

# **FACT SHEET**

## **KANKAKEE MAINSTEM, RIVER MILES 33-58 ILLINOIS RIVER ECOSYSTEM RESTORATION**

**MARCH 2002**

## Fact Sheet

### Kankakee Mainstem Illinois River Ecosystem Restoration

**1. STUDY AUTHORITY.** This site-specific evaluation is being conducted as a component of the Illinois River Ecosystem Restoration Study, which is a General Investigation study authorized by Section 216 of the Flood Control Act of 1970 with supplemental authority from Section 519 (Illinois River Basin Restoration) of the Water Resources Development Act of 2000. The study was initiated pursuant to the provision of funds in the Energy and Water Development Appropriations Act, 1998. The Feasibility Study was initiated in October 2000, with completion scheduled for December 2003.

**2. STUDY PURPOSE.** As stated in the Illinois River Ecosystem Restoration Project Study Plan, a number of site-specific evaluations will be conducted during the feasibility study. The site-specific evaluations will focus on developing detailed restoration alternatives for potential implementation at specific sites. A Restoration Needs Assessment (RNA) will be conducted to develop a comprehensive, basin-wide assessment of historic ecological change, existing conditions, predicted future conditions, and desired future conditions. If greater system needs are identified during the RNA, a larger list of potential improvements will be prepared and recommended for authorization. The main purpose of the document is to guide selection of the site-specific projects.

This document will: (1) provide a general description of the existing and anticipated future conditions of the mainstem Kankakee River, (2) identify problems, opportunities, and goals and objectives for restoration, (3) identify potential alternatives to address the problems in the reach, and (4) select a critical (pilot) project for the river. Following the selection of the critical project, a Project Management Plan will be developed to identify the scope, schedule, and cost of the feasibility level investigation.

### **3. LOCATION OF STUDY AREA/CONGRESSIONAL DISTRICT.**

The Kankakee River is located in northeastern Illinois and northwestern Indiana. The basin has a total area of approximately 5,800 square miles and encompasses portions of 22 counties in both states. The Kankakee River originates near South Bend, Indiana, and flows west for about 140 miles to its confluence with the Des Plaines River in Will County, Illinois. The confluence of the Des Plaines and Kankakee Rivers forms the Illinois River. The Kankakee's three principal tributaries are the Yellow River in Indiana and the Singleton Ditch and Iroquois River in Illinois and Indiana. The study area for this fact sheet is the mainstem of the Kankakee River in Illinois, upstream of the Kankakee Dam, which includes River Miles 33-58 (Figure 1)

This portion of the mainstem of the Kankakee River is located in the 11th Congressional District (Gerald Weller - R).

### **4. DISCUSSION OF PRIOR STUDIES, REPORTS AND EXISTING WATER PROJECTS.**

**a. Prior Studies and Reports.** A number of watershed planning documents were available for review:

Hydraulics of Flow and Sediment Transport in the Kankakee River in Illinois. 1980. N. G. Bhowmik, et al. ISWS Report RI-98/80. Illinois State Water Survey, Champaign, IL.

*The Kankakee River Yesterday and Today.* 1981. J. L. Ivens et al. ISWS Miscellaneous Publication 60. Illinois State Water Survey, Champaign, IL.

*Geology of the Kankakee River System in Kankakee County, Illinois.* 1981. D. L. Gross and R. C. Berg. Environmental Geology Notes 92. Champaign: Illinois State Geological Survey.

*Kankakee River Master Plan.* 1989. Kankakee River Basin Commission, Indiana.

*Draft Detailed Project Report and Environmental Assessment, Kankakee River Will County, IL Section 205 Flood Control Study.* 1989. U.S. Army Corps of Engineers. Chicago District, Chicago, IL.

*Dendogeomorphic Estimate of Changes in Sedimentation Rate Along the Kankakee River Near Mokence, Illinois.* 1995. R. L. Phipps et al. Water-Resources Investigations Report 94-4190. U.S. Geological Survey, Urbana, IL.

*Suspended-Sediment Budget for the Kankakee River Basin, 1993-95.* 1997. R. R. Holmes, Jr. U.S. Geological Survey Open-File Report 97-120.

*Changes in Cross-Section Geometry and Channel Volume in Two Reaches of the Kankakee River in Illinois, 1959-94.* P. J. Terrio and J. E. Nazimek. 1997. Water-Resources Investigation Report 96-4261. U.S. Geological Survey, Urbana, IL.

*Kankakee River Area Assessment.* 1998. Illinois Department of Natural Resources. Volumes 1-5.

