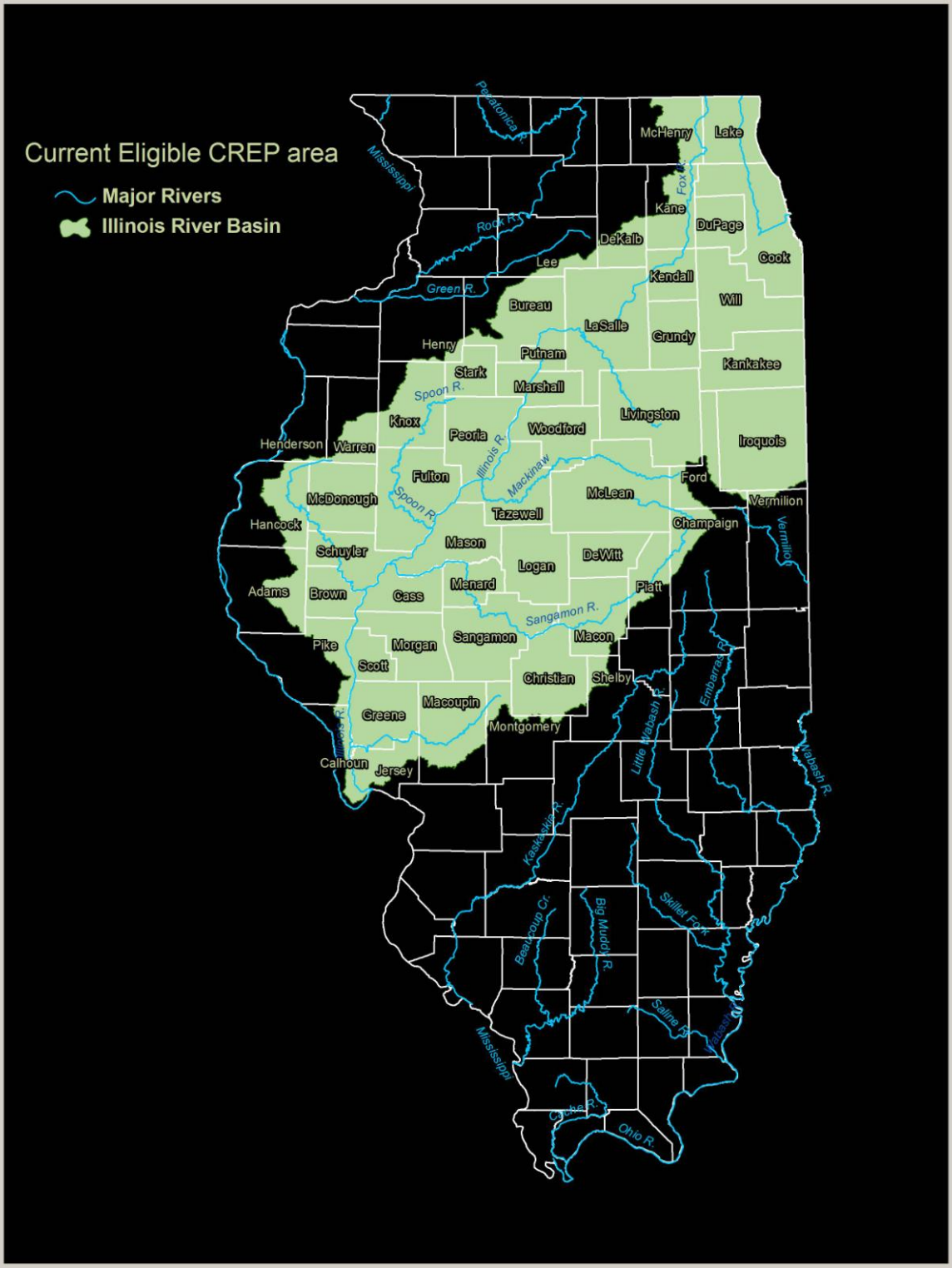
CONSERVATION RESERVE ENHANCEMENT PROGRAM

2009



ILLINOIS

Illinois Conservation Reserve Enhancement Program
(CREP)
Reporting Period: October 1, 2008 through September 30, 2009

The Illinois Conservation Reserve Enhancement Program (CREP) is a federal-state program that was created by a Memorandum of Agreement (MOA) between the U.S. Department of Agriculture, the Commodity Credit Corporation, and the State of Illinois in March 1998. Enrollments into this program began on May 1, 1998.

Since the beginning, the program has been extremely well received by the landowners in the targeted area. The MOA was re-authorized by all the parties on December 18, 2002 increasing the eligible acreage for enrollment to 232,000 acres.

CREP is being implemented through a federal-state-local partnership in the eligible area. The Agencies that are implementing the program are USDA - Farm Service Agency (FSA), USDA - Natural Resources Conservation Service (NRCS), the Illinois Department of Agriculture (IDOA), the Illinois Environmental Protection Agency (IEPA), the Illinois Department of Natural Resources (IDNR), and the County Soil and Water Conservation Districts (SWCDs) along with the Association of Illinois Soil and Water Conservation Districts (AISWCD) in the eligible area. Other agencies and organizations provide guidance and assistance for the program through the CREP Advisory committee, which is a subcommittee of the State Technical Committee.

ENROLLMENT SUMMARY:

For the reporting period of October 1, 2008 through September 30, 2009, the Federal CREP Program did not enroll new contracts. Total Federal enrollment figures from the inception of the program May 1, 1998 through September 30, 2009 are reported by USDA-FSA as follows:

Number of contracts	-	6,634
Average acres/contract	-	19.1
Total acres contracted	-	126,601.5
Average rental rate/acre	-	$120.00

Total State enrollments are as follows:

Number of Contracts	-	278
Average acres/contract	-	63.69
Total acres enrolled	-	81,391.36
Average cost/acre	-	$688.98

TECHNICAL ASSISTANCE AND PROGRAM STAFF:

Technical assistance in this program is made up of three types:
1. Assistance to the landowners during the enrollment process in determining eligibility, options, and selecting approved practices;
2. Assistance to landowners in implementing the approved CREP practice once the property is enrolled in the program; and
3. Assistance to the SWCD and landowners in the state requirements for execution of the state easement documents.

The Farm Service Agency, Natural Resources Conservation Service, Department of Natural Resources, and the County Soil and Water Conservation Districts provide primary technical assistance.

NON-FEDERAL CREP PROGRAM EXPENDITURES:

For this reporting period, the State obligated $432,223.41 for CREP expenditures, State cost-share expenses, monitoring costs, SWCD administrative fees and other associated enrollment and easement costs. In addition, the IDNR has provided another $322,796.50 from its operational dollars to provide for CREP Administrative Expenses, bringing the total

State dollars directly expended for CREP enrollments to $755,019.91.

State CREP Expenses
October 1, 2008 through September 30, 2009

State Bonus Payment for State Option	$ 0.00
State Cost-Share Payments	$ 0.00
Soil and Water Conservation District (SWCD) Administrative Fees	$ 40,252.80
DNR Administrative Expenses - Contract and Data Management, Technical Assistance, Reports, Training	$ 322,796.50
Add. Admin. Fees – Legal, Survey, filing costs	$ 39,277.88
Monitoring	$ 352,692.73
TOTAL	**$ 755,019.91**

The Memorandum of Agreement (MOA) for the Illinois CREP, as amended on December 18, 2002, details the formula to determine the overall costs of the program and to determine if the State has fulfilled its obligation to provide 20% of the total program costs. A summary of these enrollments follows: The total federal annual rent payment, the total annual incentive payment and the total federal annual rent plus incentive and maintenance over the life of the 15-year contracts.

To determine the overall costs of CREP, the following costs are to be used: the total land retirement costs, which will include the CRP payments made by the Commodity Credit Corporation and the easement payments or the bonus payments made by Illinois; the total reimbursement for conservation practices paid by the CCC and Illinois; the total costs of the monitoring program; and the aggregate costs of technical assistance incurred by Illinois for implementing contracts and easements, and a reasonable estimate of the cost incurred by the State to develop conservation plans. Since the CRP contract payments will be annual payments, an 8 percent per annum discount rate (per the MOA) is normally used to compare the CRP Payments with the State Bonus payment.

As the State had contributed 23% of the total program costs after using the discount rate last year, and there has not been an open enrollment period or new contracts since last year, additional expenditures by the State of $755,018.91 assures that the State continues to exceed the requirement for incurring 20% of the total Program costs.

OTHER PROGRAMS AND PARTNERSHIPS

There are other state, federal and organizational programs that are contributing to the accomplishment of the goals of the Illinois CREP. The following highlights a few of the programs that contributed to achieving the goals the State has set for the Illinois River Basin. Any state or non-federal dollars that have been expended in these programs have not been included in the previous section that describes and lists the direct state expenditures for CREP match.

STATE SUPPORTING AGENCIES

CREP AND PARTNERS FOR CONSERVATION (FORMERLY C2000): ANOTHER GREAT PARTNERSHIP

Conservation 2000 (C2000) was renamed Partners for Conservation and extended until 2021. This multi-agency, multi-million dollar comprehensive program is designed to take a holistic, long-term approach to protecting and managing Illinois' natural resources. The Illinois Department of Natural Resources administers the Ecosystems Program and the Critical Trends Assessment Program (CTAP), a statewide ecosystem assessment and monitoring program.

The Ecosystems Program**,** a landmark program, is based upon an extensive network of local volunteers working to leverage technical and financial resources to promote ecosystem based management primarily on private lands. With 95% of the state in private ownership (non-state owned), the main objective of the program is to assist in the formation of public/private partnerships, *Ecosystem Partnerships*, to develop plans and projects on a watershed scale with an ecosystem-based approach. There are two key criteria established for the Ecosystems Program. One, that they must be voluntary, and based on incentives rather than government regulation; and, two, they must be broad-based, locally organized efforts, incorporating the interests and participation of local communities, and of private, public and corporate landowners.

Currently there are 41 Ecosystem Partnerships covering 86% of Illinois. Half of those partnerships are located in counties that comprise the Illinois River watershed; 21 to be exact. They are Big Rivers, Chicago Wilderness, DuPage River Coalition, Fox River, Headwaters, Heart of the Sangamon, Illinois River Bluffs, Kankakee River, Lake Calumet, LaMoine River, Lake Michigan Watershed, Lower Des Plaines, Lower Sangamon Valley, Mackinaw River, North Branch of the Chicago River, Prairie Parklands, Spoon River, Thorn Creek, Upper Des Plaines, Upper Salt Creek, and Vermillion Watershed Task Force.

Since 1996, the C2000 Program has awarded more than $14,755,000 million in C2000 grants to Ecosystem Partnerships in the Illinois River watershed basin for projects providing a variety of conservation practices. Another $14,727.000 has been leveraged as match for these projects for a total of nearly $30 million for 442 projects. Accomplishments from these projects include: 14,522 acres of habitat restoration, 160,302 feet of stream bank restoration, 1,426 sites have been or are being monitored, and more than 636,000 people have been educated on watershed protection and restoration.

ILLINOIS DEPARTMENT OF AGRICULTURE

The Illinois Department of Agriculture administers numerous soil and water conservation programs that produce environmental benefits in the Illinois River Watershed. In total, the Partners for Conservation Program, administered by IDOA, has allocated $3.2 million dollars to the 46 counties that have significant acreage in the Illinois River Watershed for cost-sharing the installation of upland soil and water conservation practices. Administered by the Department, with assistance from County Soil and Water Conservation Districts (SWCDs), this program provides up to 70% of the cost of constructing conservation practices that reduce soil erosion and protect water quality.

Eligible conservation practices include terraces, grassed waterways, water and sediment control basins, grade stabilization structures and nutrient management plans. Although not all of the FY09 results are available, 793 projects have been completed by the SWCD's with significant benefits in the Illinois River Basin during the last 3 fiscal years. Individual conservation projects were completed with funding of more than $1.8 million dollars. These projects are responsible for bringing soil loss to tolerable levels on hundreds of acres of land. This translates into over 54,500 fewer tons of soil loss each year, or the equivalent of more than 2,400 semi truckloads of soil saved.

In FY 09, the Department of Agriculture provided $3.65 million to 54 county SWCD offices in the Illinois River Watershed for operational expenses. Specifically, these funds were used to provide financial support for SWCD offices, programs, and employees' salaries. Employees, in turn, provided technical and educational assistance to both urban and rural residents of the Illinois River Watershed. Their efforts are instrumental in delivering programs that reduce soil erosion and sedimentation and protect water quality.

In an effort to stabilize and restore severely eroding streambanks that would otherwise contribute sediment to the Illinois River and its tributaries, the Department of Agriculture, with assistance from SWCDs, is administering the Streambank Stabilization and Restoration Program (SSRP). The SSRP, funded under the Partners for Conservation Program, provides funds to construct low-cost techniques to stabilize eroding streambanks. Through FY09, 44 individual streambank stabilization projects totaling $414,222 were constructed in 24 counties within the Illinois River Watershed. In all, over 4.8 miles of streambank have been stabilized to protect adjacent water bodies during the past 3 fiscal years.

Another environmentally oriented Partners for Conservation Program administered by the Department of Agriculture is the Sustainable Agriculture Grant Program. Grants are made available to individuals, organizations and universities for conducting research, demonstration, or education programs or projects related to profitable and environmentally safe agriculture. In FY 008, $227 in funds was awarded to 13 grant recipients with programs or projects in the Illinois River Watershed in such areas as local food

systems, cover crops, alternative crops, grassland management, composting, sustainable beef production and organic production.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

One of the key missions of Illinois EPA is to monitor and protect the water resources of Illinois; these resources are relied upon for drinking water, fishing, transportation and recreational use and other environmental and economic benefits. One of the most dramatic improvements in water quality that Illinois EPA has documented has taken place on the Illinois River.

Illinois EPA has eight Ambient Water Quality Monitoring Sites on the main channel of the Illinois River. Water chemistry is collected at these sites nine times per year. There are also approximately 250 Intensive Basin Survey Sites in the Illinois River watershed. These sites are monitored "intensively" once every five years. The monitoring includes water chemistry, macroinvertebrates, fish, habitat, sediment and at some sites fish tissue contaminants are collected. This information is cooperatively collected with the Illinois Dept. of Natural Resources, a partnership that began many years ago and continues annually.

The monitoring shows that the Illinois River mainstream water quality has improved significantly since the passage of the Federal Clean Water Act in 1972. Early improvements were due primarily to point source controls, such as additional treatment requirements and limits on discharges from wastewater treatment plants. The majority of water quality improvements over the last fifteen years have been from the implementation of nonpoint source management programs that reduce urban and agricultural runoff, programs such as CREP.

As reported by the Illinois EPA in their 2008 Integrated Report, of the ***stream miles assessed*** in the Illinois River Basin for Aquatic Life Use Support attainment, 64.6% were reported as "Good," 30.4% as "Fair," and 5.0% as "Poor." This compares to statewide figures of 61.1% "Good," 34.8% "Fair," and 4.1% "Poor." Regarding ***lake acres assessed***, 71.6% were reported as "Good" and 28.4% as "Fair" (no acres reported as "Poor"). This compares to statewide figures of 69.4% "Good" and 30.6% "Fair" (no acres reported as "Poor").

Illinois EPA continues to participate on the State CREP Advisory Committee and continues to provide financial assistance to local soil and water conservation districts so they can assist landowners to enroll, in CREP. Since 1999, more than $1,346 million of 319 grant funds have been put towards implementation of the CREP program.

The benefits derived through this financial support is not only efficiency in the sign-up process to increase CREP enrollment, but it also allows the existing SWCD and NRCS staff to continue to implement the other conservation programs so desperately needed to improve water quality in the Illinois River watershed. Some of those Illinois EPA programs include:

Section 319: Since 1990, the IEPA has implemented 214 Clean Water Act Section 319 projects within the Illinois River Watershed. The Agency receives these federal funds from USEPA to identify and administer projects to prevent nonpoint source pollution. These projects include watershed management planning; best management practices implementation and outreach efforts. Illinois EPA has dedicated almost $48 million with another $41 million of local and state funds for total project costs of nearly $90 million towards these projects to help improve the health of the Illinois River, its tributaries and ultimately the

Mississippi River and Gulf of Mexico. Hundreds of conservation practices have been installed in the Illinois River watershed by dozens of our partners through the Section 319 program. Traditional practices such as terraces and waterways are dotting the landscape along with porous pavement parking lots, green roofs and miles of rural and urban stabilized streambank.

Since 1990, the 319 NPS program, through on the ground implementation can show load reduction decreases of: 1,228,759 lbs of nitrogen, 1,500,246 pounds of phosphorus, and 78,822 tons of sediment per year, each and every year since the Best Management Practices were implemented as a result of 319 grant projects between IEPA and our local partners, in both the private and government sectors.

Pilot Construction Site Erosion Control Program: Illinois EPA has continued a program subcontracting with several soil and water conservation districts, the majority of them in the Illinois River Basin. Those partners include the DeWitt, Macon, McHenry and Winnebago County Soil and Water Conservation District Offices. District staff complete on-site NPDES Construction Stormwater Permit inspections and provide technical assistance in implementing best management practices to minimize runoff to nearby water bodies. This program is a natural fit for properly developing acreage that does not qualify for CREP.

Other Illinois EPA programs that complement CREP include:

Total Maximum Daily Load (TMDL): USEPA has approved 492 completed TMDL evaluations and Illinois EPA is currently developing another 303 TMDLs. TMDLs are a tool that we use to restore impaired watersheds so that their waters will meet Water Quality Standards and Full Use Support for those uses that the water bodies are designated. A TMDL looks at the identified pollutants and develops, through water quality sampling and modeling, the amount or load reductions needed for the water body to meet its designated uses.

Partners for Conservation: A total of 36 lake monitoring (study) or protection/restoration projects have been conducted in the Illinois River Basin via the Illinois EPA's Illinois Clean Lakes Program and Priority Lake and Watershed Implementation Program. Over $7.5 million of local and state funds have been allocated for these efforts.

In conclusion, the Illinois River is a valuable resource that we are working hard to protect and restore. Illinois EPA will continue long-term monitoring of the river and its watershed and will continue to pursue funds to help implement CREP and other water quality restoration and protection projects and to work with citizen groups and local government and industry to continue the progress we have made.

FEDERAL PARTNERS

NATURAL RESOURCES
CONSERVATION SERVICE (NRCS)

EQIP

One of NRCS' primary conservation programs is the Environmental Quality Incentives Program (EQIP), which is designed to provide cost-share funds to farmers who qualify for practices designed to improve or create conservation-minded operations or solutions. EQIP addresses practices for livestock operations, grazing operations or non-livestock operations, which covers most of Illinois' private landowners in need of conservation solutions.

EQIP's Forestry Efforts

The primary focus of the Forest Management Plans special project incentive is to help applicants develop management plans and protect their forested acres. Eligible applicants receive funds to help hire a professional forester who will visit the property, inventory the site, and write out a complete woodland management plan. This Special Projects opportunity through Illinois' EQIP can help landowners manage their woodland resources better and obtain a quality management plan that is also approved by the State of Illinois. With more acres of Illinois forest resources well planned for and managed, the health and value of our forest resources will be greatly improved.

Wetland Reserve Program

NRCS' Wetland Reserve Program (WRP) continues to create and restore quality wetland habitats in the Illinois River Watershed and across the state.

For additional information on NRCS conservation programs, please visit www.nrcs.usda.gov.

Illinois Department of Natural Resources (IDNR) and its conservation partners will continue to work as a team to implement CREP and other conservation programs designed to assist private landowners. Priority will be given to watersheds identified by Natural Resources Conservation Service (NRCS) and Illinois Environmental Protection Agency (IEPA) as having high mean total concentrations of nitrate and phosphorous; and CREP will be integrated with NRCS' Mississippi River Basin Healthy Watersheds Initiative to improve the overall health of the Mississippi River Basin and assist with Gulf Hypoxia issues. CREP is also a good fit with initiatives related to climate change and carbon sequestration.

US FISH AND WILDLIFE SERVICE/PARTNERS

The US Fish and Wildlife Service Partners for Fish and Wildlife Program (Partners) has supported the Illinois River Conservation Reserve Enhancement Program (CREP) since its inception. The Illinois River CREP has provided opportunities on a landscape scale for restoration, enhancement, and preservation of natural habitats on private land. The net benefit of the Illinois CREP is the significant benefit for Federal Trust Resources produced by the large scale restoration and preservation of floodplain and riparian habitat in the Illinois River Watershed. The Federal Trust Resources benefited include migratory waterfowl, shorebirds and neotropical migrants that use wetland and forested floodplain habitats to feed and rest as well as the species that nest and raise their young in the restored habitats. Federally listed threatened and endangered species, particularly the threatened decurrent false aster (*Boltonia decurrens*) have benefited from the Illinois CREP. Equally significant are both direct and indirect benefits to National Wildlife Refuge lands located on the Illinois River that accrue as a result of expanded habitat adjacent and near the Refuges, as well as improved water quality that results from implementing approved conservation practices.

Partners primary contribution to the Illinois River CREP has been technical assistance through participation on the CREP Advisory Committee, providing technical and policy assistance input to the program. At the local level, Partners personnel coordinate with local NRCS, SWCD, and Illinois DNR staff as necessary on individual or groups of projects. CREP has opened a host of opportunities for habitat restoration, enhancement, and preservation on private land that fulfills the objectives of a broad coalition of Federal, State, local, and non-government conservation organizations.

Within the Illinois River Watershed, individual Partners projects compliment CREP and other habitat programs. The Partners program provides a tool for restoration and enhancement of habitats on private lands that may not be eligible for other landowner assistance programs. Partners local coordinators also review the full range of landowner assistance programs with each potential cooperator and refer landowners to CREP and other USDA and Illinois DNR programs that best meet their habitat development and economic goals.

NON-GOVERNMENTAL PARTICIPANTS

ASSOCIATION OF ILLINOIS SOIL AND WATER CONSERVATION DISTRICTS

The AISWCD, in partnership with the Illinois Environmental Protection Agency and the Illinois Department of Natural Resources, helps with administration of the CREP program, by providing funding to SWCDs through a 319 grant. The grant is given to certain SWCDs who express the need of additional support in their District office to complete CREP related duties. The AISWCD serves on the CREP Advisory Committee.

ILLINOIS FARM BUREAU

Illinois Farm Bureau (IFB) continues to publicize and promote the Conservation Reserve Enhancement Program (CREP). IFB also used their statewide radio network to highlight details of the program. Information on CREP was sent directly to county Farm Bureaus® (CFB) via e-mail and through county Farm Bureau mail system.

Illinois Farm Bureau continues to provide input about CREP through various groups and committees and also continues to voice support for the program. CREP is another tool producers can use that provides cost share incentives and technical assistance for establishing long-term, resource-conserving practices and is a positive program in Illinois.

By working together, the conservation partners will meet both the goals of CREP and the objectives of private landowners. They will help implement the Illinois Wildlife Action Plan by creating and enhancing habitat corridors along Illinois' rivers and tributaries for species protection and migration. The partners will develop strategies to facilitate landowner enrollment in many different conservation programs and ensure the programs are implemented effectively. Continued monitoring efforts will provide the long-term data required to properly assess changes in Illinois' watersheds, and assessment of these changes will ensure efficient implementation of CREP and other conservation programs.

PROGRAM ACTIVITIES AND ACCOMPLISHMENTS

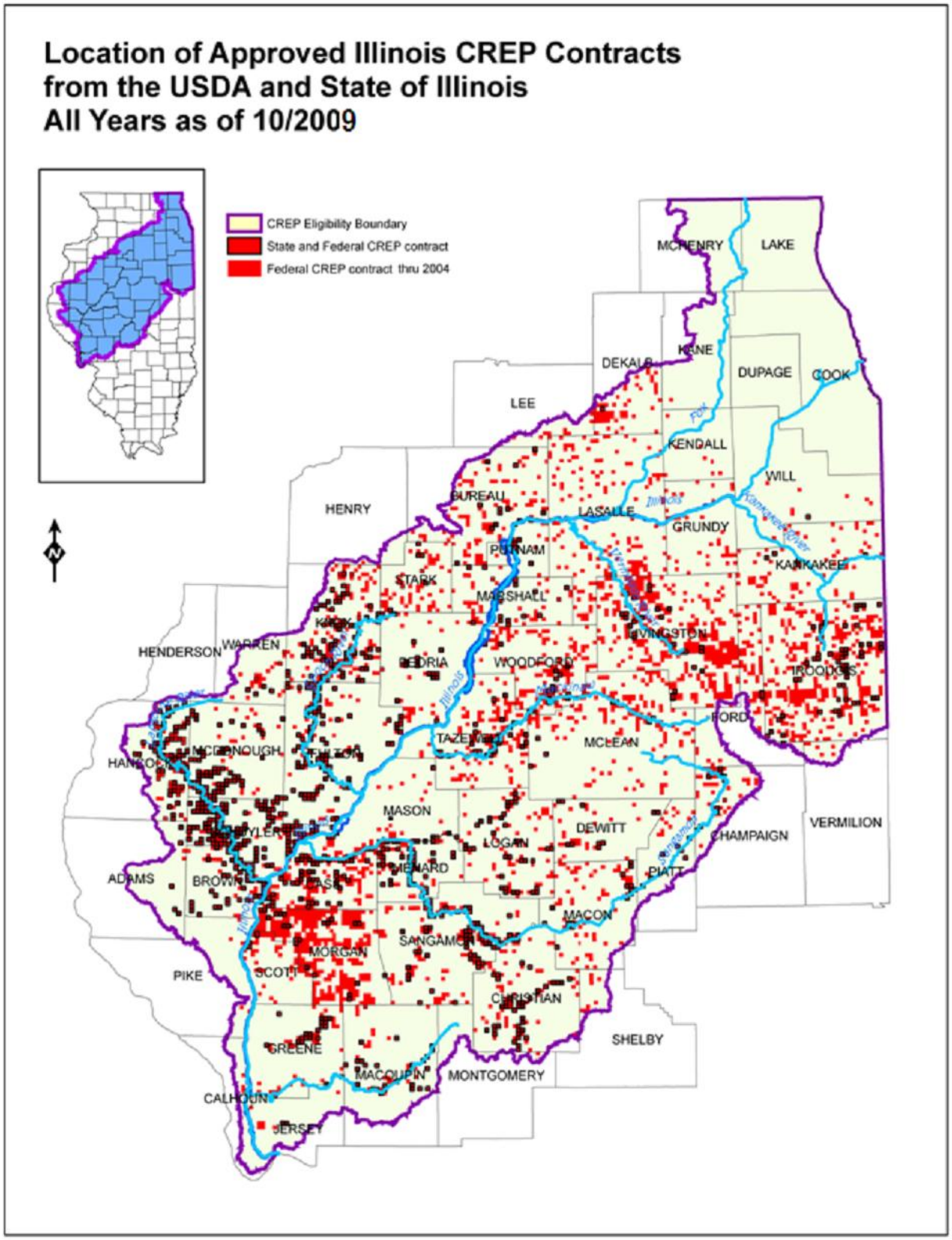
Since the beginning of the CREP program on May 1, 1998 through the end of the current reporting period (September 30, 2009), CREP has restored and/or protected 126,601.5 acres of land either in existing native vegetation or in a previous CRP sign-up (See Map 1).

Of the 48,434.55 Federal acres enrolled in the State option, 7.7% selected the 15-year extension, 5.2% selected the 35-year extension, and 87.1% selected the permanent easement option. In Illinois, 38.3% of the 126,601.5 acres enrolling in the Federal CREP Program also enrolled in the State enhanced option.

The CREP program is restoring and protecting large stretches of floodplain corridors both on the main stem of the Illinois River and along the major tributaries. It is helping landowners, who have only been able to produce crops in the area once or twice in the last decade, to retire these lands from agricultural production. The state's 2009 capital budget is providing $45 million for CREP over the next 3 years to restore another 100,000 acres to native vegetation by implementing conservation practices.

Additionally, CREP activities are directly contributing to, or complimenting, the objectives of the Illinois Fish and Wildlife Action Plan and the Landowner Incentive Program of the U.S. Fish and Wildlife Service.

Map 1


Location of Approved Illinois CREP Contracts
from the USDA and State of Illinois
All Years as of 10/2009
CREP Eligibility Boundary
State and Federal CREP contract
Federal CREP contract thru 2004
MCHENRY
LAKE
DEKALB
KANE
DUPAGE
COOK
LEE
KENDALL
WILL
HENRY
BUREAU
LASALLE
GRUNDY
PUTNAM
KANKAKEE
STARK
MARSHALL
KNOX
HENDERSON
WARREN
PEORIA
WOODFORD
IROQUOIS
FORD
MCLEAN
MASON
DEWITT
CHAMPAIGN
VERMILION
LOGAN
PIATT
MENARD
ADAMS
BROWN
MACON
SANGAMON
MORGAN
PIKE
SCOTT
CHRISTIAN
SHELBY
GREENE
MACOUPIN
MONTGOMERY
CALHOUN
JERSEY

FUTURE PLANS AND RECOMMENDATIONS

The State is recommending some changes to Illinois CREP to address water quality issues, sedimentation and nutrient runoff, that impact all of Illinois's rivers and streams and ultimately results in increased nutrient loading in the Mississippi River. The Illinois CREP will be integrated with the NRCS EQIP Gulf Hypoxia Initiative and give priority to watersheds identified by NRCS and IEPA has having high mean total concentrations of nitrate and phosphorus. In addition, these changes will help Illinois focus on practices that increase carbon sequestration and create habitat corridors along rivers and tributaries for species protection and migration. Priorities will be given to areas that have been previously identified by the Illinois Wildlife Action Plan that also meet the Illinois Climate Change Initiative.

Recommendations:

- Expand eligible area to Kaskaskia River Watershed (See Map 2)
- Amend MOA to #5
- Amend MOA to #6
- Amend MOA to #7

CONTINUED STRATEGIES ON PROGRAM IMPLEMENTATION

1. Maintain long-term staffing and monitoring strategies to assure adequate staff and support for the proper administration of the program and to maintain the habitat values created by the Program. Target sites towards enrollment for corridor development.

2. Continue training and workshops, for all field staff and SWCD's as a means of maintaining and updating the training manual for field use. Maintain online mapping tools support for IDNR Staff.

3. Continued support for SWCD staff to assist in the administration of the CREP program at the County level. Efforts to work with IEPA and other Partners will continue to fund staff and cost-share will continue.

4. Continue efforts providing mid-management habitat assistance to achieve Wildlife Action Plan objectives while complying with CREP objectives.

5. Replace nongame grassland birds with grassland birds in CREP goals.

6. Change eligibility criteria for lands with a weighted average Erodibility Index (EI)$\geq$ 12 to Erodibility Index (EI) $\geq$ 8; All other land criteria to remain the same.

7. Add the following practices:

CP23A - Wetland Restoration, Non-Floodplain

CP27 - Farmable Wetlands Pilot Wetland

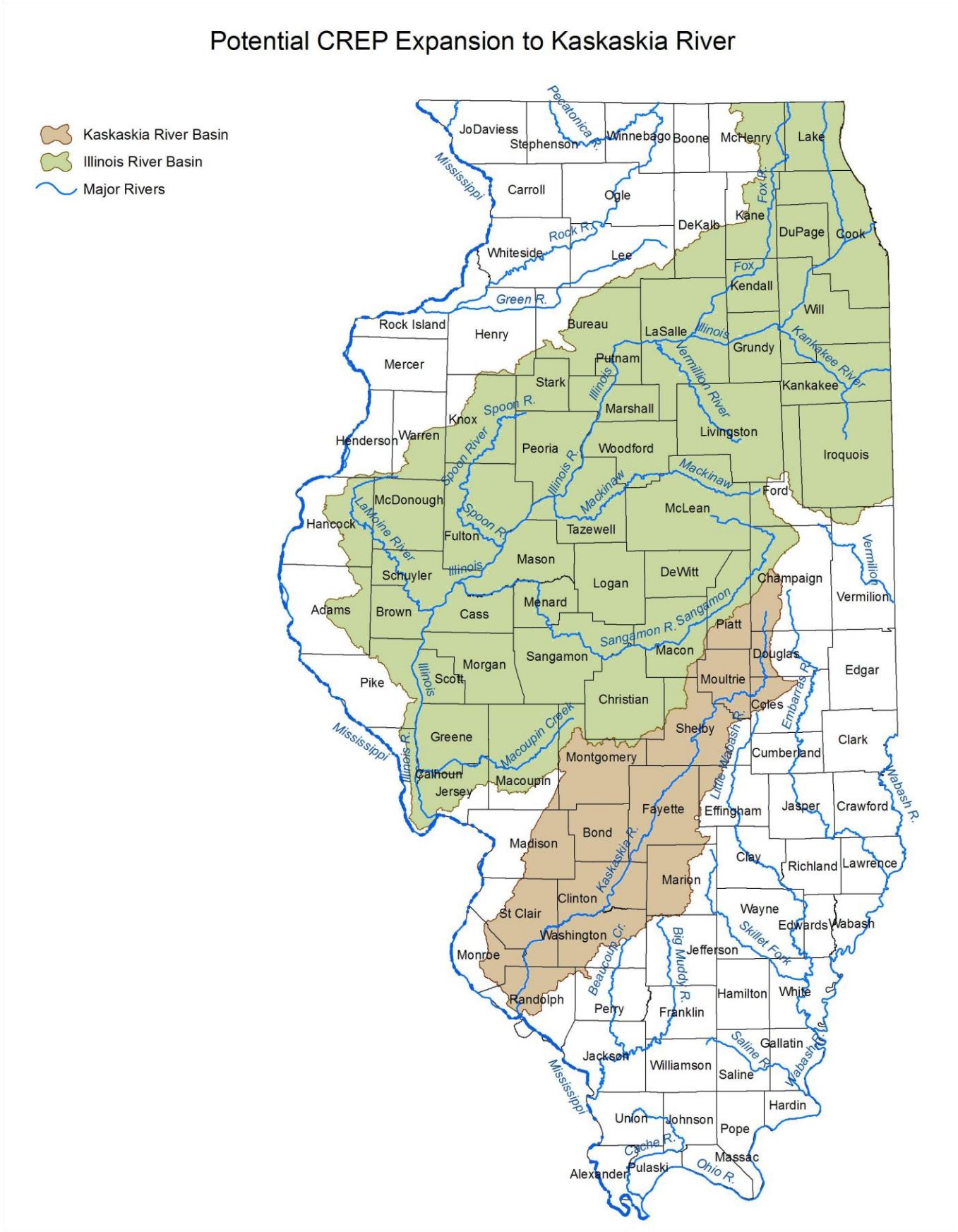
CP28 - Farmable Wetlands Pilot Buffer

CP29 - Marginal Pastureland Wildlife Buffer

CP30 - Marginal Pastureland Wetland Buffer

CP31 - Bottomland Timber Establishment on Wetlands

Map 2


Potential CREP Expansion to Kaskaskia River
Kaskaskia River Basin
Illinois River Basin
Major Rivers
JoDaviess
Stephenson
Winnebago
Boone
McHenry
Lake
Carroll
Ogle
DeKalb
Kane
DuPage
Cook
Whiteside
Lee
Kendall
Will
Rock Island
Henry
Bureau
LaSalle
Grundy
Kankakee
Mercer
Putnam
Stark
Marshall
Livingston
Knox
Henderson
Warren
Peoria
Woodford
Iroquois
McDonough
Ford
McLean
Hancock
Fulton
Tazewell
Mason
DeWitt
Champaign
Vermilion
Schuyler
Logan
Adams
Brown
Cass
Menard
Piatt
Douglas
Edgar
Morgan
Sangamon
Macon
Pike
Scott
Moultrie
Christian
Coles
Shelby
Clark
Greene
Montgomery
Cumberland
Calhoun
Jersey
Macoupin
Fayette
Effingham
Jasper
Crawford
Bond
Madison
Clay
Richland
Lawrence
Marion
Clinton
Wayne
St Clair
Edwards
Wabash
Washington
Jefferson
Monroe
Hamilton
White
Randolph
Perry
Franklin
Gallatin
Jackson
Williamson
Saline
Hardin
Union
Johnson
Pope
Massac
Alexander
Pulaski
Rock R.
Green R.
Spoon R.
Spoon River
Illinois R.
Mackinaw
LaMoine River
Illinois
Sangamon R.
Macoupin Creek
Mississippi
Fox R.
Fox
Vermilion River
Kankakee River
Vermilion
Embarras R.
Little Wabash R.
Kaskaskia R.
Beaucoup Cr.
Big Muddy R.
Skillet Fork
Wabash R.
Saline R.
Cache R.
Ohio R.

MONITORING AND EVALUATION OF THE ILLINOIS RIVER

♦

Monitoring and Evaluation of Sediment and Nutrient Delivery to the Illinois River:
Illinois River Conservation Reserve Enhancement Program (CREP)

♦

A Summary of the Illinois Conservation Reserve Enhancement Program Habitat Monitoring Program Pilot Study
Summer 2009

♦

2009 Smallmouth Bass Assessment in Sugar Creek, Bellrose Nature Preserve

♦

Excerpts from State Wildlife Grants on the Illinois River

♦

A Decade of Changes in the Illinois River Watershed

Monitoring and Evaluation of Sediment and Nutrient Delivery to the Illinois River: Illinois River Conservation Reserve Enhancement Program (CREP)

by
Center for Watershed Science
Illinois State Water Survey
Illinois Department of Natural Resources

Prepared for the
Office of Resource Conservation,
Illinois Department of Natural Resources

November 2009

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Monitoring and Evaluation of Sediment and Nutrient Delivery to the Illinois River: Illinois River Conservation Reserve Enhancement Program (CREP)

By
Center for Watershed Science
Illinois State Water Survey
Illinois Department of Natural Resources

1. Introduction

The Illinois River Conservation Reserve Enhancement Program (CREP) was initiated as a joint federal/state program with the goal of improving water quality and wildlife habitat in the Illinois River basin. Based on numerous research and long-term data, the two main causes of water quality and habitat degradations in the Illinois River were known to be related to sedimentation and nutrient loads. Based on this understanding, the two main objectives of the Illinois River CREP were stated as follows:

1. Reduce the amount of silt and sediment entering the main stem of the Illinois River by 20 percent.

2. Reduce the amount of phosphorous and nitrogen loadings to the Illinois River by 10 percent.

To assess the progress of the program towards meeting the two goals, the Illinois Department of Natural Resources (IDNR) and the Illinois State Water Survey (ISWS) are developing a scientific process for evaluating the effectiveness of the program. The process includes data collection, modeling, and evaluation. Progress made so far in each of these efforts is presented in this report.

Acknowledgments

The work upon which this report is based was supported by funds provided by the Office of Resource Conservation, Illinois Department of Natural Resources. Ms. Debbie Bruce and Richard Mollahan managed the project for IDNR and provided the proper guidance and support to design and operate the monitoring program and the associated research. Their continued support and guidance is greatly appreciated.

Several Illinois State Water Survey staff participated and contributed towards the successful accomplishment of project objectives. Jim Slowikowski, Kip Stevenson, Mike Smith, Josh

Stevenson, and Amy Russell are responsible for the data collection and analysis. Laura Keefer was responsible for analysis of the land use data with assistance from Sandy Jones and Brad Larson. Jas Singh and Yanqing Lian were responsible for the development of the watershed models. Vern Knapp provided the analyses on variability and trends in precipitation and streamflow in the Illinois River basin. Momcilo Markus analyzed the Illinois Environmental Protection Agency nutrient data for analyses of long-term trends. David Crowder analyzed the Benchmark Sediment Monitoring data for long-term trend analysis. Becky Howard prepared the draft and final reports.

2. Monitoring and Data Collection

The monitoring and data collection component consist of a watershed monitoring program to monitor sediment and nutrient for selected watersheds within the Illinois River basin and also to collect and analyze land use data throughout the river basin. Historically, there are a limited number of sediment and nutrient monitoring stations within the Illinois River basin, and most of the available records are of short duration. For example, figure 2-1 shows all the active and inactive sediment monitoring stations within the Illinois River basin prior to the start of monitoring for CREP. Out of the 44 stations shown in the map, only 18 stations had records longer than 5 years and only 8 stations had more than 10 years of record. Therefore the available data and monitoring network was insufficient to monitor long-term trends especially in small watersheds where changes can be observed and quantified more easily than in larger watersheds.

To fill the data gap and to generate reliable data for small watersheds, the Illinois Department of Natural Resources funded the Illinois State Water Survey to initiate a monitoring program that will collect precipitation, hydrologic, sediment, and nutrient data for selected small watersheds in the Illinois River basin that will assist in making a more accurate assessment of sediment and nutrient delivery to the Illinois River.

Sediment and Nutrient Data

Five small watersheds located within the Spoon and Sangamon River watersheds were selected for intensively monitoring sediment and nutrient within the Illinois River basin. The locations of the watersheds and the monitoring stations are shown in figures 2-2 and 2-3 and information about the monitoring stations is provided in table 2-1. Court and North Creeks are located within the Spoon River watershed, while Panther and Cox Creeks are located within the Sangamon River watershed. The Spoon River watershed generates the highest sediment per unit area in the Illinois River basin, while the Sangamon River watershed is the largest tributary watershed to the Illinois River and delivers the largest total amount of sediment to the Illinois River. The type of data collected and the data collection methods have been presented in detail in the first progress report for the monitoring program (Demissie et al., 2001) and in the Quality Assurance Project Plan (QAPP) given in Appendix A. This report presents the data that have been collected and analyzed at each of the monitoring stations.

Table 2-1. Sediment and Nutrient Monitoring Stations Established for the Illinois River CREP

Station ID	*Name*	*Drainage area*	*Watershed*
301	Court Creek	66.4 sq mi (172 sq km)	Spoon River
302	North Creek	26.0 sq mi (67.4 sq km)	Spoon River
303	Haw Creek	55.2 sq mi (143 sq km)	Spoon River
201	Panther Creek	16.5 sq mi (42.7 sq km)	Sangamon River
202	Cox Creek	12.0 sq mi (31.1 sq km)	Sangamon River

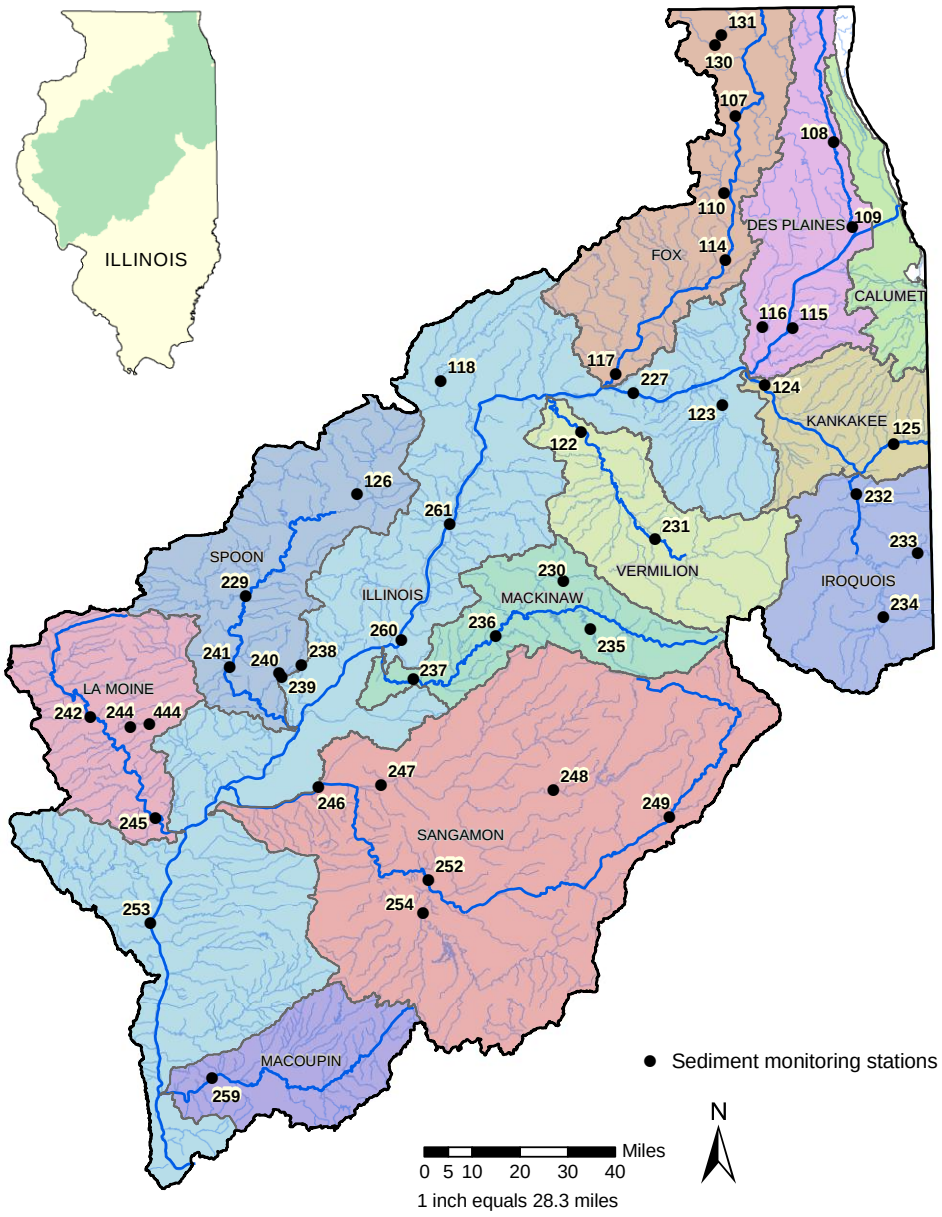


Figure 2-1. Locations of available in-stream sediment data within the Illinois River watershed, 1981-2000

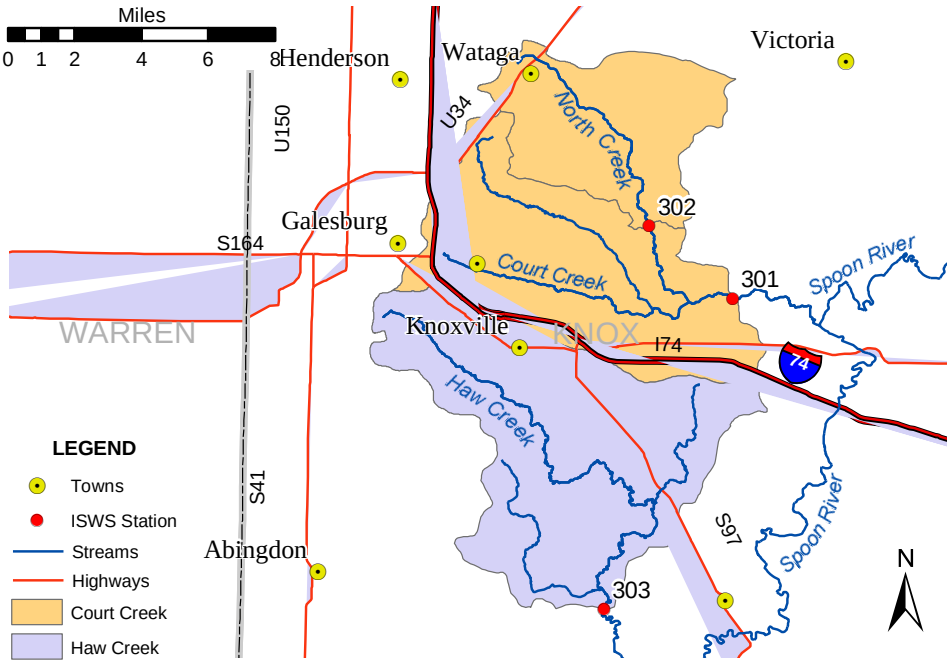


Figure 2-2. Location of monitoring stations in Court and Haw Creek watersheds

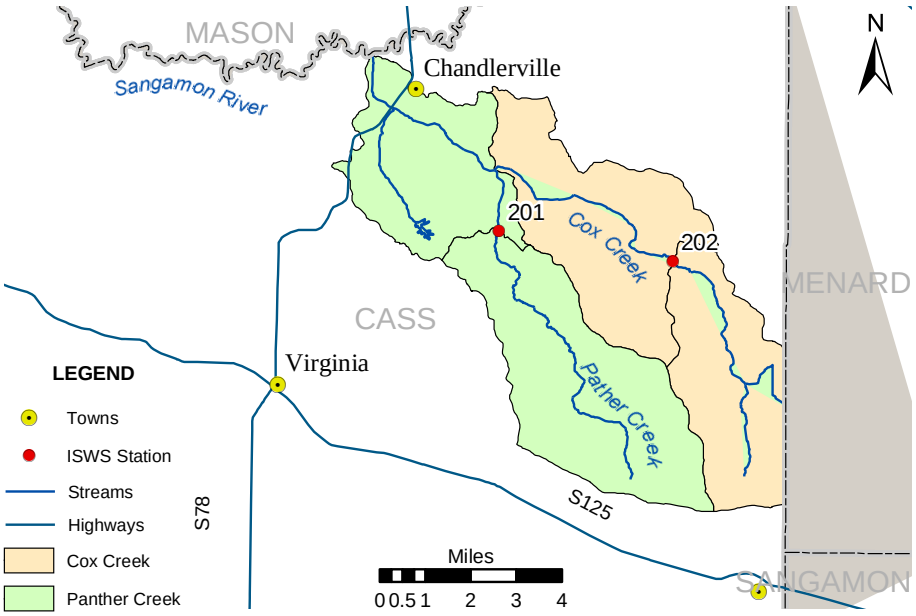


Figure 2-3. Location of monitoring stations in Panther and Cox Creek watersheds

Sediment Data

The daily streamflow and suspended sediment concentrations observed at all the five monitoring stations from Water Year 2000 to Water Year 2008 are given in Appendix B and C. Examples of the frequency of data collection are shown in figures 2-4 and 2-5 for the Court Creek Station. A summary of statistics for all stations showing the mean, medium, minimum maximum, 25^{th} percentile, and 75^{th} percentile are given in table 2-2. Over 14,617 samples have been collected and analyzed at the five monitoring stations since the monitoring program was initiated. As can be seen in the figures, suspended sediment concentrations are highly variable throughout a year and also from year to year depending on the climatic conditions. It is also evident that sediment concentrations are the highest during storm events resulting in the transport of most of the sediment during storm events. Therefore, it is extremely important that samples are collected frequently during storm events to accurately measure sediment loads at monitoring stations.

Nutrient Data

All the nutrient data collected and analyzed from Water Year 2000 through Water Year 2008 at the five monitoring stations are given in Appendices D and E. The nutrient data are organized into two groups: nitrogen species and phosphourous species. The nitrogen species include nitrate-nitrogen (NO_3-N), nitrite-nitrogen (NO_2-N), ammonium-nitrogen (NH_4-N), and total Kjedahl nitrogen (TKN). The phosphorous species include total phosphorous (TP), total dissolved phosphorous (TDP), and orthophosphate (P-ortho). Over 8,829 samples have been collected and analyzed for nitrate (NO_3-N), ammonium (NH_4-N) and orthophosphate (P-ortho). In addition, more than 5,589 samples have been analyzed for nitrate (NO_2-N), total Kjeldahl nitrogen (TKN), total phosphorous (TP), and total dissolved phosphorous (TDP). Examples of the type of data collected for the nitrogen species are shown in figure 2-5, while those for the phosphorous species are shown in figure 2-6. A summary statistics for all sations showing the mean, median, minimum, maximum, 25^{th} percentile, and 75^{th} percentile are given in table 2-2.

Data for the nitrogen species at all five monitoring stations show that the dominant form of nitrogen transported by the streams is nitrate-N. During storm events, the concentration of TKN rises significantly, sometimes exceeding the nitrate-N concentration. TKN is highly correlated to suspended sediment concentrations.

One significant observation that can be made from the data is the consistently higher concentrations of nitrate-N at Panther Creek and Cox Creek (tributaries to the Sangamon River) than at Court Creek, North Creek, and Haw Creek (tributaries of the Spoon River).

Data for the phosphorous species at all five monitoring stations show that most of the phosphorous load is transported during storm events. Concentrations of total phosphorous are the highest during storm events and relatively low most of the time. This is very similar to that shown by sediment and thus implies high correlations between sediment and phosphorous concentrations and loads. In terms of phosphorous concentrations, it does not appear there is any significant difference between the different monitoring stations from the Spoon and Sangamon River watersheds.

