ILLINOIS RIVER BASIN RESTORATION
COMPREHENSIVE PLAN
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

APPENDIX G

U.S. FISH AND WILDLIFE SERVICE
COORDINATION ACT REPORT

FISH AND WILDLIFE COORDINATION ACT REPORT

for the

ILLINOIS RIVER ECOSYSTEM RESTORATION STUDY

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U.S. FISH AND WILDLIFE SERVICE
GREAT LAKES – BIG RIVERS REGION
FORT SNELLING, MINNESOTA

May 2004

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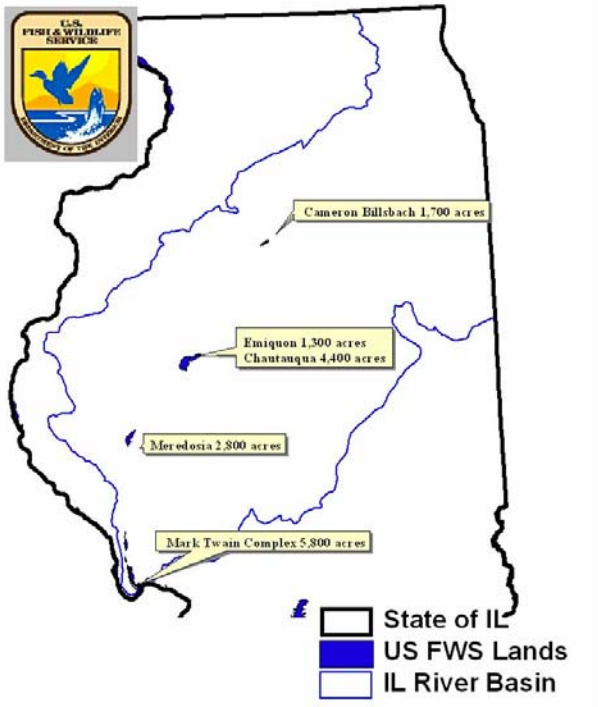
Chapter 1 – Introduction, Background and Purpose

Introduction

The U.S. Fish and Wildlife Service (Service) became a major partner in the Illinois River (IR) community in 1936, when Congress authorized the acquisition of 4,488 acres of IR floodplain to establish the Chautauqua National Fish and Wildlife Refuge (Figure 1.1). The purpose of the refuge was national in scope and aimed at preserving the wetlands, waters, and floodplains so critical to the continued existence of fish and wildlife. Since that time, our work on the IR system has expanded to include over 16,000 acres of lands and water in the National Wildlife Refuge system along the IR and its floodplain. Including state-managed lands, about 10 percent of the IR floodplain is managed for fish and wildlife purposes.

Figure 1.1, US Fish and Wildlife Service, National Refuge Lands within the Illinois River Basin



In addition to direct land management authority, the Service is authorized under the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) to provide reports, such as this one, on federally funded projects. The purpose of the report is to present information on the likely effects of the proposed project on fish and wildlife resources. The Fish and Wildlife Coordination Act presents an opportunity for the Fish and Wildlife Service to offer recommendations and comments which will help to improve proposed project alternatives and features for fish and wildlife habitat.

Further, we provide technical assistance under the National Environmental Policy Act (NEPA) of 1969. The NEPA requires that an environmental impact statement be prepared when a Federal action is proposed which may result in significant impacts to the environment. It further requires an analysis of cumulative effects, defined in 40 CFR §1508.7 as:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

As an ecological restoration initiative, we believe that the net result from all related projects would be beneficial to the natural resources of the IR basin.

The Service also provides technical expertise on the protection and enhancement of federally threatened and endangered species by consulting with Federal agencies on effects to those species. Consultation under the Endangered Species Act is outlined in Chapter 7 of this report.

Background

The Illinois River Ecosystem Restoration Study is being carried out under the Corps of Engineers' General Investigations Program. The study was initiated pursuant to the provision of funds in the Energy and Water Development Appropriations Act, 1998. The study was authorized by Section 216 of the 1970 Flood Control Act. Congress has provided specific authority to address Illinois River Basin Restoration in Section 519 of the Water Resources Development Act (WRDA) of 2000. This authority calls for the completion of a comprehensive plan and critical restoration projects. Efforts were initiated following the provision of funds in the Energy and Water Development Appropriations Act of 2002.

This Fish and Wildlife Coordination Act Report addresses the final response to the Comprehensive Plan portion of the Illinois River Restoration authority provided in Section 519 of the WRDA of 2000.

Purpose

The purpose of this report is to present information and our opinions, recommendations, and comments on impacts of the proposed IL 519 authority, Illinois River Restoration Project, and the preferred alternative. This authority seeks to improve the Illinois River Ecosystem by concentrating on seven key ecosystem related goals and implementing a selected alternative to address system-wide problems. We offer direct comments on each of these goals as well as the alternative formulation and agency coordination throughout this report and, in particular, in the final chapter (9) of the report titled conclusions and recommendations.

We also provide an analysis and recommendations on the ongoing river management projects such as the restructured 9-foot Channel Navigation Study, Environmental Management Plan (EMP), and Long Term Resource Management Program (LTRMP) and how those programs will interact, either independently or in cooperation with, the IL 519 authority. It is vital for the successful restoration of the system that these programs be complimentary and cohesive. As we strive to repair the ecological damage of the past century, it is important that river resource managers address other on-going authorities/initiatives and identify ways to compliment one another.

Chapter 2 - Proposed Project Description and Formulation Process

The Rock Island District Corps of Engineers (Corps), in partnership with the Illinois Department of Natural Resources (IDNR), has investigated an array of alternatives to initiate ecosystem restoration of the IR basin. Both small and large-scale management features, related to the ongoing management of the basin and potential future management of the basin, have been investigated and discussed with representatives from the majority of interested stakeholders throughout the State of Illinois. These investigations included: (1) Identifying a series of critical restoration projects and locations, (2) Identifying basin-wide programs that currently act to alleviate specific concerns related to sediment, and (3) Identify natural resource needs in terms of biologically significant areas, water level management, side channel habitat restoration, and backwater restoration. In addition to system wide investigations, the project includes LTRMP to be established and implemented by the IDNR in conjunction with the Illinois Natural History Survey and the Illinois State Water Surveys as a portion of the non-Federal cost share to the project.

Description of Project Area

The IR begins near Channahon, Illinois, at the confluence of the Des Plaines and Kankakee Rivers and flows over 270 miles to Grafton, Illinois, where it joins the Upper Mississippi River (UMR). The Illinois Waterway includes all of the IR and continues approximately 60 additional miles upstream along portions of several rivers and man-made channels to Lake Michigan. Except where indicated, this document references the IR portion of the basin and its associated tributaries including their watersheds draining into the IR. The basin is approximately 30,000 square miles and contributes to roughly 40 percent of the entire State of Illinois in land area. The IR basin consists of eight major tributaries including the Des Plaines, Kankakee, Fox, Vermilion, Mackinaw, Spoon, Sangamon, and La Moine Rivers and their watersheds.

Project Objectives

The feasibility study identifies several planning objectives which include the following: (1) Assess overall restoration needs and develop a consensus-based desired future condition of the Illinois River Watershed, (2) Address restoration of ecosystem function, structure, and dynamic processes to the nationally recognized IR system. Help restore a naturalistic, functioning, and self-regulating system and protect critical resources from further degradation, (3) Develop Critical Restoration Projects in the context of broader system/ecosystem or watershed level. Consider the interrelationships of plant and animal communities and their habitats in a larger ecosystem context (health, productivity, and biological diversity), (4) Incorporate an adaptive management approach to restoration efforts considering the interconnectedness of water and land, dynamic nature of the economy and environment, and need for flexibility in the formulation and evaluation process, (5) Develop watershed or sub-watershed management plans identifying the combination of recommended actions to be undertaken by various potential stakeholders, (6) Collaborate in partnership with other governmental agencies, organizations, and the private sector, (7) Produce benefits consistent with the North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, Partners in Flight Bird Conservation Plan, Clean Water Action Plan, Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, and

Brownfield's Cleanup and Redevelopment, (8) Provide ancillary recreational benefits, (9) Minimize the conversion of farmland, and (10) Meet requirements established in Section 519 of the WRDA 2000.

As an overarching objective and identified as (6) in the above section, the planning process was intended to coordinate a multi-agency multi-program restoration initiative to develop system-wide management actions which, when implemented as system alternatives, would restore, improve, and/or protect the natural resources of the IR basin and return it to a 'self-sustaining' ecosystem.

In an effort to organize system needs, a series of six goals were established to address the basin's ecological needs (Chapter 3). These goals, in conjunction with the above objectives, were combined to create seven system alternatives (Chapter 4) to be evaluated for ecological benefits.

Listed here are a few of the small and large scale measures which have been identified as system needs and are incorporated into each of the seven alternatives for the system either through a specified goal or through management actions of alternatives.

Small-Scale Measures (wetland and stream corridor improvements)

- Stabilize unstable streams in rural and urban areas, particularly streams where the rate or magnitude of erosion yields abrupt or progressive changes in location, gradient, or pattern of natural or human-induced changes (ex., work with a variety of U.S. Department of Agriculture (USDA) and Soil and Water Conservation District (SWCD) programs).

- Reduce the effects of excessive sedimentation in the river and its associated water bodies.

- Restore riparian and floodplain biological functions.

- Restore connections between system ecological elements.

Large-Scale Measures

- Water level management (of the IR mainstem).

- Backwater restoration (12,000 acres in recommended plan).

- Side channel habitat restoration (35 project locations in recommended plan).

As early as 1945, it was known that the levees along the IR needed to be rectified to reduce flood heights and/or improve habitats for waterfowl, fish, and other floodplain dependant species. The Illinois Department of Conservation (now IDNR) urged that the levee and drainage districts be considered for storage of flood waters. In addition, they argued that these levees could serve as high quality habitat for floodplain dependant species (IL DOC 1950).

The statements by the Department of Conservation in 1950 remain concerns today. As outlined by the feasibility report, extensive water level management opportunities still exist within and along current levee and drainage districts. These opportunities, however, will require extensive coordination between interested agencies and landowners. It is important that river managers, interested drainage districts, and stakeholders participate in this process. The IL 519 Study teams will need to work with floodplain organizations to understand and alleviate some the concerns which exist.

The IL 519 program should seek future partnerships with drainage districts. These partnerships may allow for the utilization of specified areas as recreational hunting areas while assisting with water level management, one of the most serious problems impacting the IR.

Chapter 3 – Ecosystem Restoration Goals

Goals

In an effort to efficiently plan and organize the IR Ecosystem Restoration alternatives, a program objective and six goals were formed and subcommittees tasked with organization within each of these goal categories. Although each goal category can be linked to others, they also stand alone and require specific attention when assessing the system as a whole. Ultimately combinations of goals comprise system-wide alternatives (Table 4.1). The objective of the program and the six goals and associated problem statements are:

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

Problem: The combined effects of habitat loss to urban and agricultural development, human exploitation, habitat degradation and fragmentation, water quality degradation, and competition from aggressive invasive species have significantly reduced the abundance and distribution of many native plant and animal species in the Illinois River Basin. In addition, human alterations of Illinois River Basin landscapes have altered the timing, magnitude, duration, and frequency of habitat forming and seasonal disturbance regimes. These systemic changes, no longer simple cause and effect relationships, are now severely limiting both the habitat and species populations and use of the Illinois River Basin.

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

Problem: Increased sediment loads from the basin have severely degraded environmental conditions along the mainstem Illinois River by increasing turbidity and filling backwater areas, side channels, and channel border areas. Improved practices have reduced the amount of sediment generated from many agricultural areas, but large quantities of sediment are still delivered to the river due to eroding channels and tributary areas, including urban and rural construction sites. The most critical problems are the loss of depth and habitat quality in off-channel areas connected to the mainstem river. Similar problems can be seen at other areas within the basin where excessive sediment has degraded tributary habitats.

