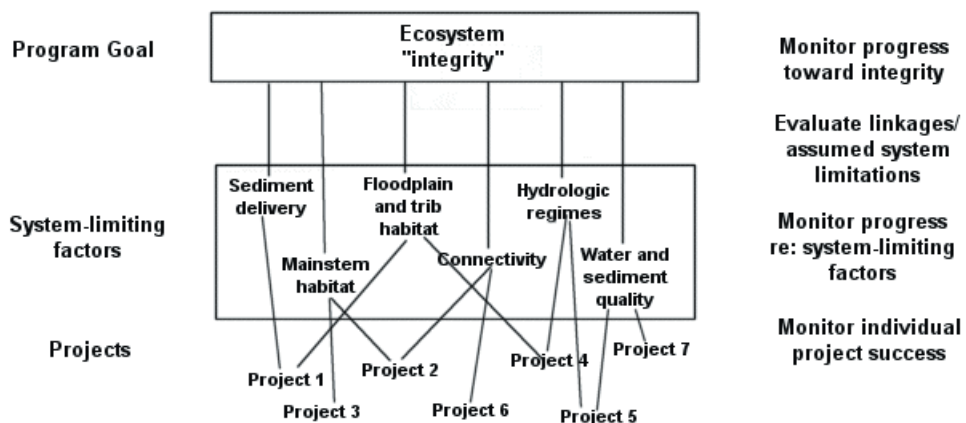


Figure 1. Conceptual model of Illinois River Basin Restoration Project and Monitoring.

Goals, Objectives, and Measures

The interagency study team developed the Illinois River Basin system wide ecosystem restoration goals and objectives in direct response to the widely identified system limiting factors. These goal categories are interrelated and improvements in all areas are needed to substantively improve ecological integrity. As efforts are undertaken across several goal categories, the system will reverse complex, systemic declines that have degraded the system below critical thresholds.

Overarching Goal. Restore and maintain ecological integrity, including habitats, communities, and populations of native species, and the processes that sustain them,

Goal 1. Reduce sediment delivery to the Illinois River from upland areas and tributary channels with the aim of eliminating excessive sediment load,

Goal 2. Restore aquatic habitat diversity of side channels and backwaters, including Peoria Lakes, to provide adequate volume and depth for sustaining native fish and wildlife communities,

Goal 3. Improve floodplain, riparian, and aquatic habitats and functions,

Goal 4. Restore and maintain longitudinal connectivity on the Illinois River and its tributaries, where appropriate, to restore or maintain healthy populations of native species,

Goal 5. Restore Illinois River and tributary hydrologic regimes to reduce the incidence of water level conditions that degrade aquatic and riparian habitat, and

Goal 6. Improve water and sediment quality in the Illinois River and its watershed.

The study team utilized a restoration needs assessment approach to develop more specific and measurable objectives under each of the goal categories. The assessment process first determined the desired future condition for the resources under each goal category, next the conditions for the resource were estimated assuming no additional actions are taken in the future, and then the difference or short fall was identified as the restoration need or restoration objective. Examples of objectives include: reduce sediment delivery to the Illinois River by 20%, restore 19,000 acres of backwaters, and restore 150,000 acres of mainstem floodplain. The study team also evaluated and identified potential measures to address the limiting factors and their expected outputs and costs.

Plan Formulation

Eight alternative plans (including the No Action alternative) were formulated to provide a range of restoration options for consideration in addressing the system limiting factors to restore ecosystem structure and function. These alternatives address the restoration objectives to varying levels, with the largest alternative roughly equally the desired future condition. All alternatives, except the No Action alternative, would reduce anticipated future degradation. While the smaller alternatives would include focused efforts to provide regional habitat and regional ecological integrity benefits in parts of the basin over the 50-year planning horizon, the larger alternatives would provide improvements in overall basin ecological integrity. In addition to restoration planning and implementation costs, all alternatives included management costs and a Technologies and Innovative Approaches Component addressing the other components called for in Section 519: development and implementation of dredging and beneficial use technologies; long term resource monitoring; and a computerized inventory and analysis system.

Alternatives were formulated in coordination with state and Federal agencies to address the total additional

restoration needs beyond the existing and expected future without project restoration funding levels. Based on the assessment of key evaluation criteria, Alternative 6 was selected as the tentative selected plan (this recommendation and the report is currently under policy review at Corps Headquarters). If fully implemented over the next 50 years, it would cost approximately \$8 billion and provide measurable increases in system ecological integrity and sustainability over the without project condition.