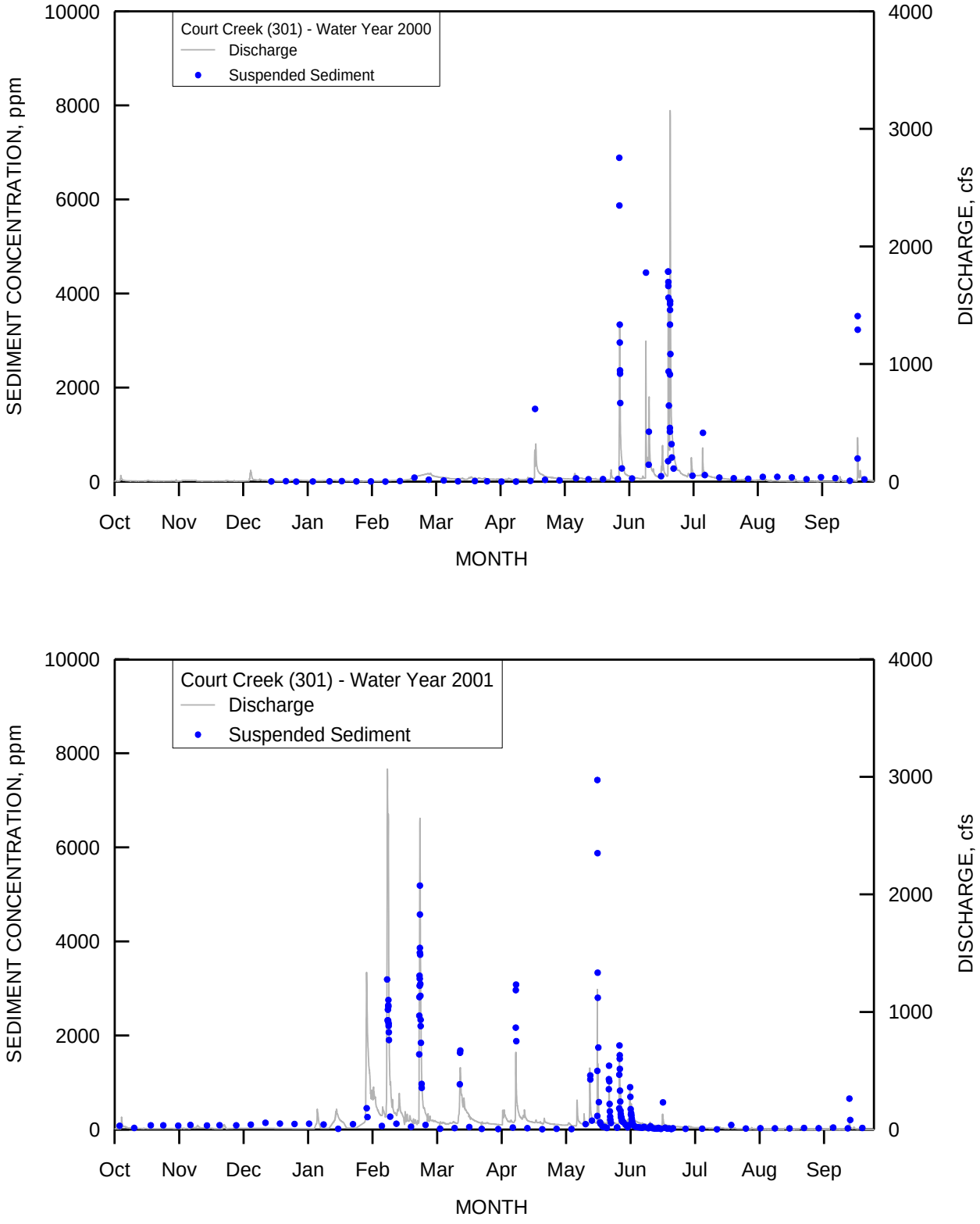
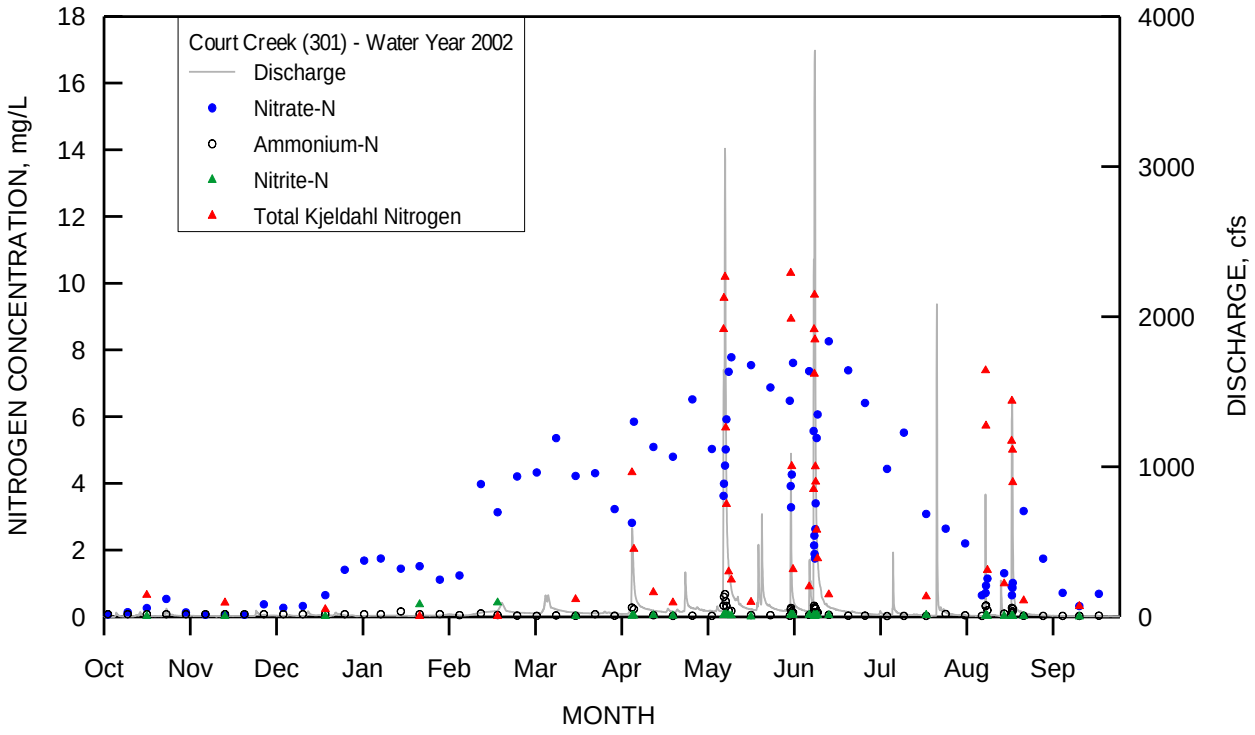


Figure 2-4. Suspended sediment concentrations and water discharge at Court Creek (301) for Water Years 2000 and 2001



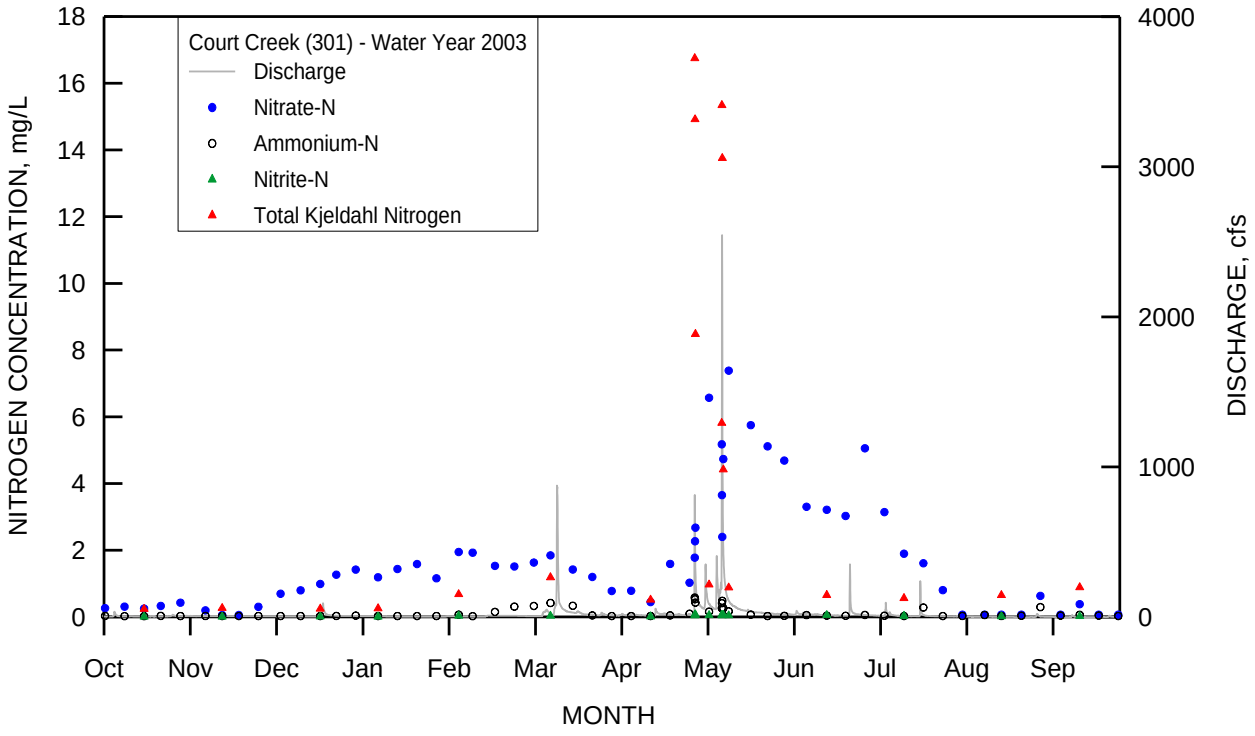
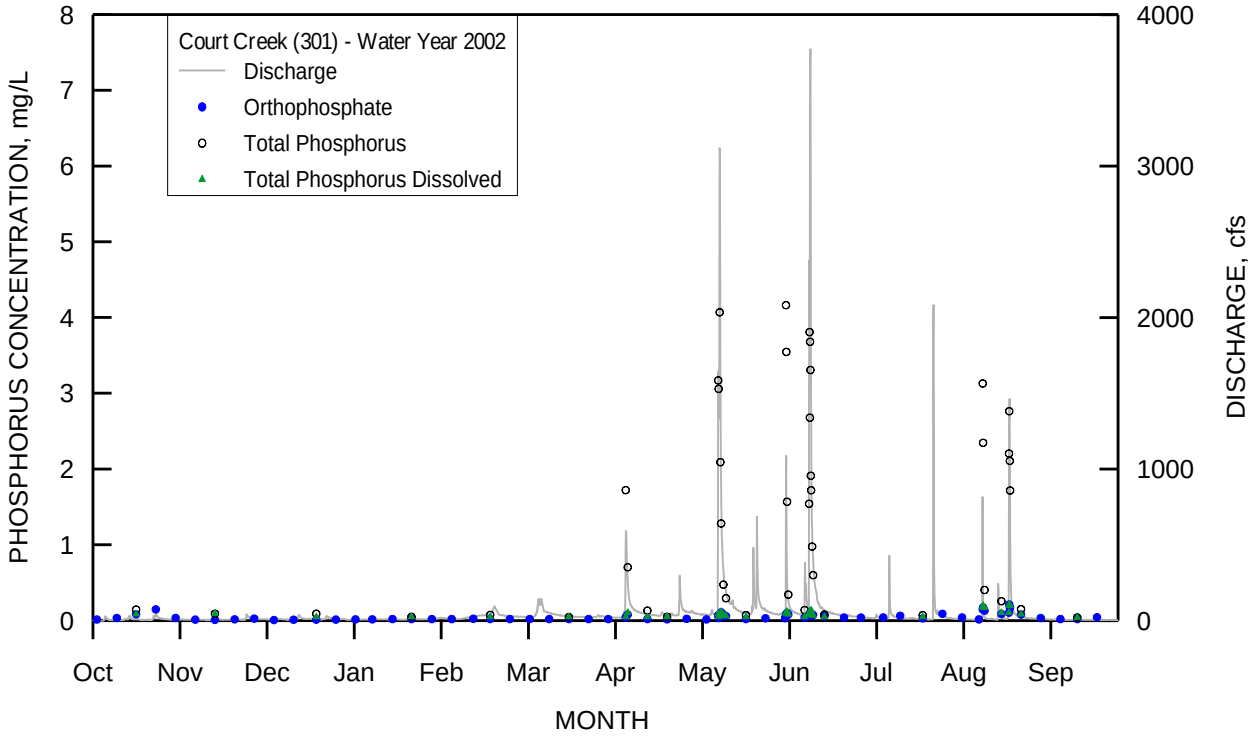


Figure 2-5. Concentrations of nitrogen species and water discharge at Court Creek (301) for Water Years 2002 and 2003

Table 2-2. Summary Statistics for Water Years 2000–2008. All concentrations in mg/L

	NO3-N	*oPO4-P*	*NH4-N*	*NO2-N*	*TKN*	*t-P*	*t-P-Dissolved*	*SSC*
Court Creek (Station 301)								
Count	614	614	614	310	309	309	309	2586
Mean	3.15	0.07	0.15	0.04	2.65	0.90	0.12	611
Median	2.90	0.04	0.07	0.04	1.38	0.37	0.10	106
Min	<0.06	<0.01	<0.03	<0.01	<0.23	<0.03	<0.03	1.93
Max	11.37	0.69	0.90	0.13	18.69	6.58	0.71	10709
25th Percentile	0.78	<0.02	<0.06	<0.02	0.61	0.11	<0.06	31.2
75th Percentile	5.03	0.08	0.18	0.05	3.57	1.30	0.15	517
North Creek (Station 302)								
Count	608	608	608	304	304	304	304	3357
Mean	3.34	0.08	0.15	0.04	2.41	0.83	0.14	413
Median	3.14	0.04	0.07	0.03	1.11	0.31	0.10	63.2
Min	<0.06	<0.01	<0.03	<0.01	<0.23	<0.04	<0.03	0.36
Max	12.66	0.90	1.55	0.19	17.95	6.69	0.90	13287
25th Percentile	0.53	<0.02	<0.06	<0.02	0.62	0.10	<0.06	24.1
75th Percentile	5.56	0.09	0.15	0.05	2.92	1.06	0.17	216
Haw Creek (Station 303)								
Count	619	619	619	312	312	312	312	3325
Mean	4.52	0.08	0.13	0.05	2.41	0.82	0.13	500
Median	4.47	0.06	0.07	0.04	1.33	0.38	0.10	145
Min	<0.06	<0.01	<0.03	<0.01	<0.23	<0.04	<0.03	2.17
Max	12.59	0.71	1.07	0.21	16.75	5.92	0.95	9818
25th Percentile	1.48	<0.04	<0.06	<0.03	0.64	0.13	<0.07	43.3
75th Percentile	6.98	0.09	0.15	0.06	2.99	1.06	0.14	495
Panther Creek (Station 201)								
Count	551	551	551	237	237	237	237	3049
Mean	4.35	0.12	0.10	0.04	2.59	1.14	0.20	746
Median	3.50	0.07	0.06	0.03	0.84	0.26	0.13	79.0
Min	<0.06	<0.01	<0.03	<0.01	<0.12	<0.03	<0.03	1.47
Max	14.76	1.31	1.27	0.19	23.99	11.21	1.38	24404
25th Percentile	<0.09	<0.04	<0.06	<0.02	0.48	0.12	<0.08	33.2
75th Percentile	7.95	0.14	0.08	0.05	3.44	1.50	0.24	308
Cox Creek (Station 202)								
Count	551	551	551	235	235	235	235	2300
Mean	5.84	0.17	0.32	0.05	3.03	1.19	0.28	746
Median	4.68	0.09	0.07	0.04	1.37	0.41	0.17	110
Min	<0.06	<0.01	<0.03	<0.01	<0.14	<0.04	<0.03	0.95
Max	18.14	2.70	12.83	0.27	18.25	7.90	2.95	21768
25th Percentile	0.53	<0.05	<0.06	<0.02	0.57	0.16	0.08	49.1
75th Percentile	10.61	0.19	0.17	0.06	3.91	1.52	0.40	358



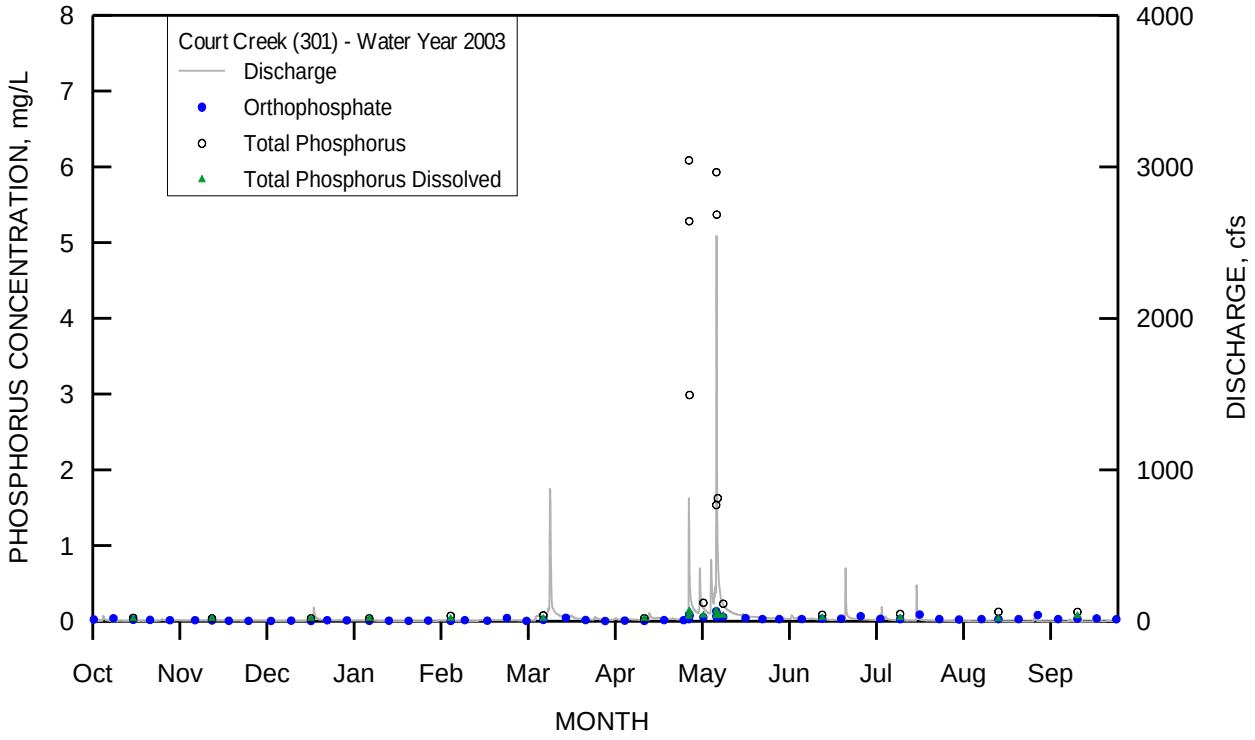


Figure 2-6. Concentrations of phosphorous species and water discharge at Court Creek (301) for Water Years 2002 and 2003

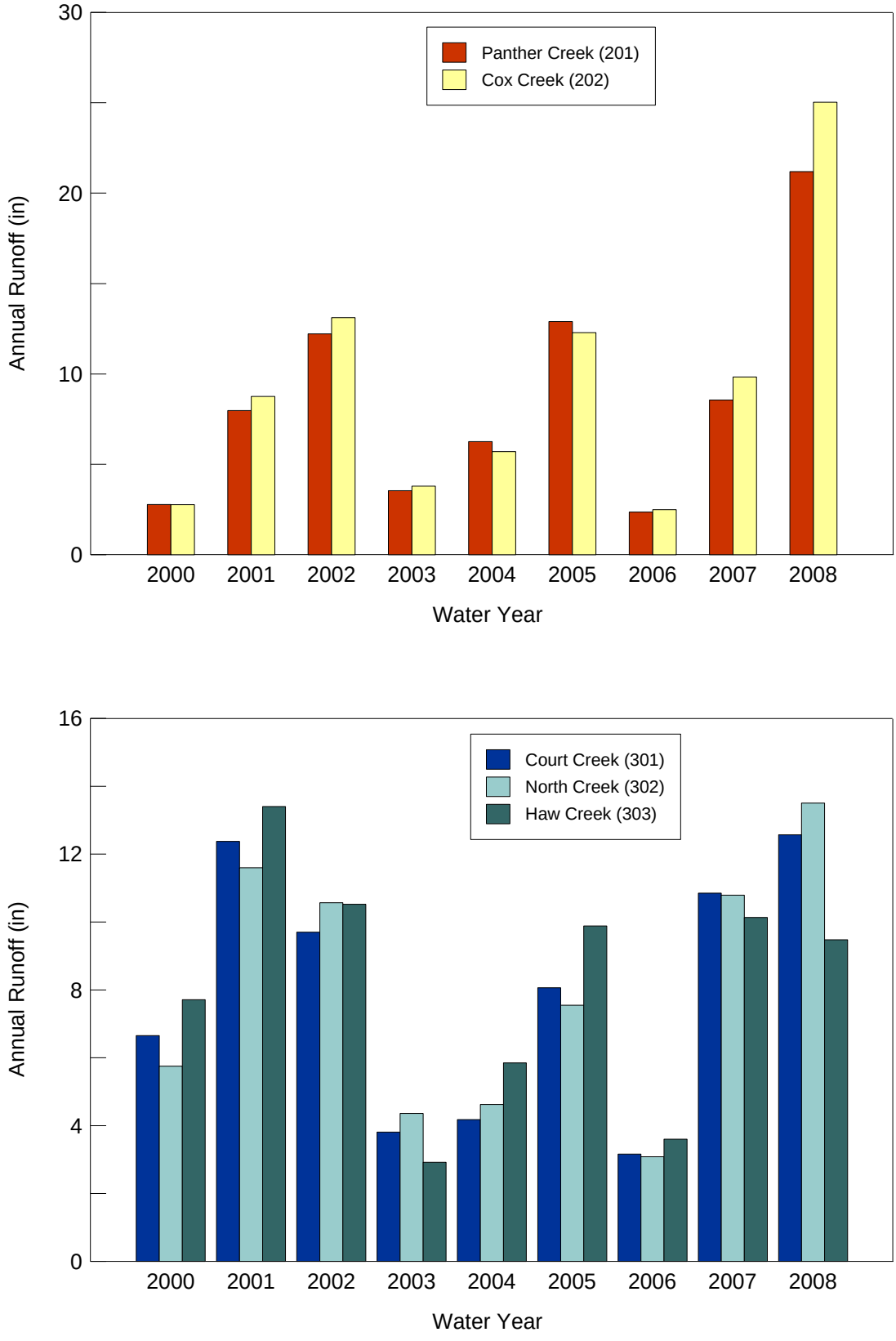


Figure 2-7. Annual runoff at the five CREP monitoring stations

Sediment and Nutrient Loads

The sediment and nutrient concentrations and water discharges are used to compute the amount of sediment and nutrient transported past monitoring stations. Based on the available flow and concentration data, daily loads are computed for sediment and the different species of nitrogen and phosphorous. The daily loads are then compiled to compute monthly and annual loads. Results of those calculations are summarized in tables 2-3 to 2-7 for each of the five monitoring stations. Each table presents the annual water discharge, sediment load, nitrate-N load, and the total phosphorous load for one of the stations. Similar calculations have been made for the other species of nitrogen and phosphorous, but are not included in the summary tables. The annual sediment loads are highly correlated to the water discharge, and thus the wetter years, 2001, 2002, 2007, and 2008 generated more sediment at all stations as compared to drier years, 2000, 2003, and 2006. The annual sediment loads ranged from a low of 1,820 tons in 2003 at Cox Creek to a high of 62,841 tons in 2002 at Court Creek. The nitrate-N loads ranged from a low of 10.3 tons in 2000 at Cox Creek to a high of 322 tons in 2001 at Haw Creek. The total phosphorous loads ranged from a low of 1.6 tons in 2006 at Cox Creek to a high of 58 tons in 2001 at Haw Creek. For comparison purposes, the runoff, sediment, nitrate-N, nitrite-N, ammonium-N, Kjeldahl-N, total phosphorous, dissolved phosphorous, and ortho-phosphate phosphorous loads phosphorous loads (for the five monitoring stations) are shown in figures 2-8 to 2-15. In terms of the total annual loads, the larger watersheds, Court and Haw, consistently carry higher sediment and nutrient loads than Panther and Cox Creeks. However, per unit area Panther and Cox generate more sediment than Court, North, and Haw Creeks.

Table 2-3. Summary of Annual Water Discharges, Sediment and Nutrient Loads at Court Creek Monitoring Station (301)

		Load		
Water Year	*Water discharge (cfs)*	*Sediment (tons)*	*Nitrate-N (tons)*	*Total phosphorus (tons)*
2000	11,880	26,504	131.2	35.0
2001	22,100	43,511	274.8	39.2
2002	17,320	62,841	203.7	47.9
2003	6,805	21,725	59.9	18.3
2004	7,459	7,347	76.0	7.5
2005	14,400	18,799	207.5	20.4
2006	5,650	7,886	84.3	6.5
2007	19,376	48,831	240.8	46.8
2008	22,442	41,034	265.4	45.6

Table 2-4. Summary of Annual Water Discharges, Sediment and Nutrient Loads at North Creek Monitoring Station (302)

		Load		
Water Year	*Water discharge (cfs)*	*Sediment (tons)*	*Nitrate-N (tons)*	*Total phosphorus (tons)*
2000	4,009	6,954	42.8	10.4
2001	8,091	16,718	102.9	12.7
2002	7,372	29,266	97.8	24.2
2003	3,039	11,381	32.9	9.1
2004	3,224	2,038	37.7	2.4
2005	5,266	6,061	76.3	7.7
2006	2,151	4,177	36.2	3.4
2007	7,524	16,657	99.3	14.3
2008	9,416	19,727	119.0	21.0

Table 2-5. Summary of Annual Water Discharges, Sediment and Nutrient Loads at Haw Creek Monitoring Station (303)

		Load		
Water Year	*Water discharge (cfs)*	*Sediment (tons)*	*Nitrate-N (tons)*	*Total phosphorus (tons)*
2000	11433	21258	162.2	32.0
2001	19878	49403	322.0	58.0
2002	15603	44148	256.5	42.8
2003	4337	5896	41.7	8.3
2004	8676	10894	143.4	12.6
2005	14661	18024	281.4	18.5
2006	5341	5759	113.7	6.0
2007	15032	20114	262.5	23.9
2008	14054	16372	227.0	25.5

Table 2-6. Summary of Annual Water Discharges, Sediment and Nutrient Loads at Panther Creek Monitoring Station (201)

		Load		
Water Year	*Water discharge (cfs)*	*Sediment (tons)*	*Nitrate-N (tons)*	*Total phosphorus (tons)*
2000	1,236	4,337	13.8	4.4
2001	3,550	9,806	84.9	5.1
2002	5,440	34,384	101.8	16.4
2003	1,578	2,946	26.4	1.8
2004	2,787	7,767	52.5	5.8
2005	5,743	13,743	112.2	10.2
2006	1,053	2,682	22.5	2.5
2007	3,809	13,249	75.4	10.6
2008	9,437	83,508	123.1	46.7

Table 2-7. Summary of Annual Water Discharges, Sediment and Nutrient Loads at Cox Creek Monitoring Station (202)

		Load		
Water Year	*Water discharge (cfs)*	*Sediment (tons)*	*Nitrate-N (tons)*	*Total phosphorus (tons)*
2000	894	4,149	10.3	5.7
2001	2,833	9,609	77.9	5.5
2002	4,242	23,143	100.6	16.1
2003	1,226	1,820	29.6	1.7
2004	1,844	4,574	45.3	3.7
2005	3,976	8,109	109.0	8.8
2006	806	3,648	19.3	1.6
2007	3,181	10,072	81.5	7.2
2008	8,097	73,350	154.7	31.4

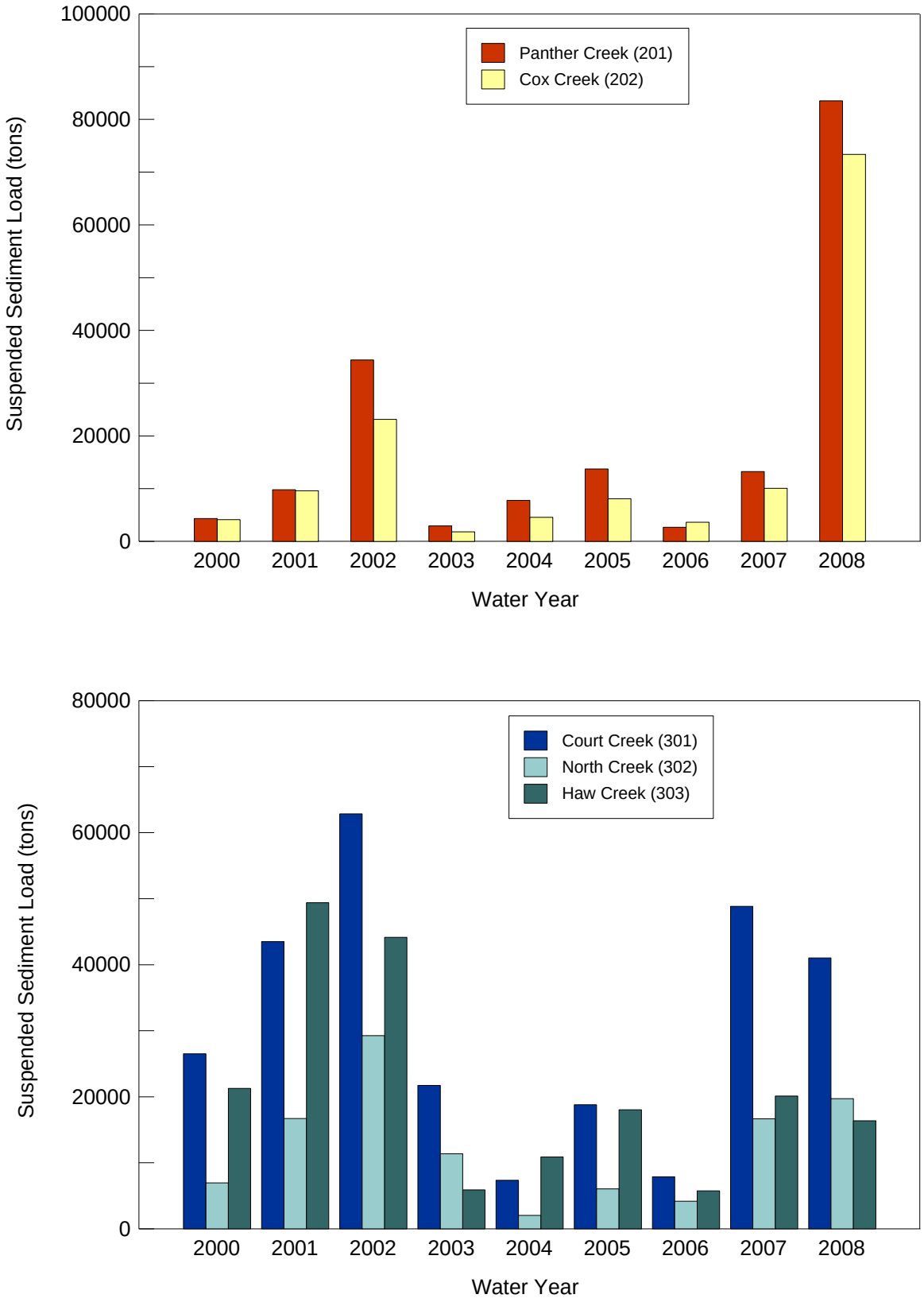


Figure 2-8. Annual suspended sediment loads at the five CREP monitoring stations

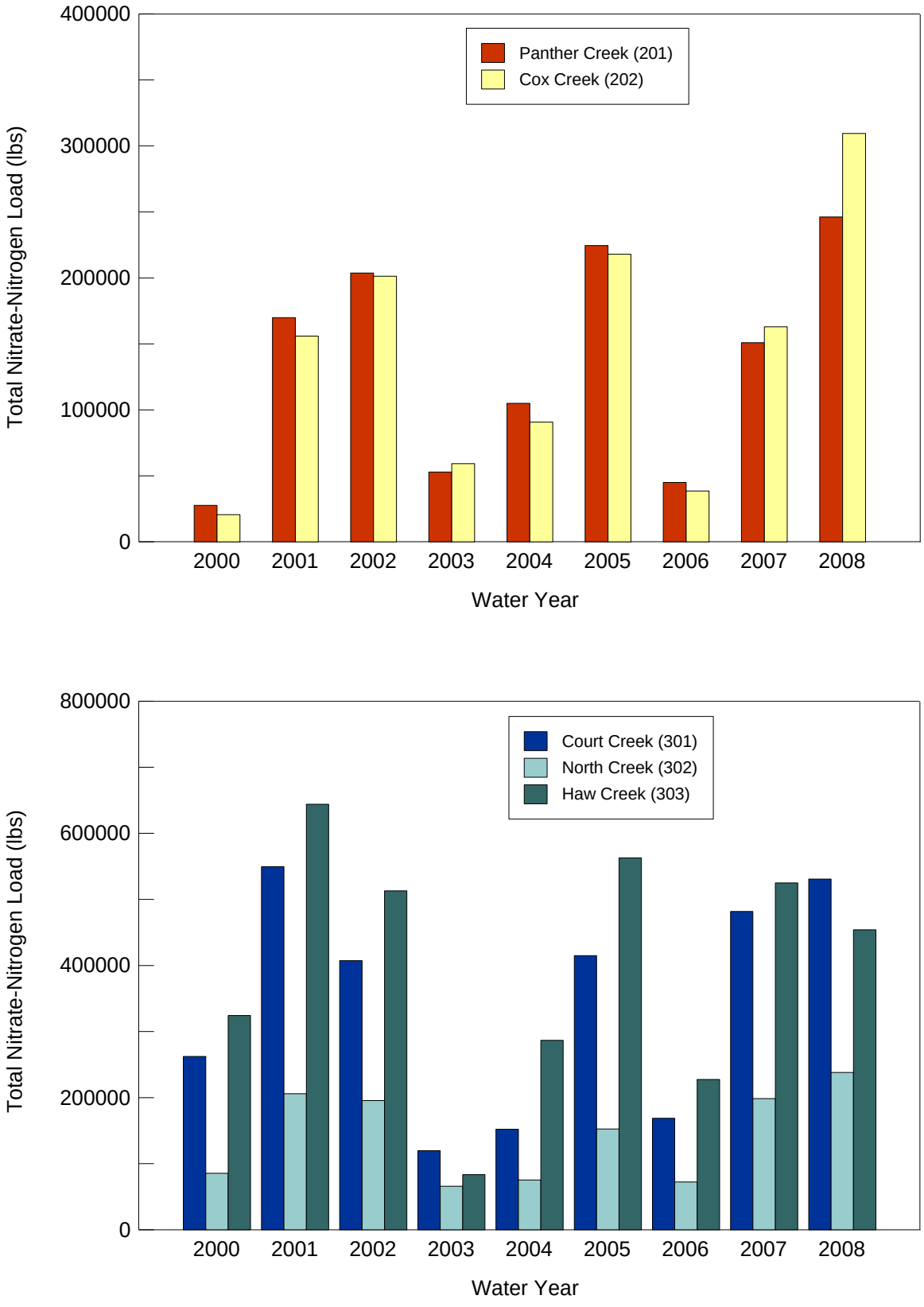


Figure 2-9. Annual nitrate-N loads at the five CREP monitoring stations

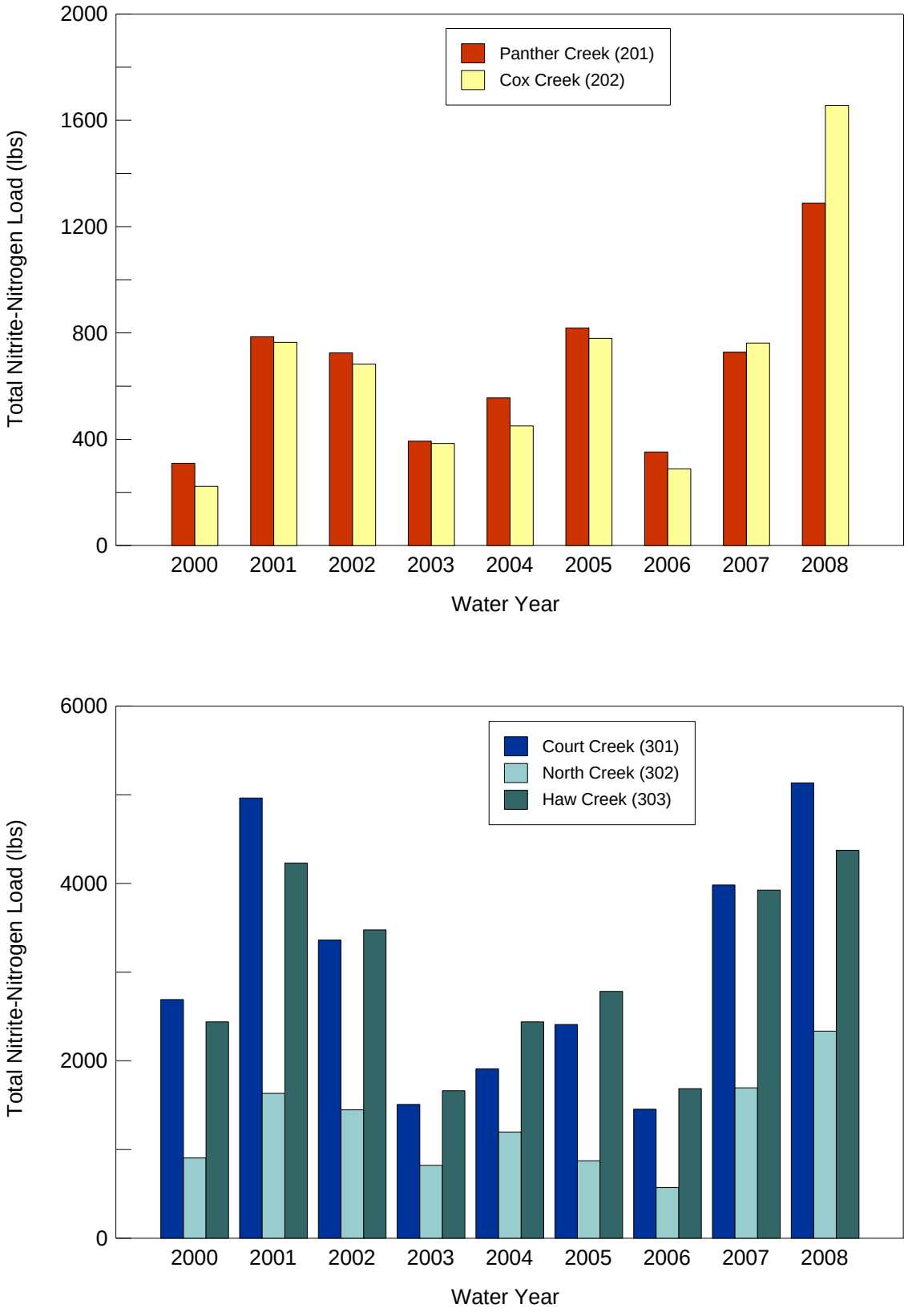


Figure 2-10. Annual nitrite-N loads at the five CREP monitoring stations

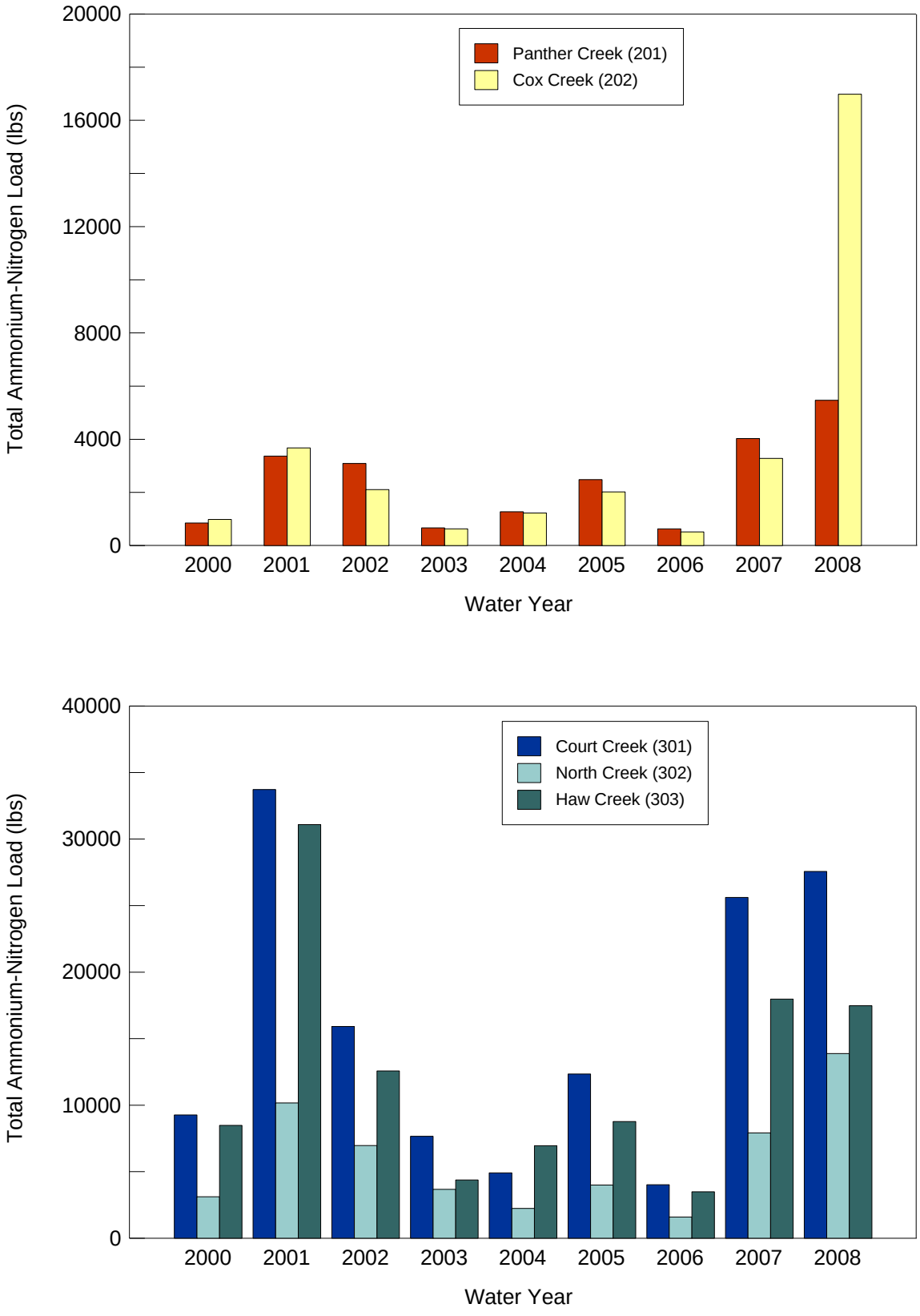


Figure 2-11. Annual ammonium-N loads at the five CREP monitoring stations

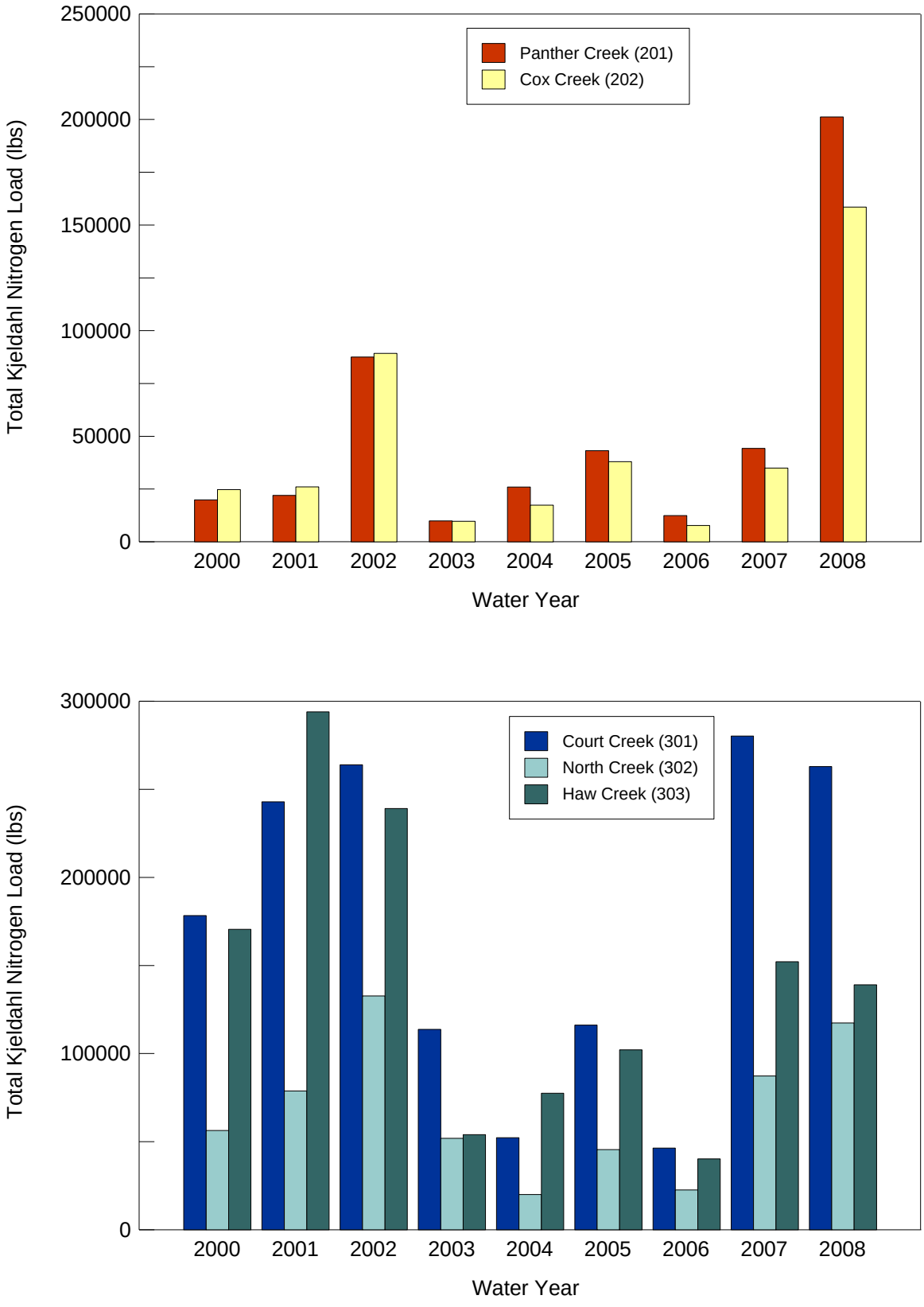


Figure 2-12. Annual Kjeldahl nitrogen loads at the five CREP monitoring stations

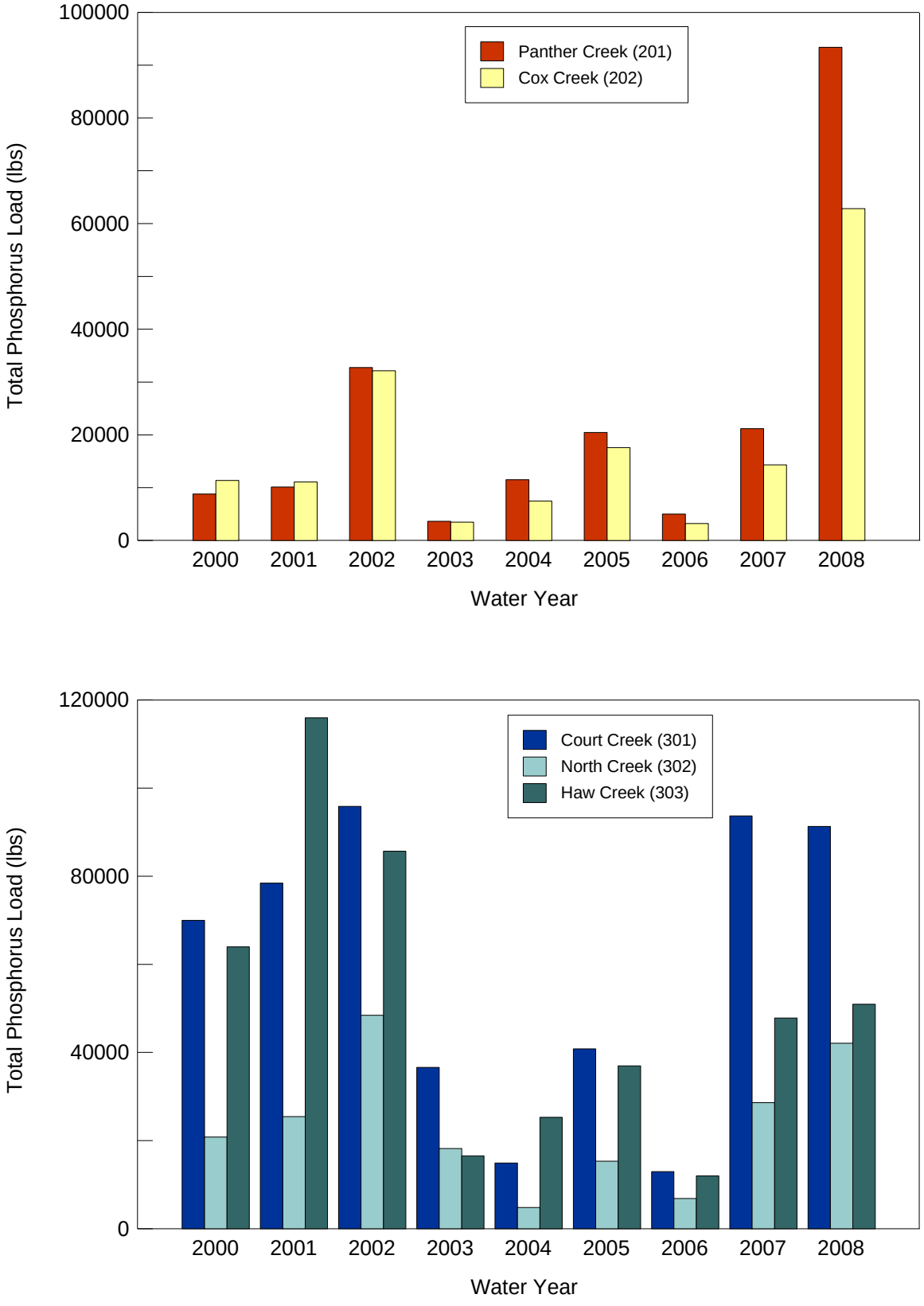


Figure 2-13. Annual phosphorous loads at the five CREP monitoring stations

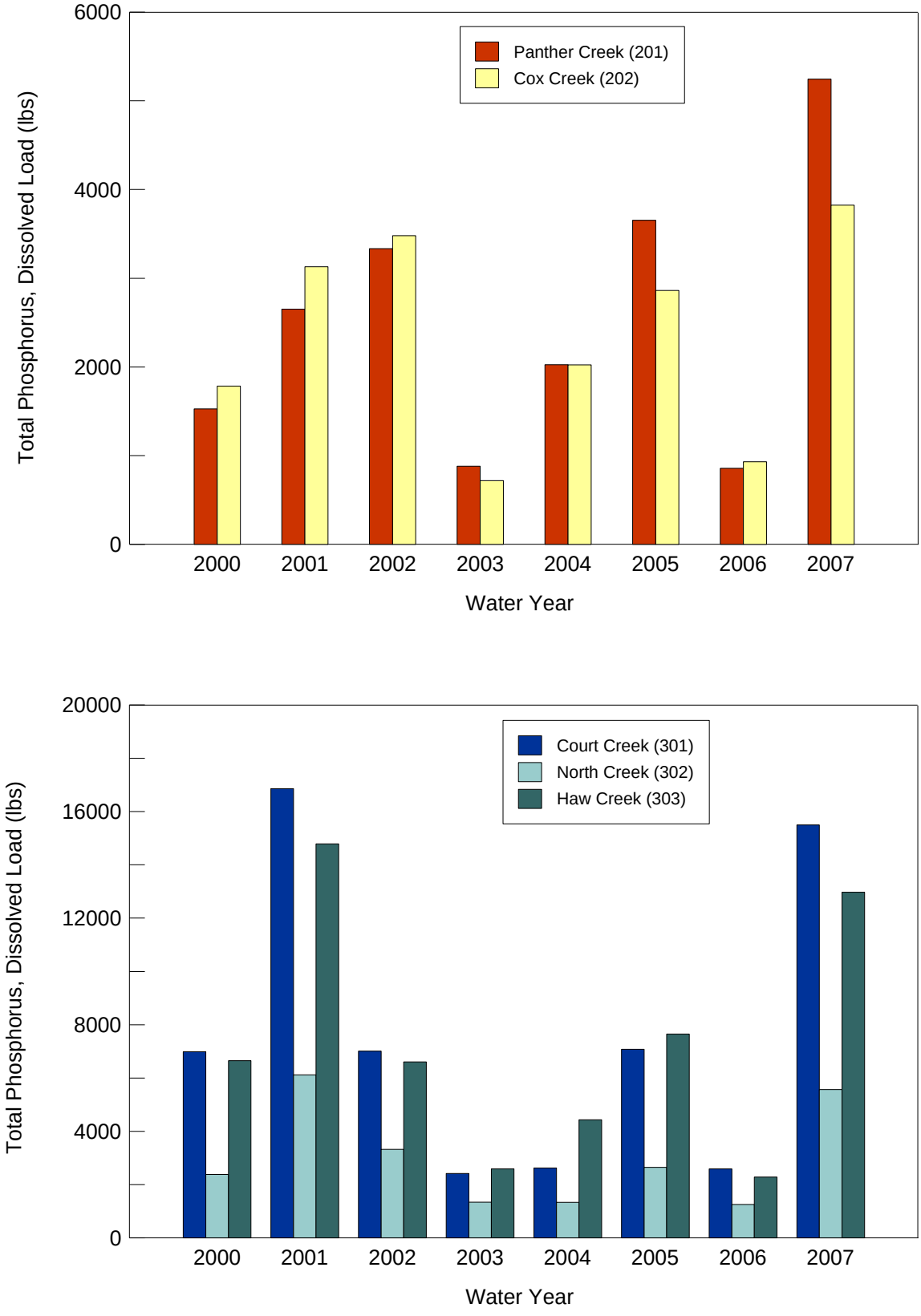
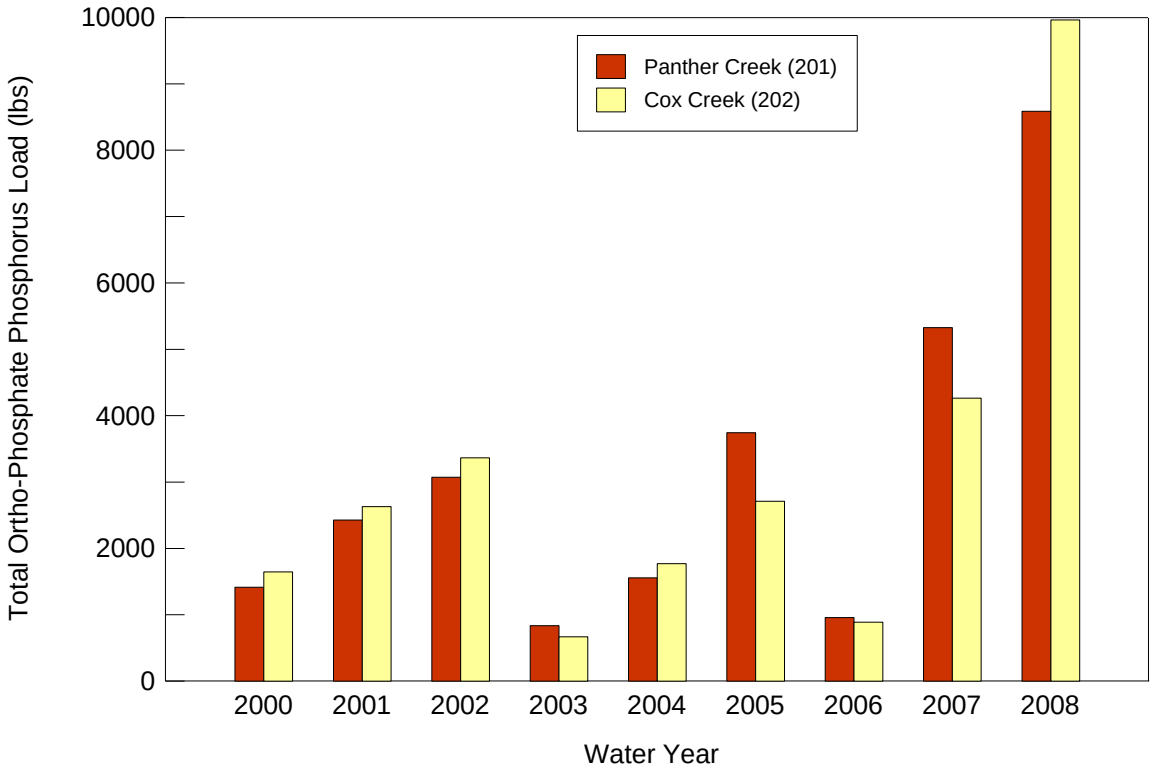


Figure 2-14. Annual dissolved phosphorous loads at the five CREP monitoring stations



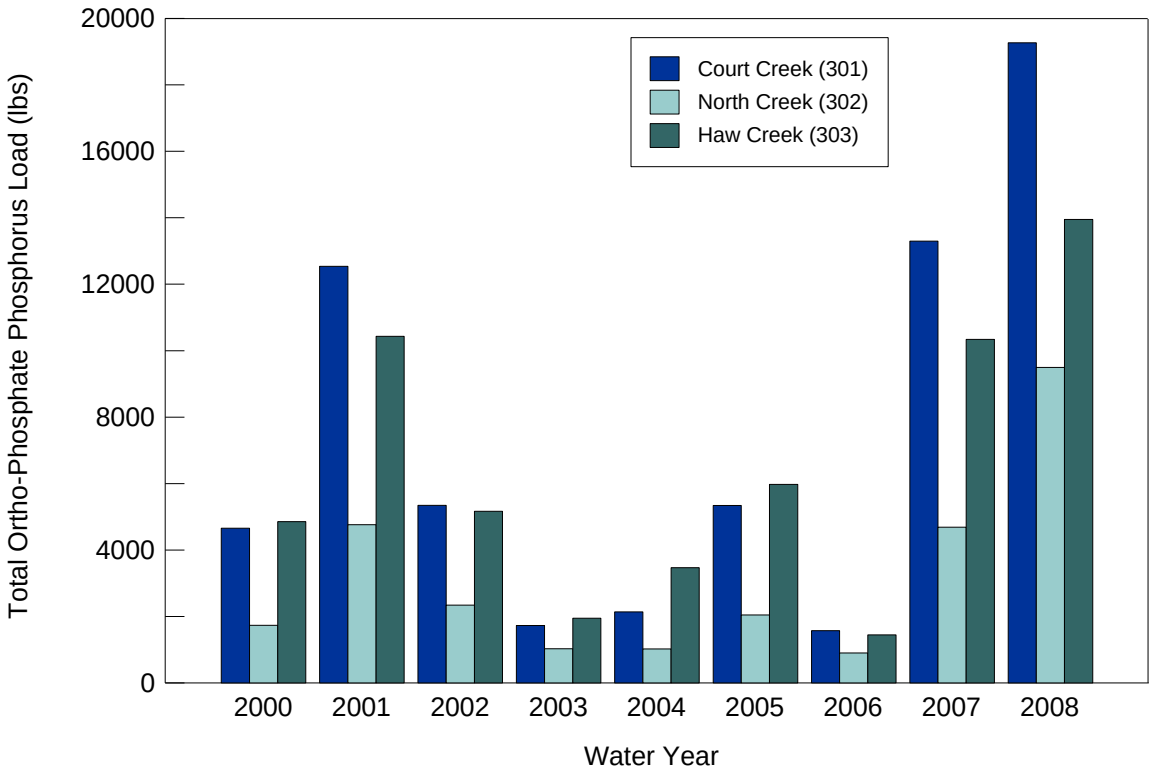


Figure 2-15. Annual ortho-phosphate phosphorous loads at the five CREP monitoring stations

Sediment and Nutrient Yields

To compare the different watersheds in terms of the amount of sediment and nutrient generated per unit area from each of the watersheds, the annual sediment and nutrient yields were computed by dividing the total annual load with the drainage area in acres for each of the monitoring stations. The results are provided in table 2-8 for sediment yield, table 2-9 for nitrate-N yield, and table 2-10 for total phosphorous. Sediment yields range from a low of 0.12 tons/acre for station 302 in 2004 to a high of 9.53 tons/acre for station 202 in 2008. Because of the high level of variability from year to year the average sediment yield for the nine years of data collection are compared in figure 2-16. The stations are arranged in order of their drainage area, with the station with the smallest drainage area (202) on the left and the station with the largest area (301 on the right. As can be seen in the figure, on the average the stations with the smaller drainage areas (202 and 201) yield higher sediment (over 1 ton/acre) than the stations with the larger areas (302, 303, 301) that yield less than 0.7 tons/acre.