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.

Problem: The dramatic loss in productive backwaters, side channels, and channel border areas is due to excessive sedimentation. In particular, the Illinois River has lost much of its critical spawning, nursery, and over-wintering areas for fish, habitat for diving ducks and aquatic species, and backwater aquatic plant communities. A related problem is the need for timely action. If restoration is not undertaken soon, additional significant aquatic areas will be lost due to conversion to terrestrial habitats.

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

Problem: Land use and hydrologic change has reduced the quantity, quality, and function of aquatic, floodplain and riparian habitats. Flood storage, flood conveyance, habitat availability, and nutrient exchange are some of the critical aspects of the floodplain environment that have been adversely impacted.

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.

Problem: There is a lack on lateral and longitudinal hydrologic connectivity on the Illinois River and its tributaries. Aquatic organisms do not have sufficient access to diverse habitat such as backwater and tributary habitat that are necessary at different life stages. Lack of longitudinal connectivity slows repopulation of stream reaches following extreme events such as pollution or flooding and reduces genetic diversity of aquatic organisms.

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

Problem: Historical basin changes and river management have altered the water level regime along the mainstem Illinois River, stressing the natural plant and animal communities along the river and its floodplain. The most critical changes include an increased incidence of water level fluctuation, especially during summer and fall low water periods, and the lack of drawdown in areas upstream of the navigation dams.

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

Problem: The state's surface water resources are impaired due to a combination of point and non-point sources of pollution. Through effective regulatory efforts, point sources of impairments have continued to decline. Non-point sources of water quality impairment, such as sediments and nitrates, continue to degrade the surface waters of the state.

The Corps and IDNR have done an excellent job identifying system restoration goals that are not only critical to the restoration of the IR ecosystem, but are also tangible and can produce achievable ecological outputs. However, significant coordination is still needed to establish the required agreements to make the IL 519 successful and the restoration of the IR possible. In particular, goals 1, 3, and 6 are being actively pursued in various efforts by a number of different entities throughout the basin. These similar interests may provide significant cumulative benefits through coordination and support by this study.

Chapter 4 – Project Alternatives

Project Alternatives

Using the recommendations of each restoration goal subcommittee, eight basic system alternatives were designed. These eight alternatives cover a wide level of effort and range from 'no action under the 519 authority', 'regional improvement', 'maintaining the current system' to 'reasonable upper bound to system improvements'. Table 4.1 represents each alternative, the level of effort, and some expected benefits of each of the goals. After each alternative had been outlined, the IL 519 team evaluated each alternative and selected a preferred alternative. The preferred alternative reflected opinions of several regional and state experts in the fields of waterfowl ecology, sediment retention, fishery ecology, aquatic vegetation, and other IR system issues. In addition to reflecting these experts' opinions, the preferred alternative sought to establish a future condition of the IR which was consistent with management plans and restoration efforts of the basin.

Alternative Plans Considered in the IL 519 Study, See Table 4.1: The eight alternatives were established and evaluated in this feasibility report starting with 'No Action' and incrementally increasing in scope to the eighth alternative. Table 4.1 outlines the goal by goal benefits which are expected to be seen from each of the evaluated alternatives. These alternatives were formulated and evaluated through a series of multi-agency coordination meetings and represent predicted desired/future conditions as outlined by the participating agencies and individuals.

Table 4.1, System-wide Alternatives w/ benefits by goal category

Alternative Name	1	2	3	4	5	6
	Sediment Delivery	Backwaters & Side Channels	Floodplain, Riparian, & Aquatic	Connectivity	Water Level Management	Water Quality
No Action	Some Increase Delivery	Decline 1-2%/yr	No Change	Potential Improvement	More Fluctuations	Minor Improvement
Alt 1	0% Upper Tribs 20% Peoria Tribs 0% Lower Tribs	3,600 BW acres 10 Side Channel 10 Island Protect	5,000 acres MS 5,000 acres Trib 25 stream miles		1.5% Peak Reduce 30k acre-ft	Minor Regional Improvements
Alt 2	0% Upper Tribs 40% Peoria Tribs 0.5% Lower Tribs	6,100 BW acres 20 Side Channel 15 Island Protect	5,000 acres MS 10,000 acres Trib 50 stream miles		2.5% Peak Reduce 45k acre-ft	Regional Improvements
Alt 3	11% Upper Tribs 40% Peoria Tribs 4% Lower Tribs	8,600 BW acres 30 Side Channel 15 Island Protect	20,000 acres MS 20,000 acres Trib 100 stream miles	Fox, DuPage, DesPlaines	2.5% Peak Reduce 45k acre-ft, Auto Gates	Some System Improvements
Alt 4	11% Upper Tribs 40% Peoria Tribs 4% Lower Tribs	6,100 BW acres 20 Side Channel 15 Island Protect	5,000 acres MS 20,000 acres Trib 100 stream miles	Fox, DuPage, Des Plaines, Kankakee, Spoon, Aux Sable	7.5% Peak Reduce 160k acre-ft, Auto Gates	Some System Improvements
Alt 5	11% Upper Tribs 40% Peoria Tribs 4% Lower Tribs	8,600 BW acres 30 Side Channel 15 Island Protect	40,000 acres MS 40,000 acres Trib 250 stream miles	Fox, DuPage, Des Plaines, Kankakee, Spoon, Aux Sable	7.5% Peak Reduce 160k acre-ft, Auto Gates	Some System Improvements
Alt 6	11% Upper Tribs 40% Peoria Tribs 20% Lower Tribs	12,000 BW acres 35 Side Channel 15 Island Protect	75,000 acres MS 75,000 acres Trib 500 stream miles	Fox, DuPage, Des Plaines, Kankakee, Spoon, Aux Sable	7.5% Peak Reduce 160k acre-ft, Auto Gates, Drawdown	Some System Improvements
Alt 7	11% Upper Tribs 40% Peoria Tribs 20% Lower Tribs	18,000 BW acres 40 Side Channel 15 Island Protect	150,000 acres MS 150,000 acres Trib 1000 stream miles	Fox, DuPage, Des Plaines, Kankakee, Spoon, Aux Sable, 3 Mainstem Dams	7.5% Peak Reduce 160k acre-ft, Auto Gates, Drawdown, Replace Wickets	Some System Improvements
	Preferred alternative plan is Alt. 6					

Recommended Plan, Alternate 6

Ecological Integrity: Restoration under this goal would provide a measurable increase in the level of habitat and ecological integrity at the system level through implementation of all goal recommendations. It is a basic assumption of the study team and participating agencies (including the Service) that this initiative would produce system-wide biological and ecological benefits. Alternate 7 would produce more resource benefits but the cost has been determined to be too high.

These recommendations, when combined into Alternate 6, will provide a level of management that is unparalleled within the basin at this time. However, we emphasize the need and importance of coordination between Federal, state, and private restoration efforts within the basin. These efforts, though common in goal, can become less efficient if appropriate coordination and funding opportunities are not established. In addition, we feel that immediate and localized benefits could be seen at sites that are in existing Federal, state, and private conservation agency ownership. Targeting these pre-existing sites could greatly reduce planning and real estate costs while maximizing benefits to the system.

Sediment Delivery: Alternate 6 calls for the reduction in sediment delivery from the Peoria tributaries by 40 percent, other tributaries upstream of Peoria Lakes by 11 percent, and tributaries downstream of Peoria Lakes by 20 percent. System benefits include reduced delivery of sediment by 20 percent to Peoria Lakes and 20 percent system-wide.

Excessive sedimentation is well known to be a significant source of ecological loss within the IR basin. However, sedimentation is part of a natural process by which stream channels meander through their floodplains via erosion and deposition. It is only when a particular stream is prevented from meandering that erosion and sedimentation begin to adversely affect the stream. In reference to this alternative's goal of reducing 40 percent of the Peoria tributaries sediment delivery, excessive sediment control could also produce negative ecological impacts at the localized stream level as well as at a cumulatively larger scale. Localized investigations may be warranted to determine if retention of significant sediment loads will alter critical habitat forming processes and adaptive management measures may be required to alter project features to ensure system stability.

In regard to the use of grade control structures, the feasibility report (page 4-3) states that, "Pool and riffle units provide a diverse range of hydraulic and biological niches that are critical to sustaining thriving river habitats". The use of this technique for sediment control is relatively new and few biological investigations have been completed. These structures do provide pool habitat as well as some degree of riffle habitat. However, the larger stone used for construction may not provide the critical habitats which are found in natural riffles. We recommend that (at a project specific level) the Corps adhere to any newly published scientific literature relevant to the specifications of pool-riffle complexes.

Backwater and Side Channels: Under Alternate 6, restoration is proposed for 12,000 acres in 60 of the approximate 100 backwaters on the IR system. The alternative calls for dredging an average of 200 acres per backwater, at an optimal level of 40 percent of the approximate average 500-acre backwater area. This would create optimal backwater and over-wintering habitat spaced approximately every five miles along the system. The alternative also calls for the restoration of 35 of the remaining 56 side channels in the IR and protection of 15 islands.

Because these very issues are also being studied and recommendations being made under the Corps' Navigation Study, if this authority moves forward, a much greater level of coordination needs to be initiated to insure that overlap and competition does not become an issue. The environmental restoration objectives of the Navigation Study may prove to be of vital importance to this effort and vice versa (see Chapter 8, Agency Coordination).

Floodplain, Riparian, and Aquatic Restoration: Restoration under Alternate 6 is proposed for 75,000 acres of mainstem floodplain (approximately 14.9 percent of total mainstem floodplain area) including approximately 31,700 acres of wetlands, 25,300 acres of forest, and 18,000 acres of prairie. Tributary restoration is proposed for 75,000 acres (approximately 8.8 percent of total tributary floodplain area) including approximately 47,600 acres of wetlands, 13,900 acres of forest, and 13,500 acres of prairie. Aquatic restoration is proposed for 500 miles of tributary streams (16.6 percent of the approximately 3,000 miles of channelized streams) with a mix of improved instream aquatic habitat structure and channel remeandering.

We agree that these types of habitat restoration are needed within the basin. Mainstem floodplain habitats have been lost at an alarming rate during the last century and have created the degraded system that we have today. It seems appropriate that a strong initiative of this goal should be to establish contacts and relationships with private floodplain landowners. These relationships will be vital in the establishment of restoration efforts. Funding to private entities should also be considered in order to create privately owned habitat projects within the floodplain.

As it relates to tributary floodplains and tributary streams, we encourage the project management branch of the Corps to work with their regulatory branch and coordinate information flow between one another. The regulatory branch of the Corps is the primary agency responsible for the issuance of Section 404 water quality permits and, as a result, has contacts with a significant number of tributary landowners who wish to channelize streams and/or alter wetlands that exist on their lands. With the cooperation of the regulatory branch, initial contacts could be made to minimize future stream impacts as well as identify past channelization projects using their R.A.M.S. database. This database is tied directly to a geographic information system and can be used to spatially assess potential project sites for restoration or preservation.

Connectivity: This alternative calls to restore fish passage at all mainstem dams on the Fox River, all dams on the West Branch of the DuPage River, all mainstem dams and one tributary (Salt Creek) of the Des Plaines River, Wilmington and Kankakee Dams on the Kankakee River, Bernadote Dam on the Spoon River, and the Aux Sable Dam.

