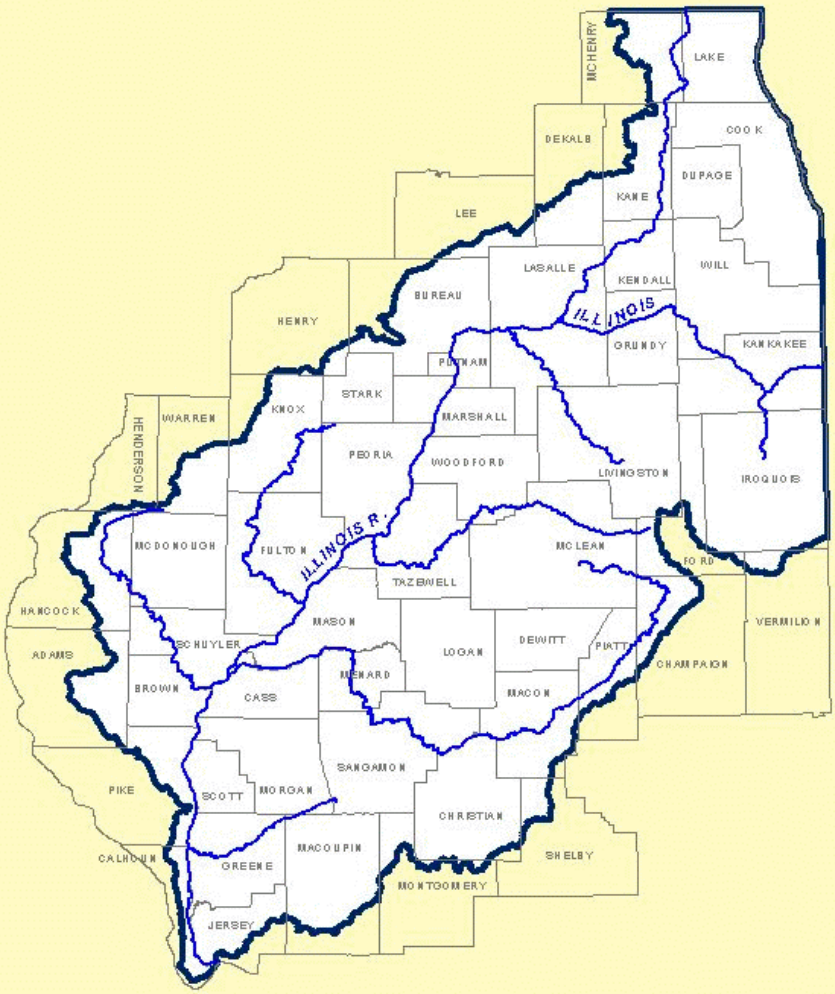
2001 Annual Report

Illinois Conservation Reserve Enhancement Program (CREP)



A Partnership Between the USDA and the State Of Illinois

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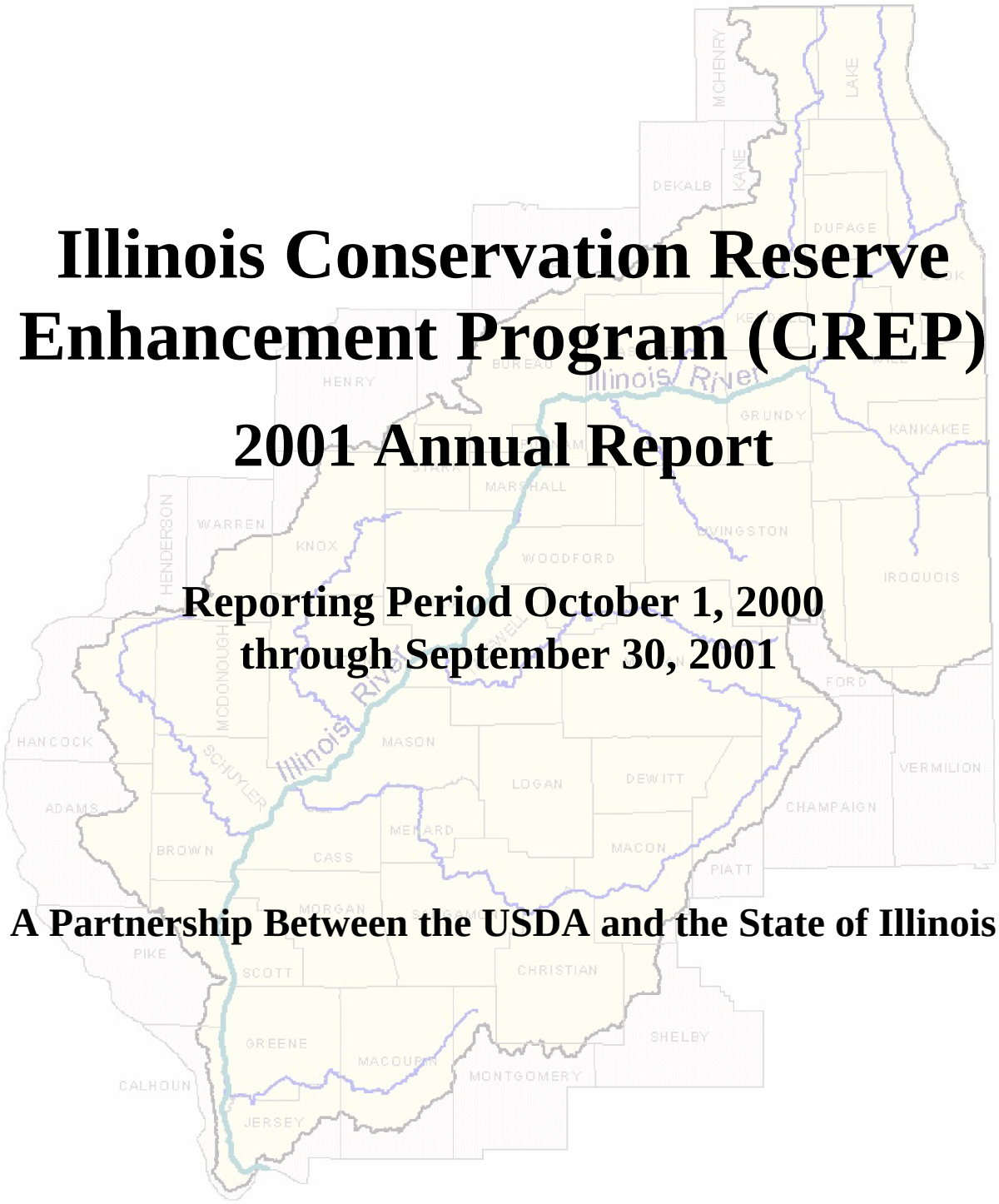

Reporting Period October 1, 2000 through September 30, 2001

A Partnership Between the USDA and the State of Illinois

Acknowledgments

Contributors to this document include the State CREP Advisory Committee, the Illinois State Water Survey (Laura Keefer, Dr. Deva Borah, Dr. Mike Demissie), the Illinois Natural History Survey (Hope Dodd), Long-Term Resource Monitoring Program (Dr. Mark Pegg), and Illinois Department of Natural Resources, Office of Resource Conservation (Valerie Njapa, Richard Mollahan, Debbie Bruce, Dr. Doug Austen, Steve Sobaski, Lisa McCauley, Susan Schneider, Nancy Rogers, Doug Carney, Steve Niemann, Bob Gottfried, and Dave Day).

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Table of Contents

Table of Contents (continued)

Table of Contents (continued)

List of Figures

List of Figures (continued)

List of Tables

List of Tables (continued)

Illinois Conservation Reserve Enhancement Program (CREP)
Reporting Period: October 1, 2000 through September 30, 2001

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 amended twice during this reporting period ultimately expanding the targeted area to include the entire Illinois watershed within Illinois and increase total eligible enrollments to 132,000 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 Resource Conservation Service (NRCS), the Illinois Department of Agriculture (IDA), 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). 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.

1. Enrollment Summary

For the reporting period of October 1, 2000 through September 30, 2001**,** the USDA-FSA enrolled 1,383 CRP contracts totaling 25,805.5 acres into CREP. The average rental rate for these contracts was $163 per acre, which includes a $127 per acre average soil rental rate plus maintenance and an average $36 per acre incentive payment.

During the same reporting period, the State approved 285 contracts enrolling 19,805.66 acres into State options. A total of 19,049.26 acres or 96.2 % of the acres in State Options are enrolled in permanent easements. Another 401.5 acres or 2.0 % are in 15 year contract extensions and 354.9 acres or 1.8% are in 35 year contract extensions. The average state incentive payment per acre for these enrollments is $506 per acre. The average cost to the State per acre is $655 per acre, which includes the incentive payment, cost-share, administrative expenses, state technical assistance and legal expenses.

2. Technical Assistance and Program Staff

Technical assistance in this program is made up of three types:

- Assistance to the landowners during the enrollment process in determining eligibility, options, and selecting approved practices;
- Assistance to landowners in implementing the approved CREP practice once the property is enrolled in the program; and
- Assistance to the SWCD and landowners in the state requirements for execution of the state easement documents.

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

The Department of Natural Resource has provided $300,031.94 from its operational funds to provide technical assistance, program administrative assistance, contract and data management, reports, training, and providing GIS coverage.

Other agencies have re-allocated staff time, as well, but as the program continues to grow and expand, all agencies are struggling to meet the program demands for all types of technical assistance.

3. Non-Federal Program Expenditures

The State obligated $13.17 Million dollars for CREP expenditures to pay for the 285 State contracts (19,805.66 acres), State cost-share expenses, monitoring costs, SWCD administrative fees and other associated enrollment and easement costs. In addition, the IDNR has provided another $300,031.94 from its operational dollars to provide for CREP Administrative Expenses, and $14,000.00 in outreach grants for SWCD support, bringing the total State dollars directly expended for CREP enrollments to $13.48 Million (Table 1).

Table 1. State CREP expenses for the reporting period of October 1, 2000 through September 30, 2001.

State Bonus Payment for State Option	$10,017,062.95
State Cost-Share Payments	$1,877,896.04
Soil and Water Conservation District (SWCD) Administrative Fees	$852,684.41
Additional Administrative Fees - Legal, Surveying, Filing Costs	$231,474.41
SWCD Outreach Grants	$14,000.00
IDNR Administrative Expenses - Contract and Data Management, Technical Assistance for CPO's, Reports, Training	$300,031.94
Monitoring	$189,832.26
TOTAL	**$13,482,982.01**

The total federal annual rent payment for the 1,383 CRP contracts (25,805.5 acres) is $4,193,587.00. The total annual incentive payment is $928,251.00. The total federal annual rent plus incentive and maintenance over the life of the 15-year contracts is $61,720,056.00. The estimated total federal cost share is $3,043,981.00.

The Memorandum of Agreement (MOA) for the Illinois CREP 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. 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 annual 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) will be used to compare the CRP payments with the State bonus payments (Table 2).

Table 2. Annual CRP payments discounted at 8% for 15 years.

Payment Year	Annual Payment	Payment Year	Annual Payment
Year 1	$4,193,587	Year 9	$2,152,229
Year 2	$3,858,100	Year 10	$1,980,051
Year 3	$3,549,452	Year 11	$1,821,647
Year 4	$3,265,496	Year 12	$1,675,915
Year 5	$3,004,256	Year 13	$1,541,842
Year 6	$2,763,916	Year 14	$1,418,495
Year 7	$2,542,803	Year 15	$1,305,015
Year 8	$2,339,379	**TOTAL 15 Years**	**$37,412,183**

The total Federal and State costs of the CREP from October 1, 2000 through September 30, 2001 was $78,247,019.00. The State's share of costs for the reporting period was $13,482,982.00. Using the 8% per annum discount rate per the MOA, the Federal costs to be used for comparison to the state expenditures are $37,412,183, resulting in a total program cost for calculation of match of $53,939,146. The State contributed 17% of the CREP total program costs before the 8% discount rate was applied and 25% of the total program costs after using the discount rate. The State has met the requirement for incurring 20% of the total program costs (Table 3).

Table 3. Total Federal and State Expenditures for the reporting period October 1, 2000 through September 30, 2001.

CRP Payments (Before Discount)	$61,720,056	**CRP Payment (Discounted 8%)**	$37,412,183
Federal Cost-Share	$ 3,043,981	**Federal Cost-Share**	$ 3,043,981
State Payments for CREP Enrollments	$13,482,982	**State Payments for CREP Enrollments**	$13,482,982
Total Program Costs	**$78,247,019**	**Total Program Costs**	**$53,939,146**

4. 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, 2001), CREP has restored and/or protected 88,426.1 acres of land either in existing native vegetation or in a previous CRP sign-up (Figure 1).

During that same time period, 58,287.66 acres were enrolled in the CREP State Options. Of these acres, 91.5% or 53,319.26 acres were enrolled in permanent easements; 5.6% or 3,299.5 acres were enrolled in 15 year contract extensions; and 2.9% or 1668.9 acres were enrolled in 35 year contract extensions.

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.

5. Special Accomplishments

On the far western edge of Illinois lies Hancock County, draining partially to the Illinois River, and partially to the Mississippi River. A landowner who has been working with state foresters for over a decade offered the state the unique opportunity of enrolling 272 acres of uplands immediately adjacent to the CREP enrollment at the same rate as the CREP Program through another State Program entitled Conservation 2000. The landowner enrolled a 735 acre parcel of land in CREP that includes approximately 3 miles of riparian corridor along the La Moine River, tributary to the Illinois River. This enrollment connects with previous CREP enrollments, interconnecting the riparian corridor for several more miles. The landowner has been active in the CRP Programs in the past, planting most tillable acres to trees. The balance of the acreage is in woodland, hay fields, and pasture. Enrollment of these acres eliminated the possibility of future farming and grazing in these areas.

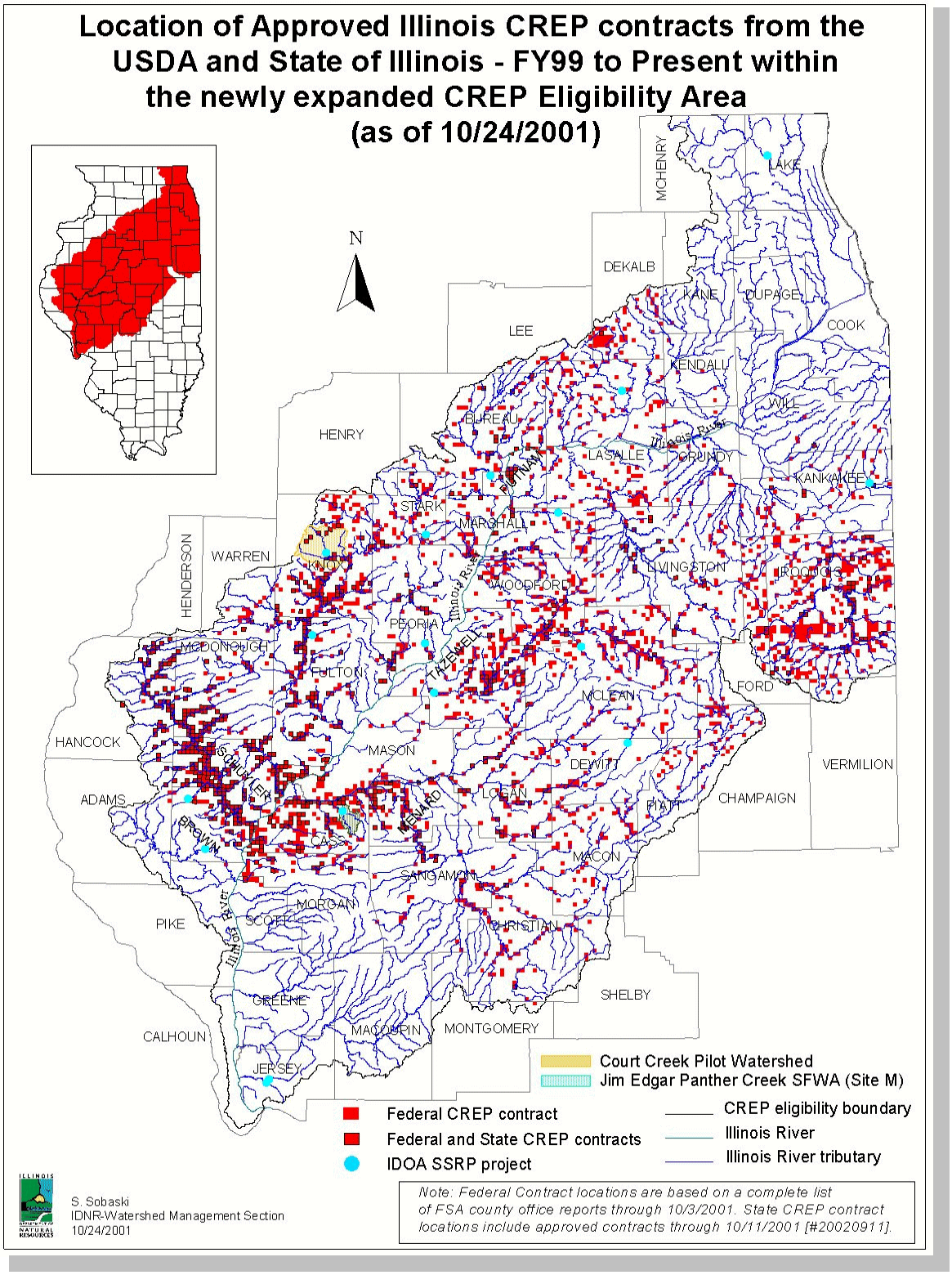


Figure 1. Map of the CREP enrollments in the Illinois River Basin through October 24, 2001.

Our opportunity to enroll the 272 acres of uplands at the CREP rate substantially reduced the easement costs, protected the area from development, and allowed us to develop a seamless transaction of both CREP and Conservation 2000 funding to the landowner in a single easement document. As all of these acres are now in a permanent easement, long-term protection of the riparian corridor, and the uplands draining into the riparian area, are protected from adverse land use activities. The State will be looking to partner with the Conservation 2000 Program as opportunities arise.

Another example of program coordination is on a parcel of land enrolled in the CREP program that is the focal point for the in-stream construction of Newbury weirs. These weirs would protect the stream bank from future degradation by erosion activities. The funds for the work on this project are from the Illinois Department of Agriculture's Streambank Stabilization and Restoration Program (SSRP), and technical support is being provided by USDA-NRCS. CREP sites have become, in some cases, focal points for targeting of limited resources in order to maximize effect, and assure stable land use.

6. 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 some of the programs that contributed to achieving the goals the State has set for the Illinois River Basin. State or non-federal dollars that have been expended in these programs have not been included in the previous section that describe and list the direct state expenditures for CREP match.

A. ILLINOIS DEPARTMENT OF AGRICULTURE-ILLINOIS RIVER BASIN

- Through September 30, 2001, with state funds appropriated in FY01, $1,557,648 has been spent on upland soil and water conservation practices in the 53 counties that comprise the Illinois River watershed, through the Conservation 2000-Conservation Practices Program. An additional $1,100,103 is earmarked for conservation practices now under construction. The program, administered by the Department and county soil and water conservation districts (SWCD), provides 60% of the cost of constructing eligible conservation practices that reduce soil erosion and protect water quality. Eligible conservation practices include terraces, grassed waterways, water and sediment control basins, and grade stabilization structures, among others. From July, 2000 through September, 2001 approximately 783 individual conservation projects were completed in the Illinois River watershed. This resulted in 35,264 acres being benefitted by the program. Soil loss was reduced to T or tolerable levels, as well as control of gully erosion, on this land. In addition, over 157,000 tons of soil have been saved and will continue to be saved each year.

- In FY2001, the State of Illinois, through the Department of Agriculture, provided nearly $3.6 million to the 51 county SWCDs in the Illinois River watershed. Funds are used to provide financial support for SWCD offices, programs and employees salaries. Employees in turn, provide 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 stream banks that would otherwise contribute sediment to the Illinois River and its tributaries, the Department is administering the Streambank Stabilization and Restoration Program (SSRP). The SSRP, funded under Conservation 2000, provides monies to construct low cost, vegetative or bio-engineered techniques to stabilize eroding stream banks. In FY2001, 47 individual stream bank stabilization projects, totaling $288,544, were constructed in 23 counties within the Illinois River watershed. In all, 23,854 linear feet of stream bank, or more than 4.5 miles, have been stabilized thereby protecting adjacent water bodies.

- Another Conservation 2000 program administered by the Department of Agriculture that is helping to protect the environment, especially water quality, is the Sustainable Agriculture Grant Program. Grants are made available to agencies, institutions and individuals for conducting research, demonstration or education programs or projects related to profitable and environmentally safe agriculture. In FY2001, $386,614 was awarded to 17 grant recipients with programs or projects in the Illinois River watershed. Their work in such areas as alternative crops, nitrogen rate studies, residue management and other important research is helping to protect the Illinois River watershed.

B. ILLINOIS ENVIRONMENTAL PROTECTION AGENCY-ILLINOIS RIVER BASIN

The Illinois EPA has been an active member of the State's CREP Advisory Committee since its inception in 1998. Through programs such as Section 319 of the Clean Water Act, the Illinois EPA has been able to provide financial support for staff to assist 16 counties in their enrollment efforts. As of November 2, 2001, those 16 counties constitute approximately 54,500 acres of the 94,300 enrolled acres (58%) and approximately 13,400 of the 35,300 pending acres (38%) yet to be enrolled in the federal side of CREP.

This type of success demonstrates the need to provide assistance not only in counties with high landowner interest, but also in other counties needing enhanced marketing of the program to improve sign-up. Illinois EPA will evaluate contract renewals to continue this support in the coming year and work towards future participation in expanded areas and consideration of new contract areas.

C. FEDERAL PROGRAMS CONTRIBUTING TO THE GOALS FOR THE ILLINOIS RIVER BASIN

The Environmental Quality Incentives Program (EQIP) has or is currently funding 15 priority areas in the Illinois River Basin. The EQIP program works to provide technical, financial, and educational assistance to farmers and private landowners who are faced with serious threats to soil, water and related natural Resources. Currently, the EQIP program has spent approximately $4.2 million for financial and educational assistance in the Illinois River Basin to treat Natural Resource concerns on approximately 277,000 acres working with approximately 2,593 landowners. Approximately, $1.5 million is planned for financial and

educational assistance in priority areas and statewide resource concerns for 2002.

The Wildlife Habitat Incentive Program (WHIP) provides assistance to people who want to develop and improve wildlife habitat primarily on private lands. Statewide the program has worked with approximately 380 producers to improve wildlife habitat on approximately 9200 acres. Approximately, $300,000 was spent to enhance or create wildlife habitat through this program. Approximately 25% of the WHIP financial assistance has been put in place in the Illinois River Basin.

The Wetland Reserve Program (WRP) increases wildlife habitat and improves water quality by providing increased wetland habitat, slowing overland flow and providing a natural pollution control. To date, approximately $3.9 million have been spent in the Illinois River Basin on Wetland Restoration, covering 2700 acres and working with 17 producers.

The Forestry Incentives Program (FIP) provides an avenue of assistance to private landowners for planting trees, improving timber stands, as well as other non-industrial private forest land practices. In the Illinois River Basin, approximately $21,000 have been spent to treat approximately 520 acres through 21 producers. Approximately $15,800 will be spent on timber practices in the Illinois River Basin, through FIP in 2002.

CRP enrollments beyond the CREP Program enrollments provide additional in-place conservation practices facilitating resource management in the Illinois River Basin. A total of 34,182 acres were enrolled in other CRPs during this time period.

D. ILLINOIS FARM BUREAU

Illinois Farm Bureau (IFB) continues to publicize and promote the Conservation Reserve Enhancement Program (CREP). In 2001, several articles in FarmWeek provided information about aspects of the program and contained details about the number of contracts and the total acres involved in the program. Information was also distributed regarding changes in eligibility and expanded areas of CREP. Interviews with participating farmers were done to help publicize the program and IFB covered the Illinois State Fair press conference on CREP expansion. Additionally, IFB used our statewide radio network to highlight aspects of the program.

Information on CREP was sent directly to county Farm Bureaus (CFB) via e-mail and through our CFB mail system. An Illinois Farm Bureau statewide workshop on voluntary programs for farmers included information about CREP.

Illinois Farm Bureau supported the Illinois River 2020 Program, of which CREP is a component. We also continue to serve on the CREP Advisory Committee and provide input into the program.

E. THE NATURE CONSERVANCY

The Nature Conservancy supports the Illinois Conservation Reserve Enhancement Program and sees it as an important tool in implementing restoration work in the Illinois River watershed. The Conservancy promotes the program in the areas where it works and this year hired a land protection specialist who will work with landowners in Conservancy priority areas to encourage them to enroll eligible lands into CREP.

Other accomplishments: The Illinois River and its watershed is a high priority for The Nature Conservancy. In 1997, the Conservancy worked with scientists, biologists and other

experts to write a conservation plan for the Illinois River watershed, which helps guide the work of the Conservancy. Some of the strategies identified in the plan include restoration of large floodplain habitat, reduce Illinois River bluffs erosion, and work in agricultural and urban areas to reduce run off.

The restoration work at Spunky Bottoms, the Conservancy's preserve in Brown County, is an example of floodplain restoration and will be used as a guide in restoration of the Emiquon project in Fulton County. Emiquon and Spunky Bottoms will one day likely have reconnection structures in the levees along the Illinois River to allow a managed connection to the river that will allow aquatic organisms access to the restored habitats to feed and breed.

The Mackinaw River is an important area for the Conservancy where targeted outreach efforts have increased the number of BMPs installed on agricultural lands, including CREP contracts. Funding from the Kellogg Foundation is giving The Nature Conservancy the ability to monitor the impact of these BMPs on the tributaries to the Mackinaw River.

In the past two years, the Conservancy has been concentrating staff time into addressing urban threats to the Fox River, a tributary to the Illinois River. With the recent hiring of a conservation engineer, the protection of biological diversity is being integrated into urban development.

F. UNIVERSITY OF ILLINOIS-EXTENSION

In 2001, Extension, IDNR and the Illinois Environmental Protection Agency forged a new relationship. With three years of funding provided by the three parties and support from members of the CREP Advisory Committee, two new Extension Educators are now in the field and developing a comprehensive information program for landowners and a consistent set of training materials for staff from all the agencies and organizations responsible for implementing CREP. During the second half of the three-year agreement, the two Educators will focus their efforts on watershed problems and the development of an education program for identifying and implementing economically sound, resource-enhancing solutions. Three years of progress will hopefully set the stage for an even stronger partnership and commitment to continue the work.

7. Recommendations And Future Plans

As identified in the opening of this report, the eligible enrollment area and acres were increased in mid-August, 2001. Soon after the announcement of this expansion, there was a significant increase in enrollments, upwards of 1400% increase in one week and about 300% in most others until the State and Federal CREP Programs were required to freeze enrollments. Appropriations for state fiscal year had been obligated, and the 132,000 cap on the Federal side would be shortly obtained based on executed and pending contracts as reported by the FSA Field Offices. This sudden rush of enrollments following the August 2001 authorization of additional CREP acres in Illinois re-affirms the CREP Advisory Committees decision to pursue the additional acres and expand the eligible CREP area to encompass the entire Illinois River Basin.

Future Plans

1. Continue to pursue long-term additional staff to assist SWCDs in the administration of the CREP Program at the County level.

2. Continue efforts to obtain additional CREP acres, while securing financial resources for the State's obligations under the Agreement with USDA.

3. Through contractual assistance with the University of Illinois Extension, provide a web site for the Illinois CREP Program that will assist SWCDs and landowners with information on the program and downloadable forms necessary to prepare enrollments.

4. Continue to hold training and workshops, as needed, for all field staff as a means of updating staff on issues, and refinement of the enrollment process.

5. Refinement and implementation of the State's CREP site review procedures will be completed and in place for use by SWCDs and IDNR staff for site reviews.

Other Recommendations

- A guidance document or manual for tax issues for the program needs to be developed to cover income tax, property tax and capital gains tax information.

- Additional funding should continue to be sought for dedicated full-time staff to provide technical assistance to landowners in the following Agencies: NRCS, IDNR, and SWCDs.

- Once the CREP Program is re-opened in Illinois, the marketing tool for absentee landowners should be completed.

Assessment of the Illinois River Conservation Reserve Enhancement Program (CREP) For Attaining the Four Restoration Goals

8. Review of the Four Illinois CREP Goals

In the Illinois River basin, excessive sediment and nutrients are seriously degrading the quality of this geologically and biologically-diverse area. Once a national-esteemed river for its abundant waterfowl (Havera 1999), commercial fishery and mussels, these attributes have been diminished due to a variety of sources, including sediment and nutrients. Therefore, the goals of CREP have been developed to address these most significant concerns. These goals are to:

1. Reduce the amount of silt and sedimentation entering the mainstem of the Illinois River by 20 percent.
2. Reduce the amount of phosphorus and nitrogen in the Illinois River by 10 percent.
3. Increase in the Illinois River watershed by 15 percent the populations of waterfowl, shorebirds, nongame grassland birds, and state and federally listed threatened and endangered species such as bald eagles, egrets, herons; and
4. Increase the native fish and mussel stocks by 10% in the lower reaches of the Illinois River (Peoria, La Grange, and Alton Reaches).

The intent of the monitoring component of the Illinois CREP is to ensure that the program is effective in working towards the established goals. The monitoring results will also provide guidance for future modifications of the CREP rules, should it be determined that the program is not providing the desired results. However, it should also be apparent from the discussions below that directly linking the ecological and physical responses in the basin to CREP will be difficult and for some aspects it will be impossible. However, we believe that it will be possible to demonstrate the projected impact of CREP and, in fact, provide verifiable quantification of the CREP impacts for some characteristics.

9. CREP Monitoring Design

Approaches for Assessment of CREP

Due to the immense geographical coverage and interrelatedness of many variables, the monitoring for CREP uses several sources of data to assist with documenting change in response to implementation of practices. This diverse approach provides for the development of CREP-specific assessment, as well as the use of corroborative projects. This approach to monitoring of the Illinois CREP relies upon three main sources that include:

1. intensively monitored experimental watersheds,
2. use of extant data and programs that were developed for purposes other than CREP monitoring, and
3. modeling of species responses to habitat modification.

Each of these three approaches will be used to provide information on multiple goals and are discussed below.