Nitrate-N yields vary from a low of 2.6 lbs/acre for station 201 in 2000 to a high of 40.2 lbs/acre for station 202 in 2008. For comparison purposes the average annual nitrate-N yield for the five stations is shown in figure 2-17. In general the stations with smaller drainage areas generate more nitrate per unit area than those with larger drainage areas, except for station 303 that is generating similar amounts as station 201 that has a smaller area.

Total phosphorous yields vary from a low of 0.29 lbs/acre for station 302 in 2004 to a high of 8.81 lbs/acre for station 201 in 2008. For comparison purposes, the average annual total phosphorous yield for the five stations is shown in figure 2-18. Similar to the nitrate-N yield, the stations with the smaller drainage areas generate more total phosphorous per unit area than those with larger drainage areas.

Table 2-8. Sediment Yield in tons/acre for the CREP Monitoring Stations

	CREP sediment yield (tons/ac)				
Water Year	*201*	*202*	*301*	*302*	*303*
2000	0.41	0.54	0.62	0.42	0.60
2001	0.93	1.25	1.02	1.01	1.40
2002	3.24	3.01	1.48	1.76	1.25
2003	0.28	0.24	0.51	0.69	0.17
2004	0.73	0.59	0.17	0.12	0.31
2005	1.30	1.05	0.44	0.37	0.51
2006	0.25	0.47	0.19	0.25	0.16
2007	1.25	1.31	1.15	1.00	0.57
2008	7.88	9.53	0.97	1.19	0.46

Table 2-9. Nitrate-N Yield in lbs/acre for the CREP Monitoring Stations

	CREP nitrate-nitrogen yield (lbs/ac)				
Water Year	*201*	*202*	*301*	*302*	*303*
2000	2.6	2.7	6.2	5.2	9.2
2001	16.0	20.2	12.9	12.4	18.2
2002	19.2	26.1	9.6	11.8	14.5
2003	5.0	7.7	2.8	4.0	2.4
2004	9.9	11.8	3.6	4.5	8.1
2005	21.2	28.3	9.8	9.2	15.9
2006	4.2	5.0	4.0	4.4	6.4
2007	14.2	21.2	11.3	12.0	14.9
2008	23.2	40.2	12.5	14.3	12.9

Table 2-10. Total Phosphorus Yield in lbs/acre for the CREP Monitoring Stations

	CREP total phosphorus yield (lbs/ac)				
Water Year	*201*	*202*	*301*	*302*	*303*
2000	0.83	1.48	1.65	1.25	1.81
2001	0.95	1.44	1.84	1.53	3.28
2002	3.09	4.17	2.25	2.92	2.43
2003	0.34	0.45	0.86	1.10	0.47
2004	1.09	0.97	0.35	0.29	0.72
2005	1.93	2.28	0.96	0.92	1.05
2006	0.47	0.42	0.31	0.41	0.34
2007	2.00	1.86	2.20	1.72	1.35
2008	8.81	8.16	2.15	2.53	1.44

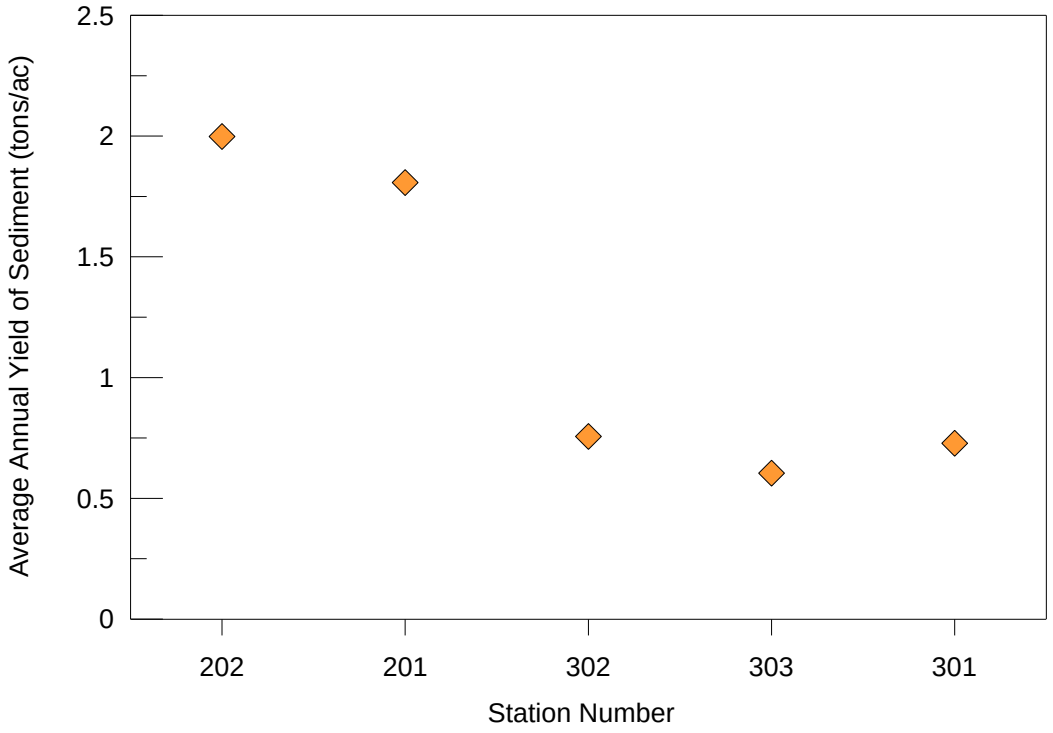


Figure 2-16. Average annual sediment yield in tons/acre for the CREP monitoring stations

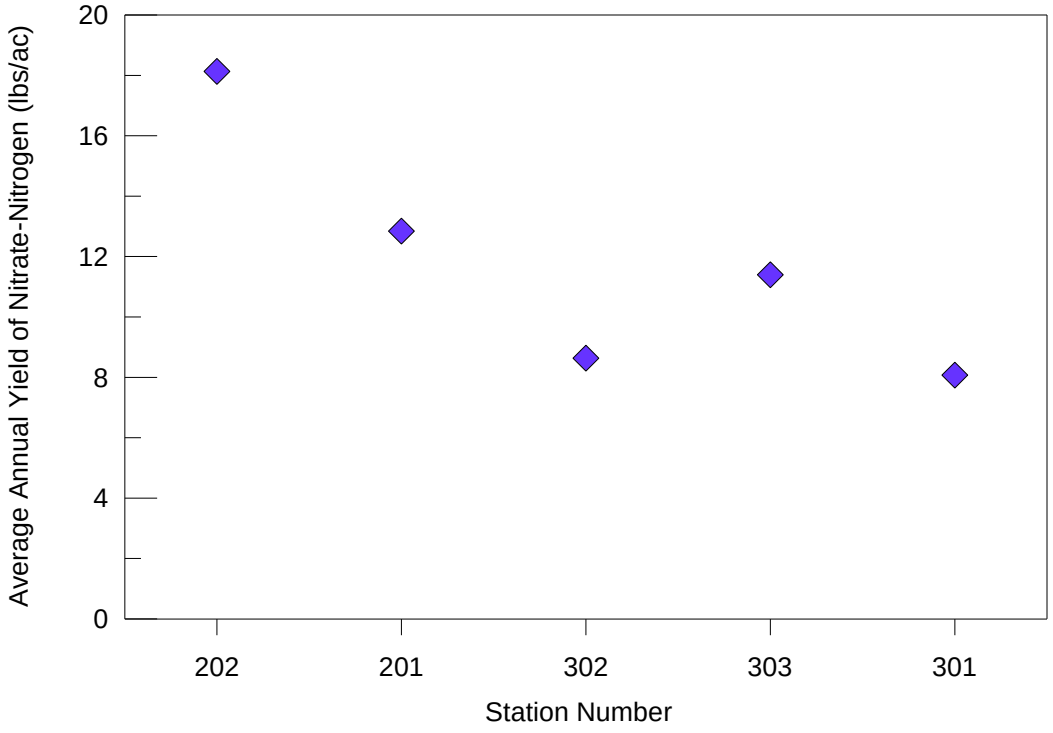


Figure 2-17. Average annual nitrate-N yield in lbs/acre for the CREP monitoring stations

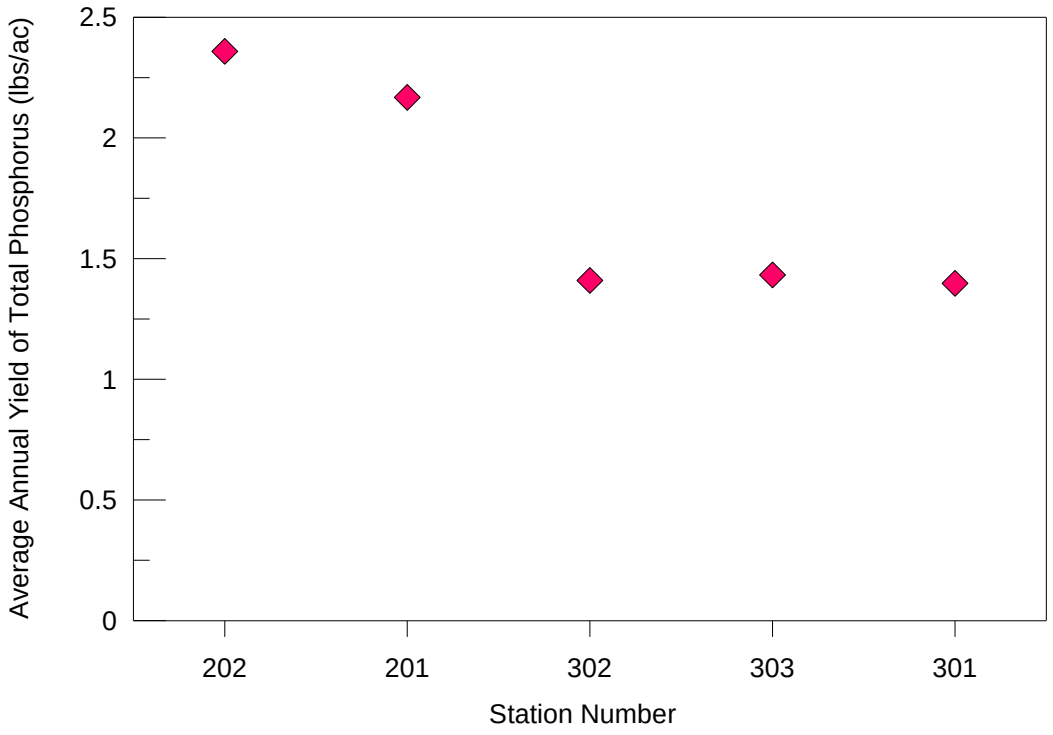


Figure 2-18. Average annual total phosphorous yield in lbs/acre for the CREP monitoring stations

Additional CREP Data Collection Efforts

In addition to the CREP monitoring in the Court/Haw and Panther/Cox watersheds, that was initiated in 1999, several additional monitoring efforts have been initiated by the ISWS through the CREP project in order to provide additional information on the role BMPs in reducing sediment and nutrient yields and to better define the context of existing CREP data on a larger watershed scale.

During September of 2006 in response to significant CREP enrollments and an intensive restoration effort by the Natural Resources Conservation Service, two additional monitoring stations (table 2-11) were installed in the Cedar Creek watershed, located in the Spoon River basin (figure 2-19). Station 306 is located on the right descending bank of the mainstem of Cedar Creek where it intersects CR 000 E in Fulton County (border with Warren Co). The second gage, station 305, is located near the left descending bank of Swan Creek, a major tributary of Cedar, where it flows beneath CR 000 E Fulton County, approximately 2.1 miles south of the Cedar Creek (306) gage.

Table 2-11. Additional CREP Monitoring Stations in the Spoon River Watershed

Station ID	*Name*	*Drainage area*	*Location*	*Watershed*
305	Swan Creek	98.1 sq mi (254 sq km)	N 40.67700 W 090.44391	Spoon River
306	Cedar Creek	146.2 sq mi (379 sq km)	N 40.70847 W 090.44540	Spoon River
RG39	Rain Gage 39	NA	N40.79145 W090.49999	Spoon River

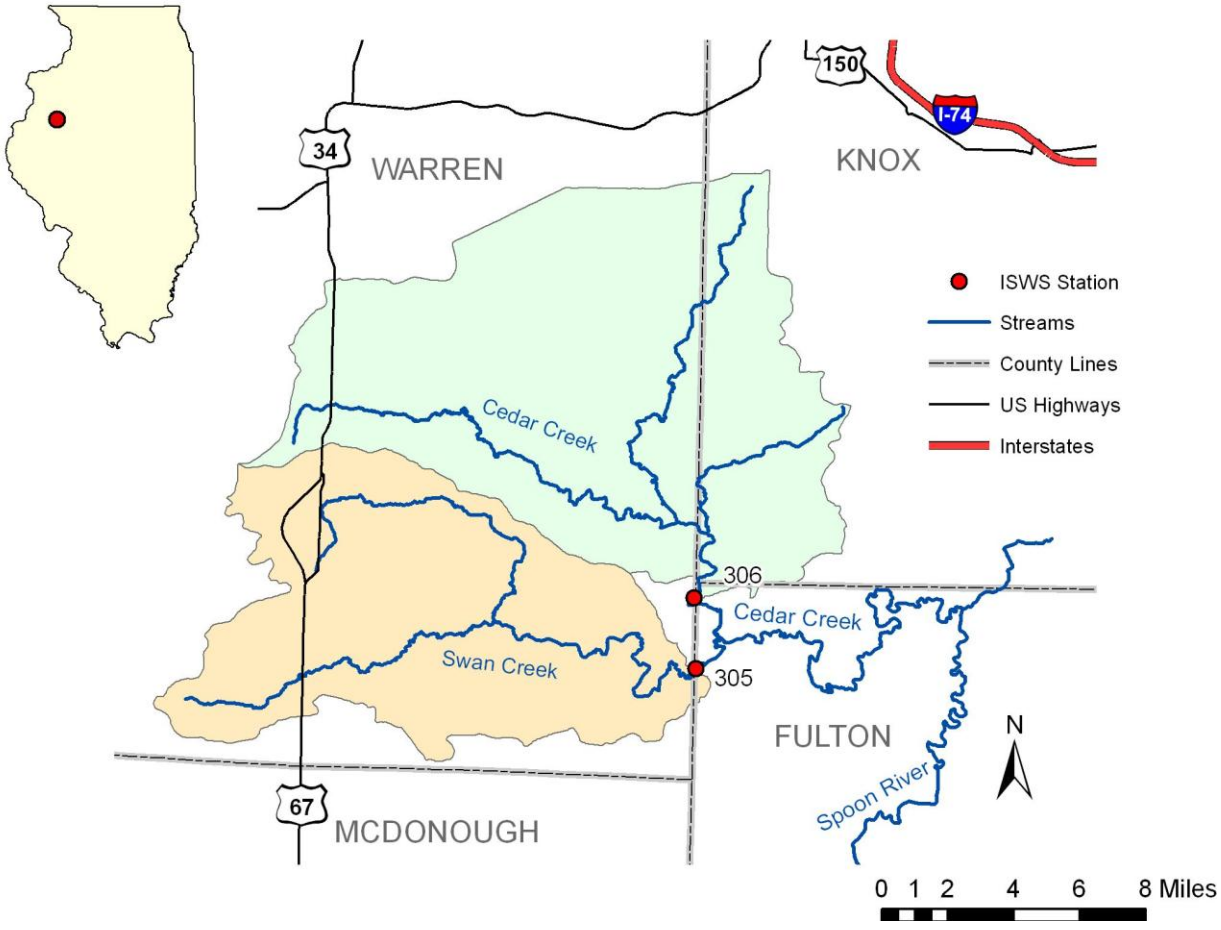


Figure 2-19. Locations of monitoring stations in the Cedar and Swan watersheds

Both watersheds are located in the Galesburg Plain physiographic region. The topography is flat to gently rolling and the soils are primarily loess. Stream channels and associated floodplains are heavily dissected with stream channels commonly being incised into the floodplain. Both watersheds are mostly rural with agriculture the predominant land use. Pasture and woodlands are also common due to the topography introduced by the dissected stream channels.

Both gages became operational near the end of Water Year 2006 (9/15/2006) and are instrumented and operated as are all CREP gages, in accordance to the CREP QAPP (Appendix A). Both stations utilize a pressure transducer to determine stage, log data on a 15 minute time step and are equipped with an ISCO automated pump sampler slaved to the stage sensor in order to augment manual discrete sampling efforts. Thirty-eight and thirty-three discharge measurements have been collected at stations 305 and 306 respectively in an effort to establish a reliable rating in as short a time as possible. Based on provisional data, summary statistics for suspended sediment concentration data is provided in table 2-12.

In addition to the two streamgages the ISWS has installed a recording raingage immediately east of CR1500E and approximately 0.5 mi north of CR1100N in Warren Co. The raingage is a modified Belfort equipped with a linear potentiometer, in order to provide a digital output, and can be operated throughout the year. Raingage deployment and maintenance as well as the download and reduction of precipitation data can be found in the CREP QAPP (Appendix A).

ISWS field staff began suspended sediment sampling at two U.S. Geological Survey (USGS) gages located on the mainstem of the Spoon River on 3/29/2004. Samples are collected weekly at both sites with additional samples collected during runoff events. Sampling at London Mills (05569500) is done from the Route 116 bridge where the USGS gaging station is located. Sediment sampling at Seville (05570000) is done approximately 1 mile downstream of the current USGS gage location on State Route 95. Current USGS sediment data are also collected at this location. As of 9/30/08, 289 samples have been collected at London Mills while 282 samples have been collected at Seville. Summary statistics for suspended sediment concentration data collected through Water Year 2008 are presented for each station in Table 2-13.

Table 2-12. Suspended Sediment Concentration Data (mg/L) for Swan and Cedar Creeks

	Swan (305)	*Cedar (306)*
Count (number)	1242	1273
Mean	254	320
Max	4316	4231
Min	2.0	1.6
Median	98.4	88.6
25th Percentile	35.2	34.4
75th Percentile	247	272

Table 2-13. Suspended Sediment Concentration Data (mg/L) for London Mills and Seville

	London Mills (05569500)	*Seville (05570000)*
Count (samples)	289	282
Mean	207	258
Max	2269	3224
Min	1.9	3.9
Median	65.8	90.1
25th Percentile	35.3	41.4
75th Percentile	190	236

3. Land Use Practices

Land Cover

The Illinois River Basin is nearly 16 million acres with a diverse range of land covers. The extent of these land covers is illustrated in figure 3-1 using the Land Cover of Illinois 1999-2000 inventory (Luman and Weicherding, 1999). This database is a product of a cooperative, interagency initiative between the U. S. Department of Agriculture National Agricultural Statistics Service (NASS), Illinois Department of Agriculture (IDA), and Illinois Department of Natural Resources (IDNR) to produce statewide land cover. The database contains 23 land cover that are grouped into 5 categories: agricultural land, forested land, urban land, wetland, and other. The agricultural land category lists corn, soybeans, winter wheat, other small grains and hay, winter wheat/soybeans, other agricultural land, and rural grassland due to the times of year the satellite imagery was taken.

The Illinois River Basin is dominated by agricultural land, comprising of 77% of the basin (figure 3-2). Corn and soybean acreage accounts for most of the agricultural land cover. Urban and forested land are the next highest with 10% and 9%, respectively. This is attributed to the areas of Chicago and surrounding urban communities, as well as the City of Peoria. Wetlands, surface water, and other combine to 4% of the remaining acreage in the Illinois River Basin. The Spoon and Sangamon River watershed area is 30% of the Illinois River Basin and the Spoon River watershed is a third of the size of the Sangamon River watershed. As can be seen in figures 3-3 and 3-4, the Spoon and Sangamon River watersheds show similar trends in land cover as the Illinois River Basin. Agricultural land cover, especially corn and soybeans, accounts for over 80% of the land area in each watershed. The largest difference between the Spoon and Sangamon watersheds is the Spoon has 10% more forested land cover than the Sangamon. Otherwise, they are similar in all other categories.

Land Use Practices

Outside of natural factors such as the physical settings and climate variability, land use practices are the main driving factors that affect watershed's hydrology, erosion, sedimentation, and water quality. It is therefore important to document and analyze changes in land use practices in a given watershed to properly understand and explain changes in its hydrology, water quality, and the erosion and sedimentation process. The Illinois River basin has undergone significant changes in land use practices during the last century. These changes have been used to explain degradation in water quality and aquatic habitat along the Illinois River. In recent years, there have been significant efforts at the local, state, and federal level to improve land use practices by implementing conservation practices throughout the watershed. The Illinois River CREP is a course of major state and federal initiatives to significantly increase conservation and restoration practices in the Illinois River basin.

Historical agricultural land use practices and the recent conservation efforts including CREP are briefly discussed in the following paragraphs.

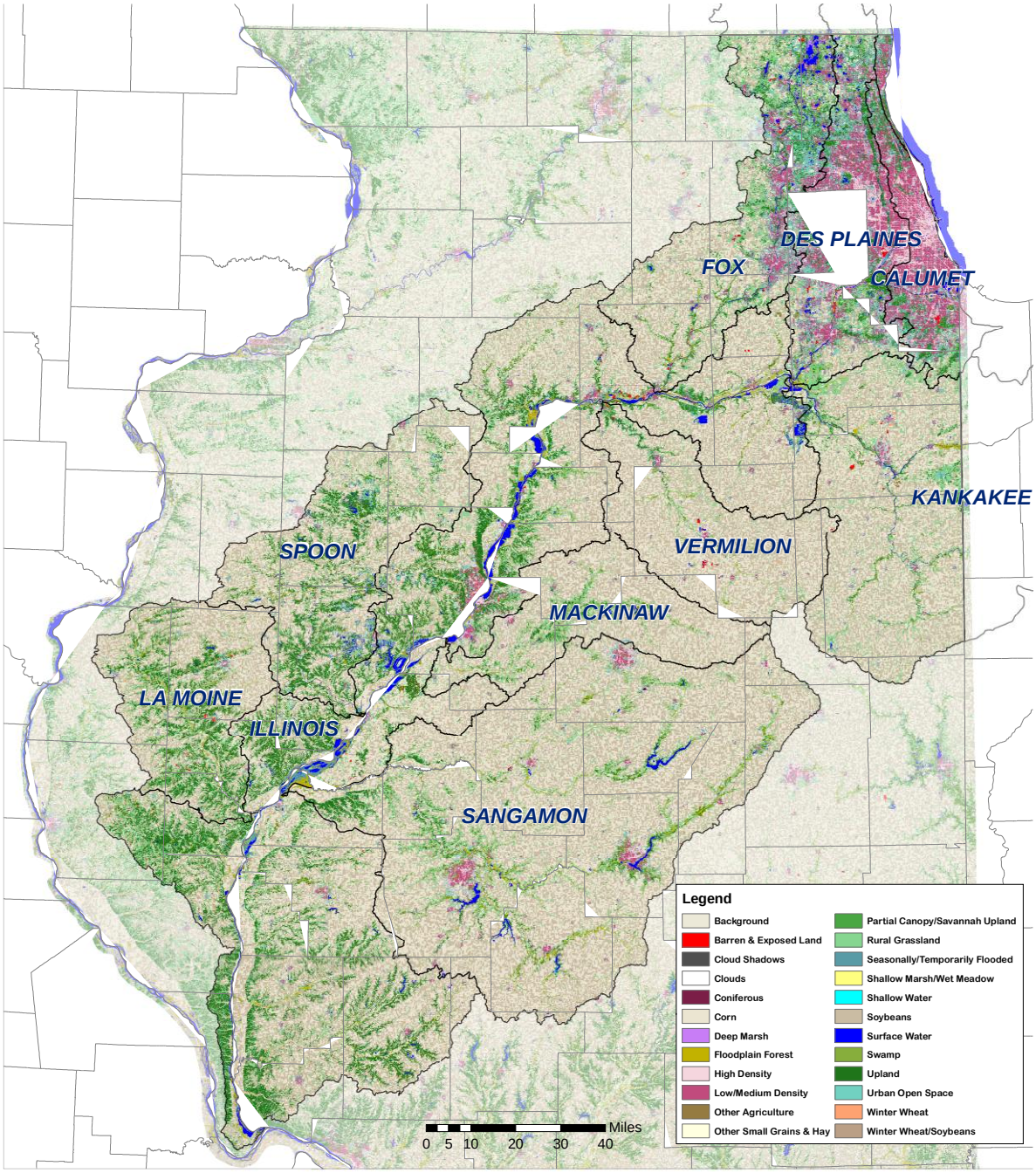


Figure 3-1. Land cover of the Illinois River Basin (Luman and Weicherding, 1999)

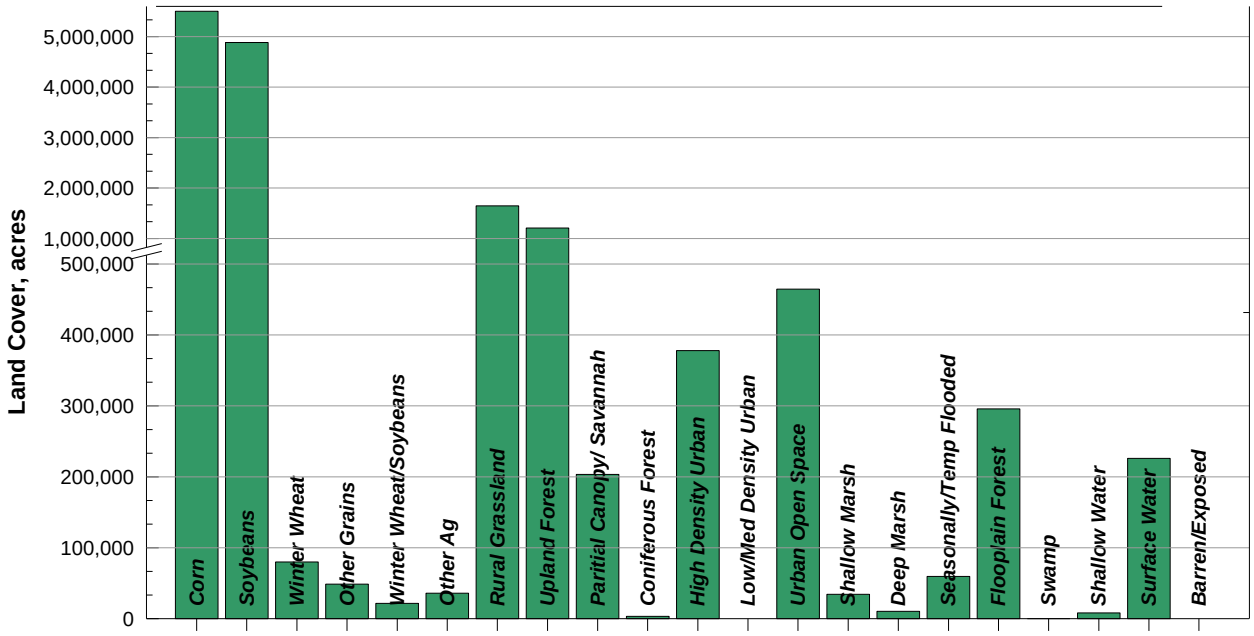


Figure 3-2. Land cover acreages in the Illinois River basin

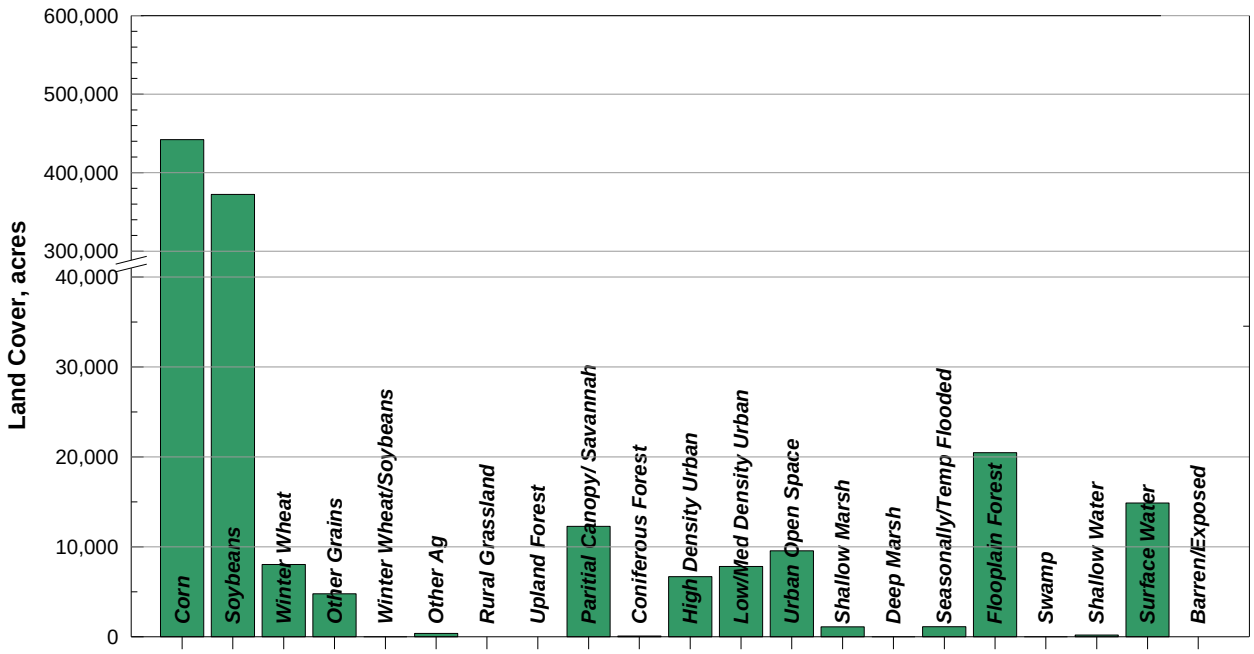


Figure 3-3. Land cover acreages in the Spoon River watershed

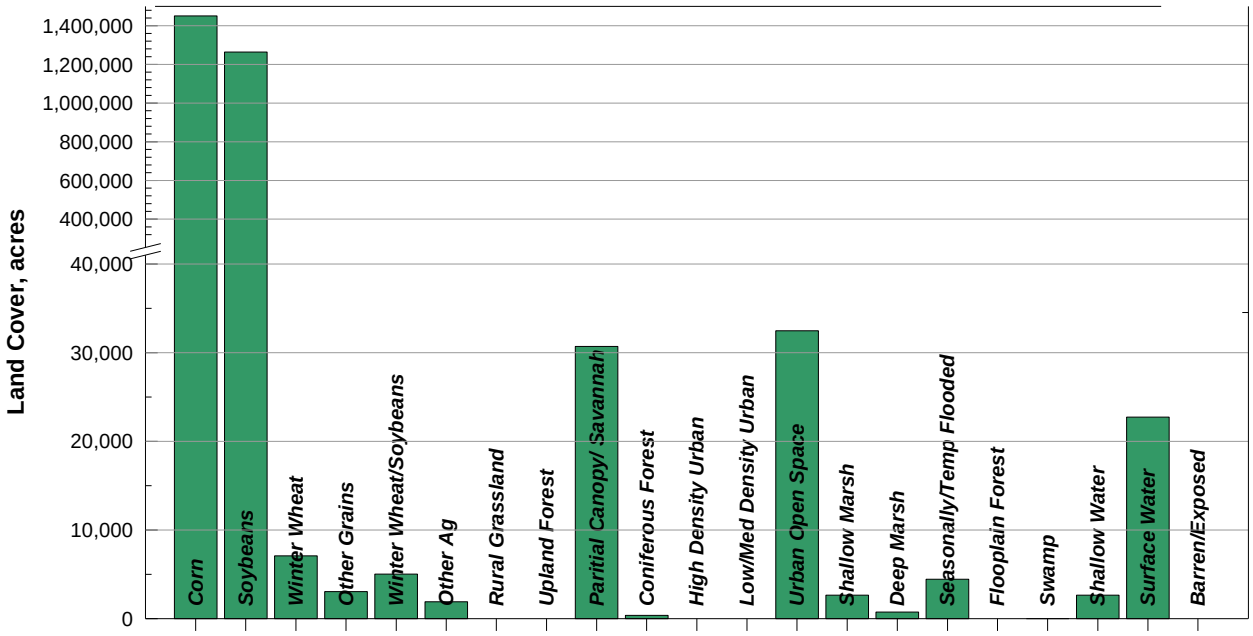


Figure 3-4. Land cover acreages in the Sangamon River watershed

Historical Agricultural Land Use Trends in Illinois

To provide a historical perspective to changes in land use practices in the Illinois River basin, we have compiled and analyzed historical land use data from different sources for the whole state. The earliest land use data is based on the Illinois Agricultural Statistics (IAS) records. The IAS data shows that in 1866 approximately 23 percent of the state's land area was in agricultural crop production (figure 3-5). In 2006, agricultural production has increased to 65 percent of the state's land. From 1866 through to the 1920s, crop production increased from 8 to 18 million acres mostly due to a three-fold increase in small grain (wheat, oats, and hay) acreage. In the 1920s small grain acreage began to decline in favor of soybeans. Essentially, from this period to present, a steady reversal in acreage has occurred between small grains and soybeans such that current soybean acreage is the same as was small grains were in the 1920s. From 1866 to 2006, total Illinois land area in crop production increased by more nearly tripled from 8 to 23 million acres. The dominant crops in 1866 were corn and small grains, whereas corn and soybeans (row crops) acreage was 93 percent of the total crop acreage in 2006. During the period of record (1866-2006), corn acreage has remained fairly steady at 9.3 million acres. Corn was harvested on 4.9 million acres in 1866 but increased to the long-term average acreage by 1881. Acreage peaked in 2005 at 12.1 million acres and was 11.3 million acres in 2006. From 1925 to 2006 crop acreage increased by 23 percent.

In 1925, IAS began delineating agricultural crop production data by county, rather than as a state total, which allows for the estimation of crop acreage by basins. The Illinois River Basin (IRB) is nearly half of the Illinois land area, and occupies over 18 million acres when the watershed area in the states of Indiana and Wisconsin are included. Figure 3-6 shows similar trends in crop production as was seen for the State of Illinois. In 1925, 51 percent (9.4 million acres) of the IRB land area was in crop production while in 2006, 56 percent (10.3 million acres)

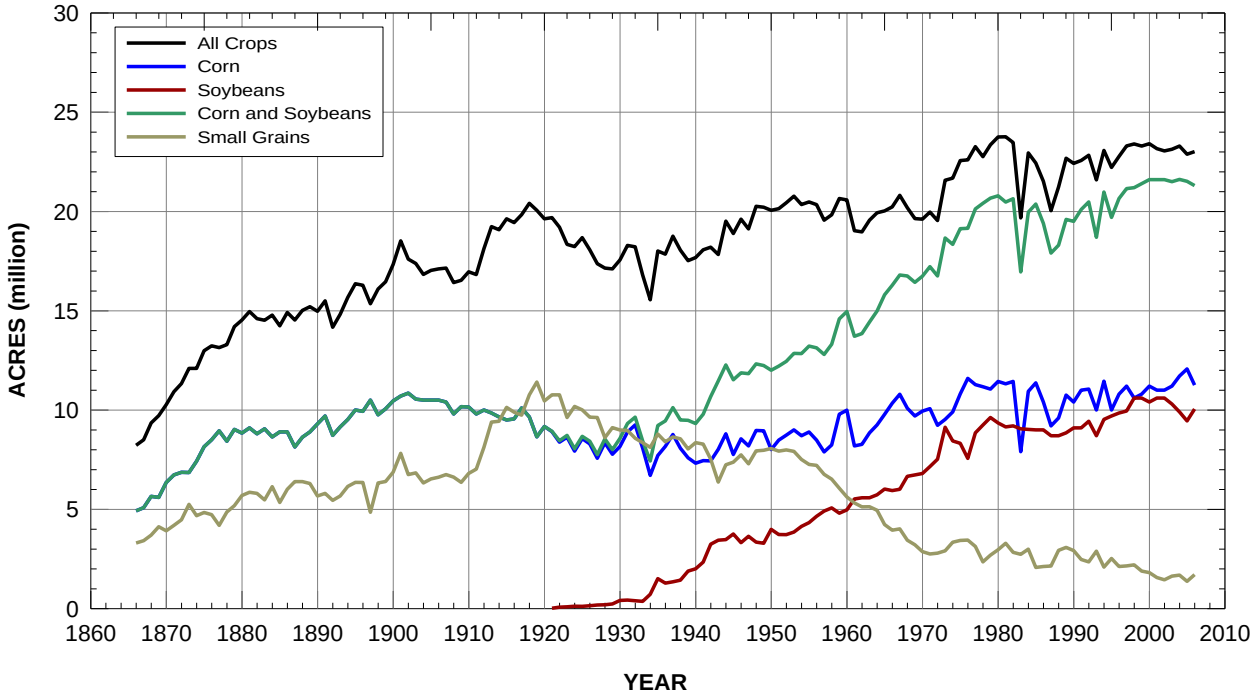


Figure 3-5. Acreage of agricultural land uses in State of Illinois (1866-2006)

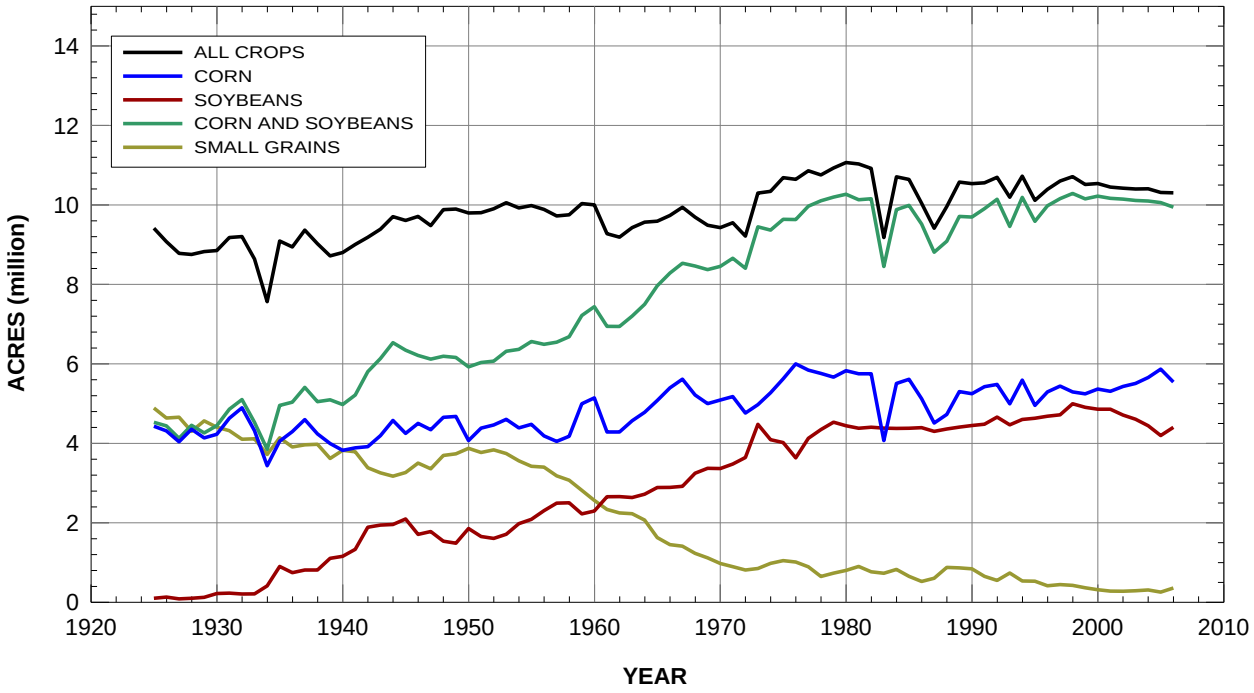


Figure 3-6. Acreage of agricultural land uses in Illinois River basin (1925-2006)

was in crop production. The same reversal of small grain and soybean acreage is also seen. Corn acreage is fairly steady for the period of record, averaging 4.8 million acres, increasing from 4.4 to 6.0 million acres from 1925 to 1976, and slightly decreasing to 5.5 million acres in 2006. Total IRB watershed area in crop production increased by 9 percent from 1925 to 2006 which is smaller than the 23 percent increase for the whole State of Illinois during the same period.

The Spoon River watershed is one of ten major tributaries to the Illinois River with a drainage area of 1.2 million acres (6.5 percent of the IRB drainage area). From 1925 to , watershed area in crop production increased from 54 to 66 percent. Figure 3-7 shows that the trends in corn, small grains, and soybeans are also similar. Corn and small grain acreage was 0.64 million acres in 1925 and in 2006 corn and soybeans were 0.75 million acres. Corn acreage increased by 0.19 million acres from 1925 to 1976 and then decreased by 0.09 million acres through 2006. The total Spoon River watershed area in crop production increased by 22 percent during 1925-2006 period and is only slightly below that of the increase in the State of Illinois and higher than the 9 percent increase for the IRB.

The Sangamon River watershed has a drainage area of 3.4 million acres (18.5 percent of the IRB drainage area). From 1925 to 2006, watershed area in crop production increased from 67 to 78 percent. Figure 3-8 shows that the trends in corn, small grains, and soybeans are also similar to the IRB. Corn and small grain acreage was 2.2 million acres in 1925 and in 2006 corn and soybeans were 2.6 million acres. Corn acreage increased by 0.37 million acres from 1925 to 2006. The total Sangamon River watershed area in crop production increased by 17 percent during 1925-2006 period and is below that of the increase in the State of Illinois and higher than the 9 percent increase for the IRB.

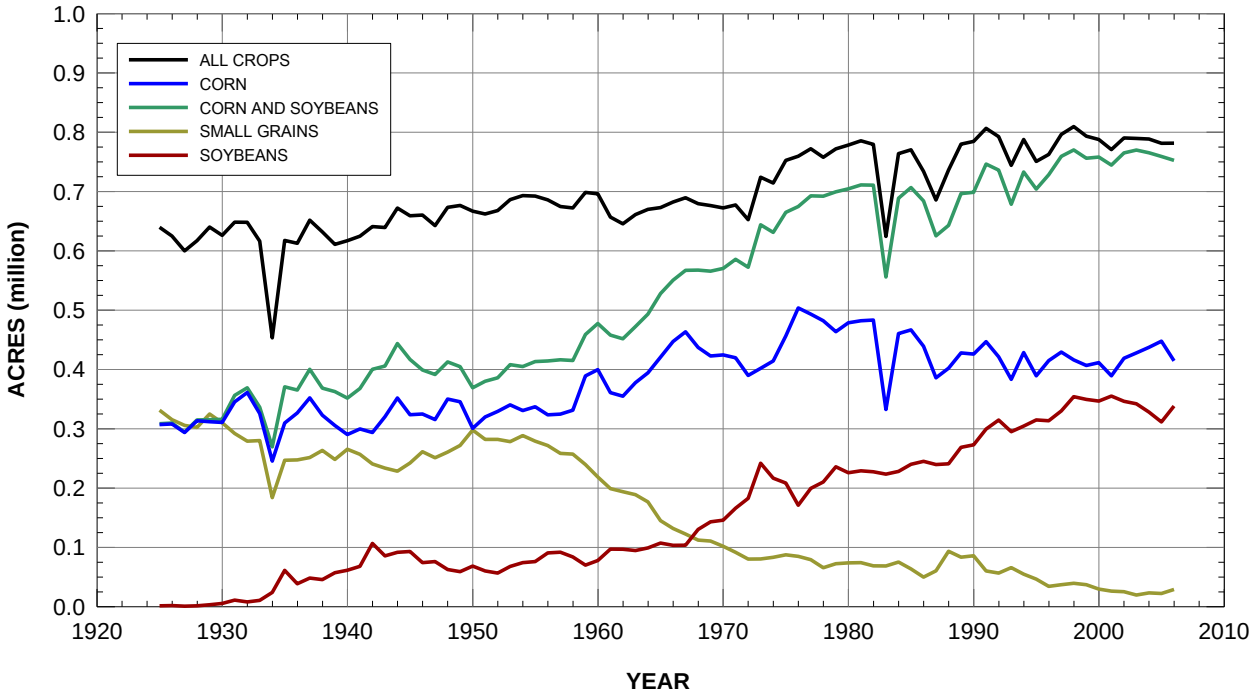


Figure 3-7. Acreage of agricultural land uses in Spoon River watershed (1925-2006)

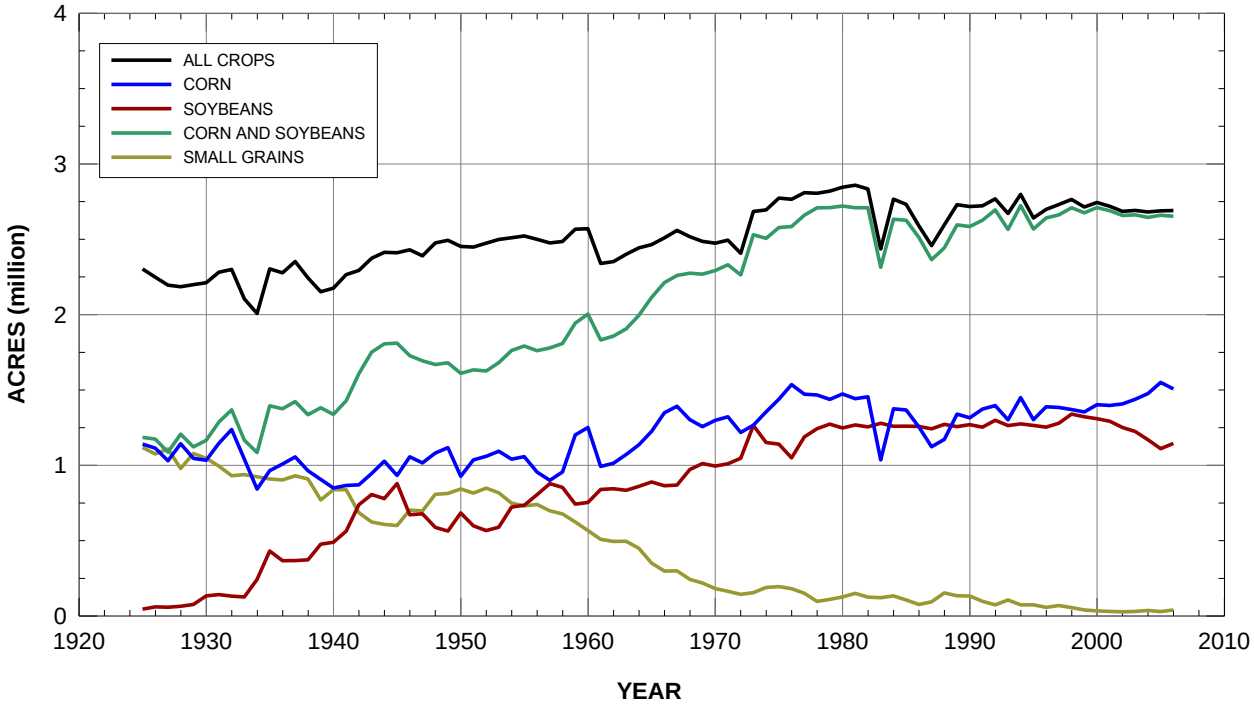


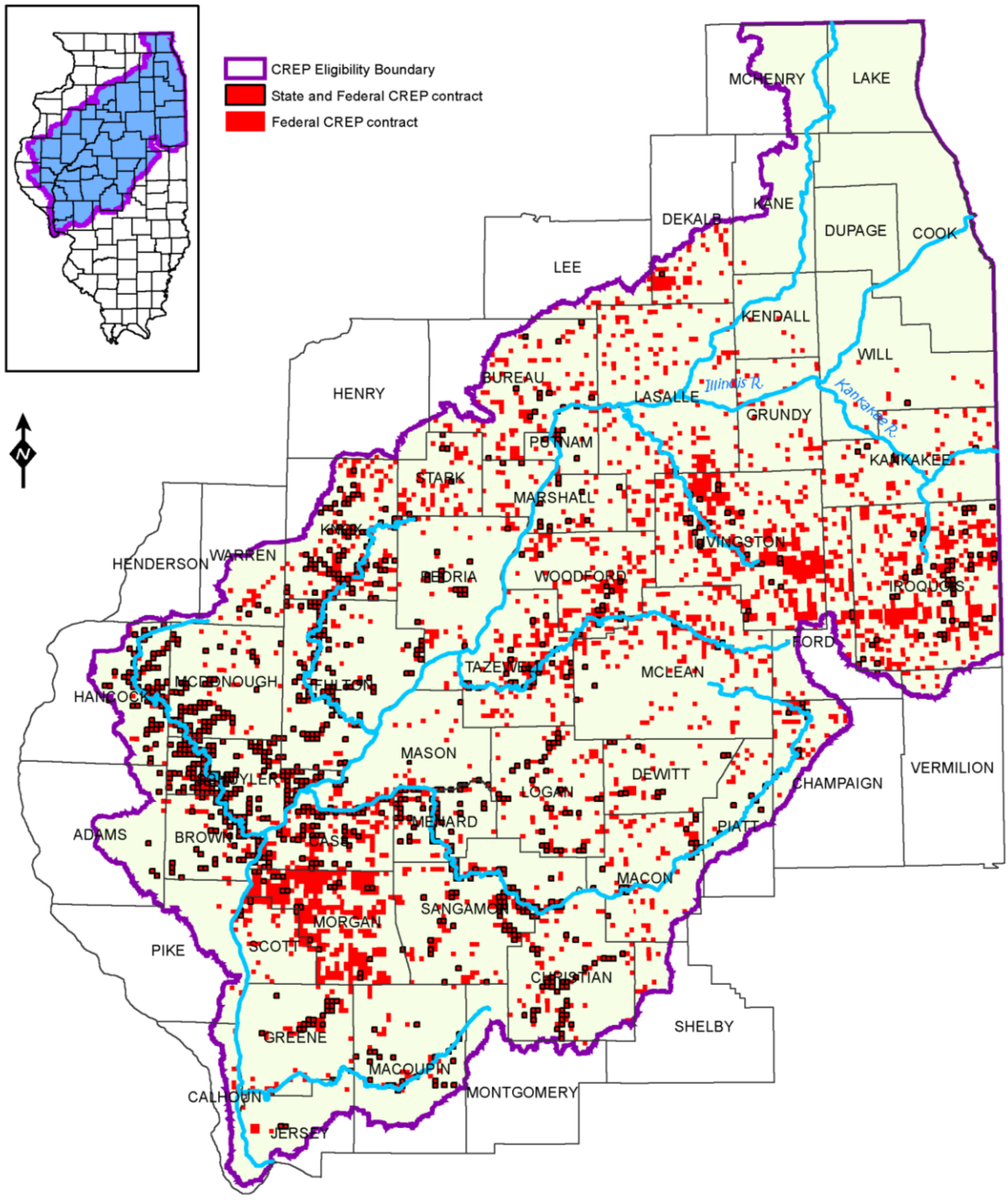
Figure 3-8. Acreage of agricultural land uses in Sangamon River watershed (1925-2006)

Overall, total crop acres within the Sangamon and Spoon River watersheds steadily increased from 1925 to the early 1980s and then remained steady through 2006. The Illinois River Basin and the entire State of Illinois show the same trend for total crop acres.

Conservation Practices

There has been a significant increase in the implementation of conservation practices in Illinois in recent years with CREP making a major contribution. IDNR has established different programs to document and track conservation practices in Illinois. The major initiative is known as the Illinois Conservation Practices Tracking System (ICPTS). The ICPTS is developing "a comprehensive database documenting the precise location, nature, and planned duration of conservation practices being implemented through Illinois CREP as well as other conservation incentive programs within the Illinois River basin," (State of Illinois, Department of Natural Resources, 2002). The database will be very useful for assessing and evaluating the effectiveness of different programs in meeting their objectives. The land use data from the database will be used along with the sediment and nutrient data being collected under the monitoring program to evaluate how conservation practices are influencing sediment and nutrient delivery to the Illinois River. Two examples of information and data on land use are shown in figures 3-9 and 3-10

Figure 3-9 shows the location of approved Illinois CREP contracts from the USDA and state of Illinois from 1999 through 2007. With this type of information it will be possible to identify areas where there has been significant participation in the CREP program and where changes in sediment and nutrient delivery should be expected. The information will provide important input data to the watershed models that are being developed to evaluate the impact of



Source: IDNR (2007)

Figure 3-9. State and Federal CREP contract locations.

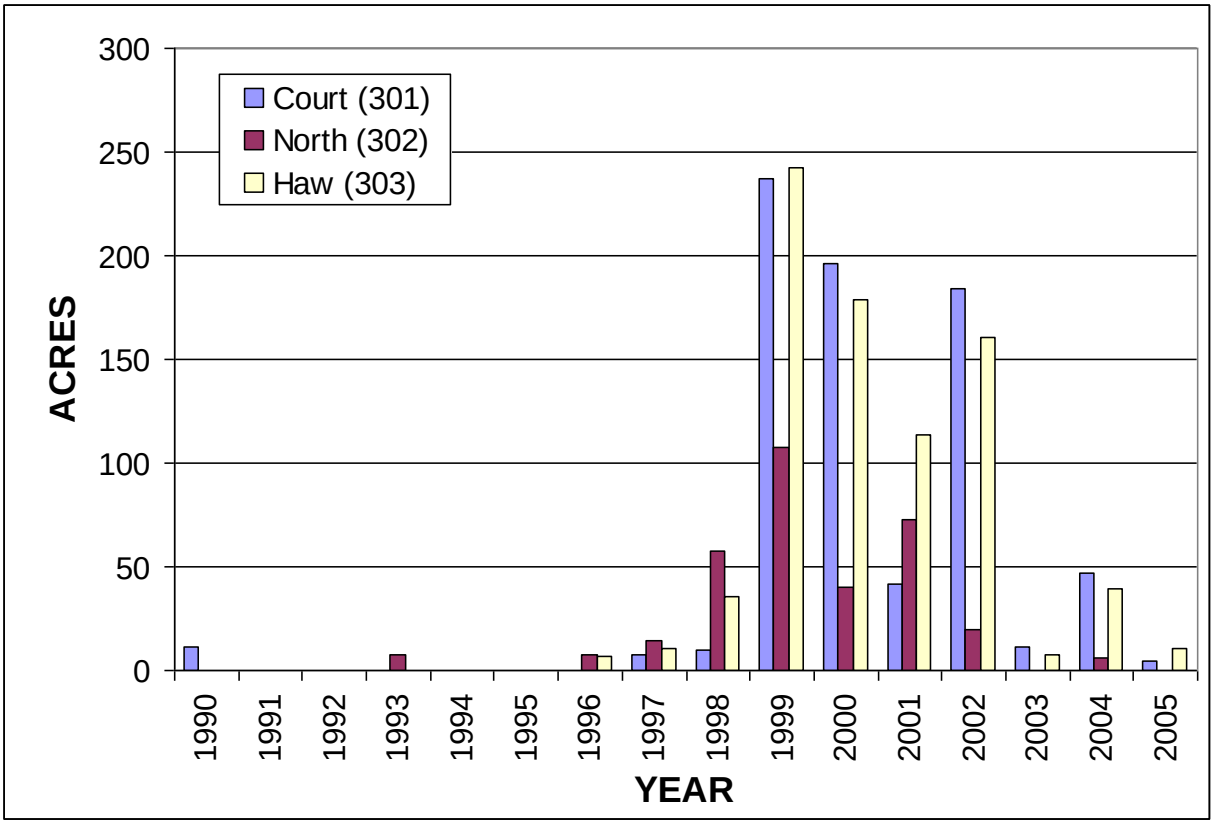


Figure 3-10. Acres of conservation practices installed in Court and Haw Creek watersheds over time

land use changes on sediment and nutrient delivery. It is also possible to extract much more detailed land use information as shown in figure 3-10 where the total acres in conservation practices are provided for small watersheds like Court and Haw Creeks on annual basis. The data shows the significant rate of increase in conservation practices in the Court and Haw Creek watersheds since 1997. This type of data will be extremely useful for assessing and evaluating the effectiveness of CREP and other conservation practices.