Water Level Management: This alternative aims to create 107,000 acres of storage area at an average depth of 1.5 feet and 38,400 acres of groundwater infiltration, increase water level management at navigation dams using electronic controls and increased flow gauging. Results are predicted to include an 11 percent reduction in the five-year peak flows in tributaries, an overall average 20 percent increase in tributary base flows, and up to 66 percent reduction in the occurrence of half-foot or greater fluctuation during the growing season in the mainstem IR. This alternative also would see benefits accrue from drawdowns in the LaGrange or Peoria Pools.

Though sedimentation has been identified as a serious problem within the IR basin, uncontrolled fluctuations in the water levels of the IR also create a very significant problem for the ecology of the IR. These fluctuations create unstable substrates and produce undesirable water regimes in many of the backwaters. These problems combine to create a system that has lost and is unable to re-grow a significant percentage of its aquatic vegetation. Though cumulative benefits will be seen throughout the life of this project (as uplands and tributary watersheds are restored), priority should be give to measures which return some natural regime to the hydrology of the IR. Drawdowns within the LaGrange and Peoria Pools may prove to be extremely effective if annual base flows present the opportunity to sustain a pool-wide drawdown. Drawdown attempts are annually initiated on Pool 13 of the Mississippi River and similar drawdowns have been complete on Pools 8 and 25 on the Mississippi River. These projects on the Mississippi may present 'lessons learned' which could be utilized for the IR drawdown attempts.

Water Quality: This alternative is anticipated to improvement water quality due to reduced sediment, phosphorus, and nitrogen delivery. These improvements would result from sediment delivery reduction measures and water level management measures.

As an overall ecosystem restoration project, we anticipate that the IR will slowly regain some of its lost capacity to process excessive nutrient loads. In addition to the direct benefits in water quality due to the reduction of sediment loads, phosphorus and nitrogen, a healthy system will improve the overall water quality.

Chapter 5 - Existing Natural Resources in the Illinois River Basin

This chapter attempts to provide a general summary of habitat and land use characteristics, a list of public lands, and a general description of the current status and importance of natural resources within the IR basin. A more comprehensive overview of fish and wildlife resources, their habitats, and the physical and biological processes that affect them can be found in "Ecological impacts of navigation system development, operation, and maintenance" (Theiling 2000) and the April 2000 Draft Coordination Act Report from the Service to the Corps regarding the Navigation Study on the Upper Mississippi River System.

The Illinois River floodplain ecosystem is in a severely degraded condition. The most serious threats to the river during the last 100 years have been related to poor water and sediment quality, excessive sedimentation, exotic species, and isolation of the river main stem from its floodplain. In spite of the fact that water quality has improved greatly in recent decades, the river is currently unable to support the diverse assemblages of fish, wildlife, macroinvertebrate, and plant species that were present prior to 1900. Although protected and restored areas, particularly in the lower pools, provide important habitat for a variety of fish and wildlife species, additional conservation measures, rehabilitation projects, and long-term monitoring are needed to improve the condition of this once highly productive ecosystem.

Many sources of information were used to compile this chapter. The primary sources of information were the "Ecological impacts of navigation system development, operation, and maintenance" (Theiling 2000), and the *Ecological Status and Trends of the Upper Mississippi River System 1998* (Status and Trends Report) prepared by the Upper Midwest Environmental Sciences Center (UMESC) in Onalaska, Wisconsin (USGS 1999). The Status and Trends Report describes UMR and IR natural resources trends primarily based on monitoring data collected by the LTRMP in Pools 4, 8, 13, 26, and the Open River on the UMR and the LaGrange Pool on the IR. The natural resources inventory (described below) was also used as a source of fish and wildlife resource information.

Natural Resources Inventory

As a partner in river resource management, the Service initiated compilation of a Geographic Information System (GIS) database of natural resources for the UMR and IR in 1998. The primary objectives of the project were to: (1) Illustrate the spatial distribution of existing important habitats for fish and wildlife resources throughout the UMR and IR floodplain ecosystems, (2) Identify existing and potential navigation-related impacts to those resources, and (3) Identify potential mitigation opportunities.

The UMESC produced base maps for the project which contained land cover/land use classifications, river miles, wing dams, boat access points, refuge boundaries, levees, and topographic quadrangles. The base maps were used as a foundation to identify and digitize the following additional categories of information: bald eagle roosting and feeding areas, bald eagle nests, heron and egret nesting colonies, waterfowl use areas, migratory and resident bird habitats, mussel and fingernail clam resources, commercial fisheries, sport fisheries, fish over-wintering areas, fish spawning areas, other important fish habitats, reptile and amphibian use areas,

mammal use areas, unique habitats, areas with potential for enhancement or restoration, navigation impact areas, and areas which have already been restored.

The Service completed the draft database which contained information gathered from existing literature and from over 60 river biologists and managers who participated in a series of 8 workshops held from June 1998 to February 1999. Workshop participants included representatives from the following Federal and state agencies: U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Army Corps of Engineers, Minnesota Department of Natural Resources, Wisconsin Department of Natural Resources, Iowa Department of Natural Resources, Illinois Department of Natural Resources, and Missouri Department of Conservation.

Draft maps and tables were created and printed by UMESC and sent to over 100 professional biologists, managers, and university professors from the agencies mentioned above as well as the Nature Conservancy, National Audubon Society, Western Illinois University, and Midwest Raptor Research Fund for the technical review process. UMESC finalized the database consistent with the information and comments received during the review period, and hard copy atlases displaying all records with customized icons were printed (USFWS 2000b; USFWS 2000c). Table 5.1 and Figure 5.2 demonstrate the types of spatial and narrative information contained in the database and atlases. Table 5.1 represents all entries within the IR Natural Resource Inventory and contains 1277 records which are summarized by category and IR pool. Figure 5.2 is a spatial representation of the IR near the Tazewell and Mason County line.

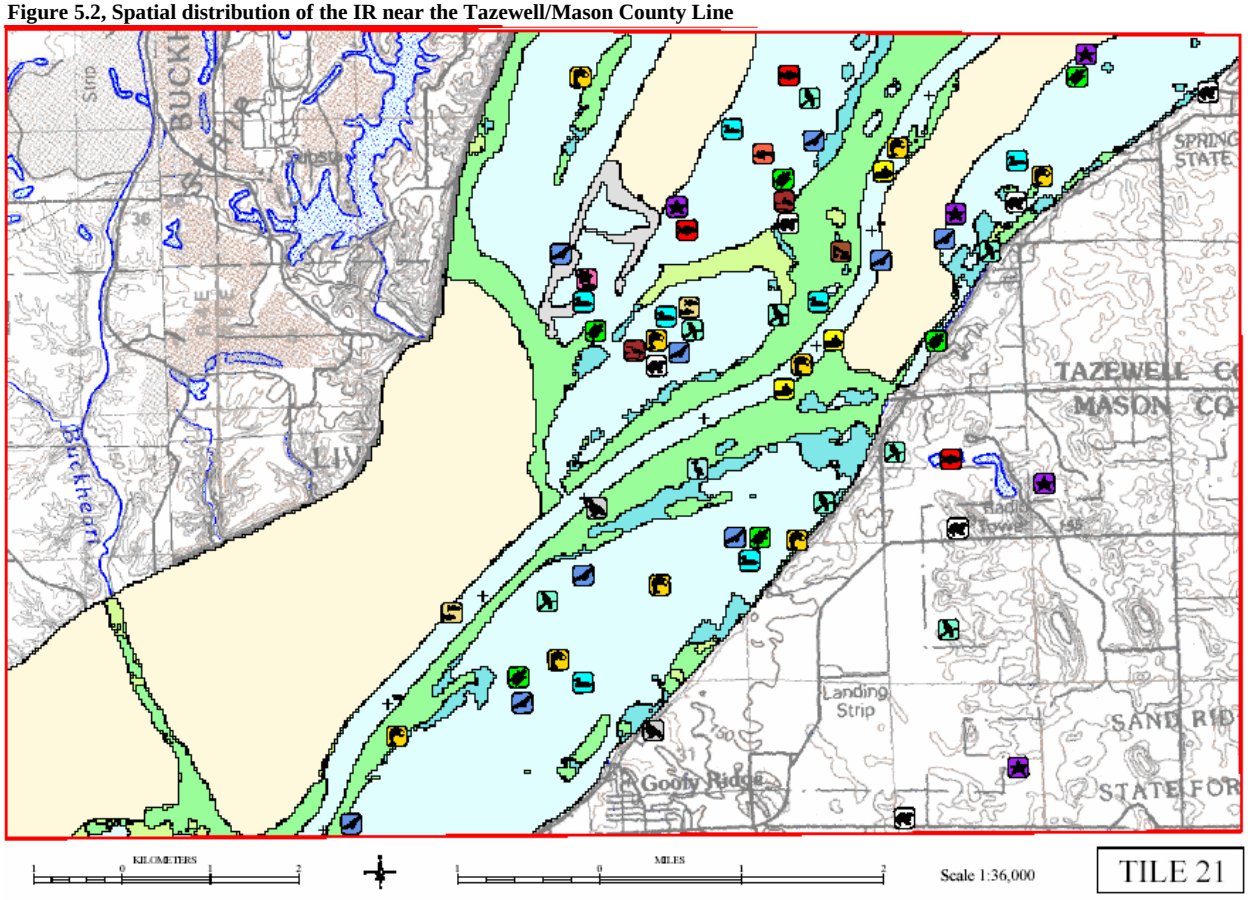
Although we caution against using this information for purposes other than making gross comparisons between areas or for making very generalized conclusions, this dataset presents a unique compilation of existing natural resources along the IR mainstem. Though not developed for this specific purpose, the inventory can act as a significant resource at the regional, systemic, and executive team levels of the IL 519 Study process. In addition, this tool (developed by a multidisciplinary team including the Corps and IDNR) could be utilized and improved/expanded for tracking additional restoration efforts which are funded or authorized under the IL 519 authority.

In addition to housing natural resource data, the inventory also contains a general reference for recreational use areas up and down the river. As an identified objective, the feasibility report states that ancillary recreational benefits would be seen through implementation of the IL 519 authority. The resource inventory could also assist with this objective.

Table 5.1, Number of records in the IR resources inventory data set by category and pool.

Resource Category	Pool								
	Alton	LaGrange	Peoria	Starved Rock	Marseilles	Dresden Island	Brandon Road	Lockport	**Total**
Migratory and resident birds	31	58	32	2	6	5	0	0	**134**
Waterfowl use areas	27	59	39	3	9	6	0	1	**144**
Heron and egret nesting colonies	3	4	2	0	0	0	0	0	**9**
Bald eagle nests	5	6	0	0	0	0	0	0	**11**
Bald eagle roosting and feeding areas	18	51	21	0	2	0	0	0	**92**
Fish over-wintering areas	9	12	4	1	2	0	0	0	**28**
Fish spawning areas	12	18	26	7	4	2	0	0	**69**
Sport fisheries	22	71	83	7	9	12	1	1	**206**
Commercial Fisheries	2	29	0	0	0	0	0	0	**31**
Other important fishery resources	6	7	6	3	2	0	0	0	**24**
Mussel and fingernail clam resources	18	15	7	2	2	0	0	0	**44**
Mammal use areas	9	23	12	2	4	0	0	1	**51**
Reptile and amphibian use areas	54	29	1	0	1	0	0	0	**85**
Unique areas	20	40	28	7	15	5	0	9	**124**
Areas with potential for enhancement	34	10	3	0	1	1	0	0	**49**
HREPs and other restored areas	9	9	2	0	0	0	0	0	**20**
Navigation impact areas	4	41	36	6	11	4	3	1	**106**
Total	**283**	**482**	**302**	**40**	**68**	**35**	**4**	**13**	**1227**

Figure 5.2, Spatial distribution of the IR near the Tazewell/Mason County Line



Floodplain Lands Managed for Fish and Wildlife Resources

Land management authorities vary in the IR corridor. Unlike the UMR, the Corps owns only a small amount of land in the IR floodplain, except in Alton Pool. Public lands along the lower IR are primarily owned and managed by the IDNR or the Service. Along the upper IR, public lands are managed by the IDNR or county forest preserve districts.