10. Intensively Monitored Watersheds

Background

Assessment of the efficacy of CREP in meeting the program's biological and water quality goals is initially focused in two study areas: the Court Creek watershed in the Spoon River basin and the IDNR Jim Edgar-Panther Creek State Fish and Wildlife Area in the Sangamon River basin.

Court Creek is one of four watersheds participating in the interagency Illinois Pilot Watershed Program (see below). One of the focal points of this program involves intensive monitoring to answer the following questions:

(1) Is increased implementation of conservation practices (BMP) in the pilot watersheds effective in improving natural resource quality?

(2) What level of BMP implementation is needed to achieve a "significant" improvement in stream quality?

Study Design and Analytical Procedures

To address these questions, a biological and water quality assessment program has been designed using a *paired watershed* approach (Stewart-Oaten *et al.* 1992) for Court Creek as well as the other pilot watersheds. In each pilot watershed basin, a single watershed has been identified as a "treatment" watershed (e.g., Court Creek) to receive an elevated intensity of best management practices (BMPs), including CREP. The pilot watershed is then paired with a reference watershed (e.g., Haw Creek in the Spoon River basin) that is similar in size, location, land cover, and physical and biological attributes. In this reference watershed, BMPs will be

applied at an ambient intensity. Identical monitoring protocols for a variety of parameters are then conducted at upstream and downstream sampling locations within each watershed.

In the Pilot Watershed (i.e., Court Creek), both the pilot (i.e., treated) and reference watersheds are divided into an upper and lower part. A monitoring site is located in the middle (P_U = pilot upper; R_U = reference upper) and lower (P_L = pilot lower; R_L = reference lower) subwatersheds. As designated by sampling protocols, a suite of biological, habitat, hydrological and water quality data are collected at these sites. The significance of this sampling design is the ability to establish baseline data, accounting for the difference between the treated and reference watersheds, prior to intense implementation of BMPs. For example, to assess the effects of BMPs in the upper portion of the pilot watershed we calculate, for any parameter of interest (e.g., the number of fish species), the difference between the pilot and reference watershed ($d_U = P_U - R_U$) prior to the start of intensive BMP implementation within the pilot watershed. Then, during the period following the intensive implementation of BMPs, test for a significant change in d_U for each parameter being monitored. This comparison is likewise repeated for the lower watershed monitoring sites.

Similarly, in Jim Edgar Panther Creek State Fish and Wildlife Area, the two watersheds, Panther Creek and Cox Creek serve as treated and reference systems. Hydrologic and sediment monitoring are conducted with the same sampling protocols as in the Pilot Watersheds (e.g., Court Creek) however, biological sampling, exclusively fish, has been conducted but at a lower frequency than in the Pilot Watersheds.

A. The Pilot Watershed Program and CREP in Illinois

In 1997, Illinois initiated a multi-agency coordination of watershed restoration activities, on four watersheds. Designated the Pilot Watershed Program, the cooperating agencies were responsible for natural resources, agriculture and water quality issues. The initial criteria for selection of watersheds for this project was based on mutual agency programmatic interests. For example, using GIS we matched IEPA targeted watersheds, NRCS conservation priority areas, IDA “T by 2000" soil conservation priority counties, and IDNR Conservation 2000 Ecosystem Partnerships. Following this selection, recommendations were gathered from agency field staff and local citizens for the final designation of watersheds. The Pilot Watershed Program is not a new program, rather it uses ongoing initiatives from each of the participating agencies to help implement four main goals.

Goals of the Pilot Watershed Program

1. to help stakeholders improve their watershed
2. to enhance multi-agency coordination for funding, research, and implementation of watershed activities
3. to evaluate the effectiveness of watershed management practices and
4. to serve as showcases for watershed management.

One of the four Pilot watersheds is Court Creek, located within the Spoon River Basin of the Illinois River (Figure 2). This 98 square mile watershed has many features characteristic of west-central Illinois and the western portion of the Illinois River valley. Topography is moderately steep and rolling with intensive row-crop agriculture in the flat areas and pasture on steeper grades. Other landuses include forested uplands, abandoned strip-mined lands, livestock facilities and small urban areas.

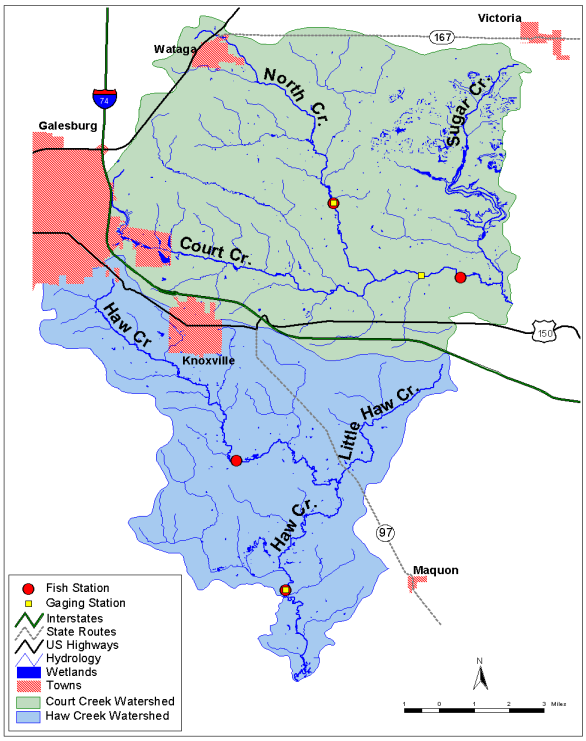


Figure 2. Map of Court Creek (pilot) and Haw Creek (reference) watersheds located in the Spoon River Basin.

In Court Creek, a local citizen-based watershed planning committee, through an iterative process with the agencies and a series of public meetings, has developed a watershed plan and scope-of-work. The watershed plan provides background information on the watershed, delineates the concerns of the stakeholders, and explains the goals and objectives of the plan. Upon completion of the plan, a scope-of-work was developed to document the types of practices and details of implementation. In September 2000, a $1 million grant agreement was authorized by the IDNR to the Knox County Soil & Water Conservation District, for implementation of the watershed plan.

Implementation of best management practices began in 2001 and included the installation of 14 rock riffles in a one mile reach of North Creek, two wetlands and a water retention structure. The project reach of North Creek was identified by Illinois State Water Survey scientists as a significant source of sediment. Here, channel incision was leading to banks exceeding their critical height and consequently serving as direct sources of sediment to the stream system. Other practices installed in the Court Creek watershed, as part of the Pilot Watershed Program, include wetlands and water retention structures. All of these practices are directed towards addressing Goals and Objectives identified in the *Court Creek Watershed and Restoration Plan* (Ortlieb and Hall 2000).

As noted earlier, one of the goals of the Pilot Watershed Program is the evaluation of practices at the watershed scale. Because of the interconnectedness of features in a watershed, the monitoring program has been developed to cover several major components including stream hydrology, sediment, nutrient transport, fish, macroinvertebrates, erosion (sheet, rill, gully and streambank) and instream habitat. Hydrologic and sediment assessments are underway and assessments of freshwater mussels, shorebirds, upland habitat and wildlife are also being considered. These assessments will be used to evaluate the performance of the best management practices (BMPs), including but not limited to CREP. It is important to understand how a group of practices, including their position and sequence, affect a watershed. Standard practices that

have been determined to perform well at a plot or field scale may have different responses at this landscape scale.

A multi-scale evaluation can guide future assessments efforts. For example, on North Creek, researchers are monitoring the biological responses (i.e., fish and macroinvertebrates) to the rock-riffles to assess local effects, while the established monitoring sites are used for the watershed scale evaluations. As new practices are developed, it is important to determine their effectiveness in treating a problem, at several scales.

B. Jim Edgar Panther Creek State Fish and Wildlife Area

Acquired by the Illinois Department of Natural Resources in 1993, the 24 miles^2 conservation and recreation area comprises substantial portions of two watersheds, Panther Creek (18 miles^2) and Cox Creek (26 miles^2) (Figure 3). In the 16,174 acre conservation area, 3,361 acres are actively cropped, with former agricultural areas converted to various wildlife habitats. The watersheds are typical of the Illinois River bluffs and are sources of excessive sediment into the Illinois River. In these watersheds, incised stream channels and high rates of bank erosion are major sediment contributors.

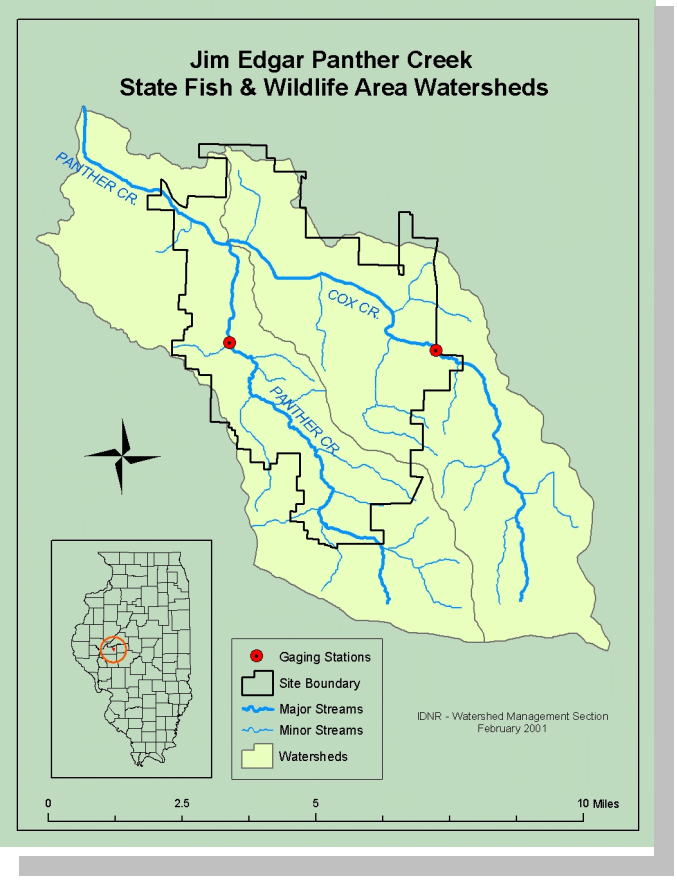


Figure 3. Map of the gaging stations and Jim Edgar Panther Creek State Fish & Wildlife Area watersheds.

Panther Creek, functioning as a "treated" area, has approximately 44 % of its 17,818.1 acre watershed located within the boundaries of the conservation area with approximately 60% of the area upstream of the ISWS water quality monitoring station, maintained by the IDNR. By comparison, Cox Creek serves as a "reference" watershed. Approximately 43% of its 16,772.8 acre watershed is located within the IDNR managed (includes agricultural lands with conservation tillage) area however, the water quality monitoring station on Cox Creek is located at the upper boundary of the State-managed area. At this location over 99% of the area upstream is in private ownership. Thus, these areas allow evaluation of differences between a managed area and an area that is considered typical of similar-sized watersheds in west-central Illinois that is not receiving the intensive management.

This area provides a rare opportunity to better-understand soil erosion and transport in small watersheds of the Illinois River Valley.

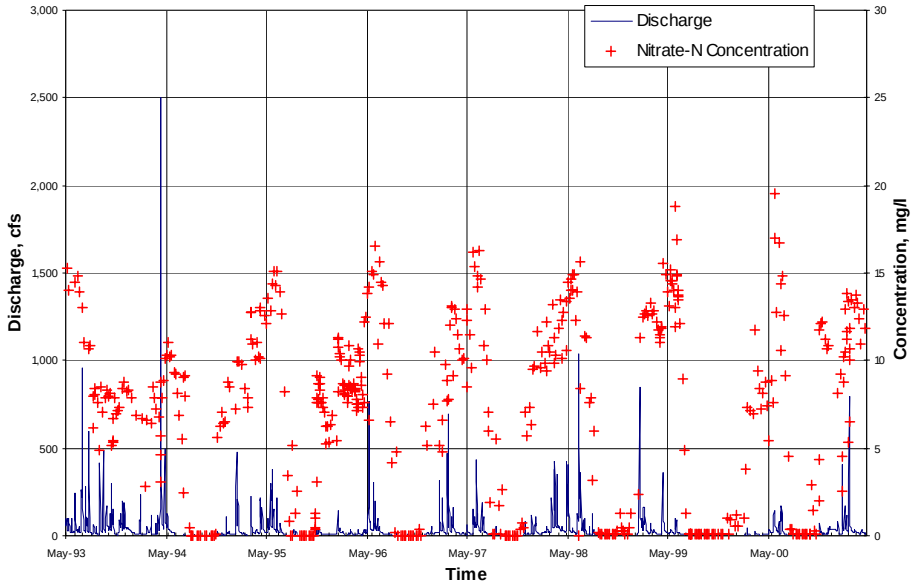
Instream remediation (e.g., installation of pool and riffle grade control structures) were installed on lower Panther and Cox Creeks in 1997, prior to the implementation of the CREP monitoring. However, the gaging stations are located upstream of these practices and thus should have minimal influence on data obtained from the gaging stations. The gaging stations should provide valuable information on sediment concentrations as upland practices are implemented in the State-managed area.

C. Monitoring in the Lake Decatur Watershed

Lake Decatur has been experiencing water quality problems for over 25 years and several studies by different federal and state agencies have documented these problems. Most of the concerns are associated with non-point source pollution generated in the watershed of the Upper Sangamon River, an area recently added to the Illinois River CREP. The Illinois State Water Survey (ISWS) has been collecting weekly nitrate-N samples and continuous streamflow in the Upper Sangamon River watershed (funded by the City of Decatur) for the past eight years (Demissie *et al.* 1996, Keefer *et al.* 1996, Keefer *et al.* 1997, and Keefer and Demissie 1999, 2000, 2002 *in preparation*). In this watershed, Lake Decatur is the drinking water reservoir for the city and the lake water's generally have high levels of total suspended solids and nitrates. Since the early 1980's levels of nitrate-N in the lake have often exceeded drinking water standards. A grant from the Illinois Council on Food and Agricultural Research (C-FAR) Water Quality-Strategic Research Initiative (WQ-SRI) has enhanced the nitrate-N data already being collected at three of the eight stations in the ISWS Lake Decatur Watershed study (Big Ditch, Camp Creek, and Sangamon River at Monticello) by adding sediment and all nitrogen and phosphorous species for analysis.

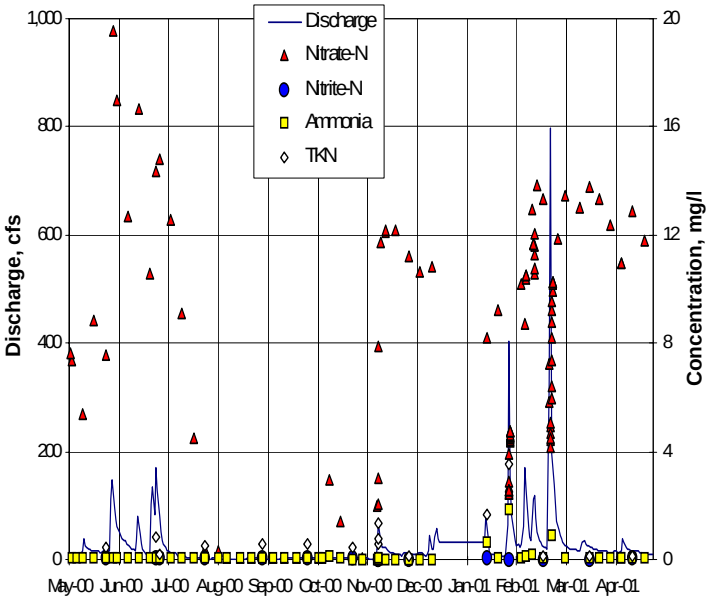
This C-FAR WQ-SRI study is part of a coordinated research effort being conducted in the Monitoring, BMP and Modeling groups of the Mass Balance Team and not only provides the surface water component of the nutrient mass balance study but assists the City of Decatur with better data for the ISWS study and leverages their research grant. Studies are conducted upstream of the Big Ditch station, which acts as the control near the base of the watershed. A website details each of the projects funded in the WQ-SRI (**http://web.aces.uiuc.edu/sriwq**). Being able to monitor stream-transported nutrients in a more intensive manner can contribute to a better understanding of the contribution to the overall mass balance. The data are collected in tandem with in-stream and tile studies located upstream, which provides temporal cohesiveness between each of the mass balance components being investigated. The intended outcome of the coordinate research effort is to collect the data needed to model the interactions and transport of nitrogen, and thereby understand what projects and management plans need to be installed and evaluated to reduce nitrogen losses from agricultural watersheds and impacts to stream habitat.

Nitrate-N data have been collected at the Big Ditch station since May 1993 (Figure 4). Concentrations fluctuate throughout the year with annual peak values occurring during the months of May and June. Also shown is the mean daily discharge at the station for the same period. The nitrate-N fluctuation can be seen and the other nitrogen species are shown to be fairly low throughout the year except during mid-winter storms (Figure 5).



Nitrate-N concentrations and discharge for Big Ditch station, May 1993 - April 2001

Figure 4. Concentrations of Nitrate-N and discharge for Big Ditch, Sangamon River watershed for the period of May, 1993- April, 2001. Source: Illinois State Water Survey, Champaign, IL.



Nitrogen concentrations (mg/l) and discharge (cfs) for Big Ditch station, May 2000 - April 2001

Figure 5. Nitrogen concentrations and discharge for Big Ditch, Sangamon River watershed for the period of May, 2000-April, 2001. Source: Illinois State Water Survey, Champaign, IL.

11. Extant Data: Other Data Collection Within the CREP Area

A. Mapping Conservation Practices in the Illinois CREP eligibility area

CREP Enrollment Tracking

Progress has continued during this reporting period to document conservation enrollments in CREP in a twofold manner. The general location of all Illinois CREP enrollments (USDA and State) based on Illinois Public Land Survey section(s) has continued to be tracked in the PC-based CREP Enrollment Database, managed by the Illinois Department of Natural Resources (IDNR) Watershed Management Section and first described in the 2000 Illinois Conservation Reserve Enhancement Program annual report. Reports of new CREP contracts are submitted monthly to the State FSA office by all FSA county offices participating in the program. Data from these reports are then provided to IDNR where they are consolidated with State CREP contract information, maintained by IDNR, to form the CREP Enrollment Database. The Enrollment Database is the only comprehensive source of enrollment data for the Federal and State portions of Illinois CREP enrollments.

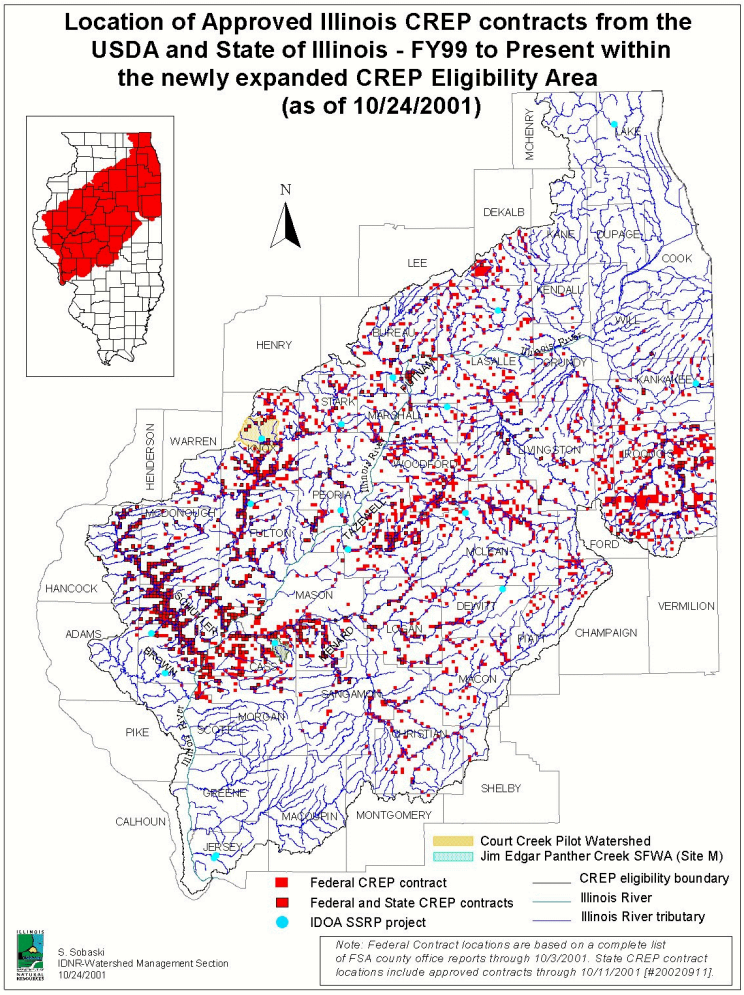


Figure 6. A map derived from the Illinois CREP Enrollment database, showing the status of USDA and State enrollments by Illinois Public Land Survey section through 10/24/2001.

Contract data maintained in this database include the location of each enrollment by county, FSA Farm and Tract number, and Survey section, as well as the total area enrolled in CREP by conservation practice. Through October 2001, 4,283 contracts (3,446 USDA and 837 State) have been entered into this database and it continues to serve as a useful tool for generating Illinois CREP status maps (Figure 6), creating tabular summaries of enrollments by county, and a source of general conservation easement data for simulation models relevant to the Illinois River basin.

Illinois Conservation Practices Tracking System (ICPTS)

Significant progress has also been made during this reporting period in further developing the Illinois Conservation Practices Tracking System (ICPTS). The ICPTS initiative, begun in 2000, is an attempt to address the need for 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. The goal of this initiative is to provide researchers, managers, and planners with (a) baseline data of appropriate scale and detail to assess the effectiveness of implemented conservation practices in contributing to the attainment of the water quality and habitat goals of Illinois CREP, (b) a tool that will aid CREP partner agencies in planning, implementing, and better coordinating watershed management projects within the Illinois River basin, and (c) a system to visualize the extent and cumulative impact of conservation programs within the Illinois River basin.

The design of this integrated GIS and relational database system and the protocols used to record contract data have been discussed in detail in the 2000 Illinois Conservation Reserve Enhancement Program report. Data specifically *related to a conservation practice* are maintained as polygon records in a shape file, created in ArcView GIS 3.2 (ESRI, Inc.). Practice attributes include the precise boundary of each individual practice implemented under a conservation enrollment, the contract number associated with the enrollment, the FSA conservation practice code and, if applicable, subpractice code, the five-year cropping history for that area (if available), the size of the parcel in acres - calculated by ArcView as well as that calculated independently by the county office, and metadata related to the digitizing of the parcel boundaries (i.e., identification of the basemap used in digitizing the contract and who digitized the contract). Data specifically *related to the contract*, rather than to the parcel of property enrolled, are maintained in a standard relational database (Corel's Paradox 8). These data include the contract number, date of contract approval, total acres enrolled, as well as total acreage delineated by conservation practice, the agency and program under which the contract was executed, and the planned duration of the contract.

Over this past year these mapping efforts have continued, through the support and cooperation of the Illinois FSA state executive director William Graff and his conservation staff, FSA county executive directors and staff, as well as county Soil and Water Conservation District and NRCS staff, in the initial four-county focus area of the project: Cass and Knox (location of two intensively monitored sub-basins) and Fulton and Schuyler (counties with high CREP enrollment activity and complementary to Cass and Knox in their location in the Middle Illinois River basin). The State of Illinois allocation for CREP has provided the funding to continue this mapping effort under contract with Dr. Richard Farnsworth of the University of Illinois Extension.

As with last year, an emphasis has been placed on precisely digitizing and documenting all conservation practices implemented through CREP (USDA and State of Illinois), as well as other USDA conservation programs: Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), Wetland Reserve Program (WRP), and Wildlife Habitat Incentives Program (WHIP) within the four counties initially targeted by the project. Additional state CREP enrollments in other counties have also been recorded in ICPTS as time permitted. During 2000 all active USDA conservation enrollments, dating back to the inception of these programs, were recorded for Knox and Cass counties and a number of State CREP enrollments were recorded over an additional 25 counties. For this current reporting period through November

2001, one research technician, working full-time, has completed the mapping of all active USDA enrollments in the aforementioned programs, as well as State CREP enrollments, within Fulton and Schuyler counties (Figure 7). Given the continuous enrollment period of CREP and new enrollments in the other conservation programs, an effort has also been made to periodically revisit each of the four county offices during this year once the initial collection of county conservation contracts has been documented into ICPTS. The basemaps used for digitizing contracts into the ArcView GIS portion of ICPTS were significantly enhanced this year as newly acquired, orthorectified, 1:12,000 scale Digital Orthophotography Quarter Quad (DOQQ) files became available for the entire state of Illinois. Consequently, a considerable effort was made to review all contract information previously digitized for Cass, Fulton, and Knox counties using 1:50,000 Landsat imagery to assure that contract locations correctly matched the more detailed imagery and to redigitize practice boundaries when necessary. All conservation practice polygons recorded in ICPTS will be consistently digitized to a 1:12,000 scale by 2002.

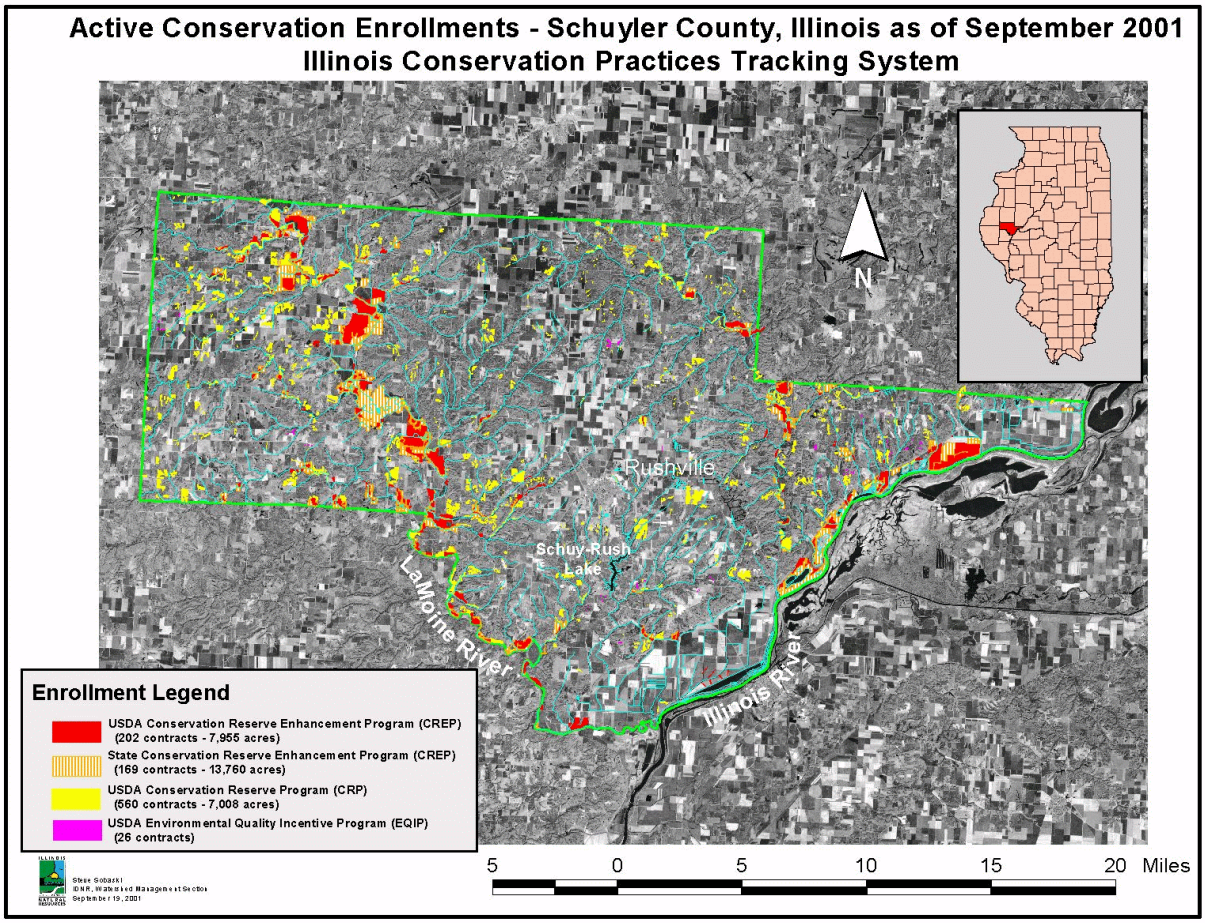


Figure 7. Active conservation enrollments displayed by USDA or State incentive program documented within the Illinois Conservation Practices Tracking System for Schuyler County, Illinois through September 2001.

ICPTS Project Accomplishments in 2001

During this past reporting period 1,241 enrollments, covering 24,861 acres, were recorded in the *contract-specifi*c database portion (Paradox relational database) of the Illinois Conservation Practice Tracking System. This brings the total number of contracts of all conservation programs documented in the system to 3,233 encompassing 99,129 acres within the Illinois River basin (Table 4). Conservation practices from a total of 1,296 enrollments were added to the *practice-specific* (ArcView GIS) portion of ICPTS during this period (Figure 8), bringing the total number of contracts digitized to 2,465 (Table 5) covering 72,631.87 acres of the Middle Illinois River basin.