The Water Survey is analyzing changes in conservation practices in the Illinois River Basin since the initiation of CREP in 1998. The conservation practices data is compiled by the IDNR and USDA-FSA. The CREP conservation practices installed in the entire Illinois River Basin, as well as a more detailed conservation practice database for the four intensively monitored watersheds, is being analyzed to investigate relationships between sediment loadings and changes in conservation practices. Overall, IDNR reports that as of August 2007, 125,030 acres have been awarded by USDA-FSA CREP program with over 8,000 acres pending approval. The State of Illinois CREP program has awarded 78,288 acres with approximately 4,500 acres pending in county Soil and Water Conservation offices. More detailed information on CREP acres is available through 2005 with analysis of 2006-2007 in progress. Therefore, below are some statistics of the conservation practices through 2005:

Illinois River Basin

- Conservation practice acres within the Illinois River Basin (IRB):
  - The IRB has approximately 153,000 acres of conservation practices installed since 1999.
  - The majority of the CREP acres (91 percent) are located in the Illinois River Valley and the La Moine, Sangamon, Spoon, and Iroquois River subwatersheds.
  - There are 16 different conservation practices (table 3-1) being used in the IRB CREP program. Five of the 16 practices account for 94 percent of the total CREP acres.
  - Wetland restoration (CP23) is the most used conservation practices covering nearly 38 percent of the total CREP acres in the IRB. This is followed by riparian buffer (CP22), permanent wildlife habitat, noneasement (CP4D), filter strips (CP21), and hardwood trees (CP3A) at 25, 15, 11, and 5 percent, respectively.
- Conservation practice acres within each subwatershed:
  - Distribution of conservation practices installed varies between subwatersheds.
  - Wetland restoration is the dominant conservation practice in the Illinois River Valley and the La Moine, Iroquois, and Kankakee River subwatersheds (47, 65, 52, and 45 percent, respectively).
  - In the Sangamon River subwatershed 32 percent of the conservation practices were riparian buffers and 25 percent in permanent wildlife habitat (noneasment).
  - In the Spoon River subwatershed, the dominant conservation practices installed were wetland restoration and riparian buffers at 29 and 30 percent of the total CREP acres.

Table 3-1. Description of Conservation Practices Used in the Illinois River Basin CREP

Practice code	*Practice description*
CP1	Establishment of permanent introduced grasses and legumes
CP2	Establishment of permanent native grasses
CP3	Tree planting
CP3A	Hardwood tree planting
CP4B	Permanent wildlife habitat (corridors), noneasement
CP4D	Permanent wildlife habitat, noneasement
CP5A	Field windbreak establishment, noneasement
CP8A	Grass waterways, noneasement
CP9	Shallow water areas for wildlife
CP11	Vegetative cover - trees - already established
CP12	Wildlife food plot
CP16A	Shelterbelt establishment, noneasement
CP21	Filter strip
CP22	Riparian buffer
CP23	Wetland restoration
CP25	Rare and declining habitat

CREP Monitoring Watersheds

Court/Haw Creeks (Knox County)

- The Court and Haw Creek watersheds have a total of 1896 acres of conservation practices installed under CREP and CRP. These acres are located in the watershed area being monitored by the ISWS at three separate locations (figure 1-2). Court Creek (301) has 767 acres, North Creek (302) has 323 acres, and Haw Creek (303) has 806 acres.
- Almost 70 percent of the conservation practice acres in the Court (301) and North (302) watersheds are riparian buffer, wetland restoration, and filter strips. Permanent wildlife habitat, riparian buffer, and filter strips account for 61 percent of the conservation practices in the Haw (303) watershed.
- Most of the conservation practice acres in the three watersheds were installed between 1999 and 2002 (figure 3-10).

Panther/Cox Creeks (Cass County)

- The Panther and Cox Creek watersheds have 887 acres of conservation practices.
- Approximately 147 acres (16 percent) have been installed above the two ISWS streamgages.
    - Panther (201): 129 acres
    - Cox (202): 18 acres
- Nearly all the conservation practices installed in the watershed upstream of Panther (201) has been riparian buffers (126 acres) funded by CREP.
- The 18 acres of conservation practices installed above Cox (202) were cool/warm season grass/shrubs and grass waterways funded by CREP, CRP, and WHIP (Wildlife Habitat Incentives Program).

Variability and Trends in Precipitation and Streamflow

Results of a short-term monitoring program have to be viewed with respect to the climatic and hydrologic conditions under which the data was collected. Under ideal conditions, which rarely happen, the monitoring period would include a combination of wet, dry, and normal climatic conditions that represent the range of variability in climatic and hydrologic conditions in the watershed. The influence of climatic and hydrologic conditions on the data collected has been taken into consideration, especially when different datasets collected at different times and conditions are combined or compared. The Illinois River basin, as any major watershed, has experienced significant variability in precipitation and streamflow over the last century and recent periods. Data collection for the CREP program started in 1999 to provide a perspective as to how the current monitoring period compares to the long-term variability of precipitation and stramflows within the Illinois River basin. Historical precipitation and streamflow data are analyzed and presented in this segment of the report.

Climate and hydrologic records from the past 100 years in Illinois show considerable long-term variability. These variabilities and trends were analyzed for two stations on the Illinois River and six tributary stations in the Illinois River basin (figure 3-11). Figure 3-12

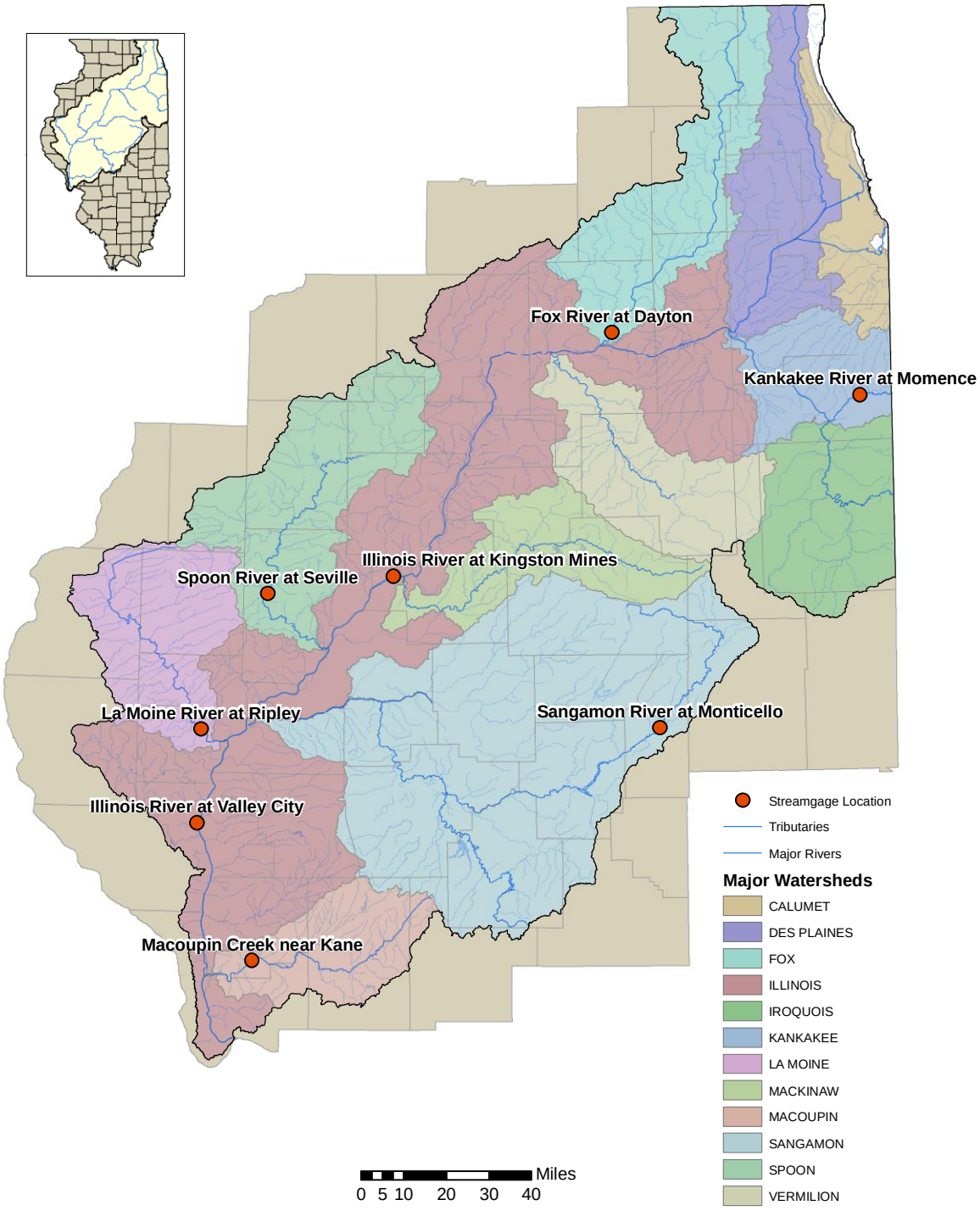


Figure 3-11. Location of streamgaging stations with long-term data used in the analysis of variability and trends

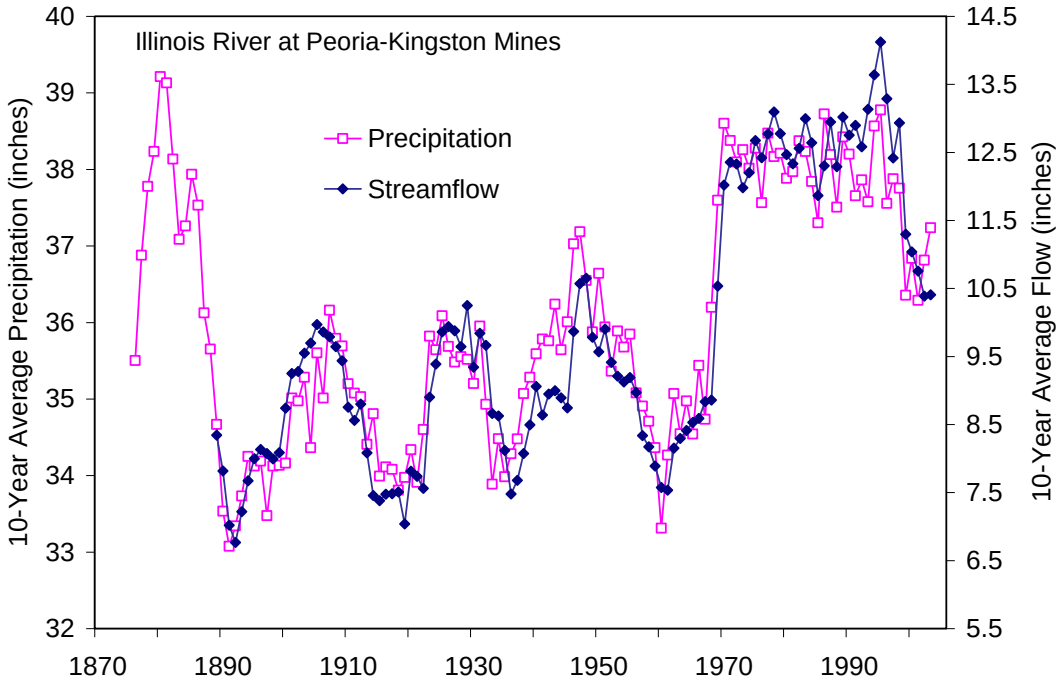


Figure 3-12. Ten-year average precipitation and streamflow, Illinois River at Peoria-Kingston Mines

compares average precipitation and streamflow for the Upper Illinois River watershed since the 1880s, as expressed in moving 10-year average values. Similar comparisons are shown in figures 3-13 to 3-18 for the Fox, Kankakee, Spoon, Sangamon, LaMoine, and Macoupin subwatersheds, respectively, but for shorter time periods as limited by the available gaging records. Figure 3-19 for the entire Illinois River Basin (at the Valley City streamgage) is nearly identical to figure 1 except for the period of record. The 10-year average precipitation and streamflow values plotted in figures 3-12 to 3-19 represent the approximate midpoint of the 10 years; for example, the value for 1995 represents the average for 10 years from 1990-1999, the value for 1996 represents the average for the 10 years 1991-2000, and so forth. Streamflow values are expressed in inches of water spread uniformly over the entire watershed such that average streamflow can be compared directly with precipitation for the concurrent period. Streamflow values in figure 3-12 are computed from flow and stage records at Peoria prior to 1940 and at Kingston Mines since 1940.

Figure 3-12 shows that precipitation and streamflow in the Upper Illinois River watershed from 1970 to 1995 were considerably higher than at any other time in the 20th Century. Prior to 1895, precipitation for the Illinois River watershed is estimated from a small set of gaging records dating back to 1870. These precipitation records show that there was a decade of high precipitation in the late 1870s and early 1880s similar in magnitude to high precipitation amounts during 1970-1995. A comparison of 10-year average precipitation and streamflow amounts clearly shows that streamflow has been very closely related to concurrent precipitation throughout the past 125 years, with a correlation coefficient (r) of 0.958.

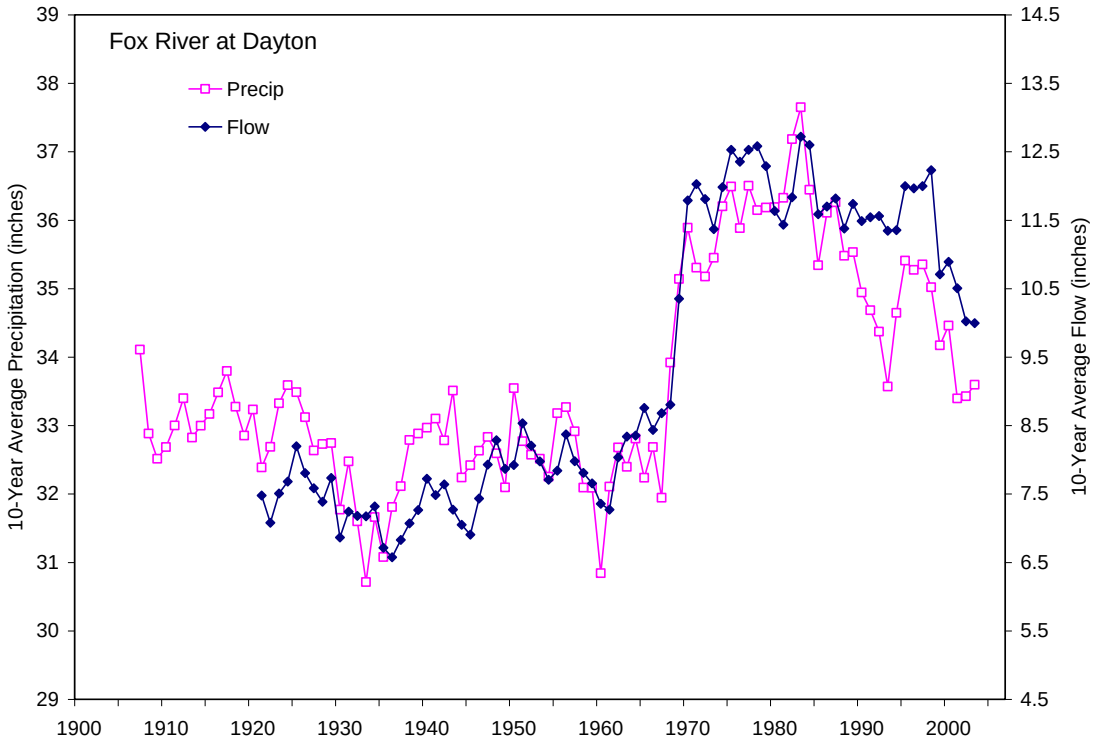


Figure 3-13. Ten-year average precipitation and streamflow, Fox River at Dayton

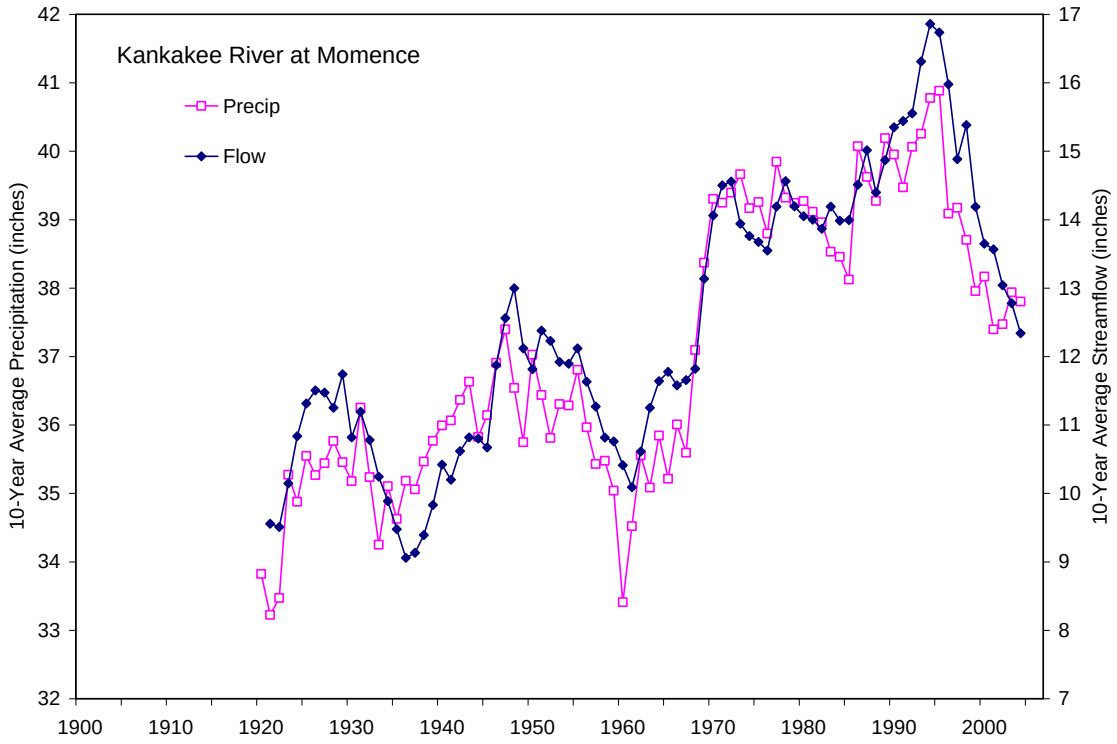


Figure 3-14. Ten-year average precipitation and streamflow, Kankakee River at Momence

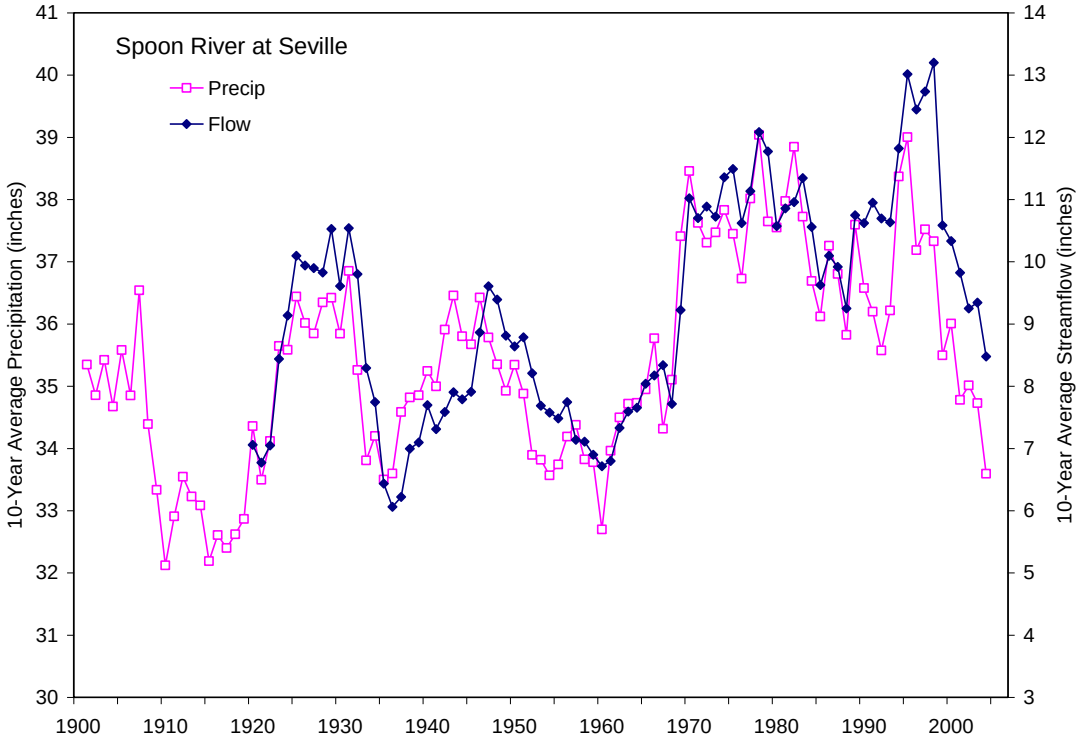


Figure 3-15. Ten-year average precipitation and streamflow, Spoon River at Seville

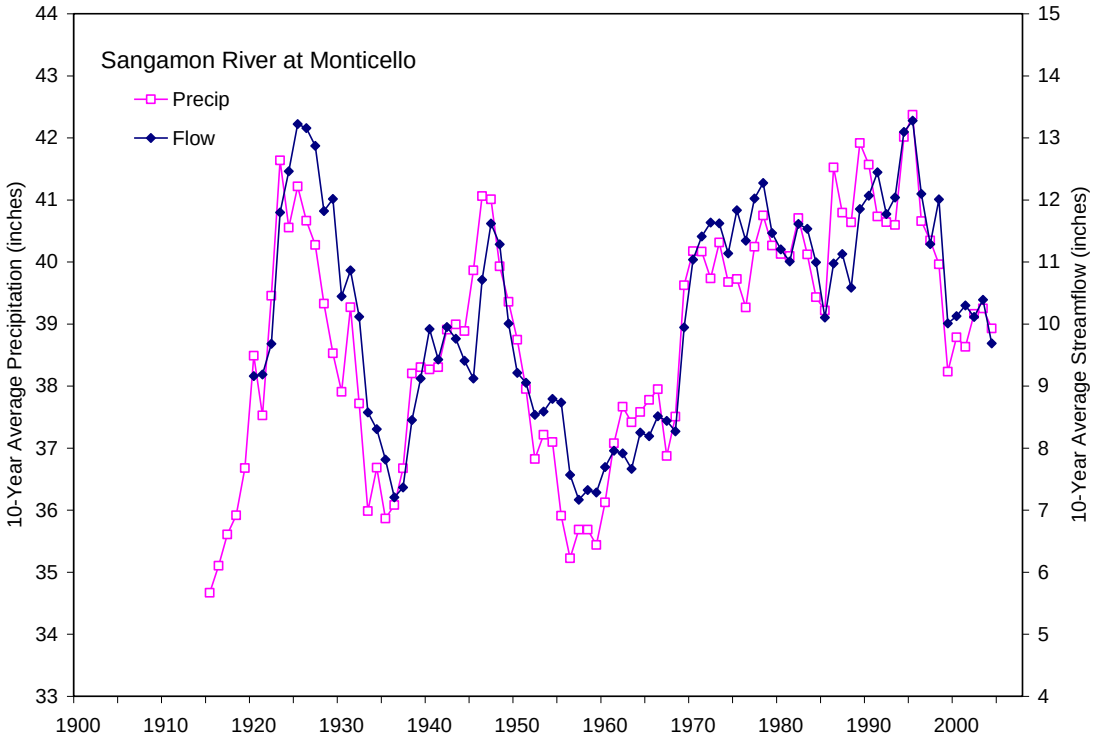


Figure 3-16. Ten-year average precipitation and streamflow, Sangamon River at Monticello

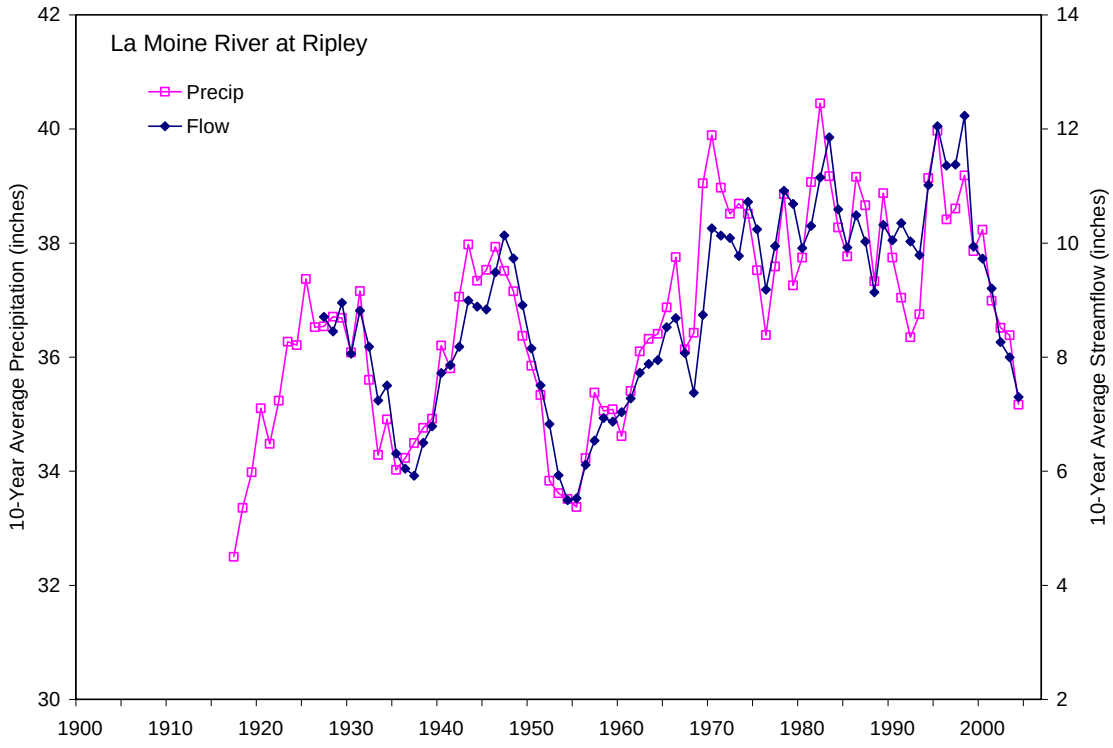


Figure 3-17. Ten-year average precipitation and streamflow, LaMoine River at Ripley

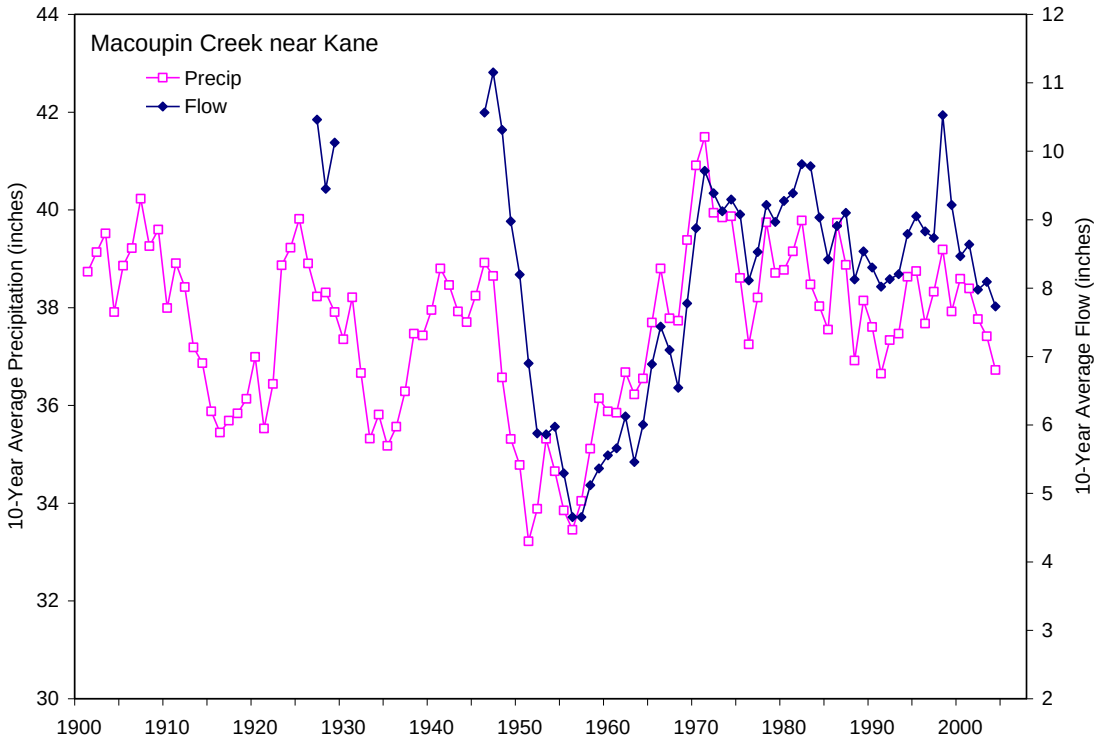


Figure 3-18. Ten-year average precipitation and streamflow, Macoupin Creek near Kane

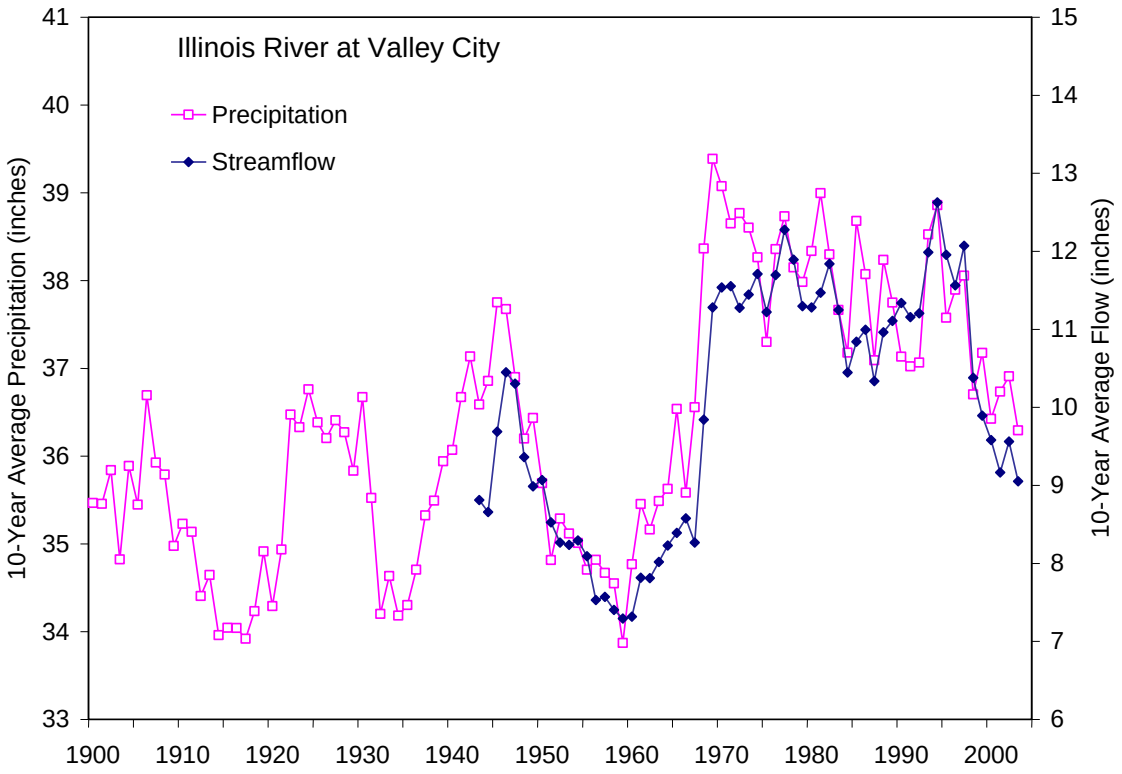


Figure 3-19. Ten-year average precipitation and streamflow, Illinois River at Valley City

Precipitation and streamflow trends shown in figure 3-12 are consistent with regional trends that have affected northern Illinois and much of the upper Midwest (Knapp, 2005). Statistical analyses of long-term streamflow records by Knapp (2005) using the Kendall tau-b trend statistic indicate that streamgage records in northern Illinois, eastern Iowa, and Minnesota all exhibit increasing trends in average streamflow (figure 3-20). Conversely, long-term flow records in the southern two-thirds of Illinois generally do not show significant increases in streamflow.

Figures 3-13 to 3-18 illustrate that trends in precipitation and streamflow vary across the Illinois River watershed. Increasing trends are particularly evident in the Upper Illinois River watershed and its two primary tributaries, the Fox and Kankakee River (figures 3-13 and 3-14). In contrast, the Macoupin, LaMoine, and Sangamon River subwatersheds, in the southern portion of the Illinois River basin, show much less or no overall trend in precipitation or streamflow — even though these records show considerable variation in precipitation and streamflow from decade to decade. The Spoon River watershed, having an intermediate location, shows an increasing trend in flow amount, but to a lesser degree than the Fox and Kankakee River watersheds located farther to the north. In all cases, there is a strong correlation between average precipitation and streamflow.

The significance of the trends is identified using the Kendall tau-b statistic. The Kendall tau-b statistical test provides a quantitative measure of trend, with a coefficient value of 0 indicating no trend and a value of 1 indicating an absolute increasing trend. For the 93-year flow

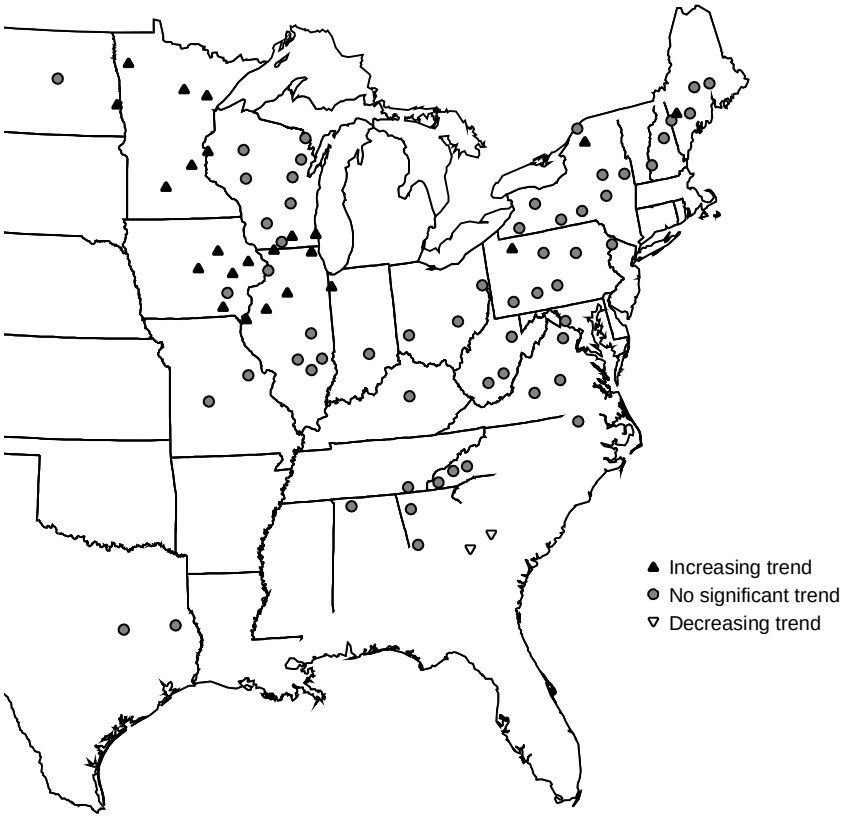


Figure 3-20. Locations of long-term streamflow gages (at least 89 years of record) showing statistically significant trends in mean annual flow in the eastern United States (from Knapp, 2005)

records dating back to 1915, a coefficient value greater than or equal to 0.115 indicates an increasing trend at a 90 percent confidence level, and a value greater than or equal to 0.162 indicates an increasing trend at a 98 percent confidence level. Table 3-2 shows the Kendall Tau-b trend coefficients computed for two time periods, 1915-2007 and 1970-2007. The 1915-2007 trend analyses for the Fox, Kankakee, and Upper Illinois (Peoria-Kingston Mines) flow records show increasing trends with very high levels of confidence. The 1915-2007 trend analysis for the Spoon River record shows an increasing trend, with roughly a 94 percent level of confidence. The flow records for the tributaries located farther south in the watershed do not show a significant trend (having less than an 80 percent level of confidence). The 1915-2007 trend coefficient for the Illinois River at Valley City is not shown because the flow record does not date back to 1915.

Although flow records from the northern half of the Illinois River watershed display an general increasing trend over their full period of record, a closer look indicates: 1) there was a geographically widespread and sizable jump in average flow amount between the 1960s and 1970s (this jump also occurred in the southern part of the basin to a lesser extent); and 2) for most locations there has been little or no additional increase since the 1970s. In fact, for most

Table 3-2. Kendall Tau-b Trend Statistics for Flow Records on the Illinois River and Major Tributaries

	Kendall Tau-b coefficient value period-of-record used in the analysis	
Streamgage record	*1915-2007*	*1970-2007*
Fox River at Dayton	0.294	-0.135
Kankakee River at Momence	0.316	-0.007
Illinois River at Peoria-Kingston Mines	0.315	-0.144
Spoon River at Seville	0.127	-0.127
Sangamon River at Monticello	0.087	-0.081
LaMoine River at Ripley	0.075	-0.166
Macoupin Creek near Kane*	-0.009	-0.081
Illinois River at Valley City**	------	-0.112

Notes:
* The periods of record for the Macoupin Creek gage near Kane are 1921-1933 and 1941-2007.
** The flow record at Valley City only extends back to 1939. The trend coefficient for the 1939-2007 period at Valley City, 0.162, is somewhat less than the trend coefficient for Peoria-Kingston Mines for the same time period (0.192).

locations, the average flows since 1995 have declined from the high flow levels that occurred from 1970 to 1995. Table 3-3 presents the average annual precipitation and streamflow amounts for the Illinois River and its major tributaries over the past 12 years (1996-2007) and compares these amounts to those for earlier periods (1915-1969 and 1970-1995) and to the overall long-term record. Except for the Kankakee River, the average flow from 1996-2007 for these rivers is much closer to the long-term average than it is to the higher flow amounts that were experienced from 1970 to 1995. Thus, with the exception of the Kankakee River watershed, it is reasonable to conclude that other flow records collected throughout the Illinois River watershed over the 1996-2007 timeframe may represent conditions similar to their expected long-term average condition.

Although it is not possible to predict how these trends will progress in the future, concerns expressed in previous decades regarding the potential for continued increases in flows throughout the Illinois River watershed (for example by Ramamurthy et al., 1989) for the time being may no longer be an issue. If anything, there may be growing concerns that the occurrence of drought periods such as existed prior to 1970 may become more frequent. This analysis does not specifically look at trends of flooding or low flows. However, for long-term gaging records in the Illinois River watershed, Knapp (2005) found that trends in high flows and low flows tended to be coincident and proportional to trends in average flow.

Table 3-3. Average Annual Precipitation and Streamflow (inches) for Different Periods of Record

Precipitation

Watershed	*1915-2007*	*1915-1969*	*1970-1995*	*1996-2007*
Fox	33.7	32.6	35.9	34.4
Kankakee	37.0	35.5	39.5	38.4
Upper Illinois (Peoria)	36.3	35.2	38.3	37.1
Spoon	35.7	34.9	37.7	34.8
Sangamon	38.9	38.1	40.7	38.9
LaMoine	36.6	35.8	38.6	35.9
Macoupin	37.4	37.0	38.6	36.9
Entire Illinois (Valley City)	36.5	35.6	38.3	36.6

Streamflow

Watershed	*1915-2007*	*1915-1969*	*1970-1995*	*1996-2007*
Fox	9.3	7.7	12.1	10.0
Kankakee	12.3	10.9	14.7	13.5
Upper Illinois (Peoria)	10.2	8.8	12.9	10.8
Spoon	9.1	8.0	11.3	9.2
Sangamon	10.4	9.5	12.4	10.1
LaMoine	8.7	7.7	10.7	8.2
Macoupin	8.4	8.1	9.1	7.8
Entire Illinois (Valley City)	9.8	8.4	11.7	9.5

4. Model Development and Application

The Illinois State Water Survey has been developing a watershed model for the Illinois River basin in support of the Illinois River Ecosystem project. In the initial phase, a hydrologic model of the entire Illinois basin has been developed and used to evaluate potential impacts of land use changes and climate variability on streamflow in the Illinois River basin. The model is based on the U.S. Environmental Protection Agency's BASINS 3.0 modeling system. The Hydrologic Simulation Program – FORTRAN or HSPF (Bicknell et al., 2001) which is part of BASINS was used to simulate the hydrology of the Illinois River basin. The HSPF is a comprehensive and dynamic watershed model that also has the capability to simulate water quality and sediment transport.

To make the model applicable for assessing and evaluating the impact of CREP and other land use changes on water quality and sediment transport, the Water Survey has been developing the sediment transport and water quality capabilities of the HSPF model for the Illinois River basin. The initial effort has focused on the Spoon River watershed (figure 4-1) where two of the four intensively monitored watersheds, Court and Haw Creek, are located. Streamflow, sediment, and water quality data being collected at three monitoring stations are being used to calibrate and test the model for the Spoon River watershed. Once the calibration and validation process are completed for the Spoon River watershed, the model parameters can be used to develop models for other similar watersheds to simulate the hydrology, sediment transport and water quality under different climatic and land use scenarios. Over time, as land use practices change significantly as a result of CREP and other conservation practices, the models being developed will provide the tools to evaluate and quantify changes in water quality and sediment delivery to the Illinois River.

The progress in model development for the Spoon River watershed is discussed in the following sections.

HSPF Model

The HSPF model is a conceptual, comprehensive, long term continuous simulation watershed scale model which simulates non-point source hydrology and water quality, combines it with point source contributions, and performs flow and water quality routing in the watershed and its streams. The HSPF model simulates land-surface portion of the hydrologic cycle by a series of interconnected storages – an upper zone, a lower zone, and a ground-water zone. The fluxes of water between these storages and to the stream or atmosphere are controlled by model parameters. The model uses a storage routing technique to route water from one reach to the next during stream processes.

For sediment simulation, the surface erosion component of the HSPF model performs processes such as sediment detachment from the soil matrix in the pervious land segments during rainfall event, washoff of this detached sediment, scour of the soil matrix, and reattachment or compaction of the sediment. Storage and washoff of sediments from the impervious surfaces is

Figure 4-1. Location of the Spoon River watershed

also considered. The sediment load and transport in the stream channel is dependent on the particle diameter, density, fall velocity, shear stress for deposition and scour, and erodibility. The noncohesive (sand) and cohesive (silt and clay) sediment transport is simulated in the model using different subroutines.

Nutrients in the watershed soil in the HSPF model are simulated either as attached to organic or inorganic solids, dissolved in the overland flow, or as concentrations in the subsurface flow reaching the streams laterally. For both nitrogen and phosphorous compounds, the processes simulated include immobilization, mineralization, nitrification/denitrification (nitrogen only), plant uptake, and adsorption/desorption. The nutrient loads from the watershed undergo further transformation in the stream reaches.

Model Input Data

The HSPF model requires spatial information about watershed topography, river/stream reaches, land use, soils, and climate. The hourly time-series of climate data required for hydrologic simulations using HSPF include precipitation, potential evapotranspiration (ET), potential surface evaporation, air temperature, dew-point temperature, wind speed, and solar radiation. The hourly precipitation data from the two ISWS gages, one each in Court Creek (ISWS31) and Haw Creek (ISWS32) watersheds, were used (figures 4-2 and 4-3). Daily precipitation data from the MRCC (Midwestern Regional Climate Center) gaging station at Galesburg (ID 113320) was also used after it was disaggregated into hourly data based on the hourly precipitation data from an ICN (Illinois Climate Network) station located in Monmouth (MON). The other time series of the climate inputs for the above three precipitation stations were obtained from the ICN station at Monmouth. Daily data from nine additional MRCC stations (figure 4-4) in or near the Spoon River watershed were also disaggregated into hourly data based on the hourly data from three stations at Peoria, Moline, and Augusta, as found in the BASINS database. These additional stations were used for the Spoon River watershed model.

For topographic inputs, the 30-meter Digital Elevation Model (DEM) raster dataset produced by the Illinois State Geological Survey (ISGS) and the United States Geological Survey (USGS) was used. The high resolution National Hydrography Dataset (NHD) developed by the USGS was used to provide stream/river reach information to the model. The land use data were obtained from the Illinois Department of Agriculture which is based on the satellite imagery of the State of Illinois acquired from three dates during the spring, summer, and fall seasons of 1999 and 2000. Land use in the study watersheds was classified as corn, soybean, rural grassland, forest, urban, wetland and other (figures 4-5, 4-6, and 4-7). The soils data were based on digitized County Soil Association Maps of the Knox County and the STATSGO dataset (figure 4-8). The soil type for various parts of the study watersheds were determined spatially from the digitized soils maps, but the parameters corresponding to the soil type were manually entered during development of the HSPF model.

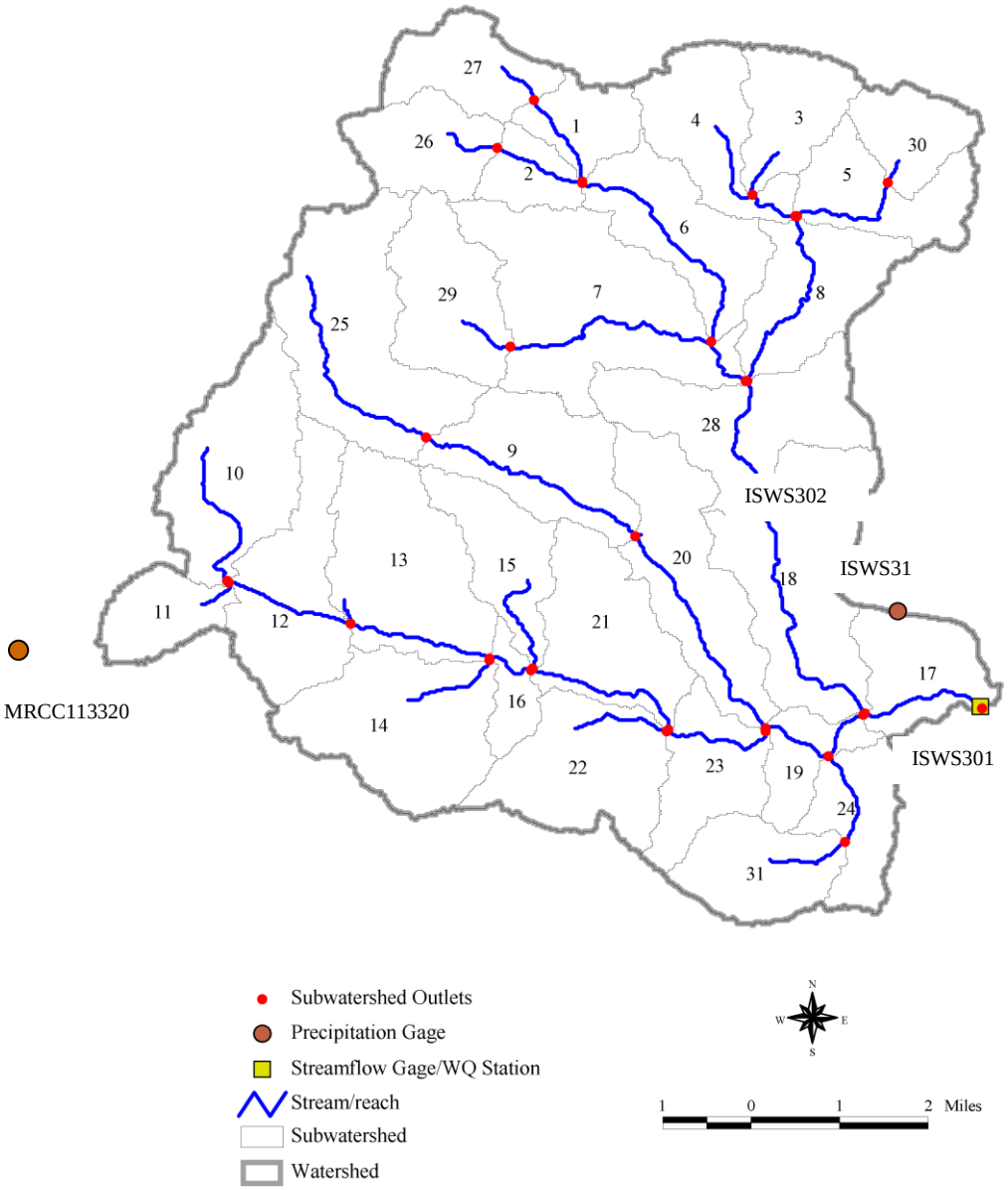


Figure 4-2. Schematic of the subwatershed and stream delineation, and precipitation gages used for the Haw Creek model

Figure 4-3. Schematic of the subwatershed and stream delineation, and precipitation gages used for the Haw Creek model

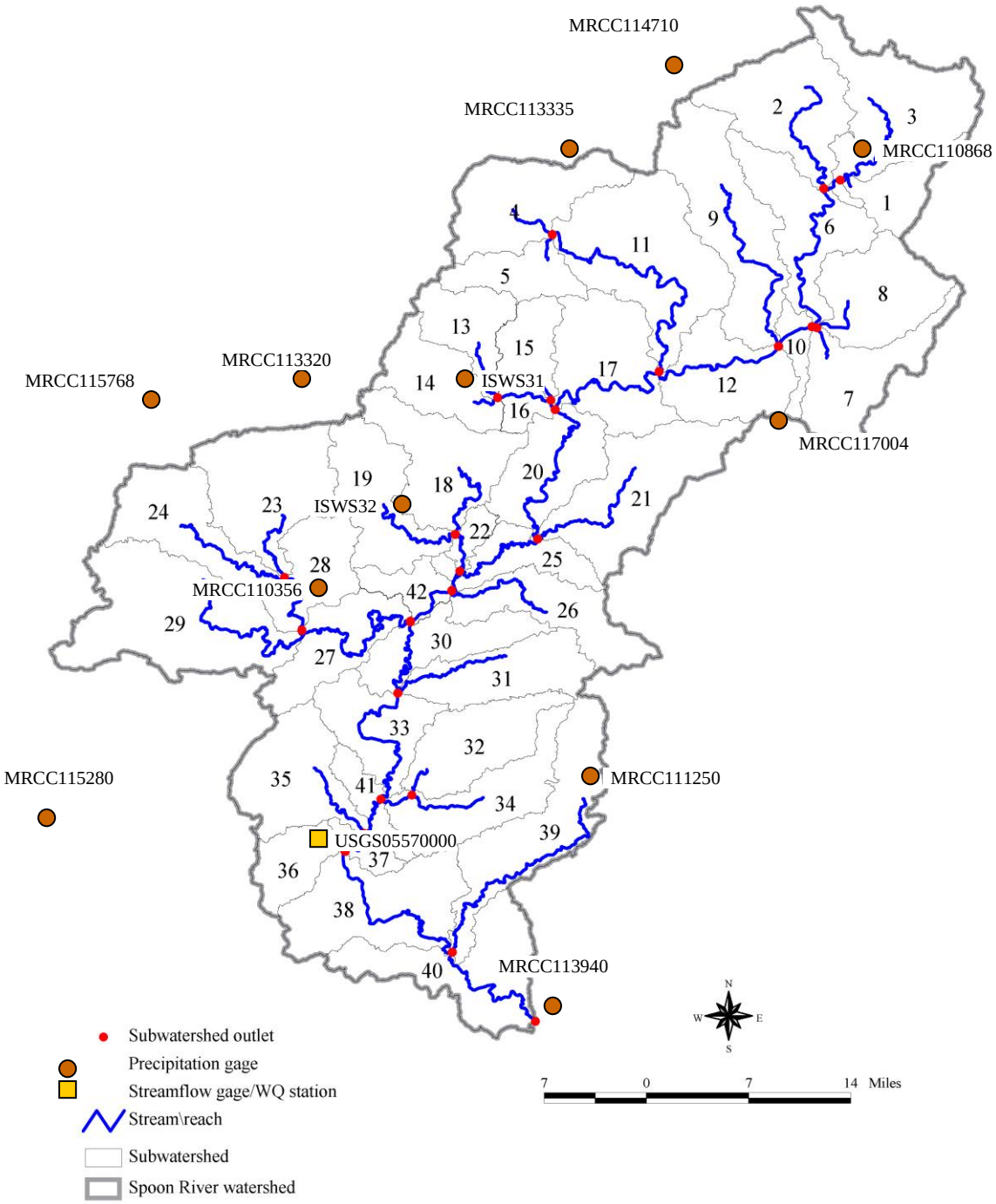


Figure 4-4. Schematic of the subwatershed and stream delineation, and precipitation gages used for the Spoon River watershed model