National Wildlife Refuges: Congress has placed over 16,000 acres of land and water in the IR floodplain into the National Wildlife Refuge System (Table 5.3). The commercial navigation channel passes along or through most of these tracts. Refuge lands along the IR are managed primarily for the benefit of fish and wildlife, but also contribute greatly to recreation, flood storage, and water supply functions of the system. These lands provide significant habitat for many animal and plant species which utilize floodplain habitats. Such habitat has been largely eliminated or is being developed or modified in many non-refuge areas.

Table 5.3, Summary of National Wildlife Refuge lands along the Illinois River

Illinois River National Wildlife and Fish Refuges	Acres	Location
Cameron-Billsback Unit	1,709	Peoria Pool
Chautauqua NWR	4,488	LaGrange Pool
Emiquon NWR	1,303	LaGrange Pool
Meredosia NWR	2,883	Alton Pool
Mark Twain National Widlfie Refuge Complex		
Two Rivers NWR	5,840	Alton Pool
Total IR acres in the National Wildlife Refuge System	**16,223**	

Two Rivers National Wildlife Refuge of the Mark Twain National Wildlife Refuge Complex includes over 5,800 acres along the lower portion of the IR, near its confluence with the UMR. The refuge has additional lands along the UMR. Key goals of the refuge are to conserve and enhance the quality and diversity of fish and wildlife and their habitats and to restore floodplain function in the river corridor. It is recommended that where appropriate, the IL 519 goals be coordinated with existing or draft refuge Comprehensive Conservation Plans (CCPs). These CCPs may present existing plans to increase fish and wildlife habitat and offer a roadmap to success in these areas without the need for extensive additional planning efforts.

State Managed Lands**:** The IDNR manages over 50,000 acres for migratory waterfowl and hunting at 23 sites along the IR, including 6 state parks and several boat access sites. In the Alton Pool, approximately 8,800 acres of Corps-owned lands are managed by IDNR. In general, management objectives of these lands are to provide refuge for fish and wildlife and to provide access and enhance opportunities for outdoor recreation including camping, hiking, boating, hunting, fishing, trapping, and wildlife observation.

Private Management: There is a considerable amount of fish and wildlife habitat controlled by private interests in the IR floodplain. Private duck hunting clubs manage approximately 60,000 acres of the floodplain (Havera 1995). The Illinois Chapter of The Nature Conservancy is restoring natural floodplain communities on former agriculture levee districts as part of an overall IR conservation plan. Among their goals is reestablishing the ecological processes that once supported the abundant and diverse biological communities along the river. Restoration has begun at their Spunky Bottoms Project, which consists of 1157 acres in Brown County. Plans include reestablishing wetland habitats and working with the Corps of Engineers on a Section 1135 project that will include a water control structure to provide a managed connection with the river. Planning is also underway for the Conservancy's Emiquon Project in Fulton County, where their recently acquired 7604-acre property will have over 6000 acres of restored open water, marsh, wet prairie, and bottomland hardwood habitats in the floodplain. The Wetlands Initiative is in the process of acquiring a 2500-acre drainage and levee district along the IR near Hennepin, and similar restoration efforts are anticipated.

General Habitat and Land Cover Characteristics

The IR floodplain has two distinct geomorphic reaches which cover a total of approximately 613,000 acres (Theiling 2000). The upper IR is a geologically young section of the river, extending upstream from the town of Hennepin, and the lower IR follows an ancient reach of the

Mississippi River, from Hennepin to Grafton, Illinois. Land cover types based on LTRMP 1989 data are summarized in Table 5.4.

The upper IR reach includes the Starved Rock and Marseilles navigation pools and is characterized by a steep gradient, narrow floodplain, and a lack of non-channel aquatic habitat. This reach accounts for only 10 percent of the total IR floodplain area.

Table 5.4, Percentage of land cover types in the Illinois River floodplain by upper and lower reaches (source: LTRMP 1989 data).

Land Cover Type	Upper Illinois River	Lower Illinois River
Aquatic Vegetation	1%	2%
Grasses/Forbs	12%	4%
Urban/Developed	20%	3%
Sand	<1%	<1%
Open Water	23%	16%
Agriculture	24%	61%
Floodplain Forest	21%	14%

The lower IR reach includes the Peoria, LaGrange, and Alton navigation pools and has a very broad floodplain, extensive backwaters, and a low gradient that drops less than one foot per mile. This reach accounts for 90 percent of the total area of the IR floodplain (Theiling 2000). Extensive sedimentation problems in this reach continue to threaten the productivity of backwater and main channel border areas. Floodplain development has isolated a majority of the floodplain from the main channel and many backwaters are now behind levees. For example, in the LaGrange and Alton Pools approximately 55 percent of the floodplain is isolated from the main channel.

Table 5.5, Historical overview of conditions on the Illinois River, 1900 to present.

Time Period	Description
pre-1900	Historically, the Illinois River was ecologically diverse and served as a nationally significant commercial fishery, sport fishery, and waterfowl hunting area.
1900	The Chicago Sanitary and Ship Canal was constructed, and water from Lake Michigan and sewage from Chicago were diverted into the Illinois River.
1910	The river's benthic organisms were destroyed due to the increased pollution and low dissolved oxygen levels.
1920	Aquatic plant beds had virtually disappeared from the river.
late 1920's - early 1930's	Sewage treatment plants were constructed in Chicago, resulting in improved water quality and dissolved oxygen levels in the river. Aquatic plant beds and macroinvertebrates returned.
1930's	The lock and dam system was constructed to support commercial navigation.
1955-1960	The river changed rapidly during this time frame, and a critical ecological threshold was broken. Macroinvertebrates and aquatic plant beds disappeared from the river, followed by a subsequent rapid decline in fish and wildlife populations. Accelerated de
1970's	The Clean Water Act of 1972 facilitated reductions in toxic waste and organic pollutant loads in the river, resulting in improved water quality. However, excessive sediment inputs as well as sediment resuspension continued to result in the loss and degra
1990's	The exotic zebra mussel (native to eastern Europe) entered into the Illinois River from Lake Michigan and spread rapidly throughout the river. Most native mussel beds in the river were infested by 1993.
2001	The Illinois River still has not recovered to an ecologically sustainable condition. In spite of the water quality improvements afforded by waste water treatment facilities, sedimentation, non-point source pollution, and poor water clarity remain serious

Overall habitat conditions on the IR have been severely degraded during the last 100 years. A historical summary of events and conditions on the river are provided in Table 5.5.

Water Quality: A number of factors including domestic sewage, industrial wastes, and agricultural land use practices have adversely affected water quality in the IR during the past 100 years. In the past 30 years, improvements in water quality have taken place with implementation of the Clean Water Act. However, runoff from urban areas and agricultural fields in the watershed continue to transport sediment, fertilizers, and pesticides into the waters of the IR. Waves generated by wind and commercial tows re-suspend fine sediments, resulting in ongoing poor water clarity. Sedimentation is perhaps the most serious problem threatening the river's resources today.

Fishery Resources: The distribution and relative abundance of fish are more completely known than most other faunal groups in the IR. A total of 150 species representing 27 families have been recorded from the waters of the IR and upper waterway, of which 66 are considered common to abundant (Havera et al. 1980). Considerable variation in numbers of species is found from upstream to downstream, with greater species diversity in the lower pools where more backwater lake habitats are available (Havera et al. 1980).

Fishery resources have been adversely impacted by a number of perturbations during the last 100 years, including industrial and municipal pollution, agricultural and urban runoff, extensive levees, loss of aquatic habitat due to sediment deposition, poor water clarity, and exotic species. Although fishery populations have fluctuated greatly during the last century and species composition has changed remarkably, the fishery has shown a strong recovery in recent years.

Recreational Fishing: The IR sport fishery has improved greatly since measures to reduce toxic waste and organic pollutant loads were enacted by public agencies in the 1970s. Estimated angling expenditures per day are $49.1 million for over two million sport fishing activity days. The IR averages over two million sport fishing days annually, or about 5 percent of the total fishing in Illinois. Game species commonly occurring in the IR include largemouth bass, white bass, smallmouth bass, sauger, channel catfish, drum, crappie, bullhead, bluegill, and miscellaneous sunfish such as the green and pumpkinseed.

Use of the sport fishery on the IR directly corresponds to the health and desirability of the fish population. A definite increase in sport fishing pressure has been noted in recent years. New recreation areas make boating access for fishing easier in the Tri-County area (Peoria) than in many areas along the river. The resurgence of the game fish population is being well utilized and fishing should remain good as long as water conditions remain favorable.

Commercial Fishing: Historically, the IR was a nationally significant commercial fishery. At the turn of the century, a 200-mile reach between Hennepin and Grafton produced 10 percent of the total U.S. catch of freshwater fish, more than any other river without a commercial anadromous fishery. During this time, about 180 pounds per acre were harvested. The commercial fishery declined during the 1950s and 'bottomed-out' in 1979, with a harvest of only 305,018 pounds.

However, the fishery has shown remarkable improvement since 1979. Data provided by the

IDNR indicates that the average annual harvest from the IR during the five-year period 1996-2000 was 923,094 pounds. In the year 2000, the total harvest was 796,360 pounds, with 48 percent coming from LaGrange Pool, 32 percent from Alton Pool, and 20 percent from Peoria Pool. In terms of biomass, the 2000 catch was comprised of 52 percent buffalo, 27 percent catfish, 11 percent common carp, 4 percent Asian carp, and 2 percent drum.

Mussel Resources: In 1900, approximately 40 mussel species occurred in the IR. However, mussel populations were decimated by a variety of perturbations encountered during the next several decades (Table 5.6). Since passage of the Clean Water Act in 1972, mussels have shown some signs of recovery. For example, the resource had recovered sufficiently to allow the harvest of 181 tons of mussels from the river in 1988 (Fritz 1989). Surveys conducted by the Illinois Natural History Survey from 1993 to1995 indicated that a number of species had begun to recolonize in several pools (e.g., 11 species in Marseilles Pool, 8 species in Starved Rock Pool, 15 species in Peoria and LaGrange Pools, and 17 species in Alton Pool) (USGS 1999).

Table 5.6, Numbers of freshwater mussels species by pool and year (Illinois Natural History Survey)

Navigation Pool	1870-1900	1906-1909	1966-1969	1993-1995
Marseilles	38	0	0	11
Starved Rock	36	0	0	8
Peoria	41	35	16	15
La Grange	43	35	18	15
Alton	41	36	20	17

However, further recovery of mussel resources remains threatened by the exotic zebra mussel, which was first documented in the IR in 1991. Zebra mussels entered into the IR via Lake Michigan and spread rapidly throughout the river. Most native mussel beds in the river were infested by 1993 (USGS 1999). One site near the confluence with the UMR had zebra mussel densities as high as 100,000 per square meter in 1993 (USGS 1999). As with mussels on the UMR, the future status of IR mussel fauna is very uncertain.

Birds: Historically, IR floodplain habitats have supported a wide variety of bird populations including waterfowl, colonial waterbirds, songbirds, wading birds, shorebirds, raptors, and woodpeckers. Prior to the 1950s, the IR floodplain was one of the most important waterfowl staging areas in the country (USGS 1999). Since then, however, human modifications to this floodplain ecosystem have resulted in habitat degradation and an associated decrease in bird use of the IR corridor. Dabbling duck populations on the IR have decreased steadily since the late 1940s as waterfowl migration routes have shifted from the IR to Pools 19-26 of the UMR (USGS 1999).