*Kankakee River Basin, Illinois and Indiana Reconnaissance Study.* U.S. Army Corps of Engineers, Chicago District, 1999.

*Grand Kankakee Marsh Refuge Environmental Assessment.* August 1999. U.S. Fish and Wildlife Service.

*Kankakee River Basin in Illinois: Hydraulics, Hydrology, River Geometry and Sand Bars.* Interim Report. February 2000. N. Bhowmik and M. Demissie. Illinois State Water Survey, Champaign, IL.

*Bank Erosion Survey of the Main Stem of the Kankakee River in Illinois and Indiana.* March 2001. N. Bhowmik and M. Demissie. Illinois State Water Survey, Champaign, IL.

*River Geometry, Bank Erosion and Sand Bars within the Main Stem of the Kankakee River in Illinois and Indiana.* Draft July 2001. N. Bhowmik and M. Demissie. Illinois State Water Survey, Champaign, IL.

**b. Existing Water Projects in the Basin.** There are several collaborative investigations between local, state, and federal agencies to address water and related land resources within the watershed. Significant actions include:

**(1) Existing Corps of Engineers Activities in the Watershed.**

***Kankakee River Basin Feasibility Study, U.S. Army Corps of Engineers, Chicago District.*** The study will investigate flooding problems and recommend, as appropriate, flood protection, sediment control, and ecosystem restoration in the Kankakee River Basin, Illinois and Indiana. The Illinois Department of Natural Resources (ILDNR), Indiana Department of Natural Resources, and Kankakee River Basin Commission (co-signatory with Indiana DNR) are the cost share sponsors. The \$3.3 million study was initiated in 1998 with completion scheduled for 2002. Initiatives in Illinois are tributary bank stabilization and advanced obstruction removal; vegetation strips along ditches and streams; and sediment control features in the main channel. Initiatives in Indiana are sediment traps on Singleton Ditch, restoration of river meanders, levee control at Horseshoe Bend, buffers, re-meander drainage ditches, and construction of marshes. POC: Bob Smalley, U.S. Army Corps of Engineers, Chicago District.

***Kankakee River (State Line) Aquatic Restoration Project, U.S. Army Corps of Engineers, Rock Island District.*** The study will address degradation of fish and wildlife habitat on the Kankakee River that that has resulted from sedimentation. Alternative plans to be considered include removing sediment (mostly sand), creating a controlled sediment removal area (sediment trap), creating wetland habitat, and creating/restoring fish spawning habitat and mussel habitat. The ILDNR is the non-federal sponsor for this project. The year-long combined planning and design phase was initiated in spring 2001. POC: Steve Russell, U.S. Army Corps of Engineers, Rock Island District.

## **(2) Existing Federal Activities in the Watershed.**

***Proposed Grand Kankakee Marsh National Wildlife Refuge, U.S. Fish and Wildlife Service.*** The United States Fish and Wildlife Service (USFWS) has proposed a 30,000-acre National Wildlife Refuge on the Kankakee River in Indiana and Illinois, the Grand Kankakee Marsh National Wildlife Refuge. If established, the refuge will be built from land acquired only from willing sellers over a 30-year period. The mission for the refuge would be to protect, restore, and manage ecological processes within the Kankakee River Basin to benefit threatened and endangered species, migratory birds, native fish, and diverse flora and fauna populations, while also providing, to the extent possible, environmental interpretation, education, and recreation experiences. POC: Tim Bodeen, Project Manager, U.S. Fish and Wildlife Service.

***Eastern Will-Kankakee Conservation Priority Area for the USDA NRCS Environmental Quality Incentives Program.*** The priority area includes 71,580 acres. Of the 57,979 acres of agricultural land, 40,869 are in need of treatment. The primary resource concerns for this priority area are soil erosion and water quality. The secondary concerns are habitat restoration and streambank stabilization. Proposed solutions include implementation of grassed waterways, terraces, water and sediment control basins, grade stabilization structures, conservation tillage, strip cropping, contour farming, contour buffer strips, filter strips, and streambank stabilization. The total EQIP request for assistance is \$105,000 over 3 years (2001-2003). POC: Bob Jankowski, District Conservationist - Will County, USDA Natural Resources Conservation Service.

***Pembroke Township Priority Area for the USDA NRCS Environmental Quality Incentives Program.*** The priority area includes 4,224 acres in Pembroke Township. The objective of the EQIP area is to help Pembroke Township farmers become more successful operators in both traditional row crop agriculture and in the growing of vegetable crops. Project components include investigating growing organic food grade crops, operation of a greenhouse, and the use of cover and green manure crops. The total EQIP request for assistance is \$150,000 over 3 years. POC: Bob Gotkowski, District Conservationist - Kankakee County, USDA Natural Resources Conservation Service.