Table 4. Summary by CREP county of conservation practice data entered into the Paradox portion (contract specific information) of the Illinois Conservation Practices Tracking System through 11/15/2001. Note that totals from most counties are very incomplete and the lack of or small number of contracts in many counties reflects the focus of mapping effort in the ICPTS project, rather than actual enrollment activity in USDA conservation programs. More detailed and current information on CRP enrollments is available on-line through the FSA site at: **http://www.fsa.usda.gov/crpstorpt/11approved/r7crepyr/r7crepyr2.htm**

	USDA-CREP		STATE OF ILLINOIS-CREP		USDA-CRP		USDA-EQIP		USDA-WHIP /WRP	
County	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres
ADAMS	2	29.30	1	53.90	5	26.7				
BROWN	29	1,478.60	35	1,800.00						
BUREAU	3	21.80	3	21.80						
CASS	201	5,157.20	47	3,559.80	248	5,614.4	5	3.9	5	405.0
CHRISTIAN	1	33.00	1	41.98						
DEKALB	2	43.00	2	43.00						
DEWITT	2	50.30	2	92.40						
FORD	2	33.30	2	33.30						
FULTON	146	4,603.30	95	5,984.70	238	4,337.6	11		1	27.6
HANCOCK	51	2,382.60	43	4,689.80						
HENRY	1	7.20	0	0.00	5	23.5				
IROQUOIS	35	1,386.00	43	2,257.20	8	445.0				
KANKAKEE	6	85.40	6	104.90						
KNOX	144	4,027.40	45	2,054.50	391	5,895.3				

County	USDA-CREP		STATE OF ILLINOIS-CREP		USDA-CRP		USDA-EQIP		USDA-WHIP /WRP	
	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres
LIVINGSTON	14	197.90	22	450.00	8	175.9				
LOGAN	3	64.40	3	87.80						
MARSHALL	8	214.00	9	241.60	1	27.5				
MASON	6	517.60	5	1,283.80						
MCDONOUGH	30	1,099.00	34	1,957.30	3	57.5				
MCLEAN	4	49.00	6	127.60	1	24.9				
MENARD	19	204.60	21	589.00	3	47.0				
MORGAN	19	382.50	4	361.30	6	93.1				
PEORIA	4	267.20	12	750.54	6	130.6				
PUTNAM	3	115.90	4	200.30	1	52.0				
SANGAMON	1	22.60	1	44.00						
SCHUYLER	223	8,537.30	173	13,959.80	581	7,093.0	26			
STARK	4	57.50	7	89.90	3	32.4				
TAZEWELL	23	1,068.30	29	750.50	5	81.6				
WARREN	3	82.20	2	82.20	2	113.0				
WOODFORD	13	223.30	11	266.90						
TOTAL	**1,002**	**32,441.70**	**668**	**41,979.82**	**1,515**	**24,271.0**	**42**	**3.9**	**6**	**432.6**

Table 4 (continued). Summary by CREP county of conservation practice data entered into the Paradox portion (contract specific information) of the Illinois Conservation Practices Tracking System through November 15, 2001.

As noted last year, the success of Illinois CREP in terms of numbers of enrollments and acres under contract, relative to other current USDA conservation easement programs in the four-county project focus area, remains impressive. Table 6 presents a comparison of contract totals and acres enrolled in CREP eligible conservation practices under Illinois CREP versus all other USDA conservation programs mapped for Cass, Knox, Fulton, and Schuyler counties. Over the first three years of CREP, the total area of land enrolled in Illinois CREP conservation practices exceeds the combined total acreage in active CRP, EQIP, WHIP, and WRP enrollments, since the inception of those programs (as far back as 1986), in three of the four intensively mapped counties. A comparison of overall enrollment totals (CREP Eligible Total + Non-CREP Eligible

Total; Table 6) between CREP and all other programs mapped shows that active CREP acres exceed those of all other programs combined by 17% in Cass, 51% in Fulton, and 119% in Schuyler counties. Knox is the sole exception with CREP totaling 66% of CRP enrollment acres through September 2000.

Not surprisingly, CREP is having its greatest success, relative to the other programs, in establishing riparian easements in these four counties. When considering the combined area enrolled in four riparian conservation practices (CP21, CP22, CP23, CP9) as a conservative estimate of all the riparian acreage enrolled during the first three years of CREP versus the total acres enrolled in these practices under all other USDA conservation programs in these four counties, the riparian acres enrolled in CREP consistently exceed that of all other programs combined (Knox by 1,165 acres, Fulton by 2,722 acres, Cass by 2,894 acres, and Schuyler by 6,414 acres).

Table 5. Summary by CREP county of digitized conservation practice data entered into the ArcView portion of the Illinois Conservation Practices Tracking System. Acreage totals are based on area values for the digitized polygons calculated by ArcView GIS, rather than those listed on file with the individual contracts.

	USDA-CREP		STATE OF ILLINOIS-CREP		USDA-CRP		USDA-EQIP		USDA-WHIP /WRP	
County	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres
ADAMS					2	8.33				
BROWN	1	10.62	1	10.62	1	5.17				
CASS	193	5,355.26	44	3,446.57	234	5,360.14	5	3.87	5	405.39
FULTON	129	4,288.99	83	5,033.57	215	3,829.16	6	4.52	1	28.55
HANCOCK	4	47.09	3	123.24						
HENRY	1	1.00								
KNOX	127	3,353.67	25	1,002.63	357	5,151.94				
MASON	1	39.24								
MCDONOUGH	3	51.60	4	150.90	1	9.90				
MENARD	1	2.75	1	40.12	1	0.83				
MORGAN	11	169.62			6	92.10				
SCHUYLER	220	9,059.59	169	16,033.29	580	6,954.34	26	50.78		
WARREN	1	14.08	1	14.08	2	13.32				
TOTAL	**692**	**22,393.51**	**331**	**25,855.02**	**1,399**	**21,425.23**	**37**	**59.17**	**6**	**433.94**

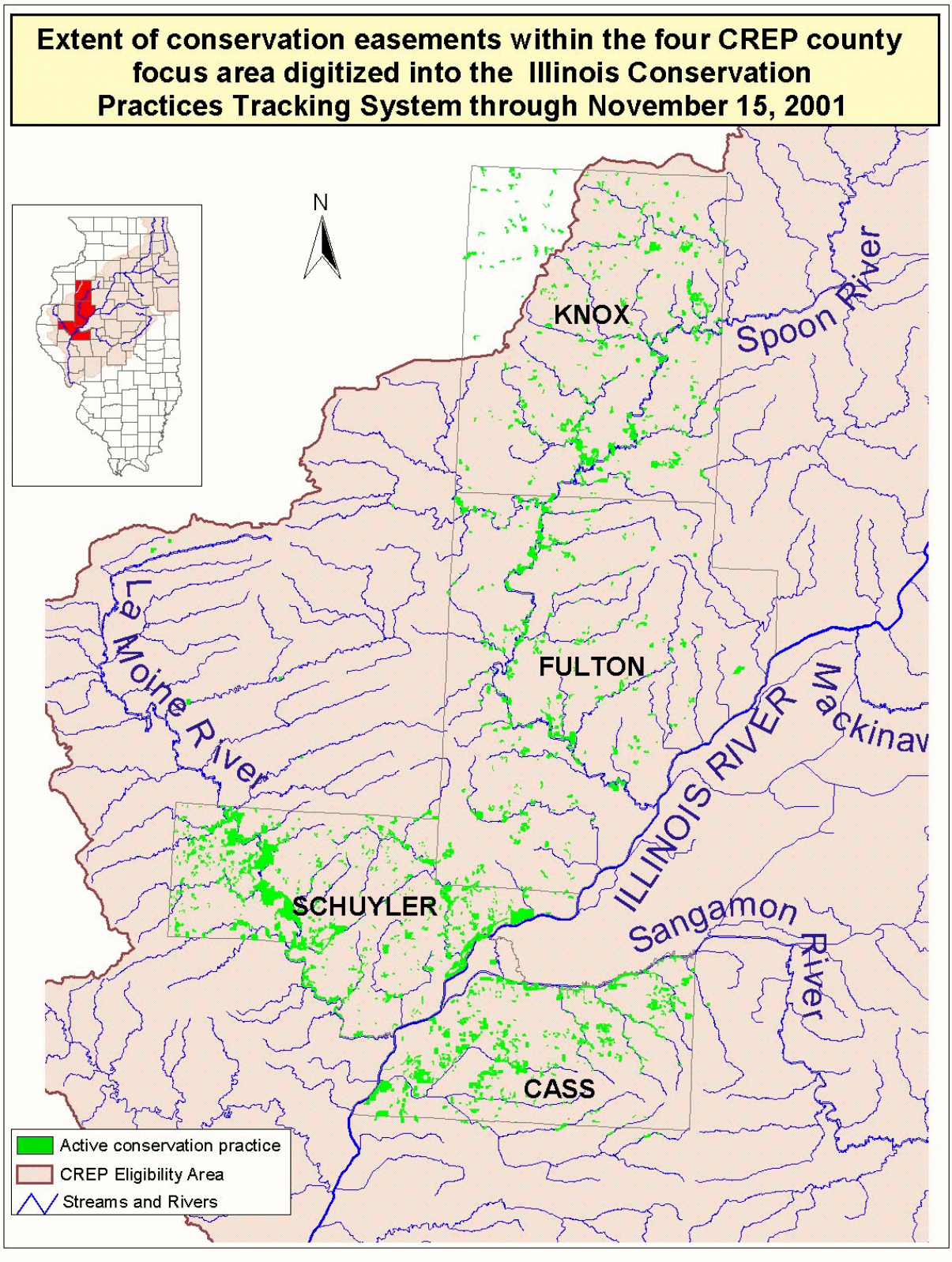


Figure 8. The extent of conservation practices from all 2,465 active conservation program enrollments in the Middle Illinois River digitized through November 2001 in the Illinois Conservation Practices Tracking System.

A picture of the relative cumulative impact of Illinois CREP with CRP, EQIP, WHIP, and WRP on a watershed basis can be seen by examining the ratio of the total area conservation practices to total acres of agriculture found within each watershed traversing these four counties. A preliminary analysis (Figure 9) was performed examining the portion of all 56 USGS sub-basins (11-digit hydrologic unit code scale) falling within the borders of the four counties intensively mapped in ICPTS. The total area encompassed by conservation practices over all conservation programs was calculated and compared to the total watershed acres in row crop and small grain agriculture, as derived from the 1995 IDNR Land cover analysis of Illinois based on 1991-1995 Thematic Mapper/Landsat 4 satellite imagery of the state. Of the 56 basins examined, 25 (45%) had a Conservation Easement:Agricultural Land ratio of greater than 5%; 13 basins (23%) had a ratio greater than 10%; and 5 basins (9%) had a ratio exceeding 20%. Areas showing particularly high areas of conservation enrollments relative to available farmland within these four counties include sub-basins of the lower La Moine River in Schuyler county, those of the Sanganois/Snicarte Island area of the Illinois River in Cass and Schuyler counties and the subbasins immediately adjacent to the lower Sangamon River in Cass County. Given the higher proportion of agriculture land enrolled in conservation treatments, these watersheds may be logical candidates for assessing the impact of conservation programs such as Illinois CREP on water quality and biological resources within Illinois River watersheds.

Table 6. Comparison of active conservation enrollments in CREP versus other USDA incentive programs, by CREP eligible practice type, digitized into ICPTS through November 2001 in Cass, Knox, Fulton, and Schuyler counties. Contract and acreage totals are based solely on USDA enrollments, save for "ADD" which are additional acres enrolled through the State portion of CREP. The number of USDA CREP enrollments extended through State contracts is given in parentheses immediately below the USDA contract total. Non-CREP Eligible Practice totals are presented in the final row of the table. *Table begins on the following page.*

Conservation Practice	CASS				KNOX			
	CREP		NON-CREP (CRP,EQIP, WHIP,WRP)		CREP		NON-CREP (CRP)	
	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres
CREP ELIGIBLE Practices (Total)		**6,710.63**		**3,127.66**		**3,419.33**		**2,882.67**
CP11- Vegetative Cover - Trees Already Established			1	3.42			4	37.23
CP12 - Wildlife Foodplot							1	20.03
CP2- Establishment of Permanent Native Grasses	1	8.50	3	44.33	1 (1)	27.70	9	127.19
CP21- Filter Strip	77 (6)	601.83	13	68.46	68 (6)	860.82	95	981.57
CP22- Riparian Buffer	12 (3)	391.92	1	2.64	29 (11)	700.37	26	327.83
CP23- Wetland Restoration	40 (24)	2,101.11	6	130.28	27 (2)	1,056.32	6	134.05
CP3- Tree Planting			1	2.29	1 (1)	26.28	3	29.53
CP3A- Hardwood Tree Planting	2	5.66	6	41.01	3 (3)	237.19	22	309.67
CP4D- Permanent Wildlife Habitat, Noneasement	68 (12)	2,000.43	102	2,835.23	10 (4)	422.06	20	906.76
CP9 - Shallow Water Areas for Wildlife							3	8.81
ADD- Additional Easement, State CREP	26	1,601.18			6	88.59		
NON-CREP Eligible Practices (Total)			117	2,620.26			192	2,318.80

Table 6 (continued). Summary of enrollments by conservation practice in Illinois CREP in Cass, Knox, Fulton, and Schuyler counties compared to all other FSA Conservation Program enrollments in those counties, as digitized into ICPTS through November 2001.

Conservation Practice	FULTON				SCHUYLER			
	CREP		NON-CREP (CRP,EQIP)		CREP		NON-CREP (CRP,EQIP)	
	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres	#Contracts	Total # Acres
CREP ELIGIBLE Practices (Total)		**5,840.37**		**1,768.48**		**15,279.23**		**4,221.78**
CP11- Vegetative Cover - Trees Already Established			3	39.26			5	69.61
CP12 - Wildlife Foodplot								
CP2- Establishment of Permanent Native Grasses	1 (1)	18.25	9	147.84			9	197.19
CP21- Filter Strip	16 (5)	118.88	43	413.67	14 (22)	94.13	93	595.93
CP22- Riparian Buffer	32 (20)	948.47	1	23.06	63 (43)	1,584.57	49	1,297.28
CP23- Wetland Restoration	51 (39)	2,369.50	5	274.60	143 (110)	7,263.14	13	634.96
CP3- Tree Planting			3	66.21	2		2	16.61
CP3A- Hardwood Tree Planting	13 (9)	388.12	8	143.21	8 (4)		34	337.67
CP4D- Permanent Wildlife Habitat, Noneasement	21 (11)	383.53	29	656.76	12 (3)		62	1,072.53
CP9 - Shallow Water Areas for Wildlife			1	3.87				
ADD- Additional Easement , State CREP	42	1,613.62			144	6,337.39		
NON-CREP Eligible Practices (Total)			130	2,100.41			351	2,764.91

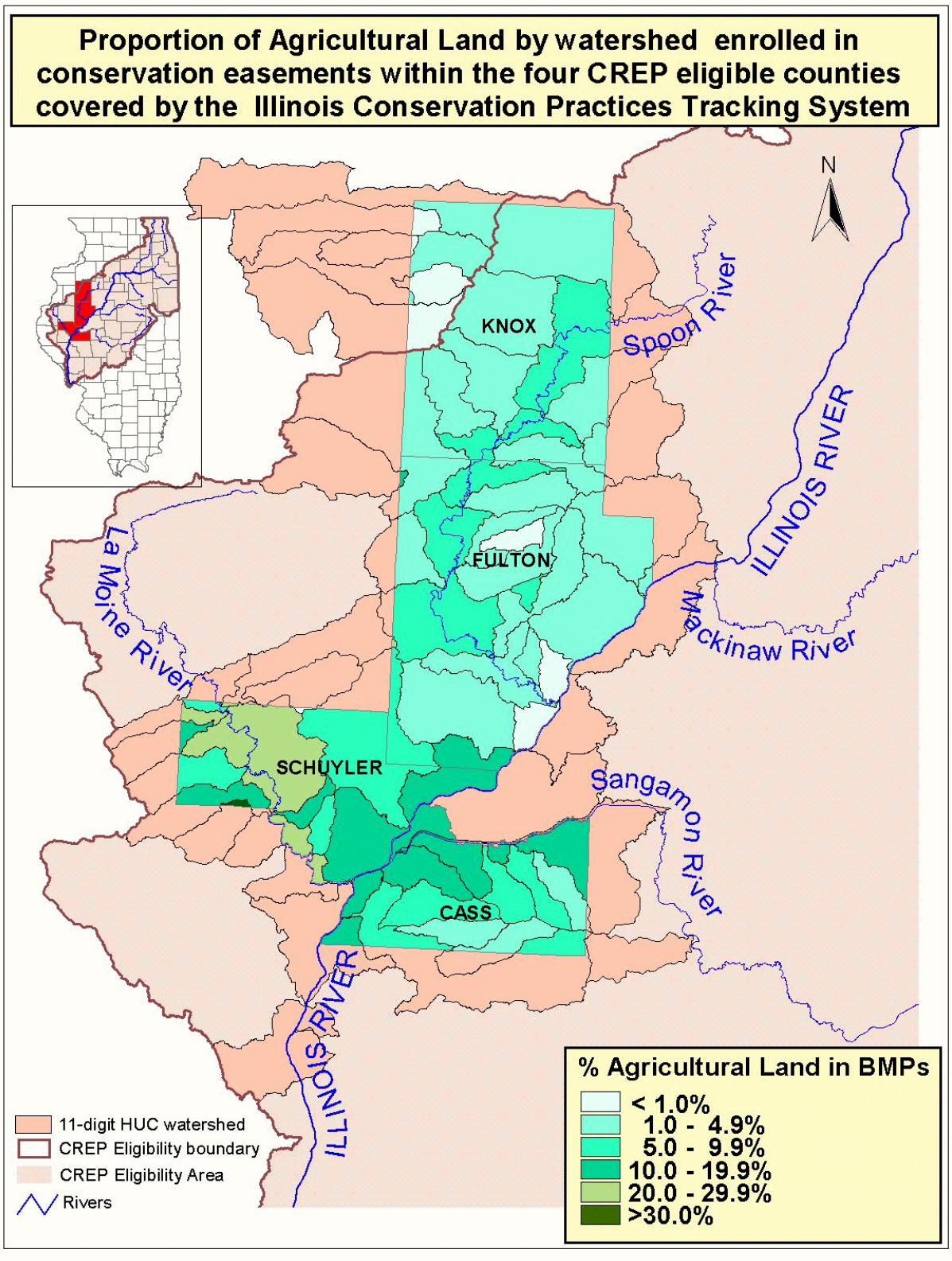


Figure 9. Extent (by area) of conservation easements implemented through Illinois CREP and other USDA conservation incentive programs relative to the extent of agricultural land within USGS HUC-11 watersheds of Cass, Fulton, Knox, and Schuyler counties.

Wetland Restoration Project Tracking System

Wetland restoration projects account for more riparian enrollments in Illinois CREP than any other single conservation practice. Overall, through October 2001, these projects accounted for more than 30,000 acres or 35% of the total acres enrolled in the USDA portion of CREP. This is similarly reflected in the CREP enrollments within the four-county focus area of the ICPTS mapping project, where wetland restorations comprise 31-47% of all areas enrolled in CREP in these counties. Given the importance of wetland restorations in Illinois CREP and in general resource and watershed management within the Illinois River basin, a second tracking system was developed specifically for wetland restoration projects (CP23) during 2001. The Wetland Restoration Project Tracking System expands on the Illinois Conservation Practices Tracking System by documenting more detailed information on the construction of these restoration projects, the areas where they are established, and the type of wetland anticipated from the restoration project. This GIS-based tracking system is intended to serve as a model for a comprehensive information system describing the location and design of all wetland restorations throughout the Illinois River valley. Records of the system document the boundary of each conservation practice associated with a wetland restoration project (e.g., total area under restoration, associated wildlife food plots, riparian buffers) implemented under conservation programs such as CREP. Conservation practice polygons, as well as the extent of areas planted or the location of water control structures, are digitized in ArcView GIS from information obtained from aerial photographs on file at county Farm Service Agency (FSA) and Soil and Water Conservation District offices at the same time that precise boundaries of the project are gathered for the ICPTS. Conservation practice polygons (e.g., CP23 polygons within ICPTS) are further divided and attributed by the general type of vegetation being planted or reestablished at that site in order to derive a Cowardin classification code (wetland type) for the wetland being restored or created. During the period of July through September 2001, 261 Illinois CREP and CRP wetland restorations from Schuyler and Fulton counties were entered in the database accounting for nearly 14,500 acres.

Standard Protocol for Digitizing Illinois CREP Wetland Restoration Projects

A standard protocol for digitizing Illinois CREP wetland restoration projects has been developed as part of this effort, in part, to address the need for consistency in recording conservation plans at a local level across Illinois county offices as well as to facilitate the transfer of that information into a regional tracking system. The remainder of this section details the standard protocol used in recording wetland restoration projects in the tracking system.

Restoration Project Source Material

The location and details of all planting techniques and structures applied in wetland restoration projects are taken directly from contract files maintained by, and with the approval of, county USDA-Farm Service Agency or Soil and Water Conservation District offices. Detailed project boundaries are found on FSA aerial photographs of the enrollment area, as delineated by the county district or resource conservationist, maintained in contract or producer files within the county office of the funding agency. Boundaries are entered into a Geographic Information System database (ESRI's ArcView GIS 3.1) as polygons through manual "on-screen" or "head's-up" digitizing against a base map of 1:12,000 scale Digital Orthophotography (DOQQs) of Illinois (1998-1999).

a. Digitizing wetland restoration polygons

The Wetland Restoration Project Tracking System GIS database or "shapefile" is derived from conservation practice polygons of the Illinois Conservation Practices Tracking System. The enrollment polygons defining the boundaries of restoration projects are examined relative to the DOQQ basemaps and split by planting techniques, as recorded by the district conservationist for that county. All planting techniques are digitized, as well as water control structures and 15-day flood lines when available. Figures 10 and 11 present an example of an aerial map of a wetland restoration maintained on file in FSA county offices and the corresponding map after being digitized into the Wetland Restoration Project Tracking System.

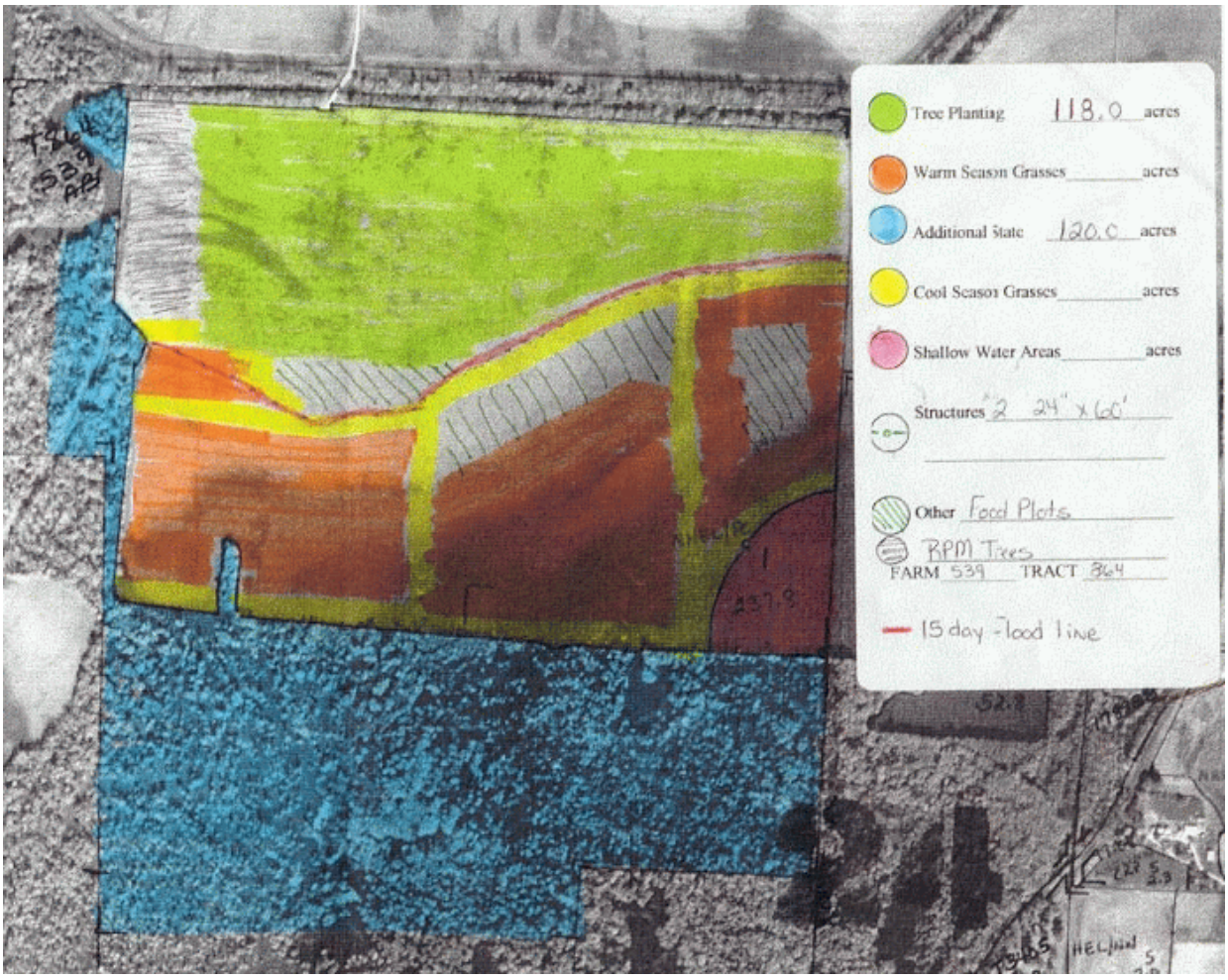


Figure 10. Example of an aerial photograph maintained in FSA or SWCD county producer files showing a wetland restoration project with planting techniques delineated in color.

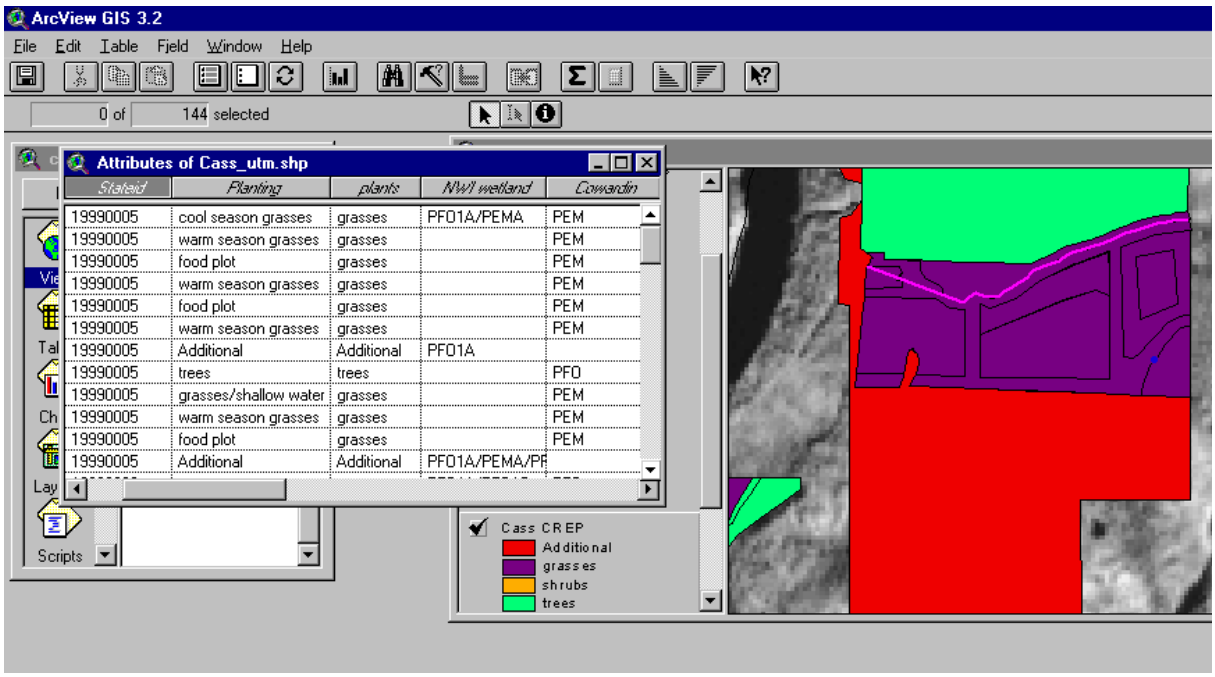


Figure 11. Example of the enrollment in Figure 10 as digitized into the Wetland Restoration Project Tracking System. Attribute data recorded for each planting comprising the restoration project is displayed to the left.

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b. Polygon records within the Wetland Restoration Project Tracking System Attribute Table

Each polygon from the Conservation Practices Tracking System is attributed with the funding agency, program, and agency contract number associated with the conservation practice; the corresponding FSA code for the conservation practice; the total area encompassed by the practice as calculated by the ArcView software as well as that calculated by the county office at the time of the contract's approval. The following fields have been added to the attribute table to further detail each wetland restoration project:

- **PLANTING COMMENTS** - comments field describing the general design of a wetland restoration. These include if an area is a natural regeneration, a food plot, moist soil management, acres for wildlife, or wet areas.
- **PLANTS** - generally describes the vegetation found on the site of a wetland restoration. All tree planting and natural regeneration is labeled as *trees*. All cool season grasses, warm season grasses, food plots, moist soil management areas, and acres for wildlife are labeled as *grasses*. All shrub planting is labeled as *shrubs*.
- **NWI WETLANDS** - the Cowardin wetland classification code for any 1980 National Wetlands Inventory (NWI) wetlands corresponding to the restoration project site. All wetlands overlapping the restoration site are recorded, while those polygons without a corresponding NWI wetland(s) are left blank.
- **COWARDIN** - documents the intended Cowardin classification code (Cowardin *et al.* 1979) for the wetland being restored or created. For most polygons this code is only partial due to lack of information about the hydrology of the enrollment area. Once complete

Cowardin classification codes are added to the tracking system record, they must be reviewed and verified as the restoration project matures to ensure that the assigned code is still accurate.

c. Assigning the Cowardin code

The following section explains how a Cowardin classification code is constructed for each wetland restoration enrollment record. All Cowardin codes consist of three elements: the system, class, and water regime attributes. Some wetland classification codes may include additional elements including: the subsystem, a subclass, and a special modifier.

The Cowardin code for a wetland is derived by concatenating the following data fields:

P		**FO**	**1**	**A**	**h**
System	Subsystem (if any)	Class	Subclass (if any)	Water regime	Special modifier (if any)

Cowardin Classification Code: **PFO1Ah**

P = Palustrine system; **FO** = Forested class; **1** = Broad-leaved-deciduous subclass; **A** = Temporarily flooded water regime; **h** = Diked/impounded special modifier

There are three major System types applicable to the Illinois River basin wetlands: Palustrine, Lacustrine, and Riverine. A matrix of each of these wetland systems with its corresponding classes and subclasses is presented in Table 7. When digitizing the polygons representing a wetland restoration project, a System code is determined first, followed by the subsystem (if required), the class and a subclass (if required). The letters and numbers of these categories are joined to comprise the first part of the Cowardin classification code. The code is then completed by assigning the appropriate water regime codes (listed below) as well as special modifiers when appropriate.