In spite of the overall degradation in habitat within the IR floodplain, protected and restored areas in the lower pools continue to provide important areas where waterfowl and other migratory birds can stop, rest, feed, and nest. The Alton, LaGrange and Peoria Pools support greater species diversity and higher numbers of migratory and resident birds than upstream pools (USFWS 2000b). The lower pools of the IR may provide benefits to as many as 264 bird species (USFWS 2001a).

The American Bird Conservancy has designated the Illinois River National Wildlife and Fish Refuges as an *Important Bird Area in the United States*, reflecting the importance of these areas to bird populations. In addition to supporting waterfowl, refuge lands are also known to support

bald eagles and other raptors, colonial waterbirds, songbirds, wading birds, shorebirds, and woodpeckers (USFWS 2001a). Continued efforts to protect and restore habitats within the IR floodplain will be of benefit to many migratory bird populations over the long-term.

Mammals: A total of 28 species of mammals have been officially recorded in the Illinois River National Wildlife and Fish Refuges, including foxes, coyotes, raccoons, whitetail deer, badgers, beaver, muskrat, woodchucks, rabbits, squirrels, opossum, mink, and otter (USFWS 2001a). The federally endangered Indiana bat is also known to utilize forested habitats along the river and has been recorded within the IR floodplain in LaSalle, Pike, and Jersey Counties (Walters 2001). It is anticipated that future protection and restoration of floodplain areas would induce benefits to a wide variety of mammal species.

Reptiles and Amphibians: Wetlands and backwater lakes within the IR floodplain provide important habitat for a variety of reptiles and amphibians, including frogs, toads, salamanders, turtles, and snakes. As expected, the resources inventory (USFWS 2000b) shows that the Alton, LaGrange, and Peoria Pools in the lower IR are of particular importance for these animals. Further, the Illinois chorus frog, a state-listed species, has been recorded at several locations within the IR floodplain (USFWS 2000b). Protection and restoration of IR floodplain habitats should be considered an important component in the conservation of Illinois' reptiles and amphibians. Additionally, data gaps should be filled to better establish population status and trends.

Macroinvertebrates: Ammonia toxicity has been identified as a causal agent in the widespread disappearance of benthic macroinvertebrates on the IR during the mid-1950s (USGS 1999). Because these organisms play such an important role in the aquatic food web, declines in macroinvertebrate populations in the past have been linked to subsequent declines in fish and bird populations on the IR. Sparks (1984) identified the decline in benthic macroinvertebrates as an important causal factor in the decline of the IR commercial fishery since 1950. The shift in migratory bird use away from the IR in the 1950s is also likely directly related to the status of the macroinvertebrate community.

Today, macroinvertebrate communities continue to remain poor in the upper reaches of the IR, and fingernail clams and mayflies now only occur in low densities in the lower river reaches (USGS 1999). In contrast to the UMR, fingernail clam densities are higher in channel areas than in non-channel areas in the IR; this is probably attributable to the fine grained sediments in channel areas, lack of channel border habitats, and water and sediment quality problems in the backwaters of the IR (USGS 1999).

If habitat conditions in IR backwaters can be restored to support a more diverse, healthy macroinvertebrate community, then fish and waterfowl populations will also clearly benefit. Management strategies aimed at achieving this goal should be incorporated and prioritized in the IL 519 project authority and among all restoration efforts in the IR floodplain and watershed.

Floodplain Forests: Floodplain forest habitat covered 14.3 percent (or 78,467 acres) of the IR valley landscape in 1989 (USGS 1999). Although existing floodplain forest acreages have been greatly reduced in comparison to pre-settlement times, these habitats are still an important component of IR floodplain ecosystem. They provide important habitat for fish and wildlife during flood conditions, reduce soil erosion, and improve water quality. Floodplain forests are

particularly important to migratory bird populations. Management actions, much like those at Pekin Lake, are needed to restore and enhance the quality of floodplain forests in the IR floodplain.

Aquatic Vegetation: Aquatic plant beds were well-established in IR backwaters prior to the 1900s. Organic pollution nearly eliminated these beds by 1922, but they returned in the late 1930s in response to waste water treatment (USGS 1999). In the mid-1950s, a critical threshold with respect to sediment problems was reached, and aquatic vegetation died out on the IR. This die-off was followed by backwater substrates becoming easily disturbed, an increase in turbidity, a shift in the fish community toward more tolerant species, and a shift in waterfowl migrations away from the IR. Aquatic plant beds have not recovered since the 1950s, and their distribution is primarily restricted to backwater areas isolated from the river (USGS 1999).

Aquatic plant beds perform a number of important ecological functions including: generation of dissolved oxygen, stabilization of substrates, filtration of suspended sediments, uptake of nutrients, supplying tubers as an important food source, providing habitat for invertebrate communities, and providing shelter for young and spawning fish (USGS 1999). Therefore, restoration of aquatic plant beds should be incorporated as an important objective for ongoing and future restoration projects in the IR floodplain.

Chapter 6 – Probable Future Conditions (with and without project)

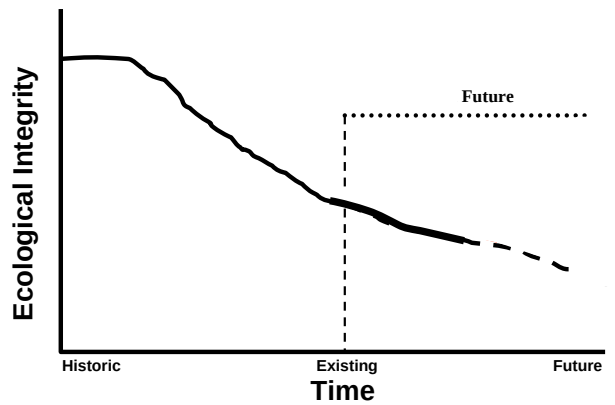
Over the past century, fish and wildlife habitats on the IR have been severely degraded by navigation activities, floodplain development, poor water quality (point and non-point source pollution), tributary watershed degradation, and exotic species introduction. Improved water quality in the last 30 years has resulted in significant beneficial effects on aquatic organisms, but overall the ecosystem is still declining. Although some biologists believe that the rate of degradation has subsided, many habitats and IR species populations are expected to degrade further in coming decades. The cumulative effects of navigation project operation and maintenance actions, impacts from floodplain development, continued sedimentation, continual degradation in tributary watersheds, un-natural hydrologic regimes, and the additional spread of exotic species will continue to degrade species diversity and habitat quality and quantity unless management actions are taken to reverse this trend.

As they are currently funded or structured, we agree with the Corps that the currently authorized restoration and management activities are not adequate to reverse the system-wide decline in fish and wildlife habitat that is occurring.

Future Without Project Condition

Based on assumptions, which are outlined by the Corps' Feasibility Study and have been documented by other environmental reports on the IR system regarding current conditions of the ecosystem and anticipated changes, it appears likely that the future without project conditions of the IR will continue to degrade from the present condition without management intervention. Figure 6.1 depicts future projected conditions of the IR as predicted by regional experts. These predicted conditions were established through expert panel discussions and extensive research efforts within the state and IR basin. This predicted degradation is well documented (see Status and Trends Report and the Upper Mississippi River and Illinois Waterway Cumulative Effects Study).

Figure 6.1, Predicted Future condition of IR w/out Project



In addition to this feasibility study, another recent investigation makes predictions on the future of fish and wildlife resources on the IR and is used in this chapter to help describe probable future conditions without the project. This study is the *Upper Mississippi River and Illinois Waterway Cumulative Effects Study* (Cumulative Effects Study), also prepared by the Rock Island District Corps for the System Navigation Study (USACE 2000a; USACE 2000b). The Cumulative Effects

Study analyzed historic photographs to quantify trends in aquatic habitat since river impoundment in the 1930s. Geomorphologists

extrapolated the observed trends over the next 50 years. Biologists then interpreted what effect these aquatic habitat changes would have on fish and wildlife. The Cumulative Effects Study has some significant limitations. It does not address terrestrial habitat changes which are critical to ecosystem health, and depth was not included as an aquatic parameter which seriously impaired the evaluation of changes in habitat quality.

For the purposes of this study, the future without project analysis was defined as follows. The without project condition is what the river basin and its uses are anticipated to be like over the 50-year planning period without any restoration implemented as part of the study. Of general concern to the Service is the lack of the future without project analysis to address the likelihood of environmental restoration occurring within the IR basin as part of the Navigation Study being completed by the Corps. If, however, the Corps is making an assumption that that the future only includes continued operation and maintenance of the 9-foot Channel Project and no significant changes related to environmental restoration, then that assumption should be described within the feasibility report.

The Rock Island District has the responsibility for completing both the IL 519 Study and the Navigation Study and should produce an analysis of future condition based on the co-inhabitance of the two authorities.

Corps of Engineers Cumulative Effects Study

The Corps' Cumulative Effects Study predicts changes in UMR and IR aquatic habitat likely to result from multiple influences (e.g., floodplain development, changes in water quality, and sediment input from the watershed), not just navigation traffic-related effects. Trends in floodplain terrestrial habitat were not analyzed since the Corps' focus was on aquatic habitats potentially affected by navigation traffic. Despite some serious limitations, the study still provides a useful forecast of future trends in fish and wildlife aquatic habitats.

General conclusions drawn by the geomorphic analysis of the IR include the following:

1. The flow along the IR is affected by numerous man-made and natural influences including structures to operate and maintain the 9-foot navigation channel. These include levees, wing dams, bridges, channel erosion and sedimentation, dredging, locks and dams, dams and reservoirs on tributaries, watershed land use, consumptive water use, and potentially climate change.

2. River stages within the IR navigation pools are significantly influenced by the operation of the 9-foot Channel Project locks and dams.

3. The 9-foot Channel Project and levees have influenced river stages within the IR. The construction of levees along the IR has isolated large portions of the floodplain from the river and reduced available flood storage capacity.

Regarding predictions for aquatic habitat changes, the Cumulative Effects Report estimates the following:

With respect to the IR and upper waterway, the report states that significant portions of existing backwater areas would be converted to marsh or wetland by the year 2050, referring to the work of other investigators. The report concludes that "...little overall change has occurred along the main channel from the confluence with the UMR upstream to the Brandon Road Lock and Dam." These statements are very consistent with the finding of the IL 519 Study and underline the significance of the sedimentation issues in the IR basin.

Predictions made by the Cumulative Effects Study for the IR are summarized in the following table (Table 6.2).

Table 6.2, Summary of aquatic habitat changes on the Illinois Rivers (summarized from the Corps' Cumulative Effects Study (USACE 2000a; USACE 2000b)).

	Habitat Trends	**Animal/Plant Trends**
Illinois River	Significant loss of backwater lakes anticipated due to sedimentation. No change in main channel habitat.	Main channel species will remain stable, but backwater guilds will likely decline.

The following aquatic guilds were assessed in the Cumulative Effects Study based solely on general planning information. No depth data was available and no field testing was conducted. Thus, the assessment is limited to assumptions based on increasing or decreasing aquatic surface area. The IL 519 Study Feasibility Report also addresses these issues and concluded with similar findings. The following sections include a summary of the IL 519 Study, a summary of the Cumulative Effects Study, and our analysis for each aquatic guild.

Aquatic Vegetation: The IL 519 Study concluded that on the mainstem IR, submersed aquatic plants died off in the mid-1920s. In the late 1930s, these plants made a brief recovery in response to early wastewater treatment efforts. By the 1950s, aquatic plants reached a critical threshold, in relation to sediment and wave-related problems, from which they have not recovered. Currently, submersed aquatic plants are found only in isolated areas of the mainstem. This loss of vegetation has lead to easily disturbed backwater substrates, increased turbidity, poorer habitat conditions, and fish communities increasingly dominated by species tolerant of low dissolved oxygen and poor habitat. Waterfowl, particularly diving ducks, have shifted their migrations away from the IR. Limiting factors to submersed aquatic plant recovery include sediment quality, excessive sedimentation and turbidity, rough fish activity, and unstable water levels.