Specific actions would include reducing systemic sediment delivery by 20%, restoring 12,000 acres of backwaters, restoring 35 side channels, protecting 15 islands, restoring 75,000 acres of main stem floodplain, restoring 75,000 acres of tributary floodplain and riparian areas, restoring 1,000 stream miles of aquatic habitat, providing fish passage along the Fox, DuPage, Des Plaines, Kankakee, Spoon, and Aux Sable Rivers, producing an 11% reduction in the 5-year peak flows in tributaries, increasing tributary base flows by 20%, reducing half-foot or greater water level fluctuations along the main stem during the growing season by approximately 30%, and providing system level improvements in water quality.

In total, this alternative would provide approximately 63 percent of the desired future conditions. Fully implemented, the anticipated benefits of Alternative 6 include reaching a number of key thresholds that are currently limiting ecological integrity. These include: increasing depth diversity in backwaters areas providing spawning, nursery and overwintering habitat for native fish and habitat for the return of diving ducks; increasing connectivity of riparian and aquatic habitats providing improved species and population viability of state and Federally listed species; reducing water level fluctuations and turbidity to levels that allow for reestablishment of aquatic plants beds in the Illinois River; and increasing macro-invertebrate numbers as a food base for the system.

The Comprehensive Plan was formulated to address system restoration needs and was not specific to Corps of Engineers and Illinois Department of Natural Resources activities. As a result, the total restoration costs include a relatively large portion of work for other agencies including the: U.S. Department of Agriculture; U.S. Fish and Wildlife Service, U.S. Geological Survey; U.S. Environmental Protection Agency; Illinois Department of Agriculture; Illinois Environmental Protection Agency; and others. The identification of agency missions and programs has been initiated, but the process of full multiple agency implementation will continue to develop over the initial years of the program. It is acknowledged that there are funding challenges for all agencies, which highlights the need to partner in the implementation of the Illinois River Basin restoration.

RECOMMENDATIONS

The Comprehensive Plan recommendations call for continuing restoration efforts under the existing authority of Section 519. Corps of Engineers cost shared restoration efforts would begin with \$155 million in funding through 2011 (Tier I) and increasing to \$385 million in restoration efforts through 2015 (Tier II). The funding and activities included would begin significant restoration consistent with implementation of Alternative 6 (Tentatively Selected Plan). The initial phases are proposed to demonstrate the benefits of the various measures and project components prior to seeking additional funds. While some work will occur throughout the basin, restoration efforts would focus on the upper watershed, and in particular, the Peoria Pool and tributaries and the Kankakee River Basin. These are two of the high value resource areas that due to their location in the upper reaches of the basin, have potential to more rapidly demonstrate the effectiveness of the various projects.

The restoration efforts undertaken in partnership with the Corps of Engineers would be cost shared 65% Federal and 35% non-Federal. Funding would be allocated into three major categories as described below: (1) planning, design, construction and adaptive management of restoration projects; (2) technologies and innovative approaches component; and (3) system management. A report to Congress will be submitted in 2011, documenting the project successes and the results from Tier I restoration efforts, estimated at \$155 million (\$100 million Federal).

Estimated projects and cost breakdowns by Tier:

- Tier I – through 2011 - \$155 million program (\$100 million Fed)
- Projects \$132.5 M
- Small Watersheds – 10 watersheds
- Major Tributaries – 2 reaches
- Mainstem – 3 backwaters, 2 Side Channels (SC)/Islands, 1 floodplain
- Technologies and Innovative Approaches \$20 M
- Management \$2.5M
- Tier II – through 2015 - \$385 million program (\$250 million Fed)
- Projects \$327.5 M
- Small Watersheds – 20 watersheds
- Major Tributaries – 4 reaches
- Main Stem – 5 backwaters, 4 SC/Islands, 2 floodplain
- Technologies and Innovative Approaches \$52 M
- Management \$5.5 M
- Alternative 6 – through 2055 - \$8 billion total – ALL AGENCIES and PROGRAMS
- Projects \$7.2 billion
- Small Watersheds – 150 watersheds
- Major Tributaries – 88 reaches
- Main Stem – 60 backwaters, 35 SC/Islands, 150 floodplain
- Technologies and Innovative Approaches \$700 M
- Management \$55 M

An implementation framework for the Illinois River Basin Restoration study will guide the actions taken to achieve the system study recommendations. The system formulation developed the restoration vision, goals, objectives, and level of restoration effort identified in the recommended plan. The implementation framework provides the organizational structure to oversee: identification, selection, study and implementation of restoration projects; monitoring and adaptive management activities; and further system investigations.

