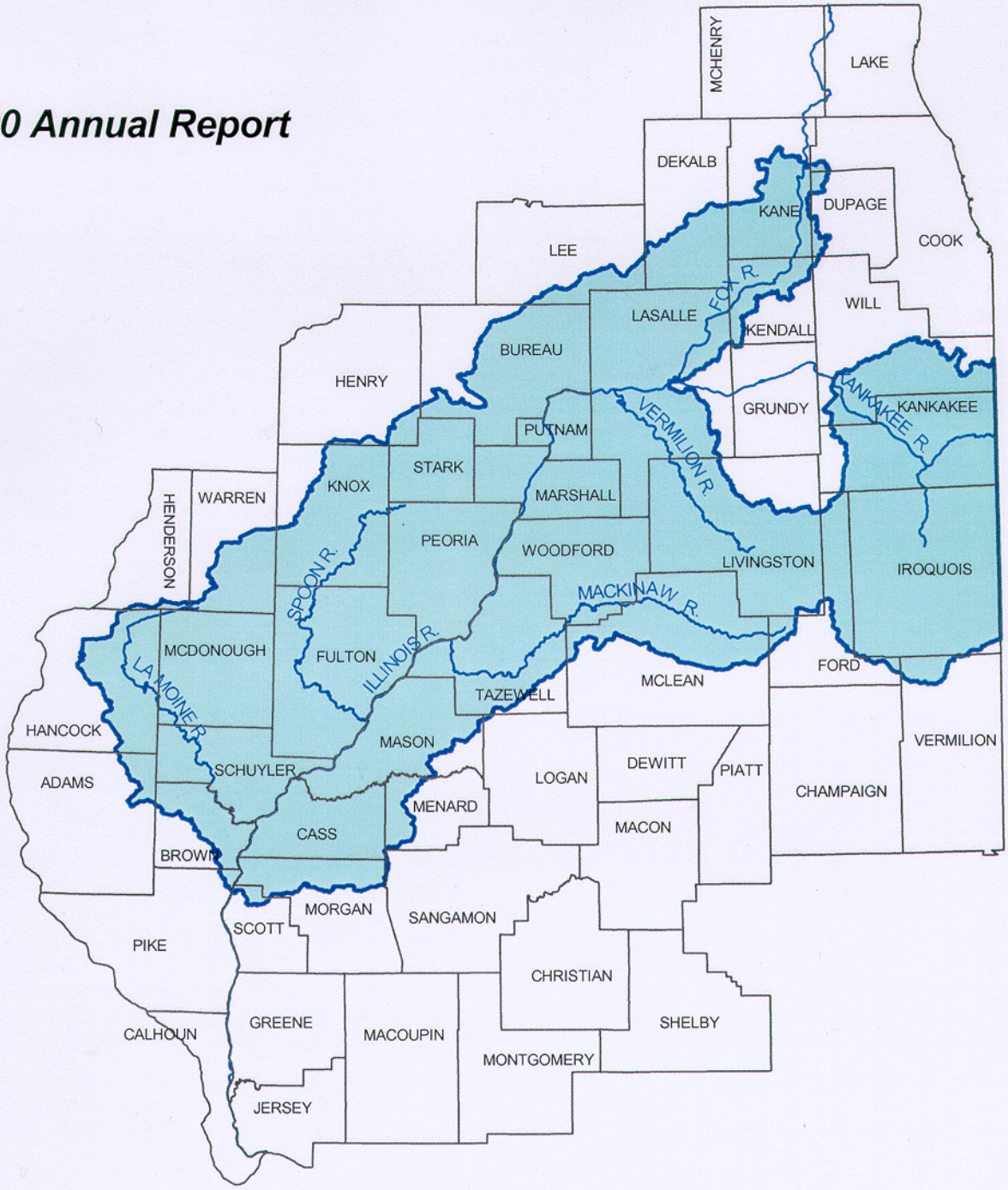
Illinois Conservation Reserve Enhancement Program (CREP)

2000 Annual Report



A Partnership Between the USDA and the State Of Illinois

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Illinois Conservation Reserve Enhancement Program (CREP)

Reporting Period: October 1, 1999 through September 30, 2000

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 the first reporting period (May 1, 1998 through September 30, 1999) to clarify terms, expand the number of practices offered, and to expand the targeted area to include the La Moine watershed. It was amended once in the current reporting period (October 1, 1999 through September 30, 2000) to incorporate the Signing Incentive Payments (SIP) and the Practice Incentive Payments (PIP) that became available to continuous CRP in April, 1999 into the Illinois CREP.

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 (SWCD) along with the Association of Illinois Soil and Water Conservation Districts (AISWCD) in the eligible area. Other Agencies and organizations provide guidance and assistance for the program through the CREP Advisory committee which is a subcommittee of the State Technical Committee.

1. Enrollment Summary

For the reporting period of October 1, 1999 through September 30, 2000**,** the USDA - Farm Service Agency (FSA) approved 1,290 CRP contracts enrolling 28,722.4 acres into CREP. The average rental rate for these contracts was $155 per acre which includes a $121 per acre average soil rental rate plus maintenance and an average $34 per acre incentive payment.

During the same reporting period, the State approved 287 contracts enrolling 17,467.83 acres into State options. A total of 15,358.87 acres or 87.8 % of the acres in State Options are enrolled in permanent easements, another 1,529.2 acres or 8.8 % in 15 year contract extensions and 601.6 acres or 3.4% in 35 year contract extensions. The average state incentive payment per acre for these enrollments is $457 per acre. The average cost to the State per acre is $678 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 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.

Technical assistance is primarily provided by the Farm Service Agency, Natural Resource Conservation Service, Department of Natural Resources, and the Soil and Water Conservation Districts. To date, only the Department of Natural Resources has any dedicated staff to this program. The DNR has one CREP Program Administrator who works with DNR Legal Counsel to provide technical assistance the SWCDs to help execute state easement documents. DNR field staff who provide assistance in developing and implementing conservation plans of operation (CPO's) and have re-aligned work load priorities to provide technical assistance in this program. To date, DNR has no field staff dedicated to this program.

The Department of Natural Resources has provided $249,140.90 from its operational funds to provide for technical assistance, program administrative assistance, contract and data management, reports, training, and providing GIS coverage.

The 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 $11.85 Million dollars for CREP expenditures to pay for the 287 State contracts (17,467.83 acres), State cost-share expenses, monitoring costs, SWCD administrative fees and other associated enrollment and easement costs. In addition, the IDNR has provided another $249,140.90 from its operational dollars to provide for CREP Administrative Expenses, bringing the total State dollars directly expended for CREP enrollments to $12.1 million.

State CREP Expenses
October 1, 1999 through September 30, 2000

Table 1.

State Bonus Payment for State Option	$8,003,466.01
State Cost-Share Payments	$2,140,669.82
Soil and Water Conservation District (SWCD) Administrative Fees	$620,696.33
Additional Administrative Fees - Legal, Surveying, Filing Costs	$827,273.85
DNR Administrative Expenses - Contract and Data Management, Technical Assistance for CPOs, Reports, Training	$249,140.90
Monitoring	$256,020.62
TOTAL	**$ 12,097,247.53**

The total federal annual rent payment for the 1,290 CRP contracts (28,722.4 acres) is $4,444,145. The total annual incentive payment is $982,664. The total federal annual rent plus incentive and maintenance over the life of the 15 year contracts is $65,892,356. The estimated total federal cost share is $2,500,424.

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.

Annual CRP Payments
Discounted at 8% for 15 Years

Table 2.

Payment Year	Annual Payment	Payment Year	Annual Payment
Year 1	$4,444,145.00	Year 9	$2,280,819.09
Year 2	$4,088,613.40	Year 10	$2,098,353.56
Year 3	$3,761,524.33	Year 11	$1,930,485.28
Year 4	$3,460,602.38	Year 12	$1,776,046.46
Year 5	$3,183,754.19	Year 13	$1,633962.74
Year 6	$2,929,053.85	Year 14	$1,503,245.72
Year 7	$2,694,729.54	Year 15	$1,382,986.06
Year 8	$2,479,151.18	**TOTAL 15 Years**	**$39,647,472.78**

Total Federal and State Expenditures
October 1, 1999 through September 30, 2000

Table 3.

CRP Payments (Before Discount)	$65,892,356.00	**CRP Payment (Discounted 8%)**	$39,647,472.78
Federal Cost-Share	$2,500,424.00	**Federal Cost-Share**	$2,500,424.00
State Payments for CREP Enrollments	$12,097,247.53	**State Payments for CREP Enrollments**	$12,097,247.53
Total Program Costs	**$80,490,028.00**	**Total Program Costs**	**$54,245,144.00**

The total Federal and State costs of the CREP from October 1, 1999 through September 30, 2000 was $80,490,028. The State's share of costs for the reporting period was $12,097,247. Using the 8% per annum discount rate per the MOA, the Federal costs to be used for comparison to the state expenditures are $39,647,473. The State contributed 15.0% of the CREP total program costs before the 8% discount rate was applied and 22.3% of the total program costs after using the discount rate. The State met the requirement for incurring 20% of the total program costs during Federal Fiscal Year 2000.

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, 2000), CREP has restored 55, 167.6 acres and permanently protected an additional 13,681.48 acres that were adjacent to the restored cropland either in existing native vegetation or in a previous CRP sign-up (Fig. 1).

During that same time period, 38,482 acres were enrolled in the CREP State Options. Of these acres, 89.1% or 34,270 acres were enrolled in permanent easements; 7.5% or 2,898 acres were enrolled in 15 year contract extensions; and 3.4% or 1,314 acres were enrolled in 35 year contract extensions.

Wetlands accounted for 65.0% (25,016 acres) of the restorations or permanently protected acres enrolling in the State options. The remaining acres were restored to tree practices (26.5% or 10,207 acres) and grasses (8.5% or 3,259 acres).

The CREP program is restoring and protecting large stretches of floodplain corridors both on the mainstem 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

Areas near the 8,900 acre Sanganois State Fish and Wildlife Area (SFWA) have enrolled in the program and the available wetland habitat has doubled through the CREP program. Along the northwest side of the Illinois River between Schuyler and Cass Counties and directly across the river from the Sanganois SFWA, almost all landowners have enrolled in CREP permanent easements, creating a 15-mile corridor of protection. All acreage will be restored to wetlands or is already in wetlands. When completed, this corridor will add 4,500 acres of wetland habitat to the existing adjacent Sanganois and Anderson Lake State Wildlife Areas. Snicarte Island, which is located in the middle of the Illinois River northeast of the Sanganois SFWA, has enrolled in CREP as a 1,200 acre wetland restoration. In addition, approximately 3,000 acres along the Sangamon River on the south side of the Sanganois SFWA have also enrolled in wetland restorations. This has effectively doubled the available wetland habitat of the Sanganois at a cost of approximately $540 per acre to the State.

Since the opening of the La Moine River Basin to the CREP eligible area in September, 1999, 58% of the mainstem (or 53 miles on both sides) have been permanently protected by wetland restorations (5600 acres) through CREP. Another 9 miles of river corridor have been restored to trees through the regular continuous CRP and are requesting permanent easements from the State. Another 3 miles of the La Moine River near the mouth of the river are protected by levees.

In Cass County, there is an area of land referred to locally as Meredosia Island along the mainstem of the Illinois River. Over 1000 acres have been enrolled by 4 landowners. These landowners have restored the ground to wetlands. One landowner has told the State that his family was only able to get 2 crops off his 400 plus acres since 1990 due to the frequent flooding of the

area. However, they could not afford to quit farming the area until CREP offered him another opportunity for his land. This story has been repeated many times by landowners in the program.

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. Any 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 Natural Resources - The Conservation 2000 Ecosystems Program

The State initiated a $100 million dollar program, called the Conservation 2000 (C2000) Program, in 1995 to protect and manage Illinois' natural resources. The program is authorized through the year 2009 and is subject to annual appropriations. There are nine programs funded under C2000 and administered by 3 state agencies: Illinois Department of Natural Resources, Illinois Department of Agriculture, and Illinois Environmental Protection Agency.

The largest C2000 Program administered by IDNR is the Ecosystem Program. The Ecosystems Program provides financial and technical support for maintaining, restoring, and enhancing ecological and economic conditions in key watersheds throughout the Illinois River Watershed and the rest of the state. The Program is delivered through Ecosystem Partnerships which are coalitions of local stakeholders - private landowners, business people, scientists, sportsmen, naturalists, recreation enthusiasts, and local policy makers - all united by a common interest in the natural resources of their area's watershed. The Ecosystem Partnerships develop and implement natural resource plans that include a broad array of projects for restoration, protection, enhancement, monitoring, and education. The Partnerships submit grant applications for projects that are awarded on a competitive basis.