***Iroquois County Priority Area for the USDA NRCS Environmental Quality Incentives Program.*** The primary concerns identified in the Priority Plan for the Iroquois River Basin are soil erosion and water quality. Secondary resource concerns identified were livestock waste management, wildlife habitat management, and wetland preservation. Proposed solutions include implementing nutrient management plans, construct shallow water marshes, implementing livestock waste management systems, removing blockages along the river, and reducing sedimentation. The total EQIP request for financial assistance is \$1,582,650. POC: Mike Kiefer, District Conservationist - Iroquois County, USDA Natural Resources Conservation Service.

***Conservation Reserve Enhancement Program.*** As of June 2001, a total of 565 acres were enrolled in contracts under the Conservation Reserve Enhancement Program in Kankakee County. Practices included wetland restoration (383 acres), riparian buffer (87 acres), filter strips (86 acres), and wildlife food plots (9 acres).

### **(3) Partnerships and Ongoing Water Resource Projects and Programs.**

**Kankakee River Basin Partnership.** The Kankakee River Basin Partnership is a coalition of local stakeholders in the Illinois portion of the basin. The partnership was formed under the ILDNR Conservation 2000 (C2000) Program to bring together the local citizens and government to address the problems and issues facing the land and water resources of the Kankakee River Basin. The partnership has developed a Stewardship Plan for the Kankakee River Valley which has the support of numerous signatory groups, associations, and governmental entities. POC: J. R. Black, Alliance to Restore the Kankakee.

**Kankakee River Conservancy District.** The Kankakee River Conservancy District (KRCD) is a unit of the Kankakee County government. The KRCD had its birth as a result of the River Conservancy Districts Act of 1925. By virtue of a referendum of the affected voters of Kankakee County, the KRCD was incorporated as a county level agency on November 12, 1953. The KRCD boundaries encompass the entirety of the Mokense Wetlands from the village of Mokense eastward to the Illinois-Indiana state line. As stated in its articles of incorporation, it is the charge of the KRCD to participate in the management of both the lands and the waters that jointly make up the Mokense Wetlands. This ecosystem has been rated as a National Natural Landmark by the U.S. Department of the Interior. District programs and projects are diverse and include a river safety patrol, safe boating classes, river hazard identification and removal, management and restoration of its land holdings, and facilitation of both educational and recreational programs that are consistent with the purpose of the district. POC Gregg Tichacek, Kankakee River Conservancy District.

**Conservation 2000 Program.** In 1998, the ILDNR granted to the Kankakee River Basin Partnership under the Conservation 2000 (C2000) Program nearly \$1.0 million to complete several projects in the basin.

**5. PLAN FORMULATION.** Rock Island District staff have conducted a number of site visits to the Kankakee River mainstem to meet with local representatives, identify problems and needs, and evaluate potential actions to be addressed in the study.

#### **a. Identified Problems.**

**(1) Existing Conditions.** The Kankakee River originates near South Bend, Indiana, and flows southwest for nearly 100 miles through artificial channels until it reaches the Illinois-Indiana border. For the next 9.5 miles, the river regains its natural character and meanders until it reaches the 4-mile-long limestone ledge between Mokense and Aroma Park. The Kankakee River is joined by the Iroquois River at Aroma Park and turns to the northwest for 38 miles until it merges with the Des Plaines River to form the Illinois River. A 12-foot-high dam at Kankakee creates what is called the Six Mile Pool (although actually only 4.7 miles long), and an 11-foot-high dam at Wilmington creates a pool 2 miles long. A structure protecting a sewage pipe impounds water in a secondary channel at Mokense. The Kankakee River's three principal tributaries are the Iroquois River, Singleton Ditch, and Yellow River. The Iroquois is the largest tributary.

**Geology.** Almost all of the Kankakee River basin in Illinois falls within the Kankakee Plain physiogeographic subdivision, as defined by Leighton et al. (1948), who described this area as "a level to gently undulating plain with low morainic islands, glacial terraces, torrent bars, and dunes ... [where] most of the region is poorly drained by shallow low-gradient streams which follow constructional depressions." The Kankakee River basin is underlain with unconsolidated sands and gravels deposited from the outwash of a glacial lake. These sand and gravel deposits have had a large impact on the biological characteristics of the basin.