Table 7. Major system, class, and subclass categories applicable in assigning a Cowardin classification code to wetland restoration projects implemented within the Illinois River basin.

System	**P - Palustrine**						
Class	AB - Aquatic Bed	EM - Emergent	FO - Forested	OW - Open Water	SS - Scrub Shrub	UB - Unconsolidated Bottom	US - Unconsolidated Shore
Subclass	1. Algal 2. Aquatic Moss 3. Rooted Vascular 4. Floating Vascular 6. Unknown surface	1. Persistent 2. Non-persistent	1. Broad-leaved deciduous 2. Needle-leaved deciduous 5 Dead 6 Deciduous		1. Broad-leaved deciduous 2. Broad-leaved evergreen 5. Dead		2. Sand

Table 7 (continued). Major system, class, and subclass categories applicable in assigning a Cowardin classification code to wetland restoration projects implemented within the Illinois River basin.

System	L - Lacustrine								
SubSystem	1. Limnetic			2. Littoral					
Class	AB - Aquatic Bed	OW - Open Water	UB - Unconsolidated Bottom	AB - Aquatic Bed	EM - Emergent	OW - Open Water	RS - Rocky Shore	UB - Unconsolidated Bottom	US - Unconsolidated Shore
SubClass	3. Rooted Vascular 4. Floating Vascular			3. Rooted Vascular 4. Floating Vascular	2. Non-persistent				

System	R - Riverine									
Subsystem	2 - Lower Perennial						3 - Upper Perennial			4 -Intermittent
Class	AB - Aquatic Bed	RB - Rock Bottom	OW - Open Water	SB - Streambed	UB - Unconsolidated Bottom	US - Unconsolidated Shore	AB - Aquatic Bed	RB - Rock Bottom	UB - Unconsolidated Bottom	SB - Streambed
Subclass	4. Floating Vascular	1. Bedrock 2. Rubble					1. Algal			

Water Regimes

The water regime letter follows the class or subclass (if required) portion of the Cowardin code.

- **A** - Temporarily Flooded. Surface water remains on site for only brief periods during the growing season with the water table well below the soil surface for most of the season.
- **B** - Saturated. Substrate saturated to the surface for extended periods during the growing season but surface water seldom present.
- **C** - Seasonally flooded. Surface water for extended periods in growing season but not at the end of the growing season.
- **F** - Semipermanently flooded. Surface water throughout the growing season in most years.
- **G** - Intermittently exposed. Surface water throughout the year except in extreme droughts.
- **H** - Permanently flooded. Surface water throughout the year in all years.
- **J** - Intermittently flooded. Substrate usually exposed, variable presence of surface water without detectable seasonal periodicity.
- **K** - Artificially flooded. Flooding controlled by pumps or siphons in combination with dikes or dams.
- **U** - Unknown.
- **Z** - Intermittently exposed/permanent. See definitions for intermittently exposed (G) and permanently flooded (H).

Special Modifiers

Special modifiers are used to further define wetlands based upon general hydrologic conditions, soil conditions, and man-made or beaver-made modifications to wetlands. This code follows the water regime code in the Cowardin code if appropriate.

- **b** - Beaver. Created by beaver activity.
- **d** - Partially drained/ditched. Artificially drained but can still support hydrophytes.
- **f** - Farmed. Altered for the production of crops but hydrophytes could reestablish.
- **h** - Diked/impounded. Barrier obstructs inflow (dike) or outflow (impoundment) of water.
- **r** - Artificial substrate. Substrates placed by humans.
- **s** - Spoil. Refuse material removed from an excavation.
- **x** - Excavated. Lies in a basin or channel excavated by humans.

Cowardin Code Definitions:

(1) SYSTEMS - a complex of wetland and deepwater habitats that share the influence of similar hydrologic, geomorphological, chemical or biological factors.

LACUSTRINE: Deepwater habitats with all the following characteristics:

1. Situated in a topographic depression or dammed river channel.
2. Lacking trees, shrubs, persistent emergents, emergent mosses, or lichens with greater than 30% areal coverage.
3. Total area exceeds 20 acres (8 hectares). Areas less than 20 acres may be included in the Lacustrine system if an active wave-formed or bedrock shoreline makes up all or part of the boundary, or if water is greater than 6.6 feet (2 meters) in the deepest part of the basin at low water.

PALUSTRINE: Area dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. Areas lacking such vegetation are also included if they have all of the following characteristics:

1. Area is less than 20 acres (8ha).
2. No active wave formed or bedrock shoreline.
3. Water depth in deepest part of basin less than 6.6 feet (2m) at low water.

May be situated at the edge of a lake or river or in river floodplain.

RIVERINE: Wetland and deepwater habitats contained within a channel with periodically or continuously moving water.

(2) SUBSYSTEMS

Intermittent: Flowing water present only part of the year. When water is not flowing, it may remain in isolated pools or surface water may be present.

Limnetic: deep water (greater than 6.6 feet or 2m).

Littoral: from shore to a depth of 6.6 feet (2m).

Lower Perennial: Water velocity slow, but some water flows throughout the year. Gradient is low. The substrate consists of sand and mud. Oxygen deficits may occur.

Upper Perennial: Gradient high, water velocity fast. Water flows throughout the year. Substrate consists of rock, cobble, gravel, and sand. Dissolved oxygen content high.

(3) CLASSES - describe the general appearance of the habitat in terms of either the dominant life form of the vegetation or physiography and composition of substrate.

Aquatic Bed: This includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

Emergent: Vegetation includes erect, rooted herbaceous hydrophytes representing more than 30% of the areal cover.

Persistent: Vegetation remains upright and visible throughout the year.

Non-persistent: Vegetation dies back and is not visible during the non-growing season.

Forested: Woody vegetation that is 20ft (6m) tall or taller, covering 30% or more of the area.

Open Water: Non-vegetated areas less than 20 acres (8ha) that are covered by water less than 6.6 ft (2m) deep. This includes ponds, borrow pits, small reservoirs, and open water areas within a marsh or swamp.

Rock Bottom: Areas with stone, boulder, or bedrock cover 75% or more, vegetative cover <30%, and permanently flooded.

Rocky Shore: Areas with 75% or more bedrock, stones, or boulders, vegetative cover <30%, and not permanently flooded.

Scrub-Shrub: Characterized by woody vegetation less than 20ft (6m) covering 30% or more of the area.

Stream Bed: Areas where channel is completely dry at low water periods and vegetative cover <30%.

Unconsolidated Bottom: Wetlands in which the substrate is at least 25% particles smaller than stones, vegetative cover < 30%, and permanently flooded.

Unconsolidated Shore: Areas with less than 75% coverage of bedrock, stone, or boulders, vegetative cover < 30%, and not permanently flooded.

Illinois Conservation Practices Tracking System Future Scope of Work

In summary, during this past year, GIS digitizing has been completed for all conservation enrollments in Fulton and Schuyler counties approved through at least October 2001. Work has now begun in Knox county to update and revise that portion of the database, which is current only through September 2000. Following the completion of Knox mapping, the Cass portion of ICPTS, current through December 2000, will be updated during early 2002. Permission has also been granted by the Illinois FSA executive director to expand the mapping project into an additional four counties in the Middle Illinois CREP region during 2002: Christian, Menard, Morgan, and Sangamon. These four counties have been selected as mapping priorities by the State FSA office due to their level of enrollment activity, proximity to initial four county focus area, and recent inclusion into the CREP program through the addition of the entire Sangamon River basin and lower Illinois River basin. The scope of mapping priorities for these new counties will continue to be all active Illinois CREP, CRP, EQIP, WRP, and WHIP enrollments.

The State FSA office, recognizing the value of the tracking system, has also agreed to the future expansion of the scope of the mapping project to the entire CREP eligibility area. The value of this system has also been acknowledged outside of Illinois CREP as the ICPTS being considered as a design model for developing GIS-based tracking systems for other conservation programs offered by IDNR and the Illinois Environmental Protection Agency. Nevertheless, short-term funding of the project is guaranteed only through June 2002 through the State CREP monies. A significant expansion of the scope of the ICPTS project geographically and/or programmatically, through the additional of other relevant conservation programs active in the Illinois River basin (e.g., Illinois EPA: Nonpoint Source Management Program (Section 319), Illinois Department of Agriculture: Conservation Practices Cost-Share Program (CCP) and Streambank Stabilization and Restoration Program (SSRP), IDNR's Conservation 2000 Ecosystem Program and U.S. Army Corps of Engineers'/IDNR Illinois Rivers 2020 initiative) will not be attained until additional and long-term funding of the project is achieved.

B. Additional Data Sources

Additional data collection efforts and scientific studies, not directly related to CREP, have been, or are currently, conducted in the Illinois River basin by the Illinois Department of Natural Resources and other state and federal agencies (Table 8; Table 9; Figures 12-15). The following data sets have been identified to-date as potential sources of baseline or supplemental data on the status of silt and sediment loading, nutrient yield, and natural resources (waterfowl, non-game birds, threatened or endangered species, and native fish and mussel stocks) within the Illinois River basin.

Table 8. Agencies and programs that include data collection relevant to the objectives of the Illinois CREP.

Agency	**Project or Program**
Illinois Environmental Protection Agency (IEPA)	(1) Ambient Water Quality Monitoring Network (2) Intensive River Basin Surveys
Illinois Natural History Survey (INHS) w/ USGS	Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River System
Illinois Department of Natural Resources (IDNR)	(1) Aerial census of waterfowl (2) Basin surveys of stream fisheries (3) EcoWatch volunteer monitoring programs (RiverWatch, PrairieWatch, ForestWatch)
Illinois Natural History Survey	Long-Term Illinois River Electrofishing Data Statewide Critical Trends Assessment Program (CTAP)
Illinois State Water Survey (ISWS)	Water and Atmospheric Resources Monitoring Program (WARM)
U.S. Geological Survey (USGS)	(1) National Water-Quality Assessment Program (NAWQA) for the Upper Illinois and Lower Illinois River Basins (2) Stream Gaging Network (3) National Stream Quality Accounting Network (NASQAN)

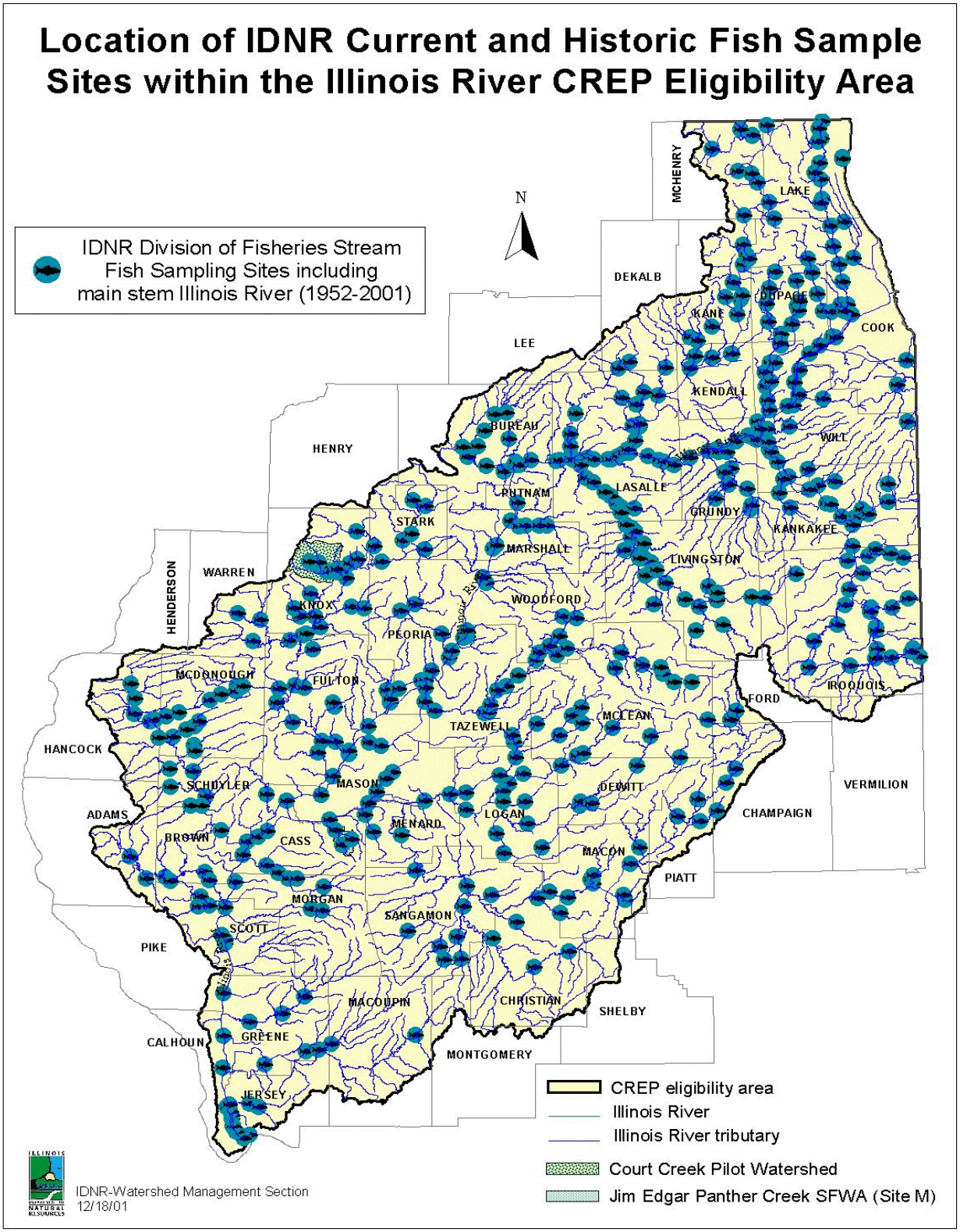

Figure 12. Location of IDNR fish sampling sites in the Illinois River CREP area.

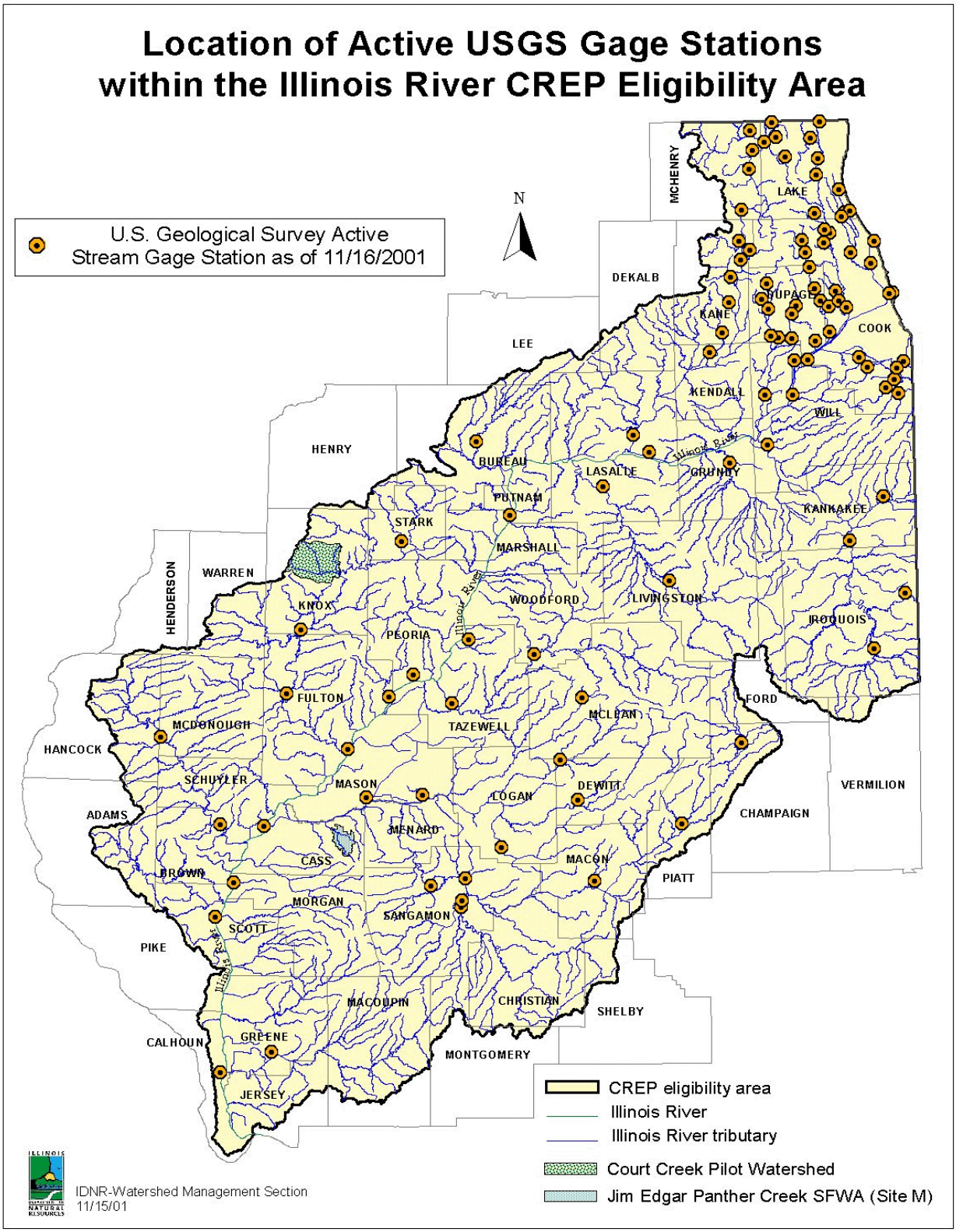

Figure 13. Location of USGS gaging stations in the Illinois River CREP area.

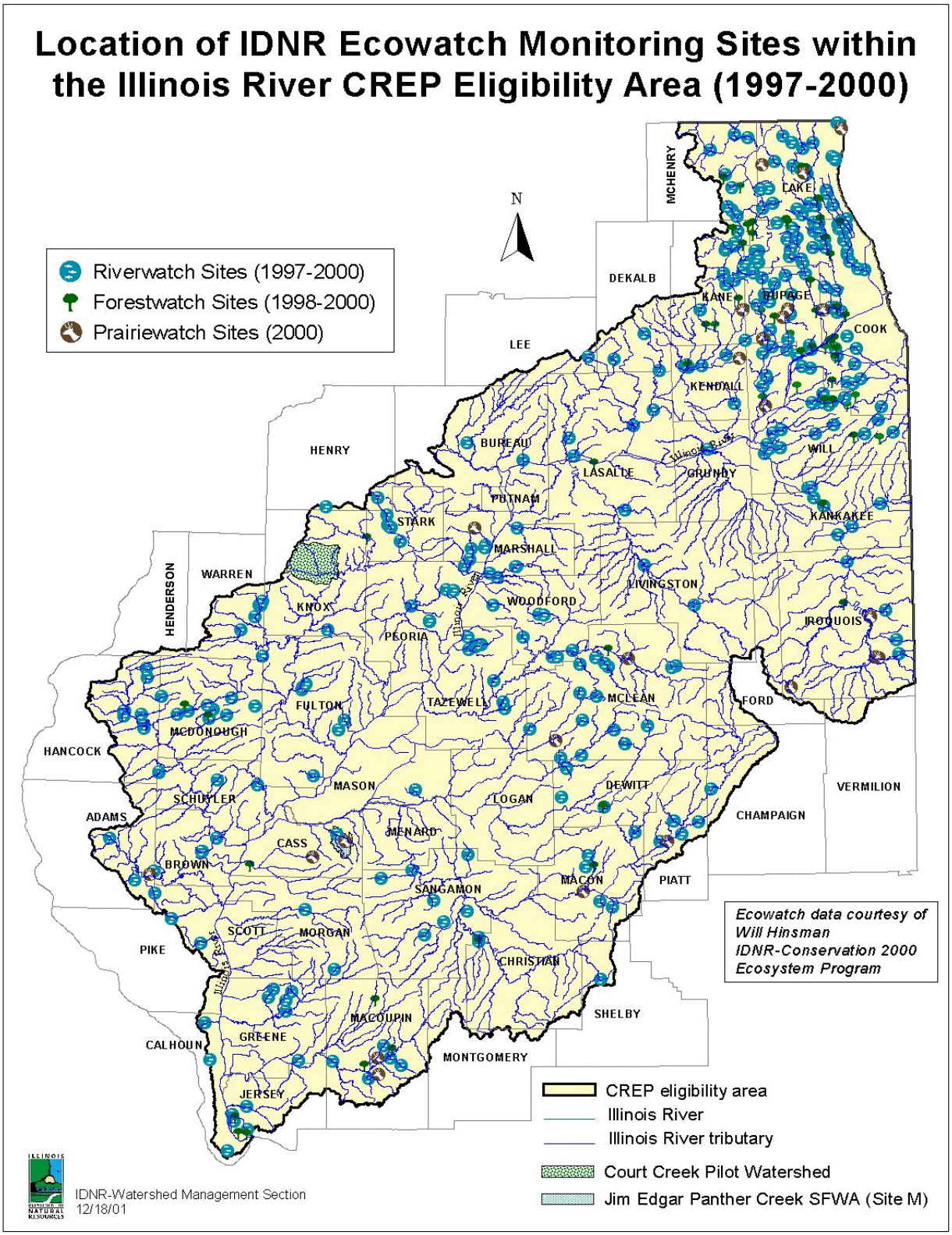

Figure 14. Location of EcoWatch monitoring sites in the Illinois River CREP area.

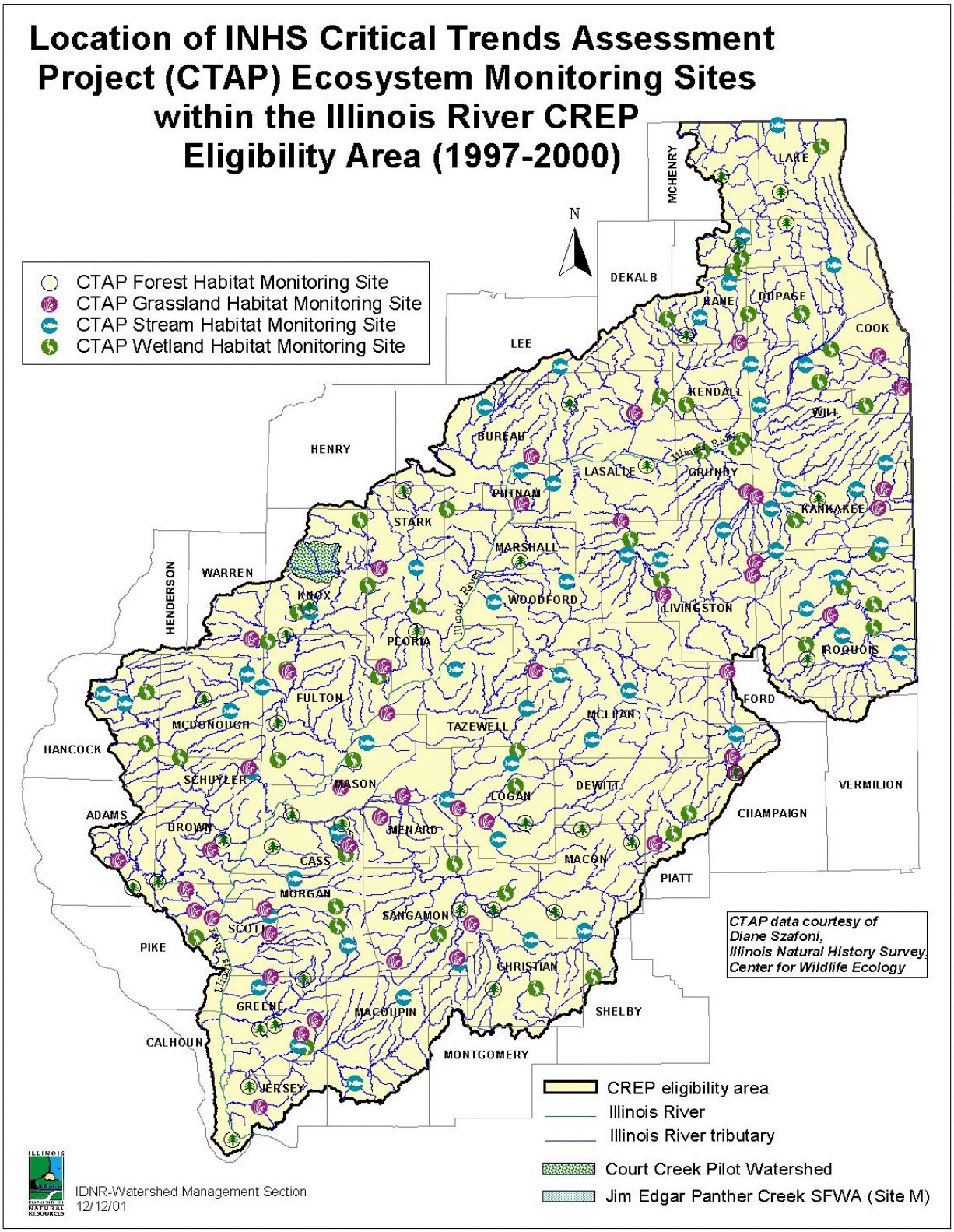

Figure 15. Location of the Critical Trends Assessment Project (CTAP) sampling sites.

Table 9. Research and monitoring projects conducted by the Upper Midwest Environmental Science Center on the Illinois and Mississippi Rivers. For more information see the following address: **http://www.umesc.usgs.gov/**

Ecosystem/Habitat projects

Project Title	Location	Principal Investigator
Development of models for ecological investigation and management of the Upper Mississippi River System (UMRS).	Upper Mississippi and Illinois Rivers	Gutreuter, S. J.
Macroinvertebrate monitoring for the Upper Mississippi River System.	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Sauer, J. S.
Ecological status and trends in the Upper Mississippi River System (UMRS).	Upper Mississippi and Illinois Rivers	Lubinski, K. S.
Obtain and summarize five annual increments of limnological monitoring data for selected reaches of the Upper Mississippi River System (UMRS).	Upper Mississippi River Pools 4, 5, 7, 8, 9, 12, 13, 14, 26, Open LTRM study reach and La Grange reach on the Illinois River	Soballe, D. M.
1998 annual status report: Submersed and rooted floating leaf vegetation	Upper Mississippi River Pools 4, 8, 13, 26, and La Grange reach on the Illinois River	Yin, Y.
Aquatic vegetation dynamics in selected backwater areas of the Upper Mississippi and Illinois Rivers (UMR)	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Yin, Y.
Patterns and abundance of aquatic vegetation in the Upper Mississippi and Illinois Rivers	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Yin, Y.
A demographic study of the common woody species in the Upper Mississippi River System (UMRS)	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Yin, Y.

River Inventory and Monitoring

Long-term Resource Monitoring Program (LTRMP).	Upper Mississippi and Illinois Rivers	

Science Applications to Resource Management

Project Title	Location	Principal Investigator
Complete and summarized annual increments of monitoring data for fish sampling on the Upper Mississippi River System.	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Burkhardt, R. W.
Development of models for ecological investigation and management of the Upper Mississippi River System (UMRS).	Upper Mississippi and Illinois Rivers	Gutreuter, S. J.
Evaluation tools for management of non-indigenous species.	Upper Mississippi and Illinois Rivers	Dawson, V. K.
Mark Twain National Wildlife Refuge and Illinois River National Refuge Decision Support System.	Upper Mississippi River Pools 16, 17, 18, 20, 21, 22, 24, 25, 26, and Illinois River reaches La Grange and Peoria.	Korschgen, C.E.
Habitat needs assessment for the Upper Mississippi River System.	Upper Mississippi and Illinois Rivers	Korschgen, C. E.
Initial analyses of change detection capabilities and data redundancies in the Long Term Resource Monitoring Program.	Upper Mississippi and Illinois Rivers	Lubinski, K. R.

Aquatic Science

Project Title	Location	Principal Investigator
1999 Annual Status Report: A summary of fish data in six reaches of the Upper Mississippi River System.	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Burkhardt, R. W.

Project Title	Location	Principal Investigator
Sediment-contaminant database for the Upper Mississippi River System (UMRS).	Upper Mississippi and Illinois Rivers	Bartsch, M. R.
Complete and summarize annual increments of monitoring data for fish sampling on the Upper Mississippi River System.	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Burkhardt, R. W.
Assessment of potential effects of increased commercial navigation on the fishes of the Upper Mississippi River System (UMRS).	Upper Mississippi and Illinois Rivers	Gutreuter, S. J.
Spatial analysis of fish monitoring data collected by active gear	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Koel, T.
Integrated analysis of fish monitoring data.	Upper Mississippi River Pools 4, 8, 13, 26, Open LTRM study reach and La Grange reach on the Illinois River	Koel, T.
Bathymetric surveys and generation of geographic information system data set for selected pools of the Upper Mississippi River System (UMRS).	Upper Mississippi and Illinois Rivers	Rogala, J. T.
The limnology and ecology of off-channel areas in the Upper Mississippi River System (UMRS)	Upper Mississippi and Illinois Rivers	Soballe, D. M.
Development of regional nutrient criteria for the Upper Mississippi River Basin and U.S. Environmental Protection Agency Region 5 (URMB, USEPA)	Upper Mississippi and Illinois Rivers	Soballe, D. M.

12. Modeling

A fundamental component of the assessment program is the development or use of models that will provide a better understanding of the system and allow predictions of impacts. Data collected through the intensive monitoring will be used to calibrate and validate the models, thus making them more robust.

Also, despite the intensive monitoring efforts underway in the Illinois River CREP area, it is recognized that all streams and uplands cannot be monitored. Therefore, in areas where monitoring is limited, simulations or models are being used to assess the potential effectiveness of CREP. One component outlined in the CREP proposal includes sediment. However, sediment is influenced by other factors, including movement of water across the land and in stream channels. Intensive monitoring for sediment and hydrology began in 1999 and both parameters have been highlighted as issues of concern by the Court Creek Watershed Planning Committee.

The ongoing hydrologic and nutrient data collection effort will be used to further validate and calibrate models developed under this Program. Incorporation of a streambank erosion component is anticipated in future versions of these models.