Eight Ecosystem Partnerships in the CREP area have been awarded $3.7 million in state C2000 dollars for 124 projects that are directly related to CREP's goals for water quality, habitat and wildlife population increases. These projects provide for streambank stabilization, wetland restorations, prairie restorations, riparian buffers, vegetative covers on construction sites, and restoration of oxbows in the Kankakee River Basin, the Fox River Basin, the Mackinaw River Basin, the Sangamon River Basin and other direct tributaries into the Peoria Pool of the mainstem of the

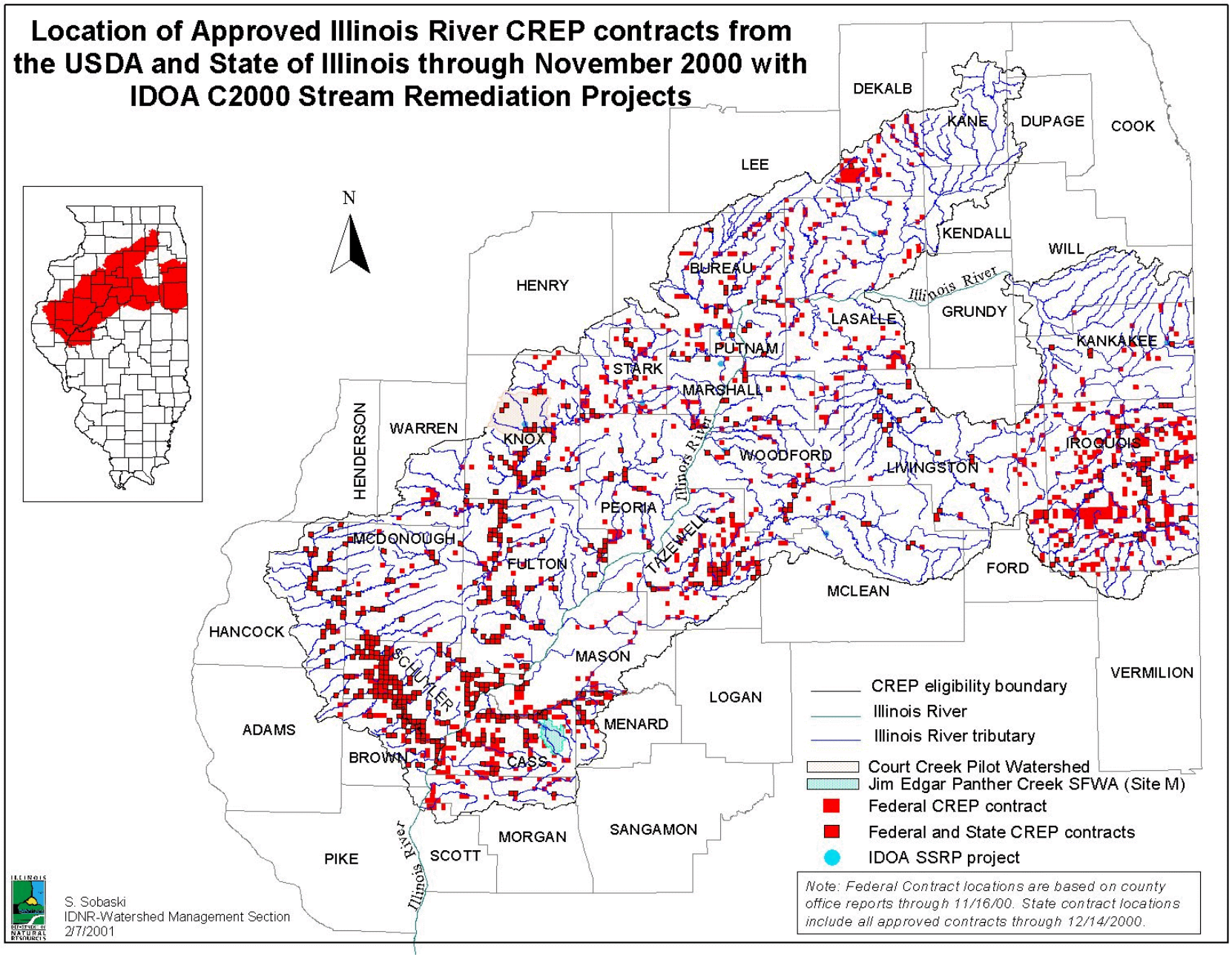
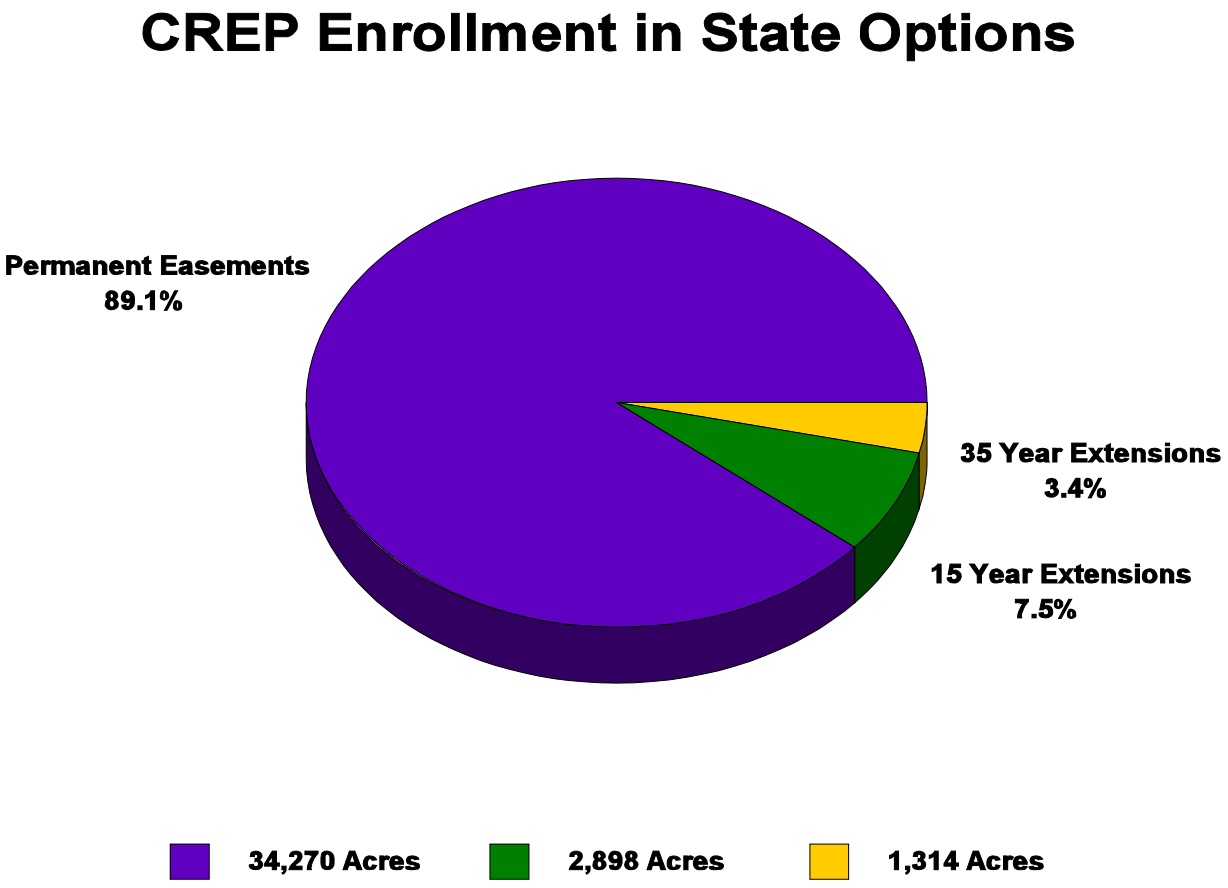


Figure 1. Location of Approved Illinois CREP enrollments through November 2000.



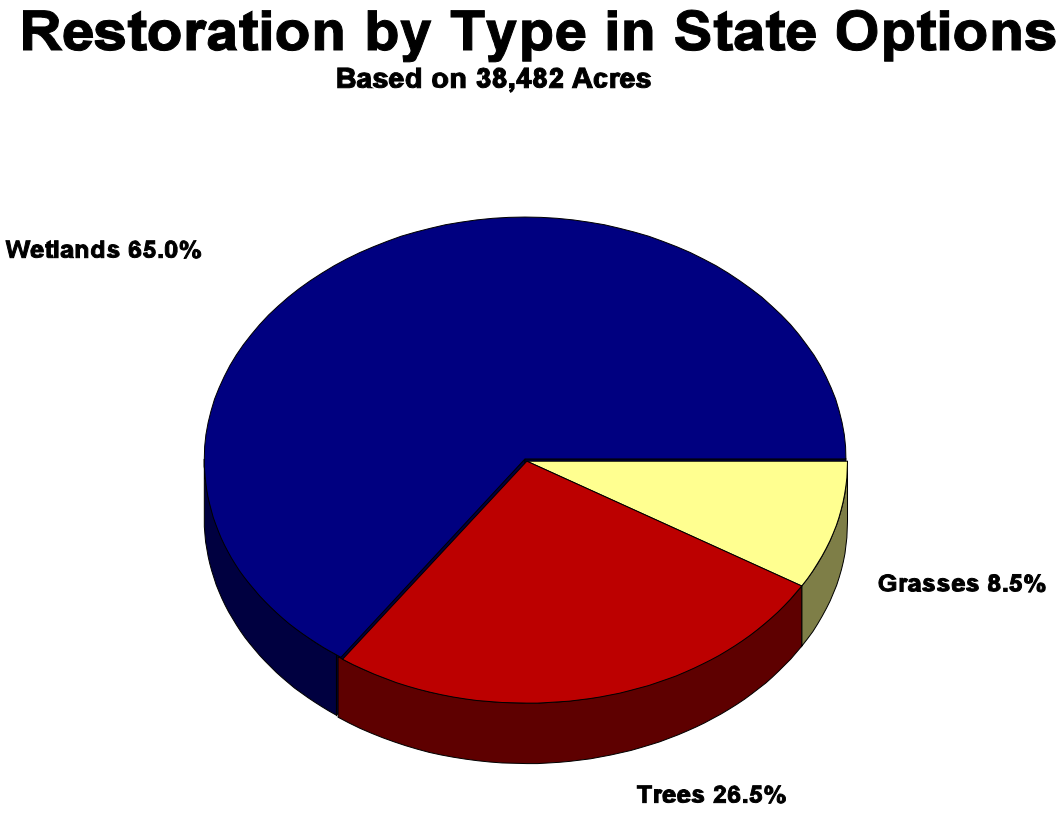


Figure 2. Breakdowns of CREP Enrollments in the State Options.

Illinois River. Most of these projects are occurring on lands that would not meet the agricultural cropping history for CREP, so are a necessary compliment to CREP in the Basin.

To date, 61 of the 124 projects awarded have been habitat projects. These projects have resulted in 550 acres of wildlife habitat restoration work, 2.6 miles of stream re-meander/riparian corridor establishment, 2 dam removal/stream enhancements, 6 in-stream grade stabilization structures and 97 acres of wetland development.

Another area of emphasis for the grants awarded to the Ecosystem Partnerships within the CREP Area have been realty projects. There have been 1,217 acres of land acquisition and 211 acres of conservation easements secured with state funds from the IDNR's C2000 Program. These lands will be held and managed by approved, non-IDNR entities for the purposes of habitat restoration, natural area preservation, and open space recreation.

The IDNR's C2000 Program is also involved in the CREP Area with the Ecosystem Partnerships in a number of other important areas. These eight partnerships have all received computer systems and software which enables them to have an electronic connection to the IDNR and other partnerships, GIS software for data collection, planning and administrative decision making along with routine word processing. The IDNR has promoted the use of GIS by not only providing the Partnerships with the software but by also providing a two-tiered training session. This has increased the Partnership's knowledge of possible uses of GIS and how it can be a tool in achieving their Partnership's goals and objectives.

To help achieve goals and objectives, C2000 of the IDNR has made available to each Partnership a $10,000 Planning Grant to help the Partnerships organize and set down a "road map" for achieving the goals they have identified as key to their partnership. This type of grass roots organizing of partnership participants is a key element in the IDNR's C2000 Program. For these eight Partnerships, the CREP Program has been an important component of their goals and objectives.

Also, within the CREP Area is the IDNR Ecosystem Program's first watershed pilot grant project. It is a $1 million, 5-year grant to the Knox County SWCD for the restoration of the Court Creek Watershed. The goal of this pilot watershed project is to deliver appropriate best management practices from all available State and Federal programs to the Court Creek Watershed in a concentrated area with the intent of improving water quality while creating wildlife habitat and restoring riparian areas.

B. Illinois Department of Agriculture (IDA) Accomplishments - Illinois River Watershed

Through September 30, 2000, with state funds appropriated in FY00, $2,160,213 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. The program, administered by the Department and county soil and water conservation districts (SWCD's) provides 60% of the cost of constructing eligible conservation practices that reduce soil erosion and protect water quality. Eligible conservation practices include such practices as terraces, grassed waterways, water and sediment control basins and grade stabilization structures. From July, 1999 through September, 2000 approximately 900 individual conservation projects were completed in the Illinois River watershed. This resulted in over 48,810 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 235,000 tons of soil have been saved and will continue to be saved each year.

In FY2000, the State of Illinois through the Department of Agriculture provided over $3.6 million to the 51 county SWCD offices 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 streambanks 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 streambanks. In FY2000, 56 individual streambank stabilization projects, totaling $346,527, were constructed in 24 counties within the Illinois River watershed. In all, over 32,774 linear feet of streambank, or more than 6.2 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 FY2000, over $162,000 was awarded to 6 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.

C. Illinois Environmental Protection Agency (IEPA) Accomplishments - Illinois River Basin

The Illinois EPA has been an active member of the State's CREP Advisory Committee since its inception. 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 six counties in their enrollment efforts. Those six counties constitute approximately 22,000 acres of the 49,000 acres enrolled in the federal CREP Program as of the middle of September 2000 (45%). They also constitute approximately 2,500 of the 5,000 pending acres yet to be enrolled at that time (50%).

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.

Future participation in expanded areas, and consideration of new contract areas and contract renewals will be evaluated by the Illinois EPA in the coming year.

D. 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 $2.9 million for financial and educational assistance in the Illinois River Basin to treat Natural Resource concerns on approximately 250,000 acres working with approximately 2,400 landowners. Approximately $1.3 million is planned for financial and educational assistance in priority areas and statewide resource concerns for 2001.

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 300 producers to improve wildlife habitat on approximately 6,800 acres. Approximately $1,000,000 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 $3.4 million have been spent in the Illinois River Basin on Wetland Restoration, covering 2,300 acres and working with 13 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 $14,400 have been spent to treat approximately 350 acres working with 12 producers. Approximately $3,900 will be spent on timber practices in the Illinois River Basin through FIP in 2001.

CRP enrollments beyond the CREP Program enrollments provide additional in-place conservation practices facilitating resource management in the Illinois River Basin. A total of 36,019.5 acres were enrolled in other CRP sign-ups during this time period.

E. Illinois Farm Bureau

The Illinois Farm Bureau (IFB) has actively publicized and promoted the Conservation Reserve Enhancement Program (CREP). During Federal fiscal year 2000, several articles in FarmWeek provided information about aspects of the program and contained details about the total acres involved in the program and counties eligible for CREP. The articles also contained maps outlining the counties in CREP areas. Additionally, IFB used their statewide radio network to highlight the program.

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

Illinois Farm Bureau supports the Governor's Illinois Rivers 2020 Program, of which CREP is a component. IFB continues to serve on the CREP Advisory Committee and provides input for program guidance.

F. The Nature Conservancy

The Nature Conservancy (TNC) has supported the CREP Program in Illinois through news releases, membership publication articles, and attendance at Advisory Committee Meetings.

Currently, TNC is involved in several large watersheds within the Illinois River Basin. To support their work in these areas, and also support CREP activities in these areas, TNC is looking to place additional field staff within the Basin.

G. Recommendations and Future Plans

As the program continues to grow rapidly, the CREP Advisory Committee continues to look for strategies and actions to assist with program implementation. The future plans for the program and other recommendations are as follows:

<u>Future Plans</u>

The CREP Advisory Committee is in the process of establishing a CREP Technical advisory group to help with program consistency in implementing practices across the 46 county eligible area. This group will review policy for where and how the practices are implemented and assist with bringing technical issues to the CREP Advisory Committee's attention. This may include items such as cost-share issues, which species should be used in specific areas, which practices should be used in particular watersheds, update guidances for practices such as CPD and CP23, and landowner information brochures.

Efforts will continue to secure additional staff, particularly for the SWCDs, to assist with the marketing and implementation of the program.

A web site for information will be developed, as well as, securing the services of an entity such as University of Illinois Extension to publish and update informational materials and State CREP Procedure manual.