**Channelization/Wetland Loss.** Originally, the Kankakee River meandered through some 2,000 bends over a 240-mile course. Limestone outcrops in the stream channel near Mokense, Illinois, acted as a natural dam and created a vast marsh in Indiana. The Grand Marsh,

or Kankakee Marsh, extended upstream of Momence to South Bend, Indiana, and covered some 500,000 acres, most of which was in Indiana. The Indiana portion of the Kankakee River was channelized in the late 1800's to early 1900's. The limestone outcrop near Momence was lowered 2½ feet in 1893. The poorly defined tributaries were also channelized. These changes drained a significant portion of the marsh, allowed agricultural production, and resulted in significant hydrologic changes.

The Illinois portions of the Kankakee and Iroquois Rivers flow as naturally meandering streams. Tributaries have been channelized to permit drainage and facilitate conversion of wetlands to agricultural uses.

**Habitat.** Most of the riverbed in Illinois is on or near bedrock. At the state line, there are sand deposits; between Momence and Kankakee, the river flows on mostly bedrock; and between the Momence and Kankakee, the substrate is gravel and cobble with numerous riffles, shallow pools, and small islands. Below Kankakee, the river has silted pools separated by extensive runs of solid bedrock. Near the confluence with the Des Plaines River, the Kankakee River is wide and deep with heavy sediment deposition.

The average slope of the Kankakee River in Illinois (RM 0-55) is 0.041%. See Figure 2 for the elevation profile of the Kankakee River.

The Kankakee River from Momence to the Des Plaines Wildlife Conservation Area was recognized as a Biologically Significant Stream by Page et al. (1992) because of its mussel and fish diversity. This section of the Kankakee River is one of the best opportunities in the Illinois River Basin for protection of large numbers of native species. The following state threatened and endangered fish species are present in the river: pallid shiner (state endangered), weed shiner (state endangered), western sand darter (state threatened), and river redhorse (state threatened). A high diversity of mussels is also present, including the threatened sheepnose.

The Biological Stream Characterization (Betrand et al. 1995) rated the Kankakee River from the state line to Interstate 55 as a "B" stream or "highly valued" aquatic resource (see Figure 3).

**Sedimentation.** Sand deposition is a problem in the Kankakee River. Clean rock and gravel substrates provide habitat for many species of aquatic insects and other invertebrates and important spawning habitat for many fish species. Sand deposition degrades these habitats. Sediment can also negatively affect aquatic plants. As plants are eliminated, populations of insects and fishes are reduced or eliminated because they have less and poorer quality habitat. Past studies (Gross and Berg 1981; Bhowmik et al. 1980; Ivens et al. 1981) disagreed on whether sedimentation rates would continue to increase or if the river had reached equilibrium. Recent studies (Terrio and Nazimek 1997) concluded that sedimentation problems will continue.

According to Bhowmik and Demissie (2001), the reach between Aroma Park and Singleton Ditch experienced sediment deposition between 1966 and 1977, but has been fairly stable since 1977. The steep slope and rocky substrate are likely responsible for reduced sediment deposition in this reach. While absolute values of sediment deposition are small, some areas of the reach have been accumulating sediment. Some scour is evident in other parts.

The Six Mile Pool downstream of this reach has filled with trapped sand at a rate of about 0.67 percent per year since 1980 (Bhowmik and Demissie 2001). The upstream reach from Singleton Ditch to State Line Bridge is also losing capacity.

**Land Use.** The Kankakee River Basin in Illinois is dominated by agricultural uses (78%). Urban/built-up land covers only 2.5% of the area and it is distributed among several towns. The Kankakee/Bradley/Bourbonnais area is the largest urban area. Grassland occupies 15.8% of the land area and includes pastures, hay, idle field, road and railroad rights-of-way and remnant prairies. Forest covers 3.1% of the area, with 2.3% being upland forest and 0.5% bottomland

forest. Non-forested wetlands comprise only 0.5% of the area (Illinois Department of Natural Resources 1998).

**Water Quality.** According to the Illinois Water Quality Report (Illinois EPA 1996) 98.5% of the assessed stream miles in the Kankakee River drainage were rated as “Full Support” meaning that water quality meets the needs of all designated uses protected by applicable water quality standards. The remaining 1.5% of stream miles was rated as “Partial Use/Minor Support.” Nutrients and sedimentation attributed to agriculture were the causes of the Partial Use rating.

**Flooding.** Flooding is not a significant issue in Kankakee County. Flooding in Aroma Park and Momence is localized. According to Bhowmik and Demissie (2001), Kankakee River flow records show increases in high, medium, and low streamflows over recent years.

**(2) Expected Future Conditions.** It is expected that sedimentation will continue in the Illinois portion of the Kankakee River. While studies and projects currently underway will begin to address sedimentation entering the Illinois reach of the Kankakee River, additional efforts are needed.