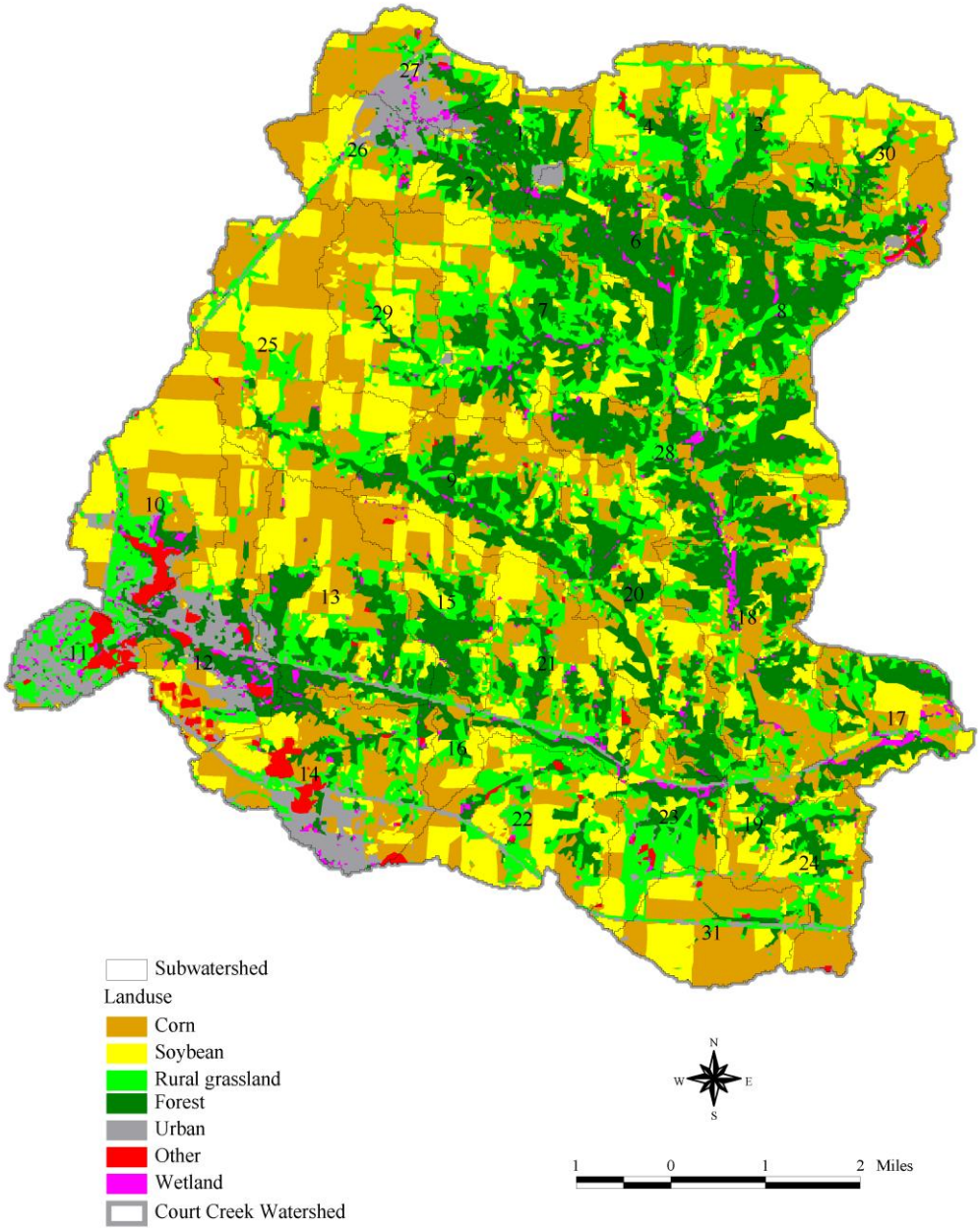


Figure 4-5. Land use in the Court Creek watershed

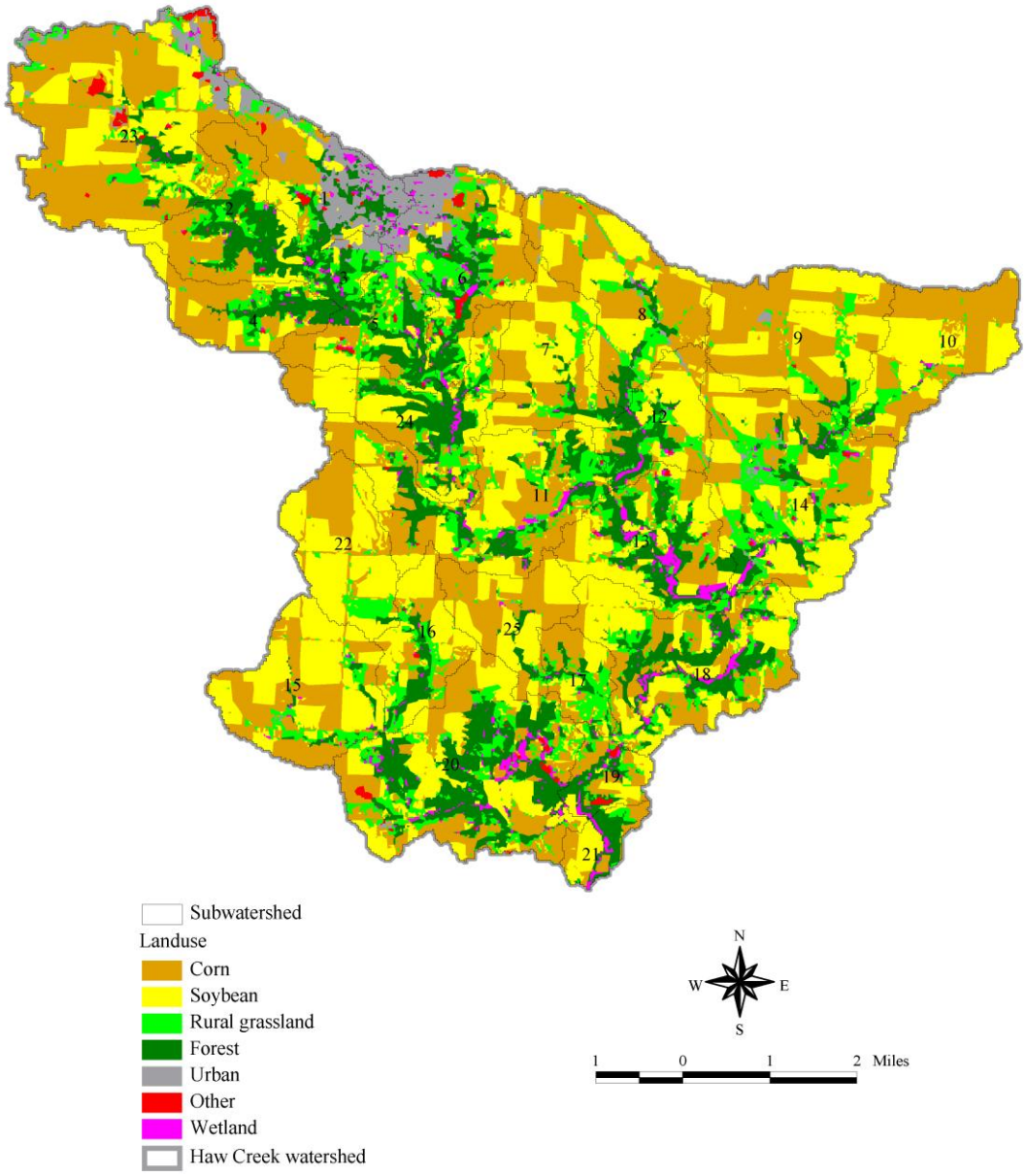


Figure 4-6. Land use in the Haw Creek watershed

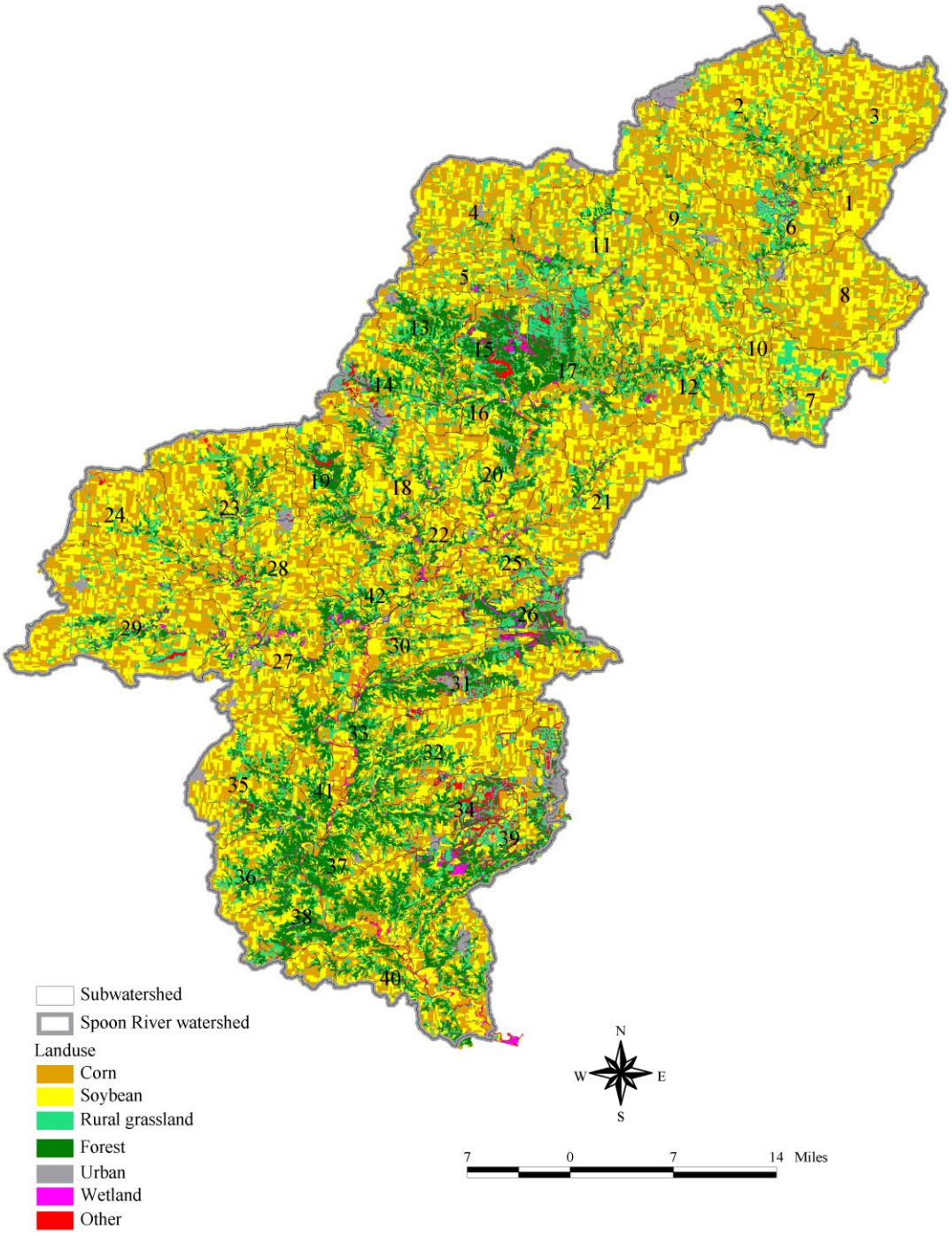


Figure 4-7. Land use in the Spoon River watershed

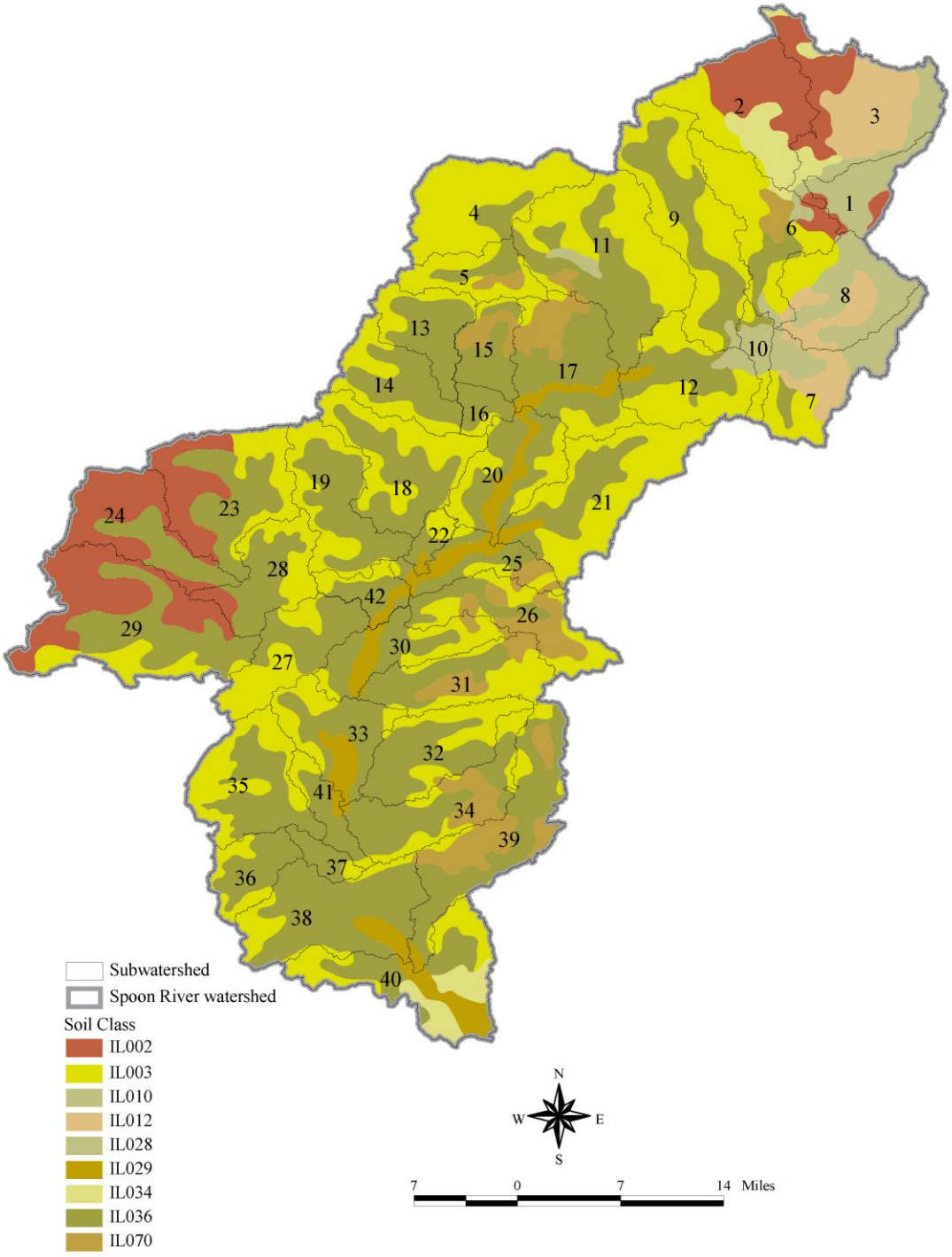


Figure 4-8. Soil types in the Spoon River watershed

Model Development

Based on the topographic and hydrographic data, the watersheds were subdelineated into smaller hydrologically-connected subwatersheds and stream reaches, and respective outlets. The Automatic Delineation procedure in BASINS with an option of 'burning in' existing streams was used. Subdelineation was done for representing spatially variable physical and other characteristics of a watershed in the HSPF model. The Court, Haw, and Spoon River watersheds were subdivided into 31, 25, and 42 subwatersheds, respectively (figures 3-2, 3-3, and 3-4). During subdelineation, outlets were specified in the models corresponding to the streamflow gaging/water quality monitoring stations on the North Creek (ISWS302), Court Creek (ISWS301), Haw Creek (ISWS303), and the USGS streamflow gaging station at Seville (USGS05570000) in the Spoon River watershed (figures 3-2, 3-3, and 3-4). The subwatersheds were further subdivided into Hydrologic Response Units (HRUs) based on land use, soil, and climate to account for the spatial variability of a basin's physical and hydrologic characteristics at a finer scale. An HRU is an area within a watershed that is expected to have a similar hydrologic response to input of precipitation and evapotranspiration. Each HRU has a set of parameter values that must be determined through the calibration process to define runoff characteristics as well as loading of various constituents from that HRU. In the Court Creek watershed HSPF model, climate data from the Court Creek and Galesburg precipitation gages were input to different subwatersheds based on the proximity. Similarly, in the Haw Creek HSPF model data from the Haw Creek and Galesburg gages were input to various subwatersheds. In case of Spoon River watershed HSPF model, data from all ten MRCC stations were specified for different subwatersheds based on their proximity to the gages.

Model of the Court Creek watershed was developed first using two years (WY2001-WY2002) streamflow and sediment concentration data from the ISWS301 streamflow gage/WQ station on the Court Creek. Calibrated model parameters from this model were then used to populate the models of the Haw Creek and Spoon River watersheds. No further calibration of these two models was performed. Haw Creek watershed model was run for the same two year period as Court Creek watershed model and the model results were compared with the observed data from the ISWS303 gage on the Haw Creek. Since long-term climate and streamflow data were available for the Spoon River watershed, this model was run for 1972-1995 period using data from the USGS05570000 at Seville.

Modeling Results

Values of a large number of HSPF model parameters can not be obtained from field data and need to be determined through model calibration exercise. The Court Creek watershed model was calibrated to assign best possible parameter values to each HRU and stream reach so that the model simulated daily streamflows and pollutant concentrations similar to the values observed at the gaging/monitoring stations. Calibration of the hydrologic component of the model was followed by the calibration of the water quality component for the sediment concentration. Model was run for hourly time step. For the two year calibration period of WY2001-WY2002, percent volume error between the model simulated and observed streamflows at gages ISWS301 on the Court Creek and ISWS302 on the North Creek were 1.2% overestimation, and 3.5%

underestimation, respectively. Comparisons of the daily streamflows simulated by the model for WY2001-WY2002 period with those observed at gages ISWS301 and ISWS302 are shown in figures 4-9a and 4-9b. The performance of this preliminary model is promising and overall the simulated streamflows follow the similar trend as the observed values. The timings and shape of the simulated streamflow hydrographs resemble the observed ones but some peak flows were underestimated by the model. In this study the model was not calibrated to match the individual stormflow events, rather it was calibrated to fit the long-term and daily data over the two year calibration period. Also, data from only two precipitation gaging stations, both near the boundary of the watershed (figure 4-2), were used to spatially represent the precipitation over the entire watershed. It is possible that rainfall measured for a particular event at one of the gages did not represent the rainfall that actually occurred in different parts of the watershed, thereby resulting in discrepancies between the observed and simulated streamflow hydrographs. Thus, more precipitation gaging stations will help improve the performance of the hydrologic model by more accurately simulating the stormflow hydrographs.

For sediment simulation by the model in the Court Creek watershed, parameters controlling soil erosion on the surface and sediment transport in the stream channel were calibrated. Comparison of sediment concentration simulated by the model and those observed at gages ISWS301 and ISWS302 are shown in figure 4-10 for the WY2001-WY2002 period. The simulated values generally followed the same trend as the observed sediment concentration values at both gages. Since most soil erosion occurs during extreme runoff events, some high sediment concentrations were underestimated by the model as a result of poor estimation of the stormflow peaks by the model during hydrologic simulations.

Streamflow and sediment concentration simulation results from the Haw Creek watershed model are compared with the observed data as shown in figures 4-11 and 4-12, respectively. Similar results from the Spoon River watershed model are shown in figures 4-13 and 4-14. In this preliminary phase, the performances of these two models were similar to the calibrated model of the Court Creek watershed. Performance of these models can be improved in the future if climate, streamflow, and water quality data are available for more stations and longer time period to improve the model calibration.

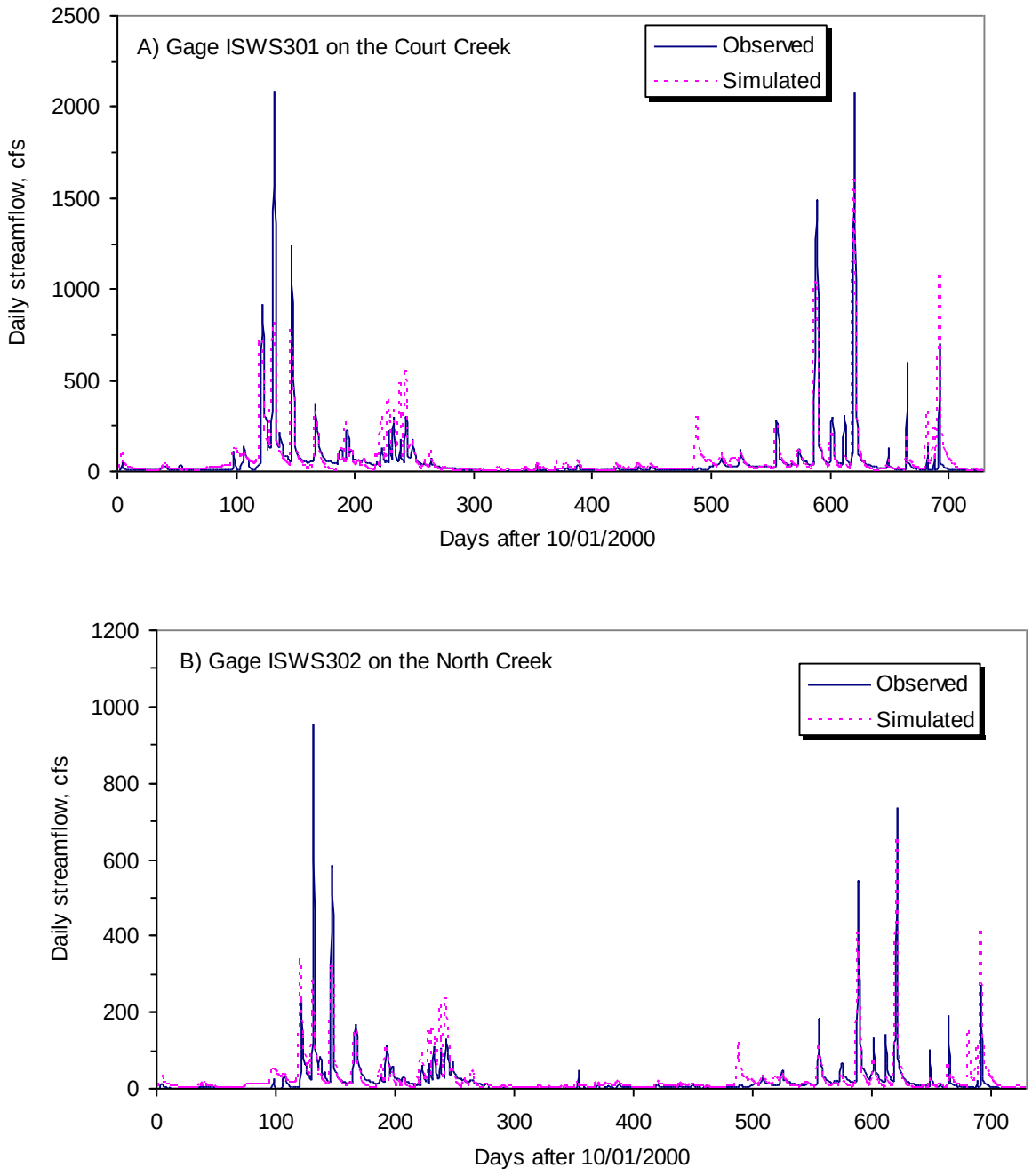


Figure 4-9. Results of model calibration for streamflow simulation for the Court Creek watershed

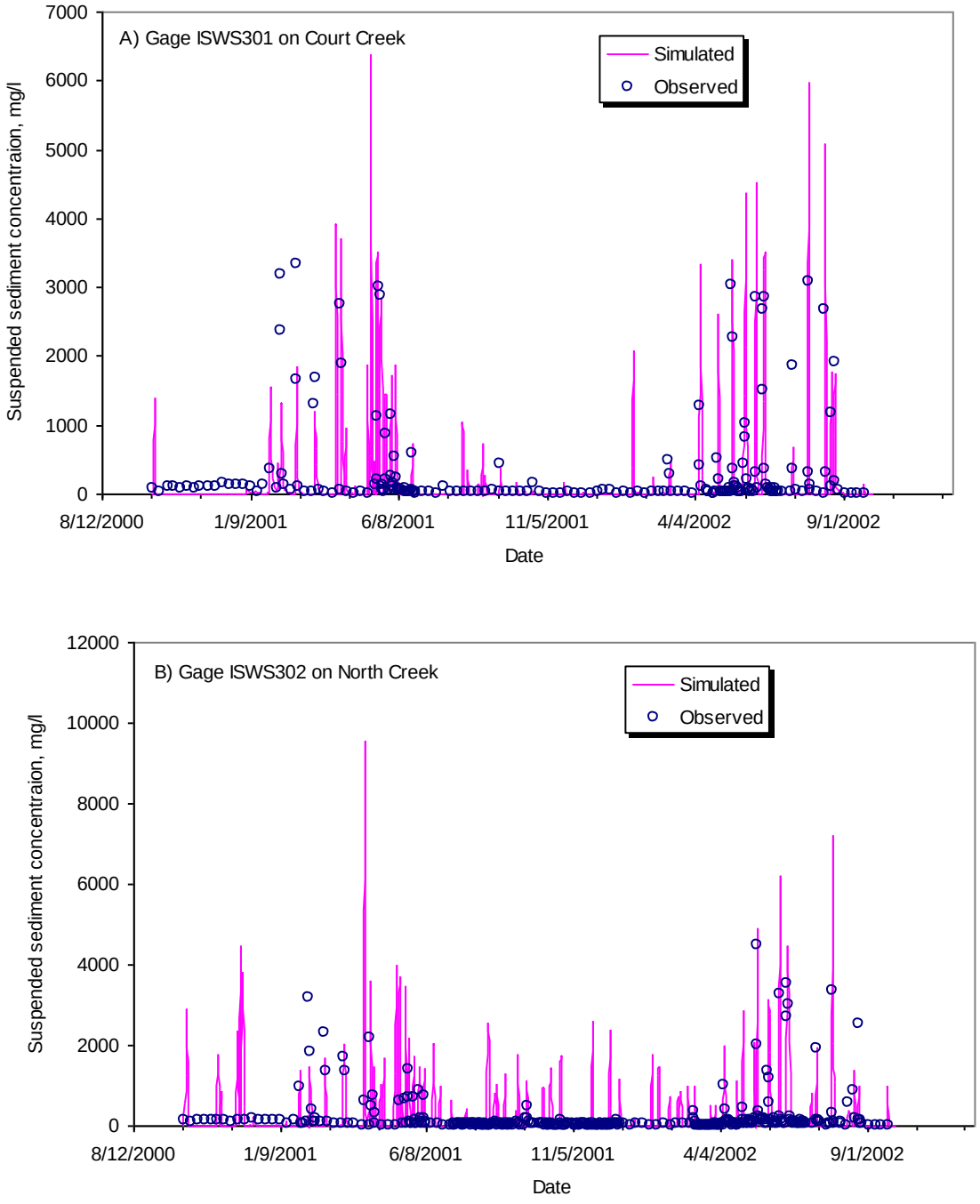


Figure 4-10. Preliminary results of model calibration for suspended sediment concentration simulation for the Court Creek watershed

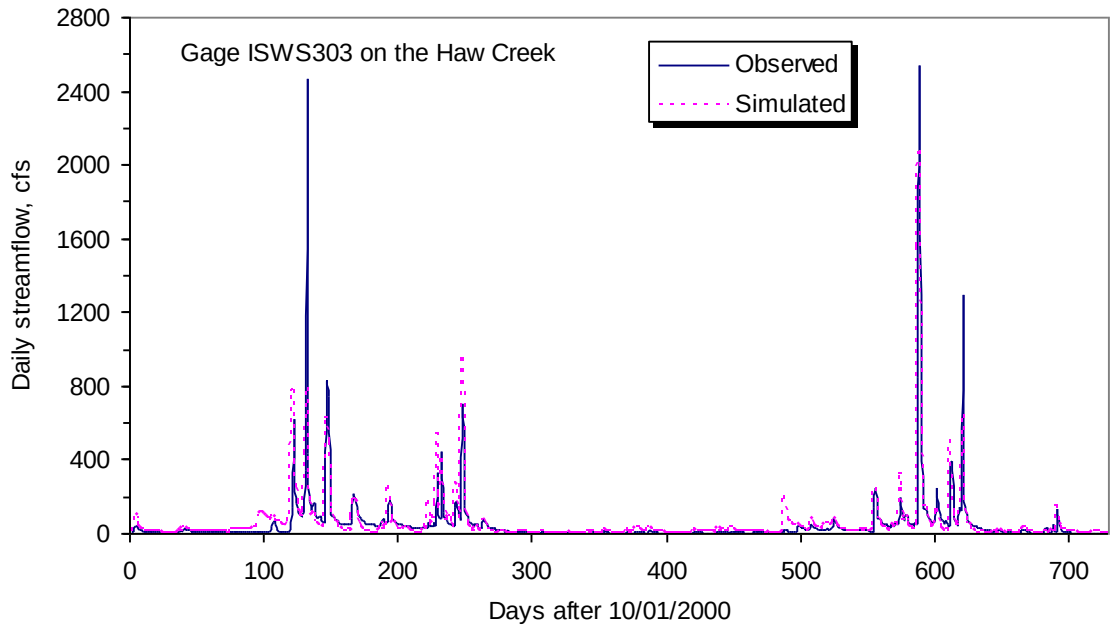


Figure 4-11. Comparison of observed and simulated streamflow by the Haw Creek watershed model developed using the calibrated parameters from the Court Creek watershed model

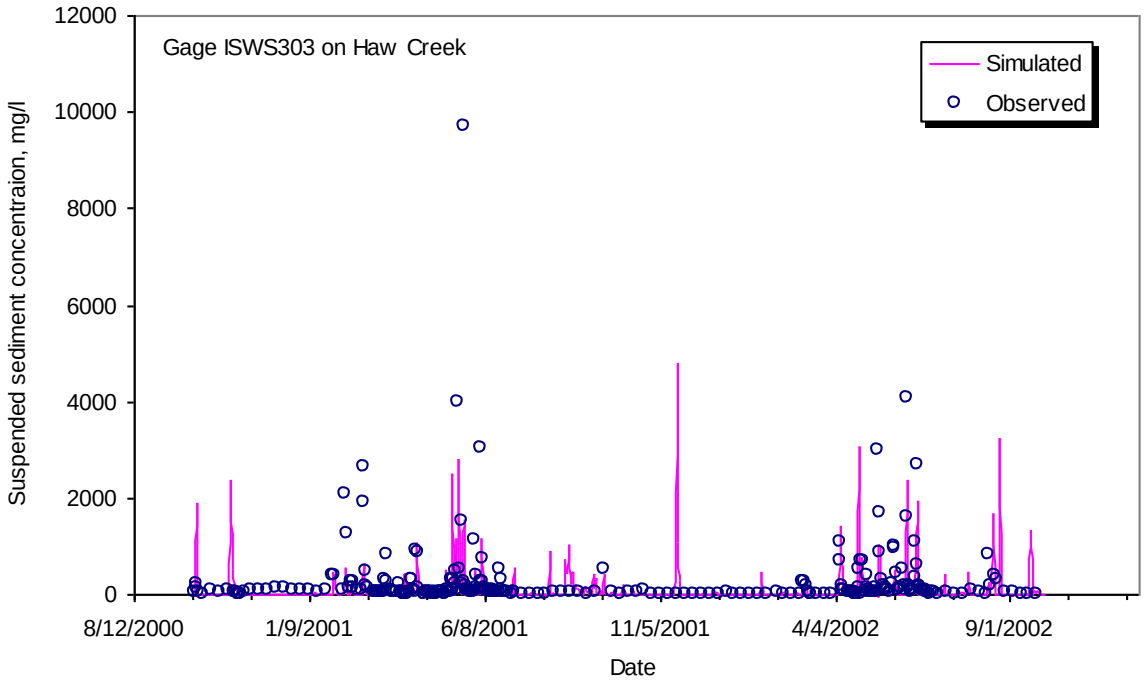


Figure 4-12. Preliminary results for suspended sediment concentration from the Haw Creek watershed model developed using the calibrated parameters from the Court Creek watershed model

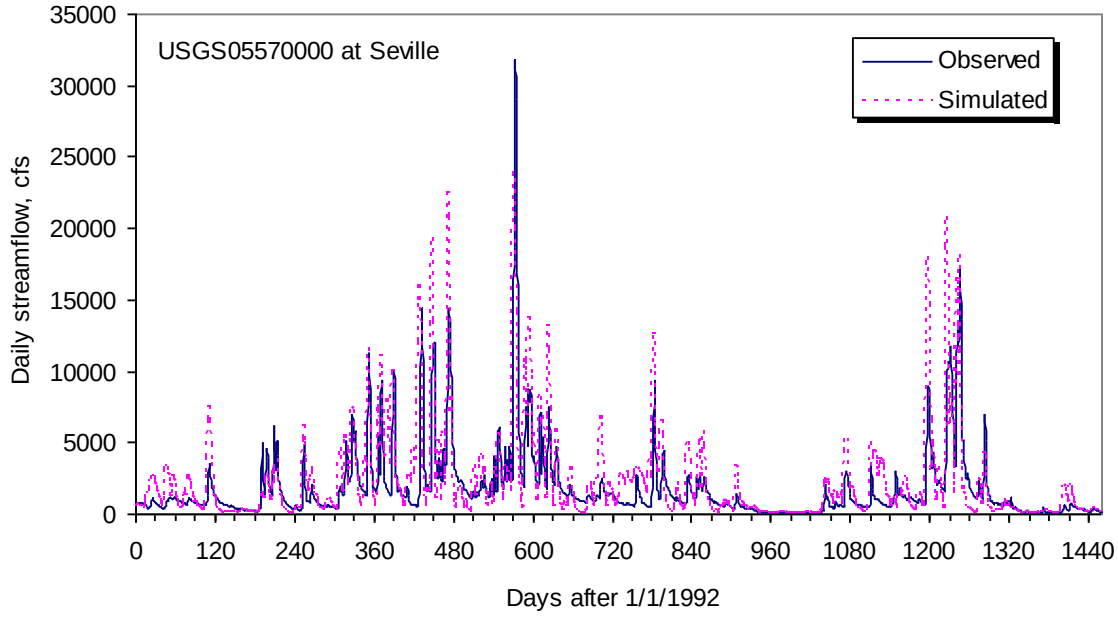


Figure 4-13. Comparison of observed and simulated streamflow simulation by the Spoon River watershed model developed using the calibrated parameters from the Court Creek watershed model

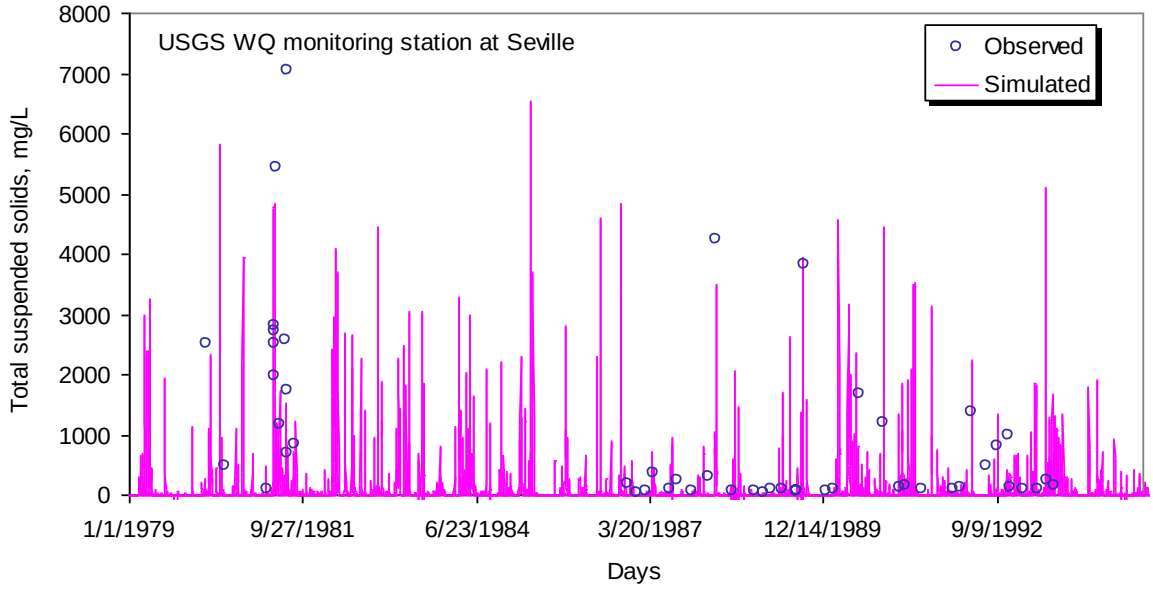


Figure 4-14. Preliminary results for suspended sediment concentration from the Spoon River watershed model developed using the calibrated parameters from the Court Creek watershed model

5. Analyses and Discussion

Sediment Loadings

Based on sediment records since 1980, the Illinois River on the average receives approximately 12 million tons of sediment annually from tributary streams (Demissie et al., 2004). About 55 percent of the sediment delivered to the river (6.7 million tons) is deposited in the river, backwater lakes, and side channels along the river. Most of this sediment is generated in the tributary watersheds to the Lower Illinois River, with the Spoon and LaMoine River watersheds as the highest per unit area generators of sediment among the major tributaries. The smaller tributaries draining directly to the river also contribute significant sediment. Controlling the erosion processes that are producing excessive sediment and reducing sediment delivery to the Illinois River will be a long-term effort, since sediment storage and mobilization along major rivers is a slow process. It will take some time to flush the sediment already in the system. In the initial phase of a restoration project, the major goal is to stabilize the system so that the erosion process is not accelerating and generating more sediment. The readjustment processes will take a number of years to reach a dynamic equilibrium condition where the natural processes of erosion and sedimentation are in balance. The long-term goal of the Illinois River restoration projects is to reach such a state where continued excessive sedimentation is eliminated.

To assess these processes, long-term monitoring is needed. The CREP program has been collecting sediment data at selected watersheds to supplement other monitoring programs. The data collection for the CREP program started in 1999 and has generated nine years of data. The annual sediment load data for each of the five CREP monitoring stations have been presented in chapter 2. Because of the short duration of data collection program, this data cannot yet be used to assess long-term trends. However, the short-term trends are shown in figure 5-1, where the sediment load per unit area was normalized by the runoff in inches to account for the variability of runoff from year to year. Even though the extreme wet year 2008 stands out as the year with the highest yield (for Panther and Cox Creeks), the general trend for the other stations is a gradual decrease. Again, these are short term trends and any major climatic or hydrologic variability in the coming year could change the trends, as illustrated with the influence of 2008 on Panther and Cox Creeks.

The data were also compared with historical data collected by the USGS for small watersheds in the Illinois River basin as shown in figure 5-2. As shown in the figure, the CREP dataset is consistent with the older dataset and will be used to develop improved sediment delivery estimates for small watersheds in the Illinois River basin and improve our assessment and evaluation capability.

To assess long-term trends, data collected by the USGS and ISWS since 1980 were used to compute sediment delivery for the major tributaries to the Lower Illinois River. For the USGS data, sediment delivery from the three major tributary watersheds to the Lower Illinois River was computed for the downstream gaging stations near the outlet of the watersheds using the same methods developed by Demissie et al. (2004). The outflow of sediment from the Illinois River basin is measured at Valley City. The sediment loads and the corresponding water discharges for

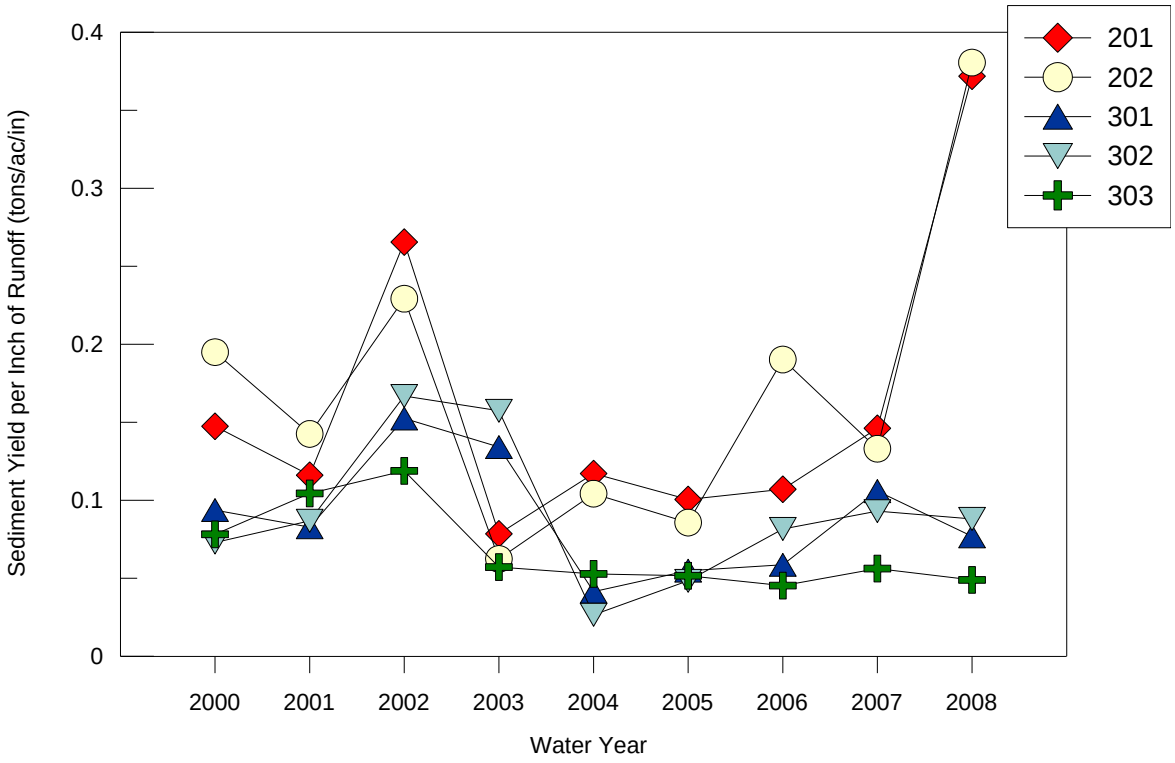


Figure 5-1. Variability of sediment yield per inch of runoff for CREP monitoring stations

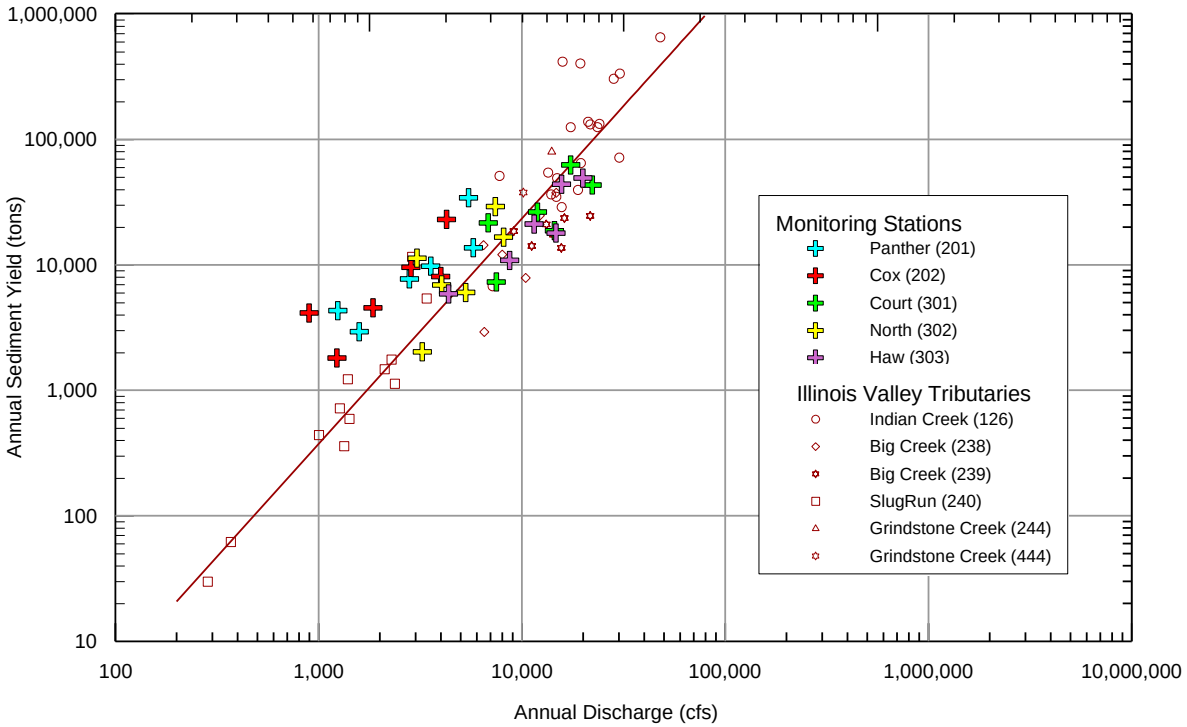


Figure 5-2. Comparison of sediment load from CREP monitoring stations with historical sediment data for small watersheds by the USGS

five-year increments since 1980 are shown in figure 5-3. The period 1991-1995 generally shows the highest sediment delivery to the Illinois River and the highest outflow from the Illinois River for the period under consideration, primarily because of the 1993 major floods. Since that period, sediment delivery from the tributaries and outflow from the Illinois River have generally been decreasing. If these trends continue into the future, there would be significant reduction in sediment delivery to the Illinois River.

Similar trends are also observed from the analyses of sediment data collected by the ISWS for the Benchmark Sediment Monitoring Program for Illinois Streams. The Benchmark Sediment Monitoring Program has been collecting weekly sediment data at selected monitoring stations throughout the state since 1980 (Allgire and Demissie, 1995). The data collected over that last 25 years have been processed and analyzed to observe trends in sediment concentrations and loads (Crowder et al., 2008). Figures 5-4 to 5-6 show the trend in sediment load since 1980 for the Spoon River at Long Mills, LaMoine River at Ripley, and Sangamon River at Monticello, respectively. All three stations show a decreasing trend since 1980.

Nutrient Loadings

To assess long-term trends in nutrient loadings as conservation practices are implemented, the state has been collecting nutrient data at the five monitoring stations where sediment data have been collected since 1999. Even though there are some low and high nutrient load years, the dataset is not long enough to assess long-term trends in nutrient loading. However, the short-term trends based on the data collected so far are shown in figures 5-7 and 5-8 for nitrate-N and total phosphorous yields per inch of runoff. The nutrient yield values were divided by the inches of runoff to partly remove the effect of the variability of runoff from year to year. As shown in figure 5-7, the nitrate-N loads do not show any significant trend except for the jump in yield from 2000 to 2001 for stations 201 and 202 and decline from 2007 to 2008. Figure 5-8 shows a slight decreasing trend for total phosphorous for stations 301, 302, and 303, similar to the one observed for sediment.

Long-term data collected by the Illinois EPA as part of their Ambient Water Quality Monitoring Network can, however, provide a fair indication of the general long-term trend in nutrient delivery to the Illinois River. Figure 5-9 shows annual nitrate-N yields in tons per square mile from the three major tributaries of the Lower Illinois River (Spoon, Sangamon, and LaMoine Rivers). Nitrate-N represents about 70 percent of the total nitrogen load in most of Illinois' agricultural watershed, and thus is a good surrogate for total nitrogen load. As can be seen in the figure, the nitrate yields can range from almost zero during a drought year like 1989 to a high of about 11 tons per square mile during a major wet period like the 1993 flood year. Therefore, climatic factors do play a major role in nutrient transport and delivery. The most important observation that can be made for the figure is the slow decreasing trend of nitrate-N yield from the major tributary watersheds. Even though it is very difficult to measure how much impact the CREP program might have had, it is obvious that conservation practices in these watersheds, where most of the CREP lands are located, are making a difference in nitrogen delivery to the Illinois River.

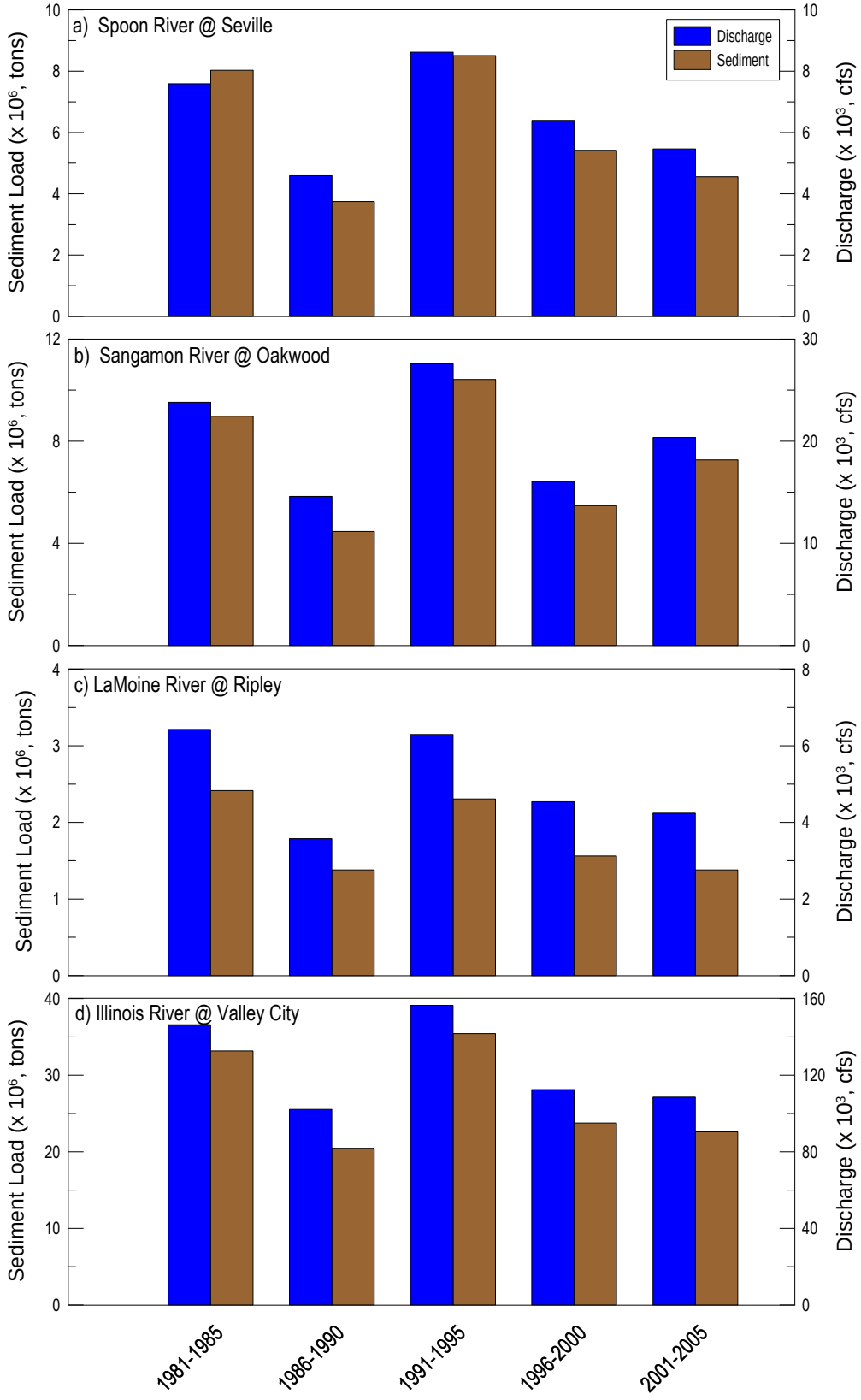


Figure 5-3. Sediment delivery from the three major tributary watersheds to the Illinois River and sediment outflow from the Illinois River at Valley City

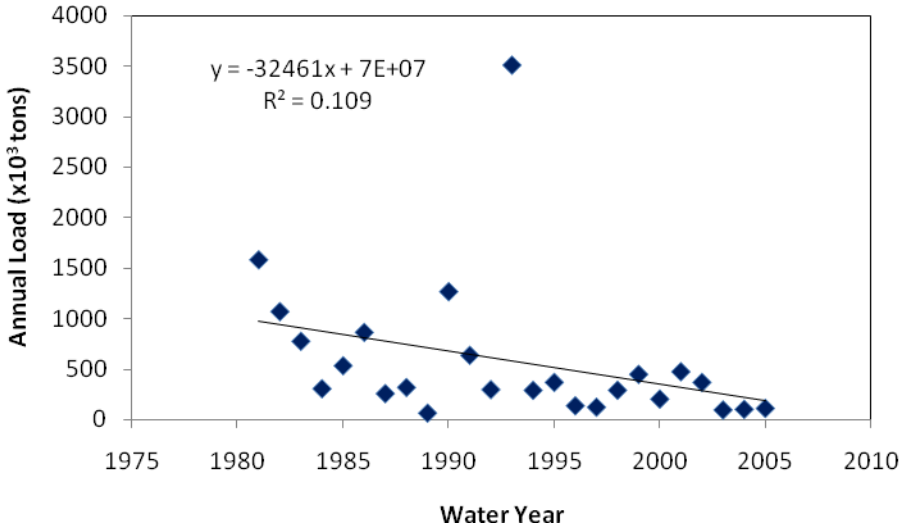


Figure 5-4. Trends in sediment load at Spoon River at London Mills (after Crowder et al., 2008)

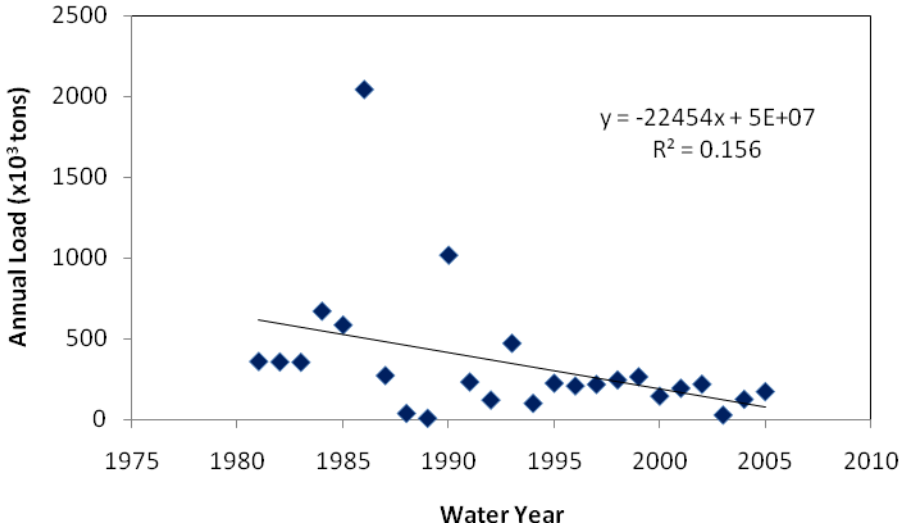


Figure 5-5. Trends in sediment load at LaMoine River at Ripley, IL (after Crowder et al., 2008)

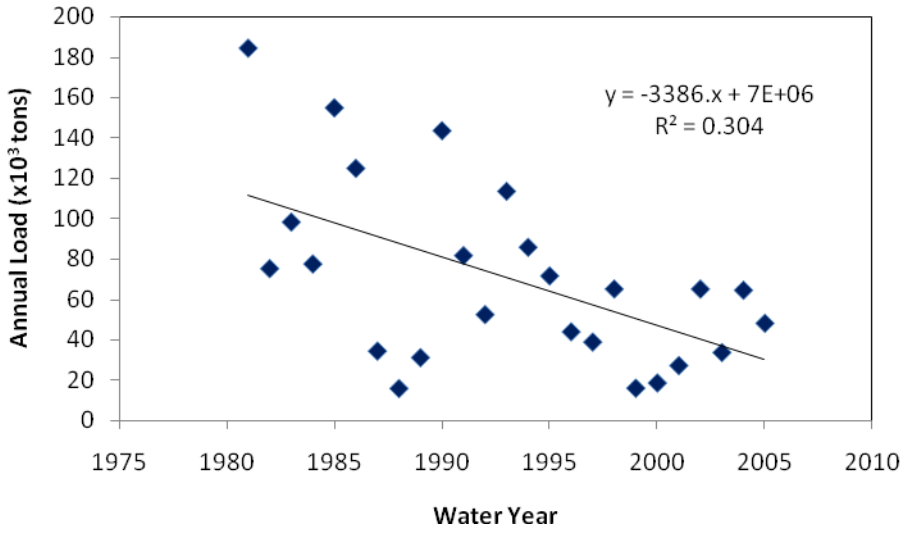


Figure 5-6. Trends in sediment load at Sangamon River at Monticello, IL (after Crowder et al., 2008)

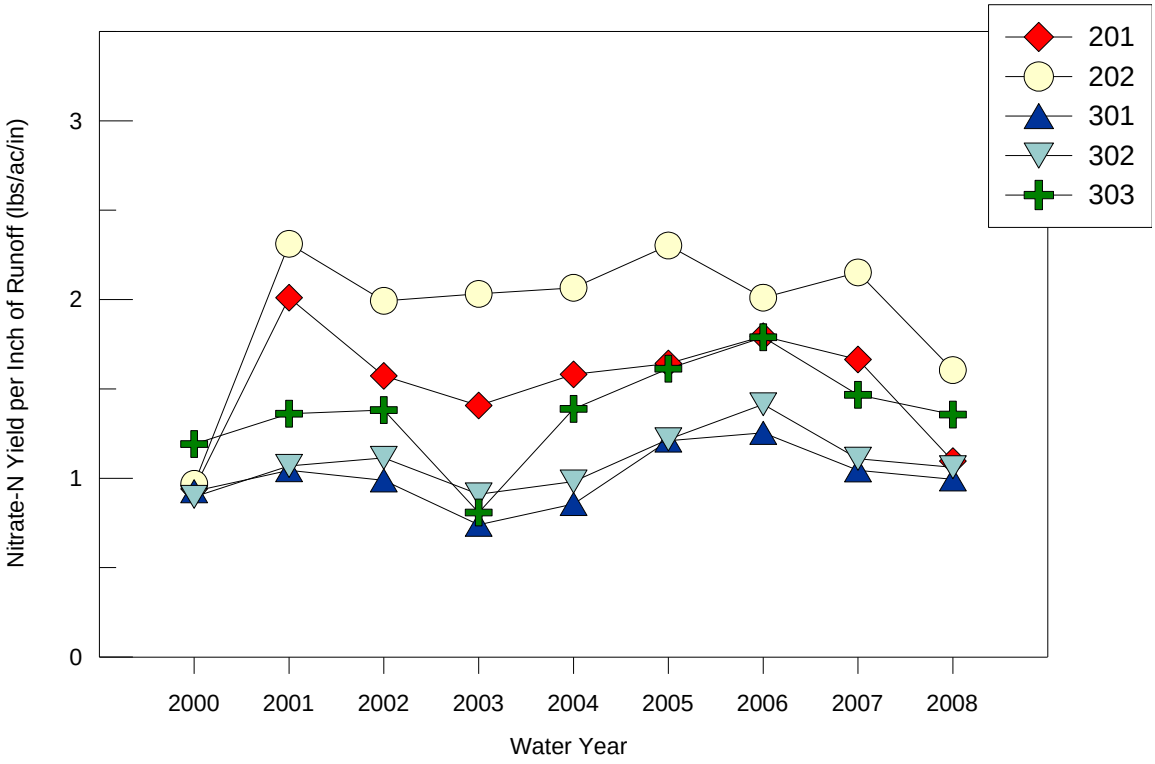


Figure 5-7. Variability of nitrate-N yield per inch of runoff for CREP monitoring stations

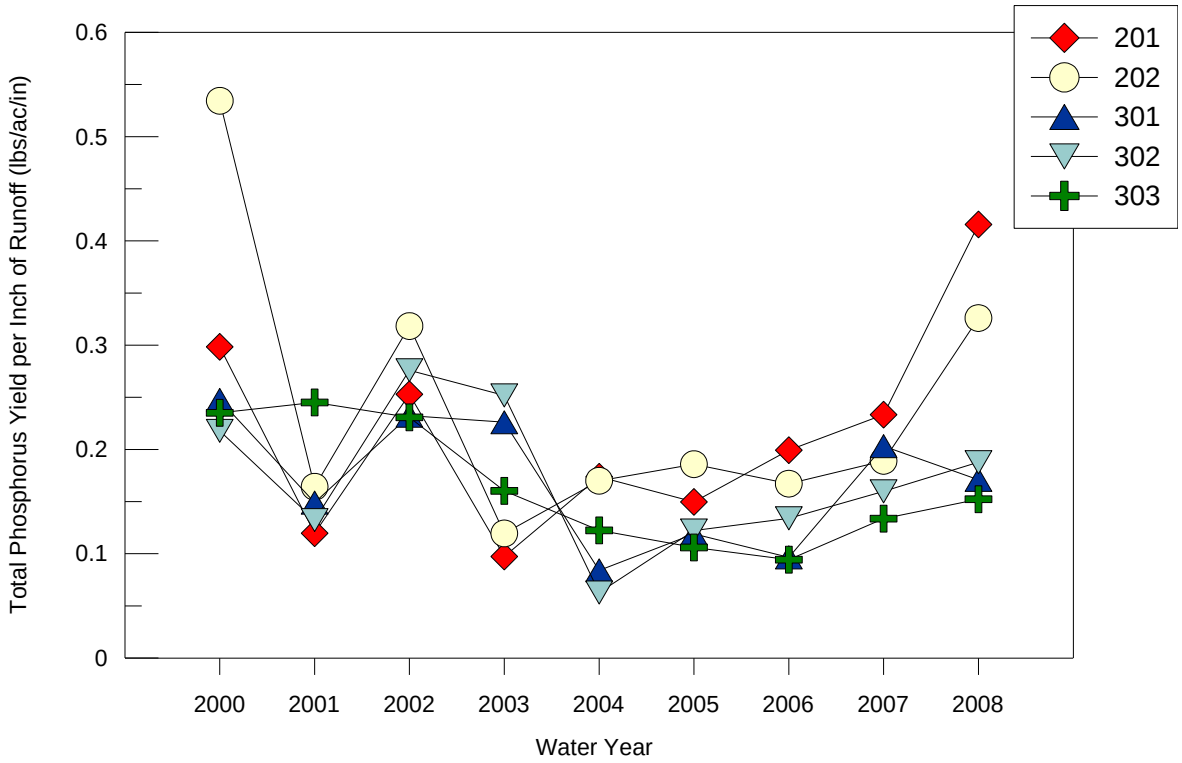


Figure 5-8. Variability of total phosphorous yield per inch of runoff for CREP monitoring stations

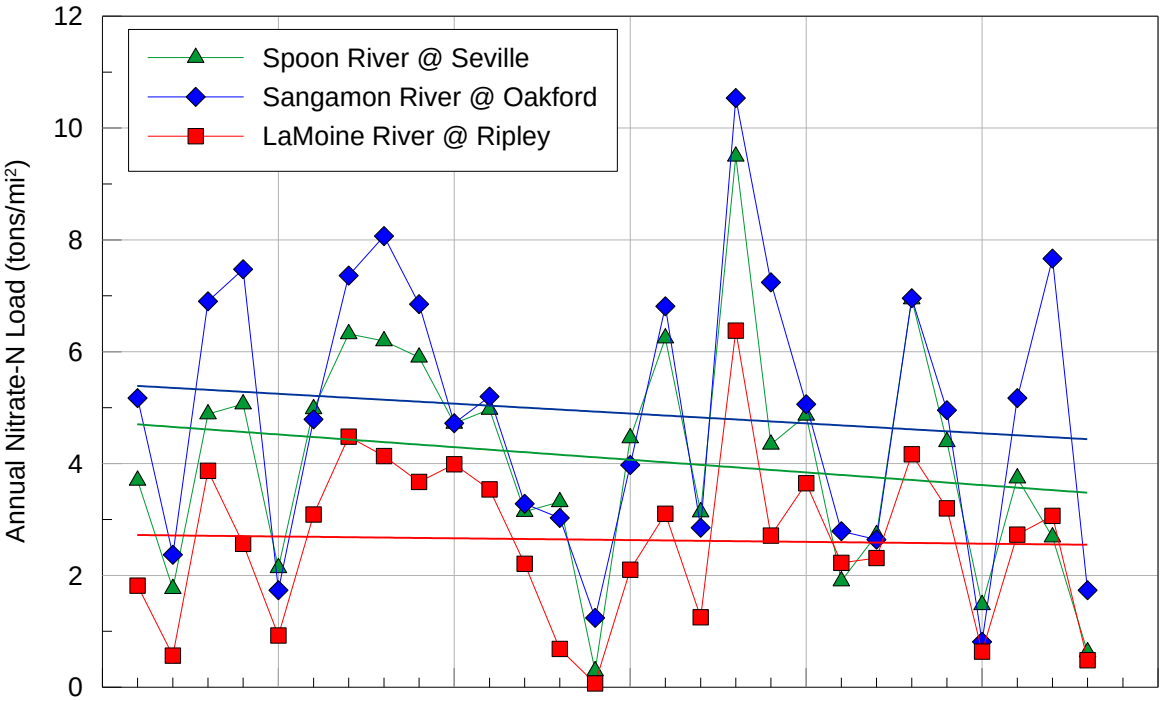


Figure 5-9. Annual nitrate-N loads for the three major tributary watersheds to the Lower Illinois River

Figure 5-10 shows the total phosphorous yield from the same three tributary watersheds discussed in the previous figure. Annual phosphorous delivery ranges from a low of almost zero during the drought year 1989 to a high of almost one ton per mi^2 for the extreme wet year of 1993. The data also show how dependant phosphorous delivery is on climatic variability. Similar to the trends to the nitrate delivery, there is a slow but gradual decreasing trend in phosphorous yield from the Spoon and LaMoine Rivers, while there is a gradual increase from the Sangamon River.