Additional program training/workshops will be held to ensure consistent and current information is given to all field staff involved in program implementation.

A CREP Monitoring Workshop with research and agency professionals will be held by the CREP Advisory Committee in March 2001, to review all the monitoring efforts that are available for the Illinois River Basin. The goal of this workshop is to assess the current CREP monitoring effort and identify any additional data needs.

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.

It has been two years since a feedback survey was done to get suggestions from field staff, particularly from the SWCDs, for ideas to make the program run more smoothly. It would be of benefit to do another, as well as, to develop a landowner survey.

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

A marketing tool for absentee landowners should be developed.

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

7. 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 sediments and nutrients. Therefore, the goals of CREP have been developed to address these most significant concerns. These goals are to:

Reduce the amount of silt and sedimentation entering the mainstem of the Illinois River by 20 percent.
Reduce the amount of phosphorus and nitrogen in the Illinois River by 10 percent.
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
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.

8. CREP Monitoring Design

A. Three Approaches Used in CREP Assessment

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.

B. Intensively Monitored Watersheds

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 IDNR's Jim Edgar-Panther Creek 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?

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 (BMP's), 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.

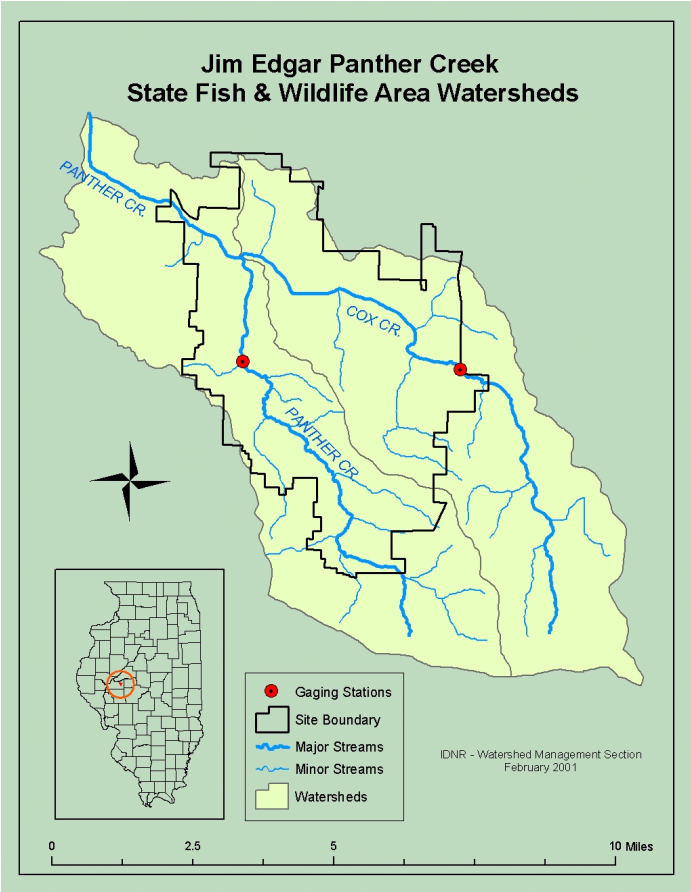


Figure 3. Map of the gaging stations and Jim Edgar Panther Creek State Fish & Wildlife Area watersheds.

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 priority counties, and IDNR 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 on-going 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. This 98 square mile watershed has many features characteristic of west-central Illinois and the western half 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 stripmined lands, livestock facilities and small urban areas.

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.

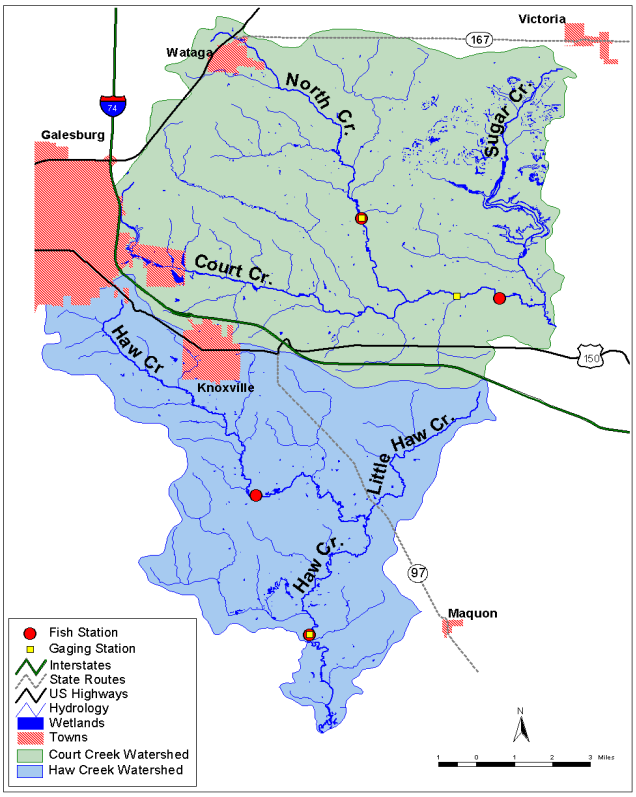


Figure 4. Map of Court Creek (pilot) and Haw Creek (reference) watersheds located in the Spoon River Basin.

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 (BMP's), 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 work well at a plot or field scale may different responses at this larger scale. Further, new practices are being developed and it is important to determine their effectiveness in treating a problem.

Monitoring in the Lake Decatur Watershed

Lake Decatur has been experiencing water quality problems for over 25 years. Several studies by different federal and state agencies have documented water quality problems in the lake. Most of the problems are associated with non-point source pollution generated in the watershed of the Upper Sangamon River. The lake generally has high levels of total suspended solids and nitrates. In recent years, the most pressing problem has been high concentrations of nitrates.

The nitrate load into the lake originates in the watershed of the Upper Sangamon River that feeds into Lake Decatur. To characterize and quantify the spatial and temporal distribution of nitrate yields in the Upper Sangamon River watershed, the City of Decatur has been sponsoring a watershed monitoring program for the watershed since 1993. The purpose of the monitoring program is to collect reliable hydrologic and water quality data throughout the watershed for use by the city planners and resource managers to develop water quality and watershed management alternatives based on scientific data. Data are being collected at six monitoring stations located on the mainstem of the Sangamon River and its tributaries.

More intensive monitoring is being conducted at three of the Lake Decatur monitoring sites in support of the Water Quality Strategic Initiative of C-FAR. The monitoring program involves more frequent sampling for nutrients and sediment. The data will be utilized in the development of a mass balance model for nutrients for the Big Ditch watershed which is one of the tributaries for the Upper Sangamon River. The research is a component of a more comprehensive data collection and modeling effort supported by the WQ-SRI.

C. Assessment Protocols

Analytical Procedures

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 BMP's. 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.

Biological and Stream Habitat Assessments

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

Fish

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

Benthic Macroinvertebrates

Methodology includes sampling all major habitats sampled (e.g., riffle, run/pool) using a combination of core and Hess samplers, depending upon the proportion of habitat in the stream reach. Using stratified random sampling (quantitative) design, reaches are sampled three times/year (early spring, early summer, late summer). Response variables include: species abundance, assemblage composition and structure, indices of biological integrity (single and multi-metric).

Habitat assessment

Instream and riparian habitat conditions will be evaluated following a modified version of the Stanfield method (Stanfield *et al.*, 1998). Habitat parameters will be 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).

Hydrology and Water Quality Assessment

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 have been installed and are being operated at the lower subwatershed sampling site in each pilot and reference watershed. For the Spoon River study basin an additional monitoring station has been installed at the upper pilot subwatershed sample station on North Creek (Court Creek watershed). 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 will provide the following hydrologic data:

- water stage (recorded every 15 minutes),
- estimated hourly streamflow, (manual discharge measurements during the initial study phase will be used to establish rating curves for each station),
- water temperature (recorded every 15 minutes)
- precipitation (recorded daily; one recorder in each watershed-Court and Haw. One recorder used for both Cox and Panther Creek watersheds).

Water quality data will include: Nutrient Concentration (mass per unit volume)Nitrate-N, ammonia, and ortho-phosphate, collected weekly, based on automatic single point samples. These same constituents are also collected during storm events (6 to 8 events per year) and during monthly manual cross-sectional, depth-integrated sampling.

- Nitrite-N, total Kjeldahl Nitrogen, total Phosphorus, and total dissolved Phosphorus based on manual cross-sectional, depth-integrated samples collected monthly.

Suspended Sediment Concentration:

- automatic, single point samples collected daily and more frequently during high flow conditions
- manual, depth- and width-integrated samples from the stream cross-section, for six to eight storm events per year
- manual, depth-integrated samples during all monitoring station visits to verify the adequacy of samples from the automatic water sampler.

Data Calculations/Analyses

- Daily stream stage and calculated discharge
- Daily sediment concentrations and loadings
- Weekly nutrient concentrations and loadings
- Peak flows, flood volumes, sediment and nutrient concentrations during floods.
- Annual and seasonal sediment and nutrient loads for the pilot and reference watersheds.

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. The two models being developed to address these issues are focused on the Court Creek Watershed, within the Spoon River Basin. Intensive monitoring for both sediment and hydrology began in 1999 and both parameters have been highlighted as issues of concern by the Court Creek Watershed Planning Committee.

The hydrology model (Borah *et al.*, Illinois State Water Survey) functions by dividing the Court Creek watershed into discrete units (overlands) and stream channel units. This model uses physically-based equations to simulate movement of water as well as transport of sediment and agricultural chemicals. Initial verification of the model has been made using data collected in a previous study of this watershed. The on-going hydrologic and nutrient data collection effort will be used to further validate and calibrate the model. Incorporation of a streambank erosion component is anticipated in future versions.

In a second modeling project, areas of erosion and sediment deposition are identified using a variety of approaches including USLE/RUSLE and more complicated models such as USPED (Unit Stream Power Based Erosion Deposition) and SIMWE (Simulation of Water Erosion). Refinement of the model will be done using higher resolution Digital Elevation Models (DEM's). These models can be reviewed at the following web-address: **www2.gis.uiuc.edu:2280/modviz/courtcreek/cc.html**.

Because these models independently address related features of the watershed (flow and sediment) it will be important to the overall CREP assessment to consider the interrelationship of these parameters. Therefore, the next procedure, now underway, is to merge the two models. This

will allow evaluation of both sediment and flow, so that practices can be applied which will address the issue of concern.

D. Use of Extant Data: Other Data Collection Efforts Within the CREP Area

Additional data collection efforts and scientific studies, not directly related to CREP, have or are currently being conducted in the Illinois River basin by the Illinois Department of Natural Resources and other state and federal agencies (Tables 4 & 5 and Figures 6-8). 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 4. Agencies and programs that include data collection relevant to the objectives of the Illinois CREP.

Agency	**Project or Program**
Illinois Environmental Protection Agency	(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 Dept. Natural Resources	(1) Aerial censuses of waterfowl (2) Basin surveys of stream fisheries (3) EcoWatch volunteer stream monitoring program (RiverWatch, PrairieWatch, ForestWatch)
Illinois Natural History Survey	Long-term Illinois River electrofishing data set Statewide Critical Trends Assessment Program (CTAP)
Illinois State Water Survey	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)

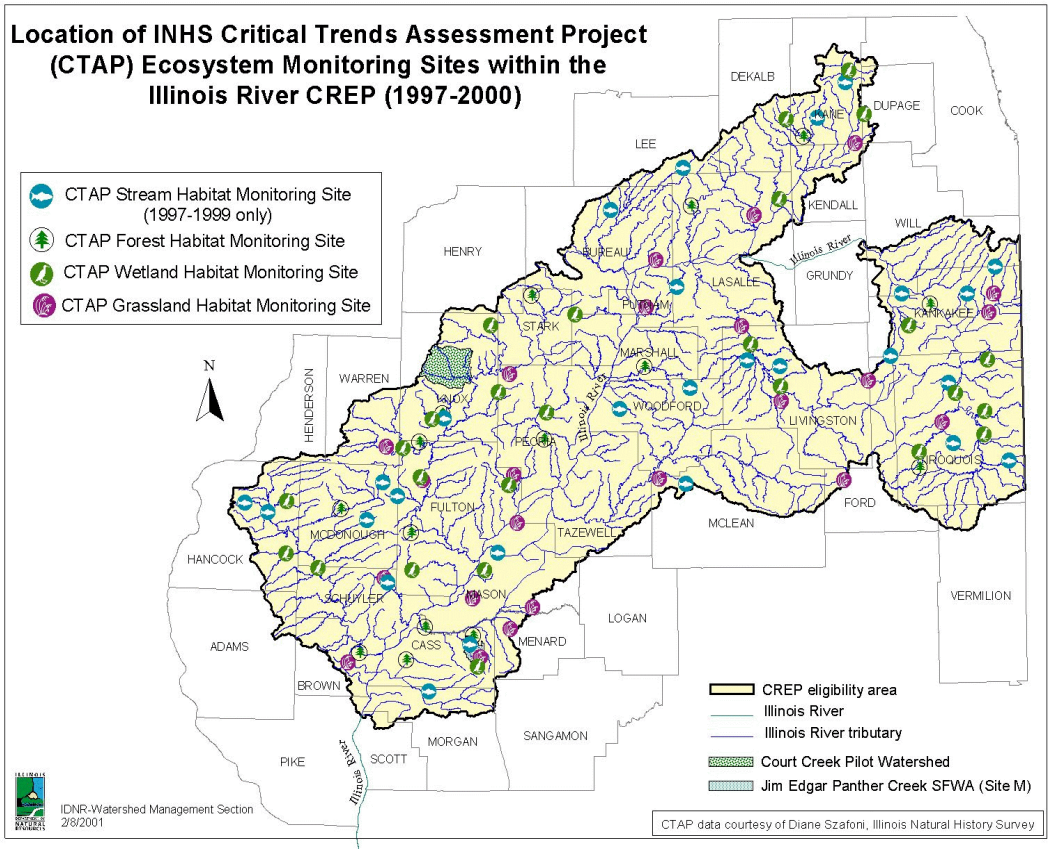


Figure 5. Location of Critical Trends Assessment Project (CTAP) monitoring sites in the Illinois River CREP area.