Sedimentation of key aquatic habitats is expected to continue. Side channel and pool areas are expected to continue to lose depth. The interstitial spaces between cobble and gravel substrates may become clogged with sediment. Overall, the high quality habitat of the Kankakee River is expected to decline due to sediment deposition.

**(3) Problems and Opportunities.** Sedimentation of important aquatic habitats is a major problem in the Kankakee River mainstem. The high mussel diversity and high biological stream characterization rating indicate the high quality of available aquatic habitat. Sand deposition threatens the quality of many of the high quality pool, riffle, and side channel habitats.

Potential opportunities that could be addressed by the Corps of Engineers or in collaboration with the non-federal sponsors and other federal and local agencies are listed below:

- Restore riffle, pool, and side channel habitats
- Increase suitable mussel habitat
- Increase submerged aquatic vegetation
- Reduce sedimentation in pool, riffle, and side channel areas

**(4) Planning Objectives and Constraints.** The principal focus of this study is to identify opportunities to restore degraded ecosystem structure and function, including the ecosystem’s hydrology, plant, fish, and wildlife communities.

**Planning Objectives:**

- Increase flow velocity to flush existing sediment
- Reduce sedimentation in side channels, pools, and riffle habitats
- Restore natural stream processes that flush sediment deposits in riffles, pools, and side channels
- Reduce sediment delivery

## Planning Constraints:

- Avoid negative impacts to aquatic flora and fauna including mussels
- Avoid increases in flood heights
- Avoid damage to infrastructure
- No control over sediment delivery from Indiana
- Avoid increase of sedimentation in Six Mile Pool

**b. Alternative Plans.** There must be a collaborative effort among various local, state, and federal stakeholders who are concerned about or charged with the protection and restoration of the Kankakee River mainstem. Potential alternatives to be developed in the feasibility phase to address the above problems and opportunities include, but are not limited to, the following:

- Sediment removal
- Install structures to increase flow velocities to flush existing sediments and keep substrates clean

**c. Preliminary Evaluation of Alternatives.** Site-specific projects that have already been identified by previous watershed efforts are presented below. Alternatives were evaluated based on anticipated benefits and costs, anticipated feasibility, and level of detail of existing site-specific plans.

**(1) *Aroma Park.*** This alternative would involve restoring a side channel just downstream of the bridge in Aroma Park and restoring depth to a pool located between the railroad bridge and the island immediately downstream of the bridge in Aroma Park. Side channel habitat is very limited in this reach of the Kankakee River. Restoration of the deep pool would provide winter and summer habitat for fish.

**(2) *Momence Dam.*** This project would involve stabilization of the Momence Dam to maintain deepwater habitat which is created by the dam. An island splits the channel in two and the dam is located on the right descending channel. The dam, which protects a sewer line, is owned by the ILDNR and is in danger of failing. The ILDNR would like to repair the dam to maintain deepwater habitat in the upstream impoundment. Deepwater habitat is limited to non-existent in this reach of river and is important to the game fish and the state endangered river redhorse. The dam is not an impediment to fish migration as there is upstream passage in the left descending channel.

**(3) *Kankakee State Line.*** The U.S. Army Corps of Engineers and the ILDNR are undertaking an aquatic ecosystem restoration project at the Indiana-Illinois state line. The project is being conducted under Section 206 of the Water Resources Development Act of 1992. The goal of the project is to remove excess sediment before it enters the Illinois portion of the Kankakee River and to restore a wetland area adjacent to the Kankakee River. The study is evaluating several innovative sediment removal techniques.

**(4) *Six Mile Pool.*** A project proposed for the Six Mile Pool involves removal of sediment that has accumulated over time and periodic dredging to maintain desired water depths. Identification of sediment placement sites would be challenging. This alternative would restore some deepwater fish habitat and would provide ancillary recreation benefits.

**(5) *Kankakee State Line Log Jam.*** This project would involve removal of a logjam in a side channel near the Indiana-Illinois state line. Further evaluation would be required to clearly identify benefits of removal.

**(6) Restoration of Pool and Riffle Habitat.** This project would identify locations where sediment deposition is negatively affecting species that utilize the pools and riffles. Alternatives would be evaluated to encourage scour and discourage sedimentation in these areas.

**(7) Sediment Removal in Reach from Aroma Park to Highway 17 Bridge.** This project would involve identifying and evaluating alternative sites and techniques for sediment removal.