The trends in nutrient loads from the major tributaries are reflected in nutrients transported by the Illinois River. Analyses of the data from the two downstream monitoring stations, Havana and Valley City, are shown in figure 5-11 for nitrate-N and total phosphorous, respectively. In general, the trend is a gradual decrease to no increase. These observations are extremely important as to nutrient delivery from Illinois streams to the Mississippi River and eventually to the Gulf of Mexico. Illinois had been identified as one of the major sources of nutrients to the Gulf of Mexico, and the fact that nutrient delivery from Illinois has not increased and is gradually decreasing is good news not only to Illinois but to the Gulf of Mexico, too.

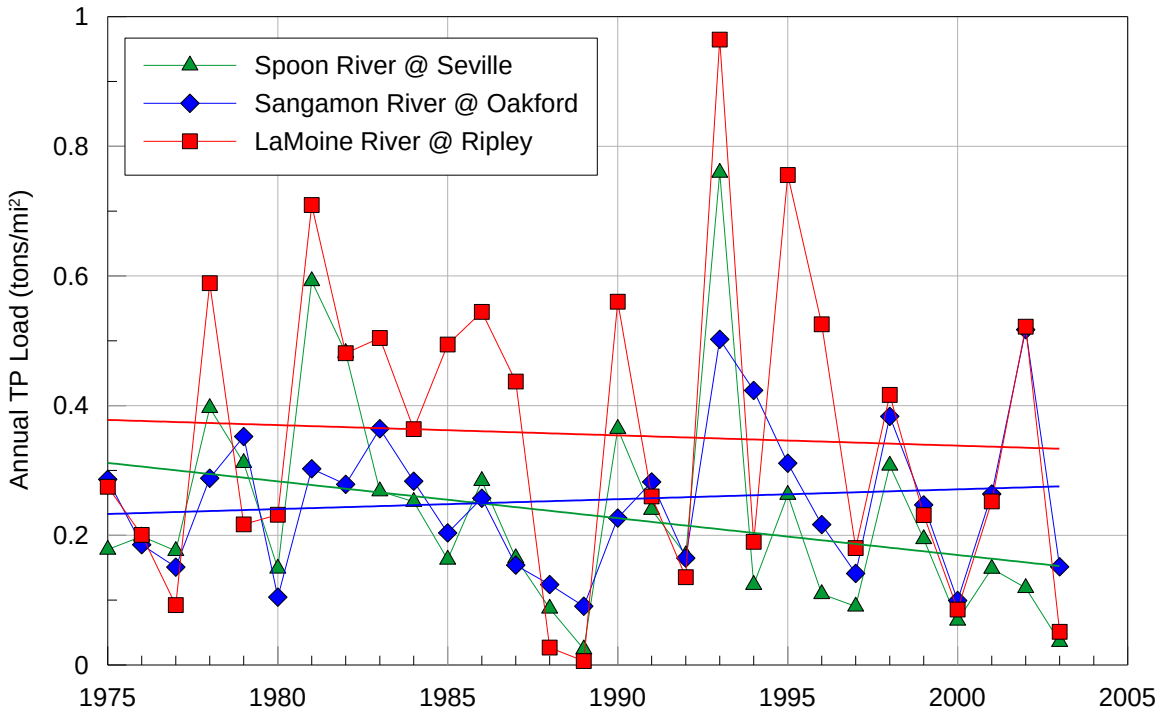


Figure 5-10. Annual total phosphorous loads for the three major tributary watersheds to the Lower Illinois River

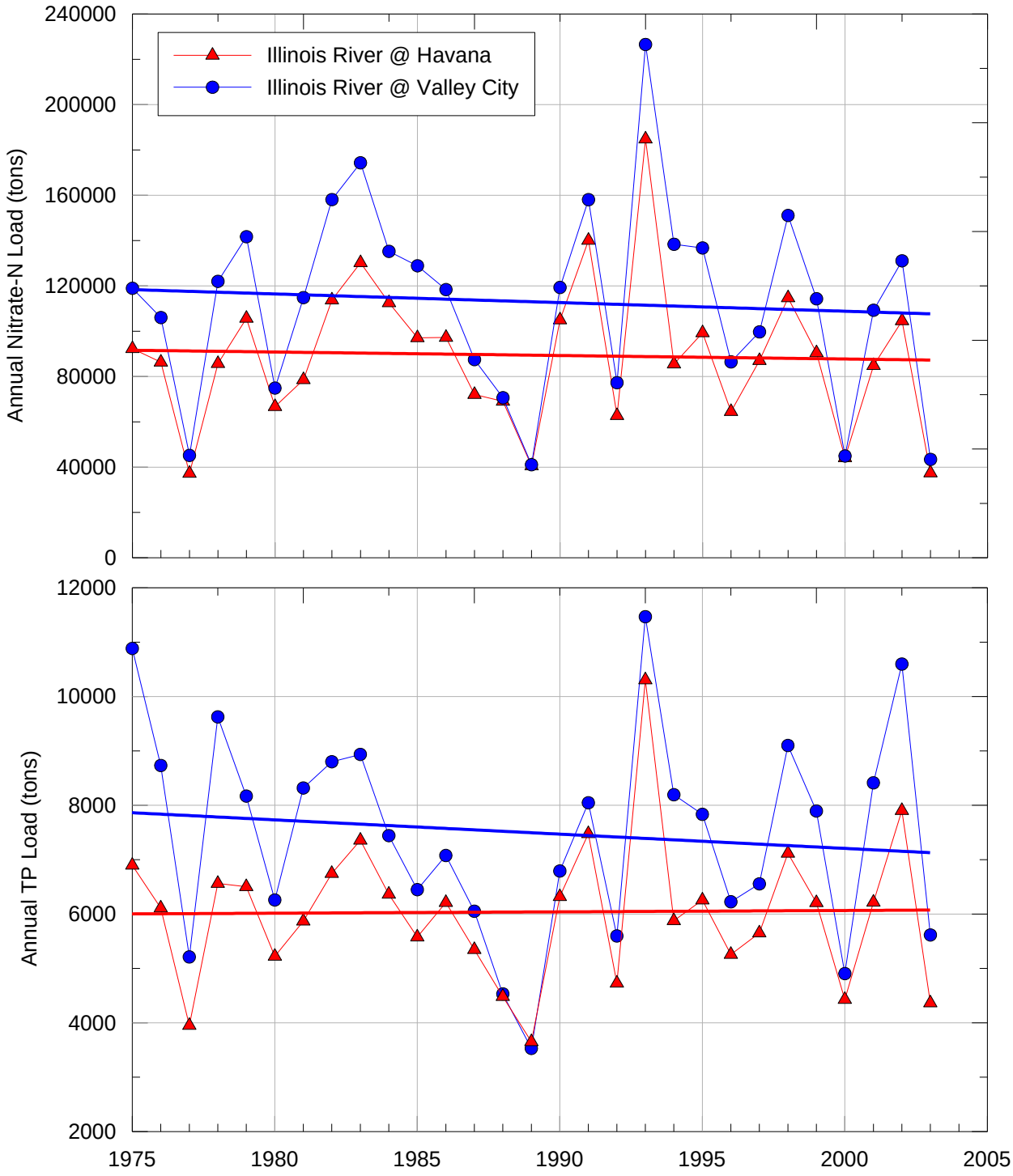


Figure 5-11. Nitrate-N and total phosphorous loads along the Lower Illinois River

6. Summary and Conclusions

As outlined in the Illinois River Basin Restoration Plan, the alternative of no-action in the Illinois River watershed will result in increased sediment delivery to the Illinois River and habitats and ecosystem would continue to degrade. However, recent data indicate that both sediment and nutrient delivery to the Illinois River have either stabilized or decreased as a result of implementation of conservation practices in the watershed. With the knowledge that reduction in sediment delivery from large watersheds takes time to move through the system, the indication of stabilized sediment delivery shows progress is being made in restoring the Illinois River watershed. If the present trends continue for the next 10 to 15 years, sediment and nutrient delivery to the Illinois River will be significantly reduced, and lead to improved ecosystem in the river and tributary watersheds.

7. References

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A Summary of the Illinois Conservation Reserve Enhancement Program Habitat Monitoring Program Pilot Study Summer 2009

Abstract
The Illinois Department of Natural Resources (IDNR) is currently involved in thousands of Conservation Reserve Enhancement Program (CREP) easements. However, no formal monitoring program is in place for monitoring the habitat at CREP easements. Thus, the purpose of this research is to develop and implement a CREP habitat monitoring program. A monitoring program developed for another IDNR program, the Natural Resource Damage Assessment Program (NRDA), will be used as a template (Forrest 2008). Forrest (2008) describes 10 components which should be included in a government restoration project monitoring program. One of those components is adaptive management. When following adaptive management procedures it is advised when implementing a monitoring program that a pilot period be included for testing the feasibility of the proposed monitoring approach and identifying where improvements can be made (Elzinga et al. 1998). As a result of this recommendation a pilot study was conducted of the CREP habitat monitoring program in the summer of 2009 by having Critical Trend Assessment Program (CTAP) botanists evaluate the habitat at a random number of CREP easements. CREP and Soil and Water Conservation District (SWCD) staff attended a few of the site inspections and received some training by CTAP botanists for how to conduct qualitative assessments of the CREP easements. Ultimately, the CREP staff will be able to adapt and implement the monitoring program designed in this research to all of their easements and track the overall success of the program.

Background
A pilot study was utilized for the CREP habitat monitoring program to answer the question: how do you go about monitoring CREP sites for habitat quality? The below information explains the background for the pilot study.
A partnership formed to conduct the pilot study was with the CTAP program, which is sponsored by IDNR and housed at the Illinois Natural History Survey (INHS). CTAP is a long-term habitat monitoring program run by professional scientists who collect statewide data on the following Illinois habitats: forests, wetlands, grasslands, and streams (INHS and IDNR 2001). The monitoring protocols to monitor these attributes are valuable references (see http://ctap.inhs.uiuc.edu/mp/monitoring.asp). The main goal of CTAP is to collect baseline data on the current conditions of the aforementioned habitats and determine how the habitats are changing over time (INHS and IDNR 2001). CTAP has been collecting detailed biological data in 600 randomly selected sites from across the state on both public and private lands since 1997 (INHS and IDNR 2001). The data is then compared to baseline/reference sites, limited to Illinois Nature Preserves or other protected high-quality natural areas (INHS and IDNR 2001). This information is then used to help support efforts to preserve, restore, and manage Illinois habitats (INHS and IDNR 2001). For example, CTAP data can be used to compare to Illinois Natural Areas Inventory (INAI) data. If CTAP staff find that INAI sites are not regenerating oaks as

well as the random CTAP sites, they can help site managers understand what makes this happen: i.e. disturbance (logging disturbance has allowed a better oak/hickory regeneration). Similarly, the CREP program would like to utilize the expertise of the CTAP program to help direct CREP conservation initiatives. When comparing CREP sites with CTAP sites, for example, if CTAP staff finds that CREP sites are not functioning as well, CREP staff can research the causes and determine how to manage the area for better biological and ecological performance. CREP staff can also compare what's going on locally at the CREP practices to CTAP's regional trends, and then make management decisions if areas need improved.

Methods

GPS coordinates were obtained from CTAP staff for the proposed 2009 CTAP sampling sites. As previously mentioned, these sites are randomly selected sites throughout the state of Illinois, occurring on both public and private property. Using ArcGIS software and established shapefiles for all of Illinois CREP easements a GIS query was conducted for CREP easements in a 1km radius of CTAP 2009 sampling sites. The query provided a random number of CREP sampling sites to assess. There were a few gaps in the range of sites as a result of the CREP/CTAP query, for example, there were no sites selected in the North Eastern range, South Central, or North Western range of the Illinois CREP watershed. As a result of these gaps various counties were selected to randomly pick a CREP easement, the sites selected by this process were in the following counties: Iroquois, Knox, and Cass.

In total, 11 sites were selected to assess for the pilot study (Fig 1). There were multiple practices represented at various sites. Therefore, there were a total of 41 practices assessed. Out of the 41 practices there were 10 different practices represented which provided for a good diversity of habitat types, including wetland restoration, riparian forest buffers, and native grass plantings. The size of the sites varied from a total of 11 to 361 acres, with a total of 2,201.61 acres assessed for the pilot study.

These sites were evaluated by conducting a site visit to each site with CTAP botanists. The CTAP botanists documented the vegetation and wildlife present, recorded their general observations of the condition of the project area, and took pictures of the practices (Fig 2 - 4). Before we could access each site, since they were all on private property, IDNR worked with SWCD staff to send out letters to all the prospective landowners of this project.

Next Steps

For the CTAP/CREP pilot study project visual technology and observations were utilized to evaluate the overall habitat quality of the sites by a "snap shot" approach. Research is being conducted to identify specific performance criteria that can be used as a template for various habitat types. Research is also being conducted to identify indicators that signify a particular habitat is not functioning properly. Historical and reference site data will also be collected and compared to the pilot study data collected. As part of the pilot study, CTAP data will be explored and compared to what is going on locally at the CREP practices to CTAP's regional trends. This research will provide the CREP program with the ability to determine whether the CREP easements are delivering the intended resource benefits and if not, which aspect of the practice needs corrective action in order to reach the project objectives.

Conclusions

Currently for evaluating the Illinois CREP program there has been a good effort at monitoring the water quality and sedimentation in the Illinois River Watershed. However, there has not been much research done on the quality of wildlife habitat being provided as a result of the implementation of CREP practices. It is well known and documented that setting aside land that buffers streams and rivers is beneficial for our stream systems. However, it is uncertain what type of habitat quality these set aside lands are providing. In order to help answer this question, monitoring techniques should be used in an adaptive management framework. This allows options to be evaluated and corrective actions to be identified when a project is not progressing toward goals (Kentula 2000; Zedler 2005; Schroeder 2006). The lessons learned should then be publicized so future restoration projects can benefit from the evaluation and acquisition of critical information (Moerke and Lamberti 2004).

Considering the level of challenges to designing and implementing a monitoring program it is important to take things step by step. This research represents the first step, utilizing a pilot study to assess the feasibility of implementing the proposed monitoring program and stating the future course of action. Since this was the first step there are not a lot of definitive conclusions which can be drawn at this time. More information will be realized once the data collected is analyzed and compared to regional trends. More importantly, this plan has served as a starting point for the CREP program staff to implement a long term CREP habitat monitoring program which can advise management of the set aside lands.

Figures.

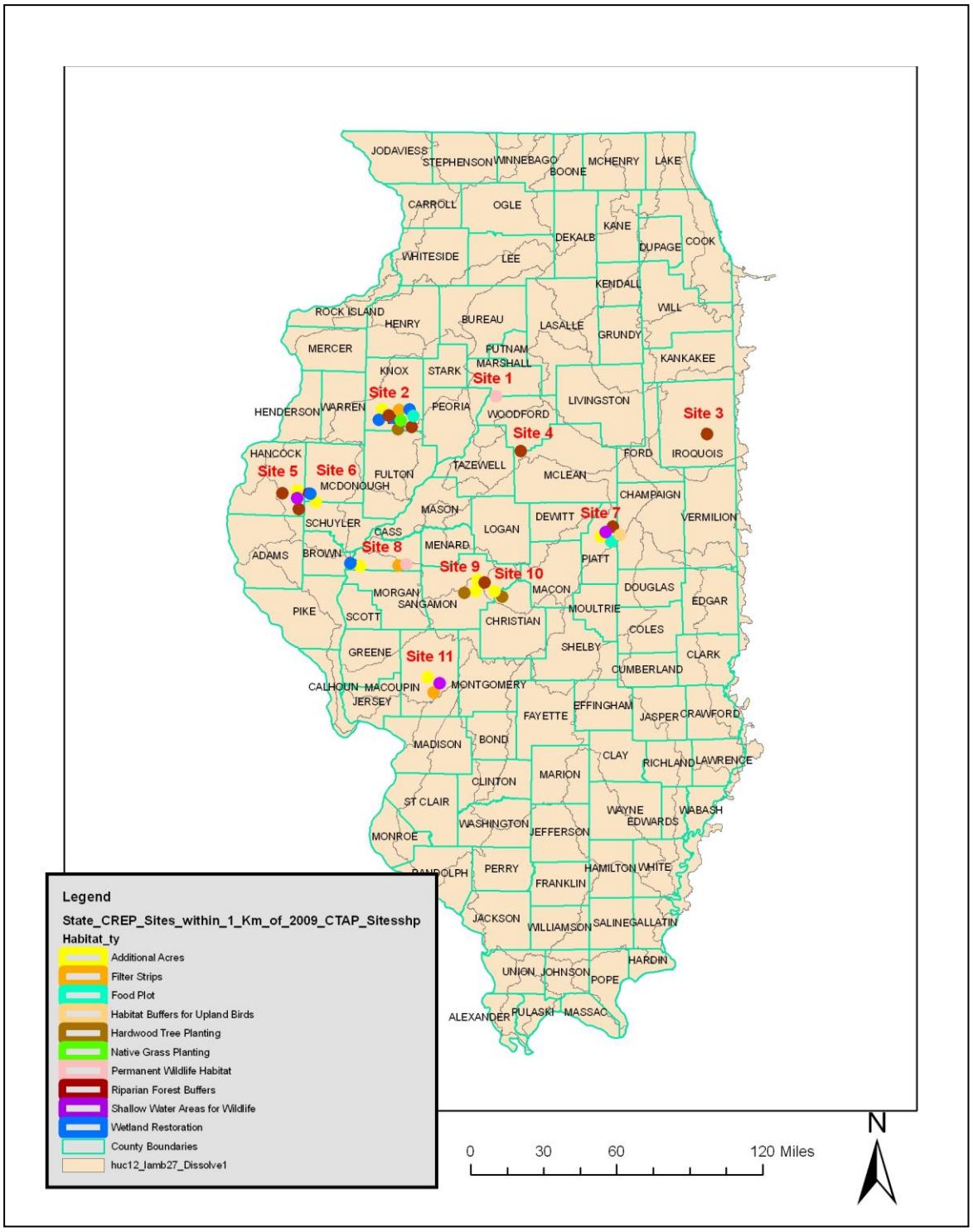

Figure 1. State CREP sites sampled for summer 2009 pilot study.


Figure 2. CTAP biologists assessing vegetation and recording observations.

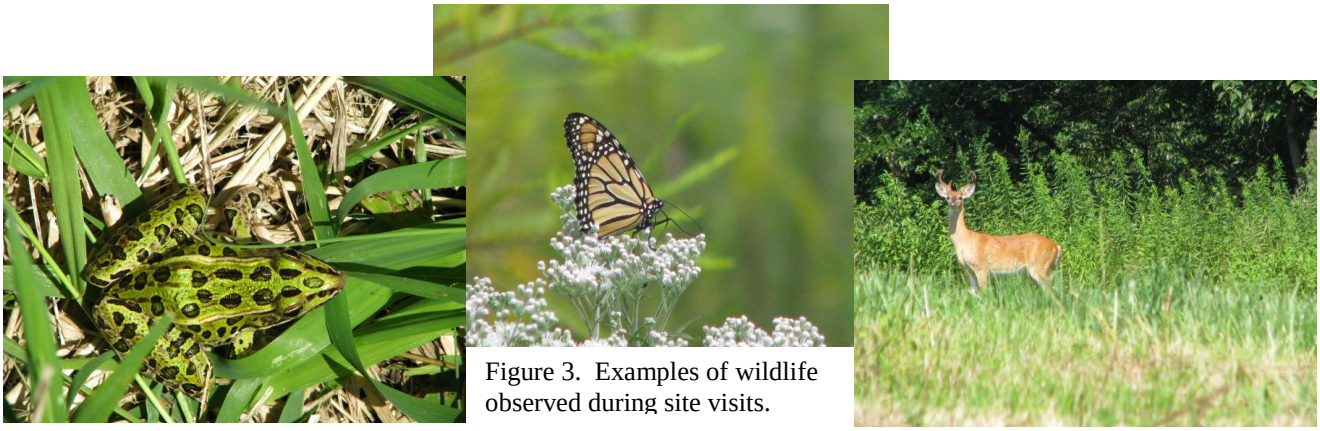

Figure 3. Examples of wildlife observed during site visits.


Figure 4. CTAP biologists and IDNR staff evaluating various CREP practices. For example: a tree planting and a wetland.

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A Summary of the Bellrose Restoration Projects Monitoring Plan

Overview

As suggested in the Conservation Reserve Enhancement Program (CREP) habitat monitoring program pilot study summary, one of the monitoring techniques utilized will be to conduct site visits and use visual technology and observations to evaluate the overall habitat quality of CREP practices. With this approach invasive species can be identified, as well as, documenting the return of desirable species. When appropriate resources are available other quantifiable results can be collected by conducting biological surveys, such as but not limited to: fish, mussel, and vegetation surveys.

Project Descriptions

The Sandra Miller Bellrose Nature Preserve, located in Logan County, Atlanta, Illinois, is approximately 106-acres and is owned by Ron and Sandra Bellrose (Lerczak 2000). The preserve consists of a 0.8-mile segment of Sugar Creek plus adjacent woodlands and fields on both sides (Fig 1). CREP and the Landowner Incentive Program (LIP) cost shared with other state and federal programs (Fig 2) to conduct instream (Fig 3), wetland (Fig 4), forest (Fig 5), and grassland (Fig 6) enhancement projects. These projects combined to create 400 acres that are permanently protected and restored in and around the nature preserve (Fig 2). The projects were implemented in the fall of 2007.

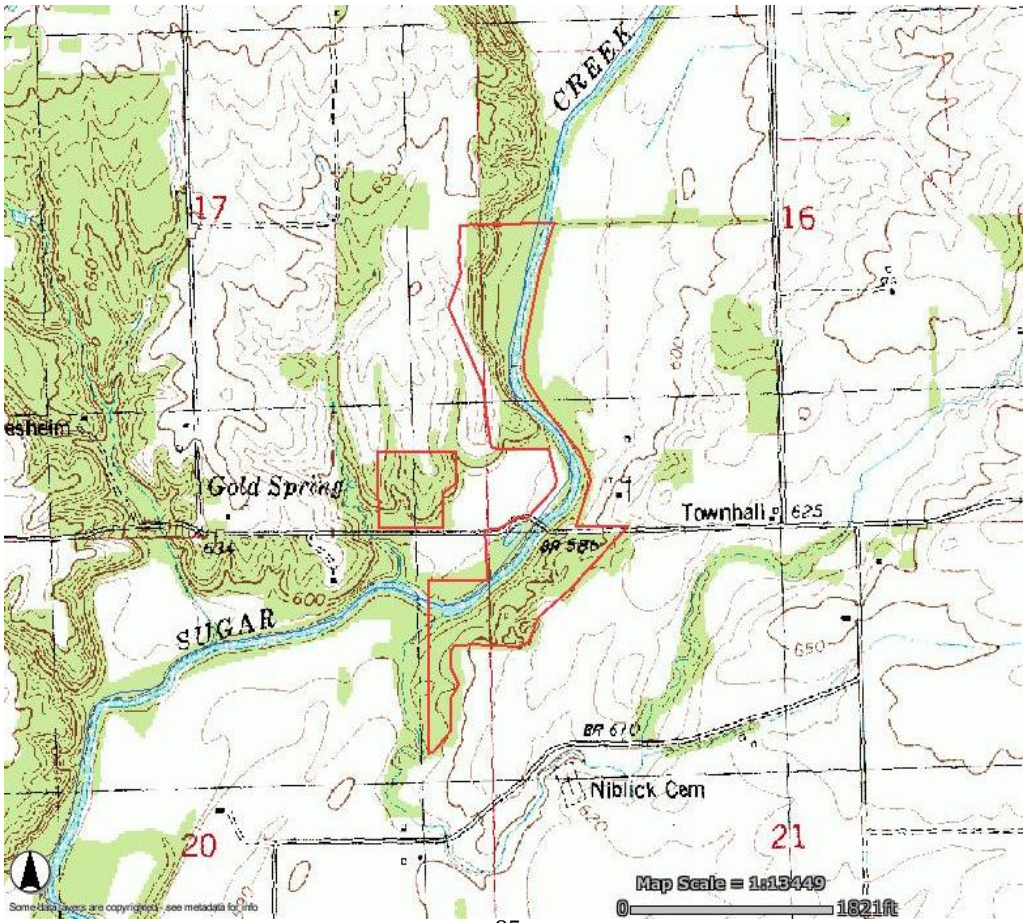


Figure 1. USGS Topographic Map of the Sandra Miller Bellrose Nature Preserve. The Bellrose Nature Preserve is outlined in red. The floodplain habitat of the preserve and Sugar Creek is also illustrated. This map was obtained through WIRT (Wetland Impact Review Tool).

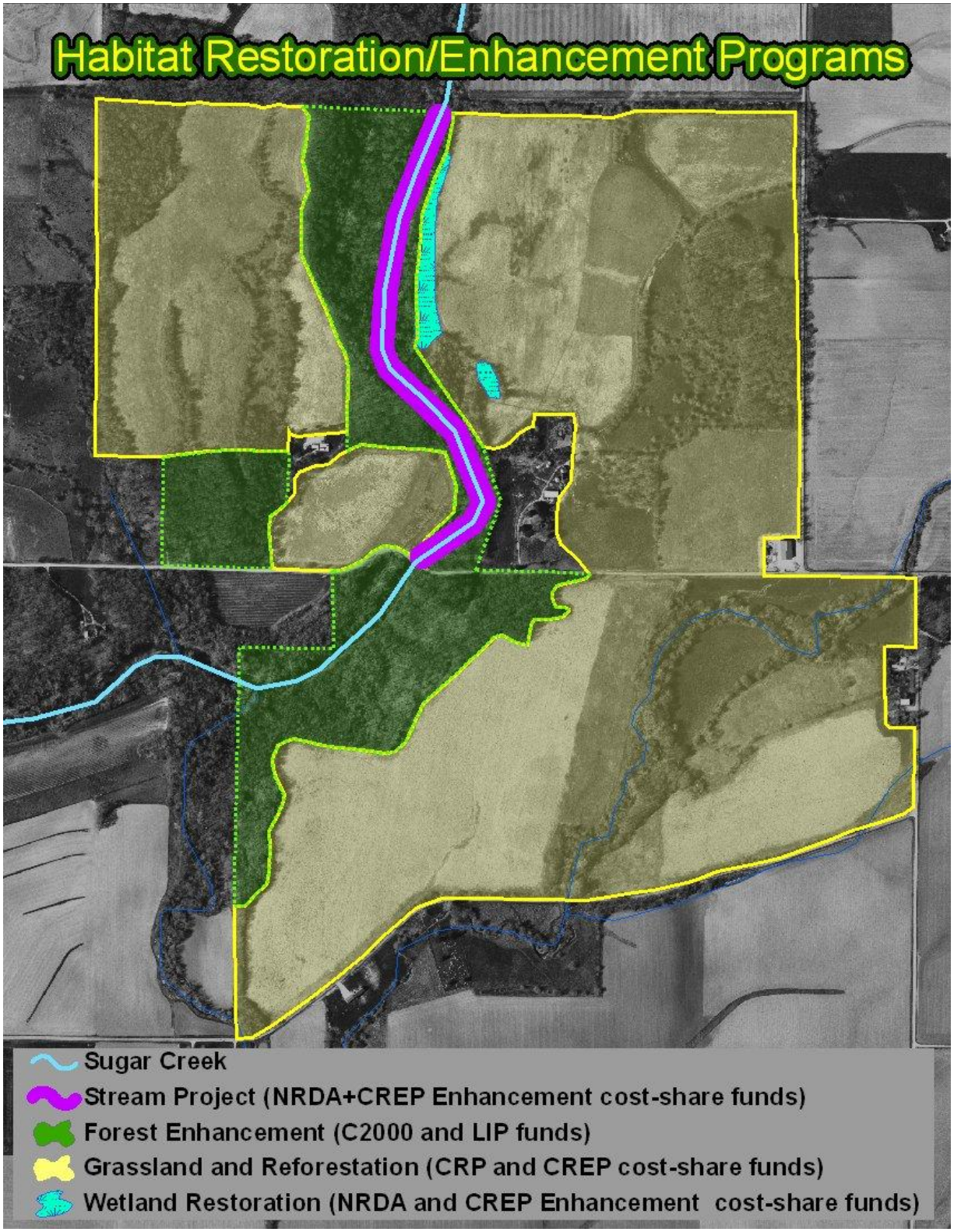


Figure 2. Digital Ortho map of the Sandra Miller Bellrose Nature Preserve (area in green) and proposed restoration projects. This map was obtained from IDNR Office Resource Conservation (ORC).

Figure 3. Instream Restoration Longitudinal Stone Habitat Structure.

Figure 4. Wetland Restoration Project.

Figure 5. Forest Enhancement Project.

Figure 6. Grassland Enhancement Project.

Monitoring Plans

For the Bellrose instream project, the objective was to increase the habitat for aquatic wildlife such as smallmouth bass, mussels, and aquatic insect species such as pollution intolerant and high quality indicator species. For the Bellrose wetland project, the objective was to increase wetland habitat for wetland birds, aquatic and terrestrial insects, and amphibians and reptiles.

For the grassland and forest projects the objective was to improve the habitat's natural quality. To assess whether or not these projects are achieving their desired goals, monitoring has been conducted pre and post restoration implementation. Table 1 illustrates the different types of surveys conducted, by whom, year, and cost. The table also indicates the projected plans for monitoring the projects for a 10 year time period.

Table 1. Monitoring funds spent, allocated, and planned for the restoration projects taking place at the Bellrose Nature Preserve.

Bellrose Monitoring Funds	Calendar Years:	2006	2007 (FY 08)**	2008 (FY 09)	2009 (FY 10)	2010 (FY 11)	2012 (FY 13)	2017 (FY 18)
Instream:	**Conducted By**	**Pre Rest**	**Pre Rest**	**1st year**	**2nd year**	**3rd year**	**5th year**	**10th year**
Bat Survey	IDNR	n/a	$0.00	n/a	n/a	n/a	n/a	n/a
Macroinvertebrate Survey/Identification	IDNR/INHS	n/a	$400 (FY 08)	n/a	$200.00 (FY 10)	n/a	approx $200.00 (FY13)	approx $200.00 (FY18)
Mussel Survey	IDNR	n/a	$0.00	n/a	n/a	$0.00	$0.00	$0.00
Habitat Survey	IDNR	n/a	$0.00	n/a	$0.00	$0.00	$0.00	$0.00
Small Mouth Bass Survey	IDNR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Wetlands:								
Wetland Bird Survey	Bellroses	n/a	n/a	$0.00	$0.00	$0.00	$0.00	$0.00
Water Depth	Bellroses	n/a	n/a	$0.00	$0.00	$0.00	$0.00	$0.00
Vegetation and Hydrological Monitoring	LaGesse & Associates	n/a	n/a	Hydrological actual = $1,640; Vegetation actual: $2,340.00 (FY 09)	revised Hydrological only = $1,160 (FY10)	approx $1,920.00 (FY11)	approx $1,920.00 (FY13)	approx $1,920.00 (FY18)
Insect/Macroinvertebrate Survey	LaGesse & Associates	n/a	n/a	$3,322.50 (Sampling: Fall 08, Spring & Summer 09) (FY 10); ? (Sampling: Fall 09, Spring & Summer 10 (FY 11)			approx $3,322.50 (Sampling: Fall 2011, Spring & Summer 2012 (FY13)	approx $3,322.50 (Sampling: Fall 2016, Spring & Summer 2017 (FY18)
Wetlands, Grassland, and Forest:								
Bird Survey***	IDNR/Bellroses	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Herp Survey	Bellroses	n/a	n/a	$0.00	$0.00	$0.00	$0.00	$0.00
Monitoring funds available:		$11,000.00	$11,000.00	$10,600.00	$6,620.00	$1,937.50	$0.00	$0.00
Monitoring funds implemented:		$0.00	$400.00	$3,980.00	($200 + $1,160 + $3,322.50) = 4,682.5	n/a	n/a	n/a
Monitoring funds allocated:		n/a	n/a	n/a	n/a	n/a	n/a	n/a
Monitoring funds planned:		n/a	n/a	n/a	n/a	(~$1,920.00 + ~$3,322.50) =$5,242.50	($200 + ~$1,920 + ~$3,322.50) = $5,442.5	($200 + ~$1,920 + ~$3,322.50) = $5,442.5
Monitoring funds left over:		$11,000.00	$10,600.00	$6,620.00	$1,937.50	~ - $3,305.00	-$5,442.50	-$5,442.50
Additional Funds required:		$0.00	$0.00	$0.00	$0.00	~$3,305.00*	~$5,442.50*	~$5,442.50*
						Total additional funds required (if all the surveys completed as outlined): $14,190		
Notes:	* After calendar year 2009/FY10 we will need to acquire funds from other sources (such as: Fish and Wildlife Fund) to cover the sampling costs. ** FY = State of Illinois Fiscal Years. *** Bird Survey: The bird counts for the Bellrose NP goes back to 2003.							

Disclaimer: This table does not contain the funds required for the LIP Vegetative Baseline Survey of the woodland enhancement project. The survey was conducted by LaGesse & Associates in the summer of 2007.

Monitoring Summary

To date, IDNR staff have been conducting surveys and collecting the data. For the smallmouth bass fish survey an anticipated increase in larger fish with addition of habitat structures has not been evidenced thus far (Carney 2009). Samples show a declining overall catch rate that went from 22.2 fish per hour in 2006, 53 fish per hour in 2007, 18.8 fish per hour in 2008, to 5.7 fish per hour in 2009 (Carney 2009). The most plausible explanations for the decline in smallmouth bass numbers are unusually high rainfall amounts during the past two reproductive seasons (Figs 7,8,9). IDNR staff will continue to monitor this project annually and we anticipate better results in future years.

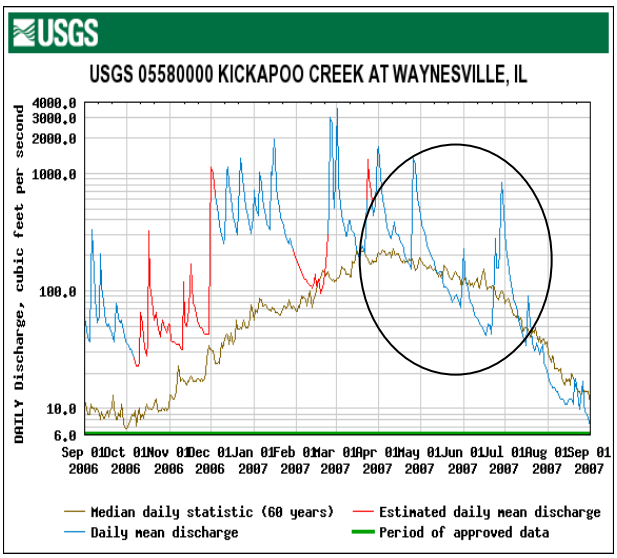


Figure 7. Daily mean discharge (cubic feet per second) in Kickapoo Creek, Waynesville, IL. September 1, 2006 to August 31, 2007.

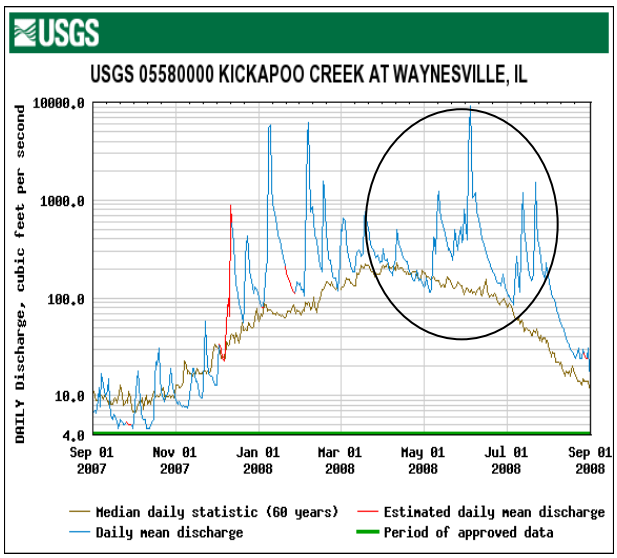


Figure 8. Daily mean discharge (cubic feet per second) in Kickapoo Creek, Waynesville, IL. September 1, 2007 to August 31, 2008.

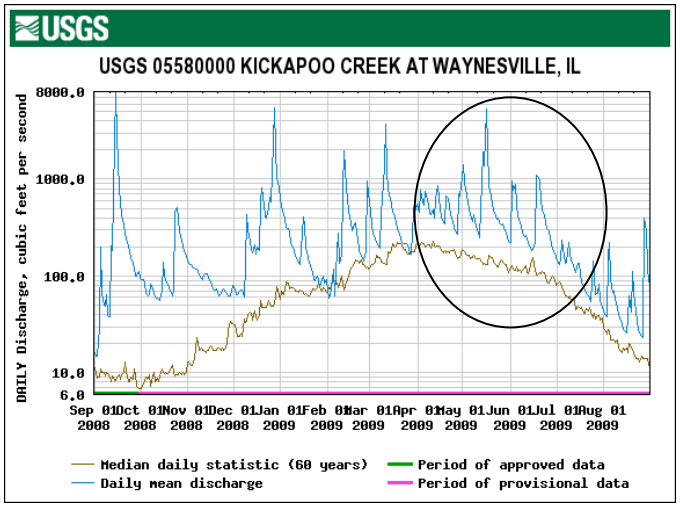


Figure 9. Daily mean discharge (cubic feet per second) in Kickapoo Creek, Waynesville, IL. September 1, 2008 to August 31, 2009.

Similarly, the other instream restoration surveys have been affected by high rainfalls in 2008 and 2009. High instream water levels denied a mussel survey from being completed in 2008 or 2009 and initial aquatic insect observations indicate a lower quality sample collected in 2009 compared to the 2007 pre restoration sample.

For the wetland restoration monitoring, the surveys have not yet been analyzed. However, an initial observation of the vegetation has led to the control of invasive species such as reed canary grass. The vegetation at the wetlands are still developing and we are still trying to manage them for higher quality species, once we get better vegetation established more insects will be in the area which will also attract more wetland wildlife such as birds and herps. Therefore, more results will be realized with future monitoring efforts.

For the grassland and forest enhancement projects the monitoring data has not yet been analyzed. It is anticipated that the vegetation quality of both communities will have increased which will provide better habitat for terrestrial organisms.

Conclusions

This more intensive monitoring approach illustrates the type of information that can be collected when adequate funds and resources are available. The monitoring data generated for the Bellrose restoration projects are preliminary in the scope of the monitoring plan. The plan involves the continuation of monitoring these projects for 10 years post restoration. So far the results have not indicated an increase in the habitat and wildlife quality, which is primarily a result of significant rainfall amounts impacting the instream parameters and a lack of high quality vegetation impacting the wetland parameters. In order to assess the trend of the ecological parameters over time we will continue to monitor the projects. Long-term monitoring data are required in order to properly assess and evaluate changes in watersheds. The monitoring protocol is intended to generate practical information for evaluating project development and implement mid-course corrections when necessary. Ultimately however, the results can be defended in a number of ways, and therefore, in order to be truly accountable, the CREP program will need to learn from the results and make their best efforts to improve the system they are trying to restore.

Overall, this is a great project in the respect of the partnerships formed to conserve and monitor critical habitat. However, the project could not have happened without the dedication and participation of the landowners. In order for the CREP program to be effective we need landowners like Ron and Sandra Bellrose to enroll their property into the program and invest in long term conservation practices. For Ron and Sandra however, the ownership of the projects does not stop there. They have an integral part in the monitoring taking place at their site including bird, herp, and wetland water depth monitoring. This illustrated commitment of the landowners to conservation and monitoring is a driving force behind the success of the Illinois Conservation Reserve Enhancement Program.

References

Carney, Doug. 2009. 2009 Smallmouth Bass Assessment in Sugar Creek, Bellrose Nature Preserve, Logan County, IL. Illinois Department of Natural Resources Memorandum. p. 1-5.

Lerczak, Tom. 2000. Proposal for Dedication of Sandra Miller Bellrose Nature Preserve as an Illinois Nature Preserve. Illinois Nature Preserves Commission. INPC 169 Item 15. p. 1.

2009 Smallmouth Bass Assessment in Sugar Creek, Bellrose Nature Preserve, Logan County, IL

Doug Carney

November 13, 2009

Smallmouth bass habitat enhancement structures were placed in Sugar Creek at the Sandra Miller Bellrose Nature Preserve in November 2007. Habitat structures included eleven boulder clusters, one stone toe protection reach, three longitudinal habitat stone structures and ten woody debris structures. In addition a stone bed key was placed at the downstream end of the project reach to insure protection from streambed degradation that could occur as a result of a knick point originating downstream. Special attention was given to preservation of the aesthetic qualities of this stream reach during the project planning.

Photographs taken in August 2008, nine months after construction, portray the non-intrusive qualities of the habitat structures. Woody debris placement and boulder structures (Fig. 1) mimic those attributes already present prior to the project. The stone toe protection reach (Fig. 2) is adjacent to a pre-existing, rock riffle. The stone bed key was incorporated into the existing riffle (Fig. 2) with special care not to raise the crest elevation. All rock used in this project was glacial rock rather than typical quarry limestone.

The second post-project smallmouth bass survey of Sugar Creek at the Bellrose property was completed on 14 August, 2009. The 2009 sample reach was the same as prior efforts - approximately 3000 feet of channel upstream of the 2400N Bridge. A total of 136 minutes of AC boat electrofishing constituted the sampling effort. Annual baseline samples have been taken in mid-August since 2006 and this year was the second post-project smallmouth bass population assessment. Unfortunately the bass numbers were quite low this year (Fig. 3). The most plausible explanations for the decline in young-of-year smallmouth bass numbers are unusually high rainfall amounts during the past two reproductive seasons and timing of those events (Figs. 4,5,6).

The Illinois State Water Survey reported 23.3 inches of precipitation at Lincoln from May through August of 2008 and 17.5 inches for that period in 2009. There were series of heavy rain events in the area during the smallmouth bass reproductive period from May through July before a dry period in August (Fig. 5).

Our samples produced approximately 30 YOY in 2008 and 8 YOY in 2009, compared to about 70 YOY in 2007 when only 10.9 inches of precipitation were recorded during the reproductive season. There were no major rain events from May 1 until late July 2007 (Fig. 7). Our samples show a declining overall catch rate that went from 53 fish per hour in 2007 to 18.8 fish per hour in 2008. The 2009 sample yielded only 5.7 smallmouth bass per hour. The two largest fish were 13.7 and 14 inches total length, each weighing 1.3 pounds. The 1+ year class was represented by only 3 fish (Fig. 3), a poor showing but not a complete surprise due to relatively poor reproduction in 2008. An anticipated increase in larger fish with addition of habitat structures has not been evidenced to date.

We will continue to monitor this project annually and we anticipate better results future years.

Figure 1. Woody structure (left) and boulder clusters (center) nine months after placement.

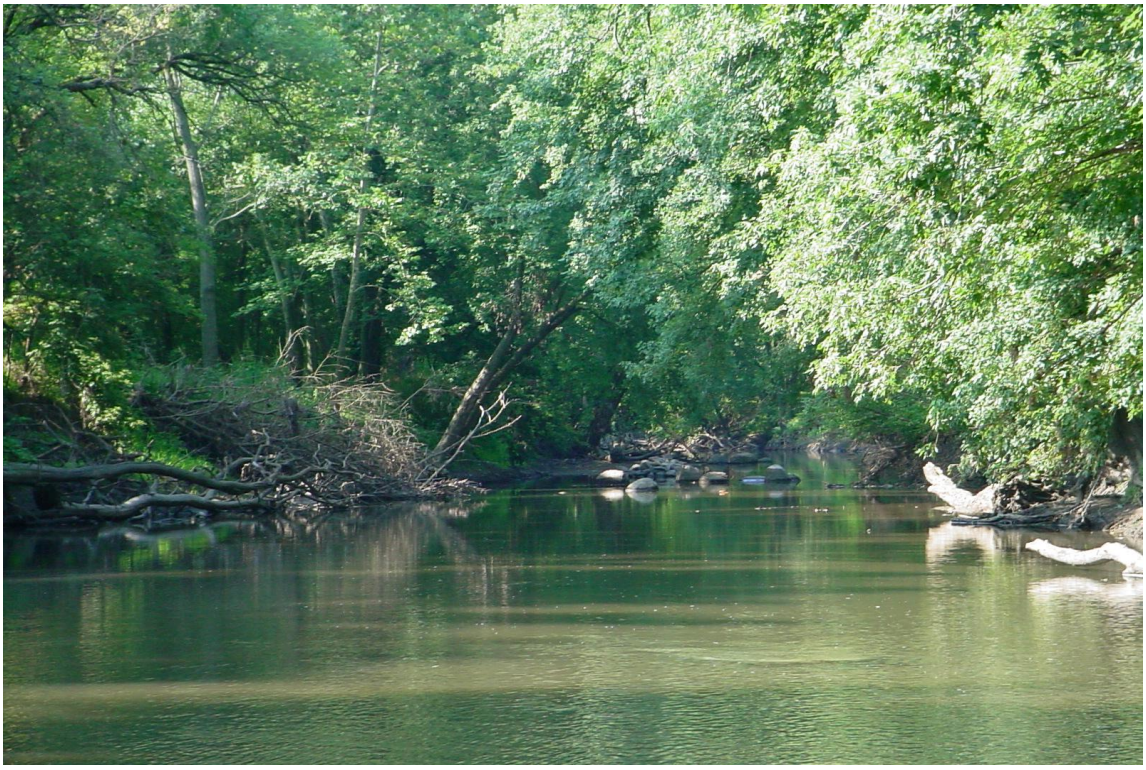


Figure 2. Longitudinal peaked stone toe protection (right), riffle and submerged stone key (center) in Sugar Creek nine months after placement.

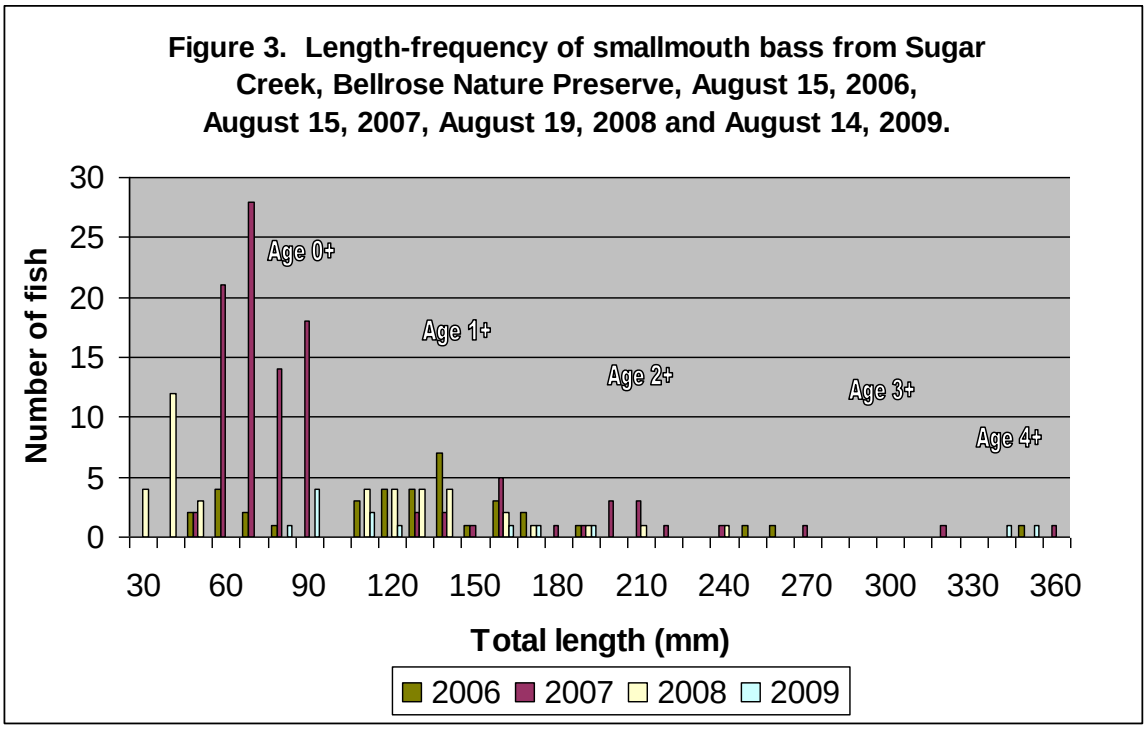


Figure 4. Longitudinal peaked stone toe protection and submerged riffle in high water on May 21, 2009.

Figure 5. Daily mean discharge (cubic feet per second) in Kickapoo Creek, Waynesville, IL September 1, 2008 to August 31, 2009.

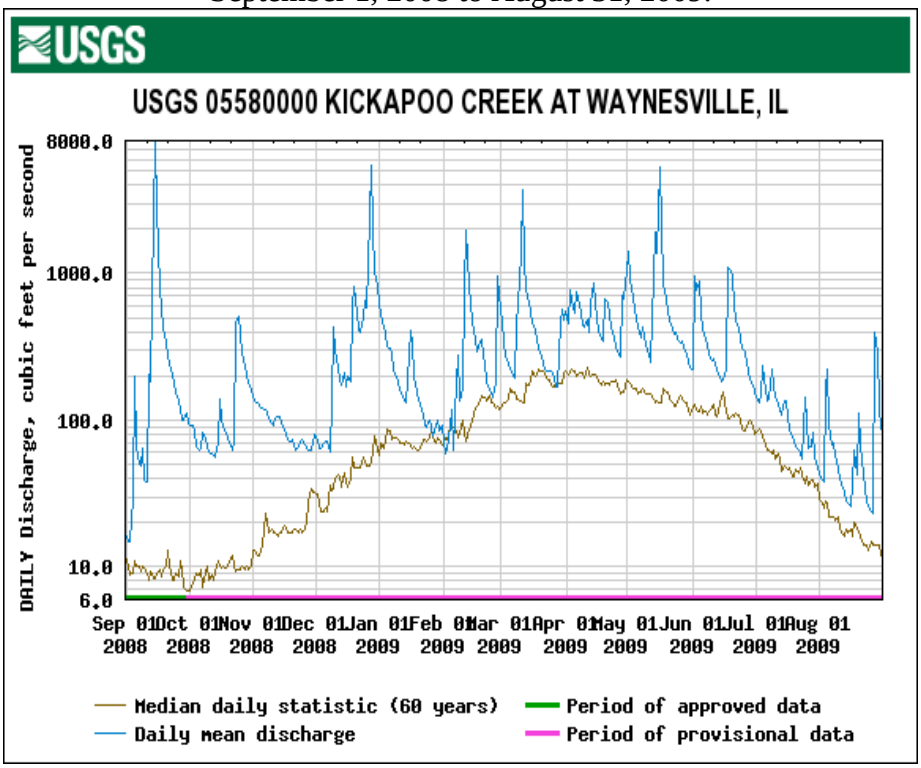


Figure 6. Daily mean discharge (cubic feet per second) in Kickapoo Creek, Waynesville, IL September 1, 2007 to August 31, 2008.