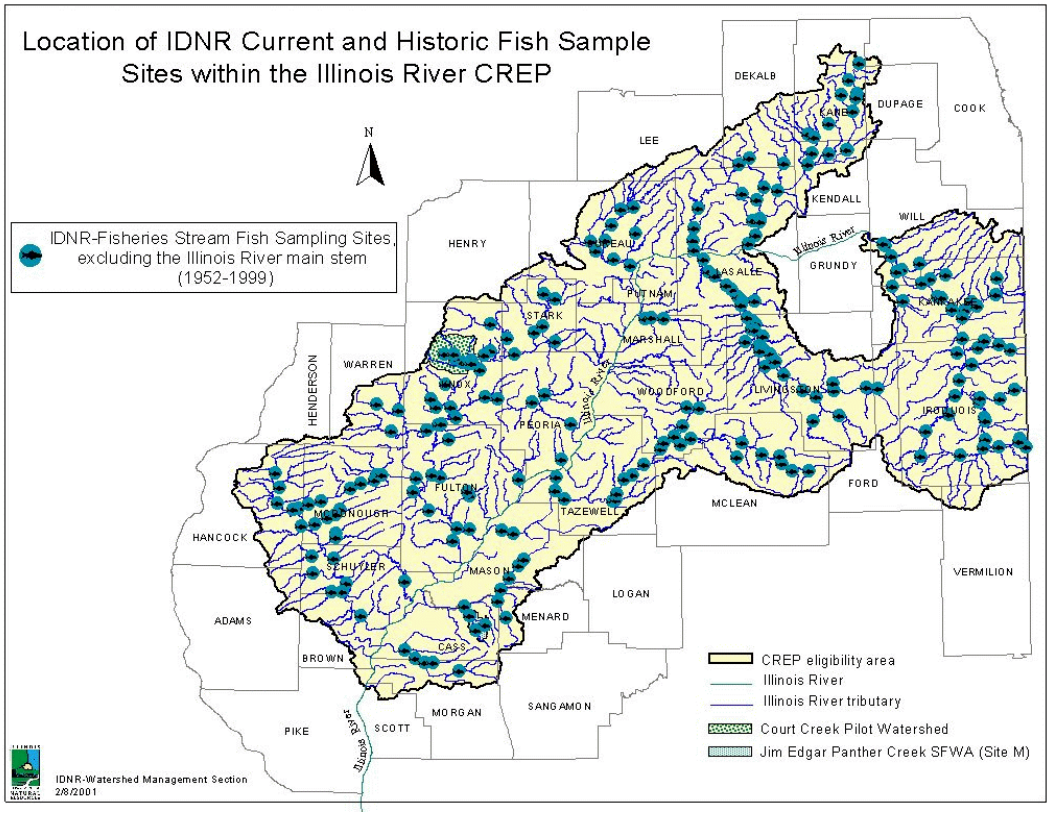


Figure 6. Location of IDNR current and historic fish sampling sites in the Illinois River CREP area.

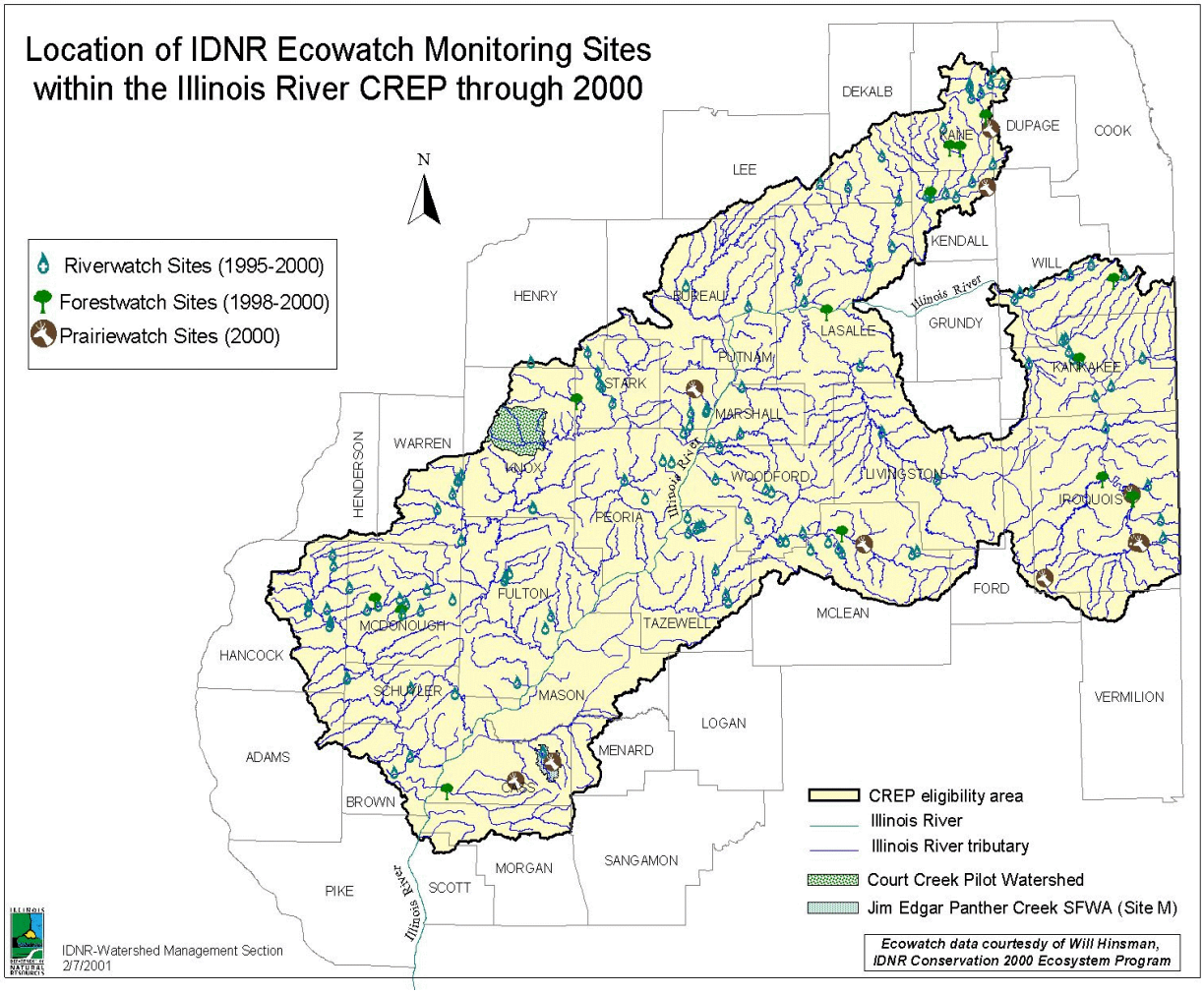


Figure 7. Location of the IDNR EcoWatch monitoring sites in the Illinois River CREP area.

Table 5. 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	Saber, 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.
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	

Table 5. (continued.)

Science Applications to Resource Management

Project Title	**Location**	**Principal Investigator**
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.
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.

Table 5. (continued).

Aquatic Science

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.

Conservation Practices Tracking Within the CREP Area

Intensive monitoring, modeling, and related Illinois River watershed data from other sources are key components in analyzing the success of Illinois CREP in meeting the long-term goals of

the program. However, in order to infer a cause:effect relationship between CREP and environmental change within the eligibility area, analyses of these data sets need to be in the context of the location, nature, and duration conservation practices implemented under the Conservation Reserve Enhancement Program, as well as other land cover changes within the basin. To this end IDNR has initiated development of two databases to track conservation practices within the CREP eligibility area; the CREP enrollment database and the Conservation Practices Tracking System.

CREP Enrollment Database

The first of these is a PC-based relational database, developed in cooperation with the Illinois Farm Service Agency state office, that documents the *general location* of land enrolled under CREP Federal and State contracts. Contract attribute information is maintained in a Corel Paradox Version 8 database. All contracts are georeferenced by the Public Land Survey sections that intersect the enrolled properties. This section-level georeferencing allows the Paradox relational database to be linked to existing ArcView GIS data sets, such as the Illinois Public Land Survey cover, in order to produce maps showing the general location of CREP contracts (Figure 8).

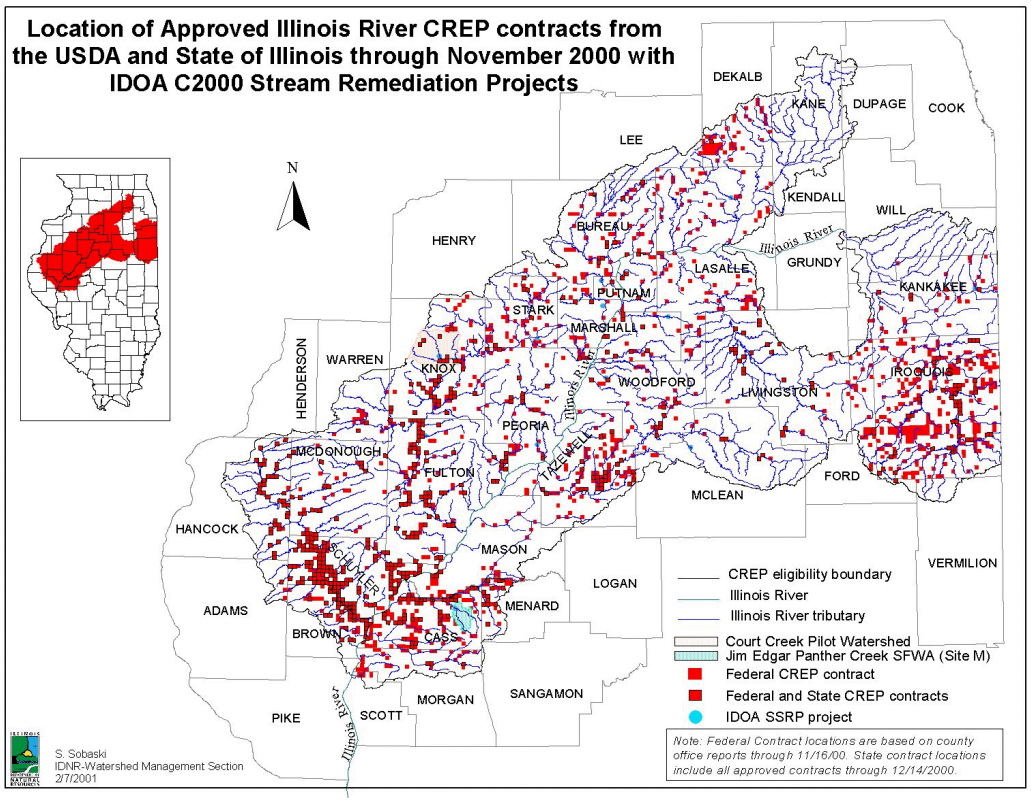


Figure 8. Example of a CREP enrollment map, where the general location of contracts are denoted in red by the PLS section(s) which they intersect. Each highlighted section represents the presence of one or more CREP contracts within its boundary.

The non-location attribute information gathered for each contract is limited to the data of enrollment, duration (in years) of the contract, identification of the county where the property resides (if different from the county of the FSA office administering the contract), the conservation practice(s) implemented under the enrollment (noted by FSA CP code), and the extent (area in acres)

of the enrollment. Federal CREP contract records in the database are uniquely identified by the county FSA office managing the contract and the contract number assigned by that office, while State records reference the CREP contract number assigned by the IDNR.

Information on the Federal CREP contracts is taken from FSA county office summary CREP reports submitted monthly to the state FSA headquarters, while State contract information is taken directly from contract files maintained in Springfield at the Illinois Department of Natural Resources headquarters. Primary outputs generated from this database, aside from the aforementioned enrollment status maps, include summary tables of county activity in CREP by number of enrollments, total acres enrolled, or acreage broken down by conservation practice. Through November 2000, 1,673 contracts (1,057 Federal and 616 state) have been documented in this database. The database is managed by the IDNR-Watershed Management Section.

Conservation Practices Tracking System

While the CREP enrollment database is valuable in providing a broad brush stroke view of CREP activity (i.e., noting that a contract exists somewhere within the one square mile encompassed by a PLS Section), it is of limited value when trying to establish relationships between the nature and extent of CREP enrollments and changes seen in water quality or fish and wildlife abundance within the Illinois River basin. Such analyses not only require precise knowledge of CREP enrollments, but also that of other land use or land cover changes within the basin, especially those initiated through other conservation programs, such as those sponsored by federal, state, and local governments, and NGOs . Precise location information of the boundaries of conservation easements, rather than general, is essential. Such information is currently unavailable in a digital format from most government agencies funding or administering conservation programs, however this information does generally exist as legal descriptions or notations on aerial photographs kept in paper files in the administering offices (Figure 9).

Figure 9. Example of enrollment boundaries of a wetland restoration (green) and that of additional acreage enrolled in just the State CREP (violet) delineated on an FSA aerial photograph from State CREP contract files.

To address this need for *detailed baseline information on conservation practices* within the Illinois CREP area, a cooperative pilot project was initiated in the summer of 2000 by the University of Illinois Cooperative Extension and the Illinois Department of Natural Resources (IDNR) with the State office of the USDA Farm Service Agency (FSA) to develop an interagency Conservation Practices Tracking System. The tracking system incorporates GIS technology with a PC relational data base to document the precise location, extent, type, and planned longevity of all conservation practices implemented in the Illinois CREP area. The initial scope of project has centered on documenting all enrollments under the USDA Farm Bill Conservation Programs: CREP, Conservation Reserve Program (active and historic), Environmental Quality Incentive Program, Wetland Restoration Program, Wildlife Habitat Improvement Program, as well as all enrollments under the State portion of CREP. As this was a pilot project, in part to assess the staff and budget resources necessary to develop the tracking system for the entire Illinois CREP area, the project has focused, in particular, on four active CREP eligible counties: Cass, Fulton, Knox, and Schuyler. Cass and Knox are of special interest due to the presence of intensive environmental monitoring for CREP being conducted in Jim Edgar Panther Creek State Fish and Wildlife Area (Site M) and in the Court Creek Conservation 2000 Pilot Watershed respectively, while Fulton and Schuyler counties rank among the most active counties in the Illinois CREP. A staff of 1-2 IDNR interns have worked since May 2000 with IDNR CREP staff and with the FSA director and office staff in these four counties to document conservation practice-related data kept in contract files. Ownership of this evolving database is shared by the University of Illinois Cooperative Extension Service and the Illinois Department of Natural Resources, and distribution of information or data from the system is done only with the permission of the FSA.

Project Information Scope

The focus of the Conservation Practice Tracking System is strictly limited to documenting:

(1) What practices have been or are being implemented in the Illinois CREP eligibility area.

(2) Where in the CREP area is each practice located, including the extent of land enrolled in a given practice.

(3) When was the practice implemented and what is the planned duration of the practice.

(4) Who was the agency and program which provided funding of the practice.

Data Sources

Information on conservation practices funded through USDA Farm Bill programs resides in contract and producer files held by the county Farm Service Agency office administering the contract. To document these contracts, IDNR or University of Illinois staff work with the county FSA staff, in the county office, to review and digitize practice boundaries as noted on FSA aerial photographs of the enrolled property kept on file with the contract application (Figures 10 and 11). By contrast, information on conservation practices implemented under the State portion of CREP are held in a central file maintained by IDNR in Springfield, as well as individually by the county SWCD office administering the contract. Here too, copies of FSA aerial photographs showing the location of conservation enrollments, as well as the contract application are reviewed from IDNR's CREP files.