**d. Recommendation on Critical Restoration Areas.** Based on preliminary evaluations, the following three alternatives were selected for further feasibility level evaluation: (1) Aroma Park, (2) restoration of pool and riffle habitat, and (3) sediment removal in the reach from Aroma Park to the Highway 17 Bridge. Reasons for selection include critical sediment removal needs, potential for testing and evaluating technologies that can be applied elsewhere in the river, and the high visibility of these areas to the public. Further formulation and evaluation of alternatives will take place in the next phase. The next phase will be initiated by development of a Project Management Plan that will outline the scope, schedule, and cost of the feasibility level investigation.

**9. ESTIMATED MILESTONES.** The following is a draft schedule, subject to revision during the development of the detailed Project Management Plan:

Complete Project Management Plan	March 2002
Initiate Feasibility Level Study	April 2002
Formulate Alternatives	October 2002
Evaluate Alternatives	February 2003
Complete Feasibility Level Analysis and Draft NEPA Documentation (Environmental Analysis)	August 2003

**11. RECOMMENDATIONS.** The Corps, the ILDNR, and other state and federal agencies should initiate development of the Project Management Plan and feasibility level study for the Kankakee River site-specific projects.

**12. VIEWS OF OTHER RESOURCE AGENCIES.** This fact sheet was developed in partnership with the Corps of Engineers, the Illinois Department of Natural Resources, and the USDA Natural Resources Conservation Service. Meetings also have been held with the Kankakee River Basin Partnership.

**13. PROJECT AREA MAP.** The project area map is included as Figure 1.

#### **14. REFERENCES.**

Betrand, W. A., R. L. Hite and D. M. Day. 1995. Biological Stream Characterization (BSC): Biological Assessment of Illinois Stream Quality through 1993. Illinois Environmental Agency Report No. IEPA/BOW.96-058. December 1996. 40 pp.

Bhowmik, N. G. et al. 1980. Hydraulics of Flow and Sediment Transport in the Kankakee River in Illinois. ISWS Report RI-98/80. Illinois State Water Survey, Champaign, IL.

Bhowmik N. G. and M. Demissie. 2001. River Geometry, Bank Erosion and Sand Bars within the Mainstem of the Kankakee River in Illinois and Indiana. Contract Report 2001-09. Illinois State Water Survey. 111 pp.

Gross, D. L. and R. C. Berg. 1981. Geology of the Kankakee River System in Kankakee County, Illinois. Environmental Geology Notes 92. Champaign: Illinois State Geological Survey.

Holmes, R. R. Jr. 1997. Suspended-Sediment Budget for the Kankakee River Basin, 1993-95. U.S. Geological Survey Open-File Report 97-120.

Illinois Environmental Protection Agency. 1996. Illinois Water Quality Report, 1994-1995. Illinois Environmental Protection Agency. Springfield, IL.

Ivens, J. L., et al. 1981. The Kankakee River Yesterday and Today. ISWS Miscellaneous Publication 60. Illinois State Water Survey, Champaign, IL.

Leighton, M. M., G. E. Ekblaw, and C. L. Horberg. 1948. Physiographic Division of Illinois: Journal of Geology 56:16-33. Illinois Geological Survey Report of Investigations 129.

Page, L. M. et al. 1992. Biologically Significant Illinois Streams: An Evaluation of the Streams of Illinois Based on Aquatic Biodiversity. Technical Report 1992(1). Illinois Natural History Survey, Champaign, IL.

Terrio, P. J. and J. E. Nazimek. 1997. Changes in Cross-Section Geometry and Channel Volume in Two Reaches of the Kankakee River in Illinois, 1959-94. Water-Resources Investigation Report 96-4261. U.S. Geological Survey, Urbana, IL.