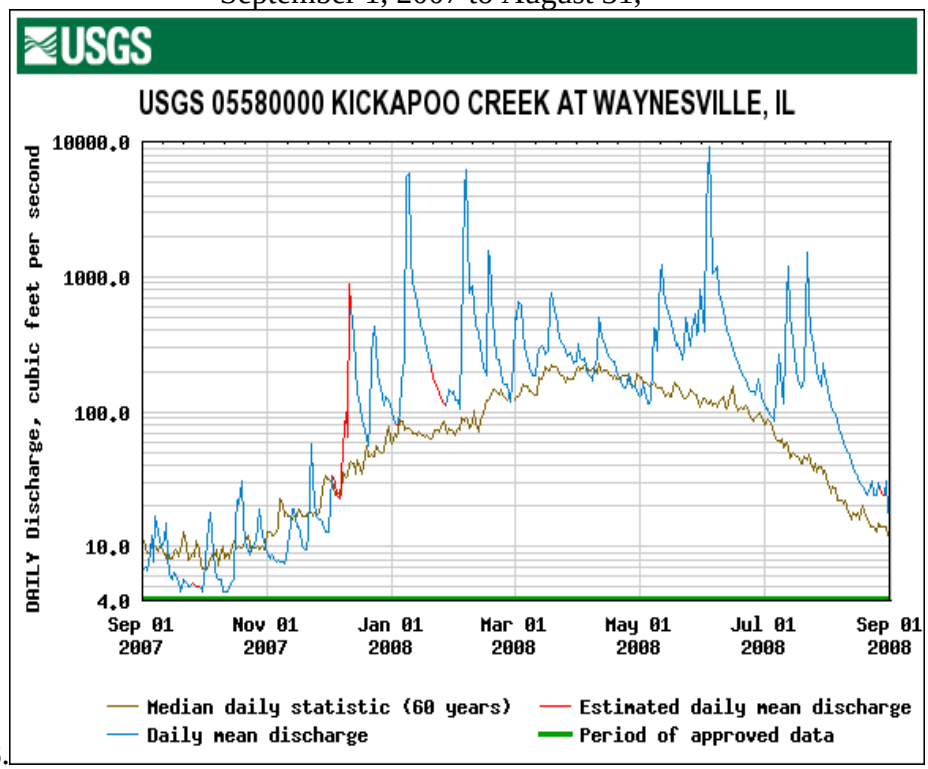
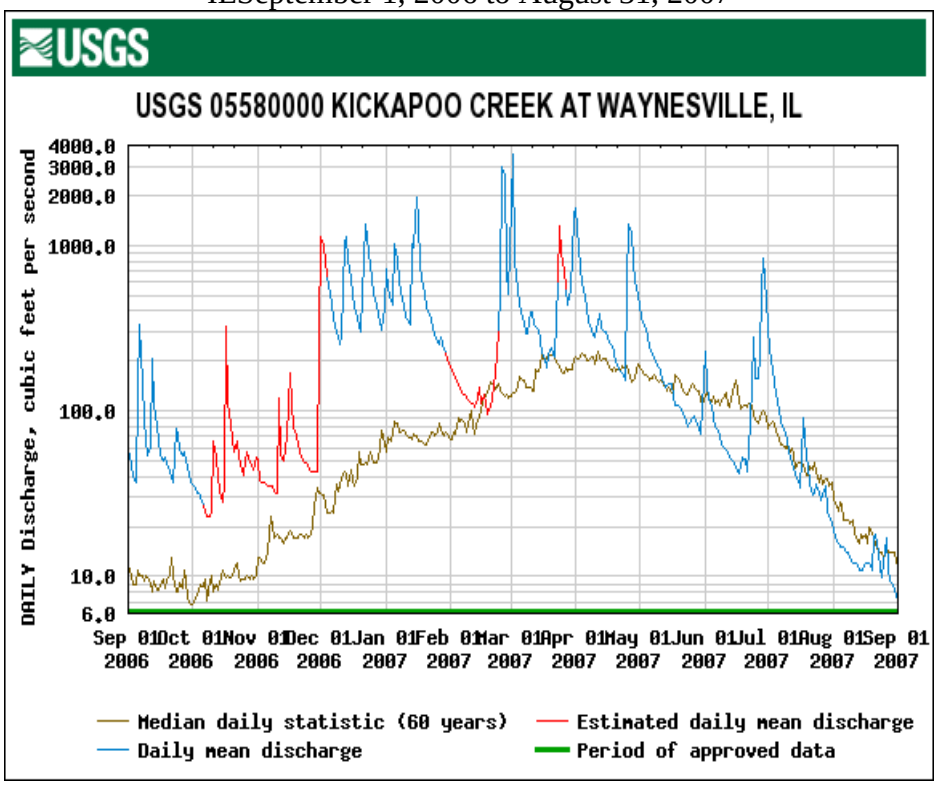


Figure 7. Daily mean discharge (cubic feet per second) in Kickapoo Creek, Waynesville, ILSeptember 1, 2006 to August 31, 2007



Excerpts from State Wildlife Grants on the Illinois River

PROJECT TITLE: Hennepin and Hopper Lakes Wetland Restoration and Research Project

PURPOSE:

The purpose of this project is to conduct research on how best to manage wetland invasive species *in the early stages of large-scale wetland restorations*. Our goal is to determine effective strategies to put large-scale restorations on a trajectory leading to the development of a biologically diverse native wetland. We will evaluate different strategies for controlling the spread of seven invasive species: cattails (*Typha latifolia, T. angustifolia*, and *T. x* hybrid), common reed grass (*Phragmites australis*), sandbar willow (*Salix interior*), purple loosestrife (*Lythrum salicaria*), and reed canary grass (*Phalaris arundinacea*). The results of this investigation can then be applied to the remaining wetlands on the Hennepin site. The results will also be published in a peer-reviewed journal.

PROJECT TITLE: Establishment of historic fish communities to restored Illinois River floodplain lakes

PURPOSE:

Currently, The Wetlands Initiative and The Nature Conservancy of Illinois are restoring three large floodplain sites along the Illinois River (Hennepin-Hopper Lake system (Putnam County), Emiquon (Fulton County), and Spunky Bottoms (Brown County)) (Figs 1-8).

These areas were once a part of some of the most productive and rich bottomlands in North America. Total area of wetlands to be restored will be over 4,000 acres and the areas will be among the highest quality aquatic communities in the Illinois River valley. The combination of size and location makes these three sites critical to the conservation of the fauna and flora of the river valley.

The purpose of this project is to introduce 4-6 native fish species to each of these areas along the Illinois River as part of the restoration of the aquatic communities. In addition to the established of native species, the project will also provide valuable research and educational opportunities.

PROJECT TITLE: Strategies for recovery of an amphibian and a reptile inhabiting sand areas in Mason and Tazewell Counties

PURPOSE:

This work will result in quantitative estimates of abundance, demography, distribution, and genetic structure for both species in the project area (Fig. 1). These data will allow modeling of long-term viability for both species, allowing conservation efforts to be focused where they are most needed and where they are most likely to succeed. Management strategies can be targeted at specific needs rather than randomly applied. For example, the Farmland and Prairie Action Item 3.b. in The Plan: "reintroduce native species into prairie habitat where decimating factors have been eliminated and natural recovery is unlikely" will benefit from the results of this project by guiding these introductions efforts. As new prairie areas are restored or created in the Illinois River Sand Areas, they will need to be evaluated for suitability of habitat for the two target species. If suitable habitats are created or restored, the probability of natural colonization can be estimated from the results of this research by using our estimates of distances moved, habitat requirements, and current locations of populations. When re-colonization probabilities are low, introduction approaches can be considered, and the results of this research will also provide guidance for these introductions. For example, the geographic distribution of genetic variation within and among populations can provide the basis for decisions on where potential release animals should be obtained. Our estimates of demographic parameters will provide answers to questions concerning how many individuals and what life stage should be released at each new site. The results of this study will be applicable for the target species for at least the term of the current Wildlife Action Plan (50 yrs). The strategies suggested by this research should be evaluated at regular intervals using data from monitoring of any reintroduced populations. Moreover, the results of this study will provide a general framework that can be applied to other species occupying sandy habitats. The viability modeling discussed above can be applied to these species if the appropriate life history data are collected in the future. These include species such as the glass lizard (*Ophisaurus attenuatus*), the ornate box turtle (*Terrapene carolina*), the western hognose snake (*Heterodon nasicus*), and the six-lined racerunner (*Cnemidophorus sexlineatus*).

PROJECT TITLE: Hill Prairie/Bluff Habitat Restoration

PURPOSE:

The expected results will be a significant increase in the amount of actual hill prairie habitat in the target project area which includes approximately 20 counties. through active management and restoration we aim to maintain and expand current hill prairie acreage and enhance habitat quality on approximately 40-50 target sites, and increase the size of these areas on average by 20- 25%. The expansion of habitat should also lead to an increase in populations of the species found at these sites which include over 20 species listed in the IWAP as species in greatest need of conservation (SGNC). The areas targeted also include many high quality natural areas that are among the highest diversity prairies remaining in "The Prairie State." Management actions on

these sites will help to preserve the diversity that is currently threatened by exotic and invasive species encroachment and general lack of management. We also believe that a substantial focus on these community types, especially on private lands, will increase public awareness of, and appreciation for hill prairie and bluff habitats. Additional educational efforts through this project will support this objective.

In addition to specific species benefits, the project addresses the following parts of the IWAP: Actions 1, 2, 3, and 7 of the Farmland/Prairie Campaign; Actions 1 and 4 of the Forest Campaign; Actions 3 and 4 of the Invasive Species Campaign; Actions 1-4 of the Land and Water Stewardship Campaign; and specific management guidelines for the natural divisions involved in the project (IDNR, 2005).

The Illinois Natural Areas Inventory determined that less than one percent of the original natural habitat prior to Euro-American settlement still existed in 1978, and the remaining hill prairies are a special example of our natural heritage (White, 1978). Today a combination of factors has led to the rapid decline in the amount and size of the remaining hill prairies. By losing these last pieces of native prairie, we continue to erode away our natural biological resources from an already greatly diminished presence. Hill prairies are not only sources of rare native plants, but they support many endangered or threatened species. They also support many economically important species such as deer, turkey and other upland game. In addition, they offer outstanding opportunities for wildlife watching and general nature study. They hold the soil on the steep terrain, preventing it from settling in places where it is a liability. Under proper management they can serve as pastures like was done in the past. They are significant in historical terms both to recent generations and in their ancient relationship with Native Americans.

PROJECT TITLE: Redspotted Sunfish (*Lepomis miniatus*) reintroduction to Illinois sites of historical distribution.

PURPOSE:

The redspotted sunfish is a Threatened species in Illinois. Targeted surveys over the past three years, funded largely by State Wildlife Grant T-14-P1, have confirmed the dire status of this species in the state. Based on this survey information, the redspotted sunfish is now being proposed for Endangered status as results showed continued decline in recent years. In fact, only two distinct populations with significant numbers of individuals and multiple year classes present were found in the effort.

At several backwater lakes along the Ohio River in southeast Illinois, the redspotted sunfish appeared to be maintaining sizable populations as recent as the 1980's (Burr and Warren 1987). However, our most recent sampling of these lakes indicate the species and its preferred habitat of aquatic vegetation to be absent or only present in very low numbers. In fact, the Cypress Ditch population was the only population throughout southern Illinois we found to be stable.
The situation is similar in west-central Illinois, which was once the species' stronghold in Illinois

waters. The redspotted sunfish is believed to be gone from the mainstem Illinois River. The species appears to rely heavily on habitats with significant stands of aquatic vegetation, and this type of habitat has been eliminated in these waters. The distribution of the redspotted sunfish in this part of the state is now restricted to a couple of small tributaries close to the Illinois River in the Sangamon River basin. A recently-discovered population in Fish Creek was the only population found in west-central Illinois to have significant numbers of individuals across multiple year classes.

These remnant populations are undoubtedly extremely vulnerable to anthropogenic disturbances. Immediate efforts to increase the distribution of the redspotted sunfish is necessary to avoid extirpation and maintain genetic viability of the species in Illinois waters. Genetic analyses of these remnant populations (T-14-P1) support propagation of the remaining individuals as a viable option. Although numbers are low, genetic variability within the populations is still substantial.

Offspring produced through captive propagation of Fish Creek individuals can be used to reintroduce the species and establish populations in restored backwater lakes of the Illinois River.

The Emiquon Nature Preserve near Havana, Illinois will be the primary target for reintroduction efforts, as this isolated backwater lake possesses the necessary habitat of aquatic vegetation essential to successful establishment of the redspotted sunfish. Reintroduction of this species coincides well with management strategies at the site also. Emiquon is currently at 500 acres of surface water, but is projected to increase to a size of 2500 acres as the water table rises in the near future.

Other possible reintroduction sites at the restored backwater lakes of Hennepin-Hopper and Spunky Bottoms need to be scrutinized closely in the coming years with regards to degrading habitat quality caused by common carp. Other area lakes being managed by IDNR biologists with ideal habitat have been proposed, but will require administrative approval prior to stocking.

PROJECT TITLE: Habitat Conservation Initiative for the Illinois Chorus Frog (*Pseudacris streckeri illinoensis*): Phase I

PURPOSE:

Illinois Chorus Frogs (*Pseudacris illinoensis*) occur in west-central and southwestern Illinois, southeastern Missouri, and northeastern Arkansas. They are listed as a Species of Special Concern in all three states and threatened in one (IL). The Illinois Chorus Frog is a habitat specialist, requiring fine, sandy soils for aestivation and ephemeral (seasonally flooded) wetlands or fishless ponds for reproduction. Suitable conditions are limited geologically to those areas represented by the species' range and distributed patchily within it.
Habitat loss is a serious threat to this species throughout its range (Trauth et al. 2006, Missouri Department of Conservation 2000, Herkert 1992). Detrimental changes can occur at both large

and small spatial scales. For example, Trauth et al. (2006) documented a recent range contraction of 61% in Arkansas when drought exacerbated widespread destruction of wetlands by precision land leveling for agricultural production.

Illinois' Wildlife Action Plan (Illinois Department of Natural Resources 2005; p. 143) lists the Illinois Chorus Frog as a Critical Species for the Illinois River and Mississippi River Sand Areas Natural Division. Habitat goals for this region (p. 75) include restoring and managing >6 areas (of 300–500 acres each) of ephemeral wetlands and accompanying upland habitats. Recent studies supported by a State Wildlife Grant (e.g., No. T-42-R; Strategies for recovery of amphibians and reptiles inhabiting sand areas in Mason and Tazewell counties) and experience with habitat projects to benefit this species [e.g., State Wildlife Grant T-28-M (Public Lands Native Wildlife Habitat Restoration Project - Job 12); USFWS Landowner Incentive Program] suggest that successful conservation strategies for the Illinois Chorus Frog must include enhancement and protection of small parcels as well as larger, more continuous ones.

Past efforts have allowed us to identify critical habitats and effective tools for conserving them. Most (84%) sites that are considered important for conservation of Illinois Chorus Frogs occur on private lands (Taubert et al. 1982). Therefore, we will use a 2-pronged approach that includes improvement of critical habitats on public lands but focuses on long-term protection of these habitats on private lands.

A Decade of Changes in the Illinois River Watershed

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has."

- Margaret Mead

This document produced by

USDA NRCS

United States Department of Agriculture

Natural Resources Conservation Service

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

October 2009

This document was produced in a joint effort between the Illinois Environmental Protection Agency (IEPA) and the United States Department of Agriculture-Natural Resources Conservation Service (USDA NRCS). Contributing agencies and organizations are listed in the appendix. While these groups submitted considerable documentation, this piece highlights only a portion. For more information on these and other projects and activities, refer to the agencies listed with their web sites on page A-9.

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David King (#5)

Final revision 10/23/09

From "A River Through Illinois" by
Daniel Overturf and Gary Marx

Table of Contents

Note: The contents in this document refer to past and current projects. As partnerships continue their work, this document may be updated in the future.

"A river is more than an amenity. It is a treasure. It offers a necessity of life that must be rationed among those who have power over it."

- former Supreme Court Justice Oliver Wendell Holmes

From "A River Through Illinois" by Daniel Overturf and Gary Marx

Photo contributed by Illinois State Water Survey

Introduction

The Illinois River and its watershed represent a complex system, an interrelationship of flora, fauna, people, places, agriculture and industry, recreation and commerce.

The year 2009 marks the twelfth biennial Governor's Conference on the Management of the Illinois River System. From the beginning in 1987, conference planners took a systems approach. The focus encompassed activities and issues on, in and around the river. This document is being issued in conjunction with this conference.

The water that flows through the Illinois River Watershed and down across the state carries a legacy throughout its journey. Upstream activities, all the way from the Atlantic Ocean through the Great Lakes, have downstream impacts to the Mississippi River and beyond to the Gulf of Mexico. Nonpoint source pollution, particularly the problem of sediment filling the river, argues for a comprehensive management approach that reaches well beyond the shorelines. Invasive species, whether zebra mussels or Asian carp, don't respect political boundaries.

Over the past twenty years, the conferences have brought together a wide range of water-related interests – people representing a variety of backgrounds, agencies and organizations at local, state and federal levels. Among the major, long-term benefits have been the partnerships that have developed to address priority projects, whether highly erodible sites, polluted places, degraded habitat or deteriorating infrastructure.

In 1997, the Integrated Management Plan for the Illinois River Watershed was developed and guided programs and activities that have been completed and planned. This document highlights some of the partnerships and projects that serve as models for the future. Changes continue to occur. The challenge in a dynamic system is to work together towards continuing improvement.

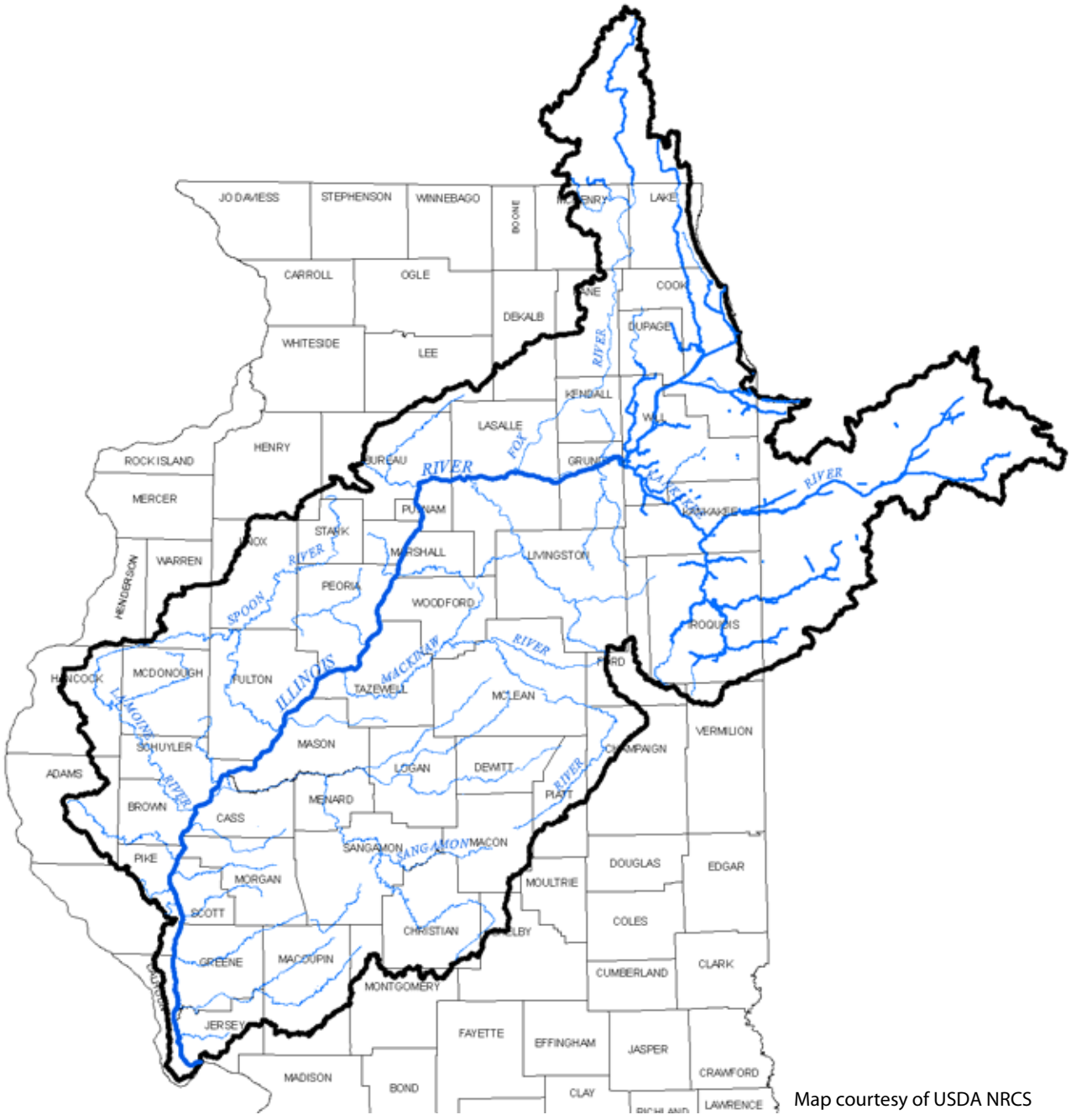
Photo contributed by Illinois State Water Survey

The Illinois River Watershed

A watershed is the area of land where all of the water that is under or drains off goes into the same place. John Wesley Powell (1834-1902), geologist, anthropologist and scientific explorer, put it well when he described a watershed as "that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community."

Powell, whose family moved to Illinois in 1851, explored not only the Illinois River, but also the Mississippi, the Ohio and the Des Moines. After the Civil War, he taught at Illinois Wesleyan University and Illinois State Normal University prior to his famed exploration of the Colorado River.

The Illinois River Watershed covers 18,500,000 acres, mostly in Illinois, but also reaches into Indiana and Wisconsin. The dark line in the map below outlines the watershed. Nearly 95 percent of the urban areas of Illinois lie in this watershed, as well as 46 percent of the state's agricultural land, 28 percent of its forests, and 37 percent of its surface waters and streams. The blue lines represent the creeks, streams and rivers that flow into the Illinois River as they drain the watershed. Throughout this document, we will highlight just a few activities taking place in the river, along the river, and beyond the river. All these activities have an effect on the health of the watershed and our lives.



Map courtesy of USDA NRCS

Overview

Over time we have learned how our activities throughout the watershed have affected the health of its land, water, wildlife, and people. It's in everyone's best interest to help in any way possible: from recycling to reduced water consumption, from proper farming techniques to lawn care, from reduced energy consumption to proper operation and maintenance of vehicles and boats. We must handle hazardous chemicals through specified locations for proper disposal. If each individual and company would adopt simple river friendly practices, the Illinois River Watershed can remain the jewel of Illinois.

This document contains stories of the current efforts as well as plans for continuing commitment of partners working to protect the Illinois River Watershed. In 1997, the Integrated Management Plan for the Illinois River Watershed of the Illinois River Watershed was developed and has guided these efforts. The partnership stories reflect only some of the efforts happening in the watershed today.

From "A River Through Illinois" by Daniel Overturf and Gary Marx

A Little History

Since 1872, the river has been manipulated to accommodate a growing human population. In 1899, a commercial fish harvest was 241,000 pounds of channel catfish: by 1964 only 94,000 pounds could be caught. A river once home for 49 different aquatic species was reduced to 24 by 1969. Levees and drainage districts removed half the floodplains. In 1944, biologist Frank Bellrose recorded more than 3.6 million mallards during their fall migration. By the 1950's, the duck population had decreased by 90 percent.

In 1900, in order to divert untreated waste water from Lake Michigan, Chicago began sending it down the Illinois River. Serious environmental problems soon resulted. Many native aquatic species have disappeared. More recently, invasive species, such as the zebra mussel, have made their way down the river, while Asian carp have moved in from the south.

Water quality was degrading as silt and other pollutants filled the river channels and backwaters. The increased run-off from urban and agricultural areas entered the river when the floodplains were leveed, creeks channelized and wetlands filled. Locks and dams installed to maintain depth led to increases in barge frequency and larger ships. To maintain the multi-million-dollar commercial industry that travels the Illinois River, expensive dredging was regularly needed. As aquatic and wildlife habitats dwindled, so did tourism and recreational activities.

Data excerpts from *The Illinois Steward, 2002*

From "A River Through Illinois" by Daniel Overturf and Gary Marx

From "Life Along the Illinois River", David Zalaznik

Recreation

The Illinois River has many recreational areas for visitors who enjoy the river's multitude of outdoor fun and adventures.

From "Life Along the Illinois River", David Zalaznik

Climbers in Starved Rock State Park

From "Life Along the Illinois River", David Zalaznik

Kayaking the icy Illinois River

From "Life Along the Illinois River", David Zalaznik

Hunting Asian carp

Photo contributed by Illinois State Water Survey

Boaters in Peoria

From "A River Through Illinois" by Daniel Overturf and Gary Marx

Brent Millinger hunting at Sawmill Lake

From "A River Through Illinois" by Daniel Overturf and Gary Marx

Hughes and Rounds fishing in I&M Canal, Morris

The River

The river has been the lifeline for people and wildlife over thousands of years. Once part of the ancient Mississippi, the Illinois River has been called the highway through Illinois. Agriculture, commercial shippers and others use and rely on the river to haul goods from Lake Michigan to the Mississippi, and from there to the world. To keep this highway open and functioning properly, river management requires understanding and cooperation. Partnerships are essential.

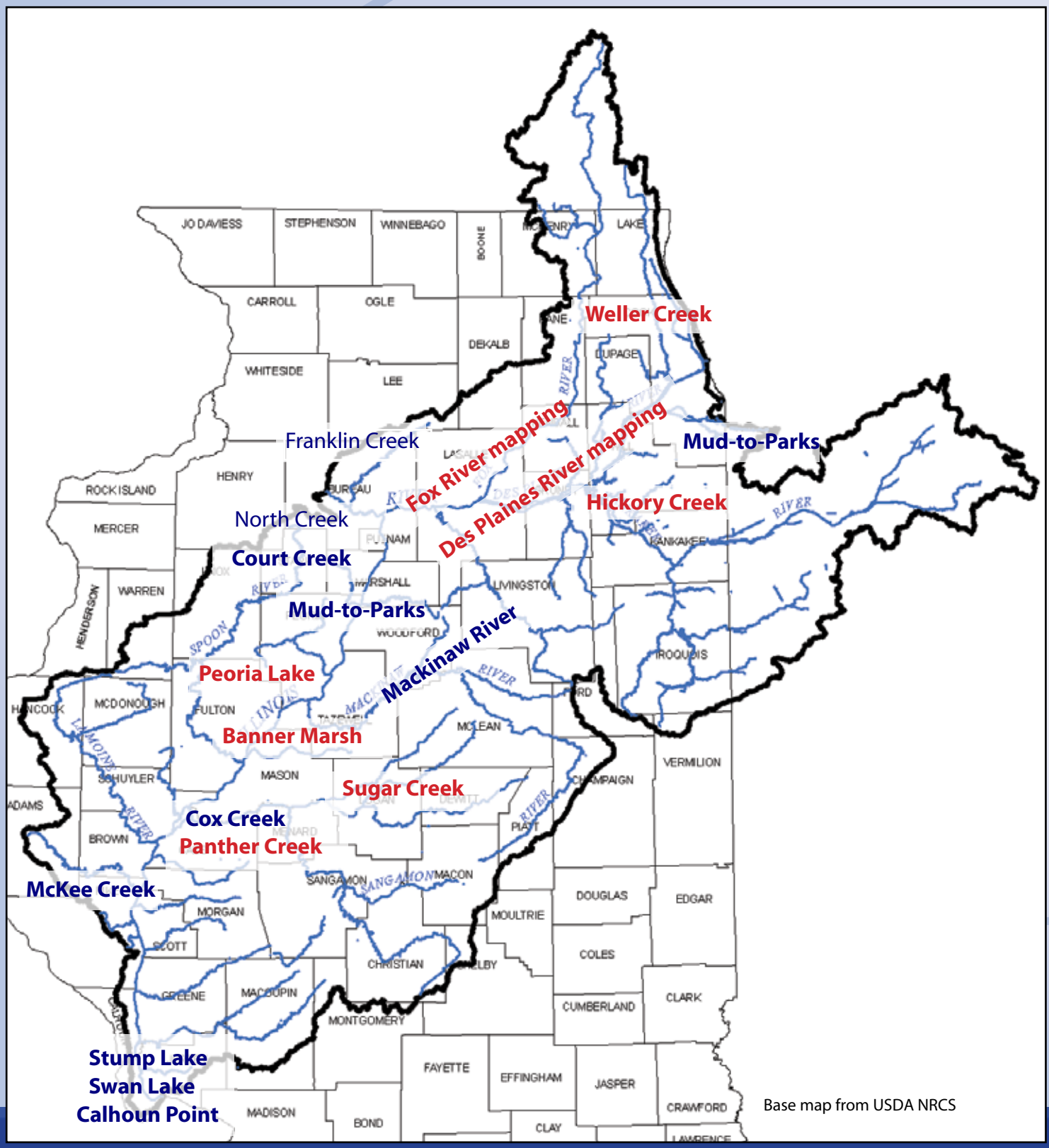
A number of studies and reports monitor and guide the changes. Watershed groups have gathered to design plans and implement actions. The funding as well as technical and scientific assistance comes from many sources.

From "Life Along the Illinois River", David Zalaznik

From "Life Along the Illinois River", David Zalaznik

The watershed map below shows general locations of projects highlighted in this chapter along with a few other notable projects.

Projects highlighted in this chapter
Other projects



Base map from USDA NRCS

The River Stories

Soil Finds New Home

The sediment filling the Illinois River from the bottom up constitutes a misplaced resource. Finding a new home for the dredged soil has led to some creative solutions, facilitated by the Illinois River Coordinating Council.

Mud-to-Parks, the name given to an initiative that moved dredged mud to create shoreline parks at former industrial sites, is among the better known projects. More recently, construction of an island has begun in lower Peoria Lake, just south of the narrows. Island construction opposite Chillicothe created deep-water habitat for fish as well as nesting sites for birds and also opened clogged backwater channels.

Two barge loads of river mud moved down river to a strip-mined area at the Banner Marsh State Fish and Wildlife Area. Healthy stands of sunflowers and other crops now grow there. The Pekin landfill in Tazewell County received topsoil for final vegetative cover as part of another project.

Another Mud-to-Park project, Riverfront Park in East Peoria on the site of a former electrical power generating plant, now hosts various festivals and a veterans memorial. The former US Steel South Works site in Chicago, now covered by 100,000 tons of river mud from East Peoria, has been created into a lakefront park. The sediment dried rapidly and was vegetated within six weeks.

None of this reuse would have proceeded without the studies by the Illinois scientific surveys. They first collected and processed dozens of core samples from the river and its backwaters. The sediment was characterized by physical properties and analyzed for potential contaminants. Numerous greenhouse and field experiments verified that the sediment developed good soil structure and was highly fertile when placed in the field and did not contain excessive amounts of metals. Corn and soybeans thrived in sandy soil test plots amended with sediment and corn had significantly higher yields. In other field plots grasses, prairie plants, sunflowers, volunteer weeds and trees also grew well. The University of Illinois soils pedology laboratory determined its fertility and overall potential for use as a productive growing medium.

Several techniques for dredging the mud and either moving it directly to shore or onto barges for transport have proven useful. The results of this work will also be helpful to communities with sediment filled water supply reservoirs.

Loading barge on Lower Peoria Lake with sediment excavated with a clamshell bucket designed to minimize the amount of water placed in the barge.

Inspecting mud drying on the field in Chicago.

Sediment that the day before was on the bottom of the lake is placed on the clay liner of the Pekin Landfill to provide soil for final vegetative cover.

Illinois Natural History Survey researcher identifying volunteer plants growing in sediment three months after placement.

Photos contributed by Illinois Sustainable Technology Center

Many Projects Combined to Support River Function

Calhoun Point and Swan Lake, both in Calhoun County, and Stump Lake in Jersey County are just a few projects with major construction completed between 1999 and 2006. These projects became possible through cost share monies contributed by the federal government and other sources

Calhoun Point is a prime site for migrating waterfowl and a prime feeding area for herons. The project has rehabilitated and enhanced wetland and aquatic habitats to provide breeding, nesting and feeding habitats for various waterfowl and other wildlife species, and furnished productive spawning and nursery areas for riverine fishes. The project included the creation of four independent fish and/or wildlife management units. Water level management is the key to success for this project. This project included dredging to facilitate water movement and to create deep water areas. Installing a combination of low elevation levees and connecting ditches between the units and gated water control structures will hold and release water as needed.

Historically, Swan Lake contained large amounts of backwater habitat for spawning, rearing and wintering fish as well as migratory bird resting and feeding areas. River and hillside sedimentation, wave action erosion, and water level fluctuation was reducing backwater habitat quality and quantity. The project restored aquatic plants and invertebrates and provided habitat for fish spawning, rearing and overwintering by reducing sedimentation, stabilizing water levels, reducing wave action, and creating deep water. The project included dredging to create deep water and islands, a riverside sediment deflection levee, hillside sediment control basins and water control structures.

Stump Lake has suffered from sedimentation and a lack of stable water levels. This combination had decreased aquatic plant production. The project deflects sediment away from the lake to create deep water areas and improved water control that has restored fish access and habitat for spawning and rearing. It also improved moist soil plant production. The project included a sediment deflection levee, seven interior levees, sluice gates and stop log structures and dredging.

Partners include Illinois Department of Natural Resources, St. Louis District Army Corps of Engineers, US Fish and Wildlife Service and USDA Natural Resources Conservation Service.

Mapping Activities of the Illinois River Watershed

The Illinois State Geological Survey (ISGS) has several activities that support the efforts within the Illinois River Watershed. Their involvement ranges from mapping geographical locations for soil and water erosion activities to developing monitoring protocols for ecosystem restoration practices.

They have developed materials in support of the restoration projects such as the Critical Trends Assessment Program Regional Watershed Assessments. Throughout the history of the Critical Trends Assessment Program, the ISGS has produced technical volumes on the geology of each assessment area. These technical volumes provide small-scale maps, tables of data, and additional sources of information about the basic composition of the bedrock, the uncompacted glacial materials, the soils, topography, mineral and groundwater resources, and interpretative information about the effects of geology on the environment in each assessment area.

These materials have been used by many local watershed planning groups as the foundation of their watershed plan.

Mackinaw River and Water Quality

From 1991 to the present, the Illinois Chapter of the Nature Conservancy in partnership with other agencies, organizations and individuals, conducted a series of studies, surveys and outreach meetings. The goal was to research how conservation practices have contributed to improving water quality in the Mackinaw River Watershed, a subwatershed of the Illinois River Watershed. The area is 70 percent agricultural land and contains 23 percent of the highest quality streams in Illinois.

Activities include:

- Determining effects of outreach on the awareness and adoption of conservation practices by farmers
- Evaluating agricultural conservation practices in Illinois, including the benefits, if any, of stream buffers and grassed waterways
- Studying aquatic biodiversity in two agriculturally-dominated smaller watersheds of central Illinois
- Establishing a demonstration farm for promotion of agricultural conservation through outreach and wetland research
- Comparing effects of subirrigation-wetland systems and constructed wetlands on water quality on a watershed scale
- Testing a hydrologic watershed model
- Measuring nitrogen pathways through constructed wetlands
- Developing stakeholder outreach teams

Benefits of these particular studies are to achieve long-term conservation goals in agricultural landscapes, and to understand farmers' perspectives on what practices are effective, practical, and economically attainable. Data from these surveys will provide biological assessments of two watersheds within the Mackinaw River that can be incorporated with previous research findings to:

(a) identify biotic indices that are most useful at assessing agricultural impacts on biodiversity,
(b) identify effective conservation strategies, and
(c) measure the effectiveness of conservation practices addressing these impacts.

The Demonstration Farm provides an opportunity for farmers to see how these practices work on agricultural lands and a forum to inquire about economic and practical aspects of these practices. One project has served as an important step towards implementing and measuring watershed-scale effectiveness of wetlands for reducing contaminants from agricultural runoff from subsurface tiles. The results of the research is expected to lead to a better understanding of the operation and maintenance requirements of constructed wetlands that will provide for maximum effectiveness at removing nutrient runoff from subsurface drainage.

The Mackinaw River Watershed Plan, developed by a local watershed planning committee, identified the need to implement 29,000 acres of wetlands in the Mackinaw River Watershed.

Collaborators and partners

- The Nature Conservancy, Illinois Chapter
- USDA Natural Resources Conservation Service
- McLean County Soil and Water Conservation District
- Illinois State University
- University of Illinois at Urbana-Champaign
- Southern Illinois University
- Illinois Natural History Survey
- Illinois State Water Survey
- AGREM LLC
- Illinois Department of Natural Resources
- Mackinaw River Partnership
- Participating landowners

Current and past funding

- Kellogg Family Foundation
- US Environmental Protection Agency
- USDA Natural Resources Conservation Service (Conservation Innovation Grants Program)
- Illinois Department of Natural Resources (Conservation 2000 Ecosystem Program)
- Ducks Unlimited
- McLean County Soil and Water Conservation District
- Pioneer- DuPont
- Monsanto
- The Nature Conservancy

Studies and Project Implementation Within the Illinois River Watershed

Several studies have been and continue to be conducted within the watershed to see what effects human and natural activities have on the water and habitat quality. The Illinois State Water Survey, Illinois Department of Natural Resources, US Geological Survey and the USDA Natural Resources Conservation Service have partnered to conduct surveys and install practices to address issues with water quality.

Riffle 14 on North Creek

Survey projects are located on North Creek and Court Creek in Knox County; Cox Creek in Cass County; Franklin Creek in Lee County; and Crabapple Lake Creek, a branch of McKee Creek, in Adams County. Results include riffles and pools to control water flow and reduce erosion on streambanks and to improve aquatic habitats and water quality. These projects were completed between 1991 and 2003.

North Creek, Knox County: Completed in 2001 and 2003

Riffle 5 on Upper North Creek

The project included a series of fourteen riffles (a series of rocks lined across a stream to stabilize the sides and bottom of the channel) applied throughout roughly 11,000 feet of stream in 2001. Two years later, a series of five riffles was applied on an additional 3,000 feet of eroding stream. The total cost of the project was $175,000.

The project applied artificial riffle structures as grade control to slow the channel-cutting process and create pools to help dissipate energy in an effort to reduce erosion and sediment production and to enhance habitat conditions by providing greater pool depth and aeration.

Photos contributed by Illinois State Water Survey

Additional Activities

Illinois Environmental Protection Agency

Illinois Environmental Protection Agency is required by the Federal Clean Water Act to monitor and assess Illinois' water resources. Illinois Environmental Protection Agency and the Illinois Department of Natural Resources collect the following data in the Illinois River Watershed: water chemistry, sediment chemistry, fish contaminants, fish community, macroinvertebrates, phytoplankton, habitat and visual observations. The data is used to determine if the water bodies maintain their designated uses in terms of support (Good), partial support (Fair) or non support (Poor). As reported by the Illinois Environmental Protection Agency in the 2008 Integrated Report, of the *stream miles assessed* in the Illinois River Watershed for Aquatic Life Use Support attainment, 64.6 percent were reported as "Good," 30.4 percent as "Fair," and 5.0 percent as "Poor." This compares to statewide figures of 61.1 percent "Good," 34.8 percent "Fair," and 4.1 percent "Poor."

In Illinois, the most common causes of impairments are found to be nutrients, habitat alterations, organic enrichment/dissolved oxygen (the amount of oxygen dissolved in a body of water as an indication of the degree of health of the water and its ability to support a balanced aquatic ecosystem) depletions, siltation and suspended solids. The most common sources of impairment (in alphabetical order) are found to be agriculture, hydromodifications, point sources, resource extraction and urban runoff. There are eight Ambient Water Quality Monitoring Sites on the main channel of the Illinois River. Water chemistry is collected 9 times a year. There are also approximately 250 Intensive Basin Survey Sites within the Illinois River Watershed. These sites are monitored once every five years. Water chemistry is collected 3 times a year while bugs, fish, habitat, sediment and chemistry are collected once. Fish contaminates are monitored at some sites. For more information visit http://www.epa.state.il.us/water/

US Army Corps of Engineers, Rock Island District and the Illinois Department of Natural Resources

Illinois River Basin Restoration Comprehensive Plan - The US Army Corps of Engineers, Rock Island District, and the Illinois Department of Natural Resources entered into a cost-share agreement in August 2000 and, with other agencies, identified opportunities for ecosystem restoration in the Illinois River Watershed. The Comprehensive Plan provides the overall plan for the restoration of the Illinois River Watershed, including system needs and recommendations describing the restoration program, long-term resource monitoring, computerized inventory and analysis system, and innovative dredging technologies and beneficial use of dredged material. To learn about this project and more, go to http://www.mvs.usace.army.mil/

Along The River

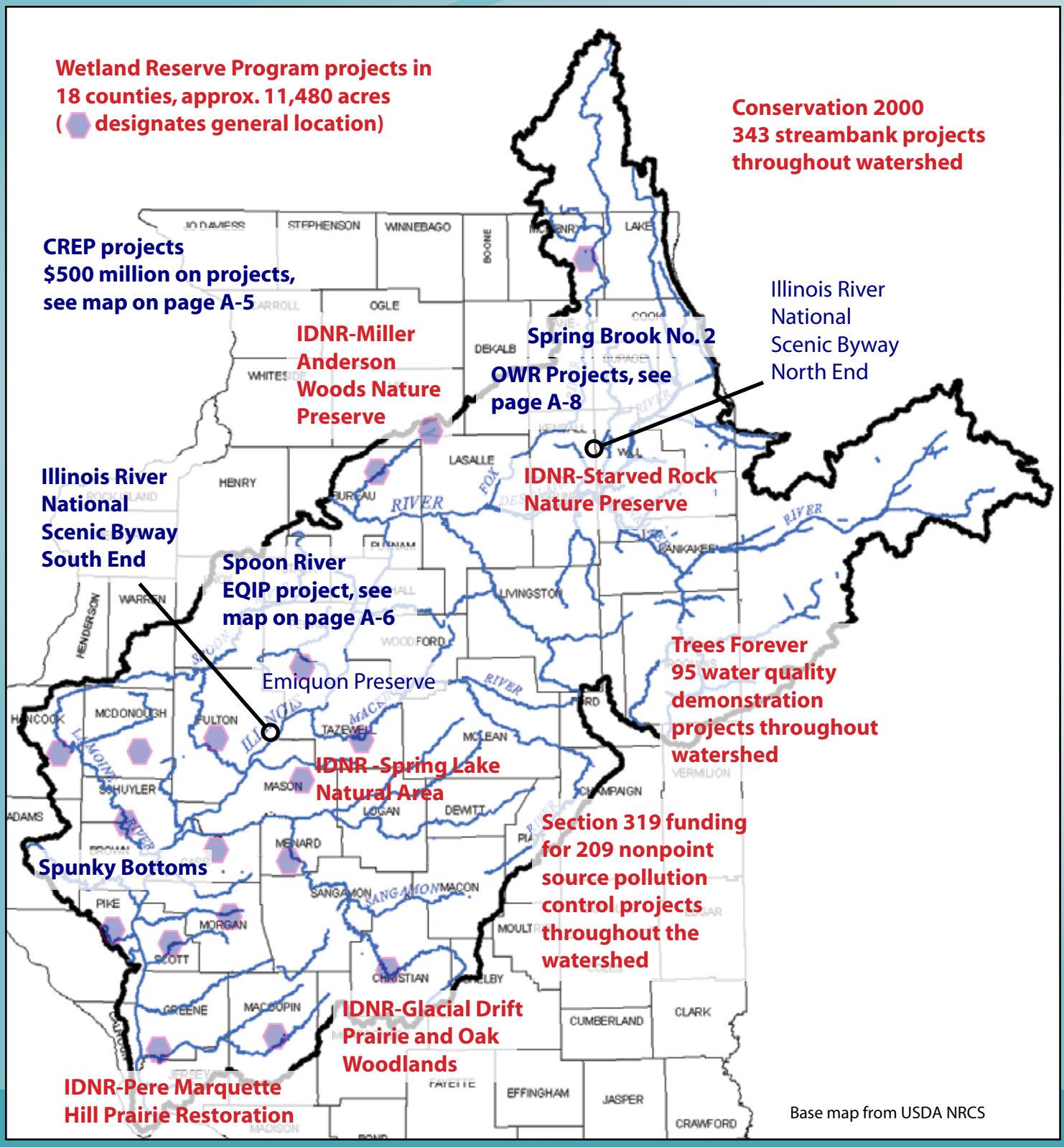
Communities rely on the river for their drinking water. With sediment and pollutants flowing into the river, strategies were designed to locate the sources and find solutions to prevent this from continuing. Wetlands and floodplains were restored, tributary streams were stabilized to prevent bank erosion, and counties and municipalities passed laws to require proper erosion control protection during construction and development.

Photo courtesy of USDA NRCS

From "A River Through Illinois" by Daniel Overturf and Gary Marx

The watershed map below shows general locations of projects highlighted in this chapter along with a few other notable projects.

Projects highlighted in this chapter
Other projects



Along the River Stories

Partnerships Creating Positive Results

Controlling erosion – keeping the soil on the land – provides the key to keeping sediment from filling the backwaters and mainstream of the Illinois River.

Eight federal and state agencies and 45 Soil and Water Conservation Districts across the Illinois River Watershed are cooperating in efforts that have focused more than $500 million for restoring more than 232,000 acres of floodplain, wetlands, and adjacent erodible land in the Illinois River Watershed.

Known as the Conservation Reserve Enhancement Program or CREP, the state-federal partnership was established in 1998 between the US Department of Agriculture, Commodity Credit Corporation and the State of Illinois.

To date, 1,288 landowners have enrolled approximately 82,000 acres into long-term state conservation easements. Over 90 percent of state-enrolled acres are in permanent easements which means they will remain as floodplains or wetlands.

From 1998 until 2008, more than 127,000 acres of floodplain and other environmentally sensitive lands have been enrolled in the federal side of CREP and restored to native vegetation. Approximately one-third were restored to wetlands. Every state dollar invested brought nearly five federal dollars in match for local landowner benefit.

CREP addresses high priority issues such as water quality and loss of critical habitat for threatened and endangered species and species in greatest need of conservation, as identified in the Illinois Fish and Wildlife Action Plan.

Partners include the USDA Farm Service Agency, USDA Natural Resources Conservation Service, Illinois Department of Natural Resources, Illinois Department of Agriculture, Illinois Environmental Protection Agency, Association of Illinois Soil and Water Conservation Districts, Illinois Soil and Water Conservation District Employee Association, and University of Illinois Extension. Illinois Department of Natural Resources has an Intergovernmental Contract Agreement with 45 Soil and Water Conservation Districts for program implementation. A CREP Advisory Committee provides guidance on program implementation.

Macon County Farmer Finds Partners and Solutions with EQIP

Ron and Jean Helm of Macon County own and operate 137 sloping and wooded acres that support a rotation of corn and soybeans and a small livestock operation; agricultural land that's been in his wife's family for more than 100 years and located on tributary of the Sangamon River. It started out as a hobby farm that was labor intensive and barely sustainable and has now become a full-time job.

Over the past few years, Ron read and learned how to farm and how to do it right. He's learned about organic farming. He inventoried his land, what it needed, and what his cattle needed. He considered different possibilities for water sources for his cattle and different scenarios for addressing resource issues on the farm.

Ron applied for the USDA Natural Resources Conservation Service's Environmental Quality Incentives Program (EQIP) and has nearly completed the installation of all items in his 5 year contract. He has installed a number of soil and water improvement practices that help his land, his livestock, and the state of natural resources within the watershed. He re-graded some areas of steeper slopes, added erosion control structures, tiled some areas, installed a rock check dam and berms to better direct and store water. He created two water and sediment control basins, established a perimeter fence around the pastured areas, a high usage pad for cattle, protected a streambed crossing with rock, and cleared out overgrowth in some wooded areas that needed attention.

Ron's new conservation additions join some historic ones established back in the 1930's through the Works Progress Administration projects created by President Franklin D. Roosevelt. Terraces were installed 60 years ago to keep sediment out of the creek. Those terraces are still working today. The acres are comprised of a diverse environment—flat ground, rolling hills, trees, and creeks. He believes this land was made for grazing cows and is just trying to make it better, keep it productive, and protect it.

A new perimeter fence was installed so Ron will be able to let his cows out to graze the corn residue while he gets busy planting clover and wheat as part of his new rotation. What Ron is doing is getting back to basics, managing his land and his livestock in a logical and cost effective way just like they did in the good old days. "I'm working and managing this farm by doing what is right and what is healthy for everybody," says Ron.

Partners include USDA Natural Resources Conservation Service and Macon County Soil and Water Conservation District.

Floodplains Gain Ground

In 1998, working with about 40 partners and funding from the Grand Victoria Foundation, the Illinois Chapter of The Nature Conservancy completed a plan for conserving the biological diversity of the Illinois River Watershed. That plan provided direction for all the Conservancy's efforts in the Illinois River Watershed including floodplain restorations at Spunky Bottoms Preserve in Brown County and Emiquon Preserve in Fulton County.

Spunky Bottoms Preserve

Restoration of approximately 1,200 acres of former floodplain began on Conservancy lands. Later the Illinois Department of Natural Resources acquired an additional 833 adjacent acres. Completion of restoration is being planned with the US Army Corps of Engineers through their Section 1135 program. Additional funds will restore and enhance forest, prairie, and wetland habitats. The project will provide passage for aquatic organisms between restored habitats and the river, and an emergency spillway to reduce damages from extreme flood events.

Spunky Bottoms
Funding: North American Wetlands Conservation Act, National Fish and Wildlife Foundation, Wetland Conservation Act conservation easement, the Open Lands Trust Partnership, and additional private and foundation gifts.

Partners: The Nature Conservancy, Illinois Department of Natural Resources, US Army Corps of Engineers, USDA Natural Resources Conservation Service, Illinois Natural History Survey and The Wetlands Initiative.

Emiquon Preserve

This restoration project involves approximately 6,500 acres of former floodplain, transition lands, and bluff. Completion of restoration is being planned with the US Army Corps of Engineers through their Section 206 Aquatic Ecosystem Restoration Program. Features being considered include: an emergency spillway to reduce flood damages during extreme flood events; islands to reduce wind action and promote beds of diverse aquatic plants; and a connection with the river to provide for water level management and movement of aquatic organisms between restored habitats and the Illinois River.

Project benefits include additional and enhanced habitats for fish as well as for both resident and migratory wildlife; increased primary and secondary productivity and transport to the river ecosystem; and carbon sequestration. Contributions to improved water quality will be reached through more natural river hydrology, reduced flood damages, improved sediment and nutrient management. These projects also provide excellent opportunities for recreation, education and compatible economic development.

Emiquon Preserve
Funding: Wetland Reserve Program conservation easement to the USDA Natural Resources Conservation Service and additional private and foundation gifts.

Partners: The Nature Conservancy, USDA Natural Resources Conservation Service, US Fish and Wildlife Service, Illinois Department of Natural Resources, University of Illinois at Springfield, Dickson Mounds Museum, Illinois Natural History Survey and numerous private donors and foundations.

Aerial view near Havana, Illinois

From "A River Through Illinois" by Daniel Overturf and Gary Marx

Emiquon Preserve before (left) and after (right) restoration.

Photo contributed by Chris Young

Restoring A Stream to Protect the River

The Springbrook Prairie Forest Preserve in Naperville has the most biologically diverse stream flowing through DuPage County - Spring Brook No. 2 - yet pollution in the form of heavy sediment was evident in many parts of the stream. Studies indicated that much of this sediment came from the streambanks during high flow events. To solve this problem, the Forest Preserve District of DuPage County initiated the Springbrook Meander Project that would create a meandering stream channel that better connects to its floodplain. The project restored two miles of the stream to more natural conditions of meanders, riffles, pools, and riparian wetlands. By managing floodwaters and reducing erosive energy, streambank stability is improved.

The stream channel design incorporated improved fish, mussel and aquatic invertebrate habitats. It created a more natural stream habitat and riparian wetlands.

This project is somewhat different from many stream restoration projects. Instead of protecting the streambanks with traditional materials, the District created a new channel designed to minimize sedimentation and erosion. By installing meanders, the stream has become longer and the channel grade flatter. This combination is designed to reduce the erosive energy of the water and should allow the stream to maintain itself much longer than if it remained channelized.

The project saved money by using the rootwads of trees removed during construction to help stabilize the banks until permanent vegetation is established. It also incorporated riffles that extended farther into the floodplain, so that the stream could move but still remain stable.

Most of the old channel was filled to form a part of the floodplain excavation. However, the project design allowed for seven areas of the old channel to remain as wetlands in the floodplain but isolated from the newly meandering channel. The off-channel wetlands should be ideal breeding areas for amphibians such as frogs and toads. The stream will be allowed to move across the flood plain but should always maintain an appropriate entrenchment ratio, staying connected to the flood plain as conditions within the watershed change over time.

Funding - The $3,428,800 project included a $1,150,000 contribution from Section 319 of the Clean Water Act available through the Illinois Environmental Protection Agency, with additional funding from Illinois Department of Natural Resources through the C2000 Program.

Partners
Illinois Environmental Protection Agency
Illinois Department of Natural Resources
DuPage County Department of Economic Development and Planning
US Environmental Protection Agency

Photos courtesy of Forest Preserve District of DuPage County

Spoon River Project - EQIP Special Project

In 2006 and 2007, USDA Natural Resources Conservation Service enrolled 53 streambank projects under the Environmental Quality Incentives Program (EQIP) Spoon River Initiative. USDA Natural Resources Conservation Service committed a total of $1.5 million of EQIP funds to the project which offered financial and technical help and provided incentive payments and cost-shares to implement the streambank stabilization practices. The Illinois Department of Natural Resources provided $650,000 in matching cost-share funds.

Photo courtesy of USDA NRCS

Rock was placed along streams in the Spoon River Watershed to stabilize the backs from eroding.