The Cumulative Effects Study concludes that many areas will only sustain their productivity with the assistance of habitat improvement projects such as the EMP, water level management, and island stabilization. These improvements are needed to maintain no net loss due, in part, to the ongoing 9-foot Channel Project with increasing traffic. Without such improvements we can anticipate that continued sedimentation and attendant turbidity will lead to further degradation of aquatic plant diversity and productivity.

Waterfowl and Wetlands: The IL 519 Study concluded that there were declines in diving ducks (essentially gone since the 1950s) and dabbling ducks (80 percent decline in mallard populations) in the basin, documented and summarized by the Illinois Natural History Survey. These losses can be linked to a loss of food sources (aquatic plants and macroinvertebrates) in

the 1950s and ongoing habitat degradation and loss. On the mainstem, habitat conditions are typically favorable only in areas isolated from the river. The loss of aquatic plants and the benthic community were identified as limiting factors on waterfowl populations.

The Cumulative Effects Study concluded that diving ducks such as canvasback and scaup feed on aquatic vegetation and invertebrates during their fall migration. Impounded areas above certain Locks and Dams and backwater areas are especially important. Future use of the UMR (specifically the IR valley) by diving ducks will depend on the availability of these food resources. Any factors affecting aquatic vegetation and invertebrates in the impounded areas will likely cause a similar response to the numbers of diving ducks using the areas. With up to 50 percent of the canvasbacks in North America using the Mississippi River basin, protection and enhancement of these resources is critical.

Fish: The IL 519 Study concluded that fish populations and diversity are thought to be stable in the lower pools and still improving in the upper pools, though at lower levels than those estimated prior to European settlement. The long-term outlook may be for populations and native species diversity to decline gradually (increasing invasive species, suitable habitat declining, and loss of mainstem benthic community).

The Cumulative Effects Study concluded that in recent decades, as water quality has improved, so have fish populations. Some species of fish which prefer high velocity main channel and side channel habitats are very healthy such as walleye, channel catfish, drum, and shovelnose sturgeon. Despite impediments such as navigation dams which block fish movement, these fish populations will likely remain stable or increase in the future. The pallid sturgeon, however, may be on the verge of extinction due to habitat loss in the unimpounded reach of the Mississippi River and lower reach of the IR. Other fishes that prefer backwaters and low velocity waters such as buffalo, bluegill, largemouth bass, and crappie are likely to decrease in number as suitable backwater habitats are lost to sedimentation, unless management actions reverse this trend. Suitable overwintering areas may become scarce, affecting entire fish communities within pools that cannot navigate to suitably deep areas to overwinter.

Freshwater Mussels: The IL 519 Study concluded that mussels had historically declined in response to over-harvesting and poor water quality, as well as ongoing problems with excessive sedimentation. After initial efforts to improve water quality, mussel populations also improved. This improvement was most evident in the upper river, where water quality impacts were most severe. Commercial mussel harvests have resumed in the lower mainstem pools. However, the general trend is still declining (numbers and species), attributed to excessive siltation, loss of habitat, chemical pollution (including herbicide and insecticide runoff), and competition from exotic species (zebra mussels).

The Cumulative Effects Study concluded that unionid mussels are one of the most important invertebrate groups on the river. Generally, mussels prefer coarse and firm stable substrates where several species may aggregate in groups known as “mussel beds.” Since the early 1900s, sedimentation has caused a significant loss of suitable mussel habitat throughout the IR. Construction of channel regulatory structures, such as wing dikes, has also eliminated significant areas of habitat in the main channel border and side channels. Some loss of habitat is likely to continue from these activities.

Potentially, the most significant threat to the future of IR mussels is the threat posed by the exotic zebra mussel. Limited sampling of mussel beds in early 2000 indicated that large numbers of native mussels were being killed by zebra mussel infestation. However, early sampling in 2003 and 2004 indicates that zebra mussel infestations may be declining and native unionids beds are stabilizing (Don Helms, aquatic ecologist, pers. com. 2004). This trend is likely to fluctuate as is typical of exotic species population dynamics, which create peak and bust-type cycles. River biologists are thus expecting the zebra mussel population to rebound and see lasting effects from this invasion. Although much has been learned, there is much more to learn about the impacts of this exotic mussel. It is assumed that native unionids will continue to decline over the next 50 years.

Macroinvertebrates: The IL 519 Study concluded that long-term widespread declines in benthic macroinvertebrates are linked to domestic and industrial pollution, metal contaminated sediments and ammonia, as well as increasingly silty substrates. These declines have had adverse effects on river fishes and birds. Because of their wide distribution and potential to exhibit dramatic community changes when exposed to water and sediment pollution, they are ideal indicators of environmental quality.

The Cumulative Effects Study predicts that burrowing invertebrates could decline in the future as sedimentation continues. This group of animals includes mussels, fingernail clams, mayflies and other insects, and worms. Continued sedimentation and turbidity, aggravated by navigation and tributary watershed degradation, will further degrade aquatic habitats used by macroinvertebrates.

Floodplain Forests: The IL 519 Study concluded that floodplain forests have been severely impacted by habitat loss, altered hydrology, fire suppression, and increasing fragmentation. Invasive species are becoming more common, primarily in the understory. In addition, higher water tables associated with the navigation pools have reduced, and in some areas, eliminated mast tree regeneration. More flood and water tolerant species, such as silver maple, have become the dominant species and species diversity is decreasing. Timber harvesting of maples is becoming increasingly common, leading to further losses in forested areas and increasing forest fragmentation. Without restoration efforts in both reestablishing forests and restoring species diversity, forests and forest-dependent species will continue to decline.

The Cumulative Effects Study concluded that agricultural and urban development have caused a significant loss of floodplain forest along the IR. IR floodplain forests are heavily influenced by water stage. The water level alterations of the early 1900s and navigation locks and dams of the 1930s severely altered the floodplain forests of the system. Most notably these changes led to more flood tolerant trees and the loss of a significant portion of the mast producing tree species. In addition to these early twentieth century changes, the flood of 1993 caused significant mortality in many of the remaining forest stands along the IR, particularly in the lower reaches. Elevated water levels from river impoundment continue to stress forests and hamper regeneration. Acreage of willow and cottonwood communities is predicted to decline further in the impounded reaches, but remain at the same level in the unimpounded reach. In the areas heavily impacted by sedimentation, patches of willow and cottonwood seedlings have since colonized openings created by the flood of 1993.

Amphibians and Reptiles: The Cumulative Effects Study concluded that turtles, frogs, snakes, toads, and salamanders comprise some of the least studied fauna on the floodplain. Most of these animals favor backwater shallow wetland habitats. Their diversity is promoted by isolation from predators. For this reason, they are likely to decline in diversity as isolated wetlands in the floodplain decline, and also in numbers where backwater habitats are also declining from sedimentation.

Migratory Birds: The Cumulative Effects Study concluded that bottomland forest habitats support significant numbers of migratory birds such as songbirds, bald eagles, herons, egrets, and ospreys. Shorebirds use shallow wetlands and mud flats. Red-shouldered hawks, which are a state endangered species in Illinois, are dependant upon larger contiguous forest tracts which are now found primarily along the river. Declines in songbird use and diversity may be inevitable if forest habitat continues to decline.

Ecological Integrity: Based on all the factors above, the general ecosystem integrity, or health, of the Illinois River Basin is still declining in spite of the dramatic water quality improvements made as a result of the Clean Water Act. Pressure on the remaining habitats will continue to increase as the population increases. Finally, changes to the ecosystem over time have been dramatic. Current trends may be difficult to reverse and will require significant commitments of resources and time.

USGS Status and Trends Report

In addition to the Cumulative Effects Study and this feasibility report, the USGS Status and Trends Report (USGS 1999) evaluated the present status and makes predictions for three reaches of the UMR and the lower reach of the IR with respect to six criteria. These six criteria are as follows.

Table 6.3, Summary of Status and Trends Criteria for the IR

CRITERIA	Illinois River Lower Reach
Viable Native Populations & their Habitats	Degraded & stable
Ability to Recover From Disturbances	Degraded & stable
Ecosystem Sustainability	Degraded & declining
Capacity to Function as part of a Healthy Basin	Degraded & stable
Annual Floodplain Connectivity	Degraded & stable
Ecological Value of Natural Disturbances	Degraded & stable

1. The ecosystem supports habitats and viable native animal and plant populations similar to those present prior to any disturbance.

2. The ecosystem is able to return to its pre-existing condition after a disturbance, whether natural or human-induced.

3. The ecosystem is able to sustain itself.

4. The river can function as part of a healthy basin.

5. The annual flood pulse “connects” the main channel to its floodplain.

6. Infrequent natural events such as floods and droughts are able to maintain ecological structure and processes within the reach.

Each river reach was graded for the six criteria as being degraded, heavily impacted, moderately impacted, or unchanged/recovered. Future trends for these criteria were then forecast for each river reach. Trends for each criteria can be stable, improving, or declining. A summary of the report's evaluation for the IR is presented in Table 6.3.

The USGS report predicts that habitats in the IR will continue to degrade overall from sedimentation and erosion because the river's natural processes are unable to function. Habitat projects to reestablish terrestrial and aquatic structural diversity are needed to offset deteriorating habitats. Point source pollution, high sediment loads from the watershed, agricultural run-off, and introduction of exotic species will continue to pose threats.

The combination of floodplain isolation, sedimentation, altered water regimes, and poor sediment quality make any short-term reversal of IR degraded habitats unlikely. Each of these factors is so degraded that improvement of any one alone may not result in much overall benefit.

The USGS report concluded that in order to maintain the current ecological conditions of the IR system and to restore degraded functions, a significant increase in restoration activities is needed.

Future With Project Conditions

The Corps has hosted a series of meetings between the IDNR, the Service, The Nature Conservancy, and other interested parties over the past two years to discuss and outline expected future conditions of the IR. During these meetings, future desired environmental conditions and measurable targets were discussed and established for the key categories of fisheries, waterfowl and wetlands, mussels, macroinvertebrates, aquatic vegetation, forests, and ecological integrity (please see Section III, page 3-47 of the feasibility report for specific targets by category). Representatives of each agency also discussed and identified the system alternative which was most likely to address the serious ecological problems facing the IR and that would obtain the future desired conditions. Alternatives 6 and 7 were chosen as most likely to create the desired future conditions and ultimately Alternative 6 was chosen as the preferred alternative. Figure 6.4 presents the probable future conditions of the IR under each of the system goals evaluated.

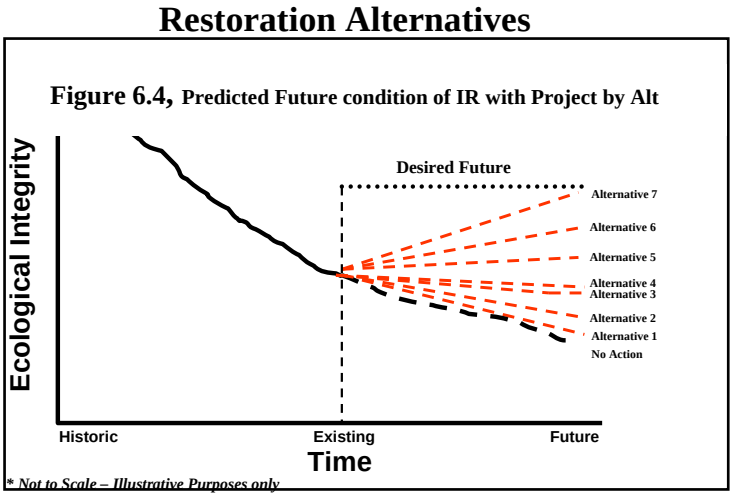


Figure 6.4, **Predicted Future condition of IR with Project by Alt**

When undertaking a restoration initiative of this scale, it is important that key priorities be established to alleviate future competition of limited funds and resources. For that reason, the IL 519 Study group has discussed the importance of criteria prioritization and has established the following list of priorities:

1. Habitat restoration and/or protection projects should be closely coordinated and combined with projects developed under other goals and authorities, in order to maximize systemic ecological integrity and effectiveness of restoration efforts and dollars.