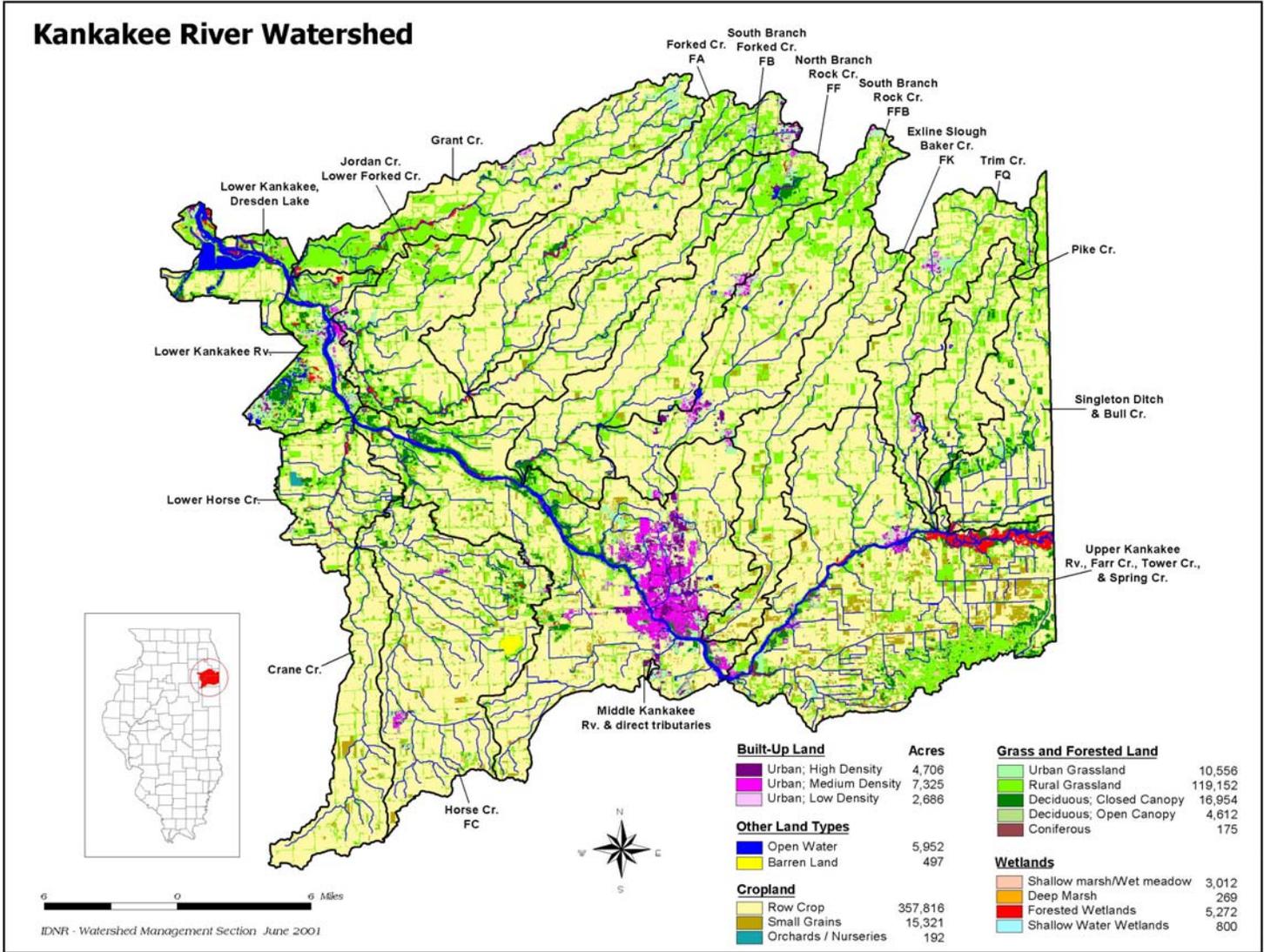


Figure 1. Map of the Kankakee River Basin

# Elevation Profile of Kankakee River

Average % slope of selected segment: 0.041

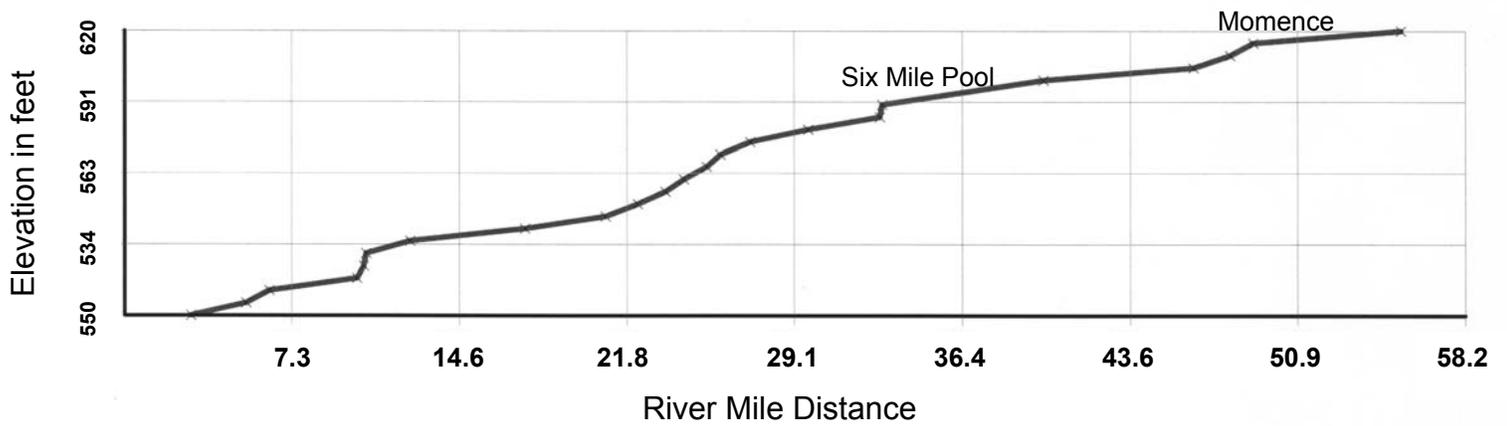