Sensitive data associated with enrollments, such as the identity or personal information related to the landowner and payments received are outside of the scope and intent of this project and are therefore absent from the database.

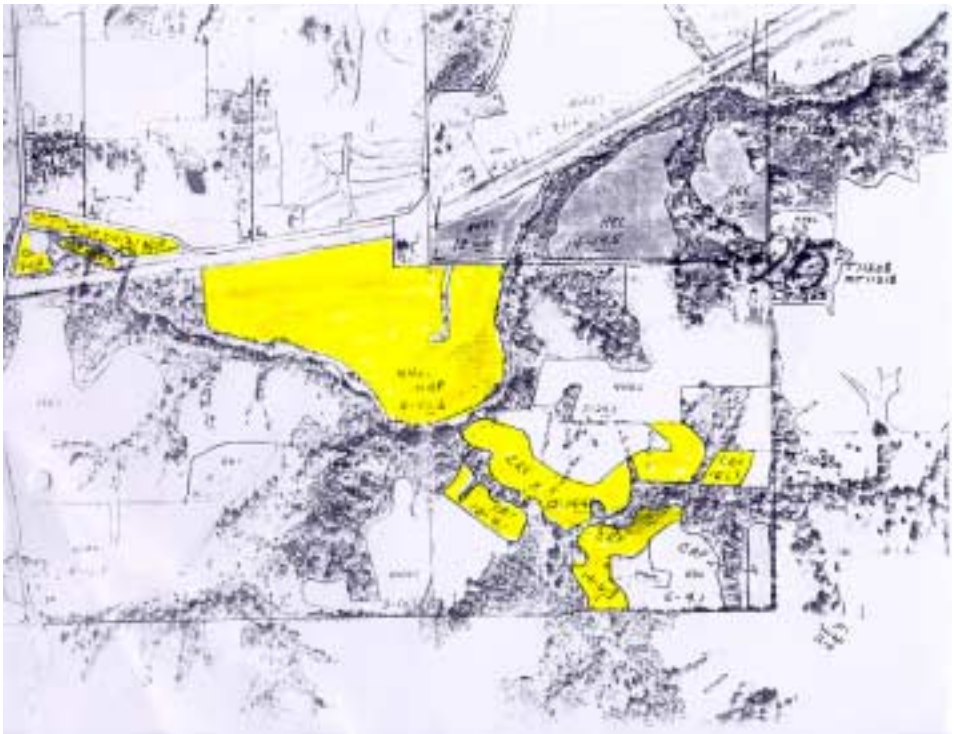


Figure 10. State CREP contract #19990012 - Wetland restoration areas outlined on file copy of FSA aerial photograph.

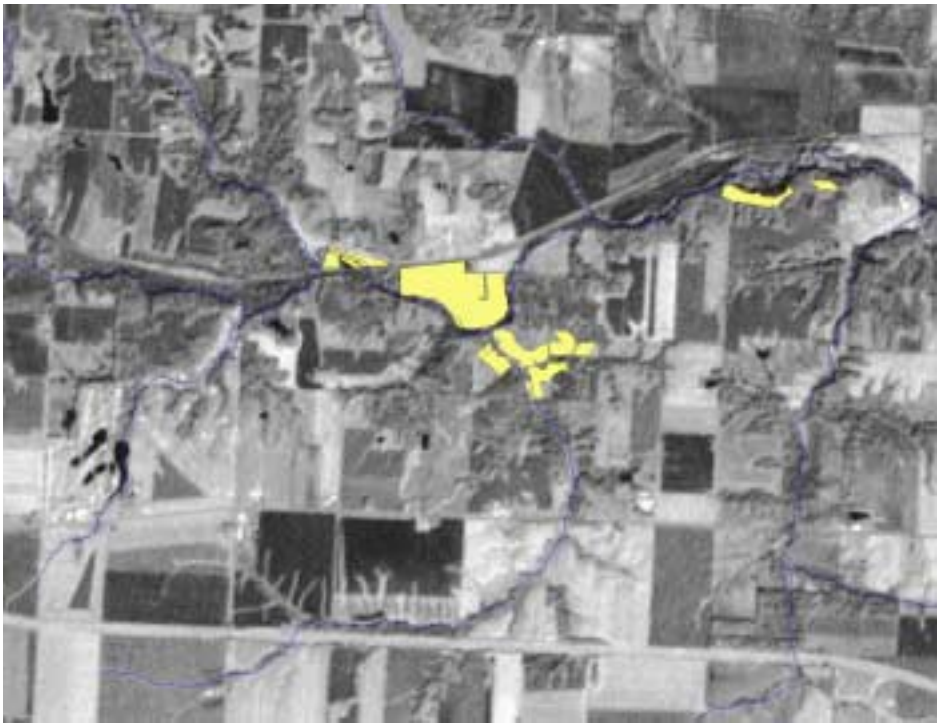


Figure 11. State CREP contract #19990012 - Contract boundaries (yellow) digitized into an ArcView database using 1:50,000 satellite imagery as background.

Data Management

Conservation practice information is maintained in the Conservation Practices Tracking System in several formats. Data related to a *specific parcel of land* enrolled in a conservation practice are maintained as records in a Geographic Information System shape file, created in ArcView version 3.2 (ESRI, Inc.) . Parcel data records include the precise boundaries of the extent of a practice, maintained as individual polygons for each area included in the practice implementation, 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 (identification of the basemap used in digitizing the contract and who digitized the contract) (Figure 12). Boundaries are digitized directly into ArcView, using a "heads-up approach" where the digitizer uses a digital orthorectified basemap, interprets the location of the practice from the FSA aerial photo on file, finds that same area on the digital basemap, then digitizes on screen the boundary directly into the ArcView data layer. Presently, the best available digital imagery, either USGS Landsat 7 1:50,000 satellite imagery of the four county region or, as they become available for the entire state of Illinois, USGS 1:12,000 Digital Ortho-Quarter Quads (DOQQs) are used for the background basemaps.

In a limited number of cases, practice boundaries have also been documented using a global positioning satellite (GPS) receiver (Trimble GeoExplorer II) to survey the extent of the enrollment directly on the contract property. Such GPS data are then exported to the ArcView data layer after post-processing and proper projecting. While practical for small parcels, surveying in this manner is time- and labor intensive for large conservation easements. Consequently, the use of GPS receivers to survey conservation practices has been limited to verifying the accuracy of a select number of contracts originally entered into the tracking system using heads-up digitizing. More accuracy testing with GPS receivers is planned as the Conservation Practices Tracking System develops.

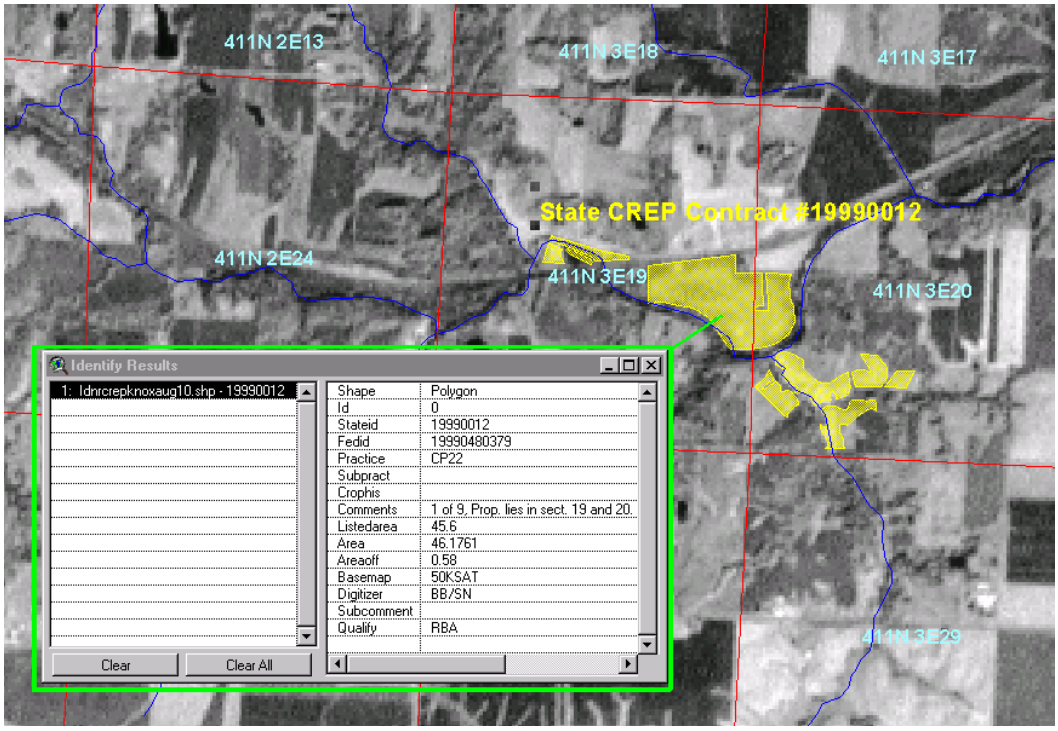


Figure 12. Example of attribute data recorded with each polygon digitized in the Conservation Practices Tracking System.

Data specifically *related to the contract*, rather than to the parcel of property enrolled, are maintained in a standard relational database (created in Corel's Paradox version 8). These data include the contract number, date of contract approval, total acres enrolled, as well as total acreage broken down by conservation practice, the agency and program under which the contract was executed, and the planned duration of the contract. The general location of the enrolled land is also maintained in this database in several formats: by county of enrolled property, by Public Land Survey section(s) (TRS), by watershed coded as NRCS Hydrologic Unit (HUC), and by FSA county Farm number and Tract number(s) (Figure 13).

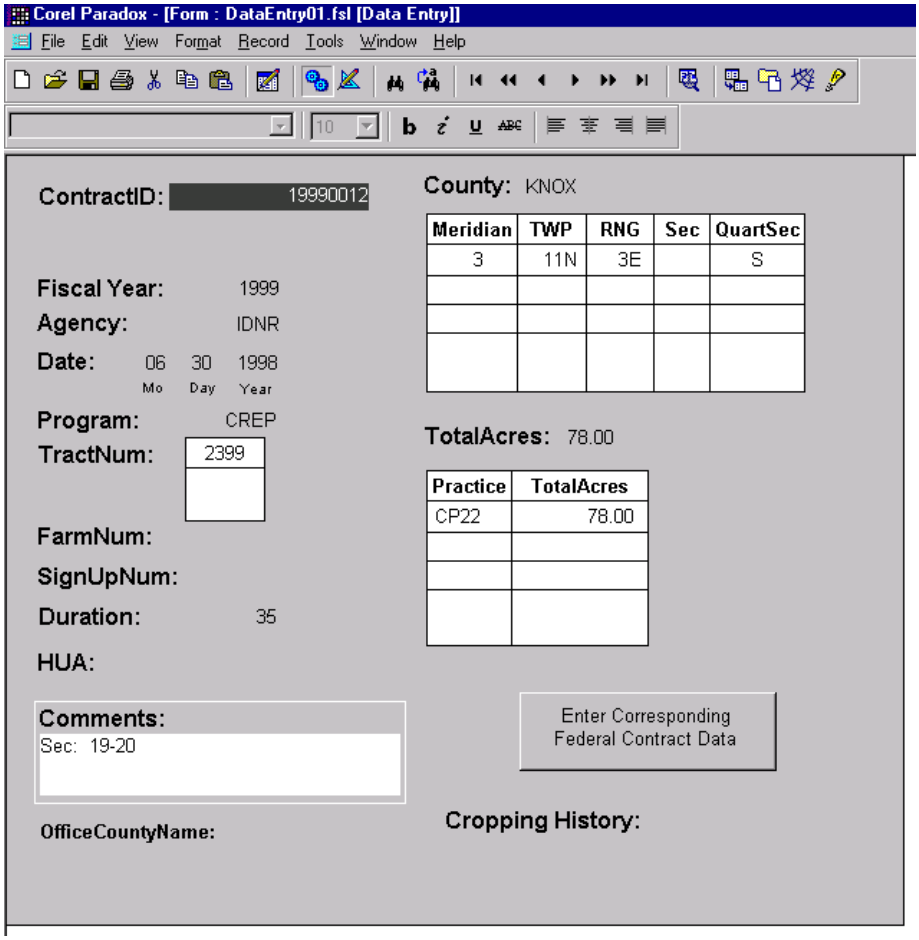


Figure 13. Attribute data for State CREP Contract 19990012 entered into Paradox 8 database portion of the Conservation Practices Tracking System.

Contract data in Paradox can be merged to practice polygon information within ArcView by linking on the common data field of Contract number. This allows users to query the Conservation Practices Tracking System database while in ArcView to create a variety of maps (Figure 14) showing conservation practices by type of practice (e.g., location of all wetland restorations), program sign-up (e.g., all CRP and CREP enrollments), funding agency (e.g., all IDNR funded practices), or age of practice (e.g., all enrollments implemented before 1998). All of the overlay, data merger, and analysis tools inherent to GIS can now be applied to these data as well, making it possible to analyze the impact of these practices based on their location and extent.

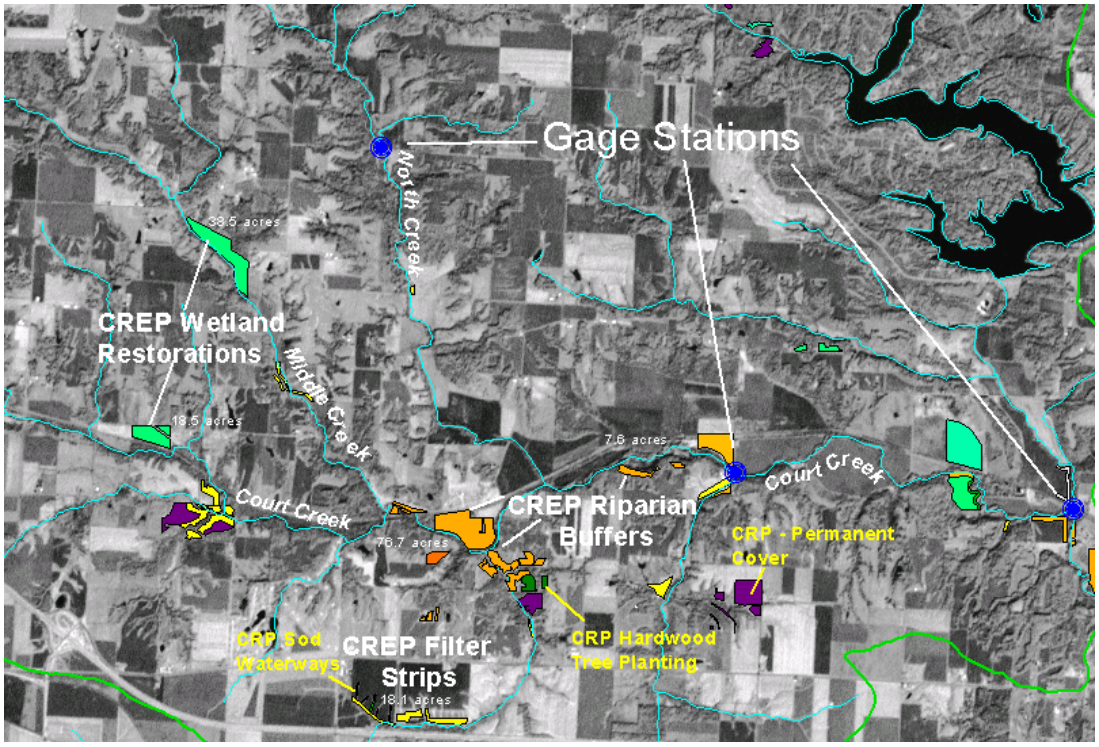


Figure 14. Example of Conservation Practices Tracking System map created by linking the ArcView and Paradox database components. Map shows all conservation practices implemented through November 2000 within the monitored area of the Court Creek pilot watershed assessment area, Knox Co., IL.