The plan implementation process specifically addresses how activities proposed for funding through the Corps of Engineers would be conducted. However, the approach of utilizing multi-agency regional teams to review project submissions and the involvement of higher level staff from other agencies in an Illinois River Basin Steering Committee will provide a sound basis for the matching of proposed restoration with the authorities and funding of various agencies.

The proposed assessment and implementation process seeks to create a systemic, comprehensive approach that is transparent and accessible to project partners and stakeholders. The ecological merits of proposed projects will be the most important factor. Other factors to be considered will include goal-specific factors, presence of threats, sustainability, public interest and acceptability, and administrative issues.

The current authorization provides ongoing authority to evaluate and implement Critical Restoration Projects. It is recommended that the Illinois River Basin Restoration Program, authorized in Section 519 of WRDA 2000, be modified to more fully address restoration needs of this nationally significant resource. These recommendations were developed in cooperation with the State of Illinois Department of Natural Resources, other Federal and State agencies, local governments, and various non-governmental organizations.

Recommendations to amend Section 519 of the Water Resources Development Act (WRDA) of 2000:

- a. That the Critical Restoration Project per project Federal cost limit be increased from \$5 million to \$20 million. Increasing the per project cost limit would allow implementation of a wider range of critical restoration

projects more directly matching the scale identified in the Comprehensive Planning efforts. Without modification many larger projects could not be implemented as effectively or at all.

b. That the current authorization for Critical Restoration Projects be expanded to more fully address component 3.B. calling for 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. Replace the specific criteria for Critical Restoration Projects found in Section 519, with a requirement that restoration projects to be identified following an implementation framework and inter-agency coordination. Individual critical restoration projects may involve restoration activities at several non-contiguous locations within a pool or sub-watershed.

c. That authorization for implementation of a Technologies and Innovative Approaches Component be provided as a complement to the Critical Restoration Project activities. Activities would include initiatives called for in Section 519 3.A, C, and D., calling for the development and implementation of dredging and beneficial use technologies; long term resource monitoring; and a computerized inventory and analysis system.

d. That authorization be provided allowing the development of cooperative agreements and fund transfers between the Corps of Engineers and the State of Illinois: scientific surveys at the University of Illinois; and units of local government: counties, municipalities, and Soil and Water Conservation Districts to facilitate more efficient partnerships.

e. That authorization be provided that the Chief of Engineers may enter into cooperative agreements with the Natural Resources Conservation Service for services to be performed by contract, grant or agreement, or by any other instrument or resource available to and consistent with the authorities of the Natural Resources Conservation Service.

f. That the authorization be expanded to allow non-profit organizations to serve as sponsors for restoration projects implemented under the Illinois River Basin Restoration Project.

g. That a report to Congress be submitted every 6 years describing the accomplishments of the programs and any needed adjustment. Submittal of this report is to be timed to allow consideration as part of a comprehensive Water Resources Development Act.

CRITICAL RESTORATION PROJECTS

Restoration of the Illinois River Basin requires the identification and implementation of projects within the watershed and along the course of the river that repair past and ongoing ecological damage so that a more highly functioning, self-sustaining ecosystem can develop within the basin. Critical Restoration Projects will produce immediate habitat and sediment reduction benefits, will help evaluate the effectiveness of various restoration methods before system wide application, and make best use of the current local and State interest in ecosystem restoration within the basin. Construction of critical restoration projects will allow sponsors and the public to see immediate results that will help to provide broad support for future projects. The Corps of Engineers will implement these Critical Restoration Projects in collaboration with the non-Federal sponsor and other Federal and local agencies.

Currently eight site-specific projects have been identified. These projects will produce independent, immediate, and substantial restoration, preservation, and protection benefits and are being completed and implemented as the initial Critical Restoration Projects of the Illinois River Basin Restoration Project. Following are brief descriptions of the Critical Restoration Projects.



Figure 2: Critical Restoration Project Location

1. Peoria Riverfront Development - Upper Island. The principal goal is to improve depth diversity enhancing aquatic habitat in Peoria Lake with ancillary recreational benefits. The recommended plan includes dredging approximately 54 acres within Lower Peoria Lake to create deepwater habitats and constructing a 21-acre island. This effort is consistent with system goals of restoring aquatic habitat diversity of side channels and backwaters, and improving floodplain and habitats and functions. The feasibility phase is complete and design is nearing completion.

2. Pekin Lake Northern Unit. Pekin Lake Northern Unit is the northern portion of a backwater lake complex located adjacent to the Illinois River at RM 153-156 of the Illinois Waterway. The project will allow for management of water levels for habitat and remove large areas of willow trees to increase moist soil plant production. The improved wetland will provide a reliable food source and critical stopover along the internationally significant Mississippi River Flyway. This effort is consistent with system goals of restoring aquatic habitat diversity of side channels and backwaters; improving floodplain, riparian and aquatic habitats and functions; and restoring hydrologic regimes. The feasibility phase is complete and design is nearing completion.