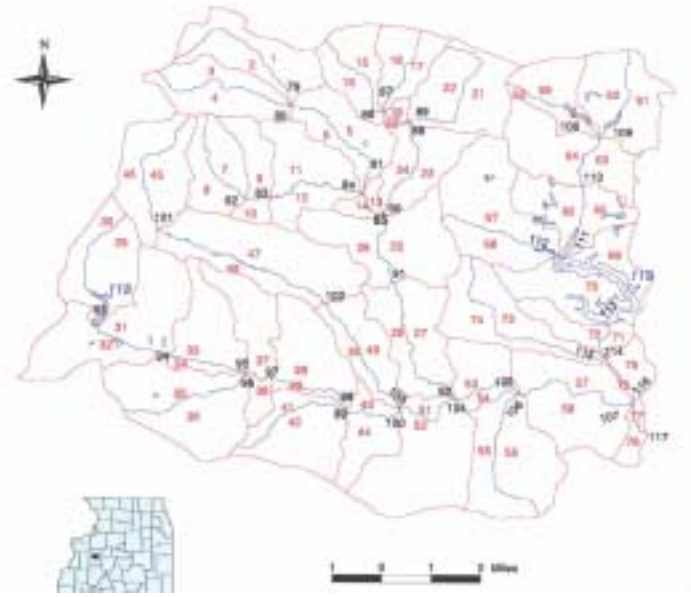

Figure 16. Division of the Court Creek watershed into 78 overland (1-78), 39 channel (79-117), and 2 reservoir (118-119) segments (Borah and Bera 2000).

Hydrologic and Sediment Transport Modeling in the Court Creek Watershed

The Court Creek hydrologic model developed earlier (Borah and Bera 2000) has been expanded to simulate rainfall-driven surface and subsurface runoff, propagation of flood waves, soil erosion, and entrainment and transport of sediment from single rainfall events. The model was used to identify high, moderate, and low runoff and sediment potential areas within the watershed and rank them along with the stream channels. Assumed water and sediment management scenarios using reservoirs were analyzed in controlling high water and sediment discharges. The work is described in Borah *et al.* (2001).

The Dynamic Watershed Simulation Model or DWSM (Borah *et al.* 1999) is used to model

the Court Creek watershed. The DWSM uses physically-based governing equations to simulate surface and subsurface storm water runoff, propagation of flood waves, soil erosion, and entrainment and transport of sediment and agricultural chemicals in agricultural watersheds. The model has three major components: (1) DWSM-Hydrology (Hydro) simulating watershed hydrology, (2) DWSM-Sediment (Sed) simulating soil erosion and sediment transport, and (3) DWSM-Agricultural chemical (Agchem) simulating agricultural chemical (nutrients and pesticides) transport. The DWSM-Hydro & Sed were applied to the Court Creek watershed. The watershed was divided into 78 overland, 39 channel and two reservoir segments. Figure 16 shows these divisions: overland 1-78, channel 79-117, and reservoir 118-119. Physical and storm data collected during earlier studies (Roseboom *et al.* 1982, 1986) have been used in constructing this model.

The model was calibrated using a storm which occurred on April 1, 1983 and was validated using another storm that occurred on December 24, 1982. Performance of the model was judged by comparing the simulated water and sediment discharges with the available observed discharges. Although some discrepancies were noticed in these comparisons, the model was able to generate comparable results considering the complexities of the physical processes being simulated and size of the watershed. Results from the April 1, 1983 storm, which is a one-year, 24-hour storm, were used to rank overland and channel segments discharging highest to the lowest peak flows and sediment yields. This storm was chosen over design storms because design storms, used earlier, generated unrealistically high flows for engineering design of best management practices (BMP's). Spatial and temporal distribution of rainfall is different for different storms as are the water and sediment discharges. Therefore, storm selection for these analyses is critical and no guidelines are available.

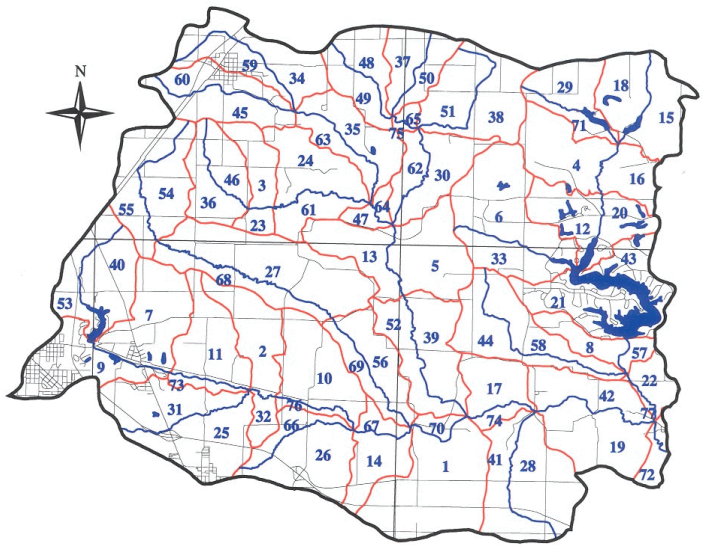

Figure 17. Ranking of overland segments generating highest to the lowest unit-width peak flows predicted from the April 1, 1983 storm, indicating runoff potential (Borah *et al.* 2001).

Overland areas, based on unit-width peak flow and unit-width sediment yield, respectively, were ranked from highest to the lowest (Figure 17; Figure 18). These new criteria, representing the peak flow and cumulative sediment discharge (yield) during the flow period over a unit width of the overland, are used to effectively rank the overland areas. The overland is assumed rectangular having the same area as delineated on the topographic map, width equal to the

adjacent channel length, slope length equal to area divided by the width, and representative slope, soil, land use, and hydraulic roughness characteristics based on observations and measurements. Due to these homogeneous assumptions, the unit-width peak flow and sediment yield are uniform across the overland width discharging uniformly into the adjacent stream channel; however, varying along the overland slope length. The rankings with unit-width peak flow and sediment yield indicate runoff and sediment potentials, respectively. The traditional approach uses soil loss per unit area (e.g., tons/acre) and a delivery ratio to estimate the sediment reaching the adjacent stream channel. Delivery ratio is an unknown parameter, widely varying, extremely difficult to estimate for an area, and is critical in the sediment yield estimate. The new approach dynamically accounts for sediment delivery in its physically-based simulation without requiring the delivery ratio parameter.

Alternative watershed management scenarios were analyzed using the calibrated and validated model and the April 1, 1983 storm event. One of these scenarios was assuming two Rice Lake-sized reservoirs installed at the two major branches of the North Creek. Impacts on water discharges were minimal, with 7% and 3% peak-flow reductions, respectively, at the North and Court Creek outlets. As expected, hydrographs at both locations were delayed, more in North Creek than Court Creek. Dramatic impact on sediment discharges was shown – 70% and 26% reductions of sediment yields, respectively, at North and Court Creek outlets. This demonstrates the usefulness of the model in evaluation of BMPs.

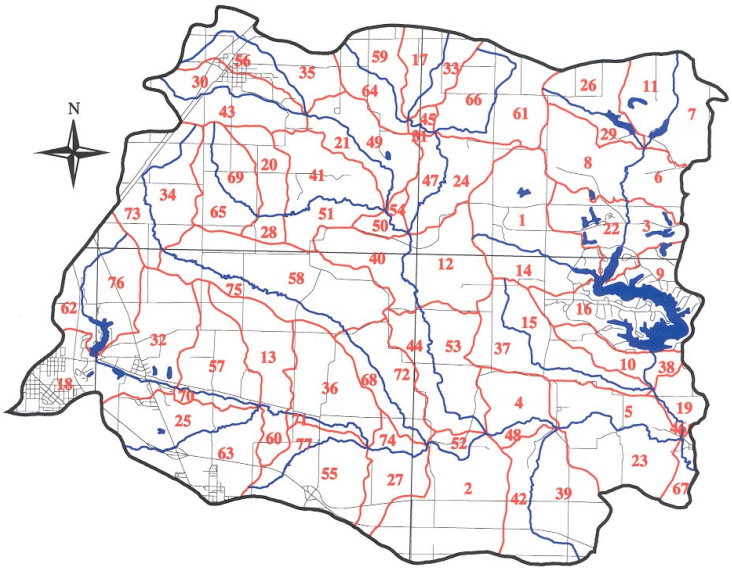

Figure 18. Ranking of overland segments generating highest to the lowest unit-width sediment yields predicted from the April 1, 1983 storm, indicating sediment potential (Borah *et al.* 2001).

At this time, the modeling results are considered preliminary. More data monitored during the calibrated and validated storms were gathered (personal communication, D. Roseboom, October 2, 2001) and are being used to refine the model parameters for better predictions. Future work will include analyzing impacts of proposed BMPs on the CREP sign-up areas, simulating stream bank erosion and agricultural chemicals, using recent monitoring data to update model parameters, and applying the model to other Illinois watersheds.

Addressing CREP Goals

13. (Goal 1)-Silt and Sediment, (Goal 2)-Phosphorus and Nitrogen

Introduction

The impact of landcover change, such as conservation easements, on delivery of sediment and nutrients to receiving water bodies is discussed in a large and complicated body of literature. To make the analysis more tractable, and to reflect the riparian nature of the Illinois CREP, it is reasonable to focus any background literature analysis on riparian and wetland impacts on sediment and nutrients. We can also utilize the findings of programs of similar nature and scope such as the Chesapeake Bay restoration effort (Lowrance *et al.* 1995). In general, the effects of any practice are dependent upon a variety of factors including: hydrology, groundwater and geology, soils, vegetation types, maintenance, loading rate, buffer width, and others. In this section, we review the expected impacts of CREP practices on sediment and nutrients, describe specific assessment efforts in the CREP area, and conclude with some general statements about potential effects and ameliorating factors.

Basic types of CREP practices

Through CREP, conservation easements have been placed on 88,426 acres of land in the Illinois River basin. This acreage has been a significant component of the total conservation activity. When examined by the type of conservation practice, CREP has played a substantial role in the development of riparian buffers and filter strips, with nearly 30,000 acres, and has created large amounts of wildlife habitat (20,638 acres in CP4 alone). In comparison with regular CRP, these practices have been important contributors to the total conservation activity, contributing between 10 and 25% of the conservation easements statewide (Table 10) and often constitutes a greater acreage than traditional CRP in high CREP signup counties such as Cass, Fulton, and Schuyler. However, it is with wetlands that CREP has made the largest contribution when compared to other programs. Out of 38,000 acres of wetlands created through CRP, over 31,000 have been created through CREP. In comparison, the wetland reserve program (WRP), has contributed 32,000 acres since 1994 **(http://www.nhq.nrcs.usda.gov/PROGRAMS/wrp/il.htm)**. Thus, CREP has been a significant boost to Illinois wetland resources, a state where about 85% of the pre-settlement wetlands have been lost to development.

Table 10. History of all CRP enrollments in Illinois statewide for the primary practices employed through CREP (CP4, CP21, CP22, and CP23) with comparison to the acreage enrolled through the Illinois CREP. Years with no enrollment are not shown.

Program Year	CP4	CP21	CP22	CP23
1992	161.3	0.0	0.0	0.0
1993	454.3	0.0	0.0	0.0
1994	201.3	0.0	0.0	0.0
1997	0.0	14,300.8	4,830.4	0.0
1998	20,544.4	27,528.0	13,604.2	1,911.8
1999	24,018.0	22,656.4	11,734.7	9,909.7
2000	37,828.7	24,037.4	17,111.1	15,547.7
2001	21,162.7	23,244.1	20,622.3	10,985.1
State total for 1988-2001	104,370.7	111,766.7	67,902.7	38,051.3
CREP total for all years	20,638.5	14,037.0	15,945.0	31,295.0

CP 4 Wildlife habitat
CP 21 Filter strips
CP 22 Riparian buffers
CP 23 Wetland restoration

Sediment reduction

The utility of buffers in reducing sediment delivery is well documented (Table 11). Sediment trapping efficiency of buffers depends upon several factors including particle size, the ability of the buffer vegetation to withstand or retard flow, the level of uniformity of flow (e.g., sheet vs. concentrated flow), slope and soil type. In general, buffers typically reduce sediment transport by 40-100% and the vast majority of retention occurs within the first several meters of the buffer. In an analysis of CP21 the mean width for riparian buffers in Schuyler county is 36.42 meters, well beyond the typical width where significant sediment retention occurs. Thus, width of buffer is rarely and issue in sediment retention. The Illinois CREP has been highly successful in the establishment of riparian buffers (CP22) and filter strips (CP21) with a total of 29,982 acres in these practices which accounts for about 16% of all of these practices in Illinois over the history of CRP.

Table 11. Typical sediment removal rates from buffers (information taken from Dosskey 2001).

	Buffer Characteristics			Pollutant Reduction (%)	
Study	**Location**	**Vegetation**	**Width(m)**	**Mass**	**Concentration**
Dillaha *et al.* (1989)	VA	Grass	4.6 - 9.1	53 - 98	62 - 94
Magette *et al.* (1989)	MD	Grass	4.6 - 9.2	66 - 82	-
Coyne *et al.* (1995)	KY	Grass	9.0	99	-
Arora *et al.* (1996)	IA	Grass	20.1	40 - 100	-
Robinson *et al.* (1996)	IA	Grass	3.0 - 9.1	-	70 - 85
Patty *et al.* (1997)	France	Grass	6 - 18	87 - 100	-
Barfield *et al.* (1998)	KY	Grass	4.6 - 13.7	> 90	-
Coyne *et al.* (1998)	KY	Grass	4.5 - 9.0	96 - 98	79 - 87
Tingle *et al.* (1998)	MS	Grass	0.5 - 4.0	88 - 98	-
Sheridan *et al.* (1999)	GA	Grass	8.0	78 - 83	63
Schmitt *et al.* (1999)	NE	Grass and woody plants	7.5 - 15.0	84 - 98	76 - 93
Lee *et al.* (2000)	IA	Grass and woody plants	7.1 - 16.3	70 - 94	-

Hydrology and Water Quality Assessment in the CREP Area

Additional studies in the CREP area will monitor changes in sediment and nutrient yields and hydrology associated with changes in land use associated with CREP. Monitoring stations equipped with a continuous streamgage recorder and automatic water sampler are being operated at the lower subwatershed sampling site in each pilot and reference watershed according to procedures specified in Demissie *et al.* (2000). For the Spoon River study basin an additional monitoring station is being operated at the upper pilot subwatershed sample station on North Creek (Court Creek watershed) Demissie *et al.* (2001). At the Jim Edgar-Panther Creek Fish and Wildlife Area study basin, monitoring stations are located in the lower subwatersheds of the pilot watershed (Panther Creek) and reference watershed (Cox Creek). Each monitoring station collects the following data:

Hydrologic data

- *Stream stage* (continuously recorded every 15 minutes)

- *Discharge measurements*: These measurements are collected on a regular basis during various streamflow conditions. These are used to create and maintain stage-to-discharge rating curves. The curves, in combination with the continuous stage data, can calculate streamflow.
- *Streamflow* (volume of water per unit time, usually cubic feet per second)
- *Water temperature* (recorded every 15 minutes)
- *Precipitation* (recorded every 15 minutes): One station in each watershed-Court and Haw, and one station used for both Cox and Panther Creek watersheds. Precipitation is reported daily.

Water quality data

Nutrient concentrations (mass per unit volume)

- *nitrate-N, ammonia, and ortho-phosphate*: collected weekly, as manual, single depth-integrated sample
- *nitrite-N, total Kjeldahl nitrogen (TKN), total Phosphorous, and total dissolved Phosphorous*: collected monthly, as manual, single depth-integrated sample, as well as during storm events (6-8 events per year).

Suspended Sediment Concentration

- automatic, single point samples collected daily and more frequently during high flow conditions
- manual, depth- and width-integrated samples from each stream cross-section, approximately six to eight times per year under various streamflow conditions
- manual, depth-integrated samples during all station visits to verify the adequacy of samples from the automatic water sampler.

Data Calculations/Analyses

Stream stage and discharge: Continuous hydrologic monitoring (water levels) at each station facilitates the calculation of continuous streamflow (discharge). This is essential for establishing the mass of sediment and nutrients being transported out of the watershed. Discharges are derived from the stream stage record for each of the monitoring stations. Stage data are converted to mean daily streamflow data by applying a stage-to-discharge rating curve. After taking several detailed field measurements of the stream discharge at known stages throughout the monitoring period, the discharges are plotted with corresponding stages, and a stage-to-discharge rating curve is developed for each station. Discharge is also converted to inches over the contributing watershed for the purposes of comparing streamflow to rainfall and comparing streamflow between basins. The discharge is divided by the drainage area upstream of the streamgaging station to determine the streamflow in inches, which is termed "runoff" volume. Rating curves have been developed for most stations and discharges are being calculated and reviewed.

Sediment concentrations and loadings: Sediment concentrations are collected on a daily basis, when there is flow, and during storm events. In combination with the discharge data, sediment concentrations will be used to calculate sediment loads. The loads are then normalized per unit area for determining the relative contribution of sediment between watersheds. For example, one watershed may have some of the highest sediment concentrations, but if it is one of the smaller watersheds with, consequently, lower discharges due to watershed area, its total sediment contribution could be small as compared to a larger watershed with larger discharges

and slightly lower concentrations.

Nutrient concentrations and loadings: The calculation of nutrient loads is similar to sediment loads as discussed above.

Peak flows, flood volumes, sediment and nutrient concentrations during floods will require separate analyses as the datasets cover longer periods of time. The product of these analyses will be used to compute annual and seasonal sediment and nutrient loads for all watersheds.

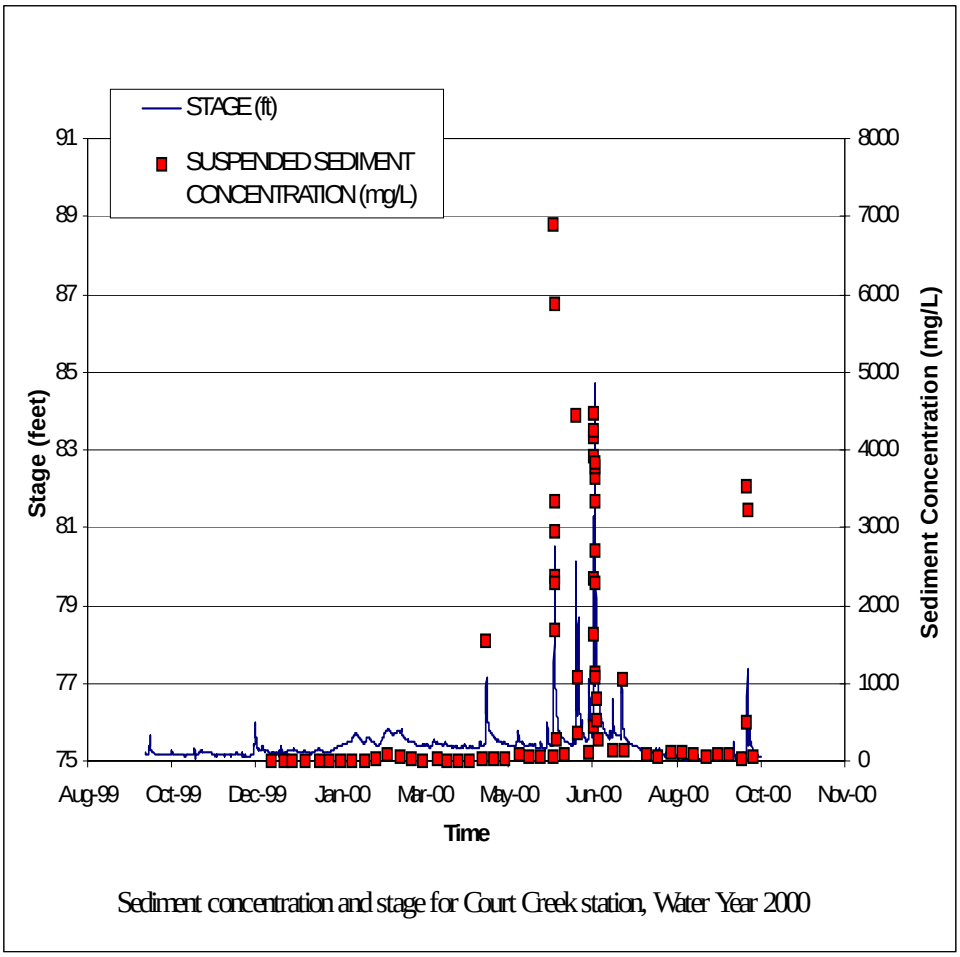

Figure 19. Sediment concentration and stage for the Court Creek gaging station (Water Year 2000). Source: Demissie *et al*. 2001.

Long-Term Resource Monitoring Program

Water Quality Component

Water quality sampling on La Grange Reach, Illinois River commenced during September 1989 (Table 11). Initially 22 fixed sites, consisting of three separate strata (main channel, side channel, and backwater lakes), were sampled weekly. Measurements of water quality parameters included water temperature, dissolved oxygen, conductivity, turbidity, secchi depth, water velocity, water depth, and ice/snow cover. In June 1991, collection of water quality parameters was expanded to include nutrient concentrations. These added measurements included pH, volatile suspended solids, chlorophyll-*a*, total phosphorus, total nitrogen, NOx (nitrate and nitrite), NHx (ammonia and ammonium), silica chloride, calcium, magnesium, sodium and potassium. Total soluble phosphorus, iron and manganese were also added at this time, but were later dropped in 1993.

In 1993, water quality sampling protocols were revised and divided into two phases: 1) fixed site monitoring and 2) stratified random sampling. Fixed site monitoring is still conducted at permanent sites, but data collection was switched to a biweekly schedule. In addition, several fixed sites were dropped and several other sites were added to include tributaries. Site selection and sampling effort of fixed sites allow for spatial and temporal trends of limnological parameters to be detected and analyzed. Presently, 13 fixed sites are sampled within the LTRMP water quality component at the Illinois River Biological Station. The second sampling design, stratified random sampling (SRS), is an intensive sampling effort that is conducted seasonally (winter, spring, summer and fall). For each SRS episode, one hundred thirty-five sites are randomly selected from within main channel, side channel, and backwater lake habitats. Sampling times are centered on noon each day. Also, sampling schedules and travel routes are randomized to minimize biases associated with daily cycles.

Table 11. Period of record for limnological measurements (laboratory and *in situ*) performed by Long Term Resource Monitoring Program field teams from 1989 through 1996.

Parameter	1989	1990	1991	1992	1993	1994-2001
Water temperature	■	■	■	■	■	■
Dissolved oxygen	■	■	■	■	■	■
Conductivity	■	■	■	■	■	■
pH			■	■	■	■
Turbidity	■	■	■	■	■	■
Secchi depth	■	■	■	■	■	■
Total suspended solids			■	■	■	■
Volatile suspend solids			■	■	■	■
Chlorophyll-a			■	■	■	■
Total phosphorus			■	■	■	■
Soluble reactive phosphorus			■	■	■	■
Total soluble phosphorus			■	■	■	
Total nitrogen			■	■	■	■
N0x			■	■	■	■
NHx			■	■	■	■
Silica			■	■	■	■
Chloride			■	■	■	■
Calcium			■	■	■	■
Magnesium			■	■	■	■
Sodium			■	■	■	■
Postassium			■	■	■	■
Iron			■	■	■	
Manganese			■	■	■	
Ice and Snow	■	■	■	■	■	■
Water Depth	■	■	■	■	■	■
Water Velocity	■	■	■	■	■	■

Conclusions - Sediment and Nutrients

Although current CREP assessment studies are too early in their data collection to provide documentation of results, the literature is quite clear in stating that the implementation of conservation practices will have a generally positive effect on removal of sediment and nutrients. However, the magnitude of this effect will vary depending upon local conditions. Further, most research centers on field-level impacts and there is a paucity of information that quantifies the change in pollution levels in streams and lakes resulting from the installation of conservation practices (Dosskey 2001). General riparian buffer performance characteristics for surface flow as noted by Dosskey include:

1. Buffers retain 40-100% of sediment that enters them from cultivated fields.
2. Sediment attached pollutants are reduced to a lesser degree than sediment.
3. Dissolved pollutants mass and concentrations are reduced in quantity similar to that or less than that of water volume.
4. There are some situations where pollutant mass and concentrations increase as a result of large runoff flows remobilizing previously captured material.

Also, several factors should be considered when evaluating program performance. First, most buffers work best when water enters as sheet flow; trapping efficiency declines precipitously when flow is concentrated. This is primarily a maintenance issue where it can happen that, in years following implementation of buffers, upslope field erosion may increase or through intense storms, sheet flow changes to rills and small gullies may form through buffers. This concentration of flow through buffers both can reduce the impact of buffers. Second, subsurface drainage can completely bypass the positive effects of riparian systems, particularly for dissolved pollutants such as nitrates (Kovacic *et al.* 2000 and Schultz *et al.* 2000). Further, subsurface drainage can have substantial influences on flow. In North Carolina studies, subsurface drainage, when compared to natural, undrained conditions, resulted in a 20% increase in total outflow and two-fold increase in peak outflow rates (Evans *et al.* 1995). In the intense agricultural areas of east-central Illinois tile drainage can be widespread with as high as 70-85% of the cropland in some watersheds being tile drained (David *et al.* 1997).

Future activities to control nitrate in streams in these highly modified systems will have to rely more upon practices such as constructed wetlands (Kovacic *et al.* 2000 and Schultz *et al.* 2000) and infield practices that lower nitrogen application rates. Large scale assessments of the needs for riparian buffers and wetlands in response to the hypoxic zone in the Gulf of Mexico have suggested that the need for these practices will be substantial (Mitsch *et al.* 2001).

14. (Goal 3)-Waterfowl, Shorebirds, Non-game Grassland Birds, and State and Federal Threatened and Endangered Species.

Influence of the Conservation Reserve Program on bird populations: A literature review

Since the establishment of the Conservation Reserve Program (CRP) in the Food Security Act of 1985, several studies evaluating the effects of the new habitat have found an increase in bird numbers attributable to the program (Table 12). These studies have examined several migratory avian species including non-game grassland birds and waterfowl species. Although most measured different parameters, their findings indicate a consistent, positive influence of CRP on bird populations. For example, when field assessments were applied to an empirical model examining the influence of habitat on duck production, Reynolds *et al.* (2001) estimated greater duck nest success and recruitment rates of 46% and 30%, respectively, for land in CRP cover as opposed to crops. From 1992-1997 it was estimated there were 12.4 million additional duck recruits in the Prairie Pothole Region as a consequence of CRP (Reynolds *et al.* 2001). Reynolds *et al.* (2001) also inferred that CRP cover was more attractive and provided greater security from nest predators than most other cover types in the study area. They detected no difference in daily survival rates for nests in CRP fields compared to areas noted for their waterfowl production, thus suggesting that the cover type in CRP fields provides the same values as those in areas developed specifically for waterfowl production.

In their study of grassland birds, Best *et al*. (1997), found CRP land held 13.5 times more nests compared to cropland. Additionally, species richness in CRP land was three times greater than found in cropland and CRP land yielded $\geq$15 times more young birds than cropland fields. Overall nest success in CRP fields was greater by 40%. Similar results were found by Johnson and Schwartz (1993) in their study on grassland birds in Montana, North and South Dakota, and Minnesota. There was a total of 73 species found on the study's CRP fields and 17 of the 20 most common species were more abundant on CRP fields than cropland. The two most common species now found on CRP fields, lark buntings (*Calamospiza melanocorys*) and grasshopper sparrows (*Ammodramus savannarum*), had been declining by more than 4% per year during 1966-1990 prior to implementation of CRP. Similar results were found in Iowa by Johnson and Koford (1995). Overall, these studies demonstrate that CRP fields are providing new habitat for populations that were in rapid decline in the years prior to the program.

Peterson and Best (1996) found mean bird abundance to be four times greater on CRP fields than on row-crop fields and that 20 of the 22 most common bird species were more abundant on CRP fields than on row-crop fields in central Iowa from 1991-1993. From their study they attributed CRP fields to an increase in the abundance of many bird species in central Iowa. Johnson and Koford (1995) censussed breeding migratory birds in nine counties in the prairie pothole region, an area containing nearly 30% of all land in CRP. They found that 13 of the 15 most common bird species were more abundant in CRP fields than in cropland. They also found daily survival rates were similar in CRP fields and in notable waterfowl production areas. Similar results were observed in several other studies. These results are leading several researchers to conclude that programs such as CRP will greatly contribute to the resurgence of several species whose declines have been attributable to the conversion of grassland to cropland.

Table 12. A review of the Conservation Reserve Program on avian populations.

Study	Species Studied	Location	# of species more abundant in CRP than row crop	DSR* similar in CRP and WPA**	Mean abundance in CRP compared to row crop
Reynolds *et al.* (2001)	ducks	MN, IA, ND, SD, MT	------	Yes	------
Best *et al*. (1997)	all avian species observed	IN, IA, KA, MI, MO, NE	------	------	1.4-10.5 times greater in CRP
Johnson and Schwartz (1993)	grassland birds	MT, ND, SD, MN	17 out of 20	------	------
Patterson and Best (1996)	all avian species observed	IA	20 out of 22	-------	4 times greater in CRP
Johnson and Koford (1995)	migratory birds	MT, ND, SD, MN	13 out of 15	Yes	------

*DSR - Daily Survival Rates
**WPA - Waterfowl Production Areas

a. Waterfowl and Shorebirds in the Illinois River Watershed

The single greatest contribution of the Illinois River Watershed to waterfowl and shorebird populations is as a stopover site for migrating birds during fall and spring migrations. Potentially large numbers of waterfowl and shorebird species are dependent upon resting and feeding sites in Illinois, but the vast majority do not nest in Illinois. Therefore, in addressing waterfowl and shorebird populations with respect to CREP, we will be referring to the migratory populations of these bird species.

The number of migrating waterfowl and shorebirds present in Illinois during the course of one migratory season is extremely variable. For example, five year averages of peak fall migrations of all ducks in the Illinois River Basin range from 373,744 (1993-1996) to 1,520,569 (1953-1957) (Havera 1999). The numbers of these migratory birds seen in Illinois each year are a result of the interaction between continental population sizes and the migration schedule and pattern in any given year, both of which are influenced by multiple factors. Breeding success at sites north of Illinois, food conditions on the wintering grounds south of Illinois, weather conditions and patterns north (in the fall) and south (in the spring) of Illinois, and simultaneous weather conditions in Illinois influence the number of birds stopping in the state in any given year.