Project Status and Future

Through November 2000, a total of 1,992 contracts, covering 74,267.84 acres have been entered into the Paradox relational database within the Conservation Practices Tracking System (Table 6). Of these contracts, 1,169 have been digitized into the ArcView portion of the tracking system, accounting for 28,963.46 acres (Table 7). Eventually, every contract within the tracking system will be digitized and documented in the relational database. Those contracts not digitized to date were necessarily omitted due to poor or absent documentation of the contract boundaries on FSA aerial photographs or gaps in the basemap imagery. All Federal CREP, CRP, and EQIP contracts have been documented (digitized and entered into Paradox) for Cass and Knox counties through November 2000, as well as the majority of State CREP contracts falling within the four county project area. Once all extant conservation practice data have been entered into the tracking system for the initial four counties, revisits to all four FSA county offices are planned periodically to revise the conservation practice databases as more enrollments are approved, as well as to resolve any errors found in the existing database. Once initial data quality control is completed on the tracking system during this initial phase of the project, each participating FSA county office and the FSA state office will be provided with maps documenting the locations of practices as well copies of the databases or any summaries of data that may be desired.

While work on the pilot project is still in its initial phase, with digitizing on-going in Fulton county, the success of CREP in terms of numbers of enrollments and acres under contract, relative to other current USDA programs is impressive. Table 8 presents a preliminary comparison of contract totals and acres enrolled in CREP eligible conservation practices under Illinois CREP versus all other FSA conservation programs in Cass and Knox counties. Although combining State and Federal CREP contracts tends to inflate the total area enrolled under CREP, in that much of the

acreage enrolled in the state portion of CREP is also enrolled under the Federal program, a conservative estimate (i.e., 50% of the total acreage reported in Table 8) of the of the total area of land enrolled into riparian conservation practices (CP21,CP22,CP23,CP9) under the first two years of CREP still exceeds (Knox) or greatly exceeds (Cass) that enrolled under all years of all other conservation programs in those counties. Total acres enrolled in HEL conservation practices under CREP, when similarly compared, is approaching (Cass) or exceeds (Knox) that enrolled under all years of all other conservation programs.

While this pilot project has proven to be a good first step in developing a comprehensive conservation practices tracking system, it is clear that the value of this tracking system would be greatly enhanced by expanding its geographic scope to include all counties within the Illinois CREP region, then onto a statewide system. And, to make this a truly comprehensive system, it is also important to expand the scope of data being gathered to include practices implemented under the programs of other interagency partners in Illinois watershed management such as USDA-NRCS: Wildlife Habitat Incentives Program (WHIP) and Wetland Reserve Program (WRP), Illinois EPA: Nonpoint Source Management Program (Section 319), Illinois Department of Agriculture: Conservation Practices Cost-Share Program (CPP) and Streambank Stabilization and Restoration Program (SSRP) and Illinois Department of Natural Resources Conservation 2000 Ecosystem program. Such information would be invaluable in improving interagency coordination in planning, funding, and implementing watershed and ecosystem management within the Illinois River watershed and elsewhere in the state. Expansion of the system, though, remains contingent upon additional funding and further cooperation by interagency partners in this project.

Table 6. Summary by CREP county of conservation practice data entered into the Paradox portion of the Conservation Practices Tracking System.

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
ADAMS	3	37.30	1	39.10						
BROWN	25	1,392.50	29	1,659.10						
BUREAU	1	12.10	1	12.10						
CASS	199	5,163.30	40	3,324.37	246	5,503.0	5	3.9	5	405.0
DEKALB	2	43.00	2	43.00						
FORD	2	33.30	2	33.30						
FULTON	67	3,675.30	62	3,227.40	5	209.0				
HANCOCK	37	1,848.00	33	3,910.40						
HENRY	4	21.10	0	0.00	2	10.0				
IROQUOIS	38	1,621.00	38	2,120.18						
KANKAKEE	6	85.40	6	104.90						
KNOX	148	4,385.90	37	1,925.90	366	5,366.0				
LIVINGSTON	19	346.90	21	408.80						
MARSHALL	9	241.50	9	241.50						
MASON	6	517.60	5	1,283.80						
MCDONOUGH	20	742.20	25	1,425.70						
MCLEAN	4	54.90	4	101.10						
MENARD	15	106.20	15	396.54	1	34.0				
MERCER	1	41.80	2	172.40						
MORGAN	20	330.90	2	169.80	2	26.0				
PEORIA	10	397.80	12	750.54						
PUTNAM	4	167.90	4	200.30						
SCHUYLER	134	5,945.14	142	11,286.43	1	4.0				
STARK	7	89.90	7	89.90						
TAZEWELL	25	1,128.00	26	723.18						
WARREN	5	95.70	2	82.20						
WOODFORD	12	211.50	10	238.86						
TOTAL	**823**	**28,736.14**	**537**	**33,970.80**	**623**	**11,152.0**	**5**	**3.9**	**4**	**405.0**

Table 7. Summary by CREP county of digitized conservation practice data entered into the ArcView portion of the Conservation Practices Tracking System. Acreage totals are based on area values calculated for the digitized polygons by ArcView GIS, rather than those given in the individual contracts.

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
ADAMS	1	7.92								
CASS	198	5,697.59	34	2901.23	231	5,138.00	5	3.87	5	405.39
FULTON	5	718.36	8	831.78	5	209.00				
HANCOCK	4	47.42	5	123.57						
HENRY	1	1.00								
KNOX	126	3,201.95	23	1133.08	308	4,300.84				
MASON	1	39.24								
MCDONOUGH	4	70.98	7	152.08						
MENARD	2	3.58	2	40.12						
MORGAN	15	236.04			2	25.68				
SCHUYLER	84	6,924.22	88	7,531.03	1	3.64				
WARREN	3	27.41	1	14.08						
TOTAL	**444**	**16,975.71**	**168**	**1,901.33**	**547**	**9,677.16**	**5**	**3.87**	**5**	**405.39**

Table 8. Preliminary summary of enrollments by conservation practice in Illinois CREP (Federal and State contracts combined) in Cass and Knox counties compared to all other FSA Conservation Program enrollments in those counties through November 2000. Non-CREP Program totals cover all years of those program.

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								
CP12 - Wildlife Foodplot							1	20.03
CP2- Establishment of Permanent Native Grasses	1	8.50	3	44.33			8	125.98
CP21- Filter Strip	74	553.90	20	116.05	75	829.11	86	892.92
CP22- Riparian Buffer	16	454.05			38	678.79	18	185.01
CP23- Wetland Restoration	67	2,256.58	1	2.42	31	1,049.63	4	11.26
CP25- Rare and Declining Habitat								
CP3- Tree Planting			1	2.29	2	26.28	2	18.20
CP3A- Hardwood Tree Planting	2	5.66	6	41.01	8	252.20	17	216.81
CP4D- Permanent Wildlife Habitat, Noneasement	80	2,033.36	98	2,719.79	12	349.82		
CP9 - Shallow Water Areas for Wildlife								
ADD- Additional Easement Acreage, State CREP	15	1,053.81			3	39.55		
NON-CREP Eligible Practices (Total)			105	2,212.10			163	2,222.13

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

A. Background Information

The sedimentation of the Illinois River is one of the major issues that has brought about the interest in the river restoration (Illinois River Management Plan) and, to a great degree, led to the development of the Illinois River CREP.

Table 9. The sediment load contributed by tributaries to the Illinois River varies significantly (data from DeMissie *et al.* 1992; with total basin size estimates revised using USEPA's River Reach File 3 database (RF3) coverages for Illinois). Using the extent of the 100-year floodplain as an approximation of the total acres of land eligible for enrollment in the CREP program, the following is a summary by basin of land eligible for enrollment. Note that the floodplain acreage includes only those streams and rivers for which the 100-year floodplain has been defined and is thus an underestimate of the total floodplain acreage.

Basin	Total Basin Size (acres)	Annual Discharge (1000 cfs)	Sediment Yield (1000 tons/yr)	Sediment Contribution (tons/acres)	Area within CREP boundary (acres)	Basin 100-yr. Floodplain w/in CREP boundary (acres)	River Miles in CREP Area (RF3 data)
Fox	1,701,120	837.5	552.6	0.3	701,440	33,920	1,143
Kankakee	3,305,600	2,105.9	872.8	0.2	1,374,720	93,440	2,273
Vermilion	845,440	407.2	932.0	1.1	845,440	62,720	1,390
Mackinaw	728,320	329.8	834.7	1.1	728,320	47,360	1,319
Spoon	1,180,800	504.3	2,729.3	2.3	1,180,800	69,120	2,393
Sangamon	3,374,080	1,492.0	1,551.7	0.4	220,160	34,560	468
La Moine	855,040	381.4	1,371.2	1.6	855,040	48,640	1,714
Other	6,509,440				2,384,000	274,560	4,700
Illinois River at Valley City	17,000,960	9,073.7	5,648.8	0.3		664,320	

B. Modeling

University of Illinois CREP targeting Model

An integrated hydrologic-economic model was developed by Drs. Yang, Khanna, Farnsworth and Onal (University of Illinois) and funded by the Illinois Council on Food and Agricultural Research (C-FAR). This model will be capable of assessing the implications of buffer programs such as CREP on farm income, sediment, and public expenditures (Yang 2000). The researchers and graduate students developed an assessment tool that identified cropland cells (each 300 by 300 foot cell equaled 2.07 acres) within a 900 foot buffer that would achieve a prespecified reduction in sediment loading at least cost (Figures 15 and 16). Data used in the analysis included a simplified stream network based on EPA reach file 3 information (RF3 at 1 to 100,00 scale). This stream network significantly underestimates the actual stream miles within any given area and this will have potentially significant impacts upon the model results. Also, it should be noted that this model does not incorporate sediment from streambank or channel erosion which can contribute over 50% of the sediment load in some areas of the Illinois River basin (Don Roseboom, ISWS, personal communication). Finally, the model does not account for sediment deposition from flooding of riparian areas through typical river stage rises and floodplain access by floodwaters. Thus, model results should be considered indicative of patterns rather than absolute amounts. Higher resolution data is being acquired and will be incorporated into subsequent runs of the model.

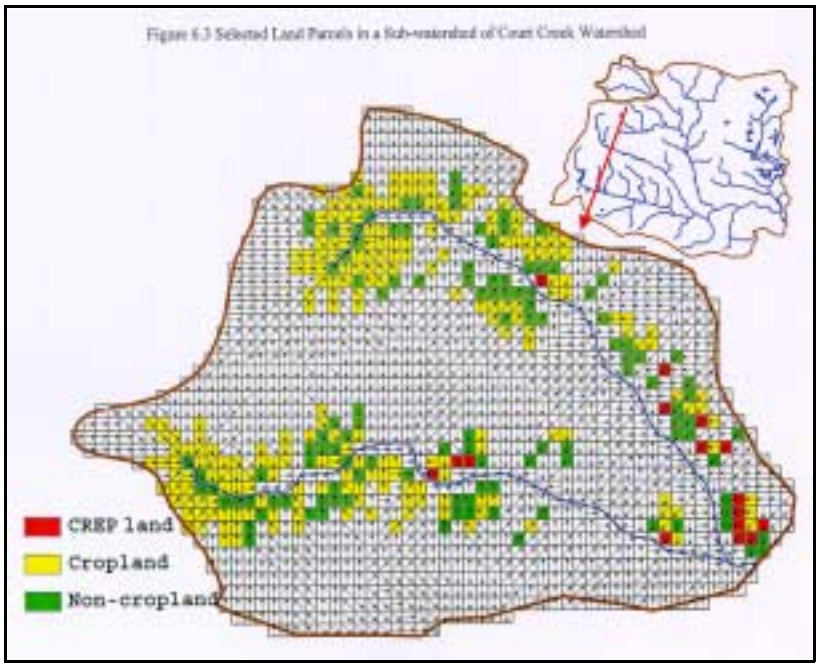


Figure 15. Selected land parcels in a sub-watershed of the Court Creek Watershed (from Yang 2000).

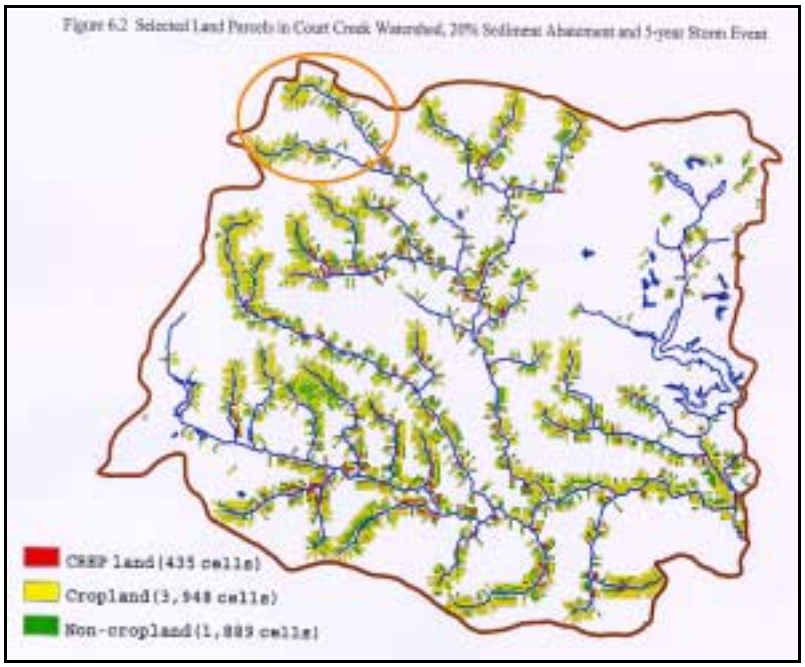


Figure 16. Selected land parcels the Court Creek Watershed with 20% sediment abatement and a 5-year storm event (Yang 2000).