3. Pekin Lake Southern Unit. Pekin Lake Southern Unit is the southern portion of a 1,200-acre backwater lake complex located adjacent to the Illinois River at River Miles (RM) 153-156 of the Illinois Waterway. The project will address the lack of overwintering fish habitat and the declines in diverse bottomland forest areas. The alternatives considered include dredging for overwintering habitat with the placement of some of the dredged material onsite to create suitable areas for mast producing trees. This effort is consistent with system goals of restoring aquatic habitat diversity of side channels and backwaters; and improving floodplain, riparian and aquatic habitats and functions. The feasibility phase is complete and design has been initiated.

4. Waubonsie Creek. Waubonsie Creek is located in northeastern Illinois. The creek has a number of low-head dams that prevent movement of fish from the Fox River into approximately 7 miles of potential spawning and nursery habitat in Waubonsie Creek. The project will restore fish access to quality spawning habitat, allow fish recolonization of the creek following high flow, restore riparian wetlands, improve aquatic habitat, and provide off-channel refuge for fish during high flow events. This effort is consistent with system goals of improving

floodplain, riparian and aquatic habitats and functions; and restoring longitudinal connectivity on the tributaries. The feasibility phase is complete and design has been initiated.

5. Kankakee River-Main Stem. The Kankakee River is a high quality river located in northeastern Illinois and northwestern Indiana. The Kankakee River carries an excessive sediment load, and habitat quality in the river is expected to decline due to sedimentation. Side channel and pool areas in this reach are expected to continue to lose depth and habitat diversity as cobble and gravel substrates become covered by sand. The project will restore and maintain deep-water and high quality riffle habitat critical to many state protected species along 30 miles of the Kankakee River. This effort is consistent with system goals of reducing sediment delivery to the Illinois River; and improving floodplain, riparian and aquatic habitats and functions. The feasibility phase is ongoing.

6. Iroquois River. The Iroquois River is located in eastern Illinois and western Indiana. Modifications of tributaries through ditching and channel straightening have increased velocities, bed and bank erosion, and the sediment load delivered to the Iroquois River and eventually the Illinois River. The project will prevent delivery of sediment to the Illinois River by stabilizing a head cut and reducing bank erosion. The project will maintain aquatic habitat in 10 miles of tributary stream by preventing degradation associated with upstream progression of channel incision. This effort is consistent with system goals of reducing sediment delivery to the Illinois River; improving floodplain, riparian and aquatic habitats and functions; and improving water and sediment quality in the Illinois River and its watershed. The feasibility phase is on hold pending funding.

7. McKee Creek. McKee Creek is a direct tributary to the Illinois River located in west-central Illinois. Modifications of McKee Creek and its tributaries through ditching and channel straightening have increased velocities, bed and bank erosion, and the sediment load delivered directly to the lower Illinois River. The stream has incised channels and high rates of lateral migration. The project will prevent delivery of an estimated 2.5 million tons of sediment to the Illinois River by stabilizing head cuts on the lower 10 miles of McKee Creek. The project will maintain and improve aquatic habitat by preventing degradation associated with headcuts and bank erosion. This effort is consistent with system goals of reducing sediment delivery to the Illinois River; improving floodplain, riparian, and aquatic habitats and functions; restoring hydrological regimes; and improving water and sediment quality in the Illinois River and its watershed. The feasibility phase is on hold pending funding.

8. Blackberry Creek. Blackberry Creek is located in northeastern Illinois. Currently, the stream has high quality habitat, but a 10-foot dam near the confluence with the Fox River severely limits fish, mussel, and macroinvertebrate access to this habitat. The project will restore fish passage at the Blackberry Creek Dam and restore access to 30 miles of quality stream habitat. This effort is consistent with system goals of improving floodplain, riparian, and aquatic habitats and functions; and restoring longitudinal connectivity on the tributaries. The feasibility phase is on hold pending funding.

CONCLUSION

Significant progress is being made under the Illinois River Basin Restoration program. The Corps of Engineers looks forward to continuing and expanding its partnerships with the Illinois DNR and other Federal and State Agencies in the basin. The Comprehensive Plan, pending approval at Corps Headquarters, is planned for released for Public Review in early 2006. In addition, four Critical Restoration projects have been planned, and depending on funding availability, could begin construction in 2007. Additional critical restoration projects will be identified and begin planning work in the coming years.