2. The assessment process should focus on quality of the habitat and the presence of threats for the area under consideration. Those areas threatened most immediately should be targeted for protection.

3. Connectivity to the IR and major tributaries and between protected areas should be key focus area.

4. Preference should be given for improving and protecting existing moderately degraded habitat areas near rare and unique communities.

5. Give special consideration to rare areas.

6. Alter hydrologic regime most relevant disturbance regime to encourage species regeneration.

7. Terrestrial patch size recommendations (amount shown or greater):

    a. Bottomland hardwood forest = 500-1000 acres; 3000 acres needed for some interior avian species.

    b. Grasslands = 100-500 acres.

    c. Nonforested wetland = 100 acres, spaced 30-40 miles apart.

    d. Riparian zone = 100 feet each side; 200-300 feet wide total.

8. Aquatic habitat recommendations:

    a. Mainstem backwaters/side channels ≥ 6 feet deep, spaced 3-5 miles apart.

    b. Instream riffles – Depending on the size of the stream, the number of structures required ranges from 4 per mile for large tributaries to 22 for minor tributaries.

Though we understand that future issues may alter these priorities, it should be stressed that this list was established through agency discussion and was agreed upon at several group meetings. This list should be used to guide planning efforts at the regional team, system team, and executive team levels.

Chapter 7 – Endangered Species Consultation

The Endangered Species Act (ESA) directs all Federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the Act. Section 7 of the Act, called "Interagency Cooperation," is the mechanism by which Federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species.

Consultation under the ESA for the Illinois River 519 Study was initiated by a letter from Mr. Kenneth A. Barr, Rock Island District Corps of Engineers, dated August 2003. The letter requested a list of federally threatened and endangered species occurring within the project area, which was considered the entire Illinois River Basin within the boundaries of the State of Illinois. This information is provided in Table 7.1.

Table 7.1, Federally Listed Threatened or Endangered Species within the IR basin

	Status	Common Name (Scientific Name)	Habitat
Birds	Threatened	Bald eagle (*Haliaeetus leucocephalus*)	wintering and breeding
Mammals	Endangered	Indiana bat (*Myotis sodalis*)	caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
		Gray bat (*Myotis grisescens*)	caves and mines; rivers & reservoirs adjacent to forests
Plants	Endangered	Leafy prairie clover (*Dalea foliosa*)	prairie remnants on thin soil over limestone
		Pitcher's thistle (*Cirsium pitcheri*)	only on shorelines or sand dunes of the Great Lakes. *believed to be extirpated from Illinois
	Threatened	Decurrent false aster (*Boltonia decurrens*)	disturbed alluvial soils
		Eastern prairie fringed orchid (*Platanthaera leucophaea*)	mesic to wet prairies
		Lakeside daisy (*Hymenopsis herbacea*)	dry rocky prairies
		Mead's milkweed (*Asclepias meadii*)	virgin prairies
		Prairie bush clover (*Lespedeza leptostachya*)	dry to mesic prairies with gravelly soil
Invertebrates	Endangered	Hines emerald dragonfly (*Somatochlora hineana*)	spring-fed wetlands, wet meadows and marshes
		Karner blue butterfly (*Lycaeides melissa samuelis*)	pine barrens and oak savannas on sandy soils and containing wild lupines (*Lupinus perennis*), the only known food plant of the larvae.
Mussels	Endangered	Clubshell mussel (*Pleurobema clava*)	riverine habitats.
Reptiles	Candidate	Eastern massasauga rattlesnake (*Sistrurus c. catenatus*)	shrub wetlands

The Illinois River Basin is host to 13 federally threatened or endangered species, one candidate species, and numerous state threatened or endangered species. We offer the following description of how projects proposed and planned under the IL 519 authority would comply with the Endangered Species Act of 1973, as amended.

To comply with ESA at the program level (i.e. this feasibility report), a programmatic consultation must be completed. The programmatic consultation may be completed before or after project authorization. However, it must be completed before construction begins or any irretrievable commitment of resources is made.

It is the Federal action agency's responsibility to fulfill Section 7 consultation. It has been our recommendation to the Corps that consultation be initiated and completed in advance of authorization of the IL 519 program. However, the Corps has chosen to fulfill their responsibility under the ESA after the program receives congressional authorization. At that time, the Corps will complete a programmatic Biological Assessment (BA) and consult with us to identify and avoid, to the extent feasible, impacts to all federally threatened or endangered species within the IR basin.

A major purpose of this study is to benefit fish and wildlife of the IR Basin. No specific projects will be approved or constructed prior to the completion of the forthcoming programmatic BA, and consultation with the Service under Section 7 of the ESA has been completed. If additional consultation under Section 7 of the ESA is required for site specific projects which have impacts or actions not covered under the programmatic documentation, then independent consultation will be initiated and completed at that time. All future activities under this potential authority will be coordinated through the appropriate USFWS office.

Chapter 8 – Program/Agency Coordination

Coordination between the Service and the Corps

Service staff have been actively involved in the IL 519 Study process and with the project team by attending meetings and providing comments on draft documents. In addition to present coordination efforts, increased coordination will be needed during implementation, at a site specific level. National Wildlife Refuges, Partners for Fish and Wildlife (PFW), and other Service interests can help to achieve many of the goals outlined by this feasibility report. It is our interest to be an active team member at the Regional Team level, as well as at a system-wide management level.

Partners for Fish and Wildlife: The PFW program through the Service has restored thousands of acres of natural habitats within the State of Illinois. Although not all within the IR basin, Table 8.1 outlines the Service's conservation efforts within the State of Illinois through this program and the associated acreages restored. This program operates out of the Rock Island Field Office and our National Wildlife Refuge offices. It is a very effective and efficient way of restoring habitats. It should be considered for partnership in future goal attainment calculations. During fiscal year (FY) 2003 alone, the PFW program restored approximately 2,015 acres of habitat within the state. In addition, the PFW is an active partner with USDA programs. Together they work with interested landowners on land conservation through either USDA or PFW programs. Service biologists within the PFW program frequently work with the county NRCS district conservationist, state biologists, and many other conservation authorities throughout the state. Through the combination of the effectiveness of the program and the strong relationships among natural resource managers, the program has become very successful.

Table 8.1, PFW restoration in IL (IL PFW Coordinator Wayne Fischer, pers. Comm.)	
Wetland basins	1987-2003, PFW has restored 376 wetland basins consisting of 7,581 acres
Upland restoration	1991-2003, PFW has restored 46 upland areas consisting of 1,603 acres
During FW 2003	PFW has restored 20 basins totaling 2,015 acres.

Coordination Needs

General agency coordination has been conducted between the IDNR, USACE, USFWS, and many other interested parties regarding the IL 519 Project. However, intensive collaboration and program integration between the IDNR/USACE and the NRCS, SWCD, friends groups, ecosystem partnerships, conservation clubs, TNC, Wetland Initiative, private stakeholders, etc. is needed for the successful development of specific projects. Many of these established entities are vital to the achievement of the system goals as outlined by the IDNR and Corps. It may be appropriate for the Corps to investigate avenues of providing funding to these groups to implement small scale projects that can achieve cumulative success at the watershed scale. It would also appear counterproductive for the Corps to spend project dollars preparing plans and specifications for project features that may or may not already be planned by other agencies (i.e. stream bank stabilization features, etc.).

As stated in the 'Significance of the Illinois River Basin' section of the executive summary report, "local communities, counties, and non-governmental organizations have developed approximately 40 management plans calling for restoration of all or a portion of the Illinois River Basin". Yet nowhere within the feasibility report does it outline how those management plans would be utilized under this authority or even complimented by this authority. It also isn't clear how, if implemented under separate funding, these management plans would be incorporated into the desired future conditions of the goal categories, most notably Goal #1 (sediment load reduction) and Goal #6 (improve water and sediment quality). Significant benefits are seen annually through projects implemented by SWCD, local NRCS, IL EPA, the Service, and other conservation agencies. These benefits should be acknowledged in future desired conditions.

Upper Mississippi Environmental Management Program: The most significant approved system-wide effort to enhance and restore UMR and IR fish and wildlife resources is the habitat rehabilitation enhancement projects (HREP) being constructed by the EMP. The EMP was first authorized by the Water Resources Development Act of 1986 (PL 99-662) and permanently authorized in that Act in 1999. The objectives of most HREPs are to restore fish and wildlife habitats degraded by sedimentation. As of 1997, approximately 28,000 acres (or about 1 percent) of the UMR-IR system have been enhanced through this program. In the future over 100,000 acres (or approximately 3.6 percent) of UMR-IR floodplain habitat may be enhanced.

EMP habitat restoration projects have helped reverse habitat decline within their immediate areas. The projects have been typically designed to achieve a select number of objectives such as migratory bird habitat, improved aquatic vegetation, fish overwintering, or bottomland hardwoods. However, in practice, each project has provided multiple fish and wildlife benefits.

For many EMP habitat projects, there is significant maintenance cost for structural upkeep. In the future, short-term mini-projects with little or no maintenance may prove to be more cost effective.

The Service is a strong proponent of the EMP. However, as it is currently funded or structured, we do not believe that the EMP alone can reverse the system-wide decline in fish and wildlife habitat that is now occurring. Future EMP habitat projects must be able to address the systemic driving variables as well as the localized symptoms of habitat decline. It has become apparent that the EMP, IL 519, navigation-related mitigation, and other similar projects need to be integrated into an overall ecosystem management program. The IL 519 Feasibility Report does not adequately describe these relationships. Much effort during the plan formulation was directed to identifying resource problems, opportunities, and ecosystem goal identification. However, more attention is needed toward agency collaboration and program integration needed to successfully restore the IR ecosystem.

USDA Programs: Several USDA programs provide funding to agricultural producers in support of environmental objectives, generally administered through the local NRCS field offices. The Environmental Quality Incentives Program (EQIP) provides technical, financial, and educational assistance to farmers and private landowners who are faced with serious threats to soil, water, and related natural resources. Working with approximately 2,400 landowners within the Illinois River Basin, the EQIP program has expended approximately $2.9 million for financial and educational assistance to treat natural resources concerns on approximately 250,000 acres. The

Wildlife Habitat Incentive Program (WHIP) has provided approximately $250,000 of assistance to develop and improve wildlife habitat on private lands within the Illinois River Basin.

The Wetland Reserve Program (WRP) increases wildlife habitat and improves water quality by providing additional wetland habitat, slowing overland flow, and providing natural pollution control. To date, approximately $3.4 million has been spent in the Illinois River Basin to restore 2,300 acres of habitat on 13 properties. Also, the Conservation Reserve Program (CRP) enrollments beyond the Conservation Reserve Enhancement Program (CREP) enrollments provide additional in-place conservation practices facilitating resource management in the Illinois River Basin. Finally, the Forestry Incentives Program provides an avenue of assistance to private landowners for planting trees, improving timber stands, as well as other non-industrial private forest land practices.