The great magnitude of continental population fluctuations, due primarily to factors external to Illinois, largely masks the contribution the state makes to the condition and status of migratory populations. Nevertheless, Illinois resources are important for these birds. If weather conditions encourage migrating birds to stop in Illinois, the feeding sites available here will determine whether or not they actually stop, and for how long. Furthermore, the quality, quantity and distribution of feeding sites in Illinois will impact the condition of the birds as they continue their migration. Abundant Illinois food resources can help maintain good condition in migratory waterfowl and shorebirds. The condition of birds entering the breeding season, in turn, influences their success and, ultimately, the number of birds produced that season.

Given the complex nature of population and migration patterns in these birds, directly measuring Illinois' contribution to migratory populations is unrealistic. The most logistically feasible and biologically meaningful approach is to focus on available habitat through studies as reported above for CRP lands. CREP has the potential to significantly increase habitat in general and wetland habitat in particular, much of which could be important to migrating waterfowl and shorebirds. Initial and incomplete assessments of habitat created by the Illinois CREP (Table 13) indicate that wetland acreage may be increased by nearly 9% at this early stage of the program. By quantifying changes in the amount, quality, and configuration of important migratory waterfowl and shorebird habitat within the basin, we can indirectly monitor the program's impact on populations of these birds.

Table 13. CREP practices and acreage implemented in Illinois through USDA CREP contracts as delineated by practice and land eligibility (e.g., erodible or riparian habitat).

CREP Practice Implemented	Category	Acres
Additional acres (State enrollments only)	Erodible	2,991
CP3 (tree planting)	Erodible	100
Total acres in erodible lands		**3,091**
Additional acres (State enrollments only)	Riparian	19,051
CP11 (vegetative cover, trees already established)	Riparian	249
CP21 (filter strips)	Riparian	14,037
CP22 (riparian buffer)	Riparian	15,945
CP23 (wetland restoration)	Riparian	31,295
CP9 (shallow water areas for wildlife)	Riparian	53
Total acres in riparian areas		**80,630**
CP2 (permanent native grass)	Riparian/Erodible	1,881
CP3A (hardwood tree planting)	Riparian/Erodible	2,302
CP4D (permanent wildlife habitat)	Riparian/Erodible	20,638.5
CP12 (wildlife food plot)	Riparian/Erodible	334
CP25 (rare and declining habitat)	Riparian/Erodible	1,183
Total acres of practices implemented in either riparian and/or highly erodible areas		**26,339**

b. Non-game Grassland Birds

Many Midwestern non-game and game grassland birds have experienced population declines in the past several decades (Herkert 1995). Habitat loss and fragmentation are top among the factors implicated in these declines. CREP acres enrolled in practices that create grassland or grassland-like habitat could benefit these species. However, the same qualifications that apply to wetlands apply here. The size, quality and distribution of grassland patches created will determine their impact on grassland bird species.

As with most wide-ranging and especially migratory wildlife species, it is logistically impractical to try to measure direct grassland bird population response to habitat changes. However, models exist that allow us to predict species response to habitat, so our approach with grassland species will also be to document changes in available habitat due to CREP.

Most grassland practices will be implemented on highly erodible land in the uplands, although some grass will be planted in filter strips and other practices in the floodplain. The upland acreage (highly erodible land) allowed under CREP is currently limited to 15,000, and enrollments in this category are very low thus far. Grassland practices will generally have the most positive impact on grassland bird species if they are placed near other grasslands and distant from trees, creating a complex that can support a variety of species. The actual benefits to grassland birds will be contingent upon the volume of enrollment and location of these practices. If the number of enrolled acres remains low, it will be difficult to predict any marked increase in grassland bird populations.

c. Threatened and Endangered Species

There are records of 52 threatened or endangered faunal species, and 111 threatened or endangered plant species within the CREP 100-year floodplain (Appendix A; Table A1). In the entire land area of the CREP boundary there are 75 faunal species and 147 plant occurrences (Appendix A; Table A2).

More than 90% of State-contract acres enrolled in CREP are in the floodplain (see Table 13). Thus, we are focusing on species that have also been known to occur there (Appendix A; Table A1). The habitat preferences of faunal species on this list (Appendix A; Table A3) suggest that an increase in wetland and/or wooded riparian habitat could have a positive impact on many of these species. By definition these species populations are small and often difficult to locate, therefore estimates of numbers of individuals do not exist, and it would be difficult to demonstrate a 15% increase in population. However, as with waterfowl, shorebirds, and grassland birds, it is possible to evaluate an increase in potential preferred habitat for these species. Some of these listed species require wetlands of a certain minimum size, so once again, it is critical to map the locations of enrolled acres, especially relative to existing wetlands. Of further importance is the monitoring of the practices, their management and quality.

d. Monitoring Approach

To accurately determine the program's impact on wetland birds (migratory waterfowl and shorebirds), appropriate listed faunal species, and grassland birds, documenting amounts of newly created habitat is not adequate. It is critical to map, classify, and monitor newly-created habitat. Mapping should be done with reference to existing wetland and grassland sites, some of which may have to be mapped as well. Our proposed methodology in this endeavor is elucidated below. Because most of the work involves developing new data sets, the proposal is subject to revision in response to any obstacles that might hinder data collection.

First, all available information on wetland and grassland habitat in the watershed prior to the initiation of CREP should be compiled. The National Wetlands Inventory (NWI 1990) and the Illinois Wetlands Inventory (Suloway and Hubbell 1994) is a reasonable representation of wetlands that existed in the watershed in the 1980's, and the Landcover Database of Illinois (IDNR 1996) lends insight to what wetlands and grasslands existed in the early 1990's. These data sets and any others we identify will be examined and their limitations and usefulness for the project assessed.

Second, wetlands and grasslands created under CREP will be mapped in order to evaluate their importance. Large habitat complexes are more important to most of the wildlife species we are targeting than small, isolated habitat patches. A given amount of habitat acreage could be of minimal value to target species if it exists in highly isolated small patches. Alternatively, the same acreage, even if in small patches, could be of significant value if the patches are placed near existing similar habitat. Wetlands and grasslands not enrolled in CREP should also be mapped if they appear to not be in existing databases such as the Wetlands Inventory or Landcover Database.

Third, wetlands created under CREP will be classified according to their features that are important for the species of interest. Under the CP23 practice (wetland restoration), many different technical practices exist, some of which would clearly benefit waterfowl, shorebird and listed species, others which would not.

Fourth, the long-term maintenance and management of restored wetlands and grassland habitat will be documented. Prime feeding habitat for many waterfowl and shorebird species requires gradual exposure of mudflats, allowing moist-soil plant production and good access to the food produced. Some restored wetlands may naturally flood in a regime that produces excellent waterfowl habitat, but others may require active management if migratory wetland bird habitat is a central goal to be achieved. Grassland habitat also needs to be managed to discourage woody growth, which is considered hostile to grassland bird species (Herkert *et al.* 1996).

e. Impact on Natural Resource Quality Areas

The Illinois CREP has also made potentially significant contributions to the enhanced protection of high quality areas in the Illinois River basin. Through an analysis of features reflecting natural resources quality, the IDNR identified "resource rich areas" throughout the state (Suloway *et al.* 1996). These areas are defined on a watershed scale using the Illinois IEPA map that delineates 816 watersheds (average size of 44,000 acres). Resource rich areas were then identified based on: (1) percent of watershed in forest, (2) percent of watershed as wetland, (3) total area included in the Illinois Natural Areas Inventory, and (4) total length of streams designated as biologically significant. Through a ranking of these data and additional considerations, approximately 20% of the highest quality land in the state was categorized as being in a resource rich area. Conservation easements through CREP have added 19,489 acres of protection to the resource rich areas (Figure 20). Significant areas of protection have been seen in the Mackinaw River basin (Tazewell, McLean, and Woodford counties) and near the confluences of the La Moine and Sangamon Rivers with the Illinois River (primarily Schuyler, Brown, and Cass counties). Significant corridors of land have also been established along the main channels of the La Moine, Sangamon, Mackinaw, and Spoon Rivers.

A similar analysis is done by examining location of threatened and endangered species, termed element occurrence records (EOR) in conjunction with CREP easements (Figure 20). Out of 3,522 EOR's in the Illinois River basin, 249 fall completely within a section (640 acres) where a CREP easement also exists while 705 EOR's are in sections adjacent to an easement. Of the 25,409 sections in the Illinois River basin, 2,580 contain at least one CREP easement (there can be multiple easements in a section). Of the sections that contain a CREP easement, 188 also include an EOR record while 688 have or are adjacent to sections with EOR's.

This analysis does not indicate that the easements will directly benefit the species; it only shows that there are EOR's and easements within the same 640-acre section. However, the proximity may provide additional habitat in some situations. Further analysis of practice-specific

easement mapping from the ICPTS and detailed species habitat analysis will be needed to better understand the potential benefits. This analysis also shows that there are potential opportunities for targeting of CREP easements in locations where additional habitat may be beneficial to known populations of threatened and endangered species. To use CREP as a more targeted conservation tool would potentially provide more direct natural resources benefits but would also require additional efforts by field staff.

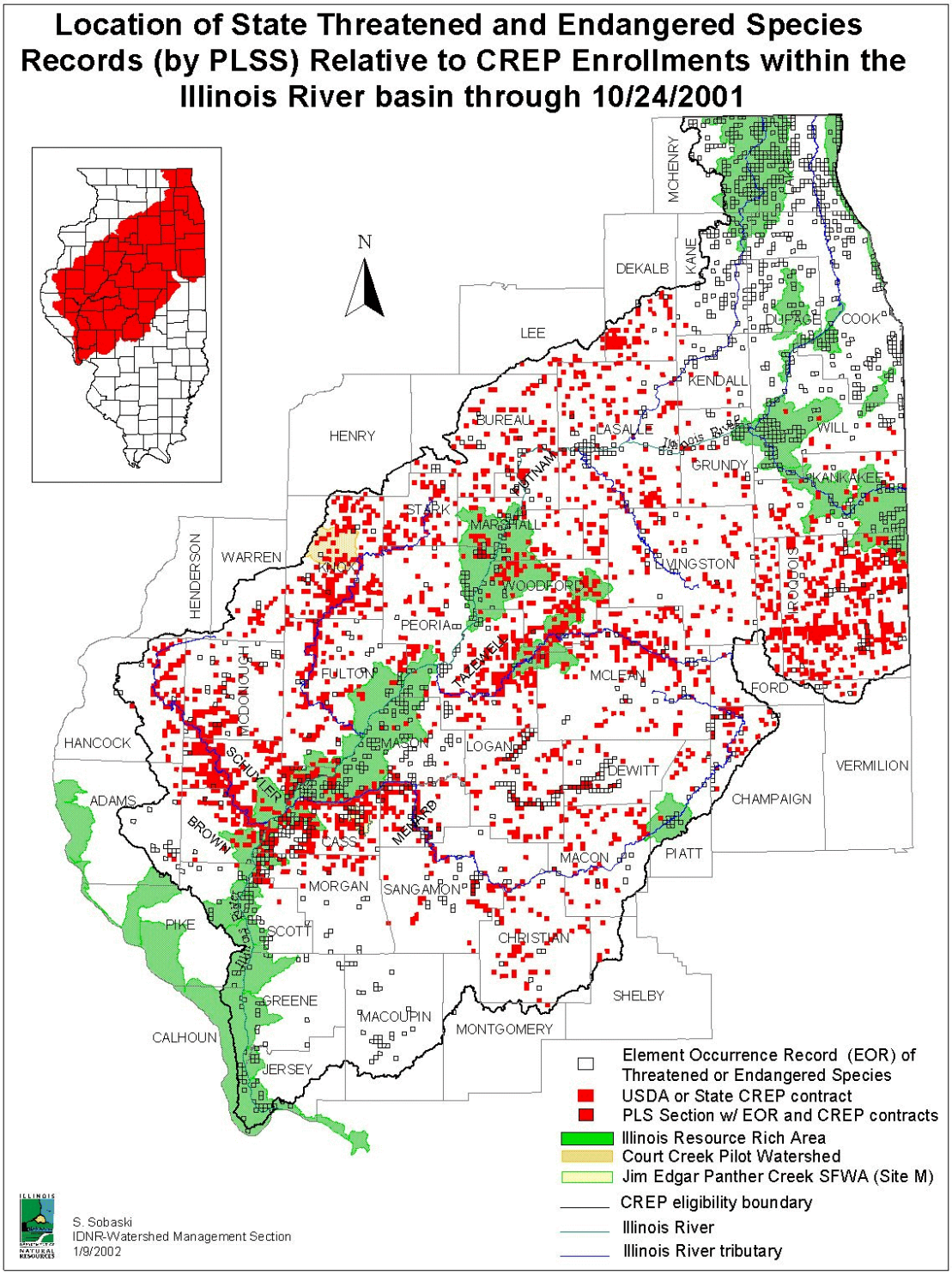

Figure 20. Location of State threatened and endangered species and resource rich areas in relation to CREP easements. Of the 3,522 records of T & E species in the Illinois River basin, 249 fall completely within a section of land that also contains a CREP easement; 705 fall adjacent to a section with an easement.

15. (Goal 4)-Native Fish and Mussel Stocks

Pilot Watershed-Preliminary Data Analysis

Large, landscape-scale programs such as CREP and the Pilot Watershed Program, have only recently (1-3 years) begun implementing projects. With the complex and dynamic systems found in Illinois, it is anticipated that potential detection of changes will require several years of post-implementation data-gathering.

Biological and Stream Habitat Assessments

Several stream components are currently being investigated, including fish, macroinvertebrates, and instream and riparian habitat. These components are sampled at study reaches approximately 20 bankfull widths of channel in length (Lyons 1992, Gough 1997).

Benthic Macroinvertebrates

Macroinvertebrates provide a valuable assessment component for CREP. With their short generation times and high intrinsic population growth rates, it is anticipated that macroinvertebrates will respond more quickly than fish to improvements in water quality and habitat. As discussed earlier, the power of the BACIP design to detect treatment effects strongly depends on the number of sampling dates before and after implementation of best management practices (BMP's). Again, because of the short generation time and typically shorter life-span than fish, macroinvertebrates can be sampled seasonally to increase the power of the BACIP design and reduce the potential for serial correlation, often associated with frequent sampling of the same organisms (Stewart-Oaten *et al*. 1992, Stewart-Oaten *et al.* 1986, Osenberg *et al.* 1994). Furthermore, most stream fish ultimately depend on benthic invertebrates as a food source. Thus, invertebrate monitoring can provide a functional understanding of improvements observed in fish assemblage structure and growth.

Two indices that incorporate macroinvertebrates are currently used to assess community structure as well as water quality. These indices include the Family Biotic Index (FBI) (Hilenshoff 1988, Lenat 1993) and percent of the following taxonomic groups: Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) known as the (%EPT index). FBI scores are based on the organic pollution tolerance value of an organism. By combining the tolerance values of individual taxa, along with their relative abundance within the stream, water quality within that reach can be evaluated. A high FBI score indicates poor water quality, while a value close to zero indicates excellent quality.

As with the FBI, the %EPT index is also indicative of stream quality. This index is based on the relative abundance of three taxonomic groups (noted above) that are sensitive to organic pollution and sedimentation. However, unlike the FBI, a low %EPT score represents low water quality in a stream. Preliminary analysis of samples processed-to-date from the Court and Haw Creek watersheds have resulted in high FBI scores and low %EPT for glide/pool habitats, indicating poor water quality or habitat availability (Table 14). Samples from riffle habitats have yet to be analyzed and should provide a more complete characterization regarding the health of the aquatic biota.

Table 14. Family Biotic Index (FBI) and percent Ephemeroptera, Plecoptera and Trichoptera (%EPT) for glide habitats at each site in Court and Haw Creek watersheds. Sites without values indicate samples that have yet to be processed. (Note: Court Upper is also referred to as North Creek).

	Fall 1998		Spring 1999		Fall 1999	
Site	FBI	%EPT	FBI	%EPT	FBI	%EPT
Court Upper	6.86	3.7	6.78	5.15	6.82	3.42
Haw Upper	7.12	2.18	7.71	0.6	7.23	0.64
Court Lower	6.78	0.0	6.78	2.17		
Haw Lower	7.26	3.55	6.98	0.0		

Water Quality Based on FBI scores (from Hilsenhoff 1988)

FBI	Water Quality
0.00 - 3.75	Excellent
3.76 - 4.25	Very Good
4.26 - 5.00	Good
5.01 - 5.75	Fair
5.76 - 6.50	Fairly Poor
6.51 - 7.25	Poor
7.26 - 10.00	Very Poor

Sampling Sufficiency of Macroinvertebrates

An important component of any sampling program is understanding the sensitivity of the sampling methods to detect changes. For macroinvertebrate assemblages using the current sampling methods, a sensitivity analysis was conducted by the Illinois Natural History Survey. They found that for most sites (the Court Upper Site was the exception), a sufficient number of core samples are collected in both spring and summer periods to reach 20% SE of the mean. When they have been processed, additional analysis is planned that will include fall samples.

Habitat assessment

Instream and riparian habitat conditions are evaluated following a modified version of the Stanfield procedures (Stanfield *et al.*, 1998). Habitat parameters are measured once/year, concurrent with the fish sampling, along ten equally-spaced transects in each reach. Response variables include stream morphology (e.g., % riffle, water depth, channel width, depth heterogeneity), stream bottom characteristics (e.g., substrate composition, cover for fish), and bank and riparian zone characteristics (e.g., bank vegetation, riparian vegetation) (Table 15).

Table 15. Summary of transect-scale habitat variables. Ten transects are sampled at each site. All variables are sampled once/year when fish sampling is conducted.

Variable	Description
Bankfull width (m)	Horizontal distance along transect, measured perpendicular to stream flow, from top of low bank to a point of equal height on opposite bank (Gough 1997). Measured one time only for site length.
Stream width (m)	Horizontal distance along transect, measured perpendicular to stream flow from bank to bank at existing water surface.
Depth (mm)	Vertical distance from water surface to stream bottom, measured at six equally-spaced points along transect.
Hydraulic head (mm)	Measurement of stream velocity at each point along transect. Taken as difference between water height on ruler facing upstream and water height on ruler facing downstream (Stanfield *et al.* 1998).
Bottom substrate type	Composition of stream bed measured at each point and in a 30 cm circle around each point where stream depth is measured. Particle diameters in each category are: Clay: ≤0.004 mm Silt: 0.004 – 0.062 mm Sand: >0.062 – 2 mm Gravel: >2 – 64 mm Cobble: >64 – 256 mm Small boulder: >256 – 512 mm Large boulder: >512 mm
Cover (%)	Object(s) that are 10 cm wide along median axis and blocks greater than 75% of sunlight; the largest object which is partially or wholly within a 30 cm circle around each point along the transect are measured.
Shading (%)	Proportion of densiometer grid squares covered at the center of each transect.
Bank vegetation cover (%)	Proportion of bank which is covered with live vegetation; based on number of 5 x 6.25cm grids out of 16 grids that contain live vegetation.
Undercut bank (mm)	Distance at each side of transect between maximum extent that streamside overhangs channel to furthest point under the bank, to nearest millimeter.
Bank height	Height from water's edge to top of bank; indicates amount of incision.
Riparian land use (left and right bank)	Composition of riparian zone at distances of 1.5-10 m, 10-30 m, and 30-100 m along each transect: largest land use category is recorded and is estimated visually; categories are: Cultivated, Herbaceous, Woody, Mature Trees, Tree Roots.

Sampling Sufficiency for Habitat

As with macroinvertebrates, Illinois Natural History Survey researchers are evaluating the effectiveness of the sampling techniques to detect change in various parameters. As an example, Table 16 shows the changes in substrate particle size that could be detected with designated years of collection. Additional analyses are needed to determine the relationship between the extent of changes in physical habitat and corresponding responses of biotic variables.

Table 16. Relationship between the number of years sampled after BMP's and the difference in average point particle size that was detectable at alpha =0.05 and beta = 0.20. Only sites with three years of baseline data were included.

	Average Point Particle (mm)					
No. of Years Post-BMP	1	2	3	4	5	10
Stream Reach						
Court Upper	45.6	32.2	26.3	22.8	20.4	14.4
Haw Upper	6.1	4.3	3.5	3.0	2.7	1.9
Court Lower	3.1	2.2	1.8	1.5	1.4	1.0
Haw Lower	23.9	16.9	13.8	11.9	10.7	7.6

Fish

The basic fish sampling methodology is one pass through each stream reach with an electric seine (for details see Dodd *et al*. 2001). Sampling frequency is once per year (generally at low-water in late summer). Response variables are: species abundance, individual growth (from scale samples), assemblage composition and structure, multi-metric indices of biological integrity (IBI) Karr *et al*. (1986).

In the Court Creek Pilot Watershed, four years of fisheries data have been collected by the Illinois Natural History Survey (1998-2001). Fish samples from 2001 are being processed and consequently are not yet available for this report. With such limited time since implementation of CREP or Pilot Watershed practices, no inferences can yet be drawn regarding the effectiveness of practices or their influences on fish or macroinvertebrates. The following discussion is a brief overview of possible analyses for future reports.

a. Catch per Effort

Total Catch per Effort was quite variable among years for most stations. The patchy distribution and schooling effect of some fishes can contribute to these results. For example, at a North Creek sample site (Upper), central stonerollers were very abundant in 1998 (324/hour), declined markedly in 1999 to 47/hour, and increased to 140/hour in 2000 (Table 17). Similar differences can be observed, among years, for several species within each station of the reference stream, Haw Creek (Table 18). While useful in corroboration with other data, this parameter is not always a reliable indicator of environmental change when used exclusively.

Table 17. Fish species and catch per effort (number/hour) for samples collected in the CREP area (Court Creek & North Creek).

Stream	Court Ck	Court Ck	Court Ck	North Ck	North Ck	North Ck
Station	Lower	Lower	Lower	Upper	Upper	Upper
Sample date	30-Sep-98	27-Aug-99	08-Aug-00	30-Sep-98	27-Aug-99	09-Aug-00
Effort (Minutes)	65	57	64	54	42	46
Carp	2.2	0.0	0.9	0.0	0.0	2.9
Creek chub	24.9	50.5	9.4	98.9	12.9	40.0
Hornyhead chub	3.3	2.1	0.0	2.2	0.0	0.0
Central stoneroller	46.6	93.7	22.5	324.4	47.1	140.0
Suckermouth minnow	21.7	0.0	0.0	17.8	10.0	0.0
Blacknose dace	24.9	16.8	3.8	21.1	12.9	11.4
Silvery minnow	0.0	1.1	0.0	0.0	0.0	0.0
Striped shiner	0.0	4.2	0.0	10.0	2.9	1.4
Redfin shiner	0.0	5.3	0.0	10.0	0.0	7.1
Spotfin shiner	0.0	210.5	0.0	0.0	0.0	0.0
Steelcolor shiner	0.0	82.1	0.0	0.0	0.0	0.0
Red shiner	1304.3	45.3	377.8	83.3	450.0	262.9
Fathead minnow	3.3	0.0	0.0	0.0	0.0	0.0
Bluntnose minnow	703.1	241.1	186.6	255.6	44.3	881.4
Bigmouth shiner	88.8	4.2	27.2	55.6	34.3	72.9
Sand shiner	497.3	114.7	182.8	115.6	282.9	421.4
Silverjaw minnow	0.0	1.1	0.0	0.0	0.0	0.0
Quillback	24.9	10.5	8.4	3.3	10.0	0.0
River carpsucker	13.0	0.0	1.9	0.0	2.9	0.0
Highfin carpsucker	0.0	0.0	0.0	0.0	1.4	0.0
White sucker	1.1	6.3	0.9	114.4	21.4	10.0
Northern hog sucker	11.9	5.3	1.9	1.1	0.0	1.4
Shorthead redhorse	6.5	0.0	0.0	0.0	0.0	0.0
Golden redhorse	54.2	26.3	14.1	36.7	40.0	11.4
Silver redhorse	0.0	0.0	3.8	0.0	0.0	0.0
Channel catfish	42.3	1.1	2.8	0.0	0.0	0.0
Yellow bullhead	0.0	11.6	1.9	11.1	1.4	2.9
Flathead catfish	0.0	0.0	0.0	0.0	2.9	0.0
Stonecat	1.1	4.2	0.9	18.9	11.4	4.3
Largemouth bass	1.1	2.1	1.9	4.4	4.3	5.7
Smallmouth bass	6.5	4.2	4.7	33.3	11.4	8.6
Green sunfish	6.5	1.1	0.0	0.0	2.9	0.0
Bluegill x Green sunfish hybrid	0.0	2.1	0.0	0.0	0.0	0.0
Bluegill	10.8	25.3	6.6	8.9	15.7	0.0
Slenderhead darter	2.2	0.0	2.8	0.0	0.0	0.0
Johnny darter	7.6	3.2	6.6	44.4	1.4	48.6
Rainbow darter	0.0	1.1	0.0	0.0	0.0	5.7
Orangethroat darter	1.1	26.3	0.0	53.3	0.0	20.0
Total No./Hour	**2910.9**	**1003.2**	**870.0**	**1324.4**	**1024.3**	**1960.0**

Table 18. Fish species and catch per effort (number/hour) for samples collected in the CREP area (Haw Creek).

Stream	Haw Ck	Haw Ck	Haw Ck	Haw Ck	Haw Ck	Haw Ck
Station	Lower	Lower	Lower	Upper	Upper	Upper
Sample date	29-Sep-98	27-Aug-99	08-Aug-00	29-Sep-98	26-Aug-99	08-Aug-00
Effort (Minutes)	46	46	53	46	40	44
Golden shiner	0.0	0.0	0.0	2.6	0.0	0.0
Creek chub	19.6	0.0	6.8	92.6	37.5	25.9
Hornyhead chub	28.7	7.8	1.1	20.9	12.0	6.8
Central stoneroller	1.3	0.0	11.3	9.1	4.5	2.7
Suckermouth minnow	35.2	9.1	3.4	2.6	4.5	0.0
Blacknose dace	11.7	2.6	2.3	0.0	1.5	0.0
Striped shiner	0.0	0.0	0.0	28.7	9.0	4.1
Redfin shiner	0.0	0.0	0.0	0.0	0.0	1.4
Red shiner	254.3	249.1	962.3	92.6	69.0	55.9
Fathead minnow	1.3	1.3	0.0	0.0	1.5	0.0
Bluntnose minnow	143.5	40.4	56.6	109.6	84.0	47.7
Bigmouth shiner	9.1	0.0	0.0	0.0	3.0	0.0
Sand shiner	191.7	53.5	118.9	41.7	43.5	9.5
Quillback	6.5	0.0	0.0	0.0	0.0	0.0
River carpsucker	0.0	1.3	0.0	0.0	0.0	0.0
White sucker	10.4	5.2	0.0	70.4	58.5	72.3
Northern hog sucker	2.6	3.9	1.1	0.0	0.0	0.0
Shorthead redhorse	14.3	0.0	0.0	0.0	0.0	0.0
Golden redhorse	23.5	11.7	2.3	20.9	13.5	13.6
Silver redhorse	5.2	1.3	0.0	0.0	0.0	0.0
Channel catfish	18.3	14.3	6.8	0.0	0.0	0.0
Yellow bullhead	2.6	3.9	1.1	2.6	1.5	0.0
Black bullhead	0.0	0.0	0.0	1.3	0.0	0.0
Flathead catfish	0.0	5.2	0.0	0.0	0.0	0.0
Stonecat	19.6	20.9	0.0	1.3	6.0	1.4
Largemouth bass	6.5	2.6	2.3	23.5	6.0	6.8
Smallmouth bass	1.3	0.0	0.0	0.0	0.0	0.0
Green sunfish	15.7	9.1	4.5	2.6	0.0	1.4
Bluegill	3.9	5.2	2.3	3.9	3.0	4.1
Slenderhead darter	0.0	3.9	3.4	0.0	3.0	0.0
Johnny darter	0.0	1.3	7.9	6.5	0.0	0.0
Total No./Hour	**827.0**	**453.9**	**1194.3**	**533.5**	**361.5**	**253.6**

b. Species Richness

From these samples, total number of species shows much more consistency than catch per effort. For both stations on these streams, species richness was higher at the downstream station, compared to the upstream station. According to Vannote *et al*. (1980) it would be expected that species richness increases with stream size. Therefore, these data follow an expected trend (Table 19). Within each station, a very similar number of species was collected from 1998 through 2000. Although total number of species was very similar, there were moderate differences in the actual species collected, with some species not being collected in subsequent years or with new species being collected, compared to the previous year. In such diverse and dynamic systems, these annual differences are not unexpected.

c. Index of Biotic Integrity

The Index of Biotic Integrity provides a comprehensive analysis of the fish community. Developed by Karr (1981) and comprising 12 metrics, the IBI accounts for differences in fish community structure (species richness), trophic composition, fish condition and abundance. The index has been calibrated for stream size and region within Illinois (Hite and Bertrand 1989) and thus provides a useful measure of differences in overall health of the fish community. Notably, the Haw Creek stations show strong consistency in IBI values among years (Table 19). By comparison, both North Creek watershed stations showed substantial differences in IBI among years. Factors influencing these differences are not clear, but future analysis of water stage and temperature data may provide some explanation. A 1995 sample collected approximately two miles downstream of the Pilot Watershed station achieved an IBI score of 50 and two other samples on North Creek (DJJB-02 and DJJB-04) attained scores of 50 and 52, respectively. Additional samples should provide a better perspective on the condition of these stations and variability of the data.

Table 19. Species richness and Index of Biotic Integrity (IBI) for samples collected from Court Creek and Haw Creek, Knox County, Illinois. Note: IBI values are indicated in ( ).