Using first year CREP enrollment numbers, the researchers selected 12 watersheds in the southern end of the CREP priority area for their model.

The model was run for a representative 5-year storm event and a 20 percent sediment abatement goal. Output from this simulation run yielded the following preliminary conclusions:

A relatively small amount of cropland converted to permanent cover could achieve a 20 percent reduction in sediment generated by a 5-year storm event. The twelve study watersheds totaled 618,639 acres with 63 percent of the land in crop production. A large portion of the cropland base – 130,000 acres – fell within 900 feet of the watersheds' streams and hence eligible for enrollment in the study's CREP-style buffer program. Of these eligible acres, only 9,255 acres (7.1 percent of eligible cropland and only 2.4 percent of all cropland in the 12 watersheds) needed to be retired from crop production to achieve a 20 percent reduction in sediment.

Most of the cropland identified for retirement is immediately adjacent to the streams. Of the 9,255 acres selected for conversion to permanent cover, 74 percent were within 300 feet of the streams.

Almost all of the cropland identified for retirement was sloping. Only 56 acres of cropland consisted of slopes between 0 and 2 percent. In general, sloping land is less productive than relatively flat land and slope contributes to a higher erosion rate. Hence, a greater reduction in sediment can generally be achieved at a lower cost by taking this land out of production.

Average annual cost per ton of sediment reduced equaled $25.

Given available CREP enrollment data and locations, the model can be used to estimate sediment reductions and then compared to this study's results. For a comprehensive assessment, wildlife, aquatic, and other water quality impacts should be added to this initial assessment which focused solely on sediment.

Illinois State Water Survey Dynamic Watershed Simulation Model

The Court Creek watershed is being modeled and examined through the application and continued refinement of the Dynamic Watershed Simulation Model (DWSM; Bora and Bera 2000). This dynamic hydrologic model simulates, for a given rainfall event, the time and space varying flow depths and flow rates of surface runoff. This is done through dividing the watershed into a series of subwatersheds with characteristic one-dimensional overland, channel and reservoir flow elements. The Court Creek watershed was divided into 78 overland (Figure 17), 39 channel (Figure 18) and 2 reservoir segments. The overland segments are represented in the model as rectangular areas characterized by their length, slope, width, soil, cover, and roughness. Channels are described by cross-sectional shape, slope, length, and roughness. Overland areas are considered the primary source of runoff with the two overlands on each side of the channel contributing to the flow in the channel.

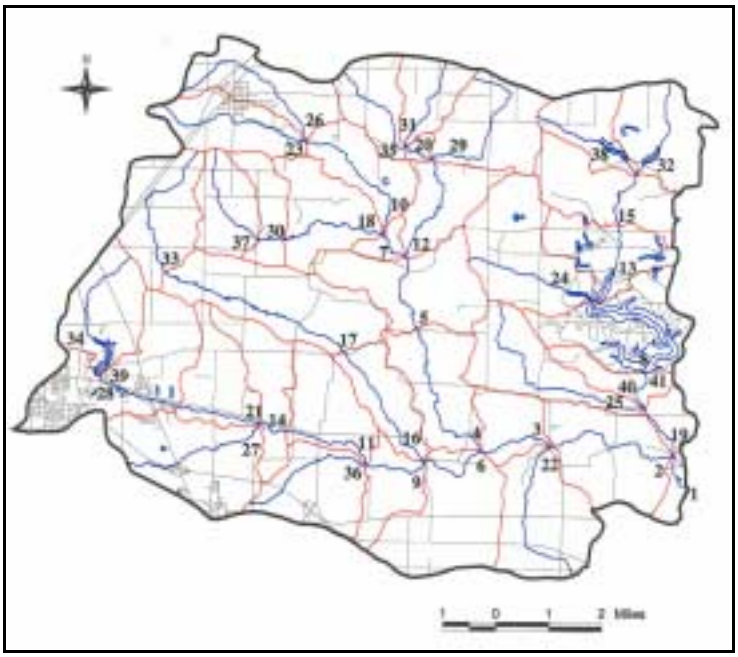


Figure 17. Stream channels designated for the dynamic hydrologic model of the Court Creek Watershed (Borah and Bera 2000).

From earlier work in Court Creek (Roseboom *et al.* 1986) storm events with flow records at three gaging stations and 13 rainfall recording states were used to calibrate and verify the model. Three storms in 1982 and 1983 were primarily used in this initial calibration. Results of these initial efforts were mixed with the model not accurately matching the rising hydrographs but following the hydrographic recession more accurately while often overestimating the peak flow. Several factors may contribute to these errors. First, tile drainage is not currently accommodated in the model and Court Creek does have a significant areas of tile although not extensive throughout the entire drainage. Second, out-of-channel flows are not currently handled and, finally, backwater from the Spoon River may impact measurements at the Court Creek outflow. Current data from projects by DeMissie and Keefer (2000) and updated landuse data will be used to re-calibrate the model to current conditions. Despite the mixed performance,

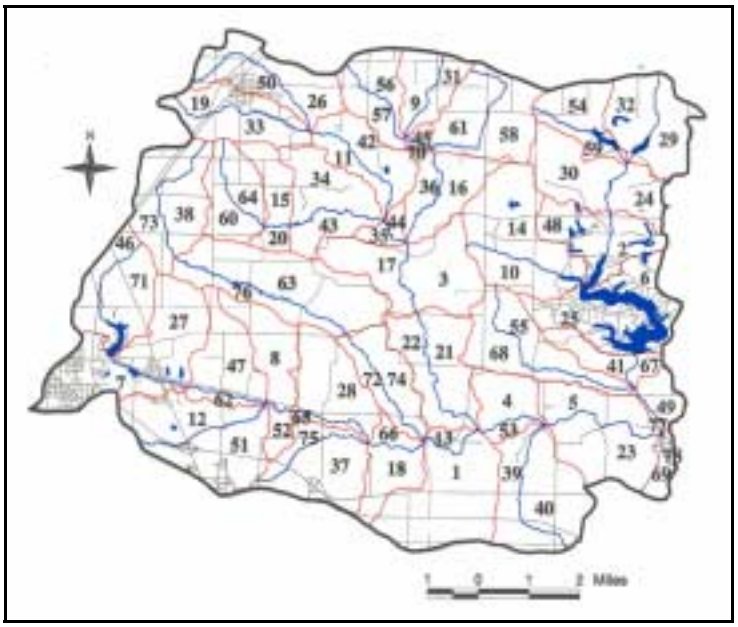


Figure 18. Overland delineations for the dynamic hydrologic model of the Court Creek Watershed (Borah and Bera 2000).

however, the model did demonstrate an ability to be useful in understanding the watershed and will provide a tool for predicting effects of land use change through the implementation of conservation practices through CREP and other state and federal programs. In current implementation, DWSM is being used to prioritize the location of conservation practices funding through the Conservation 2000 Pilot Watershed Program in Court Creek. High erosion overlands have been identified (red watersheds in Figure 20) and additional points are awarded to those applications that are located in priority areas. Practices funded through the Conservation 2000 Pilot Watershed Program complement the CREP practices (e.g., streambank and channel restoration in conjunction with CREP riparian buffer).

10. Waterfowl, Shorebirds, Nongame Grassland Birds, and State and Federal Threatened and Endangered Species (Goal 3).

A. Waterfowl and Shorebirds:

The single greatest contribution the Illinois River Watershed makes 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, and 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 for migratory waterfowl and shorebirds. 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 10) 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 10. CREP practices and acreage implemented in Illinois through state CREP contracts only as delineated by practice and land eligibility (e.g., erodible or riparian habitat).

CREP Practice Implemented (state)	Category	Acres	Estimated acreage of existing habitat in the CREP eligible area [1]
Additional acres	Erodible	147	*to be determined*
CP2 (permanent native grass)	Erodible	124	*to be determined*
CP3 (tree planting)	Erodible	16	*to be determined*
CP3A (hardwood tree planting)	Erodible	119	*to be determined*
CP4D (permanent wildlife habitat)	Erodible	285	*to be determined*
Total acres in erodible lands		**691**	
Additional acres	Riparian	13,547	*to be determined*
CP12 (wildlife food plot)	Riparian	90	*to be determined*
CP2 (permanent native grass)	Riparian	4	*to be determined*
CP21 (filter strips)	Riparian	398	*to be determined*
CP22 (riparian buffer)	Riparian	5,017	*to be determined*
CP23 (wetland restoration)	Riparian	15,941	182,098 [2]
CP3A (hardwood tree planting)	Riparian	1,409	*to be determined*
CP4D (permanent wildlife habitat)	Riparian	1,284	*to be determined*
CP9 (shallow water areas for wildlife)	Riparian	53	*to be determined*
Total acres in riparian areas		**37,743**	

[1] Note that habitat estimates are taken from the Illinois landcover analysis (IDNR 1996).

[2] Data from National Wetlands Inventory and includes all the polygons coded as Palustrine (50,430 polygons totaling 182,028.02 acres; code="P*") and polygons coded as Lacustrine littoral emergent lake (4 polygons totaling 70.60 acres; code="L2EM*").

B. Nongame Grassland Birds:

Many Midwestern nongame 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 put 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 have the most positive impact on grassland bird species in general if they are placed near other grasslands and distant from trees, creating a complex that can support a variety of species. However, 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 occurrences of 30 faunal threatened or endangered species, and occurrences of 32 threatened or endangered plant species within the CREP 100-year floodplain (Table 11). In the entire land area (not including fish and invertebrates) within the CREP boundary there are 28 faunal occurrences and 89 plant occurrences (Table 12). It should be noted that after a recent revision to the list of Illinois threatened and endangered species, there are no longer any egrets on the list (IESPB 1999).

Because the vast majority of acres enrolled in CREP are in the floodplain, we are focusing on species that have also been known to occur there (Table 11). The habitat preferences of the faunal species on this list (Table 13) suggest that an increase in wetland and/or wooded riparian habitat could have a positive impact on many of the species. Because by definition these species populations are small and often difficult to locate, 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. It is also important to monitor the practices implemented and how the acres are managed over time.

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 amount 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 Wetlands Inventory (USFWS and IDNR 1988) is a reasonable representation of wetlands that existed in the watershed in the 1980's, and the Landcover Database of Illinois (Luman *et al.* 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).

Table 11. Threatened or endangered species occurring in the 100-yr floodplain of the CREP area (data from IDNR 2000). 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.

FAUNA

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Pseudacris streckeri illinoensis	Illinois chorus frog	ST		1
Buteo lineatus	Red-shouldered hawk	ST		2
Certhia americana	Brown creeper	ST		4
Chlidonias niger	Black tern	SE		1
Gallinula chloropus	Common moorhen	ST		1
Grus canadensis	Sandhill crane	ST		2
Haliaeetus leucocephalus	Bald eagle	ST	FT, PDL	15
Ixobrychus exilis	Least bittern	ST		1
Nycticorax nycticorax	Black-crowned night-heron	SE		2
Podilymbus podiceps	Pied-billed grebe	ST		6
Thryomanes bewickii	Bewick's wren	SE		1
Xanthocephalus xanthocephalus	Yellow-headed blackbird	SE		2
Ammocrypta clara	Western sand darter	SE		1
Hybopsis amnis	Pallid shiner	SE		1
Ichthyomyzon fossor	Northern brook lamprey	SE		1
Lepomis miniatus	Redspotted sunfish	ST		1
Moxostoma carinatum	River redhorse	ST		8
Moxostoma valenciennesi	Greater redhorse	SE		6
Notropis chalybaeus	Ironcolor shiner	ST		5
Notropis texanus	Weed shiner	SE		1
Myotis sodalis	Indiana bat	SE	FE	2
Emydoidea blandingii	Blanding's turtle	ST		1
Kinosternon flavescens	Illinois mud turtle	SE		1
Speyeria idalia	Regal fritillary	ST		1
Alasmidonta viridis	Slippershell mussel	ST		9
Cyclonaias tuberculata	Purple wartyback	ST		2
Elliptio dilatata	Spike	ST		8
Ligumia recta	Black sandshell	ST		4
Plethobasus cyphyus	Sheepnose mussel	SE		2
Villosa iris	Rainbow mussel	SE		1

FLORA

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Amelanchier sanguinea	Shadbush	SE		2
Arenaria patula	Slender sandwort	ST		1
Aster furcatus	Forked aster	ST		2
Boltonia decurrens	Decurrent false aster	ST	FT	30
Filipendula rubra	Queen-of-the-prairie	SE		3
Iliamna remota	Kankakee mallow	SE		1
Malvastrum hispidum	False mallow	SE		1
Mimulus glabratus	Yellow monkey flower	SE		3
Sambucus pubens	Red-berried elder	SE		1
Solidago sciaphila	Cliff goldenrod	ST		2
Stylisma pickeringii	Patterson's bindweed	SE		1
Styrax americana	Storax	ST		2
Symphoricarpos albus var albus	Snowberry	SE		2
Tomanthera auriculata	Ear-leafed foxglove	ST		1
Utricularia intermedia	Flat-leaved bladderwort	SE		1
Valerianella umbilicata	Corn salad	SE		1
Veronica scutellata	Marsh speedwell	ST		1
Thuja occidentalis	Arbor vitae	ST		2
Carex aurea	Golden sedge	SE		1
Carex communis	Fibrous-rooted sedge	ST		1
Carex cryptolepis	Sedge	SE		1
Carex viridula	Little green sedge	ST		1
Cyperus grayioides	Umbrella sedge	ST		1
Cypripedium candidum	White lady's slipper	ST		1
Cypripedium reginae	Showy lady's slipper	SE		1
Eleocharis rostellata	Spike rush	ST		1
Platanthera flava var herbiola	Tubercled orchid	SE		1
Scirpus hallii	Hall's bulrush	ST		3
Spiranthes lucida	Yellow-lipped ladies' tresses	SE		1
Triglochin maritimum	Common bog arrow grass	ST		1
Triglochin palustris	Slender bog arrow grass	ST		1
Isoetes butleri	Quillwort	SE		1

Table 12. Threatened or endangered species occurring in the entire CREP area (data from IDNR 2000).

FAUNA (not including fish or invertebrates).