Additional Activities

Illinois River National Scenic Byway - Designation of the Illinois River Road (on the east and west sides of the Illinois River from Ottawa to Havana) as a National Scenic Byway by the US Department of Transportation Federal Highway Administration was completed in 1997. The Illinois River Road National Scenic Byway will attract visitors to our region, create a sense of pride in the region's residents and create a higher quality of life for those who live and work here by stimulating visitor-based economic development. To find out more, visit their web site at http://www.illinoisriverroad.org/

Illinois Department of Agriculture (C2000 Streambank Stabilization and Restoration Program) - The agency cost-shared $2,676,721 on 343 streambank stabilization projects using vegetative plantings, bendway weirs, rock riffles and pool systems. To learn more, go to http://www.agr.state.il.us/

Illinois Environmental Protection Agency (Section 319 Program) - Since 1990, the Illinois EPA has dedicated more than $45 million of Clean Water Act Section 319 funding for 209 nonpoint source pollution control projects in the Illinois River Watershed. Projects include streambank and shoreline stabilization and stream channel stabilization; nutrient management; wetland restoration; green roofs; porous pavement; and many more. Practices implemented since 1990 have reduced the pollutant load to the Illinois River by significant rates. To learn more, go to http://www.epa.state.il.us/

Illinois Department of Natural Resources, Office of Water Resources – Among several activities throughout the watershed, the Office of Water Resources, through an agreement with the Chicago District US Army Corps of Engineers, has provided $1.8 million dollars toward the implementation of an electric barrier across the Chicago Sanitary and Ship Canal in Romeoville, Illinois to reduce the risk of aquatic nuisance species between the Mississippi River and the Great Lakes along the Illinois River and its tributaries. Another activity, the Glen D. Palmer Dam Modification and Natural Bypass Channel Project constructed by the Office of Water Resources on the Fox River in Yorkville, is a good example of a multi-purpose project that provides public safety improvements at an existing run-of-river dam in addition to fish passage structures and the construction of a recreational white water boating course for both novice and intermediate skilled paddlers. For these projects and more, go to http://dnr.state.il.us/OWR/

Trees Forever - From 2001-present, Trees Forever's Illinois Buffer Partnership has 95 water quality demonstration projects within the Illinois River Watershed. The Illinois Buffer Partnership program improves water quality by establishing buffers of trees, shrubs, and grasses, wetlands, and other best management practices. For more information ,go to http://www.treesforever.org/Content/Get-Involved/ Programs/Illinois-Buffer-Partnership.aspx

Beyond The River

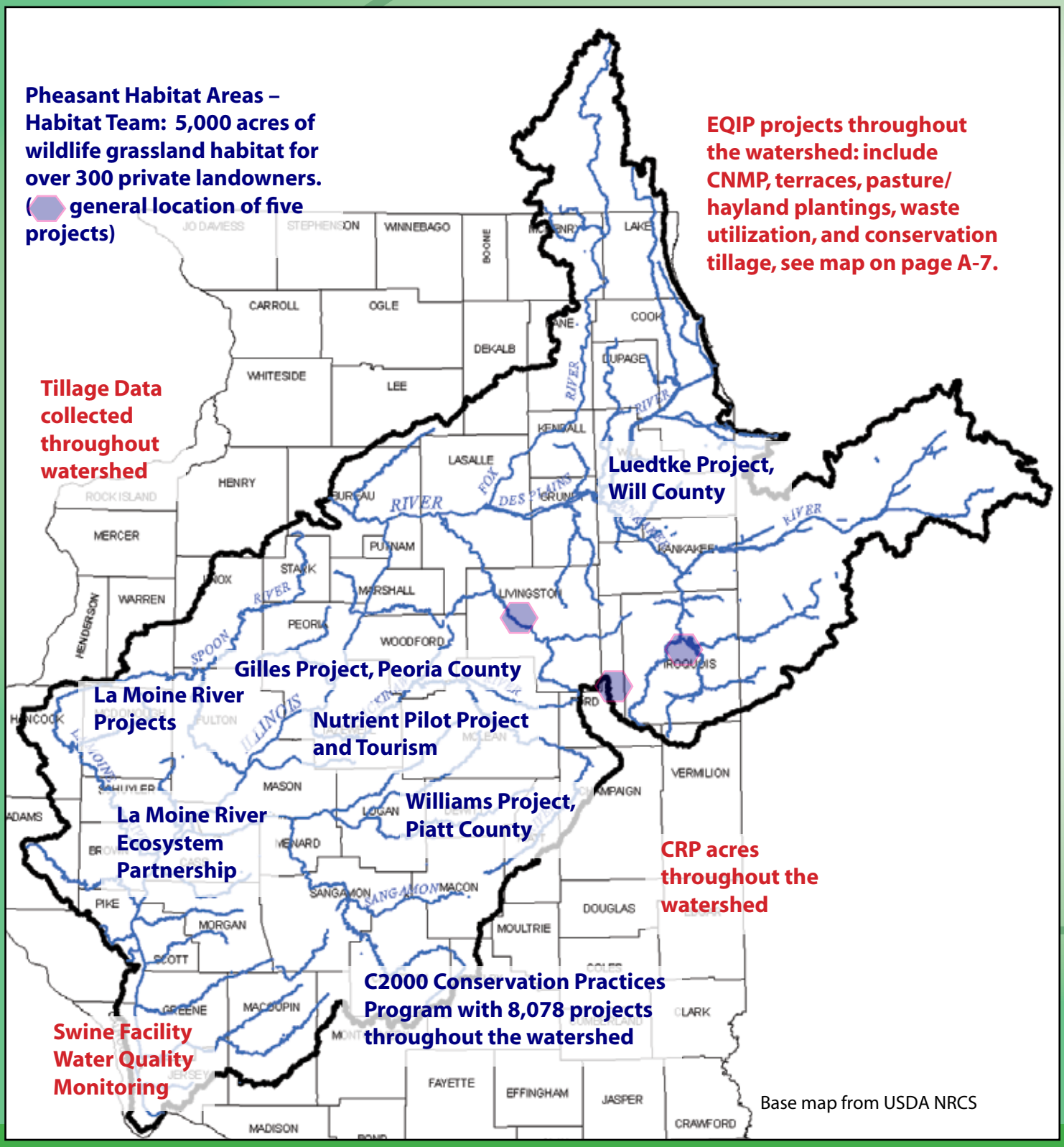
The Illinois River Watershed drains 18,500,000 acres of land, about half the state. Far from the Illinois River, farmsteads and small rural communities still have an effect on the river conditions. Taking steps to protect their land and resources helps not just the farming operation but protects the water quality of the river. Maintaining wooded areas and grasslands keeps the soil in place, retains the nutrients and prevents pesticides from entering water sources.

Photo courtesy of USDA NRCS

From "Life Along the Illinois River", David Zalaznik

The watershed map below shows general locations of projects highlighted in this chapter along with a few other notable projects.

Projects highlighted in this chapter
Other projects



Beyond the River Stories

Local Councils Help Improve Water Quality and Tourism

Three Resource Conservation and Development (RC&D) Councils have many activities between them that have positive impacts on the Illinois River Watershed. RC&D is a program administered by the USDA Natural Resources Conservation Service. RC&D is a unique program that is led by local volunteers brought together to plan and carry out activities that will make their area a better place to live. Such activities lead to sustainable communities, prudent land use and the sound management and conservation of natural resources. Three RC&D councils are located in the Illinois River Watershed:

– Prairie Hills RC&D
– Prairie Rivers RC&D
– Two Rivers RC&D

The following are just a few activities taking place within the councils.

Pasture plantings in clover-grass

Creek fenced to keep cattle out

Photos contributed by David King, Prairie Hills RC&D

La Moine River Livestock Exclusion Project, – Prairie Hills RC&D

A $250,000 grant funded by the Illinois Environmental Protection Agency to Prairie Hills Resource Conservation and Development to cost-share with livestock producers to reduce sediment, phosphorus, and nitrogen from entering into the La Moine River. The La Moine River is a tributary to the Illinois River. Practices landowners installed include cattle crossings, fencing to exclude livestock from entering the river, pasture paddocks for rotational grazing, streambank stabilization, pasture planting and improvement practices, livestock watering facilities, and natural area plantings.

There are currently seven livestock producers participating. Three livestock producers have completed their projects and four projects are in progress with some practices completed and others to be completed. The Exclusion Project began in October 2007 with some practices completed and others to be completed.

La Moine River Ecosystem Partnership, - Prairie Hills and Two Rivers RC&D

Progress on the watershed plan for the La Moine River continues with the La Moine River Ecosystem Partnership. This partnership includes parts of Adams, Brown, Schuyler, Fulton, McDonough and Hancock counties. The Board ranked five grant applications for the 2006 C2000 grant program through Illinois Department of Natural Resources. A grant from Illinois Environmental Protection Agency is helping pay for inventories and public meetings within the watershed. Conservation practice data has been digitized and the Technical Advisory Committee (TAC) is meeting to develop recommendations. A newsletter to inform landowners and invite them to participate in existing conservation programs has been distributed.

Tourism Promotion - Prairie Rivers RC&D

The Illinois River Road National Scenic Byway consists of 291 miles, embracing both sides of the Illinois River in central Illinois. The Prairie Rivers RC&D projects include an Interpretive Master Plan with interpretive displays/kiosks; directional and way-finding signage; a web site; a comprehensive map and audio tour of the Byway and nature sites. This Scenic Byway secured $253,000 in funding through US Department of Transportation and $20,000 from the Illinois Bureau of Tourism to support these efforts.

Good Stewards of Urban Lands

DuPage County is home to a variety of progressive urban best management practices and programs. With organizations like The Conservation Foundation, Morton Arboretum, the DuPage River Salt Fork Workgroup and the Kane-DuPage Soil & Water Conservation District it seems there's conservation work around every corner. It's a good thing too, because the county drains not only to the DuPage River, but also to the Fox and Des Plaines Rivers. All of these rivers drain to the Illinois River.

DuPage River Salt Creek Workgroup

Traditional watershed planning efforts in Illinois may include a municipal representative or two, but not many more. In DuPage County, the tables are turned; the DuPage River Salt Creek Workgroup (Workgroup) is weighty with municipal representatives and water treatment facility staff. Watershed planning was already successful in the county, but local efforts increased in the form of the Workgroup which was started in response to the potential development of Total Maximum Daily Loads (TMDL) (a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards) on the Dupage River and Salt Creek. The members of the Workgroup have brought a wide range of knowledge and skills to the project. An intense dissolved oxygen monitoring effort (amount of oxygen dissolved in a body of water as an indication of the health of the water and its ability to support a balanced aquatic ecosystem) has been implemented along with a biological and habitat assessment, dissolved oxygen improvement feasibility study, chloride reduction study and nonpoint source pollution control strategy. The monitoring and resulting reports have documented opportunities throughout the watershed to improve local water quality. The Workgroup is currently working on the removal or modification of a dam to improve dissolved oxygen levels in the river.

Partners include The Conservation Foundation, most of the municipalities within the watershed, Illinois Environmental Protection Agency and DuPage County Department of Environment.

Morton Arboretum

The Morton Arboretum is located in unincorporated DuPage County. It has a long, proud history of preserving and enhancing the environment and in educating the general public about trees, shrubs, and other plantings. In the 1990s a new visitor center was proposed. A new 500 car parking facility would also need to be constructed to accommodate the ever increasing number of visitors, which posed a challenge. It would be situated between Meadow Lake and the East Branch of the DuPage River. The idea of constructing a 5-acre asphalt parking lot next to Meadow Lake, and in the floodplain of the East Branch of the DuPage River, did not seem to uphold the goals of local watershed planning efforts. Such a parking lot would produce a significant concentration of pollutants, which would immediately drain into Meadow Lake and subsequently the river. In addition, the asphalt parking lot would heat the water, thereby degrading the biodiversity and ecosystem in the downstream watercourses. Given these factors, the arboretum decided that a "green" parking lot would be the best solution to this problem.

The goals to reduce overall stormwater runoff and improve downstream water quality were achieved when the permeable pavement, bioswales, level spreaders, wetlands, vegetated channels, grass filter strips, and vortex-type oil traps were installed. This project produced a parking lot with the exact opposite effect of the standard asphalt parking lot, which typically increases stormwater runoff and degrades downstream water quality.

In addition to the parking lot, the arboretum has stabilized streambanks and lakeshore throughout their property. The arboretum staff have successfully used the projects to expand their outreach efforts even farther into the field of conservation.

Partners include Morton Arboretum and Illinois Environmental Protection Agency.

Permeable pavers and bioswale with curbcuts

Morton Arboretum parking lot in use… notice holes in pavement to allow rainwater and snow to filter into the gravel base instead of running off into the lake and river.

Photo credits Morton Arboretum/Christopher Burke Engineering

Good Stewards of Working Lands

The area that drains into the Illinois River requires positive action to protect the land that in turn affects the river quality. There are many ways landowners can be successful in farming and still protect their investment and the natural resources that make central Illinois a productive agricultural system. Good stewards have a passion for conservation.

Rita Luedtke, Will County

The majority of eastern Will County's landscape is made up of rolling hills subject to erosion. Being a good steward of the soil can test the mettle of the best conservationist. Practicing conservation has been something Rita Luedtke has done for more than 25 years. She wants to do things the right way and is not afraid to try new techniques to achieve success. She is known within and around her community as a true conservationist.

With technical assistance and local, state and federal cost-share dollars, Luedtke has installed a host of practices that have improved wildlife habitat and prevented soil from entering area water bodies. Her farm has served as an educational tour site for FFA high school and local elementary school students. With Will County just minutes away from Chicago, Luedtke ensures that students maintain an appreciation and wonder of the natural world.

Luedtke and husband Jerry share their farm with deer, pheasants, quail (one of only a few wild coveys left in the county), rabbits, song birds, muskrats, egrets, blue herons, coyotes, and insects – just to name a few. To have such a diverse wildlife population so close to the City of Chicago is a remarkable accomplishment.

Partners include USDA Natural Resources Conservation Service, USDA Farm Service Agency, US Fish and Wildlife Service, Illinois Department of Natural Resources, Illinois Department of Agriculture, Will and South Cook County Soil and Water Conservation Districts, and Kankakee River Ecosystem Partnership.

Courtesy of USDA NRCS

"I have used some of the cost-share programs and they have been very helpful," she said, *"but I would have done it on my own anyway; it just would have taken longer."*

Rita Luedtke

"I'm a believer in using personal conservation plans or watershed planning efforts to help get long-term projects, practices and priorities on the land."

Courtesy of USDA NRCS

Allen Williams

Allen Williams, Piatt County

Allen Williams has been farming in Piatt County since 1972. Every year that passes brings him new ideas, new strategies, and new ways of doing things better. Williams continually finds new ways to improve not only his operation and his crop quality, but also the quality of his soil and water resources.

Williams operates about 1,700 acres, 400 of which are certified organic.

Decades ago, Williams had concerns about soil and water quality and continues to find innovative ways to manage his crops in a more sustainable way—improving the crop and making money simultaneously. Experimenting with organic crops has taught him that it is possible and profitable to raise a high-quality crop that brings in a high price by meeting consumer demands. Williams raises corn and soybeans on most of his land but also grows specialty grains, blue corn, white corn, and food grade soybeans for tofu. Other crops Allen has grown include sunflowers, rye, barley, canola, vetch, cuphea, buckwheat and popcorn.

With the help of others, Williams turned his farm into The Stewardship Farm, a working farm dedicated to using research, observations and demonstrations to develop and promote agricultural systems. These foster stewardship of natural resources, strengthen the economic health of farmers and rural communities, and contribute to a healthy food and water supply.

Even though he remains the only organic producer in Piatt County, Williams encourages other farmers to explore the profitable possibilities that exist.

Partners include the University of Illinois Extension, the Illinois Stewardship Alliance, Illinois Sustainable Ag Network, USDA Natural Resources Conservation Service, Piatt County Soil and Water Conservation District and independent advisors.

Ted and Ron Gilles, Peoria County

Ted and Ron Gilles own and operate farmland along the Spoon River in Peoria County and are true stewards of the land. They grow corn, soybeans, hay and wheat. Much of the Gilles land is hilly and subject to eroding. But all acres are protected with a stellar conservation system. The farm includes almost every conservation practice available—and more. Their parents instilled a conservation ethic in them many years ago.

The Gilles brothers strive to share their bounty with others. They use the advice and programs of the federal, state, and other environmental groups to accomplish conservation goals and to set an example for others. They demonstrate great success with conservation practices and their land is a showplace of conservation practices at work—almost like a hands-on, working conservation catalog of solutions for the farm.

The Gilles brothers are proud of their operation and offer it as public educational venue on a regular basis. The fact that it's a profitable and productive farm is almost secondary to everything else this land and these men have to offer.

The Gilles play a tremendous role in conservation in Central Illinois. They operate a sustainable operation and share their knowledge with others. They make prudent use of available state and federal cost-share programs and supplement with their own money when needed to accomplish a goal or task. The Gilles team has a love of the land and they are passionate about making the most of the land for themselves and others. Their pride and enthusiasm for conservation is evident in all that they do.

Partners include the USDA Natural Resources Conservation Service, Peoria County Soil and Water Conservation District, independent advisors state agencies and other environmental groups such as Ducks Unlimited and Pheasants Forever.

Courtesy of USDA NRCS

Ron and Ted Gilles

"Take care of the land and the land will take care of you," –words of wisdom from their mother that guides their actions even today.

Courtesy of USDA NRCS

Gilles brothers host tours of their Conservation Farm

Courtesy of USDA NRCS

Additional Activities

Illinois Department of Agriculture (C2000 Conservation Practices Program) - Between 1996 and 2008, the agency cost-shared $17,485,431 on 8,078 projects which included conservation tillage, pasture & hayland establishment, grassed waterways, and terraces. For more information go to http://www.agr.state.il.us/

Illinois Department of Natural Resources (Pheasant Habitat Areas – Habitat Team) - The Habitat Team has established more than 5,000 acres of wildlife grassland habitat for over 300 different private landowners since 2003. Partners on some of these projects include: Pheasants Forever, Quail Unlimited, USDA Natural Resources Conservation Service, USDA Farm Service Agency and Illinois Soil and Water Conservation Districts. For more information go to http://dnr.state.il.us./orc/wildliferesources/theplan/implementation.html

Illinois Farm Bureau – They continue to publicize and promote conservation programs in the Illinois River Watershed and throughout Illinois. Illinois Farm Bureau uses a weekly publication, FarmWeek, and their statewide radio network to highlight details of the programs and issues. They continue to actively participate in groups such as the Illinois Buffer Partnership, Illinois Council on Best Management Practices (C-BMP), Mahomet Aquifer Consortium, USDA Natural Resources Conservation Service State Technical Committee, Illinois River Coordinating Council, Landowner Incentive Program Advisory Group, Conservation Tour in the Illinois River Watershed, Envirothon Committee, Illinois River Conference Planning Committee, Water Conference, Illinois Fish and Wildlife Action Team, Invasive Species Council and Advisory Committee, Environmental Quality Incentive Program Subcommittees, Nutrient Standards Advisory Committee, Conservation Reserve Enhancement Program Advisory Committee, Trees Forever, Illinois Conservation Climate Initiative Advisory Group, Advisory Committee for Regional Water Supply Planning Committees. For more information go to http://www.ilfb.org/

University of Illinois Extension – Data collected for the publication "Illinois Tillage Data, Trends and Impact on a Carbon Footprint" were released in 2008. The data are collected by county offices of the Illinois Soil and Water Conservation Districts and the USDA Natural Resources Conservation Service. This information is used to calculate the acres of each tillage system for each crop. Data from Illinois and other states throughout the nation are then submitted to the Conservation Technology Information Center at Purdue University for compilation, analysis, and interpretation to provide a national perspective on tillage adoption and trends. University of Illinois research has confirmed that benefits of no-till include: controlling soil erosion, protecting water quality, reducing fuel usage, improving wildlife habitat, reducing wind erosion and improving air quality, increasing organic matter, and improving stream quality and fish numbers. No-till also protects the environment by sequestering carbon and reducing the greenhouse gases that contribute to global warming. That makes no-till farming the true "Pollution-Solution!" For more information go to http://web.extension.uiuc.edu/state/index.html

Courtesy of USDA NRCS

Working Lands and Reserved Lands

For definitions on these programs and more, see Appendix pages A-1 and A-2

Working Lands

The term "Working Lands" relates to land kept in active agricultural production of food, fiber and fuel. Conservation programs for these lands allow for resource protection and crop production at the same time. These practices can be as simple as a tillage practice that landowners can do on their own or more elaborate practices that require technical and financial assistance.

The assistance needed, whether it's technical or financial, comes from a variety of agencies and organizations. The following is a list of some programs available.

Farm Bill Programs
- USDA Natural Resources Conservation Service *(www.il.nrcs.usda.gov)*
  - Environmental Quality Incentives Program (EQIP)
  - Farm and Ranch Lands Protection Program (FRPP)
  - Wildlife Habitat Incentive Program (WHIP)
  - Conservation Stewardship Program (CSP)
  - Conservation Security Program (CSP)
- USDA Farm Service Agency *(www.fsa.usda.gov/)*
  - Farmable Wetland Program (FWP)

Illinois Department of Agriculture *(www.agr.state.il.us/C2000/index.html)*
- Conservation 2000, Sustainable Ag Grant Program *(C2000)*

Illinois Environmental Protection Agency (Section 319 program) *(http://www.epa.state.il.us/)*

US Fish and Wildlife Service *(www.fws.gov/)*
- Landowner Incentive Program

Conservation Technical Assistance - Provided by USDA Natural Resources Conservation Service, Illinois Soil and Water Conservation Districts and Technical Service Providers.

Reserved Lands

The term "Reserved Lands" relates to land that is enrolled in a long-term conservation program that removes it from production and establishes a conservation cover. Generally, this land is less desirable for production. It is best converted to a conservation cover or returned to its natural state of prairie and forest land where soil erosion is reduced and water quality and wildlife habitat is improved. Private landowners do retain the land for other uses such as bird watching or hunting.

The assistance needed, whether it's technical or financial, come from a variety of agencies and organizations. The following is a list of some programs available.

Farm Bill Programs:
- USDA Farm Service Agency *(www.fsa.usda.gov/)*
  - Conservation Reserve Program (CRP)
  - Conservation Reserve Enhancement Program (CREP)
- USDA Natural Resources Conservation Service *(www.il.nrcs.usda.gov)*
  - Emergency Watershed Protection Program - Floodplain Easement (EWPP-FPE)
  - Wetlands Reserve Program (WRP)

Conservation Technical Assistance - Provided by USDA Natural Resources Conservation Service, Illinois Soil and Water Conservation Districts and Technical Service Providers.

Appendix

Programs and Definitions

Conservation 2000 (C2000) - C2000 is a comprehensive, six year, $100 million initiative, designed to take a holistic, long-term approach to protecting and managing Illinois' natural resources. Illinois House Bill 1746 was signed into law extending the C2000 Program until the year 2009. In 2008, House Bill 1780 was signed into law as Public Act 95-0139, extending the program to 2021 as Partners for Conservation. Conservation 2000 provides additional funding for the sustainable agriculture grant program, the conservation practices program, the streambank stabilization and restoration program, and the soil and water conservation district grants program. The Partners for Conservation Program funds programs at Illinois Department of Natural Resources, Illinois Department of Agriculture, and Illinois Environmental Protection Agency.

Conservation Practices Program (CPP)- This state-supported initiative protects natural resources and enhances outdoor recreational opportunities in Illinois. The program, which became law in 1995, implements strategies for maintaining the viability of Illinois' soil and water resources into the 21st century and beyond. Several state agencies share responsibility for administering the program and the Illinois Department of Agriculture oversees the program's agriculture-related components.

Conservation Reserve Program (CRP) - CRP was authorized under the Food Security Act of 1985 (Farm Bill) providing technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. CRP is administered by the Farm Service Agency, with NRCS providing technical land eligibility determinations, conservation planning and practice implementation. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.

Conservation Reserve Enhancement Program (CREP) - CREP is convenient for producers because it is based on the familiar, highly successful CRP model. CREP is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water. CREP is administered by USDA Farm Service Agency and is a partnership among producers; tribal, state, and federal governments; and, in some cases, private groups.

Conservation Security program (CSP) - CSP is a voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. The Farm Security and Rural Investment Act of 2002 (Farm Bill) (Pub. L. 107-171) amended the Food Security Act of 1985 to authorize the program. CSP is administered by USDA Natural Resources Conservation Service.

Conservation Stewardship Program (CSP) – CSP is a voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. CSP replaces the Conservation Security Program. The Food, Conservation, and Energy Act of 2008 (Farm Bill), authorizes the new Conservation Stewardship Program for Fiscal Year 2009-12. Enrollment of acreage into program is authorized through Fiscal Year 2017.

Conservation Stewardship Program (CSP) - CSP program was designed to encourage landowners to maintain unimproved land in order to protect limited environmental resources. CSP received final legislative approval and was signed into law in 2007. The bill offered the incentive of reduced valuation for property taxes to landowners who were willing to commit to maintaining and managing unimproved land. Landowners who wish to receive the special valuation for unimproved land provided by this law are required to prepare a Conservation Management Plan according to rules developed by the Illinois Department of Natural Resources.

Environmental Quality Incentive Program (EQIP) - EQIP is a voluntary conservation program authorized under the Federal Agriculture Improvement and Reform Act of 1996 (Farm Bill) that provides assistance to farmers who face threats to soil, water, air, and related natural resources on their land. Administered by the USDA Natural Resources Conservation Service, EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land. EQIP is a competitive process.

Emergency Watershed Protection Program - Floodplain Easement (EWPP-FPE) - EWPP-FPE was authorized under Section 382 of the Federal Agriculture Improvement and Reform Act of 1996, Public Law 104-127, (Farm Bill) to purchase floodplain easements as an emergency measure. Under the floodplain easement option, a landowner voluntarily offers to sell to the USDA Natural Resources Conservation Service a permanent conservation easement with full authority to restore and enhance the floodplain's functions and values. Floodplain easements restore, protect, maintain, and enhance the functions of the floodplain; conserve natural values including fish and wildlife habitat, water quality, flood water retention, ground water recharge, and open space; reduce long-term federal disaster assistance; and safeguard lives and property from floods, drought, and the products of erosion.

Programs and Definitions continued

Landowner Incentive Program (LIP) - LIP is a new program available to Illinois landowners in the Lower Sangamon River Watershed to manage their lands for species in greatest need of conservation. There are financial and technical resources available through a partnership with the US Fish & Wildlife Service, Illinois Department of Natural Resources and local Soil and Water Conservation Districts.

Section 319 - Congress enacted Section 319 of the Clean Water Act in 1987 to establish a national program to control Nonpoint Source (NPS) pollution. Section 319 helps states address NPS pollution through the development of assessment reports; adoption of management programs; and implementation of those management programs. The Illinois Environmental Protection Agency is the designated state agency in Illinois to receive 319 federal funds from US Environmental Protection Agency. Illinois Environmental Protection Agency works cooperatively with units of local government and other organizations toward the mutual goal of protecting the water quality in Illinois through the control of NPS pollution. Technical assistance and information/education programs are also eligible.

Section 519 - Water Resources Development Act of 2000 authorized a Comprehensive Plan to develop and implement a restoration program and a long-term resource monitoring program, and evaluate new technologies and innovative approaches, and to construction of critical restoration projects. These efforts relate to the state's Illinois Rivers 2020 initiative, a proposed 20-year Federal/State effort to restore and enhance the 30,000 square-mile Illinois River Watershed.

Section 8004(b)(3)(B) -Section 8004, ecosystem restoration, was authorized in the Water Resources Development Act of 2007, Title VIII for the US Army Corps of Engineers to address cost-sharing for certain restoration projects. Actions must be consistent with requirements to avoid adverse effects on navigation and ecosystem restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River in accordance with the general framework outlined in the Plan.

Section 906 (e) - Section 906 was authorized in the Water Resources Development Act of 1986 for construction and/or study of US Army Corps of Engineers projects, such as port development, inland navigation, flood control, streambank and shoreline stabilization,as well as feasibility and control studies. The initial project costs will be Federally funded when such enhancement provides benefits that are determined to be national and are designed to benefit species that have been listed as threatened or endangered.

Section 1135 - Section 1135, authorized in the Water Resources Development Act of 1986, provides the authority to modify existing US Army Corps of Engineers projects to restore the environment and construct new projects to restore areas degraded by Corps projects, after a detailed investigation shows it is technically feasible, environmentally acceptable, and provides cost effective environmental benefits. Project costs are shared 75 percent federal, 25 percent non-federal and also allow credit for certain works in-kind, including provision of materials and construction activities.

Streambank Stabilization Restoration Program (SSRP) - SSRP is designed to demonstrate effective, inexpensive vegetative and bioengineering techniques for limiting streambank erosion. Program monies fund demonstration projects at suitable locations statewide and provide cost-share assistance to landowners with severely eroding streambanks. Illinois Soil and Water Conservation Districts and the USDA Natural Resources Conservation Service serve as partners in implementing the program.

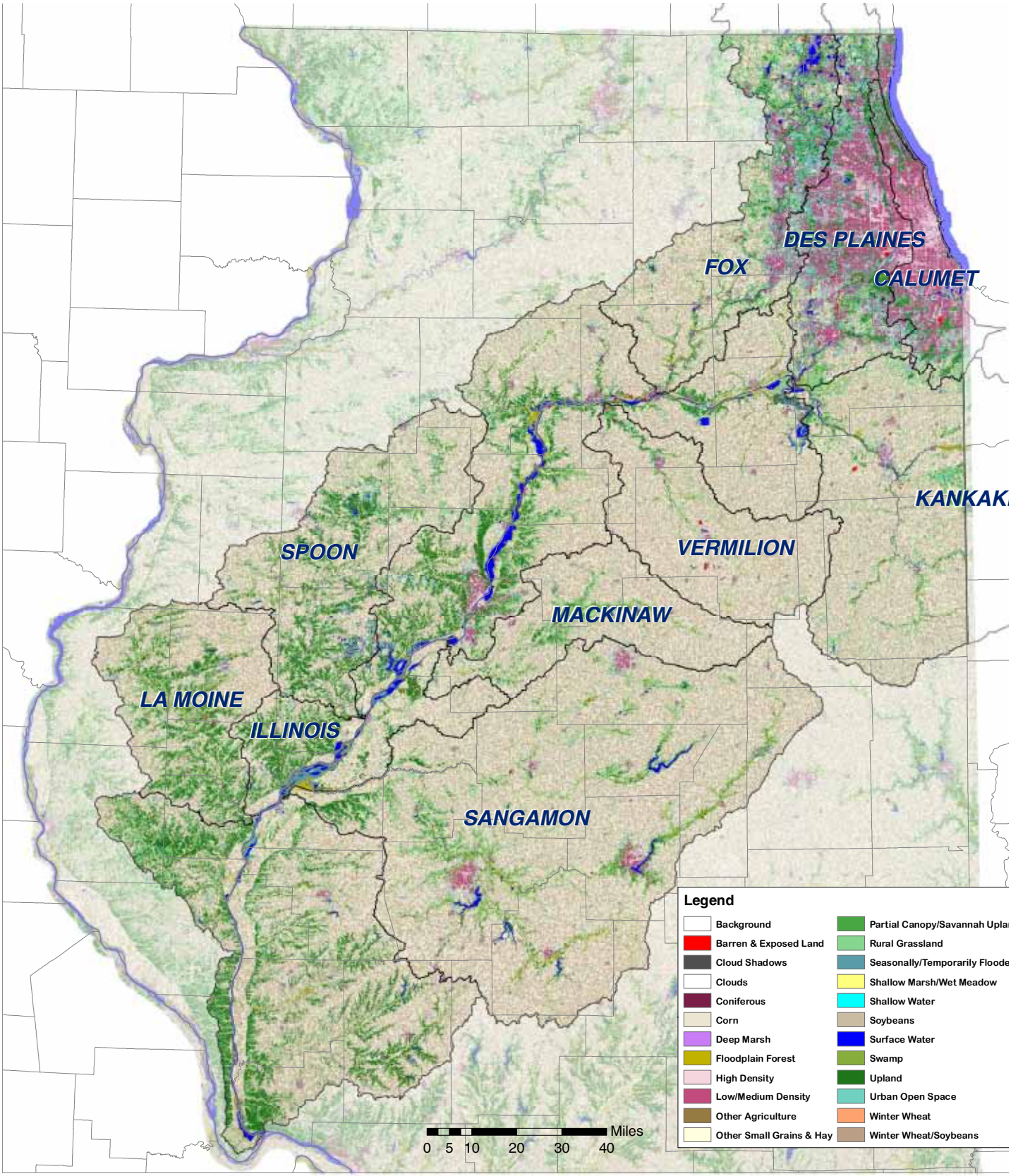
Wetlands Reserve Program (WRP) - WRP is a voluntary program authorized under the Food Agricultural Conservation and Trade Act of 1990 (Farm Bill) that offers landowners the opportunity to protect, restore, and enhance wetlands on their property. The USDA Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

Wildlife Habitat Incentive Program (WHIP) - WHIP is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land. Authorized under the Federal Agriculture Improvement and Reform Act of 1996 (Farm Bill), the USDA Natural Resources Conservation Service administers WHIP to provide both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat.

Maps

Illinois River Watershed Land Cover map

(Source: Luman and Weicherding, 1999)

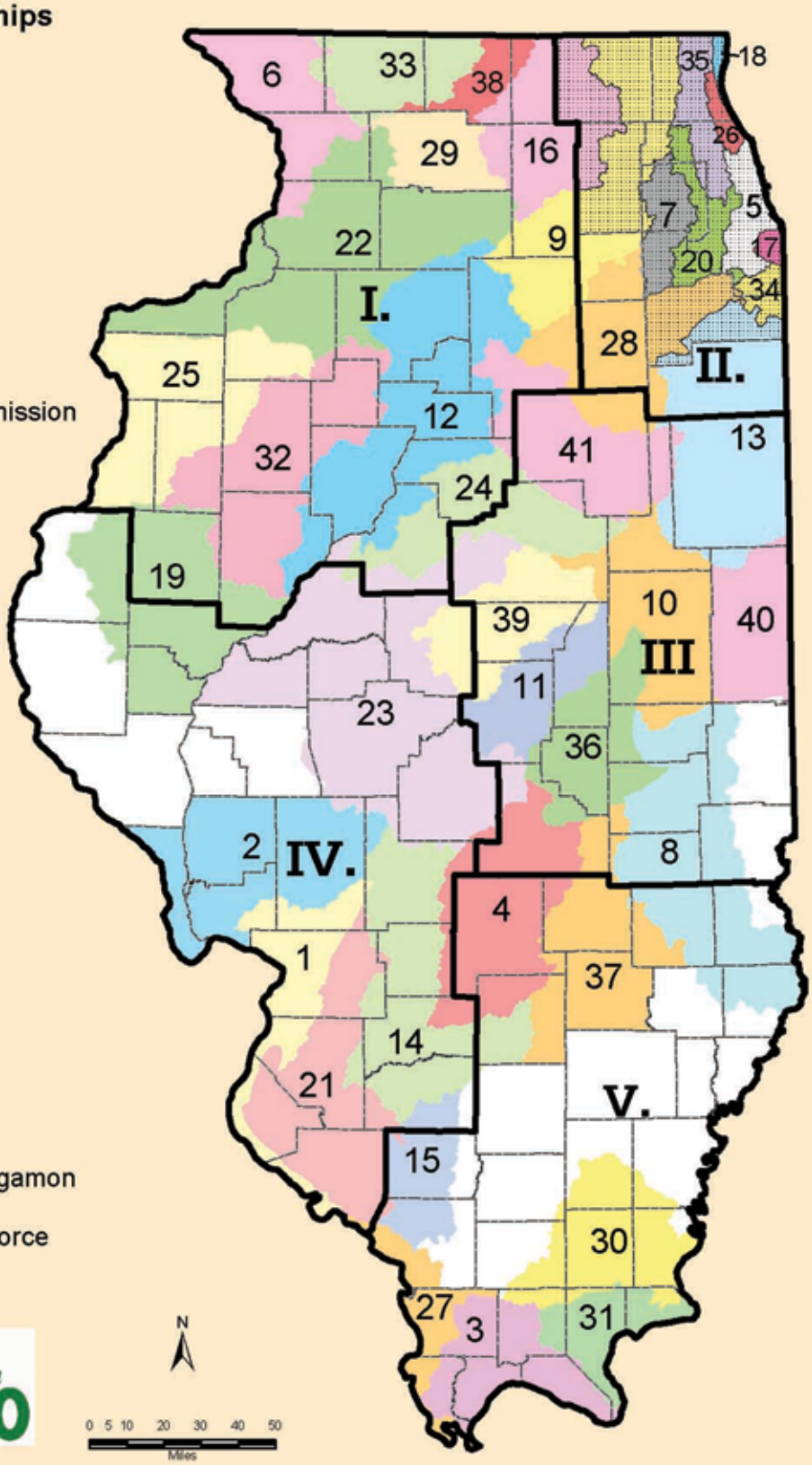


Conservation 2000 Ecosystem Partnerships

With DNR Administrative Regions

C2000 Ecosystem Partnerships

1. American Bottom
2. Big Rivers
3. Cache River
4. Carlyle Lake
5. Chicago Wilderness
6. Driftless Area
7. DuPage River Coalition
8. Embarras River
9. Fox River
10. Headwaters
11. Heart of the Sangamon
12. Illinois River Bluffs
13. Kankakee River Basin Commission
14. Kaskaskia River
15. Kinkaid Area Watershed
16. Kishwaukee River
17. Lake Calumet
18. Lake Michigan Watershed
19. La Moine River
20. Lower Des Plaines
21. Lower Kaskaskia
22. Lower Rock River
23. Lower Sangamon Valley
24. Mackinaw River
25. Mississippi Western Five
26. North Branch Chicago River
27. Ozark Hills
28. Prairie Parklands
29. Rock River
30. Saline Basin
31. Shawnee
32. Spoon River
33. Sugar-Pecatonica Rivers
34. Thorn Creek
35. Upper Des Plaines
36. Upper Kaskaskia
37. Upper Little Wabash
38. Upper Rock River
39. Upper Salt Creek of the Sangamon
40. Vermilion
41. Vermilion Watershed Task Force

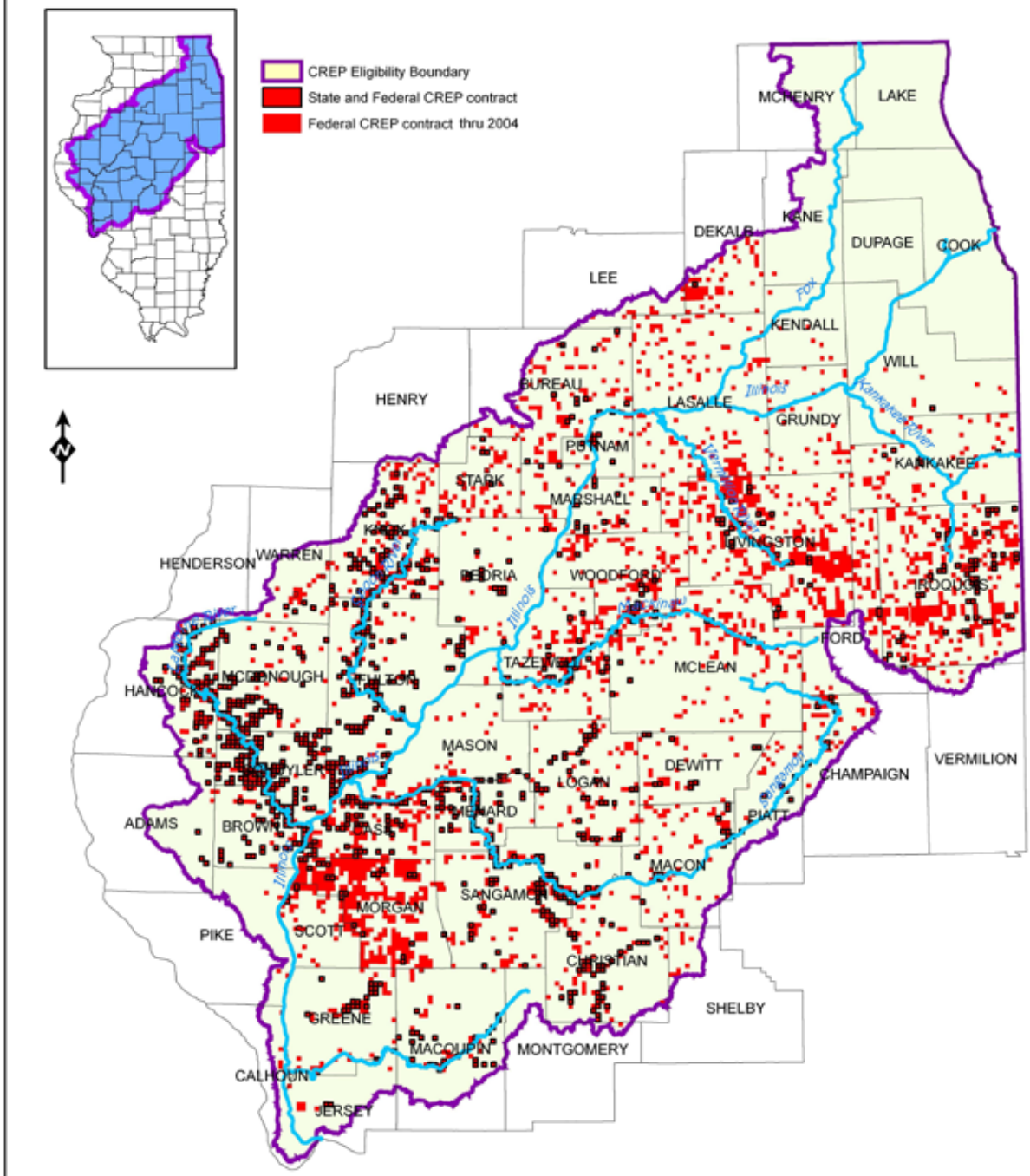


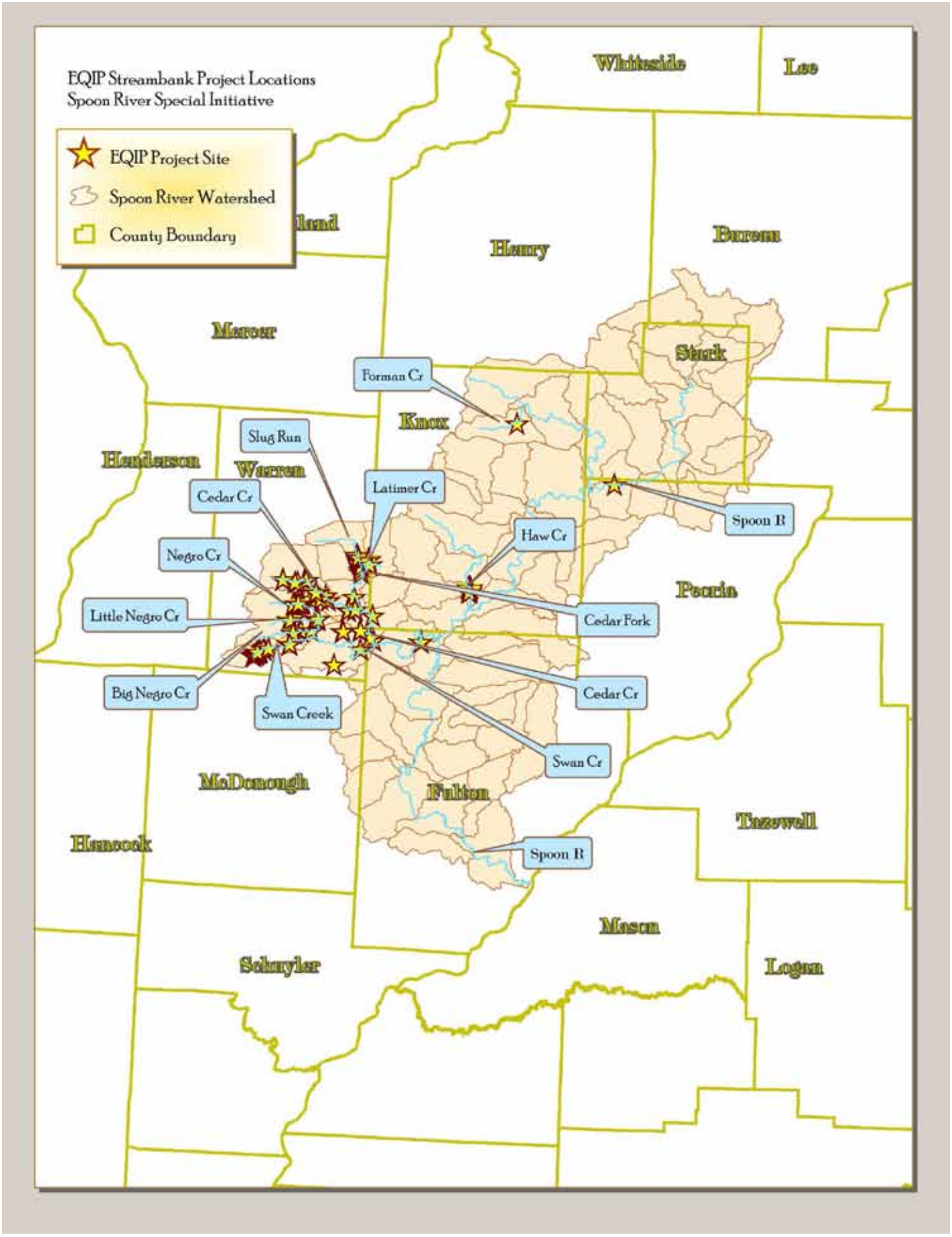
ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Conservation 2000

January, 2007
IDNR C2000 Ecosystems Program

Location of Approved Illinois CREP Contracts from the USDA and State of Illinois All Years as of 10/2008




EQIP Streambank Project Locations
Spoon River Special Initiative
EQIP Project Site
Spoon River Watershed
County Boundary
Whiteside
Lee
Henry
Bureau
Marshall
Stark
Knox
Henderson
Warren
Peoria
McDonough
Fulton
Hancock
Tazewell
Mason
Schuyler
Logan
Forman Cr
Slug Run
Latimer Cr
Cedar Cr
Haw Cr
Spoon R
Negro Cr
Little Negro Cr
Cedar Fork
Big Negro Cr
Swan Creek
Cedar Cr
Swan Cr
Spoon R

USDA-Natural Resources Conservation Service (NRCS)

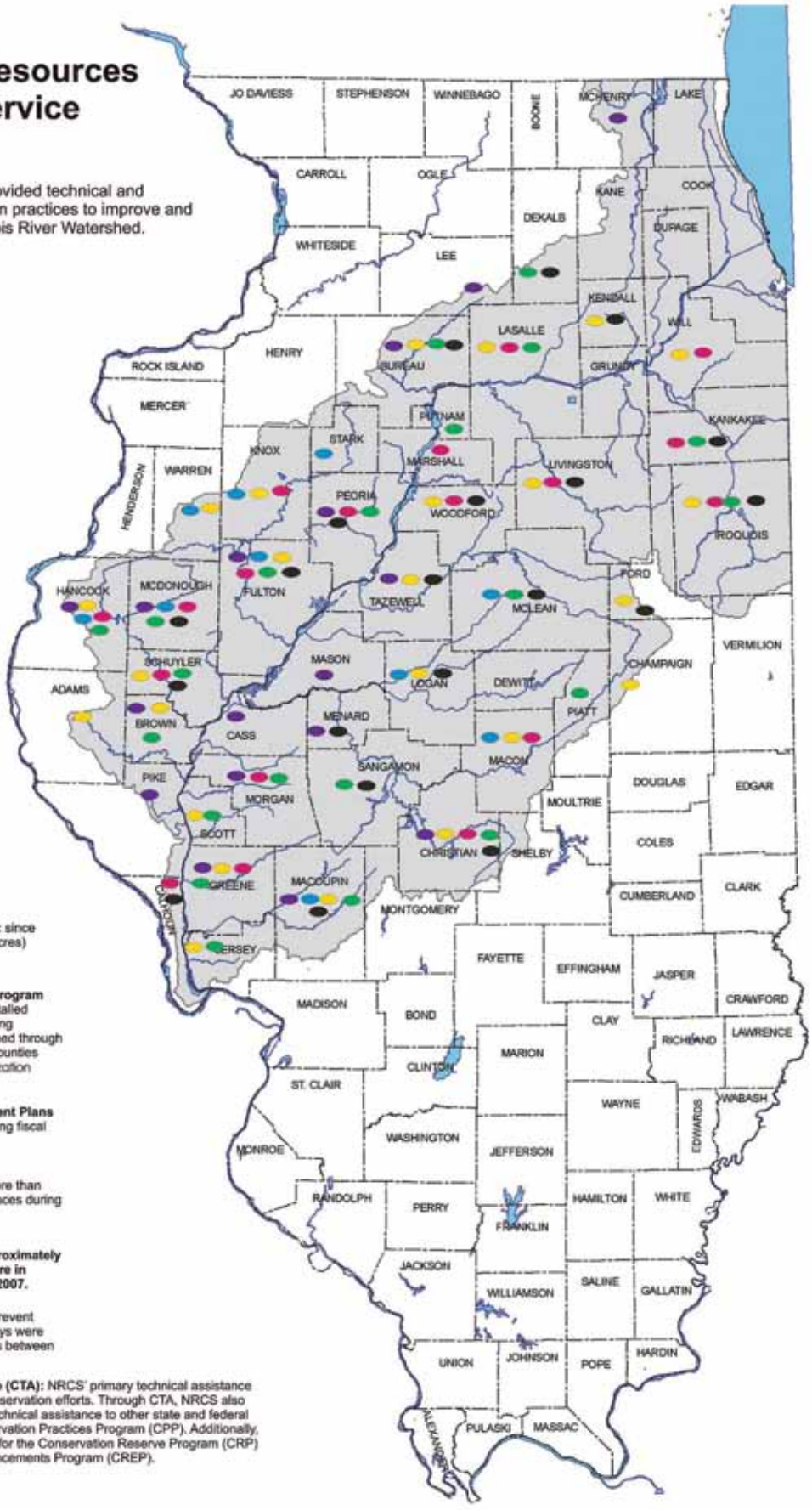
Location map where NRCS has provided technical and financial assistance for conservation practices to improve and protect the water quality in the Illinois River Watershed.

Soil Erosion Reduction

Through NRCS technical assistance with conservation practices, soil erosion is reduced significantly (approximately 1 million tons per year) in the Illinois River watershed. By applying soil and water conservation practices, in the watershed have been improved.

Many of NRCS projects are for both soil and water protection. However, some are directly related to the protection of water quality.

(Colors designate the type of practice within the county.)



Wetlands Reserve Program (WRP): since 1995, 34 contracts (approx. 11,480 acres) have been written.

Environmental Quality Incentives program (EQIP): more than 30 landowners installed streambank stabilization practices along tributaries in the Spoon River Watershed through a special project funding. Additional counties have also installed streambank stabilization practices.

Comprehensive Nutrient Management Plans (CNMP): 102 CNMP were written during fiscal years 2002-2007.

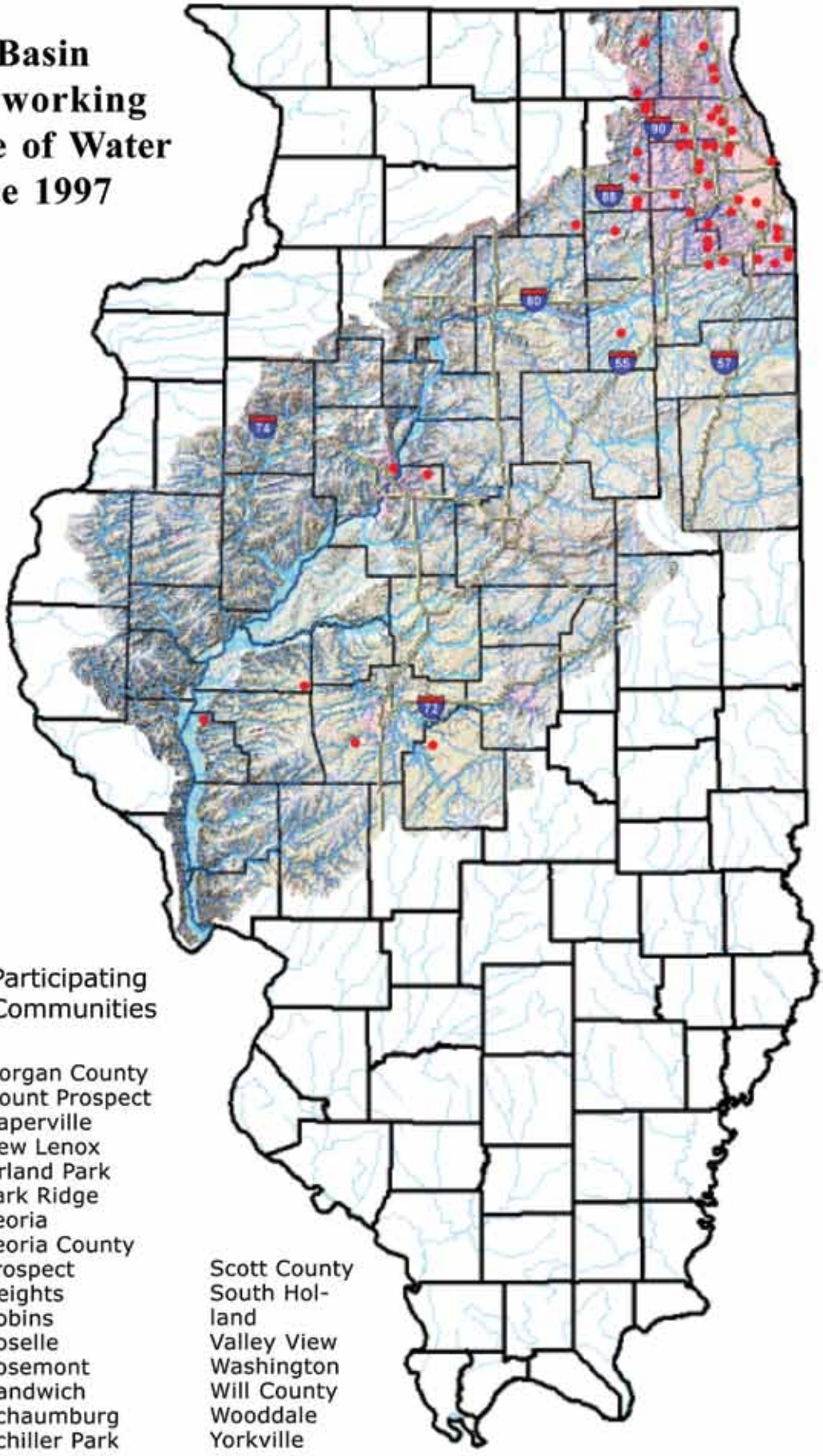
Terraces: 86 landowners installed more than 188,800 feet (almost 36 miles) of terraces during fiscal years 2002-2007.

Pasture and Hayland Planting: approximately 2,811 acres from 84 landowners were in contracts during fiscal years 2002-2007.

Waste Utilization: 107 contracts to prevent agricultural waste from enter waterways were completed on more than 35,100 acres between 2002-2007.

Conservation Technical Assistance (CTA): NRCS' primary technical assistance program to assist customers with conservation efforts. Through CTA, NRCS also provides significant time delivering technical assistance to other state and federal agency programs such as the Conservation Practices Program (CPP). Additionally, NRCS provides technical assistance for the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancements Program (CREP).

Illinois River Basin Communities working with the Office of Water Resources since 1997



Algonquin
Ashland
Aurora
Auburn
Batavia
Bensenville
Bluffs
Carpentersville
Cass County
Chicago
Chicago Heights
Cook County
Des Plaines
Dolton
DuPage County
Dundee
Dwight
East Peoria
Edinburg
Elk Grove
Elmhurst
Evergreen
Fairbury
Fox Lake
Frankfort
Franklin Park
Grundy County
Gurnee
Hickory Hills
Itasca
Joliet
Justice
Kane County
Kendall County
Lake County
Lansing
Lemont
Libertyville
Lincolnshire
Lombard
Lynwood
Matteson
Mazon
McHenry
McHenry County
Mason County
Mokena
Montgomery
Morgan County
Mount Prospect
Naperville
New Lenox
Orland Park
Park Ridge
Peoria
Peoria County
Prospect Heights
Robins
Roselle
Rosemont
Sandwich
Schaumburg
Schiller Park
Scott County
South Holland
Valley View
Washington
Will County
Wooddale
Yorkville

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Illinois Department of Agriculture (http://www.agr.state.il.us/)

Illinois Department of Natural Resources (http://dnr.state.il.us/)
- **Land Management Division** (http://www.dnr.state.il.us/lands/landmgt/)
- **Office of Water Resources** (http://dnr.state.il.us/OWR/)

Illinois Environmental Protection Agency (http://www.epa.state.il.us/)
- **Bureau of Water** (http://www.epa.state.il.us/water/)

Resource Conservation and Development Council
- **Prairie Hills** (http://www.il.nrcs.usda.gov/contact/directory/rcd.html)
- **Prairie Rivers** (http://www.prairieriversrcd.org)
- **Two Rivers** (http://www.2riversrcd.org)

The Nature Conservancy (http://www.nature.org/)

University of Illinois, Extension (http://web.extension.uiuc.edu/state/index.html)

University of Illinois
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- **Illinois State Water Survey** (http://www.iga.uiuc.edu/)
- **Illinois Sustainable Technology Center** (http://www.istc.illinois.edu/)

US Army Corps of Engineers
- **St. Louis District** (http://www.mvs.usace.army.mil/)
- **Rock Island District** (http://www.mvr.usace.army.mil/)

USDA Farm Service Agency (http://www.fsa.usda.gov/il)

USDA Natural Resources Conservation Service (http://www.il.nrcs.usda.gov/)

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