Stream	Station	1998	1999	2000
Court Creek	Lower	26 (50)	29 (41)	22 (50)
Court (North) Creek	Upper	22 (42)	22 (50)	20 (40)
Haw Creek	Lower	23 (50)	21 (48)	17 (42)
Haw Creek	Upper	18 (40)	18 (40)	14 (36)

Index of Biotic Integrity (IBI) scores range from 12-60.
Biological Stream Characterization rankings (Bertrand *et al.* 1996)

IBI Score	Class	Description
51 - 60	A	(Unique)
41 - 50	B	(Highly valued)
31 - 40	C	(Moderate)
21 - 30	D	(Limited)
$\leq$ 20	E	(Restricted)

Jim Edgar Panther Creek State Fish & Wildlife Area

Fish

In the Jim Edgar-Panther Creek State Fish & Wildlife Area, early stream remediation efforts focused on streambank erosion. A major driving process contributing to this erosion was channel incision resulting from channel straightening in the downstream reaches, and land use modifications that presumably altered hydrology of the watersheds. Techniques used to stabilize these streams have included pool & riffle structures, lunkers and willow posts. The remediation work on Cox Creek was conducted in 1997 and on Panther Creek in 1998. Post-construction biological (primarily fish community) and habitat assessments are being conducted by IDNR stream fisheries biologists. Additionally, fish sampling was conducted in 2001, but the data were not available for this report. Further fish and habitat analyses by the streams biologist are anticipated, and when available, will be included in subsequent reports.

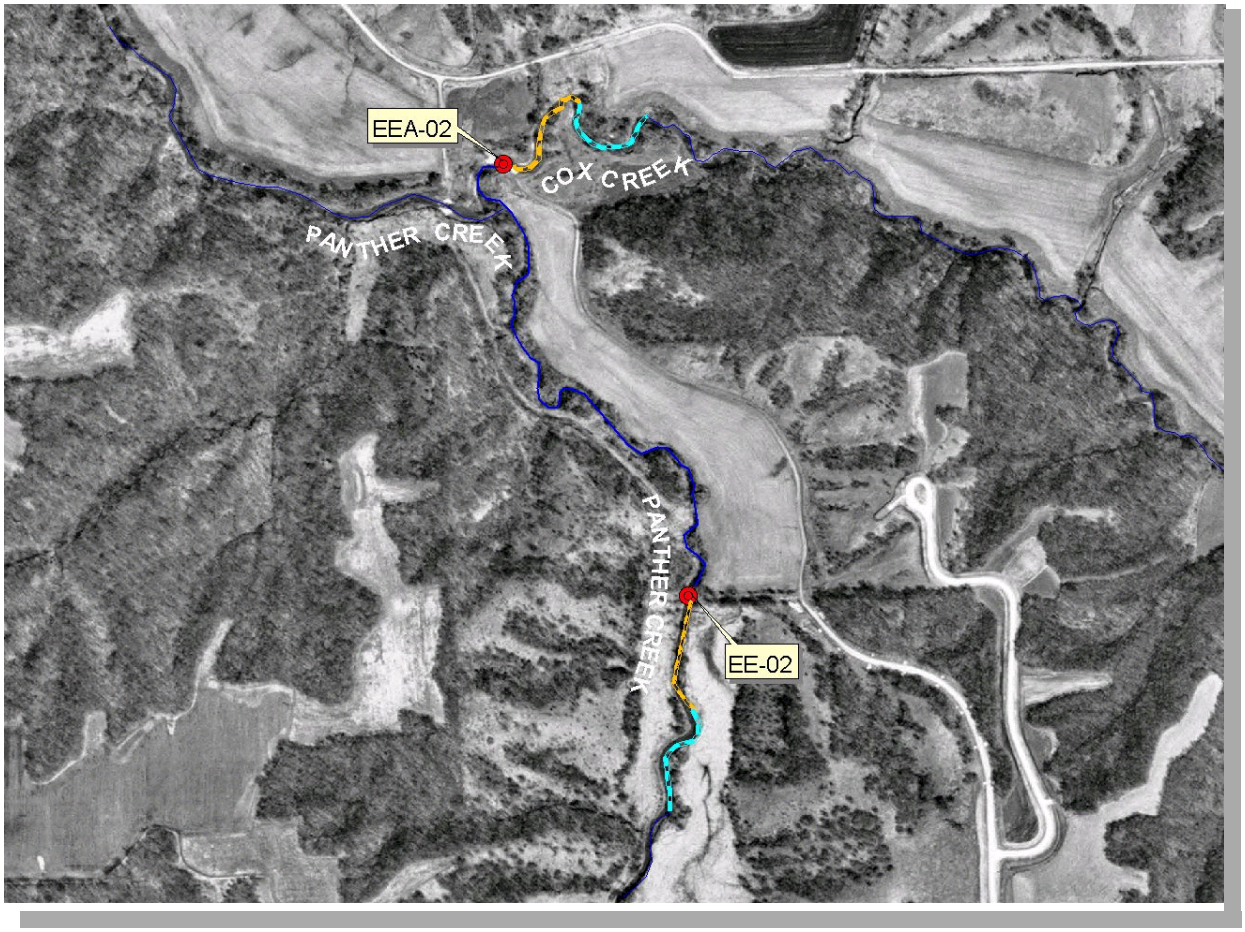

Figure 21. Aerial view of fish sampling sites at the Jim Edgar- Panther Creek State Fish & Wildlife Area. Note: Stations were divided into "lower" = orange and "upper" = blue sections.

One of the most apparent early post-construction observations is the significant decline in total fish abundance (Table 20) and the change in abundance of particular species (Table 21, Table 22). Pre-construction fish samples were dominated by various minnow species such as bluntnose minnow, striped shiner, bigmouth shiner, central stoneroller and creek chub. By comparison, post-construction fish communities contained much lower total abundances and of the above-mentioned species. Other changes included a notable increase in green sunfish abundance in both Cox and Panther Creeks following implementation of the remediation. Because abundance can be highly variable, species richness and trophic composition, as well as other factors in the Index of Biotic Integrity (IBI) can be used to evaluate the overall fish community condition. In 1998, the lower Cox Creek (treated) site showed a marked improvement in both species richness and IBI scores, compared to previous sampling (Table 20). It is yet unclear if these changes are directly attributable to the remediation effort, but further assessment of fish biomass and habitat data may contribute to further understanding the influence of these techniques.

Table 20. Summary fish data from Cox and Panther Creeks in the Jim Edgar-Panther Creek State Fish and Wildlife Area.

		Pre-Construction		Post-Construction	
Lower Reaches - pooled by obstructions (ford and old bridge)		**1995**	**1996**	**1997**	**1998**
Cox Creek Lower (Treated)	**IBI**	38	36	38	46
	# Species	21	20	17	26
	N	1510	1764	803	426
Lower Panther (Control)	**IBI**	40	36	34	36
	# Species	20	17	15	16
	N	1342	2204	392	758
Upper Reaches - free flowing					
Cox Creek Upper (Treated)	**IBI**	38	34	32	42
	# Species	17	13	15	21
	N	2855	3446	232	646
Upper Panther (Control)	**IBI**	34	32	28	38
	# Species	13	14	13	16
	N	1775	1501	768	964

Riffles, Lunkers and Willow Posts Installed Feb. 1997

Source: IDNR Streams Database; Doug Carney, IDNR (12/09/1999)

Table 21. Fish species list and abundances for Cox Creek samples collected from 1995 through 1998. Note: Stream remediation was initiated in Feb. 1997.

COX CREEK
1995-1998

	1995		1996		1997		1998	
COMMON NAME	**LOWER**	**UPPER**	**LOWER**	**UPPER**	**LOWER**	**UPPER**	**LOWER**	**UPPER**
Gizzard shad	4	0	0	0	0	0	1	1
Carp	5	0	3	0	1	0	3	6
Southern redbelly dace	0	0	0	0	1	0	0	0
Creek chub	67	196	106	270	63	14	3	5
Hornyhead chub	20	40	48	111	33	8	17	8
Central stoneroller	279	599	58	123	177	20	29	14
Suckermouth minnow	33	72	22	18	19	2	5	2
Blacknose dace	0	25	1	88	5	0	2	1
Striped shiner	252	226	151	313	19	12	96	44
Redfin shiner	0	0	0	0	0	0	3	1
Red shiner	19	55	46	52	24	13	318	366
Fathead minnow	0	0	0	0	0	0	3	0
Bluntnose minnow	346	336	389	591	245	99	135	96
Emerald shiner	0	0	0	0	0	0	2	0
Bigmouth shiner	346	1002	818	1591	46	8	14	32
Sand shiner	45	225	69	261	43	1	88	47
Quillback	23	13	5	0	0	0	3	0
River carpsucker	0	0	0	0	0	0	3	3
White sucker	3	2	1	0	50	24	10	5
Shorthead redhorse	25	3	0	0	0	0	3	0
Golden redhorse	10	10	1	0	0	1	3	2
Yellow bullhead	14	19	16	17	32	7	2	1
Black bullhead	0	0	1	0	0	0	0	0
Largemouth bass	1	0	1	0	0	0	1	0
Green sunfish	1	0	1	0	19	12	9	9
Bluegill	2	0	0	0	0	0	1	1
Blackside darter	2	2	3	1	4	2	2	1
Johnny darter	13	30	24	10	22	9	2	1
Total No. Individuals	1510	2855	1764	3446	803	232	758	646
Total No. Species	21	17	20	13	17	15	26	21
Index of Biotic Integrity	38	38	36	34	38	32	46	42

Source: IDNR Streams Database; Doug Carney, IDNR (12/09/1999)

Table 22. Fish species list and abundances for Panther Creek samples collected from 1995 through 1998. Note: Stream remediation in Cox Creek was initiated in Feb. 1997.

PANTHER CREEK
1995-1998

	1995		1996		1997		1998	
COMMON NAME	**LOWER**	**UPPER**	**LOWER**	**UPPER**	**LOWER**	**UPPER**	**LOWER**	**UPPER**
Carp	1	0	0	0	0	0	0	0
Golden shiner	0	0	1	1	0	0	0	0
Creek chub	100	177	104	109	21	73	7	22
Hornyhead chub	48	51	21	22	12	7	2	16
Unidentified Stoneroller	5	16	0	0	0	0	0	0
Central stoneroller	271	272	118	80	9	88	22	38
Suckermouth minnow	11	11	9	11	4	2	0	2
Blacknose dace	0	7	0	18	0	0	0	0
Striped shiner	403	470	99	137	61	14	73	167
Red shiner	9	21	71	12	23	13	76	240
Bluntnose minnow	230	397	783	500	123	200	65	203
Bigmouth shiner	134	276	668	542	21	171	3	121
Sand shiner	44	0	84	29	2	1	12	35
Quillback	6	0	1	0	0	0	0	0
White sucker	17	0	18	0	33	49	127	87
Golden redhorse	27	6	9	0	1	0	4	2
Yellow bullhead	12	19	7	9	2	6	1	2
Black bullhead	0	0	0	0	0	0	1	0
Largemouth bass	2	0	0	0	0	0	4	4
Green sunfish	1	0	14	1	64	94	27	18
Bluegill	1	0	1	0	0	0	1	1
Redear sunfish	1	0	0	0	0	0	0	0
Blackside darter	0	0	0	0	2	0	0	0
Johnny darter	19	52	196	30	14	50	1	7
Total No. Individuals	1342	1775	2204	1501	392	768	426	965
Total No. Species	20	13	17	14	15	13	16	16
Index of Biotic Integrity	40	34	36	32	34	28	36	38

Source: IDNR Streams Database; Doug Carney, IDNR (12/09/1999)

Long-Term Resource Monitoring Program (LTRMP)

Fish

As part of the Long Term Resource Monitoring Program (LTRMP), fish communities have been monitored in the La Grange Reach of the Illinois River since 1990. Sampling from 1990-1992 was at fixed sites throughout the reach (Table 23). However, beginning in 1993, the program implemented a stratified random sampling design. Currently, sampling gear includes large and small fyke nets, large and small hoop nets, seines, and a boat electroshocker for sampling approximately 150 randomly selected main channel border, side channel, and backwater sites in the La Grange Reach. Sampling is conducted during each of three 45-day sampling windows annually (June 15-Oct 30); this results in approximately 450 samples (Table 24) and 50,000 fish per year. Data collected through 2000 are available from the USGS Upper Midwest Environmental Sciences Center's home page and the Havana Field Station. **http://www.umesc.usgs.gov/data library/fisheries/fish page.html.** A total of 83 species and 7 hybrids have been collected throughout the La Grange Reach since the inception of the LTRMP.

Areas Sampled for Fishes

Along with main channel and side channel habitats of the La Grange Reach, major backwater areas sampled for fishes include: Pekin Lake, Big Lake, Clear Lake, Quiver Lake, Matanza Lake, Crane Lake, Chain Lake, Treadway Lake, Muscooten Bay, and Lily Lake.

Table 23. Gear and number of fixed-site Illinois River stations sampled annually by the Long-Term Resource Monitoring Program (1990-1999).

Fixed Site Sampling Effort Per Year

Gear	Tailwaters*	Side Channel Border*	Total
Day Electrofishing	12	6	18
Night Electrofishing	12	6	18
Fyke	12		12
Minnow Fyke	12	6	18
Hoop Net	12	6	18
Seine		6	6
Trawl	12		12
TOTAL	**72**	**30**	**102**

* Peoria and La Grange Tailwaters and Bath Chute Side Channel Border

Table 24. Average number of random-site fish stations sampled annually by the Long-Term Resource Monitoring Program (1993 to 1999).

Gear	Backwater Off shore	Backwater Contiguous	Main Channel Border	Side Channel Border	Totals
Day Electrofishing		36	36	42	114
Fyke		30			30
Minnow Fyke		30	24	18	72
Hoop Net			24	18	42
Tandem Fyke	18				18
Tandem Minnow Fyke	18				18
Seine		12	18	12	42
TOTAL	**36**	**108**	**102**	**90**	**336**

Invertebrates

Long Term Resource Monitoring Program (LTRMP) macroinvertebrate sampling is conducted over a 15-day period in May, and includes approximately 100 randomly selected sites and 26 fixed sites in main channel, side channel, and backwater habitats (Table 25).

Table 25. Invertebrate random sample sites for La Grange reach. Numbers in parentheses are historical (fixed) sites.

Study reach	Contiguous backwater	Impounded	Side channel	Main channel border
La Grange Pool	24 (18)	—	35 (7)	40 (1)

Single ponar grab samples are collected annually at each site. Since 1992 monitoring has targeted up to five groups of macroinvertebrates (mayflies, midges, fingernail clams, Asiatic clams, and zebra mussels) in the La Grange reach (Table 26). Generally, these results indicate a decline in mayfly densities since 1994. Further analysis is needed to determine if any habitat factors could be attributable to this decline. By comparison, fingernail clams and midges show substantial variability with apparent inverse cyclical densities. As with mayflies, more years of

sampling are needed to see if these changes are related to habitat. Both the Asiatic clam (*Corbicula* spp.) and Zebra mussels (*Dreissena* spp.) were found in low densities.

Table 26. Reachwide estimated mean number of mayflies, fingernail clams, midges, Asiatic clams (*Corbicula spp.)*, and Zebra mussels (*Dreissena* spp.) per square meter by year and study area, weighted by area of strata. Numbers in parentheses are ±1 standard error. *N* = number of samples.

Study area and year (*N*)	Mayflies (m^2)	Fingernail clams (m^2)	Midges (m^2)	*Corbicula* spp.(m^2)	Zebra mussels (m^2)
La Grange Pool					
1992 (102)	13.0 (±6.3)	3.7 (±2.4)		0.4 (±0.4)	
1993 (98)	10.7 (±4.8)	17.4 (±9.5)	52.0 (±14.3)	0.0 (±0.0)	
1994 (126)	26.6 (±8.5)	50.5 (±12.5)	57.0 (±9.9)	10.1 (±2.9)	
1995 (98)	5.7 (±3.5)	15.2 (±8.2)	31.7 (±12.1)	1.4 (±0.7)	9.3 (±9.3)
1996 (98)	3.6 (±1.5)	4.7 (±2.7)	150.0 (±49.7)	1.2 (±0.7)	0.4 (±0.4)
1997 (99)	7.7 (±3.3)	9.3 (±4.8)	100.8 (±33.0)	0.0 (±0.03)	0.0 (±0.0)
1998 (99)	8.6 (±5.6)	20.5 (11.7)	91.3 (±25.1)	0.6 (±0.6)	2.5 (±1.2)

Vegetation

In 1998, within the La Grange Reach, a stratified random sampling (SRS) design was initiated for assessment of submergent and emergent aquatic vegetation. Accessible shallow aquatic areas (< = 3m) were targeted for investigation. From 1998 to present, 1,960 sites have been sampled within four strata, including backwater isolated, backwater contiguous, main channel border and side channel areas. Each site contains 6 subsampling areas resulting in a total of 11,760 rake grabs. Points were located using a differentiated Global Positioning System (GPS), where each point represents a 2-m-wide area around the perimeter of the sampling boat (17 ft) approximately 5 m long and 2 m wide. The area of each sample point was approximately 44 m^2. We used a combination of visual examination, rake samples, and a subsample to quantify the abundance of aquatic species. Water depth and substrate type were also recorded.

Floodplain forest monitoring within La Grange Reach began in 1993. Currently, a long-term monitoring study is in place to monitor floodplain forest dynamics including seed fall production, seedling recruitment, seedling survivorship, and mortality of sapling and adult floodplain species (1996 to present). Monitoring of one oak and one silver maple-dominated site includes monthly collection (March through December) of seed fall, tagging new germinants and monitoring existing trees within a plot. Each forest type has a total of 15 subplots. Seeds are identified and tallied. New germinants are identified and tagged for subsequent monitoring. Growth of trees is recorded in the fall when trees become dormant.

Long-Term Electrofishing (LTEF) study of the Illinois River

The Long-Term Electrofishing study of Illinois River fish populations was initiated in 1957 with five sample sites in the Peoria, Starved Rock, and Marseilles Reaches. Subsequently, the monitoring program has expanded to encompass 28 sites (27 on the Illinois River from Alton Reach to Dresden Reach, and one on the Mississippi River in Pool 26 below the mouth of the Illinois River) to assess river-wide fish population trends. Sampling consists of a one-hour electrofishing run per site using a 3-phase AC generator with one person dip netting. Sites are sampled from the third week in August to the first week in October when water temperatures are above 50°F and water levels are low and stable. Collected fish are identified, weighed, and measured for total length, then returned to the water.

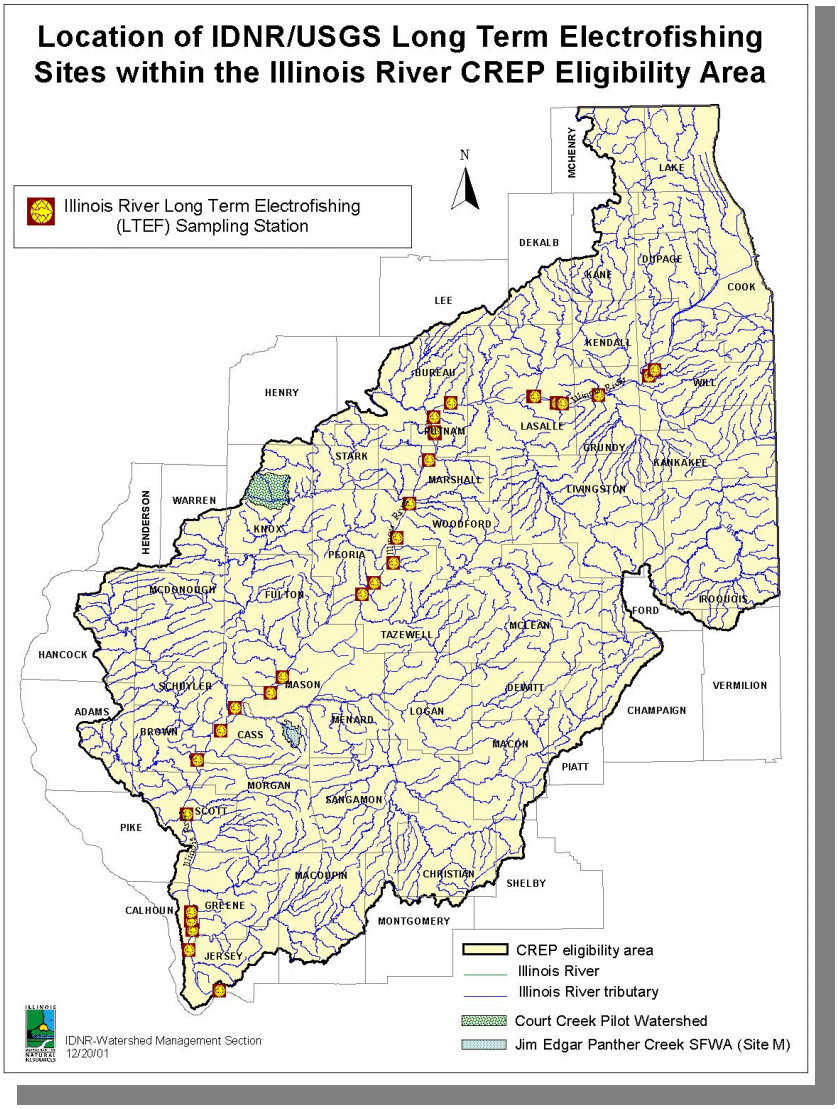

Figure 22. Fish sampling locations for the long-term electrofishing study.

Native Mussel Stocks

Although, no continuous monitoring program for mussel stocks has yet been developed, extensive mussel records are available from the Illinois Natural History Survey at the following Internet address: **http://www.inhs.uiuc.edu/cbd/collections/mollusk.html .** Research into native mussel ecology, especially in response to the invasive zebra mussel (*Dreissena polymorpha*) has focused on populations in the Illinois and Mississippi Rivers (Tucker and Atwood 1995, Tucker 1994, Tucker *et al.* 1993).

16. Conclusions and Recommendations for the CREP Assessment

Clearly, the Illinois Conservation Reserve Enhancement Program is having an impact on the landscape of Illinois. With nearly 100,000 acres placed in easements and approximately 30,000 acres on the waiting list (Illinois is currently authorized to accept 132,000 acres), the program will be a major factor in creating habitat and in the potential reduction in sediment and nutrient delivery to streams, rivers, and lakes. Literature surveys described above indicate that the traditional conservation reserve program practices have positive impacts on grassland and waterfowl bird populations. Similarly, literature describing impacts of buffer strips, filter strips, and wetlands on sediment and nutrient reduction also promise positive effects. Thus, without a doubt, we can state that CREP will have positive impacts in the immediate areas where it is implemented. However, measuring the impact will be a challenge and the positive effects of the program will be offset, to an unknown extent, by other activities in the areas adjacent to each easement, in the watersheds, and the entire Illinois River basin.

The Illinois landscape is being modified in ways that will be deleterious to natural resources. For example, about 49,000 acres per year of land are developed statewide over the period 1992-1997 (NRI 2000). Much of this has been happening in the upper Illinois River watershed area of the Chicago metropolitan area. However, we have also seen growth in several downstate Illinois River basin urban centers such as Peoria, Bloomington-Normal, and Springfield. Typically, development will lead to increased runoff rates, pollutants, and loss of habitat. It is possible that the magnitude of these events, at the watershed and basin scale, may offset gains seen through programs such as CREP. Undoubtedly, the degradation would be worse without CREP, but the measurement of largescale impacts will be severely confounded by the various activities on the landscape. The CREP assessment activities, with evaluations at multiple scales, will try to work around this problem. Nevertheless, the widespread and diffuse impacts of development will make the assessment more difficult.

While it is too early to make specific statements about CREP, some observations are evident:

1. CREP is one conservation tool among many that needs to be used for natural resources management. It will be important to continue and expand coordination with other programs such as Illinois Department of Agriculture Streambank Stabilization and Restoration Program (SSRP), Illinois EPA section 319 funding, and various other federal, state, local and NGO programs. Continued interagency coordination is necessary and the watershed approach (Dosskey 2001, NRC 1999) should be further utilized to solve problems that are systemic in nature and can only be addressed through coordinated approached.

2. The Illinois Conservation Practices Tracking System (ICPTS) will become an increasingly powerful and useful tool and should be expanded statewide. This tool not only provides a basic data layer for assessment, but will be increasingly used for planning, coordinating, and marketing programs.

3. CREP is a focused program in that eligibility is restricted to riparian and adjacent HEL lands. Also, there have been some efforts to target the program in certain areas to obtain even greater natural resources benefits. However, and as Figure 20 illustrates, there are many areas of high resource quality that have received minimal attention. If the opportunity is made available to expand CREP to the original requested 232,000 acres, it would be beneficial to define natural resource priority areas and make efforts to work with landowners in these areas.

4. The assessment of a program as expansive as CREP is difficult. Even though great deals of data are available, as described previously in this document, many are collected at inappropriate locations or at scales that are of limited use in the assessment. Additional data collections in specific targeted areas, such as those with high CREP signup, need to be added. Further, the modeling approaches and extensive conservation mapping activities described in the document will provide critical assessment tools and be useful in improving planning. Additional funds should be directed toward these components of the overall CREP program. Current year expenditures on monitoring of $189,832 make up only 1.4% of the state allocation and 0.2% of the total state and federal CREP expenditures.

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APPENDIX A

Table A1 . Threatened or endangered species occurring in the 100-yr floodplain of the CREP area (data from IDNR 2001). Note that this floodplain delineation does not include main of the smaller streams and ,therefore, may not be a complete list of all species in these categories. Status codes are as follows: ST= State Threatened; SE = State Endangered; FT = Federally Threatened; FE = Federally Endangered; PDL = Proposed for Federal de-listing; C = Candidate species.

FAUNA

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Acipenser fulvescens	Lake Sturgeon	SE		1
Aflexia rubranura	Redveined Prairie Leafhopper	ST		1
Alasmidonta viridis	Slippershell	ST		19
Ammocrypta clarum	Western Sand Darter	SE		1
Ammodramus henslowii	Henslow's Sparrow	SE		2
Bartramia longicauda	Upland Sandpiper	SE		2
Botaurus lentiginosus	American Bittern	SE		2
Buteo lineatus	Red-shouldered Hawk	ST		4
Certhia americana	Brown Creeper	ST		4
Chlidonias niger	Black Tern	SE		16
Clemmys guttata	Spotted Turtle	SE		1
Clonophis kirtlandi	Kirtland's Snake	ST		4
Crotalus horridus	Timber Rattlesnake	ST		1
Cyclonaias tuberculata	Purple Wartyback	ST		2
Ellipsaria lineolata	Butterfly	ST		1
Elliptio dilatata	Spike	ST		13
Emydoidea blandingii	Blanding's Turtle	ST		9
Etheostoma exile	Iowa Darter	SE		12
Fundulus diaphanus	Banded Killifish	ST		4
Gallinula chloropus	Common Moorhen	ST		23
Grus canadensis	Sandhill Crane	ST		26
Haliaeetus leucocephalus	Bald Eagle	ST	FT, PDL	20
Hybopsis amnis	Pallid Shiner	SE		2
Ichthyomyzon fossor	Northern Brook Lamprey	SE		1
Ictinia mississippiensis	Mississippi Kite	SE		1

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Ixobrychus exilis	Least Bittern	ST		21
Kinosternon flavescens	Illinois Mud Turtle	SE		1
Lanius ludovicianus	Loggerhead Shrike	ST		1
Lepomis miniatus	Redspotted Sunfish	ST		1
Ligumia recta	Black Sandshell	ST		2
Moxostoma carinatum	River Redhorse	ST		13
Moxostoma valenciennesi	Greater Redhorse	SE		13
Myotis sodalis	Indiana Bat	SE	FE	3
Nannothemis bella	Elfin Skimmer	ST		1
Notropis chalybaeus	Ironcolor Shiner	ST		5
Notropis heterodon	Blackchin Shiner	ST		8
Notropis heterolepis	Blacknose Shiner	SE		5
Notropis texanus	Weed Shiner	SE		2
Nycticorax nycticorax	Black-crowned Night Heron	SE		13
Papaipema eryngii	Eryngium Stem Borer	SE		1
Paraphlepsius lupalus	Leafhopper	SE		1
Plethobasus cyphyus	Sheepnose	SE		2
Podilymbus podiceps	Pied-billed Grebe	ST		40
Pseudacris streckeri illinoensis	Illinois Chorus Frog	ST		6
Rallus elegans	King Rail	SE		5
Sistrurus catenatus catenatus	Eastern Massasauga	SE	C	1
Somatochlora hineana	Hine's Emerald Dragonfly	SE	FE	1
Speyeria idalia	Regal Fritillary	ST		1
Sterna forsteri	Forster's Tern	SE		3
Thryomanes bewickii	Bewick's Wren	SE		1
Villosa iris	Rainbow	SE		2
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	SE		30

FLORA

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Agalinis skinneriana	Pale False Foxglove	ST		1
Amelanchier interior	Shadbush	SE		2
Amelanchier sanguinea	Shadbush	SE		2

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Arenaria patula	Slender Sandwort	ST		3
Aster furcatus	Forked Aster	ST		5
Astragalus tennesseensis	Tennessee Milk Vetch	SE		1
Beckmannia syzigachne	American Slough Grass	SE		2
Besseya bullii	Kittentails	ST		1
Betula alleghaniensis	Yellow Birch	SE		2
Bidens beckii	Water Marigold	SE		2
Boltonia decurrens	Decurrent False Aster	ST	FT	31
Cakile edentula	Sea Rocket	ST		1
Calla palustris	Water Arum	SE		1
Calopogon tuberosus	Grass Pink Orchid	SE		2
Cardamine pratensis var palustris	Cuckoo Flower	SE		3
Carex aurea	Golden Sedge	SE		2
Carex brunnescens	Brownish Sedge	SE		1
Carex canescens var disjuncta	Sedge	SE		2
Carex chordorrhiza	Cordroot Sedge	SE		2
Carex communis	Fibrous-rooted Sedge	ST		1
Carex crawfordii	Sedge	SE		2
Carex cryptolepis	Sedge	SE		4
Carex disperma	Shortleaf Sedge	SE		4
Carex echinata	Sedge	SE		1
Carex oligosperma	Few-seeded Sedge	SE		3
Carex trisperma	Three-seeded Sedge	SE		2
Carex tuckermani	Tuckerman's Sedge	SE		1
Carex viridula	Little Green Sedge	ST		6
Carex woodii	Pretty Sedge	ST		1
Chamaedaphne calyculata	Leatherleaf	ST		5
Cirsium hillii	Hill's Thistle	ST		1
Cornus canadensis	Bunchberry	SE		1
Cyperus grayioides	Umbrella Sedge	ST		1
Cypripedium acaule	Moccasin Flower	SE		1
Cypripedium calceolus var parviflorum	Small Yellow Lady's Slipper	SE		4
Cypripedium candidum	White Lady's Slipper	ST		7