Scientific Name	Common Name	State Status	Federal Status	# of Occurrence
Hemidactylium scutatum	Four-toed Salamander	ST		1
Pseudacris streckeri illinoensis	Illinois Chorus Frog	ST		17
Ammodramus henslowii	Henslow's Sparrow	SE		10
Asio flammeus	Short-eared Owl	SE		2
Bartramia longicauda	Upland Sandpiper	SE		12
Botaurus lentiginosus	American Bittern	SE		2
Buteo lineatus	Red-shouldered Hawk	ST		3
Buteo swainsoni	Swainson's Hawk	SE		1
Certhia americana	Brown Creeper	ST		5
Chlidonias niger	Black Tern	SE		2
Gallinula chloropus	Common Moorhen	ST		7
Grus canadensis	Sandhill Crane	ST		6
Haliaeetus leucocephalus	Bald Eagle	ST	FT, PDL	19
Ixobrychus exilis	Least Bittern	ST		4
Lanius ludovicianus	Loggerhead Shrike	ST		17
Nycticorax nycticorax	Black-crowned Night-heron	SE		5
Podilymbus podiceps	Pied-billed Grebe	ST		14
Rallus elegans	King Rail	SE		2
Thryomanes bewickii	Bewick's Wren	SE		1
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	SE		9
Lontra canadensis	River Otter	ST		2
Myotis sodalis	Indiana Bat	SE	FE	5
Clonophis kirtlandii	Kirtland's Snake	ST		2
Crotalus horridus	Timber Rattlesnake	ST		2
Emydoidea blandingii	Blanding's Turtle	ST		3
Heterodon nasicus	Western Hognose Snake	ST		4
Kinosternon flavescens	Illinois Mud Turtle	SE		9
Sistrurus catenatus catenatus	Eastern Massasauga	SE	C	2

FLORA

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Agalinis skinneriana	Pale false foxglove	ST		6
Amelanchier sanguinea	Shadbush	SE		3
Arenaria patula	Slender sandwort	ST		1
Asclepias lanuginosa	Wooly milkweed	SE		2
Asclepias meadii	Mead's milkweed	SE	FT	1
Aster furcatus	Forked aster	ST		7
Astragalus tennesseensis	Tennessee milk vetch	SE		1
Besseya bullii	Kittentails	ST		3
Boltonia decurrens	Decurrent false aster	ST	FT	38
Cimicifuga racemosa	False bugbane	SE		1
Cirsium hillii	Hill's thistle	ST		18
Comptonia peregrina	Sweetfern	SE		2

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Cornus canadensis	Bunchberry	SE		1
Corydalis aurea	Golden corydalis	SE		1
Corydalis sempervirens	Pink corydalis	SE		1
Drosera intermedia	Narrow-leaved sundew	ST		3
Filipendula rubra	Queen-of-the-prairie	SE		3
Galium labradoricum	Bog bedstraw	ST		1
Hymenoxys herbacea	Lakeside daisy	SE	FT	1
Hypericum adpressum	Shore St. John's wort	SE		3
Iliamna remota	Kankakee mallow	SE		1
Lesquerella ludoviciana	Silvery bladderpod	SE		1
Liatris scariosa var nieuwlandii	Blazing star	ST		2
Malvastrum hispidum	False mallow	SE		1
Microseris cuspidata	Prairie dandelion	SE		2
Mimulus glabratus	Yellow monkey flower	SE	(PS)	3
Orobanche fasciculata	Clustered broomrape	SE		1
Orobanche ludoviciana	Broomrape	ST		4
Plantago cordata	Heart-leaved plantain	SE		3
Polanisia jamesii	James' clammyweed	SE		1
Polygala incarnata	Pink milkwort	SE		4
Polygonum careyi	Carey's smartweed	SE		2
Rhamnus alnifolia	Alder buckthorn	SE		1
Rubus setosus	Bristly blackberry	SE		4
Sambucus pubens	Red-berried elder	SE		5
Sanguisorba canadensis	American burnet	SE		1
Solidago sciaphila	Cliff goldenrod	ST		4
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		5
Trifolium reflexum	Buffalo clover	SE		3
Ulmus thomasii	Rock elm	SE		1
Utricularia intermedia	Flat-leaved bladderwort	SE		1
Vaccinium macrocarpon	Large cranberry	SE		1
Valerianella umbilicata	Corn salad	SE		1
Veronica americana	American brooklime	SE		3
Veronica scutellata	Marsh speedwell	ST		2
Viburnum molle	Arrowwood	ST		4
Viola primulifolia	Primrose violet	SE		4
Pinus resinosa	Red pine	SE		1
Thuja occidentalis	Arbor vitae	ST		9
Calopogon tuberosus	Grass pink orchid	SE		3
Carex aurea	Golden sedge	SE		2
Carex communis	Fibrous-rooted sedge	ST		4
Carex cryptolepis	Sedge	SE		1
Carex viridula	Little green sedge	ST		2
Carex woodii	Pretty sedge	ST		1
Corallorhiza maculata	Spotted coral-root orchid	ST		1
Cyperus grayioides	Umbrella sedge	ST		10
Cypripedium candidum	White lady's slipper	ST		4
Cypripedium reginae	Showy lady's slipper	SE		2
Echinodorus tenellus	Small burhead	SE		3

Scientific Name	Common Name	State Status	Federal Status	# of Occurrences
Eleocharis rostellata	Spike rush	ST		1
Fimbristylis vahlii	Vahl's fimbristylis	SE		3
Luzula acuminata	Hairy woodrush	SE		2
Melanthium virginicum	Bunchflower	ST		7
Panicum columbianum	Hemlock panic grass	SE		1
Platanthera clavellata	Wood orchid	SE		1
Platanthera flava var herbiola	Tubercled orchid	SE		6
Platanthera leucophaea	Eastern prairie fringed orchid	SE	FT	2
Poa languida	Weak bluegrass	SE		1
Poa wolfii	Wolf's bluegrass	SE		2
Potamogeton pulcher	Spotted pondweed	SE		1
Scirpus hallii	Hall's bulrush	ST		21
Scirpus paludosus	Alkali bulrush	SE		1
Scirpus purshianus	Weak bulrush	SE		2
Sisyrinchium atlanticum	Eastern blue-eyed grass	SE		3
Sparganium americanum	American burreed	SE		3
Sparganium chlorocarpum	Green-fruited burreed	SE		2
Spiranthes lucida	Yellow-lipped ladies' tresses	SE		1
Tofieldia glutinosa	False asphodel	ST		1
Tradescantia bracteata	Prairie spiderwort	ST		3
Triglochin maritimum	Common bog arrow grass	ST		1
Triglochin palustris	Slender bog arrow grass	ST		2
Isoetes butleri	Quillwort	SE		1
Lycopodium clavatum	Running pine	SE		1
Lycopodium dendroideum	Ground pine	SE		2
Thelypteris phegopteris	Long beech fern	SE		1

Table 13. Habitat needs of faunal threatened or endangered species known to occur in the CREP floodplain.

Species Common Name	General Habitat Needs	Specific Habitat Needs
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
Least Bittern	wetland	shallow freshwater lakes and marshes
Black Tern	wetland, aquatic	freshwater marshes and shallow ponds and lakes
Black-crowned Night-heron	wetland, forest, aquatic	bottomland forest
Bald Eagle	forest, wetland, aquatic	undisturbed areas near large rivers and lakes
Red-shouldered Hawk	forest, wetland	moist and riparian forests including wooded swamps
Common Moorhen	wetland, aquatic	freshwater marshes, canals, quiet rivers, lakes and ponds with emergent aquatic vegetation
Sandhill Crane	wetland, prairie	large undisturbed freshwater marshes and prairie ponds
Brown Creeper	forest, wetland	deciduous and mixed woodlands, cypress swamps and floodplain forests
Bewick's Wren	forest, savanna	thickets, brushy areas, hedgerows and thickets in farming country, and open and riparian woodlands
Yellow-headed Blackbird	wetland	moderately dense stand of cattails and bulrushes with interspersed open water for nesting
Indiana Bat	forest, wetland, aquatic, cave	winter habitat, caves and mines, summer habitat includes a variety of wooded and riparian settings
Blanding's Turtle	wetland, aquatic	prairie marshes, ponds, swamps, bogs, shallow slow-moving rivers, oxbows, and pools adjacent to rivers
Illinois Mud Turtle	prairie, savanna, wetland, aquatic	sand areas that are interspersed with semi-permanent or permanent ponds and sloughs
Regal Fritillary	prairie	tallgrass prairies, wet meadows, and wet pastures

11. Native Fish and Mussel Stocks (Goal 4)

Preliminary Data Analysis

Fish

With only two years of data, no inferences can be drawn regarding the effectiveness of practices, however some interesting, initial findings are worth noting. The following discussion is a brief overview of possible analyses for future reports.

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 (DJJB-04) in 1998, Central stone roller were very abundant (324/hour) whereas in 1999 only 47/hour were collected (Table 15). Similar differences can be observed among years, within each station, especially for minnow species such as bluntness minnow, striped shiner and sand shiner. While useful in corroboration with other data, this parameter exclusively is not always a reliable means of evaluating change.

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 14). Within each station, a very similar number of species was collected between 1998 and 1999 (e.g., Haw Creek D.H.-03 where 18 species were collected both years). 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.

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 index accounts for differences in fish community structure (species richness), trophic composition and fish condition & 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 14). By comparison, both North Creek watershed stations showed substantial differences in IBI among years. Factors influencing these differences are not clear. A 1995 sample collected approximately 2 miles downstream of the Pilot Watershed station achieved an IBI score of 50 and two other stations on North Creek (DJJB-02 and DJJB-03) attained scores of 50 and 52, respectively. More samples should provide a better perspective on the condition of these stations and variability of the data.

Table 14. Species richness and Index of Biotic Integrity for sample from Court Creek and Haw Creek, Knox County, Illinois.

	Court Creek Lower (1998)	**North Creek Upper** (1998)	**North Creek Upper** (1999)	**Haw Creek Lower** (1998)	**Haw Creek Lower** (1999)	**Haw Creek Upper** (1998)	**Haw Creek Upper** (1999)
Total number of species	**26**	**22**	**22**	**23**	**21**	**18**	**18**
Index of Biotic Integrity (out of possible 60)	**50**	**42**	**50**	**50**	**50**	**40**	**40**

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) project-specific sampling.

Table 15. Fish species and catch per effort for samples collected in CREP area (Court Creek and Haw Creek).

	1998 Court Creek	1998 North Creek	1999 North Creek	1998 Haw Creek	1999 Haw Creek	1998 Haw Creek	1999 Haw Creek
Station Code	DJJ-04	DJJB-04	DJJB-04	DJH-04	DJH-04	DJH-03	D.H.-03
Sampling Effort (Minutes)	**65**	**54**	**42**	**46**	**46**	**46**	**40**
Common Name	Pilot	Pilot	Pilot	Reference	Reference	Reference	Reference
Carp	1.8						
Golden shiner						2.6	
Creek chub	21.2	98.9	12.9	19.6		92.6	37.5
Hornyhead chub	2.8	2.2		28.7	8.6	20.9	12.0
Central stone roller	39.7	324.4	47.1	1.3		9.1	4.5
Suckermouth minnow	18.5	17.8	10.0	35.2	10.0	2.6	4.5
Blacknose dace	21.2	21.1	12.9	11.7	2.9		1.5
Striped shiner		203.3	2.9			28.7	9.0
Redfin shiner		10.0					
Red shiner	1111.4	83.3	450.0	254.3	272.9	92.6	69.0
Fathead minnow	2.8			1.3	1.4		1.5
Bluntness minnow	599.1	255.6	44.3	326.1	44.3	109.6	84.0
Bigmouth shiner	75.7	55.6	34.3	9.1			3.0
Sand shiner	423.7	115.6	282.9	191.7	58.6	41.7	43.5
Quillback	21.2	3.3	10.0	6.5			
River carpsucker	11.1		2.9		1.4		
Highfin carpsucker			1.4				
White sucker	0.9	114.4	21.4	10.4	5.7	70.4	58.5
Northern hog sucker	10.2	1.1		2.6	4.3		
Shorthead redhorse	5.5			14.3			
Golden redhorse	46.2	36.7	40.0	23.5	12.9	22.2	13.5
Silver redhorse				5.2	1.4		
Channel catfish	36.0			18.3	15.7		
Yellow bullhead		11.1	1.4	2.6	4.3	2.6	1.5
Black bullhead						1.3	
Flathead catfish			2.9		5.7		
Stonecat	0.9	18.9	11.4	19.6	22.9	1.3	6.0
Largemouth bass	0.9	4.4	4.3	6.5	2.9	23.5	6.0
Smallmouth bass	5.5	33.3	11.4	1.3			
Green sunfish	5.5		2.9	15.7	10.0	2.6	
Bluegill	9.2	8.9	15.7	3.9	5.7	3.9	3.0
Slenderhead darter	1.8				4.3		3.0
Johnny darter	6.5	44.4	1.4		1.4	6.5	
Orangethroat darter	0.9	53.3					
Catch per effort (number/hour)	**2480.3**	**1517.8**	**1024.3**	**1009.6**	**497.1**	**534.8**	**361.5**

Note: 1999 Court Creek sample data are still being reviewed

12. Assessment Conclusions

At this early point in the assessment of the Illinois CREP, it is difficult to provide any firm recommendations on programmatic changes. However, modeling suggests that highly erodible lands should be given additional emphasis if surface erosion is a major driving factor in the program. It must be noted that all CREP modeling efforts are considered preliminary and extensive effort will be dedicated to enhancing, calibrating and validating these models in the next year. In particular, improved data on topography, land cover, soils and stream network hydrography will add to the realism of the models. Current gaging of the Court Creek watershed will provide high quality data on flow, sediments and nutrients for calibration of the models. Finally, enhancements to the models that incorporate stream channel and stream bank erosion will better reflect the sediment sources in the CREP areas. In combination, these improvements should lead to models that will help us to better understand the actions of CREP on flow and nutrient and sediment reduction. In addition, the recent expansion of the CREP area to the Sangamon River basin will open up new assessment opportunities with nearly a decade of background data in the Lake Decatur and Big Ditch watersheds.

Without a doubt, CREP has had a significant impact on habitat with over 55,000 acres restored to some form of wildlife usable cover, much of this in highly valuable wetlands. It is also known that these wetlands and floodplain habitats are used by a wide variety of state-threatened and endangered species. While current data collection efforts will be insufficient to document population changes, it is expected that species - habitat models will be useful in understanding the population responses to CREP.

Aquatic communities (fish and invertebrates) are also expected to respond to the land use changes due to CREP. Fortunately, more quantitative data exists and is being collected to document this response but it is still very early in the program for such changes to occur.

Underlying the entire CREP assessment effort is the need to develop a more comprehensive mapping program to document exact locations and types of habitat being restored. This will be critical to the assessment of species and population response and will also provide an invaluable tool for future monitoring of easement contracts by the SWCD's and the state. We hope to secure funding to expand CREP mapping eventually to all counties with eligible land and to develop the local infrastructure, training, and support to make mapping of conservation practices a routine operation for all partner agencies.

CREP will have a significant impact on the Illinois landscape for a state with limited wildlife habitat and struggling floodplain river systems. The program offers a long-term solution to move natural resource restoration forward. As the CREP assessment effort matures, we envision being able to better document this response and to provide clear guidance to the CREP advisory committee on ways to improve the already highly-successful program.

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