Figure 2. Elevation profile of the Kankakee River

# Kankakee River BSC (RM 33 - 58; state line to Kankakee)

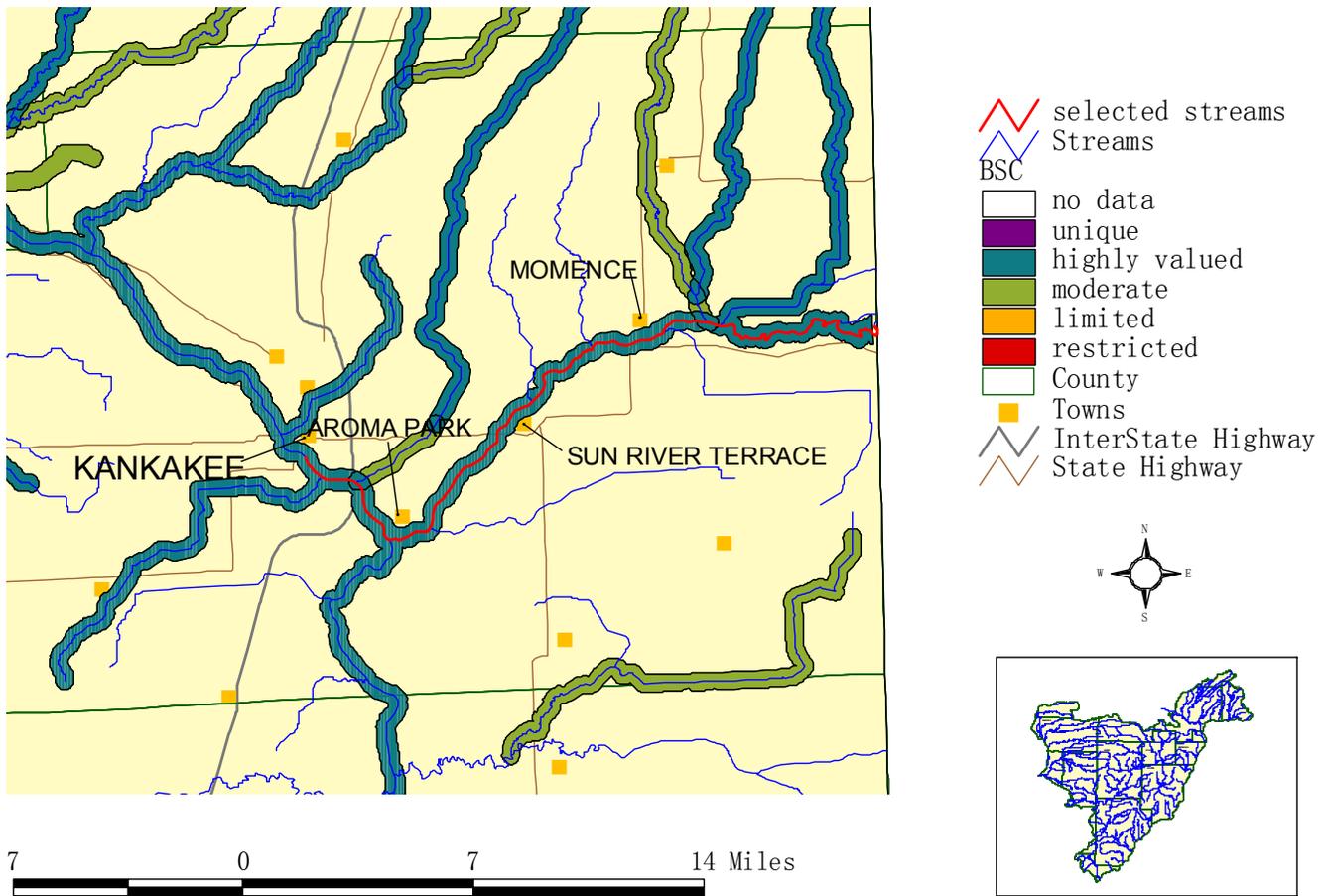


Figure 3. Biological Stream Characterization of streams in the Kankakee River Watershed