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Cypripedium reginae	Showy Lady's Slipper	SE		3
Dalea foliosa	Leafy Prairie Clover	SE	FE	1
Drosera rotundifolia	Round-leaved Sundew	SE		5
Eleocharis rostellata	Spike Rush	ST		4
Elymus trachyculus	Bearded Wheat Grass	SE		1
Epilobium strictum	Downy Willow Herb	ST		8
Eriophorum virginicum	Rusty Cotton Grass	SE		3
Erythronium mesochoreum	Prairie Trout-lily	ST		1
Filipendula rubra	Queen-of-the-prairie	SE		4
Galium labradoricum	Bog Bedstraw	ST		15
Gaultheria procumbens	Wintergreen	SE		1
Geranium bicknellii	Northern Cranesbill	SE		1
Hymenoxys herbacea	Lakeside Daisy	SE	FT	1
Iliamna remota	Kankakee Mallow	SE		1
Isoetes butleri	Quillwort	SE		2
Juncus alpinus	Richardson's Rush	SE		2
Juniperus communis	Ground Juniper	ST		1
Larix laricina	Tamarack	ST		7
Lechea intermedia	Pinweed	ST		1
Liatris scariosa var nieuwlandii	Blazing Star	ST		2
Malvastrum hispidum	False Mallow	SE		2
Milium effusum	Millet Grass	SE		1
Mimulus glabratus	Yellow Monkey Flower	SE		3
Orobanche ludoviciana	Broomrape	ST		1
Phlox pilosa ssp sangamonensis	Sangamon Phlox	SE		3
Platanthera flava var herbiola	Tubercled Orchid	SE		2
Platanthera leucophaea	Eastern Prairie Fringed Orchid	SE	FT	9
Pogonia ophioglossoides	Snake-mouth	SE		1
Polygonatum pubescens	Downy Solomon's Seal	SE		3
Polygonum careyi	Carey's Heartsease	SE		1
Populus balsamifera	Balsam Poplar	SE		1
Potamogeton gramineus	Grass-leaved Pondweed	ST		6
Potamogeton praelongus	White-stemmed Pondweed	SE		4

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Potamogeton robbinsii	Fern Pondweed	SE		5
Ranunculus cymbalaria	Seaside Crowfoot	SE		1
Rhamnus alnifolia	Alder Buckthorn	SE		1
Rhynchospora alba	Beaked Rush	ST		3
Ribes hirtellum	Northern Gooseberry	SE		2
Rubus pubescens	Dwarf Raspberry	ST		3
Salix serissima	Autumn Willow	SE		2
Sambucus pubens	Red-berried Elder	SE		1
Sarracenia purpurea	Pitcher Plant	SE		7
Scirpus cespitosus	Tufted Bulrush	SE		1
Scirpus hallii	Hall's Bulrush	ST		1
Scirpus hattorianus	Bulrush	SE		1
Scirpus paludosus	Alkali Bulrush	SE		1
Scirpus purshianus	Weak Bulrush	SE		1
Scirpus smithii	Smith's Bulrush	SE		1
Sisyrinchium montanum	Mountain Blue-eyed Grass	SE		1
Solidago sciaphila	Cliff Goldenrod	ST		2
Sparganium chlorocarpum	Green-fruited Burreed	SE		3
Spiranthes lucida	Yellow-lipped Ladies' Tresses	SE		1
Spiranthes romanzoffiana	Hooded Ladies' Tresses	SE		1
Stellaria pubera	Great Chickweed	SE		1
Stylisma pickeringii	Patterson's Bindweed	SE		1
Styrax americana	Storax	ST		2
Symphoricarpos albus var albus	Snowberry	SE		2
Thuja occidentalis	Arbor Vitae	ST		4
Tofieldia glutinosa	False Asphodel	ST		2
Tomanthera auriculata	Ear-leafed Foxglove	ST		3
Trientalis borealis	Star-flower	ST		2
Trifolium reflexum	Buffalo Clover	SE		1
Triglochin maritima	Common Bog Arrow Grass	ST		5
Triglochin palustris	Slender Bog Arrow Grass	ST		2
Trillium cernuum	Nodding Trillium	SE		1
Ulmus thomasii	Rock Elm	SE		1

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Utricularia intermedia	Flat-leaved Bladderwort	SE		4
Utricularia minor	Small Bladderwort	SE		3
Vaccinium corymbosum	Highbush Blueberry	SE		3
Vaccinium macrocarpon	Large Cranberry	SE		4
Vaccinium oxycoccos	Small Cranberry	SE		1
Valerianella umbilicata	Corn Salad	SE		1
Veronica scutellata	Marsh Speedwell	ST		1
Viola conspersa	Dog Violet	ST		1
Zigadenus glaucus	White Camass	SE		1

Table A2. Threatened or endangered species occurring in the entire CREP area (data from IDNR 2001).

FAUNA

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Hemidactylium scutatum	Four-toed Salamander	ST		1
Pseudacris streckeri illinoensis	Illinois Chorus Frog	ST		23
Ammodramus henslowii	Henslow's Sparrow	SE		25
Asio flammeus	Short-eared Owl	SE		3
Bartramia longicauda	Upland Sandpiper	SE		30
Botaurus lentiginosus	American Bittern	SE		4
Buteo lineatus	Red-shouldered Hawk	ST		17
Buteo swainsoni	Swainson's Hawk	SE		5
Certhia americana	Brown Creeper	ST		7
Chlidonias niger	Black Tern	SE		27
Circus cyaneus	Northern Harrier	SE		5
Egretta caerulea	Little Blue Heron	SE		3
Egretta thula	Snowy Egret	SE		1
Falco peregrinus	Peregrine Falcon	SE		8
Gallinula chloropus	Common Moorhen	ST		50
Grus canadensis	Sandhill Crane	ST		44

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Haliaeetus leucocephalus	Bald Eagle	ST	FT, PDL	28
Ictinia mississippiensis	Mississippi Kite	SE		1
Ixobrychus exilis	Least Bittern	ST		35
Lanius ludovicianus	Loggerhead Shrike	ST		44
Nyctanassa violacea	Yellow-crowned Night Heron	SE		2
Nycticorax nycticorax	Black-crowned Night Heron	SE		30
Pandion haliaetus	Osprey	SE		1
Phalaropus tricolor	Wilson's Phalarope	SE		1
Podilymbus podiceps	Pied-billed Grebe	ST		92
Rallus elegans	King Rail	SE		10
Sterna forsteri	Forster's Tern	SE		3
Sterna hirundo	Common Tern	SE		1
Thryomanes bewickii	Bewick's Wren	SE		2
Tyto alba	Barn Owl	SE		1
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	SE		69
Ammocrypta clarum	Western Sand Darter	SE		1
Catostomus catostomus	Longnose Sucker	ST		3
Coregonus artedi	Cisco	ST		1
Etheostoma exile	Iowa Darter	SE		25
Fundulus diaphanus	Banded Killifish	ST		9
Hybopsis amnis	Pallid Shiner	SE		2
Ichthyomyzon fossor	Northern Brook Lamprey	SE		2
Lepomis miniatus	Redspotted Sunfish	ST		3
Moxostoma carinatum	River Redhorse	ST		18
Moxostoma valenciennesi	Greater Redhorse	SE		14
Notropis anogenus	Pugnose Shiner	SE		4
Notropis chalybaeus	Ironcolor Shiner	ST		10
Notropis heterodon	Blackchin Shiner	ST		12
Notropis heterolepis	Blacknose Shiner	SE		8
Notropis texanus	Weed Shiner	SE		4
Lontra canadensis	River Otter	ST		4
Myotis grisescens	Gray Bat	SE	FE	1
Myotis sodalis	Indiana Bat	SE	FE	14

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Clemmys guttata	Spotted Turtle	SE		3
Clonophis kirtlandi	Kirtland's Snake	ST		16
Crotalus horridus	Timber Rattlesnake	ST		8
Emydoidea blandingii	Blanding's Turtle	ST		28
Heterodon nasicus	Western Hognose Snake	ST		4
Kinosternon flavescens	Illinois Mud Turtle	SE		10
Sistrurus catenatus catenatus	Eastern Massasauga	SE	C	5
Caecidotea lesliei	Isopod	SE		1
Aflexia rubranura	Redveined Prairie Leafhopper	ST		7
Atrytone arogos	Arogos Skipper	SE		1
Hesperia metea	Cobweb Skipper	ST		3
Hesperia ottoe	Ottoe Skipper	ST		10
Incisalia polios	Hoary Elfin	SE		1
Lycaeides melissa samuelis	Karner Blue Butterfly	SE	LE	1
Nannothemis bella	Elfin Skimmer	ST		2
Papaipema eryngii	Eryngium Stem Borer	SE		5
Somatochlora hineana	Hine's Emerald Dragonfly	SE	LE	8
Speyeria idalia	Regal Fritillary	ST		16
Alasmidonta viridis	Slippershell	ST		24
Cyclonaias tuberculata	Purple Wartyback	ST		3
Ellipsaria lineolata	Butterfly	ST		1
Elliptio dilatata	Spike	ST		16
Ligumia recta	Black Sandshell	ST		6
Plethobasus cyphyus	Sheepnose	SE		4
Toxolasma lividus	Purple Lilliput	SE		1
Villosa iris	Rainbow	SE		5

FLORA

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Agalinis skinneriana	Pale False Foxglove	ST		12
Amelanchier interior	Shadbush	SE		6
Amelanchier sanguinea	Shadbush	SE		6

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Arctostaphylos uva-ursi	Bearberry	SE		2
Arenaria patula	Slender Sandwort	ST		10
Asclepias lanuginosa	Wooly Milkweed	SE		7
Asclepias meadii	Mead's Milkweed	SE	FT	2
Asclepias ovalifolia	Oval Milkweed	SE		1
Aster furcatus	Forked Aster	ST		19
Astragalus crassicarpus var trichocalyx	Large Ground Plum	SE		3
Astragalus tennesseensis	Tennessee Milk Vetch	SE		2
Besseya bullii	Kittentails	ST		3
Betula alleghaniensis	Yellow Birch	SE		2
Bidens beckii	Water Marigold	SE		2
Boltonia decurrens	Decurrent False Aster	ST	FT	42
Cakile edentula	Sea Rocket	ST		11
Cardamine pratensis var palustris	Cuckoo Flower	SE		3
Castilleja sessiliflora	Downy Yellow Painted Cup	SE		2
Ceanothus ovatus	Redroot	SE		1
Chamaedaphne calyculata	Leatherleaf	ST		7
Chamaesyce polygonifolia	Seaside Spurge	SE		7
Chimaphila maculata	Spotted Wintergreen	SE		1
Cimicifuga racemosa	False Bugbane	SE		2
Cirsium hillii	Hill's Thistle	ST		35
Cirsium pitcheri	Pitcher's (Dune) Thistle	ST	FT	1
Comptonia peregrina	Sweetfern	SE		5
Cornus canadensis	Bunchberry	SE		2
Corydalis aurea	Golden Corydalis	SE		1
Corydalis sempervirens	Pink Corydalis	SE		1
Dalea foliosa	Leafy Prairie Clover	SE	FE	8
Drosera intermedia	Narrow-leaved Sundew	ST		8
Drosera rotundifolia	Round-leaved Sundew	SE		7
Epilobium strictum	Downy Willow Herb	ST		9
Filipendula rubra	Queen-of-the-prairie	SE		8
Galium labradoricum	Bog Bedstraw	ST		23
Gaultheria procumbens	Wintergreen	SE		1

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Geranium bicknellii	Northern Cranesbill	SE		3
Helianthus giganteus	Tall Sunflower	SE		1
Hymenoxys herbacea	Lakeside Daisy	SE	FT	2
Hypericum adpressum	Shore St. John's Wort	SE		4
Hypericum kalmianum	Kalm's St. John's Wort	SE		6
Lathyrus ochroleucus	Pale Vetchling	ST		13
Lechea intermedia	Pinweed	ST		6
Lespedeza leptostachya	Prairie Bush Clover	SE	FT	3
Lesquerella ludoviciana	Silvery Bladderpod	SE		1
Liatris scariosa var nieuwlandii	Blazing Star	ST		25
Malvastrum hispidum	False Mallow	SE		7
Microseris cuspidata	Prairie Dandelion	SE		2
Mimulus glabratus	Yellow Monkey Flower	SE		3
Oenothera perennis	Small Sundrops	ST		13
Orobanche fasciculata	Clustered Broomrape	SE		3
Orobanche ludoviciana	Broomrape	ST		5
Phlox pilosa ssp sangamonensis	Sangamon Phlox	SE		10
Plantago cordata	Heart-leaved Plantain	SE		4
Polanisia jamesii	James' Clammyweed	SE		1
Polygala incarnata	Pink Milkwort	SE		5
Polygonum careyi	Carey's Heartsease	SE		4
Populus balsamifera	Balsam Poplar	SE		4
Ranunculus cymbalaria	Seaside Crowfoot	SE		2
Ranunculus rhomboideus	Prairie Buttercup	ST		4
Rhamnus alnifolia	Alder Buckthorn	SE		2
Ribes hirtellum	Northern Gooseberry	SE		2
Rubus odoratus	Purple-flowering Raspberry	SE		4
Rubus pubescens	Dwarf Raspberry	ST		9
Rubus setosus	Bristly Blackberry	SE		5
Salix serissima	Autumn Willow	SE		3
Salix syrticola	Dune Willow	SE		2
Salvia azurea ssp pitcheri	Blue Sage	ST		1
Sambucus pubens	Red-berried Elder	SE		5

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Sanguisorba canadensis	American Burnet	SE		3
Sarracenia purpurea	Pitcher Plant	SE		8
Shepherdia canadensis	Buffaloberry	SE		5
Solidago sciaphila	Cliff Goldenrod	ST		4
Stellaria pubera	Great Chickweed	SE		1
Stylisma pickeringii	Patterson's Bindweed	SE		4
Styrax americana	Storax	ST		2
Symphoricarpos albus var albus	Snowberry	SE		2
Tomanthera auriculata	Ear-leafed Foxglove	ST		24
Trientalis borealis	Star-flower	ST		4
Trifolium reflexum	Buffalo Clover	SE		8
Ulmus thomasii	Rock Elm	SE		2
Utricularia cornuta	Horned Bladderwort	SE		2
Utricularia minor	Small Bladderwort	SE		4
Vaccinium corymbosum	Highbush Blueberry	SE		3
Vaccinium macrocarpon	Large Cranberry	SE		8
Vaccinium oxycoccos	Small Cranberry	SE		2
Valeriana uliginosa	Marsh Valerian	SE		2
Valerianella chenopodifolia	Corn Salad	SE		1
Valerianella umbilicata	Corn Salad	SE		1
Veronica americana	American Brooklime	SE		4
Veronica scutellata	Marsh Speedwell	ST		17
Viburnum molle	Arrowwood	ST		5
Viola canadensis	Canada Violet	SE		1
Viola conspersa	Dog Violet	ST		17
Viola incognita	Hairy White Violet	SE		3
Viola primulifolia	Primrose Violet	SE		4
Juniperus communis	Ground Juniper	ST		8
Juniperus horizontalis	Trailing Juniper	SE		2
Larix laricina	Tamarack	ST		7
Pinus banksiana	Jack Pine	SE		1
Pinus resinosa	Red Pine	SE		1
Thuja occidentalis	Arbor Vitae	ST		19

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Ammophila breviligulata	Marram Grass	SE		7
Beckmannia syzigachne	American Slough Grass	SE		5
Calla palustris	Water Arum	SE		1
Calopogon tuberosus	Grass Pink Orchid	SE		19
Camassia angusta	Wild Hyacinth	SE		1
Carex aurea	Golden Sedge	SE		10
Carex brunnescens	Brownish Sedge	SE		1
Carex canescens var disjuncta	Sedge	SE		2
Carex chordorrhiza	Cordroot Sedge	SE		2
Carex communis	Fibrous-rooted Sedge	ST		4
Carex crawfordii	Sedge	SE		2
Carex cryptolepis	Sedge	SE		4
Carex disperma	Shortleaf Sedge	SE		4
Carex echinata	Sedge	SE		1
Carex garberi	Sedge	SE		2
Carex intumescens	Swollen Sedge	ST		3
Carex oligosperma	Few-seeded Sedge	SE		3
Carex prasina	Drooping Sedge	ST		3
Carex trisperma	Three-seeded Sedge	SE		2
Carex tuckermani	Tuckerman's Sedge	SE		8
Carex viridula	Little Green Sedge	ST		19
Corallorhiza maculata	Spotted Coral-root Orchid	ST		6
Cyperus grayioides	Umbrella Sedge	ST		10
Cypripedium acaule	Moccasin Flower	SE		1
Cypripedium calceolus var parviflorum	Small Yellow Lady's Slipper	SE		7
Cypripedium candidum	White Lady's Slipper	ST		34
Cypripedium reginae	Showy Lady's Slipper	SE		5
Echinodorus tenellus	Small Burhead	SE		3
Eleocharis olivacea	Spikerush	SE		1
Eleocharis pauciflora	Few-flowered Spikerush	SE		2
Eleocharis rostellata	Spike Rush	ST		15
Elymus trachyculus	Bearded Wheat Grass	SE		8
Eriophorum virginicum	Rusty Cotton Grass	SE		4

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Erythronium mesochoreum	Prairie Trout-lily	ST		20
Fimbristylis vahlii	Vahl's Fimbristylis	SE		3
Juncus alpinus	Richardson's Rush	SE		5
Luzula acuminata	Hairy Woodrush	SE		2
Medeola virginiana	Indian Cucumber Root	SE		1
Melanthium virginicum	Bunchflower	ST		8
Milium effusum	Millet Grass	SE		1
Panicum boreale	Northern Panic Grass	SE		2
Panicum columbianum	Hemlock Panic Grass	SE		1
Platanthera ciliaris	Orange Fringed Orchid	SE		1
Platanthera clavellata	Wood Orchid	SE		4
Platanthera flava var herbiola	Tubercled Orchid	SE		15
Platanthera leucophaea	Eastern Prairie Fringed Orchid	SE	FT	30
Platanthera psycodes	Purple Fringed Orchid	SE		5
Poa alsodes	Grove Bluegrass	SE		4
Poa languida	Weak Bluegrass	SE		2
Poa wolfii	Wolf's Bluegrass	SE		6
Pogonia ophioglossoides	Snake-mouth	SE		7
Polygonatum pubescens	Downy Solomon's Seal	SE		8
Potamogeton gramineus	Grass-leaved Pondweed	ST		11
Potamogeton praelongus	White-stemmed Pondweed	SE		5
Potamogeton pulcher	Spotted Pondweed	SE		1
Potamogeton robbinsii	Fern Pondweed	SE		7
Potamogeton strictifolius	Stiff Pondweed	SE		1
Rhynchospora alba	Beaked Rush	ST		7
Scirpus cespitosus	Tufted Bulrush	SE		3
Scirpus hallii	Hall's Bulrush	ST		21
Scirpus hattorianus	Bulrush	SE		4
Scirpus paludosus	Alkali Bulrush	SE		5
Scirpus purshianus	Weak Bulrush	SE		2
Scirpus smithii	Smith's Bulrush	SE		1
Sisyrinchium atlanticum	Eastern Blue-eyed Grass	SE		6
Sisyrinchium montanum	Mountain Blue-eyed Grass	SE		10

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Sparganium americanum	American Burreed	SE		3
Sparganium chlorocarpum	Green-fruited Burreed	SE		7
Spiranthes lucida	Yellow-lipped Ladies' Tresses	SE		2
Spiranthes romanzoffiana	Hooded Ladies' Tresses	SE		1
Tofieldia glutinosa	False Asphodel	ST		10
Tradescantia bracteata	Prairie Spiderwort	ST		4
Triglochin maritima	Common Bog Arrow Grass	ST		13
Triglochin palustris	Slender Bog Arrow Grass	ST		16
Trillium cernuum	Nodding Trillium	SE		2
Trillium erectum	Ill-scented Trillium	SE		1
Trillium viride	Green Trillium	SE		1
Veratrum woodii	False Hellebore	ST		2
Zigadenus glaucus	White Camass	SE		1
Botrychium multifidum	Northern Grape Fern	SE		1
Botrychium simplex	Dwarf Grape Fern	SE		1
Isoetes butleri	Quillwort	SE		5
Lycopodium clavatum	Running Pine	SE		2
Lycopodium dendroideum	Ground Pine	SE		3
Thelypteris phegopteris	Long Beech Fern	SE		1

Table A3. Habitat needs of faunal threatened or endangered species known to occur in the CREP area floodplain.

Habitat type	Species Common Name	General Habitat Needs	Specific Habitat Needs
Aquatic			
	Banded Killifish	aquatic	clear glacial lakes
	Black Sandshell	aquatic	medium to large rivers in riffles or raceways in gravel or firm sand
	Blackchin Shiner	aquatic	clear, well-vegetated glacial lakes and their connected streams
	Blacknose Shiner	aquatic	clear vegetated lakes, and pools and runs of clear streams
	Butterfly	aquatic	large rivers in sand or gravel substrates especially in bars in current

Habitat type	Species Common Name	General Habitat Needs	Specific Habitat Needs
	Greater Redhorse	aquatic	sandy to rocky pools and runs of medium to large rivers and lakes
	Iowa Darter	aquatic	clear well-vegetated lakes, sloughs, and stream
	Ironcolor Shiner	aquatic	small, clear, low-gradient streams
	Lake Sturgeon	aquatic	bottoms of lakes and large rivers usually in water 4-9m deep
	Northern Brook Lamprey	aquatic	clean, clear gravel riffles and runs of small rivers
	Pallid Shiner	aquatic	pools with negligible current in medium to large rivers
	Pugnose Shiner	aquatic	clear, heavily vegetated lakes and rarely in low-gradient streams
	Purple Wartyback	aquatic	medium to large rivers in gravel or mixed sand and gravel
	Rainbow	aquatic	creeks and small to medium sized rivers
	River Redhorse	aquatic	deep, swift, gravelly riffles of small and medium sized rivers
	Sheepnose	aquatic	
	Slippershell	aquatic	small to medium sized streams
	Spike	aquatic	small to large streams and lakes in mud or gravel substrates
	Weed Shiner	aquatic	clear sand-bottom creeks
	Western Sand Darter	aquatic	sandy runs of medium to large rivers
	River Otter	forest, aquatic	from 33 counties, riparian habitat with extensive woodlands, good water quality, and the presence of suitable den sites and open water in winter
	Bald Eagle	forest, wetland, aquatic	undisturbed areas near large rivers and lakes
	Indiana Bat	forest, wetland, aquatic, cave	winter habitat caves and mines, summer habitat includes a variety of wooded and riparian settings
	Kirtland's Snake	forest, wetland, aquatic, prairie	wet meadows, open swamp-forests, reservoirs, and occasionally wet, vacant urban areas
	Illinois Mud Turtle	prairie, savanna, wetland, aquatic	sand areas that are interspersed with semi-permanent or permanent ponds and sloughs
	Spotted Turtle	prairie, wetland, aquatic	sedge meadows

Habitat type	Species Common Name	General Habitat Needs	Specific Habitat Needs
	American Bittern	wetland, aquatic	freshwater marshes, marshy, lake shore
	Black Tern	wetland, aquatic	freshwater marshes and shallow ponds and lakes
	Blanding's Turtle	wetland, aquatic	prairie marshes, ponds, swamps, bogs, shallow slow-moving rivers, oxbows, and pools adjacent to rivers
	Common Moorhen	wetland, aquatic	freshwater marshes, canals, quiet rivers, lakes and ponds with emergent aquatic vegetation
	Elfin Skimmer	wetland, aquatic	fens, seeps and springs
	Forster's Tern	wetland, aquatic	marsh-bordered lakes
	Pied-billed Grebe	wetland, aquatic	fairly large, well vegetated lakes, ponds, sluggish streams, and marshes
	Redspotted Sunfish	wetland, aquatic	well vegetated swamps, sloughs, and bottomland lakes
	Black-crowned Night Heron	wetland, forest, aquatic	bottomland forest
Cave			
	Indiana Bat	forest, wetland, aquatic, cave	winter habitat, caves and mines, summer habitat includes a variety of wooded and riparian settings
Forest			
	Bewick's Wren	forest, savanna	thickets, brushy areas, hedgerows and thickets in farming country, and open and riparian woodlands
	Eastern Massasauga	prairie, forest, wetland	wet prairies, bogs, swamps and rarely dry woodlands
	Black-crowned Night Heron	wetland, forest, aquatic	bottomland forest
	Indiana Bat	forest, wetland, aquatic, cave	winter habitat, caves and mines, summer habitat includes a variety of wooded and riparian settings
	River Otter	forest, aquatic	from 33 counties, riparian habitat with extensive woodlands, good water quality, and the presence of suitable den sites and open water in winter
	Mississippi Kite	forest, prairie	mature, mixed bottomland forest for nesting and fallow fields, mixed forest, marshes, or other openings for foraging

Habitat type	Species Common Name	General Habitat Needs	Specific Habitat Needs
	Bald Eagle	forest, wetland, aquatic	undisturbed areas near large rivers and lakes
	Timber Rattlesnake	primary, forest	forested areas with bluffs and rock outcrops, upland forests or crop fields
	Kirtland's Snake	forest, wetland, aquatic, prairie	wet meadows, open swamp-forests, reservoirs, and occasionally wet, vacant urban areas
	Brown Creeper	forest, wetland	deciduous and mixed woodlands, cypress swamps and floodplain forests
	Red-shouldered Hawk	forest, wetland	moist and riparian forests including wooded swamps
Prairie			
	Regal Fritillary	prairie	tallgrass prairies, wet meadows, and wet pastures
	Eastern Massasauga	prairie, forest, wetland	wet prairies, bogs, swamps and rarely dry woodlands
	King Rail	wetland, prairie	fresh-water marshes
	Illinois Chorus Frog	prairie, wetland	open sandy areas of river lowlands
	Leafhopper	prairie	sand dunes near the shore of Lake Michigan
	Eryngium Stem Borer	prairie	large prairie areas that have abundant populations of rattlesnake master
	Loggerhead Shrike	prairie, savanna	open, agricultural areas interspersed with grassland habitat
	Illinois Mud Turtle	prairie, savanna, wetland, aquatic	sand areas that are interspersed with semi-permanent or permanent ponds and sloughs
	Mississippi Kite	forest, prairie	mature, mixed bottomland forest for nesting and fallow fields, mixed forest, marshes, or other openings for foraging
	Sandhill Crane	wetland, prairie	large undisturbed freshwater marshes and prairie ponds
	Kirtland's Snake	forest, wetland, aquatic, prairie	wet meadows, open swamp-forests, reservoirs, and occasionally wet, vacant urban areas
	Spotted Turtle	prairie, wetland, aquatic	sedge meadows
	Upland Sandpiper	prairie	prairies, pastureland and hayfields

Habitat type	Species Common Name	General Habitat Needs	Specific Habitat Needs
	Henslow's Sparrow	prairie, wetland	prairie habitat, abandoned fields and hayfields with tall-dense cover
	Red-veined Prairie Leafhopper	prairie	prairies restricted to its food source plant, the prairie dropseed
Savanna			
	Bewick's Wren	forest, savanna	thickets, brushy areas, hedgerows and thickets in farming country, and open riparian woodlands
	Loggerhead Shrike	prairie, savanna	open, agricultural areas interspersed with grassland habitat
	Illinois Mud Turtle	prairie, savanna, wetland, aquatic	sand areas that are interspersed with semi-permanent or permanent ponds and sloughs
Wetland			
	Yellow-headed Blackbird	wetland	moderately dense stand of cattails and bulrushes with interspersed open water for nesting
	Forster's Tern	wetland, aquatic	marsh-bordered lakes
	Hine's Emerald Dragonfly	wetland	calcareous, spring-fed marshes overlaying dolomite limestone bedrock
	Eastern Massasauga	prairie, forest, wetland	wet prairies, bogs, swamps and rarely dry woodlands
	King Rail	wetland, prairie	fresh-water marshes
	Illinois Chorus Frog	prairie, wetland	open sandy areas of river lowlands
	Pied-billed Grebe	wetland, aquatic	fairly large, well vegetated lakes, ponds, sluggish streams, and marshes
	Black-crowned Night Heron	wetland, forest, aquatic	bottomland forest
	Elfin Skimmer	wetland, aquatic	fens, seeps and springs
	Indiana Bat	forest, wetland, aquatic, cave	winter habitat, caves and mines, summer habitat includes a variety of wooded and riparian settings
	Redspotted Sunfish	wetland, aquatic	well vegetated swamps, sloughs, and bottomland lakes
	Illinois Mud Turtle	prairie, savanna, wetland, aquatic	sand areas that are interspersed with semi-permanent or permanent ponds and sloughs
	Least Bittern	wetland	shallow freshwater lakes and marshes

Habitat type	Species Common Name	General Habitat Needs	Specific Habitat Needs
	Bald Eagle	forest, wetland, aquatic	undisturbed areas near large rivers and lakes
	Sandhill Crane	wetland, prairie	large undisturbed freshwater marshes and prairie ponds
	Common Moorhen	wetland, aquatic	freshwater marshes, canals, quiet rivers, lakes and ponds with emergent aquatic vegetation
	Blanding's Turtle	wetland, aquatic	prairie marshes, ponds, swamps, bogs, shallow slow-moving rivers, oxbows, and pools adjacent to rivers
	Kirtland's Snake	forest, wetland, aquatic, prairie	wet meadows, open swamp-forests, reservoirs, and occasionally wet, vacant urban areas
	Spotted Turtle	prairie, wetland, aquatic	sedge meadows
	Black Tern	wetland, aquatic	freshwater marshes and shallow ponds and lakes
	Brown Creeper	forest, wetland	deciduous and mixed woodlands, cypress swamps and floodplain forests
	Red-shouldered Hawk	forest, wetland	moist and riparian forests including wooded swamps
	American Bittern	wetland, aquatic	freshwater marshes, marshy, lake shore
	Henslow's Sparrow	prairie, wetland	prairie habitat, abandoned fields and hayfields with tall-dense cover