In April 1997, the USDA officially launched the National Conservation Buffer Initiative and pledged to help landowners install 2 million miles of conservation buffers by the year 2002. The initiative is led by the NRCS (in cooperation with the Agricultural Research Service, Farm Service Agency, Forest Service, and Cooperative State Research, Education, and Extension Service), state conservation agencies, conservation district, and numerous other public and private partners. The National Conservation Buffer Initiative encourages farmers and ranchers to understand the economic and environmental benefits of buffer strips and use these practices through the various programs of the conservation tool kit. Programs used for this effort include the continuous CRP sign-up, as well as the EQIP, WHIP, WRP, Stewardship Incentives Program, and Emergency Watershed Protection Program.

USDA programs have been very successful in the relative short time frame in which they have been in existence. Specific lessons learned through this program should prove to be invaluable to the IL 519 Study team as they work to establish similar achievements as has the USDA within the IR basin. Again, we encourage the Corps to investigate opportunities to assist in the funding of specific USDA type programs which perhaps already have landowner contacts and have identified prime project sites to meet or address one of the seven environmental restoration goals.

Coordination Within the Rock Island District Corps

Section 404 Regulatory Branch: As the primary regulator of Section 404 permits, the regulatory branch of the Rock Island District plays an extremely important role in this restoration initiative. It appears that many beneficial projects could be targeted by contacts made through the regulatory branch. Interested and willing landowners could be directed to contact key members of regional teams for assistance in stream restoration (as opposed to channelization), wetland protection (as opposed to draining), and many other important habitat protection measures.

Relationship of the IL 519 Study to the Navigation Study**:** The feasibility report written for the IL 519 Study states on page eight, third bullet under Assumptions and Exceptions that: "The Comprehensive Plan (IL 519 Study) will develop recommendations consistent with the Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study and the Upper Mississippi River Comprehensive Plan projects, but will not duplicate efforts and investigations regarding transportation and flood protection needs". However, significant duplication is noted between the restoration measures and intensities of those measures within the two programs'

preferred alternatives. The Service strongly recommends that these two initiatives be more closely coordinated with one another and potentially integrated as part of one another.

Table 8.2, Comparative restoration of IL 519 and the navigation study.

Restoration measures by alternative through Navigation Study (Reach 4: Illinois Waterway)

Ecosystem Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Virtual Reference
Island Building	0	3	4	4	4	4
Fish Passage	0	0	0	0	5	5
Floodplain Restoration	0	0	0	4	14	15
WLM - Pool Scale	0	0	0	0	0	0
WLM- Backwater	0	0	0	1	1	1
Backwater Restoration (Dredgi	0	340	680	920	1,040	1,120
Side Channel Restoartion	0	20	30	34	36	39
Wing Dam/Dike Alteration	0	3	3	3	3	3
Island Protection	0	15	15	15	15	15
Shoreline Protection	0	59	59	59	59	59
Topographic Diversity	0	0	0	0	0	0
Dam Point Control	0	0	0	0	0	0
Floodplain Restoration-Im.Op.	0	2	2	2	2	2
Total	0	119	147	168	191	199
Percent of Total	0	60%	74%	84%	96%	99%

* BW dredging was assumed at a 20 acre footprint

* information provided at NAV Study Public Meeting October 2003

Restoration measures by alternatives of the IL 519 Authority

Ecosystem Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Island Building	0	0	0	0	0	0	0
Fish Passage	0	0	0	3*	6*	6*	9*
Floodplain Restoration (Main Stem)	5,000	5,000	20,000	5,000	40,000	75,000	150,000
WLM - %Peak Reduced	1.50%	2.50%	2.50%	7.50%	7.50%	7.50%	15.00%
Backwater Restoration (Dredgin	3,600	6,100	8,600	6,100	8,600	12,000	18,000
Side Channel Restoartion	10	20	30	20	30	35	40
Island Protection	10	15	15	15	15	15	15
Shoreline Protection	0	0	0	0	0	0	0
Total acres restored	8,600	11,100	28,600	11,100	48,600	87,000	168,000
% of Total that is BW dredging	42%	55%	30%	55%	18%	14%	11%

* represents fish passage at Fox, DuPage, DesPlaines, Kankakee, Spoon, Aux Sable, then 3 main stem dams in that progressive order

Particular discrepancies exist between many of the main stem systematic issues and restoration efforts. These discrepancies subsequently produce much overlap between the two authorities. This overlap, though understandable, would be inefficient and unproductive as these two important authorities move forward to construction. Much of this potential duplication could be avoided if new institutional arrangements would be established. A new institutional framework should be considered that provides a central forum for integrating the IL 519, EMP, Navigation Study, and others (e.g. 1135, 206, and Comprehensive Plan). The Navigation Study has recommended a management triad consisting of a (1) River Council, (2) Science Team, and (3) Regional Management Team. The River Council could be the policy forum for integrating the IL 519 authority with other projects. Table 8.2 presents an ecosystem measure comparison of the two authorities and their respective preferred alternatives (preferred alternatives are shaded).

Much like the Mississippi River, the Illinois River has paid a significant environmental toll for the seven lock and dam structures and other navigation related structures. Environmental

alternatives which mitigate navigation impacts may be implemented on the Illinois River, if the Navigation Study is approved. As is currently outlined in the IL 519 Feasibility Report, all projects to be funded under this authority would require a 35 percent cost share from the non-Federal partner (IDNR) and 65 percent Federal cost. However, as outlined in the Navigation Study, some restoration efforts to offset navigation impacts would be implemented at 100 percent Federal cost. This will create a level of competition between the two authorities and especially in restoration categories such as Backwater Restoration (see Table 8.2).

Each of these initiatives appears to have been formulated completely independent of one another and this is reflected in an apparent duplication of effort. For example, each identifies the need to restore backwater topographic diversity and defines the importance of water level management changes for the IR. The IL 519 Study has determined that a total of 12,000 backwater acres would need to be dredged in order to restore the system in the preferred alternative (Table 8.2, Alternative 6), whereas the Navigation Study recommended that only 920 backwater acres would need to be dredged (Table 8.1, Alternative D). The Corps' Navigation Study predicts that dredging those 920 acres would benefit up to 27,600 acres (at a 1:30 ratio). Applying this rationale to the IL 519 Study would greatly exceed the 12,000 acres proposed by the IL 519 by thousands of acres. The same types of disconnects can be seen when looking at the water level management feature of the two alternatives.

Pending authorization by Congress, these two programs and related projects such as the EMP and UMR Comprehensive Plan should be more closely integrated and, at least, should become complementary of one another.

Chapter 9 - Recommendations and Conclusions

Conclusions

1. The IR ecosystem has been so severely degraded by human activities during the last 100 years that its ecological integrity and ability to recover from disturbance has been greatly diminished. Sedimentation problems continue to pose serious threats to backwater areas in the lower pools which currently provide habitat for a number of fish and wildlife species. A collaborative and adaptive management strategy involving implementation of conservation measures, rehabilitation projects, and long-term monitoring is needed to improve the condition of this ecosystem. Management decisions and actions at both the watershed and more localized scales will ultimately determine the future fate of this once highly productive river resource.

2. In cooperation with the IDNR, we believe that the Corps has done a good job of identifying system wide environmental needs and establishing an implementation process to address many of these issues. However, significant coordination is still needed to establish the appropriate level of government, non-government, and private cooperation to successfully restore the Illinois River Basin.

3. Because of sedimentation and human-induced alterations to the floodplain ecosystem, aquatic and terrestrial habitats throughout the IR will continue to decline at spatially variable and largely unquantified rates. Prioritization schemes should be implemented at the project fact sheet level to insure that limited dollars be applied most efficiently.

4. The main channel of the IR will remain stable, but backwaters will continue to decline from sedimentation. In coordination with the Navigation Study and EMP restoration efforts, critical backwater areas within each pool should be identified and restored as expeditiously as possible.

5. Main channel fish populations are expected to remain healthy, but fish species requiring backwater habitats for any life requirements will likely decline. An anticipated rapid response to backwater restoration efforts will likely be seen among fish guilds requiring backwater habitat.

6. During the fall, state natural resource agencies, the Service's National Wildlife Refuges, and many privately owned duck clubs artificially manipulate water levels in several management areas along the IR. These moist soil units enhance growth of aquatic vegetation and supplement natural sources of food. Unmanaged backwater areas that currently provide dabbling duck food resources are likely to decline in future years as backwaters diminish. There may be opportunities to work with private landowners and establish partnerships to enhance the management of these areas and potentially the integrity of the IR.

7. The quality of bottomland hardwood forest habitat will decline. Associated species which depend upon mast and mature/over mature stands will decline due to lack of regeneration.

8. As they are currently funded or structured, we do not believe that the current ecosystem restoration efforts within the basin can reverse the system-wide decline in fish and wildlife habitat without a more intense coordination between and among agencies. Future IL 519, EMP, Navigation Study, etc. habitat projects must be able to address the systemic driving variables as well as the localized symptoms of habitat decline.

Recommendations

1. All management actions (both Federal and state) such as those implemented under EMP, IL 519, Navigation Study, USDA, USFWS, and other restoration efforts along the mainstem of the IR and the mainstem floodplain need to be coordinated with one another to ensure efficient and successful management of the IR basin. This coordination may be best met through specific institutional arrangements and the formation of a management triad consisting of (1) River Council, (2) Science Team, and (3) Regional Management Team.

2. Several similar recommendations have become apparent during the coordination of this project and in light of strides made by the UMR Navigation Study to implement environmental restoration as a key component of that study's alternative matrix. It is strongly recommended that the IL 519 and the Navigation Study be more closely coordinated with one another and potentially integrated as part of one another. Much like the Mississippi River, the Illinois River has paid a significant environmental price for structures that allow and improve navigation. Environmental alternatives which mitigate navigation impacts on the Illinois River need to be coordinated with projects funded through the IL 519 authorization.

3. We recommend that a regular line of coordination be established between the Corps and the Service for endangered species consultation for the IR basin. Regional teams should coordinate with the appropriate field office of the Service (Chicago, Rock Island, or Marion, Illinois) and establish how project fact sheets would be coordinated with the Service. It is also recommended that the regional teams outreach to the appropriate field office and identify Service employees to act as a participant to the regional team. These types of relationships are important in establishing a smooth flow of information and to avoid unnecessary delays in project formulation.

4. As the primary regulator of Section 404 permits, the regulatory branch of the Rock Island District plays an important role in the success of this restoration initiative. It appears that many beneficial projects could be targeted through contacts made by the regulatory branch through Section 404 permit applications. Interested and willing landowners could be directed to contact key members of regional teams for assistance in projects such as stream restoration (as opposed to channelization) or wetland protection (as opposed to draining). Wetland, stream, and forest mitigation as outlined in the Corps' recent 'draft mitigation guidelines' could be emphasized for the most important areas within each tributary watershed of the Illinois River Basin.

5. We encourage the Corps to investigate opportunities to assist in the funding of specific USDA type programs where landowner contacts have been made and prime project sites identified to address one or more of the seven environmental restoration goals. In addition to government-led efforts, there may also be opportunities to work with various non-government organizations to accomplish many of the basin goals as well. These types of partnerships could reduce planning efforts and present more efficient 'on the ground' projects.

6. Alternative features, predominantly with regard to sediment reduction techniques, which are untested for their ecological integrity function (i.e. riffle structures, bendway weirs, etc.) should be implemented through a cautious and scientific approach to identify ecological reactions. Opportunities should be sought to collaborate with state and/or private universities to study the biological interactions of these features.

7. Adaptive management techniques should be established that would allow the Corps and IDNR to redirect focus of the IL 519 authority if future conditions of the IR turn out to be less desirable than predicted, especially in regard to sediment delivery assumptions into the Illinois River Basin.

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